Broadband in Oregon

A Report of the

Oregon Broadband Advisory Council

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House Sustainability and Economic Development Committee

for

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Executive Summary

The Oregon Broadband Advisory Council and the Broadband Advisory Council Fund were created in the 2009 Legislative session with the passage of House Bill 3158, co-authored by Representative J Smith, Representative Clem, Representative Dembrow, Representative Stiegler and Senator Morrisette, to help ensure the implementation of statewide broadband strategies.

The mission of the council is to encourage coordination and collaboration between organizations and economic sectors to leverage the development and utilization of broadband for education, workforce development, government and healthcare, and to promote broadband adoption by citizens and communities. The council members represent Oregon's cities, counties, telecommunications service providers, tribes, educators, economic development organizations, public safety agencies, healthcare providers, e-government, the Public Utility Commission, the State House of Representatives and the State Senate. Members of the Council were appointed by the Governor, the Speaker of the House and the President of the Senate.

This is a report to the Seventy-sixth Legislative Assembly on the affordability and accessibility of broadband technology in all areas of the state and on the extent of broadband technology use in healthcare, energy management, education and government.

Broadband services are widely available at competitive prices throughout the state. Oregon is benefiting from significant infrastructure improvements due to the forward-looking actions of the state's public and private sectors with the construction of fiber networks, fiber-coaxial cable networks, wireless networks and enhancements to legacy twisted-pair copper networks. Though broadband is available to 70.1 percent of the state's homes (U.S. Department of Commerce, 2010), it is not ubiquitously available across the state. There are business locations, residences and communities spread throughout the state with limited or no service available. In the next few years, Oregon will benefit from significant new broadband infrastructure and adoption programs financed through grants and loans awarded from American Recovery and Reinvestment Act of 2009 (ARRA) funded broadband programs (See Appendix I).

There are multiple initiatives in the state that demonstrate the adoption and utilization of broadband for telehealth and telemedicine applications. These initiatives seek to expand the availability and delivery of clinical services via telemedicine, expand insurance coverage for these clinical services, allow for remote health monitoring for patients in their homes (or skilled nursing facility), and to create a statewide system for electronic health information exchange for the benefit of patients and healthcare providers.

There are also initiatives underway in Oregon that demonstrate the adoption and utilization of broadband for energy management applications. Broadband technologies are being utilized to varying degrees by Oregon's electric and gas utilities for energy management applications. Smart grid technologies are being developed and tested to improve energy distribution and management systems, and broadband communications is an essential component.

Broadband is being used to varying degrees in K-12, community colleges, and four-year colleges and universities throughout the state for education delivery and administration. Broadband has tremendous potential to improve education delivery and student achievement.

Oregon state, local and tribal governments use broadband for administration, communications, and the e-government applications. The extent of use varies with government institutions and the availability of broadband services and expertise.

There are many opportunities for collaboration between organizations and economic sectors to share information, strategies, experiences and results. There is also a significant need for a broadband needs analysis and the continued development of local and statewide strategies to increase and accelerate the deployment and adoption of broadband in Oregon.

Broadband in Oregon: A Background

Broadband has long been recognized as an important public policy issue in Oregon dating back to Governor Robert's *Task Force on Telecommunications* in 1991, the *Oregon Internet Commission* in 1999, the *Oregon Telecommunications Coordinating Council* from 2001-2009 and now the *Oregon Broadband Advisory Council* in 2010.

Broadband renewed its position as a prominent national public policy issue and as a topic of interest for Oregon with the passage of American Recovery and Reinvestment Act of 2009 (ARRA) and the allocation of $7.2 billion in federal competitive stimulus funds for broadband infrastructure, utilization and mapping.

> *"President Obama believes that all Americans should have access to broadband and the transformative opportunities it affords. Broadband services allow individuals to access new career and educational opportunities. They help businesses reach new markets and improve efficiency. They support struggling communities that seek to attract new industries. And they enhance the government's capacity to deliver critical services."*
>
> *From: Recovery Act Investments in Broadband*
> *National Economic Council, Executive Office of the President*
> *December 2009*

Oregon based projects received over $52 million in federal loan and grant funding awards (see Appendix I). These infrastructure and broadband adoption projects will be implemented over the next three years. Opportunities for federal funding of additional broadband projects under other programs are available.

All states, including Oregon, are now implementing federally funded mapping projects to determine broadband availability down to the census block level. Data is currently being collected from broadband service providers and the public. An on-line Oregon interactive

broadband map is being developed and will be available early next year, and a national broadband map is expected to be available in March of 2011.

The prominence of broadband as a public policy issue was reinforced with the Federal Communication Commission's release of a National Broadband Plan (NBP) in March of 2010. This is a comprehensive plan that acknowledges and documents the importance of broadband to the nation and focuses on establishing broadband policy, standards and ambitious goals including a reallocation of the Universal Service Fund to broadband infrastructure. The NBP also proposes two goals for broadband access to be reached by 2020: a "universalization target of 4 Mbps (megabits per second) download and 1 Mbps upload," as well as a goal that "100 million U.S. homes should have affordable access to actual download speeds of at least 100 Mbps and actual upload speeds of at least 50 Mbps."

The perceived value of broadband has also changed dramatically in recent years with the growth and development of the Internet and the growth of the information, communication and entertainment services that may be delivered over Internet Protocol (IP) networks. The Internet is emerging as *the* global platform for communication, business, government, education, information storage and distribution, and entertainment. Competitive high-speed access to the Internet and telecommunications networks is increasingly viewed as essential for institutions, businesses and individuals.

Broadband is a general term used to represent a wide range of telecommunications technologies and services which utilize a faster data transmission rate than that available over the standard voice grade telephone line, which is 56 Kbps and usually less. Broadband is also widely referred to as "high-speed" Internet access service.

Until 2008, the FCC's official definition of broadband was a transport service offering a minimum data transmission rate of 200 Kbps in one direction. That year, the FCC established a set of Broadband Tiers:

Tier	***Rate***
1	200 Kbps up to 768 Kbps
2	768 Kbps to 1.5 Mbps
3	1.5 Mbps to < 3.0 Mbps
4	3.0 Mbps to < 6.0 Mbps
5	6.0 Mbps to < 10.0 Mbps
6	10.0 Mbps to < 25.0 Mbps
7	25.0 Mbps but < 100.0 Mbps
8	100.0 Mbps and beyond

FCC Broadband Service Speed Tiers

Tier 1 is characterized as "First Generation Data." 768 Kbps is now the minimum data transmission rate for "Basic Broadband." Tiers 3 through 8 reflect the range of service speeds available and expected to become available from providers.

In its National Broadband Plan, the FCC proposes a goal that every household and business location in America should have access to affordable broadband service with actual download speeds of at least 4 million bits per second (Mbps) and actual upload speeds of at least 1 Mbps with the further recommendation that the FCC review and reset this target every four years.

Many different technologies are employed to deliver broadband services. The following are common broadband service technologies currently in use in Oregon.

- Digital Subscriber Line (DSL): The term DSL is used, generally, to refer to any subscriber line that provides digital network connectivity, but it also refers to a specific transmission technology that uses the same analog network local loop that we have been using for plain old voice telephone service for decades to deliver broadband Internet access.

- Cable-Modem: Cable TV networks began as one-way broadcast distribution networks carrying video programming. Cable companies have been upgrading their networks and most are now hybrid fiber-coax networks that support two-way data communications for digital services including voice and high-speed Internet access.

- Wireless: Third Generation (3G) cellular, WiFi and satellite technologies are being used to provide a wide range of fixed-location and mobile wireless Internet access services. Fourth Generation (4G) cellular and WiMAX technologies are also now being used. Some areas of the state continue to be served by earlier generations of wireless technologies over licensed and unlicensed frequencies.

- Fiber-to-the-Premises (FTTP): Optic glass fibers, first used in backbone networks, are increasingly being used in distribution networks that extend all the way to the homes and offices of end users.

These service technologies range in transmission performance from 200 Kbps up to 50 Mbps and beyond. Oregon is benefiting from significant infrastructure improvements due to the forward-looking actions of the state's public and private sectors with the construction of fiber networks, fiber-coaxial cable networks, wireless networks and enhancements to legacy twisted-pair copper networks.

Broadband services in Oregon are available from a wide mix of service providers including franchised telephone companies, franchised cable companies, competitive access providers, fixed and mobile wireless providers, municipal and consortia providers, and satellite service providers.

The telecommunications landscape in Oregon is currently in a period of transition with changes in the ownership of the state's two largest franchised telephone companies, Verizon and Qwest. Frontier Communications took ownership of Verizon's wireline assets and business in Oregon on July 1, 2010 and has committed to improving the availability of broadband in its service territories. Frontier has committed to spending $25 million for broadband deployment and enhancement in Oregon over the next three years and filing annual reports with the Oregon Public Utility Commission detailing broadband-related service quality and customer complaint information. CenturyTel dba CenturyLink is in the process of purchasing Qwest with the transaction to be completed in the summer of 2011 following approvals from fourteen public utility commissions and the Federal Communications Commission.

Broadband is widely viewed as essential infrastructure. There is significant private and public sector broadband activity in progress around the state and the nation.

Broadband Accessibility in Oregon

Oregon is highly ranked in service availability for a large western state with a relatively small population, but broadband is not ubiquitously available across the state. There are business locations, residences and communities with limited or no terrestrial service available.

The *2008 Oregon Population Survey* conducted by the Oregon Progress Board reported that 79 percent of all Oregon households have personal computers, 74 percent have Internet access, and 61 percent have high-speed Internet access noting that high-speed Internet access has doubled in Oregon since 2004.

The U.S. Department of Commerce reported in its February 2010 publication, *"Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access,"* that fast Internet access is available to 70.1 percent of the state's homes and ranked Oregon 8th out of the fifty states for broadband reach.

The FCC in its National Broadband Plan notes that 96 percent of all households have two or fewer providers for wired broadband service available. The Public Utility Commission's "Survey Report on the Demand, Usage, Supply and Pricing of Broadband Services in Oregon" reports that, in Oregon, Cable-Modem service represents 55 percent market share of broadband services and that Digital Subscriber Line service represents 35 percent market share of broadband services with the remaining 10 percent distributed among other vendors and technologies.

The 2009 Pew Broadband Adoption Study found, generally, that relevance, price, availability, and usability were the main reasons cited for not using broadband at home. These findings were corroborated with local data in a 2010 study, "The Mt. Hood Cable Regulatory Commission Community Communications Technology Needs Ascertainment," commissioned by the Mt. Hood Cable Regulatory Commission.

Broadband Affordability in Oregon

Broadband services are available in Oregon at competitive price points, though prices vary by service area. A listing of current Oregon broadband service provider pricing follows. Information was collected from service provider websites.

DSL Service Provider	Monthly Rate
Canby Telecom [www.canbytel.com] 256 Kbps upstream, 1. Mbps downstream (faster speeds available)	$24.95
CenturyLink [www.centurylink.com] Up to 768 Kbps downstream (faster speeds available)	$29.95
Citizens Telecom dba Frontier Communications of OR [www.frontier.com] 384 Kbps upstream, 1 Mbps downstream (faster speeds available)	$19.99
Eagle Telephone System [www.eagletelephone.com] Up to 768 Kbps downstream	$79.95
Frontier Communications High Speed Internet [www.frontier.com] 384 Kbps upstream, 1 Mbps downstream (faster speeds available)	$19.95
Helix Telephone Company [www.helixtel.com] 3 Mbps downstream (other speeds are available)	$30.00
Molalla Communications Company [www.mololla.com] 512 Kbps upstream, 3 Mbps downstream (faster speeds available)	$29.95
Monroe Telephone Company [www.monroetel.com] 512 Kbps upstream, 768 Kbps downstream	$34.95
Mt. Angel Telephone [www.mtangel.net] 1 Mbps upstream, 3 Mbps downstream (faster speeds available)	$39.95
Nehalem Telecommunications [www.nehalemtel.com] 384 Kbps upstream, 1 Mbps downstream	$29.95
Oregon Telephone Corporation [www.ortelco.net] Up to 1 Mbps downstream	$49.95
Oregon-Idaho Utilities (208 461-7802)	$31.36
People's Telephone Company [http://ptc-web.com] 512 Kbps upstream, 1.5 Mbps downstream	$29.95

Pine Telephone Company [www.pinetel.com] 512 Kbps upstream, 1.5 Mbps downstream	$37.95
Pioneer Telephone Company [www.pioneertelephonecoop.com] Up to 1.5 Mbps downstream	$44.95
Qwest Connect [www.qwest.com] Up to 1.5 Mbps downstream (faster speeds available)	$30.00
Reliance Connects (formerly Cascade Utilities) [www.relianceconnects.com] 385 Kbps upstream, 1 Mbps downstream	$42.95
Roome Telecommunications [www.rtinet.com] 256 Kbps upstream, 256 Kbps downstream	$34.75
Scio Mutual Telephone [www.smt-net.com] Up to 3 Mbps downstream	$48.95
St Paul Cooperative Telephone Association [www.stpaultel.com] Up to 1.5 Mbps downstream	$39.99
Stayton Cooperative Telephone Company [www.sctcweb.com] 512 Kbps upstream, 1.5 Mbps downstream	$29.95
TDS Telecom [www.tdstelecom.com] 1.5 Mbps downstream (faster speeds available)	$29.95

Cable Modem Service Provider	Monthly Rate
Bend Broadband [www.bendbroadband.com] 1 Mbps upstream, 8 Mbps downstream (faster speeds available)	$26.95
Broadstripe [www.mdm.net] Up to 1 Mbps downstream (faster speeds available)	$79.99
Charter Communications [www.charter.com] Up to 1 Mbps (faster speeds available)	$19.99
Comcast [www.comcast.com] Up to 1 Mbps (faster speeds available)	$34.95
Crestview Cable Communications [www.crestviewcable.com] 541 Kbps upstream, 1.5 Mbps downstream	$27.95
Wave Broadband [www.wbcable.com] 512 Kbps upstream, 3 Mbps downstream (faster speeds available)	$39.95

Mobile Wireless Internet Access (3G)	Monthly Rate
AT&T Wireless [www.ATTwireless.com] 700 Kbps to 1.7 Mbps for downloads, 500 Kbps to 1.2 Mbps for upload Data Connect - 200 MB	$35.00
Verizon Wireless [www.verizonwireless.com] Mobile Broadband Plan 250 MB	$39.99
Sprint / Nextel [www.sprint.com] 3G Mobile Broadband 5GB	$59.99

Mobile Wireless Internet Access (3.5G)	Monthly Rate
Bend Broadband (download speed of 12 Mbps under optimal conditions. Average download speeds to a static USB device will vary based on the user's location in the network and the level of traffic occurring on the network. Speeds of 6-8 Mbps are typical for areas with good signal strength during non-peak hours. Mobile Broadband users traveling in a vehicle can expect download speeds between 1-6 Mbps (with good signal strength during non-peak hours). 2 GB Plan with Mobile Service only (other plans available).	$34.99

Mobile Wireless Internet Access (4G)	Monthly Rate
Clear iSpot on the Go, 1 Mbps upstream – 6 Mbps downstream	$25.00
Sprint / Nextel [www.sprint.com] 4G Mobile Broadband – Unlimited use	$49.99

Fixed Wireless Internet Access	Monthly Rate
Douglas Fastnet [www.douglasfastnet.net] 2 Mbps downstream Wireless Broadband Access Service	$40.00
Eastern Oregon Network, Inc. [www.eoni.com] 256 Kbps upstream, 768 Kbps downstream service (faster speed available).	$44.95
Eastern Oregon Telecom [www.eotnet.net] 768 Kbps downstream, 512 Kbps upstream (Other speeds available)	$69.90

FireServe Wireless Broadband [www.fireserve.com] 5 Mbps downstream (faster speed available) Prices starting at:	$20.00
Freewire Broadband [www.freewire.com] 3 Mbps x 3Mbps Symmetrical Ethernet (faster speeds available)	$350.00
Goose Lake Computing [www.gooselake.com] Up to 4.5 Mbps downstream service	$20.00
GorgeNet [www.gorge.net] 384 Kbps upstream, 1.5 Mbps downstream (faster speed available).	$39.95
Oregon FAST.net [www.oregonfast.net] 10 Mbps downstream	$39.99
SandyNet [www.sandynet.org] 2 Mbps upstream, 4 Mbps downstream In-city WiFi Price	$19.95
SawNet [www.saw.net] 256 Kbps upstream, 256 Kbps downstream (faster speeds available).	$49.00

<u>Municipal / Consortia / Public-Private Partnership Providers</u>

Ashland Fiber Network [www.ashlandfiber.net] 256 Kbps upstream, 1.5 Mbps downstream "AFN Silver" Open access network with multiple Internet Service Providers (Other speeds and ISPs available)	$36.99
Comspan [www.mycomspan.com] 7 Mbps upstream, 7 Mbps downstream Includes phone or TV service	$69.99
Eastern Oregon Telecom [www.eotnet.net] 1.5 Mbps downstream (faster speeds available)	$34.90
MINET (Monmouth-Independence Network) [www.minetfiber.com] 1.5 Mbps upstream, 5Mbps downstream (Faster speeds available)	$35.00
Q-Life [qlife.net] Q-Life is a middle mile transport provider with independent ISPs providing end-user services. 192 Kbps upstream, 1.5 Mbps downstream (Faster speeds available)	$39.95

Facilities based Competitive Access Providers

CoastCom [www.coastcom.net] Business DSL Service – 2 Mbps upstream, 16 Mbps downstream (One year contract term)	$79.00
Integra Telecom [www.integratelecom.com] 768 Kbps upstream, 1.5 Mbps downstream DSL (Other speeds and Internet access services are available)	$34.95
LS Networks [www.lsnetworks.net] 5 Mbps IP symmetrical Business Internet Access Service with SLA in Portland (Monthly rate does not include Access Loop, other access services available, services available in other areas)	$350.00
TW Telecom [www.twtelecom.com] 1.5 Mbps downstream T1 1.5 Mbps Direct Internet Access Service – On-Net 36 month contract (Other speeds and Internet access services are available)	$240.00

Satellite Internet Access	Monthly Rate
HughesNet [www.hughesnet.com] 256 Kbps upstream, 1 Mbps downstream (faster speeds available)	$59.99
WildBlue [www.wildblue.com] 200 Kbps upstream, 1 Mbps downstream (faster speeds available)	$69.95

Monthly Rates are for base level services. It should be noted that promotional discounted pricing is also widely available from all service providers.

Broadband Performance

Net Index by Ookla, a provider of global broadband speed testing through speedtest.net and pingtest.net, reports the following average download speeds for forty-five selected Oregon cities for the period of April 9, 2008 - October 9, 2010. The cities are also ranked by download speed. The Ookla speed tests may include institutional and commercial users which could impact the reported speeds. At least 1,000 unique IP addresses were included for each city over the reporting period.

1. Corvallis	18.21 Mbps	24. Gresham	10.22 Mbps
2. Albany	18.17 Mbps	25. Oregon City	10.21 Mbps
3. Salem	16.87 Mbps	26. Woodburn	10.21 Mbps
4. Eugene	16.78 Mbps	27. Redmond	10.06 Mbps
5. Wilsonville	15.86 Mbps	28. Portland	10.05 Mbps
6. Astoria	15.27 Mbps	29. Canby	9.95 Mbps
7. Hillsboro	14.37 Mbps	30. Medford	9.94 Mbps
8. Lebanon	14.29 Mbps	31. Happy Valley	9.40 Mbps
9. Newberg	14.12 Mbps	32. Roseburg	9.12 Mbps
10. Tualatin	14.12 Mbps	33. Sherwood	8.84 Mbps
11. West Linn	14.08 Mbps	34. Sandy	8.21 Mbps
12. Forest Grove	13.91 Mbps	35. Bend	8.06 Mbps
13. Lake Oswego	13.65 Mbps	36. Central Point	7.57 Mbps
14. Pendleton	13.62 Mbps	37. Newport	7.50 Mbps
15. McMinnville	12.98 Mbps	38. Silverton	6.76 Mbps
16. Lincoln City	12.72 Mbps	39. Ashland	6.44 Mbps
17. Clackamas	12.67 Mbps	40. Molalla	6.09 Mbps
18. Springfield	12.52 Mbps	41. La Grande	5.95 Mbps
19. Coos Bay	11.91 Mbps	42. Hood River	4.16 Mbps
20. Grants Pass	11.81 Mbps	43. Estacada	3.62 Mbps
21. Beaverton	11.67 Mbps	44. Cottage Grove	2.78 Mbps
22. Klamath Falls	11.06 Mbps	45. Cave Junction	1.34 Mbps
23. The Dalles	10.60 Mbps		

[Source: Net Index by Ookla, http://www.netindex.com/download/3,95/Oregon/]

For additional reference, according to *Telecompetitor*, the United States has a national index of 10.16 Mbps broadband download speed ranking it 29th in the world. The current leading countries ranked by broadband download speeds are South Korea at 36.5 Mbps, Latvia at 23.3 Mbps, the Republic of Moldova at 21.5 Mbps, Japan at 20.3 Mbps and Sweden at 19.8 Mbps (http://www.telecompetitor.com/new-broadband-speed-test-data-available/).

Many of Oregon's global competitors have already met universal broadband access goals or expect to meet them by the end of 2010. The United States, once a leader in broadband penetration, has fallen behind and is currently ranked 15th by the Organization for Economic Co-operation and Development (OECD). The OECD ranks the United States 19th in terms of

average advertised download speeds. The problems are not limited to speed and adoption. Affordability is also a major differentiator from other countries where prices are far less for better broadband connections than are widely available in the United States.

Broadband Trends

The *Survey Report on the Demand, Usage, Supply and Pricing of Broadband Services in Oregon* by the Oregon Public Utility Commission released in January 2007 reported that the number of high-speed lines in the state increased "ten-fold" since the year 2000 and that cable Internet access services comprise more than half of the current supply of broadband in the state at 55 percent, asymmetric DSL is second at 35 percent. Symmetric DSL, traditional wireline, fiber, satellite, mobile wireless and fixed wireless technologies are also used to provide service in the state (http://www.oregon.gov/PUC/telecom/statusbroadband.pdf).

As is true with other information technology products and services, the trend for broadband Internet access services appears to be increasing performance and decreasing price per bit transmitted. Broadband service availability in Oregon continues to expand and broadband service speeds continue to increase.

Broadband Technology Adoption and Utilization in Oregon

Telecommunications is essential infrastructure: "The improvement, expansion and new construction of the state's sewage treatment works, water supply works, *telecommunications infrastructure*, roads and public transportation provide the basic framework for continuing and expanding economic activity in this state, thereby providing jobs and economic opportunity for the people of Oregon" [ORS 285B.413].

But infrastructure only has value if it is put to use.

Telehealth

Broadband access is currently being used in Oregon to improve healthcare outcomes. Broadband facilitates delivery of healthcare by extending the reach of a limited resource of providers, thus increasing access to care geographically and temporally, in both acute care and chronic care situations. Broadband connectivity also assists electronic health record data handling thus enhancing care coordination. For this report, we have focused on the current status of broadband utilization in the state, highlighting the ongoing infrastructure build being spearheaded by the Oregon Health Network (OHN), efforts at improving health information exchange (HIE), existing uses of telemedicine (including recent legislative efforts to ensure physician reimbursement), and finally, a brief discussion of a potentially transformative delivery model that uses broadband to allow for in-home health monitoring.

Such uses of broadband are focused on improving the overall health of Americans while at the same time reducing cost. The FCC's National Broadband Plan[1] identifies many of the opportunities and ongoing cost issues: "Health care already accounts for 17 percent of U.S. gross domestic product (GDP); by 2020, it will top 20 percent. America is aging—by 2040, there will be twice as many Americans older than 65 as there are today—and health care costs will likely increase as a consequence." Despite these rising costs, the overall health of Americans is lagging behind the rest of the world in many areas. "In addition, the United States has a health care supply problem. The country is expected to have a shortage of tens of thousands of physicians by 2020. An aging physician workforce that is nearing retirement and working fewer hours exacerbates the situation. Supply will be further strained if previously uninsured Americans enter the care delivery system." Broadband offers many opportunities, but alone "is not a panacea. However, there is a developing set of broadband-enabled solutions that can play an important role in the transformation required to address these issues. These solutions, usually grouped under the name health information technology (IT), offer the potential to improve health care outcomes while simultaneously controlling costs and extending the reach of the limited pool of health care professionals. Furthermore, as a major area of innovation and entrepreneurial activity, the health IT industry can serve as an engine for job creation and global competitiveness."

We agree especially with the FCC assessment that "in its traditional role, the FCC would evaluate this challenge primarily through a network connectivity perspective. However, it is the ecosystem of networks, applications, devices and individual actions that drives value, not just the network itself. It is imperative to focus on adoption challenges, and specifically the government decisions that influence the system in which private actors operate, if America is to realize the enormous potential of broadband-enabled health IT." Further successful build out in Oregon is dependent not only on the efforts of OHN to create the infrastructure, but as importantly on increasing the participation of the end users, both the health care providers and patients.

Oregon's Healthcare Broadband Infrastructure

The Oregon Health Network (OHN) is a non-profit organization chartered to build the state's first state-wide broadband telehealth network that will ultimately connect all of Oregon's hospitals, clinics, long-term care facilities, community colleges, payers, pharmacies and government agencies together through a reliable high-speed, high-quality network.

In late 2006, the Federal Communications Commission announced its plans to establish the Rural Healthcare Pilot Program. This program was designed to deploy a regional broadband network infrastructure connecting various health centers across the country, and would fund up to 85 percent of the infrastructure design, construction and ongoing costs for the 5-year duration of the program. In response to this opportunity, visionary leaders from Oregon's existing telehealth community (including the Telehealth Alliance of Oregon and the Oregon Association of Hospitals and Health Systems) collaborated in the design of an organization capable of expanding the telehealth network throughout the state.

[1] http://www.broadband.gov/plan/10-healthcare

With support from Governor Kulongoski, the Legislative Assembly and Oregon's Congressional Delegation, the Oregon Health Network submitted a proposal to the FCC's Rural Health Care Pilot Program in 2007. By November of the same year, the FCC had selected its recipients for the program and allocated $417 million over five years to 69 applicants. As the fifth largest award recipient, principal funding for building OHN's broadband infrastructure comes from the unprecedented $20.2 million subsidy. This 5-year program pays 85 percent of all installation and service fees. OHN is paying the 15 percent match for the non-recurring (equaling 100 percent of covered costs for participating providers) and its participants who are then responsible for the remaining 15 percent in matching funds for the monthly recurring costs. OHN's funds raised to date are coming from multiple sources, including the State of Oregon, community colleges, and private foundations looking to build a strong, healthy Oregon.

As of October 7, 2010, the following member sites are either actively being monitored by the OHN Network Operations Center (NOC) or have received their formal Funding Commitment Letter by the FCC and are awaiting final installation and NOC turn-up. In total, 66 sites are actively participating with OHN, with 33 sites actively being monitored by the NOC.

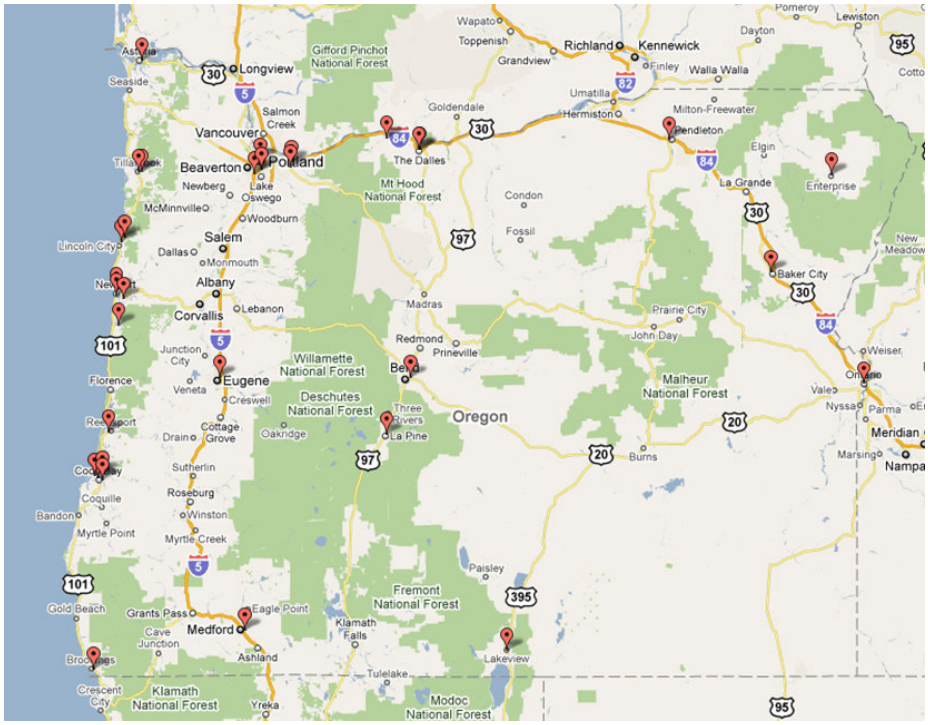
FCC Funding Commitment Letter Sites

TYPE	NAME	CITY
CC	*Blue Mountain Community College (Baker City)	Baker City
CC	*Blue Mountain Community College (Pendleton)	Pendleton
CC	Clackamas Community College (Harmony Campus)	Clackamas
CC	Linn Benton Community College (East Linn Center)	Lebanon
CC	*Mt. Hood Community College	Gresham
CC	*Mt. Hood Community College (Bruning Center for Allied Health)	Gresham
CC	*Oregon Coast Community College (Lincoln City)	Lincoln City
CC	*Oregon Coast Community College (Newport)	Newport
CC	*Oregon Coast Community College (Waldport)	Waldport
CC	*Southwestern Oregon Community College (Brookings)	Brookings
CC	*Southwestern Oregon Community College (Main Campus)	Coos Bay
CC	*Tillamook Bay Community College	Tillamook
CC	*Treasure Valley Community College	Ontario
H	*Asante Health System (Rogue Valley Medical Center)	Medford
H	*Bay Area Hospital	Coos Bay
H	*Columbia Memorial Hospital	Astoria
H	*Lake District Hospital	Lakeview
H	*Legacy Health System	Portland
H	*Lower Umpqua Hospital	Reedsport
H	Mid-Columbia Medical Center	The Dalles

H	*Northwest Medical Foundation of Tillamook	Tillamook
H	Oregon Health & Science University	Portland
H	*PeaceHealth Network Interconnect	Eugene
H	*Providence Health and Services Data Center	Tigard
H	Salem Hospital	Salem
H	Samaritan Albany General Hospital	Albany
H	Samaritan North Lincoln Hospital	Lincoln City
H	Samaritan Pacific Communities Hospital	Newport
H	*St. Charles Medical Center	Bend
H	Tuality Forest Grove Hospital	Forest Grove
H	Tuality Health Care: Health Education Center	Forest Grove
H	West Valley Hospital	Dallas
H	*Wallowa Memorial Hospital	Enterprise
FQHC	*LaClinica del Carino Family Health Center (Hood River)	Hood River
FQHC	*LaClinica del Carino Family Health Center (The Dalles)	The Dalles
FQHC	*Lincoln Community Health Center (Lincoln City)	Lincoln City
FQHC	*Lincoln Community Health Center (Newport)	Newport
FQHC	*Lincoln County Data Center	Newport
FQHC	*LaPine Community Health Center	LaPine
FQHC	*Outside In	Portland
FQHC	Umpqua Community Health Center (Drain)	Drain
FQHC	Umpqua Community Health Center (Glide)	Glide
FQHC	Umpqua Community Health Center (Myrtle Creek)	Myrtle Creek
FQHC	Umpqua Community Health Center (Roseburg)	Roseburg
FQHC	Umpqua Community Health Center (Roseburg High School)	Roseburg
FQHC	*Waterfall Community Health Center	North Bend
RHC	*Mid-Columbia Center for Living (Tenneson)	The Dalles
RHC	Mid-Columbia Center for Living (Woods Court)	Hood River
RHC	Mid-Columbia Center for Living (Annex A)	The Dalles
RHC	North Lake Health Clinic	Christmas Valley
RHC	Samaritan Health Services Coastal Health Clinics	Lincoln City
RHC	The Rinehart Clinic	Wheeler
UC	*Bay Area Hospital Women's Imaging Center	Coos Bay
UC	Tuality Forest Grove Physical Therapy Center	Forest Grove
UC	Tuality Healthplace	Hillsboro
UC	Tuality Mountain View Medical Clinic	Forest Grove
UC	Tuality Orenco Station Medical Clinic	Hillsboro
UC	Tuality Physical Therapy Hillsboro Aquatic Center	Hillsboro
UC	Tuality Physical Therapy Bally's Fitness Center	Beaverton

UC	Tuality Urgent Care	Hillsboro
UC	Tuality Westside Medical Clinic	Hillsboro

CC=Community College; H= Hospital; FQHC=Federally Qualifying Health Center; MHC=Mental Health Clinic; RHC=Rural Health Clinic; UC=Urban Clinic. Last updated October 7, 2010. Those sites listed with an (*) above are actively on the OHN and being monitored by OHN's Network Operations Center (as shown on the below map):



OHN Network Operation Center Monitored Sites

<u>Health Information Exchange (HIE)</u>

Oregon's Strategic and Operational Plans for Health Information Exchange (HIE) were submitted to the Office of the National Coordinator (ONC) in August 2010 after being formulated under the guidance of the Health Information Technology Oversight Council (HITOC).

HITOC is a statutory body of Governor-appointed, Senate-confirmed citizens, tasked with setting goals and developing a strategic health information technology plan for the state, as well as monitoring progress in achieving those goals and providing oversight for the implementation of the plan. The HITOC is currently coordinating Oregon's public and private statewide efforts in electronic health records adoption and the eventual development of a statewide system for electronic health information exchange. The HITOC will help Oregon meet federal requirements so that providers may be eligible for millions of federal health information technology stimulus dollars. The HITOC builds on the past work of the Health Information Infrastructure Advisory Committee (HIIAC) and the Health Information Security & Privacy Collaborative (HISPC).

HITOC's submitted Strategic and Operational Plans are detailed and extensive. Links to the complete plans are provided in Appendix B.

Oregon's efforts were recently recognized when the state was presented with the Healthcare Information and Management Systems Society (HIMSS) State of the Year Award in recognition of its leadership in health information technology (HIT). The award was announced as part of the 9th Annual HIMSS Policy Summit in Washington, D.C. in July 2010.

Telemedicine

Telemedicine, the interactive delivery of health care over distance using advances in telecommunication technology (i.e. video-conferencing equipment), is a new model for care delivery that promises to increase access, improve outcomes, and reduce costs. By improving access, both geographically and temporally, telemedicine is a potentially transformative use of technology, allowing earlier involvement of specialists in acute, life-threatening situations, as well as for many other in-person health interactions that while not urgent, are not efficiently occurring, impeded by the current delivery system. Access to medically underserved areas, both rural and urban, is improved, with resultant improved outcomes and cost savings from reduced patient transports.

Current Telemedicine activities in the state are as listed below. All health systems queried also identified great interest in adding additional facilities and medical specialties in the near future.

Oregon Health & Science University

Pediatric Critical Care and Stroke Neurology to a number of hospitals listed in the map below.

OHSU Pediatric Critical Care and Stroke Sites

OHSU provides Telepsychiatry to:

- Snake River Prison, Ontario, OR
- Yellowhawk Tribal Clinic, Umatilla, OR
- Hurricane Katrina Victims in New Orleans, LA

Providence Health & Services

Telestroke to:

- Curry Hospital in Gold Beach, OR
- Providence Hood River Memorial Hospital in Hood River, OR
- Providence Medford Medical Center in Medford, OR
- Providence Newberg Medical Center in Newberg, OR
- Providence Portland Medical Center in Portland, OR
- Providence St. Vincent Medical Center in Portland, OR
- Providence Seaside Hospital in Seaside, OR

Legacy Health System

- Pediatric Critical Care and Stroke Neurology to other Legacy System facilities
- Ophthalmology as a joint venture between Legacy Good Samaritan Devers Eye Institute, Oregon Health and Science University's Prevention Research Center, the Northwest Portland Area Indian Health Board, and participating tribes. Assessing for diabetic retinopathy in Native Americans in Pendleton, OR and Wichita, KS

PeaceHealth

- Geriatric services between the Gerontology Institute in Oregon in Eugene and PeaceHealth Southeast Alaska in Ketchikan
- Telestroke, Mental Health Crisis Intervention, and outpatient Psychiatry from PeaceHealth Sacred Heart Medical Center, Eugene to Peace Harbor, Florence
- Interpretation services between PeaceHealth Oregon facilities

Grande Ronde Hospital, LaGrande

- Neonatalogy, Maternal Fetal Medicine, Perioperative Training/Interactive Surgery from St. Alphonsus, Boise, ID
- Intensive Care Consultations from Advanced ICU Care, St. Louis MO
- Cardiology from Idaho Emergency Physicians and Idaho Heart Care
- Oncology and Dermatology from Walla Walla, WA
- Foreign and Sign Language Interpretation from Portland, OR and Seattle, WA

Provider Reimbursement

Provider Reimbursement is an obvious necessity for expansion of telemedicine services beyond grant funded pilot projects. The Telehealth Alliance of Oregon (TAO) worked diligently to negotiate legislative language with a workgroup consisting of Oregon payers and other stakeholders to secure reimbursement for telemedicine services. As a result, Senate Bill 24A was introduced in the 2009 Legislative Session requiring health benefit plans to pay for services delivered by telemedicine.

A summary of Senate Bill 24A:

- Requires that all health benefit plans in Oregon reimburse providers for appropriate services that are provided through telemedicine. The Bill does not impact Medicare, Medicaid, or self-insured.
- Defines telemedicine as the use of real time two-way video communication in which the practitioner can directly assess the patient.
- Requires health benefit plan to reimburse for medically necessary, evidence-based telemedicine services if service is covered for in-person service.
- Removes the distinction between services delivered to patients in rural or urban areas.
- Allows provider fees for telemedicine services to be negotiated between payer and provider at the time the contract is negotiated.

Following passage in both houses, Governor Kulongoski signed the bill and it became effective on January 1, 2010. The workgroup has turned its efforts to developing a plan to educate payers, clinicians, and provider billing staff about the legislation and how it applies to them. Providers have just started submitting bills to payers this calendar year.

"Connected Health" – Remote Health Management

Long-term, chronic conditions create many challenges—for the patients who have them, as well as for their immediate caregivers and the healthcare professionals responsible for their care. Remote health management (RHM) connects these patients and caregivers in a new care model via broadband connectivity. Combining standard physiologic monitoring equipment with sophisticated new devices and social science informed algorithms, physicians are better able to track chronic disease progress, thereby supporting their patients earlier before conditions worsen to the extreme of needed emergent care.

Studies show that RHM provides real, measurable benefits for chronic patients and their clinical teams, as well as for the healthcare organizations that face the ever-increasing challenges of chronic care. RHM can help:

- **Reduce hospitalization and readmission rates.** RHM enables clinical staff to identify changes in patients' health before conditions become acute ("The Approaching Telehealth Revolution in Home Care." Telemedicine Information Exchange (March 2009).
- **Increase patient compliance with disease management programs.** RHM has been shown to increase patient engagement and compliance ("Connected Care: Technology-enabled Care at Home." Deloitte (March 2008).

- **Offer cost-effective extended care to more patients.** By enabling clinicians to monitor patients without in-person visits, RHM allows them to extend care to more patients, maintain consistent and frequent contact with them, and provide timely interventions. ("Instead of visiting the patient on a scheduled basis, perhaps two or three time a week, telehealth technology allows care providers to monitor the patient daily." Source: "The Approaching Telehealth Revolution in Home Care." Telemedicine Information Exchange (March 2009).

The Oregon Center for Aging and Technology (ORCATECH) is a unique academic-industry-community collaboration involving Oregon Health & Science University and companies such as Intel, Inc. and SPRY Learning Company (Portland). ORCATECH was formally established in 2004 through a National Institute on Aging Roybal Center grant to study the use of "intelligent systems" to detect aging-related changes that may impair a person's ability to live independently. ORCATECH Director Jeffrey Kaye, M.D., explains that around-the-clock, in-home assessment might one day reveal possible signs of cognitive decline, such as changes in walking speed or dressing speed. This would allow clinicians to address emerging problems earlier in the disease process than they can today. "The traditional model for studying cognitive change is to identify volunteers and follow them over time, using assessment batteries that are most often administered annually," says Dr. Kaye, who also directs the Layton Aging and Alzheimer's Disease Center at OHSU. "Typically in our field, we bring people into a clinic once or twice a year, evaluate them, and then they go home. It can take years to map the trajectory of cognitive decline, and the testing is not done in people's natural environments, so we're not seeing individuals' normal daily ups and downs."

ORCATECH studies remote health monitoring in simulated and real life settings:

- The Point of Care Laboratory is designed to simulate an apartment and is outfitted with motion sensors, a user computer and a sensor computer in addition to new technologies that are being tested. All technologies that get deployed are tested in this space prior to being released to homes of the participants.
- The Living Laboratory is a population of community-dwelling seniors who have agreed to participate on an ongoing basis in research on technology-based health monitoring, intervention, and support of independent aging. The Living Lab is used to explore technologies to support independent living, to assess new behavioral markers, and to evaluate approaches for assessing neurological and other relevant health changes.

Asante Health System was awarded a HRSA Rural Services Outreach grant in 2009, to work with home care agencies from four counties to reduce emergent care visits and to prevent unnecessary hospitalizations for patients with congestive heart failure and chronic obstructive pulmonary disease (COPD). The program is administered from Three Rivers Community Hospital in Grants Pass and has served 101 patients in the past year in Curry, Douglas, Josephine, and Siskiyou (northern CA) counties. The program provides remote monitoring including standard health measurements such as blood pressure and weight, as well as video conferencing and health coaching.

Another Oregon entity involved in RHM is the Continua Health Alliance (Beaverton, OR), a non-profit, open industry coalition of leading healthcare and technology companies joining in collaboration to improve the quality of personal healthcare. With more than 200 member companies around the world, Continua's mission is to establish a system of interoperable

personal telehealth solutions, that fosters independence and empowers people and organizations to better manage health and wellness.

Continua's objectives include:

- Developing design guidelines that will enable vendors to build interoperable sensors, home networks, telehealth platforms, and health and wellness services.
- Establishing a product certification program with a consumer-recognizable logo signifying the promise of interoperability across certified products.
- Collaborating with government regulatory agencies to provide methods for safe and effective management of diverse vendor solutions.
- Working with leaders in the health care industries to develop new ways to address the costs of providing personal telehealth systems.

These many initiatives in the state demonstrate the adoption and utilization of broadband for telehealth and telemedicine applications. The state of Oregon has made significant strides in establishing a strong broadband infrastructure for healthcare; leading the way have been the efforts of the Oregon Health Network to build the network platform, as well as a nationally recognized effort in Health Information Technology. These efforts are not complete and will continue to require ongoing investments to optimize. It is on this sound backbone that transformative healthcare models will grow, including "Connected-Health" and Telemedicine. Oregon has the infrastructure and players to lead the country in this area, as demonstrated by the national recognition and the federal dollars we've thus far been able to attract. Barriers remain but there is a huge opportunity to utilize broadband to further improve healthcare for Oregonians in a meaningful way.

<u>Barriers to Broadband Adoption in Healthcare</u>

Overall:

- Proof of concept, return on investment
- Support for operational overhead for implementation and ongoing coordination

Technology:

- Quality broadband access
- Interoperability of technology, whether telemedicine, remote health monitoring equipment, or electronic health records
- Cost of technology, again for all areas

Providers:

- Provider knowledge of, access to, and comfort with HIT and telemedicine technology
- Adequacy of provider workforce capacity (both with and without Telehealth)
- Provider reimbursement, especially with regards to rules for Medicare reimbursement which are being addressed at a federal level and Oregon Medicaid managed care plans (both of which are not addressed by SB 24)
- Sustainability and funding

Health Systems and Health Care Facilities:

- Cooperation across health systems with regards to equipment (especially with respect to Stark Law Issues) to reduce redundancy and inefficiencies as Telehealth expands
- Credentialing and Privileging, lack of uniformity across health systems within the state and evolving federal rules from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the Centers for Medicare & Medicaid Services (CMS)
- Sustainability and funding, across the spectrum from large health systems to small critical access hospitals and rural clinics

Energy Management

This section of the report summarizes actions taken to date by electric and gas utilities within Oregon to deploy broadband in Oregon. We have focused on broadband uses related to controlling "mission-critical" functions that support monitoring and managing flows of energy from where they are produced to where they are consumed. We have excluded from this report broadband applications that are not considered mission-critical, such as, office email and customer service functions. Based on our literature search, it appears that the overwhelming majority of writing on broadband deployment and Smart Grid focus on the electric sector. As a result, this report also focuses primarily on the electric sector.

We examine the topic of "Smart Grid" (SG) and the national policy objective of modernizing the electrical grid, then we address the need for Broadband in implementing SG. Summaries of the information provided by the three investor-owned electric utilities (IOUs) with service areas in Oregon: Portland General Electric, PacifiCorp, and Idaho Power Company are provided along with the information collected from the customer-owned utilities (COUs) in Oregon. Information on broadband deployment by three local natural gas distribution utilities (LDCs) with Oregon customers: Northwest Natural Gas, Avista Corporation, and Cascade Natural Gas is also provided.

There are also three appendices. Appendix C contains a summary description of each of the three IOUs and a more detailed summary of their broadband capability. Appendix D contains additional information on broadband capability for each of the reporting COUs. Appendix E contains a summary description of each of the three natural gas LDCs and a more detailed summary of their broadband capability.

<u>Smart Grid</u>

What is Smart Grid (SG)? One answer is provided by The National Institute of Standards and Technology (NIST), which defines it as the "two-way flow of electricity and information to create an automated, widely distributed energy delivery network."[2]

[2] <u>Elec. Power Res. Inst. (EPRI), Report to NIST on the Smart Grid Interoperability Standards Roadmap (2009)</u>, *available at* http://www.nist.gov/smartgrid/InterimSmartGridRoadmapNISTRestructure.pdf

A report issued by the U. S. Department of Energy titled "The Smart Grid: An Introduction"[3] (SG Report) provides a good starting point to talk about the Smart Grid and Broadband. This SG Report indicates that the National Academy of Engineering identified electrification using the power grid, as "the most significant engineering achievement of the 20th Century." Except for limited storage capabilities, this grid requires its product to be used the moment it's produced. For the most part, this system functions well, and most people don't give it a second thought. Rarely do we think about reliability when we switch on and off our lights or other electric devices.

As the SG Report suggests, hopes for SG include:

- A more affordable electric system;
- Fewer environmental impacts;
- Better electrical power reliability;
- Maintain our global competitiveness; and
- Improved integration of disbursed renewable resources with traditional central station energy resources.

<u>Increased customer control over the amount and timing of the electrical use.</u>
We have become complacent regarding the reliability of our electric system because outages occur infrequently. Yet as time passes, the electrical facilities used to deliver power have begun to lag behind the technological evolution in computing and communications. Sustaining the current level of system reliability is also threatened by the growing opposition to centralized power plants and opposition to transmission line additions. The SG Report indicates that "Since 1982, growth in peak demand for electricity… has exceeded transmission growth by almost 25% every year. Yet spending on research and Development – the first step toward innovation and renewal – is among the lowest of all industries."

Modernizing the electrical grid would aid economic growth and improve efficiency of electric use. One concise view of the significance of this transformation in how electricity is managed appears below.[4] As that diagram illustrates, moving to a fully implemented SG occurs in phases, which in this diagram is illustrated by two large steps, the first step being an emerging SG that some characterize as a smarter grid and then to a fully operational SG. In a fully operational SG world, renewable and efficiency improvements have replaced more fossil/thermal generation, generation portfolios are more complex, and end-users have the potential to respond to electric prices and exercise greater control over their electric use.[5]

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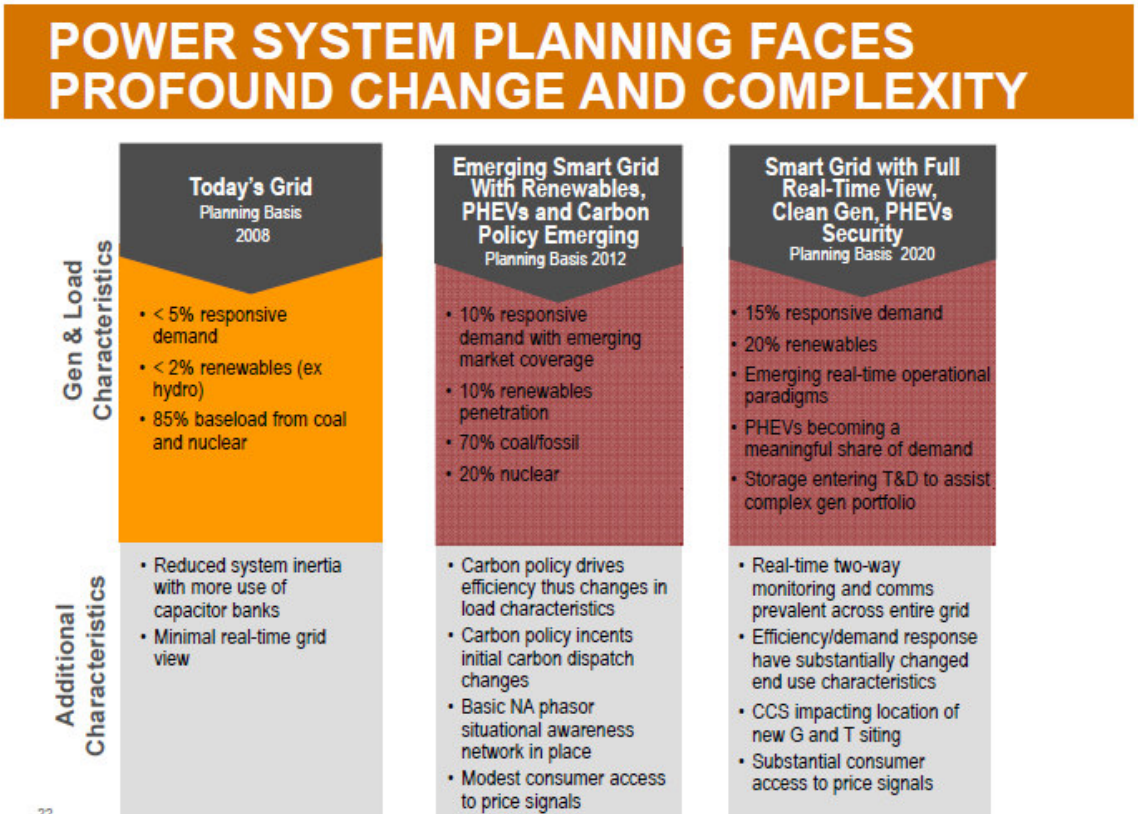
[3] <u>The Smart Grid: An Introduction</u>. Prepared for the U.S. Department of Energy by Litos Strategic Communications. See:

http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf

[4] Smart Grid, Context and Candidate Outcomes to Shape National Electric System Transformation, Presented at the Annual NARU meeting, November 2008, by Carl Imhoff, Pacific Northwest National Laboratory.

[5] It may also be useful to review the upcoming recommendations of the Oregon Global Warming Commission in their road map to 2020 project, and their futures statement contained in the 2050 vision of the electric and natural gas supply system.



Power System Planning Model

Key policy makers have recognized the importance of modernizing the electrical grid. The Energy Independence and Security Act of 2007 (EISA) established SG as an objective of national policy. Further, the ARRA devoted $4.5 billion to accelerating standardization and deployment of SG. EPRI estimates that the U.S. will spend $165 billion over the next 20 years building the SG.

SG promises a future grid that better coordinates disbursed electric generating sources, through transmission and distribution investments. As the SG Report indicates, "The move to a smarter grid promises to change the industry's entire business model and its relationship with all stakeholders, involving and affecting utilities, regulators, energy service providers, technology and automation vendors and all consumers of electric power."

<u>Is Broadband necessary for Smart Grid?</u>

In a word, yes. As noted above, SG will entail increased communication from all aspects of the electrical grid, from the generation of electricity to the consumption of electricity. The requirements for the speed of such communications are encompassed by Broadband. The Federal Communications Commission (FCC) has recognized this and holds that broadband is a

necessary component of SG. According to the FCC, "Broadband service provides higher-speed of data transmission. It allows more content to be carried through the transmission "pipeline."[6]

Chapter 12 of the NBP focuses on Energy & the Environment. It starts off noting that "U.S. prosperity and national security, as well as the health of the planet, require a national transition to a low-carbon economy and reduced dependence on foreign oil."[7] The Broadband Plan also recommends the country should pursue three parallel paths. "First, existing commercial mobile networks should be hardened [8] to support mission-critical Smart Grid applications. Second, utilities should be able to share the public safety mobile broadband network for mission-critical communications. Third, utilities should be empowered to construct and operate their own mission-critical broadband networks."[9]
Chapter 12 sets out four goals focusing on Energy and the Environment. These are:

- Goal One: Modernize the electric grid with broadband, making it more reliable and efficient,
- Goal Two: Unleash energy innovation in homes by making energy data readily accessible to consumers,
- Goal Three: Improve the energy efficiency and environmental impact of the information and communication technology (ICT) sector, and
- Goal Four: Transition to a safer, cleaner, and more efficient transportation sector.

The NBP contains specific recommendations under each of these four broad goals. For example, one recommendation for achieving Goal One is a call for the Federal Department of Energy to compile data on utilities current and projected communications requirements and the types of networks and communications they use.[10] This very report is an example of the type of data collection called for by this recommendation. Another recommendation is for states to reduce impediments and financial disincentives to using commercial service providers for smart grid communications.[11]

Another example of a recommendation for state action is under Goal Two, where it recommends that states should require electric utilities to provide consumers access to, and control of, their digital energy information, including real-time information from smart meters, historical consumption, price, and bill data over the Internet. If states fail to develop reasonable policies over the next 18 months, the NBP recommends that Congress should consider national legislation to address consumer privacy and the accessibility of energy data.[12] Two other recommendations under Goal Two are a call for every state public utility commission to require its IOUs to provide historical consumption, price and bill data over the internet in machine

[6] The FCC's broadband plan is available at www.Broadband.gov.

[7] Ch 12 of the National Broadband Plan, Energy and the Environment. Pg. 1 of Ch. 12.
[8] In this context, the term 'hardened' means to make more secure.
[9] Ibid., pg. 5 of Chapter 12.
[10] This appears as recommendation 12.6 on pg 6 of Chapter 12, Energy and the Environment.
[11] Ibid., Recommendation 12.2 on pg. 5 of Chapter 12.
[12] Ibid., Recommendation 12.7, pg. 8 of Chapter 12.

readable standardized formats.[13] It also calls for all IOUs to implement this capability by the end of 2011.[14] Furthermore, concerning the second goal of greater energy innovation at home through greater and timelier information to consumers, broadband is seen as helping inform consumers about their energy use – and its cost – and helping them have greater control over energy use.

Turning to Goal Three, sustainable information and communications technology, the energy infrastructure has not kept pace with technological improvements. In turn, this contributes to competitive and security risks. The NBP notes, "Our aging electrical grid is a patchwork of out-dated infrastructure. It's not just a system that delivers energy inefficiently -- the country's electric grid is increasingly vulnerable to failure and attack." Recommendation 12.11 is for the FCC to begin a proceeding to improve the energy efficiency and environmental impact of the communications industry.[15] In recommendation 12.12, it suggests that the federal government should take a leadership role in improving the energy efficiency of its data center.[16]

As for the fourth goal, chapter 12 of the NBP leads off by focusing squarely on the extent to which our high –carbon economy relies on fossil fuels and how broadband is a critical piece of a smart grid that helps move the U.S. to a low-carbon, more energy efficient economy.

This FCC analysis identifies broadband as the connective tissue between various parts of a digitally integrated system which will include elements such as:

- Smart meters at both home and work locations that allow for two-way communication and can significantly expand end-user control of energy use,
- Outage management systems,
- Energy management systems, and
- New sensing technologies, such as synchrophasors (equipment that monitors power flows very rapidly and assist in doing a better job of maintaining the grid).

There are many different levels of broadband as used or defined within the U.S. For example, the FCC defines broadband as 768 kilo-bits-per-second (Kbps) downstream and 256 Kbps upstream. The greater the bandwidth (a higher Mbps or Kbps number), the greater the information-carrying capacity and the faster data are transmitted. Sempra Energy has estimated that an SG will require "pervasive mobile coverage of at least 100 Kbps to all utility assets and customer locations."[17] Similarly, DTE Energy believes it will require connectivity of 200-500 Kbps to support pole-mounted distribution devices.[18] Southern California Edison points out,

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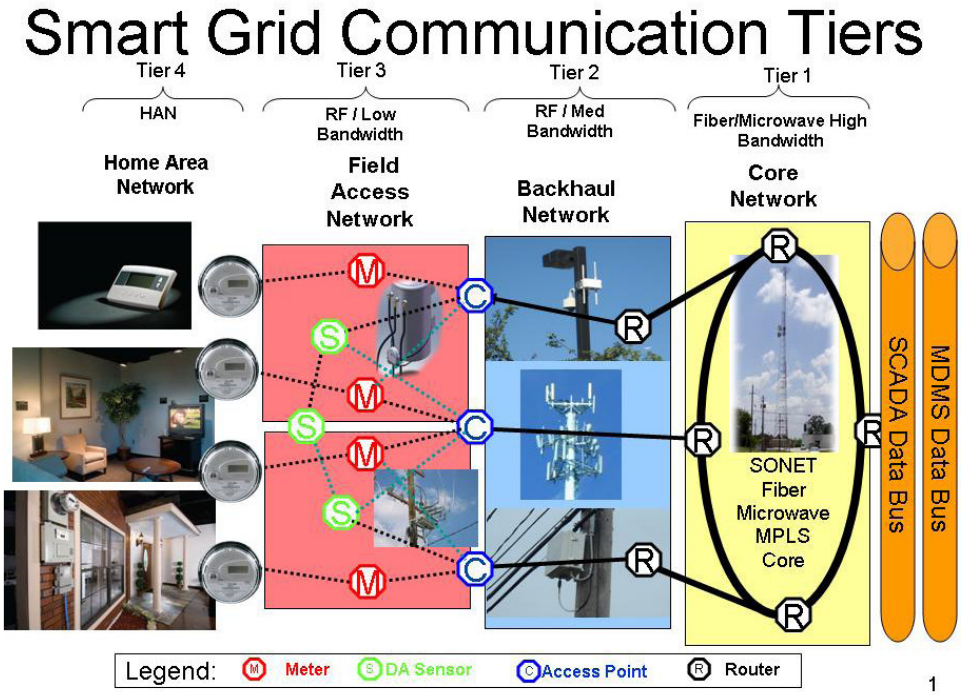
[13] Ibid., pg. 9 of Chapter 12.
[14] Ibid.
[15] Ibid., p.10 of Chapter 12.
[16] Ibid.
[17] Sempra Comments in re NBP PN #2, filed Oct. 2, 2009, at 11.

[18] DTE Comments in re NBP PN #2, filed Oct. 2, 2009, at 14.

"the history of new technology deployments shows that performance and bandwidth needs were underestimated at early stages."[19]

In the interests of promoting SG, the FCC has also embarked on coordinated efforts on Broadband as a part of the American Recovery and Reinvestment Act (ARRA) of 2009. The FCC views this effort as, "Working to make sure that America has world-leading high-speed broadband networks—both lies at the very core of the FCC's mission in the 21st Century."[20]

The following schematic illustrates where broadband fits in the communications scheme for Smart Grid deployment in the electric sector.[21]



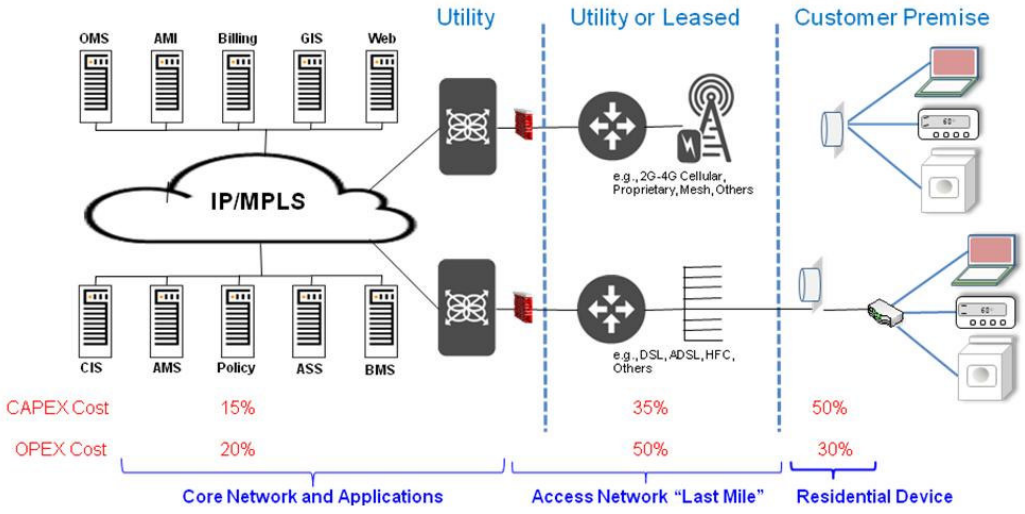
This portion of the report along with Appendices B, C, and D summarize broadband deployment by electric and gas utilities with customers in Oregon. These summaries reflect this same low-high bandwidth typology as is depicted in the above schematic.

As various jurisdictions and parties work to develop SG, that work ought to consider the cost of each segment of the SG communications network and how well it is able to accommodate future

[19] Southern California Edison (SCE) Comments in re NBP PN #2, filed Oct. 2, 2009, at 14.
[20] Available at(http://www.broadband.gov/issues/energy-and-the-environment.html)

[21] Comments submitted by Excelon Corp. in reply to FDOE Request for Information – Implementing the National Broadband Plan by Studying the Communications Requirements of Electric Utilities to Inform Federal Smart Grid Policy, by Joseph Watson, Jr. Esq. Director Federal Government Affairs, Exelon Corporation, 101 Constitution Avenue, NW, Suite 400 East, Washington, DC 20001

needs. For example, the following diagram[22] focuses on the residential sector and illustrates that the Core network is the least cost and it's also thought to be the segment that is most amenable to re-configuration as future needs arise. As a result, this segment poses less financial risk than other segments of the network. In contrast, the Access Network accounts for about 35 percent of the capital cost and 50 percent of the operating costs, and the Residential level accounts for about 50 percent of the capital cost and about 30 percent of the operating costs. The residential level will also be the most difficult and costly to change. One conclusion from this observation is that efforts to implement SG through new rules or guidelines ought to pay greater attention to the content of any such rules and guidelines for the residential level (Tier 4) than for the Core network (Tier 1).



Status of Broadband Deployment among Electric Utilities Serving Oregon Customers

A survey of broadband capabilities by Oregon's electric utilities was conducted by staff at the Oregon Public Utility Commission (OPUC). The three electric IOUs with Oregon customers are: Portland General Electric, PacifiCorp, and Idaho Power Company. There also were 27 COUs in Oregon who replied to the broadband status information request.

Information on communications facilities is considered business sensitive information. As provided for under Oregon statute, the OPUCs broadband information request guaranteed confidentiality to respondents. To meet this confidentiality requirement, the next two sections summarize the responses, first for the IOUs and then for the COUs. Appendix C and Appendix D also contain a summary of the information received from each IOU and COU, respectively. OPUC staff provided a draft to each IOU of how staff has summarized that utility. A draft of the

[22] Smart Grid System Communications Architecture for Residential Customers. See: http://www.energyauthority.net/smart-grid-%E2%80%93-system-communication-architecture-for-residential-customers/

COU sections was also provided to one individual coordinating the COU responses. All utility summaries have been approved for release.

Status of Broadband Deployment among the IOUs Serving Oregon Customers

All of the IOUs use broadband capabilities down into the 60-70 Kbps range for data transmissions that support infrastructure essential to sustaining power flows. One such use of communications down in that speed range includes data used to monitor sub-station status (please see the Smart-Grid Communication Tiers (Diagram) on page 9). This Diagram confirms the view that the Field Access Network (their Tier Three) is served by low bandwidth capabilities.

For each IOU, the utility owned broadband capability is used for such actions as two-way radio communication, generation and/or transmission energy management, along with implementing and monitoring responses to power disturbances, inter-connections with other utilities, and security operations. The broadband capabilities range in data rates as low as 12.35 Mbps and as high as 155.52 Mbps.

Each utility also utilizes commercially owned facilities. These facilities provide data rates at 64 Kbps.

Status of Broadband Deployment among the Consumer Owned Utilities (COUs) in Oregon

It appears there is more variation in broadband capabilities among the Oregon COUs. Some utilities rely solely on third-party providers for their high-speed broadband capabilities while others have large owned networks.

For some, broadband capabilities are used solely for remote meter reading. This is economically efficient for facilities that are quite remote and costly to visit on site. For others, it is also used for some substation monitoring via remote meter reading and SCADA controls. Some utilities have Advanced Metering Infra-structure (AMI) capabilities and others have none. At least three utilities own a subsidiary business that provides wholesale/retail broadband services in the county to medical, education, government, business and residences.

Several of the COUs are in the process of installing AMI capability. A number of them have at least some of their sub-stations wired for remote monitoring, and it appears that at least some of this monitoring is done at fairly high speeds of 1Mbps – 1,000 Mbps. Communications between the customer meters and sub-stations are at slower speeds in the 64 Kbps range.

Broadband Deployment by the Three Natural Gas LDCs serving Oregon Customers
At this time, there is no broadband deployment among the three natural gas LDCs serving Oregon customers. One of them, Northwest Natural Gas, reports that they are examining its use for monitoring gas storage.

Education

This section of the report outlines how broadband access is currently being used in education in Oregon, both to enhance educational outcomes and to adapt to the way students learn. We have focused on describing the current landscape regarding statewide broadband adoption in K12, community colleges, and universities as well as what schools currently using broadband bandwidth for. Section one will address baseline administrative uses which have historically driven basic broadband needs, section two will outline current and emerging teaching and learning technologies that are driving broadband adoption, and finally, section three will outline the current status of broadband connectivity for schools in Oregon.

As the recently released National Broadband Plan[23] states "[t]he country's economic welfare and long-term success depend on improving learning for all students, and broadband-enabled solutions hold tremendous promise to help reverse patterns of low achievement." Let us be clear that this is not an either/or discussion of Online learning vs. in-class face to face instruction. In our ever more connected world we are interweaving access to information in all aspects of our lives and the younger generations are leading the trend. Blending electronic information into Education is in fact common place, and it can be said that the old paradigm of "Distance Ed" has been replaced with a mix of online materials on a continuum from hardly any electronic resources used in the classroom to the completely online education where all materials and interactions with instructors is online. The NBP Plan goes on to cite a Carnegie Mellon study that shows online education can dramatically increase learning outcomes when "blended" with in-person instruction[24] and it is increasingly becoming clear that just such blended instruction is the future of education. It is also interesting to note that two Oregon examples are cited in the NBP as examples of successful online learning outcomes so to some degree Oregon may be ahead in recognizing this reality but it is clear that we have a long way to go.

Administrative Needs
Nearly all schools in Oregon are connected to the Internet. Most of those consider themselves to have "broadband" access but historically this access has been seen as needed for administrative needs. Email and web access for faculty, submission of state mandated test scores to Oregon Department of Education, and other administrative needs have driven the adoption of a basic connection. For most schools this "basic" connection is a T1 to their district office. Unfortunately, due to financial restrictions and the lack of broadband infrastructure in some of

[23] http://www.broadband.gov/plan/11-education
[24] Marsha Lovett at al., *The Open Learning Initiative: Measuring the Effectiveness of the OLI Statistics Course in Accelerating Student Learning*, J. Interact. Media in Educ., May 2008 (Lovett et al., *The Open Learning Initiative*), available at http://jime.open.ac.uk/2008/14/jime-2008-14.pdf.

our communities, approximately 231 of the approximately 1300 schools in Oregon have only a T1 or less for connectivity.

Most schools have long since adopted electronic Student Information Systems and Financial Information Systems but increasingly those systems and even basic email and office applications are being offered more cost effectively from remote locations across the Internet. As this trend continues, demands on even these basic connections will soon outpace their abilities. For example, over 70 school districts have recently adopted Google Apps as their standard email and office suite, opting to take advantage of this service under a contract negotiated by the ODE. This move will likely save them time, money, and disruptive downtime from not having to run local servers and services, but it will at the same time put much more demand on their broadband connection to the Internet.

Learning Technologies

Rather than make an attempt to articulate all learning technologies in use today in Oregon, we have attempted to cite three key learning technologies which are becoming ubiquitous across all education levels and in all corners of the state. These three technologies exemplify how a twenty-first century education relies on broadband use and assumes it as a matter of course.

Learning Management Systems

A Learning Management System (LMS) is a web based platform for organizing class materials and, if available, previously packaged electronic course content. These systems are now becoming the norm for delivering classes from K12 through university level and nearly every class offered by universities in Oregon are organized in some sort of a LMS. The broadband implication here is that we are heading towards a future where all students access at least some course materials online for every class and therefore will need broadband access from anywhere that they will be doing their school work. For example, the Oregon Virtual School District[25] just past its 110,000th account creation. With just over 550,000 students enrolled in K-12[26] that means that nearly one-fifth of all students in the state of Oregon now have access to an ODE provided LMS which allows schools and school districts to share purchased courses and a common platform while not having to run servers locally.

The Use of Video Content

Video content has finally begun to fulfill early promises of remote learning. Whether it is educational content on Teachertube.com for K-12, video captures of lectures in universities available for download to enrolled students, or guest lecturers joining a class via HD video conferencing, it is clear that video demand is now the primary driver for broadband bandwidth in schools and education. It only takes three or four moderately good quality video streams to saturate a T1 connection and schools around Oregon are looking for much higher speed connections to enable quality video content. For example, Oregon State University makes all of their public lecture series available online at http://oregonstate.edu/media.

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[25] See http://orvsd.org

[26] 561,698 students for the 2009-2010 School Year according to http://www.ode.state.or.us/sfda/reports/r0073Select2.asp .

Mobility and Ubiquitous Access
There is no question that the age of handheld mobile computers is upon us with nearly every cellular phone now capable of some level of Internet connectivity. In some cases, the broadband and computing capabilities of students' phones outstrip the average desktop computer for faculty members. Young people have integrated mobile access into their daily lives and soon their expectation will be that they can get to everything (including educational resources) online from their phone. According to a Pew Internet Report published in 2010[27] seventy-five percent of twelve to seventeen year olds now have their own cell phones and twenty-seven percent of them go online for general purposes. This is even more pronounced from lower income families with forty-one percent of teens from households earning less than $30,000 annually using their phones to go online.

Barriers to Adoption
In many ways, this future of blending online content and ubiquitous use of technology in education is here today, but there are still significant barriers to realizing the potential of this for all Oregonians:

- Those schools with a T1 or less of bandwidth will be bandwidth challenged and limited in the types of technologies they can give their students access to, most notably video content will not work very well over these connections if more than three video streams are trying to be watched at the same time
- Lack of affordable broadband for Oregon's lower income families will mean that some students will be put at a disadvantage
- Some of our rural communities continue to lack the necessary infrastructure to offer broadband access at all, even with anchor institutions such as schools and libraries receiving federal funds to pay for broadband
- While some shared content is starting to become widely available, the current controversy over the funding of on-line charter schools creates an atmosphere of competition rather than one of cooperation

<u>Oregon's Educational Broadband Infrastructure</u>
How are Oregon's Schools connected to the Internet?
Given the number of schools statewide, there is no one answer to this question. There are many ways schools connect to the internet; however, in general schools first connect to their local school district office so that all schools in a local district are first connected to each other. From there school districts typically connect to a local Educational Service District who acts as the Internet Service Provider (ISP) and makes sure that federal regulations are met when connecting schools. Similarly, most of our 17 community colleges actually have several campuses in their local service districts and those connect back to the main campus first and then connect to an ISP. Most universities and private colleges connect directly to an ISP. Many of the public schools use the Network for Education and Research in Oregon as their ISP and therefore also connect to each other before connecting to the Internet.

[27] http://pewinternet.org/Reports/2010/Teens-and-Mobile-Phones/Summary-of-findings.aspx

At what speeds are Oregon Schools Connected?
As you can see in Appendices G and H, schools connect at everything from a T1 at 1.44 Mbps to 2x10 Gbps depending on the size and complexity of the school. It should be noted that schools are regularly working to increase their connection speeds so that any data contained in this report is necessarily dated. In particular, the data contained for K-12 was compiled in 2008 by the ESDs and needs to be revisited.

At what speed should Oregon Schools be connected?
ODE has indicated a goal of 10 Mbps per 1000 students and staff for both Internal Wide Area Network connections (from each school to the district office) and external connections from the district office to the public Internet. According to this standard, ODE identified over 350 schools as being underserved. The NBP also calls for the FCC to establish base level national guidelines to be updated regularly and we look forward to them being published. Colleges and universities informally consider 1 Gbps to be the baseline goal with research Universities striving for multiple 10 Gbps connections and the ability to provision "dedicated lambdas" across the national backbone for specific research projects.

Key Issues
Some key issues expressed by educators are the exponential growth of video and concerns over dealing with mobile devices. There is less and less of a distinction between distance education and traditional education in terms of the applications used. The distinction increasingly is how much of the course content is presented on-line vs. presented in-class face to face.

Government

Oregon's state, local and tribal governments use broadband for administration, communications, and the e-government applications. The extent of use varies widely with government institutions and the availability of broadband services and expertise.

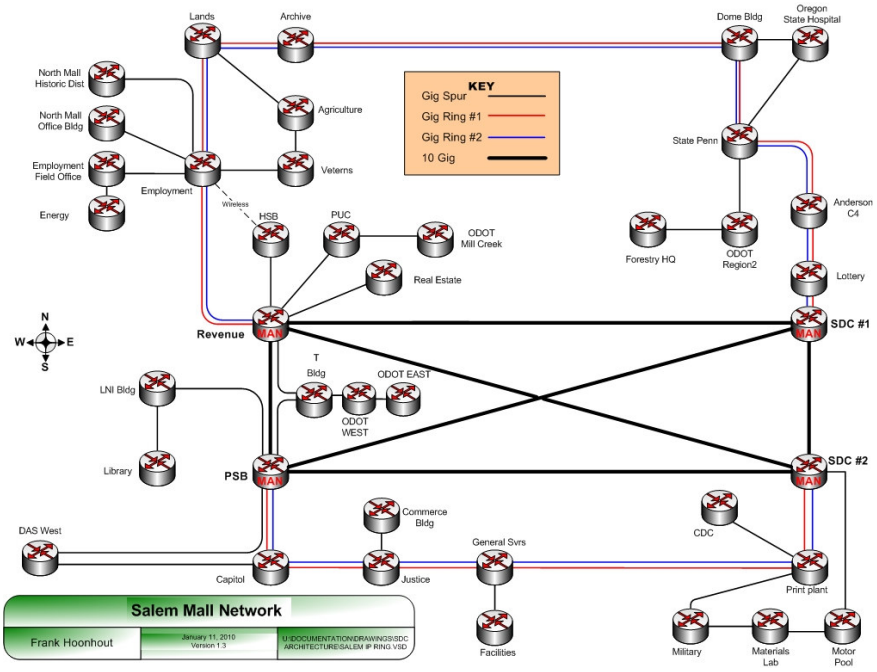
<u>Existing state network deployment (State Data Center)</u>
The State of Oregon makes extensive use of high-capacity broadband telecommunications. The Department of Administrative Services, through the State Data Center, provides network access to all state agencies, and supports contractual access to telecommunications services for many non-state governmental entities via the Oregon Cooperative Procurement Program (ORCPP). Enterprise level access is provided to at least 651 distinct locations across Oregon by the SDC and its contracted service providers (summarized in the table below). Best-Effort Service (DSL) is provided at an additional 86 locations (5 locations with 256 Kbps upload/256 Kbps download, 1 location with 640 Kbps/640 Kbps, 73 with 896 Kbps/1.5 Mbps, 3 with 896 Kbps/3 Mbps, and 4 with 896 Kbps/7 Mbps).

	Number of Locations with this Type of Service			
Bandwidth provided	**Frame Relay**	**Ethernet**	**Direct Digital**	**Total**
56 Kbps	11	2		13
1.5 Mbps	178	115	131	424
2 Mbps		68		68
3 Mbps	16	25	23	64
4.5 Mbps	1		4	5
5 Mbps		23		23
6 Mbps			4	4
9 Mbps			5	5
10 Mbps		23		23
20 Mbps		3		3
25 Mbps		2		2
30 Mbps		1		1
40 Mbps		2		2
50 Mbps		3		3
100 Mbps		9		9
200 Mbps		2		2
				651

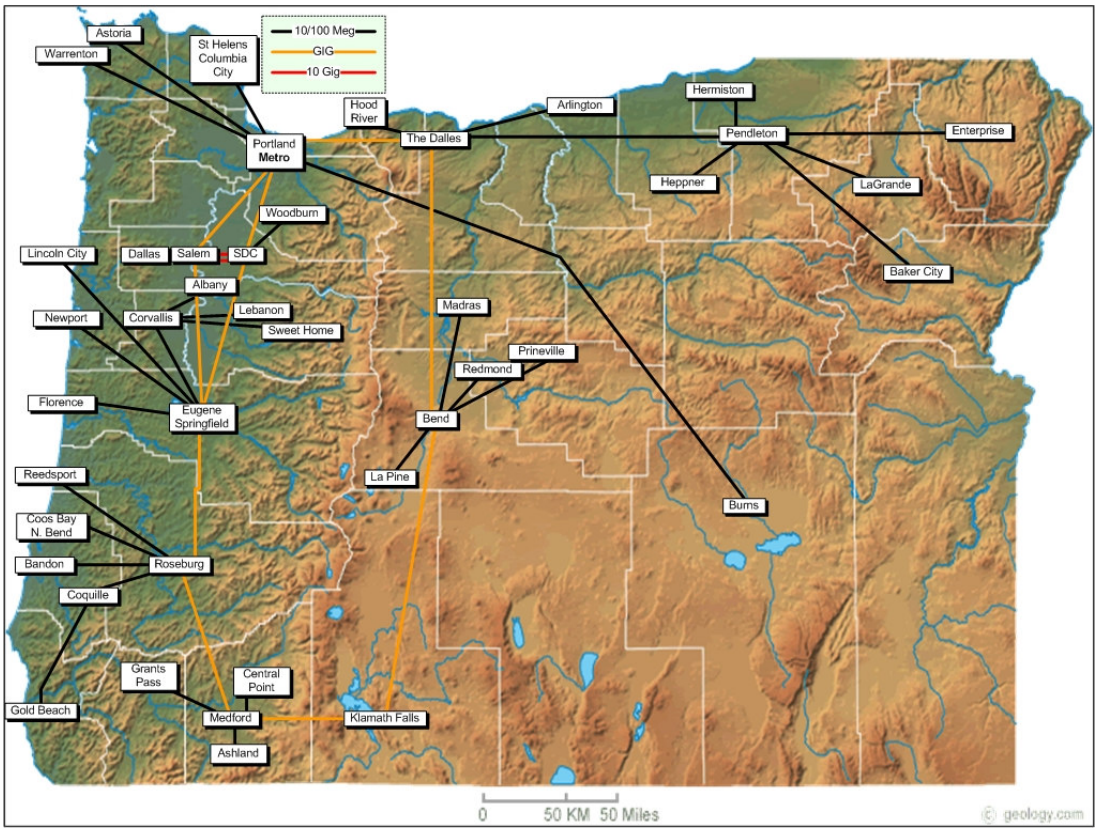
Enterprise level broadband access for state agencies

<u>Oregon networking infrastructure and legal constraints</u>
Several statutes guide the acquisition and use of telecommunications technologies by the State of Oregon, including ORS 184.475, 184.477, 283.140, 283.500, 283.505, **283.510,** 283.515, **283.520**, 283.524, and 291.037-038. ORS 283.510 establishes the definitions of "advanced digital communications" and "telecommunications provider," and then specifies that the State *must contract* for the provision of "advanced digital communications services" [emphasis added]. ORS 283.520 limits contract services contracts to a period of less than ten years. In summary, Oregon contracts for nearly all of its network services with private telecommunications providers.

The state-owned network loop supports the access and data transport needs of state agencies located on or near the Capitol Mall.



Capital Mall Network Loop



State-contracted network hubs

Oregon Broadband Mapping Project

In July 2009, the National Telecommunications and Information Administration (NTIA) released a Notice of Funds Availability (NOFA) under the State Broadband Data and Development Program for mapping the availability of broadband Internet services across the entire nation and for use in planning for the remediation of unserved and underserved populations identified during the mapping data collection efforts. These activities were undertaken, in part, to alleviate the perceived "digital divide" between regions that have access to high-speed Internet connectivity and those that do not – whether that access was limited due to technical, economic, or educational reasons.

Governor Theodore Kulongoski designated the Public Utility Commission of Oregon (PUC) as the single eligible entity to receive a grant under the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program. The PUC applied for a $1.6 million Broadband Data Collection and Mapping Grant and a $498,610 Broadband Planning Grant. The PUC selected One Economy through the state's "Request for Proposal" process to assist Oregon with fulfilling the requirements of these Grant Programs.

Data Collection and Mapping: One Economy and its partners BroadMap, Sanborn, and Spatial Focus are collaborating with the PUC and Oregon's Department of Administrative Services, Enterprise Information Strategy and Policy Division to collect and map specific data on broadband infrastructure and the availability of broadband services throughout Oregon, including tribal lands.

Once collected from available sources, such as broadband providers, this data will:

- Identify unserved and underserved areas at the most granular level possible;
- Identify community anchor institutions;
- Be displayed on a publicly accessible and interactive state website in the form of a broadband map;
- Be used as a source for ongoing endeavors to increase broadband availability to all Oregonians;
- Be updated semi-annually through 2011 and
- Be provided to NTIA per the Grant Program.

Planning: One Economy, with the assistance of Opinion Research Corporation and in collaboration with Oregon communities, the PUC, the Oregon Business Development Department and the Oregon Broadband Advisory Council (OBAC), will design and administer a statewide public survey to gather information on the demand for and use of the Internet in Oregon. The survey results will provide data on the affordability, availability and adoption of broadband technology in all areas of the state. It will also provide information to OBAC for analyzing and reporting on Oregon's use of broadband technology in the telehealth industry and for energy management, education and government. This knowledge can be used as a tool to help direct broadband awareness and adoption efforts in unserved and underserved communities and for the development of broadband public policy.

A second survey is planned for 2011. This survey will provide additional data to answer questions raised by the first survey and to measure the effects of any actions taken in the interim by the State to address broadband adoption or availability and allow for further development of state broadband strategies. Oregon's Mapping and Planning Programs are focused on the goals identified by the Federal statutes that established and funded these grants, and support the Oregon Broadband Advisory Council's efforts to develop and ensure the implementation of statewide broadband strategies.

The PUC subsequently filed a supplemental application on July 1, 2010, and was awarded an additional grant of $3.55 million dollars for the Oregon Mapping Project plus funding for three "other purpose" projects, bringing the total to $5.6 million from the State Broadband Data and Development Grant Program. This second award funded the following additional projects.

Oregon Mapping Project: To fund an additional three years of broadband data collection, integration, and validation.
Federal Grant Awarded: $1,769,876

Oregon Broadband Digital Literacy and Technical Assistance Project: Partner with the Oregon Small Business Development Center Network and Community Colleges to provide digital literacy training and consulting services.

- Develop and deliver digital literacy courses and workshops for small business
- Develop and deliver small business technical assistance and consulting services for the strategic use of broadband and information technologies

Federal Grant Awarded: $1,120,000

Oregon Broadband E-Government Project: Partner with the Association of Oregon Counties to support and accelerate the adoption of e-government applications by local governments.

- Provide e-government and broadband applications educational outreach
- Promote the use of broadband for the delivery of information and services by local government to its citizens
- Provide needs assessment and consulting
- Provide technical training
- Promote local government strategic planning for Web 2.0 / Gov 2.0

Federal Grant Awarded: $396,133

Oregon Broadband Outreach and Strategic Planning Project: Partner with the Oregon Broadband Advisory Council to develop state and local plans to accelerate broadband adoption and utilization.

- Develop broadband recommendations to the State Legislature and Governor
- Conduct outreach to local communities statewide to promote broadband adoption and utilization
- Support, through training and assistance, community and tribal task forces to develop local and regional plans to accelerate broadband adoption and utilization

Federal Grant Awarded: $263,991

Public Safety Communications

For public safety agencies in Oregon looking to use broadband to do a better job protecting lives and property during disasters through mission critical data sharing, the future is now.

- The Oregon Department of Transportation (ODOT) and the Oregon Wireless Interoperability Network (OWIN) submitted an application for a Broadband Technology Opportunities Program (BTOP) grant from the US Department of Commerce to build the Oregon Public Safety Broadband Network (OPSBN). Though the grant was not awarded to Oregon, in applying for it the BTOP Grant Team at OWIN created the concept for OPSBN. When funding becomes available, OPSBN could be a public-private enterprise designed to provide a state-wide high speed broadband mobile data system available to all emergency responders.
- The Warm Springs Telecommunications Company (WSTC) was recently awarded a $5.4 million BTOP grant by the NTIA to launch a broadband company that will cover the entire 1,000 square miles of the Confederated Tribes of the Warm Springs Reservation. This broadband network will support a public safety interoperable network that improves communications among Warm Springs police and fire agencies and allows access to OWIN for communication among all responders when there is a mutual aid response.

These are just two examples that demonstrate the potential: (1) to making it possible for first responders from different agencies to talk to each other, (2) to improving public safety response times, (3) to ensuring seamless, reliable communications when there is an emergency, and (4) to giving first responders access to the data they need immediately.

The State Interoperability Executive Council was created by an Executive Order of the Governor (EO 02-17, 2002). It has a mission "to develop recommendations for policy and guidelines, identify technology and standards and coordinate intergovernmental resources to facilitate statewide wireless communications interoperability with an emphasis on public safety". It is also responsible for setting policy for OWIN. While OWIN is consolidating the current public safety radio systems of four State agencies – Transportation, State Police, Forestry and Corrections – and will make an interoperable voice system available to all Oregon public safety agencies, the OPSBN could be the first truly shared state system, i.e. state agencies will have the same access to the high-speed broadband data network as all public safety agencies willing to pay subscriber fees. The SIEC represents all potential public safety users so it is in an ideal position to establish Oregon's public safety broadband policies.

There is currently no broadband presence within the OWIN system and no state-owned broadband infrastructure for public safety. Oregon was awarded a waiver by the federal government for use of the 10 MHz public safety spectrum. Without the BTOP grant, funding becomes a barrier to finance the construction of the infrastructure. Alternative funding in partnership with a commercial carrier through the use of the 10 MHz public safety spectrum may be a solution that could support the construction and needed infrastructure. Under this scenario, the state would own that infrastructure which would be operated and maintained by the partner carrier. State agencies and non-state public safety agencies would pay monthly subscriber fees for access to a high speed broadband network. Such a system would be superior to current

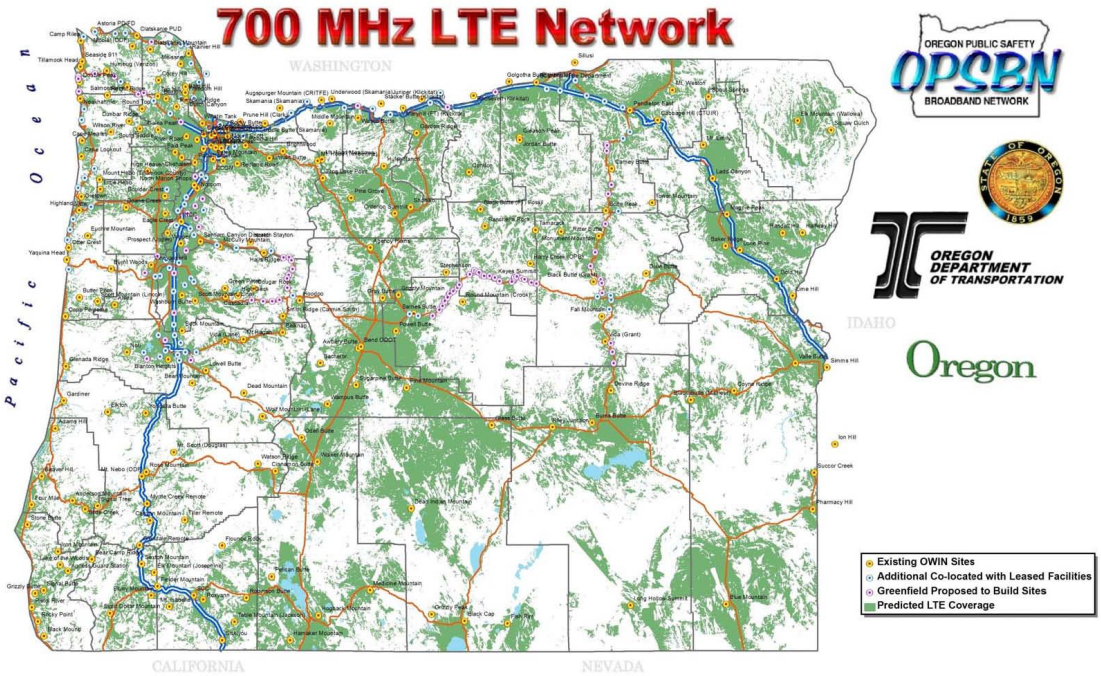
arrangements that public safety agencies have with commercial carriers for wireless data service because the new high-speed broadband network would be built to public safety grade standards and guarantee priority access for first responders when needed.

There are many ways in which the OPSBN could be used by first responders to access new applications and capabilities for the benefit of all the citizens of Oregon. Police units in the field could be sent traffic camera video to aid in the pursuit of suspects, mug shot and driver license data for safer arrests, Amber Alert information and information from automated license plate readers. Fire units in the field would be able to receive building diagrams that identify threats to the safety of first responders, hazardous materials inventory information, maps and weather information for fighting wildfires effectively and firefighter and equipment location information. Mobile incident command centers that are the "nerve centers" for the mutual aid response when natural disasters, major structural fires, hazmat incidents or terrorist incidents strike would greatly benefit from the increased bandwidth and spectrum access on the OPSBN.

The bottom line is that the OPSBN 700 MHz broadband wireless network supporting both data and voice will, for the first time, give the first responders of Oregon true interoperability in those emergencies that require a response from multiple agencies. On a day-to-day basis, this network will increase the efficiency of all public safety personnel by freeing them up to spend more time in the field responding to citizen needs and less time dealing with trying to secure the data needed to protect and serve.

The OWIN project is currently working on a network of 324 sites across Oregon for the voice systems used by the state agencies. Plans for the OPSBN call for additional sites to support a broadband system in the 700 MHz area of the radio spectrum. The OWIN system originally had a slow-to-moderate speed data system included conceptually. The higher-speed, greater-bandwidth 700 MHz Long Term Evolutionary (LTE) network will replace that. Data speeds are expected to be anywhere from 0.5 to 3 megabits per second (Mbps). (For comparison purposes, dial up offers data rates of less than 1 Mbps, the FCC has established 2 to 4 Mbps as the minimum rate for rural broadband access and many heavily populated areas enjoy minimum data rates of 20 Mbps.)

Any commercial carrier that partners with OWIN on the OPSBN will have the opportunity to use the "middle mile" service, as well as access to sites and microwave space on towers to bring broadband to unserved and underserved areas of Oregon. The commercial carrier could then provide service to areas that could not be justified previously on a return-on-investment basis. This could open the opportunity for greater broadband access for schools, hospitals and businesses in unserved and underserved areas.



The Confederated Tribes of the Warms Springs are on the cusp of developing broadband capabilities that are long overdue on a reservation where it's been reported that 35 percent of the 4,500 tribal members living on the reservation don't even have basic phone service. When it comes to police and fire services, less than 40 percent of the reservation has reliable two-way radio service. That is about to change. With Department of Homeland Security (DHS) grants secured through the State of Oregon Office of Emergency Management (OEM), the tribes have begun to act on priorities established improving telecommunications on the reservation. The top priority is Public Safety Radio communications. A phased approach to the build out of a public safety radio network has been employed. Grant funding is being used to conceptually engineer and design and then build out a more robust network for police officers and firefighters. All residents, businesses and government agencies on the reservation will have access to high-speed broadband services once the network is complete. Eventually, through an active partnership with OWIN, there will be seamless interoperability among tribal agencies and outside agencies when there's a major wildfire or multi-agency search and rescue operation.

There are also preliminary talks between the Confederated Tribes of the Warm Springs and OWIN to partner on a new communications site which will not only serve the needs of the tribes, but will also increase cell phone coverage along Highway 26 on the southern edge of the reservation from the eastern slopes of Mount Hood to the Deschutes River.

City, County and Tribal Government Broadband Access Survey

On behalf of the OBAC's Government Use of Broadband Workgroup, DAS EISPD created a web-based survey to get a sense of the current use of broadband internet services by municipal, county, tribal and state governments in Oregon. With the assistance of workgroup members that represent tribal, city, and county perspectives, information technology and business services managers were identified and then sent a web link via email. The survey took place from August 6 through 24, 2010. Each jurisdiction was asked about current and future uses of broadband service.

64 (of 241) Oregon cities, 23 (of 36) Oregon counties, 6 (of 9) federally-recognized tribes in Oregon, and 3 other organizations responded to the survey (27 percent, 64 percent, and 67 percent, respectively). Each organization was asked to respond to the questions based on their evaluation of a "typical" Internet experience for their employees. For the purposes of the survey, the NTIA definition of broadband service was used (minimum service speeds of 768 Kbps for data download and 200 Kbps for data upload).

Survey results:

- 11 of the 64 cities and 1 of the 6 tribes indicated that they did NOT have access to broadband service (768 Kbps download and 200 Kbps upload speeds). These cities serve approximately 8000 Oregonians, and the tribe comprises approximately 400 Oregonians. See Appendix G for lists of all government agencies that could have responded to the survey and the actual respondents.
- The city governments that responded affirmatively serve approximately 1.576 million Oregonians, the responding county governments serve approximately 3.2 million Oregonians, and the responding tribes represent at least 6100 Oregonians. The current population of Oregon has been estimated by the Population Resource Center at Portland State University to be 3.823 million, with approximately 2.763 million living in incorporated cities. Three county government responses did not provide broadband information beyond a simple "Yes" (Lincoln, Morrow and Multnomah).
- Nearly 70 percent of respondents to this survey felt that their access to broadband connectivity were reasonably and affordably priced (70 of 96 responses), with 16 blank responses and 10 responses that did not feel access was reasonable/affordable. Comments related to this question are recorded in Appendix G.
- 50 percent of the respondents expect to expand their broadband service provision over the next 2-5 years, and 30 percent do not expect to do so.
- 13 percent of respondents provided data on the growth in number and total value of electronic commerce transactions via the Internet. All of those responses expected continued growth. The largest online commerce providers are expecting growth of as much as 50 percent based on recent historical trends.

Typical **download** speed	No. of Governments			
	City	County	Tribe	Other
768 Kbps to 1.5 Mbps	11	1	1	1
1.5 Mbps to 3 Mbps	4	2	1	0
3 Mbps to 6 Mbps	5	5	0	0
6 Mbps to 10 Mbps	10	6	0	0
10 Mbps to 25 Mbps	7	3	3	0
25 Mbps to 50 Mbps	0	1	0	0
50 Mbps to 100 Mbps	2	0	0	1
100 Mbps to 1 Gbps	0	0	0	0
Greater than 1 Gbps	0	1	0	0
Unknown	6	0	0	0
Blank	8	4	1	0
No broadband	11	0	0	1
TOTAL	64	23	6	3

Typical **upload** speed	No. of Governments			
	City	County	Tribe	Other
200 Kbps to 768 Kbps	8	1	1	1
768 Kbps to 1.5 Mbps	10	1	0	0
1.5 Mbps to 3 Mbps	5	3	0	0
3 Mbps to 6 Mbps	4	3	2	0
6 Mbps to 10 Mbps	5	7	1	0
10 Mbps to 25 Mbps	6	2	1	0
25 Mbps to 50 Mbps	0	0	0	1
50 Mbps to 100 Mbps	1	1	0	0
Greater than 100 Mbps	0	1	0	0
Unknown	6	0	0	0
Blank	8	4	1	0
No broadband	11	0	0	1
TOTAL	64	23	6	3

Overall Responses for broadband access by governments

Gov'tal level	**Broadband technologies used to access Internet**							
	DSL	Cable modem	T-1	Fiber	Fixed wireless	Mobile wireless	Satellite	Unknown/ all blank
City	19	12	10	16	6	4	2	3/21
County	11	10	10	13	9	9	2	0/4
Tribe	5	3	4	3	5	3	3	0/1
Other	1	1	1	1	1	1	1	0/2

Broadband Technologies currently in use by survey respondents

Gov'tal level	How does government use broadband Internet?					
	Voice communications	Email applications	e-Gov't applications	Administrative applications	Video/audio coverage of public meetings	No access to broadband/all blank
City	11	43	22	30	15	10/11
County	5	19	15	18	13	0/4
Tribe	4	6	4	6	3	0*/0
Other	1	1	1	1	1	0/2

* Burns Paiute Tribe indicated no broadband access, but then indicated its use of broadband for email and administrative applications.

Broadband Technologies currently in use by survey respondents

e-Government

The informal broadband survey carried out on behalf of OBAC revealed many interesting experiences of broadband availability for governments in Oregon. A list of innovations that have been undertaken by local and tribal governments is included in Appendix H. High-level survey results related to how cities, counties, federally recognized tribes and the state use broadband through e-Government applications:

- Forty percent of respondents have a formal e-government program that uses broadband services to provide access to government services for citizens.
- Over fifty-four percent of the respondents use broadband service to support administrative applications such as employee benefits, accounting, contracting, and facilities management systems accessed via the internet.
- Nearly thirty percent use broadband services to provide audio and or video conferencing capabilities. A number of these governments used broadband internet to provide access to public meetings.
- Sixty-three percent have a single portal website that provides access to a wide variety of services offered by the jurisdiction. A service is a transaction that starts and ends online including required documents and payments. Most jurisdictions make available 50 or less transactions; four have between 50 and 250 services online, one provided between 250 and 500 services, and one provides over 1,000 services online.
- Only twenty-six percent of the respondents report conducting financial transactions on-line. But those respondents reported online financial transactions totaling in excess of $179 million in total financial transactions in 2009.
- Approximately twenty-five percent reported providing transparency information such as expenditure, contracting, staff salary and/or program performance information to the public.
- Social media was identified as the single biggest functionality added since 2008 to web sites (with over seventeen percent reporting this addition).

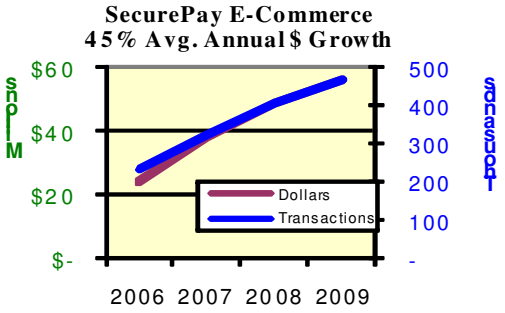
State of Oregon E-Government

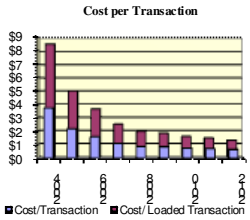
Like all government services, government use of the State of Oregon's E-government continues to grow strongly, even in the shadow of the recession.

About 100 State of Oregon agencies, boards and commissions have a presence on the Internet. The centralized Oregon E-Government program is available to all agencies and it is the primary internet presence for 83 agencies in the Executive and Judicial branches of state government.

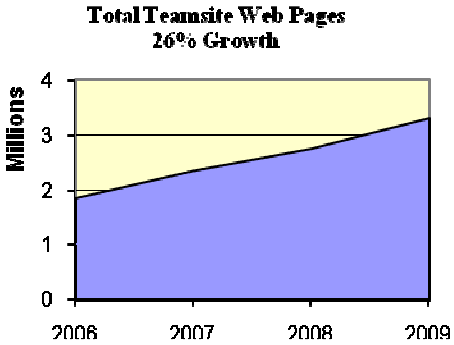
Online Services: The State of Oregon currently provides over 1,200 online services for visitors. An online service, as defined by the Center for Digital Government, is one where the visitor can complete the entire transaction online and is not required to provide additional information or payment separately.

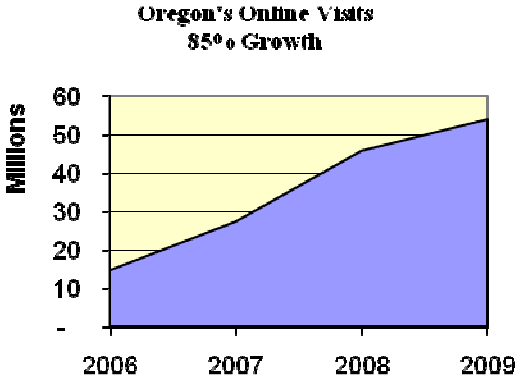
E-Government Demand: State Government E-Commerce transactions have increased from 2006-2009 at the rate of 45 percent annually. Online commerce increases agency efficiency and reduces cost per transaction. The trend also puts pressure on the E-Government program to meet increasing agency demand for E-Commerce related services.





The content (web pages and files) on Oregon.gov is increasing at a rate of 26 percent annually. In addition, Oregon.gov has had an increase in online visitors from 2006 to 2009 at a rate of about 85 percent annually. The Oregon.gov portal serves nearly 19 million pages to 6 million visitors each month.





Oregon.gov website statistics

There is a greater expectation of data sharing allowing citizens to open access to data and use within their own applications. The Oregon Geospatial Enterprise Office (GEO), within the DAS EISPD, provides access to many geospatial tools, services and statewide data resources (http://oregon.gov/DAS/EISPD/GEO/sdlibrary.shtml).

In addition to the efforts of the GEO, Oregon has launched a data.oregon.gov pilot with the expectation of providing large amounts of data publicly available for no cost in an Oregon data catalog.

Enterprise Collaboration using Social Business Software has experienced exponential growth over the past two years. Called Oregon GovSpace, it is not limited to agencies but also included agency partners (vendors, other government agencies, identified stakeholders, etc.). The system has 183 different organizations collaborating on projects for the State of Oregon. Future plans include adding a new fully public collaboration site for agencies and their partners to utilize. Average annual growth for 2008-2010 was approximately 1300 percent.

Conclusions

This report examines the current availability and use of broadband infrastructure in Oregon. It shows a state that is rapidly adopting new technologies in medicine, education, energy and government. It also shows a state that can not completely realize the benefits and full potential of broadband until the unserved and under-served areas gain access. By taking a long term view that looks across multiple uses in different sectors, Oregon has the potential of finding ways to aggregate the deployment and use of the infrastructure to reach the unserved and underserved communities.

There are still gaps in our understanding of Oregon's broadband infrastructure. As the efforts to map and survey the state's users and providers continue, a clearer picture will emerge. That picture will be important to provide the context for policy decisions in the future. Those decisions initially will involve determining the best strategies for extending infrastructure to a point where every community in Oregon has broadband access at affordable rates. Once the infrastructure is in place, Oregon will be able to realize the promise of new and more effective service delivery in telemedicine, energy management, education, government and public safety.

Broadband telecommunications infrastructure, adoption and utilization are important issues at the local, state and national levels. There is currently a great deal of broadband activity in progress at the state and national level including infrastructure builds, state and national data collection and mapping projects, adoption and utilization programs, the proposed NBP, and proposed federal rule making and legislation. The Oregon Broadband Advisory Council will monitor the progress of these developments, provide a forum for statewide discussion of broadband issues, and will continue to study broadband issues and their impact on the state.

Appendix A
Oregon Health Network – About Us

The Future of Health Care Is Now - Bringing quality care to all Oregonians

Imagine living in a rural community, fifty or more miles from your doctor and 200 miles away from the nearest full-service hospital.

Now imagine being diagnosed with a chronic illness requiring weekly visits to specialists, taking time off from work and away from your family, and the added physical and financial stress of traveling to get the care you need. This was reality for pioneers 150 years ago, and is still reality for roughly eighty percent of all Oregonians.

A number of economic, cultural and social factors are contributing to huge disparities in regional healthcare delivery. The prospect becomes even more complicated when governmental regulations and pending health care reform policies rely heavily on the ability to provide comprehensive healthcare within a patient's immediate community. Without advanced telehealth services and related technologies, rural health care providers in Oregon (and nationally) will not be able to deliver the same type of care currently available to larger urban populations.
Of course, laying the groundwork for even the most basic broadband connectivity is cost prohibitive. With additional layers of complexity required by our health care system, smaller communities simply can't fund these activities on their own.

Introducing: Oregon Heath Network

Dedicated teams of technology, telecommunications, and health care experts have joined forces to build the state's first telehealth superhighway. Thanks in large part to Federal Communications Commission (FCC) subsidies and in cooperation with dozens of industry leaders, government leaders and non-profit organizations across the state, the Oregon Health Network (OHN) provides the -broadband infrastructure needed to ensure that all Oregonians have equal access to the best possible health care regardless of their location. Upon full realization, OHN will interconnect all Oregon hospitals, clinics, public health offices, physicians, mental health, dental and optical clinics, and health education institutions with a level of interactive service delivery and access to resources that previously could only be imagined in our rural and underserved communities.

The entire Oregon Health Network About-Us document may be viewed at
http://www.oregonhealthnet.org/sites/ohn.osuosl.org/files/OHN_AboutUs.pdf

More information about the Oregon Health Network may be viewed at
www.oregonhealthnet.org

Appendix B
Health Information Exchange Strategic Plan
Executive Summary

Health Information Exchange and the Health of Oregonians
Health information exchange (HIE) is a key building block for health system improvements to enhance population health. The inconsistent and fragmented nature of patient records is a highly visible example of the problems caused by the U.S. health care system's reliance on multiple, disparate players in a complex health system. Sharing patient information in a secure, efficient manner has the potential to substantially reduce costs, waste and consumer heartache. It will support efforts to track patients' medical outcomes, reduce errors and make medical processes more efficient. It can empower consumers to better understand their own health, choose high-quality providers and make healthier choices. And information sharing can vastly improve public health agencies' ability to track disease and combat chronic illness, leading to improved population health.

The transformation of the health system, with health information technology (HIT) at its core, is already underway. The HIE effort will involve broad engagement from the public and private sector, consumers, providers and health plans. And once designed, Oregon's health information exchange approach will require "flexibility and ongoing refinement. Oregon's history of strong civic engagement throughout the state will serve this process well.

Oregon Health Reform, Health Information Technology and Health Information Exchange
Oregon has long been in the forefront of innovation in health care delivery, access and technology, dating back to its groundbreaking Medicaid waiver design with the Oregon Health Plan in 1987 and continuing to 2009, when the state Legislature approved an ambitious health reform law (House Bill 2009). Oregon's new law anticipated many of the innovations contained in the federal recovery law (American Reinvestment and Recovery Act) that same year and in national health reform (Patient Protection and Affordable Care Act) a year later. The central role of health information technology in improving access, quality and value in the health care system has been a thread running through Oregon's health reform, with one tangible result being the creation of the Health Information Technology Oversight Council (HITOC) to guide these efforts within Oregon.

One of HITOC's early focuses has been the creation of strategic and operational plans for HIE within Oregon. This opportunity came about after Congress made the acceleration of health information technology an urgent priority in early 2009; it included the HITECH Act as part of its economic recovery legislation. Ultimately this resulted in federal grant funding for the nation's states and territories to lead the planning of health information exchange, and the creation of this strategic plan.

The work of organizing electronic health information exchange in Oregon is advanced by the health system planning processes that have already taken place and in particular by the strong participation by average Oregonians along with health industry stakeholders throughout the state.

This plan builds on those efforts over the past several years, along with existing health information infrastructure in both the private sector and within government.

Oregon's leadership has established three main goals for health care system improvement:

- Improve the lifelong health of all Oregonians;
- Increase the quality, reliability and availability of care for all Oregonians; and
- Lower or contain the cost of care so it is affordable to everyone.

Oregon's approach to statewide health information exchange will include nurturing a new and growing marketplace of local and regional health information organizations (HIOs), setting and monitoring standards to ensure the security of personal health information, developing an accreditation program to ensure health information exchange with a common set of rules, providing valued centralized services and filling the gaps in availability to rural providers and other identified stakeholders.

Oregon is using a phased approach to HIE to allow "flexibility to adjust over time to new federal rules, marketplace evolution and real-world lessons learned. It will designate a non-profit, public/private state designated entity (SDE) to carry out this work after a sustainable financing plan has been developed and appropriate legislation has been passed.

Vision

The core of this work centers around the Oregon Health Authority's vision of healthy Oregonians and the three key goals: improved patient experience, improved population health and affordable health care.

Oregon Health Authority Vision and Mission:

Healthy Oregonians

Helping people and communities achieve optimum physical, mental and social well-being through partnerships, prevention and access to quality, affordable health care.

HIE Mission:

Information, when and where it is needed, to improve health and health care.

Given the complexity of this effort—which includes a rapidly changing regulatory, economic, political and technical environment—the stakeholders, planning team and HITOC have developed a strategy that includes the following key elements:

- A phased approach to allow for "flexibility and to ensure a stable finance plan
- Oregon Health Authority in a role of facilitation, coordination, communication and oversight
- Adherence to federal standards and certifications as they evolve and the development of Oregon-specific standards, accreditation processes and accountabilities
- Collaboration with and support of HIE efforts underway through local and regional health information organizations

Overarching Imperatives

- Establish a governance structure that achieves broad-based stakeholder collaboration with transparency, buy-in and trust.
- Set goals, objectives and success measures for the exchange of health information that reflect consensus among the health care stakeholder groups and that accomplish statewide coverage of all providers for HIE requirements related to meaningful use criteria.
- Ensure the coordination, integration, and alignment of efforts with Medicaid and public health programs.
- Establish mechanisms to provide oversight and accountability of HIE to protect the public interest.
- Account for the "flexibility needed to align with emerging nationwide HIE governance that will be specified in the future.
- Incorporate national and state health reform goals.
- Support opportunities to improve health outcomes and equity in all populations.

Goals of Health Information Exchange

- To ensure patients have safe, secure access to their personal health information and the ability to share that information with others involved in their care.
- To engage in an open, inclusive and collaborative public process that supports widespread electronic health record (EHR) adoption and robust, sustainable statewide coverage.
- To improve population health.
- To improve health care outcomes and reduce costs.
- To integrate and synchronize the planning and implementation of HIE and health IT in the public and private sectors, including Medicaid and Medicare provider incentive programs, the Regional Extension Center, local and regional HIOs and other efforts underway.
- To ensure accountability in the expenditure of public funds…

The entire Health Information Exchange Strategic Plan may be viewed at
http://www.oregon.gov/OHPPR/HITOC/Documents/SandOpPlans201008/HIEStrategicPlanOR.pdf

The Health Information Exchange Operational Plan may be viewed at
http://www.oregon.gov/OHPPR/HITOC/Documents/SandOpPlans201008/HIEOperationalPlanOR.pdf

Appendix C
Summary of Broadband Capability for the Three Electric Investor Owned Utilities with Oregon Customers

Idaho Power Company

Idaho Power Company (IPC), with a staff of about 2,000, is headquartered in Boise and was formed in 1916, when five companies combined assets, including water rights and hydroelectric facilities on the Snake River.[28] While IPC's service territory is primarily in Idaho, it also extends into parts of Eastern Oregon including Ontario and outlying areas extending west to near Baker City, John Day, and Prairie City.

IPC has a broadband network of about 350 miles. Among the uses to which this system is put are two-way radio communication, generation and/or transmission energy management, along with implementing and monitoring responses to power disturbances, inter-connections with other utilities and security operations.

Within Oregon, IPC owned and operated facilities include microwave terminals, microwave repeaters, and transmission switching stations. The broadband capabilities range in data rates as low as 12.35 Mbps and as high as 155.52 Mbps.

IPC also utilizes commercially-owned telecommunications facilities. Currently none of its Oregon facilities uses third parties though that is expected to change. They are beginning to rely on third-party telephone providers to provide data transmission at 64 Kbps. There are no past or current efforts between BPA and IPC related to broadband deployment.

PacifiCorp

PacifiCorp (PP&L), headquartered in Portland, was formed in 1910.[29] PP&L serves approximately 555,000 customers in Oregon.[30] PacifiCorp also serves retail customers in the states of California, Idaho, Utah, Washington and Wyoming. PP&L's Oregon service territory includes sections of: Portland, the coast, Willamette Valley, as well as southern and eastern Oregon.

Given PP&L's Oregon customer base, and its diverse service area, it has a rather extensive broadband network of which the vast majority is owned by PP&L. They also contract with third-party providers for networking into and out of their Portland control center.

PP&L has approximately 600 miles of broadband capability in Oregon related to sustaining power flows in Oregon. Among the uses to which this system is put are two-way radio communication, generation and/or transmission energy management, along with implementing and monitoring responses to power disturbances, inter-connections with other utilities, and

[28] See: http://www.idahopower.com/AboutUs/CompanyInformation/default.cfm
[29] PP&L is now owned by Berkshire Hathaway, which is headquartered in Omaha, Nebraska.
[30] See: http://www.pacificpower.net/about/cf/qf.html

security operations. Speeds range from a low of 1.2 Kbps to faster speeds of 64 Kbps and up to 1,500 Kbps on the high end.

Portland General Electric

Portland General Electric (PGE) first began providing electricity in 1889.[31] PGE now serves over 800,000 customers within a 4,000 sq. mile service territory located across seven Oregon counties. PGE's service territory focuses on the Portland Metropolitan area as well as the Willamette Valley.

PGE owns and operates about 500 miles of broadband capability related to sustaining power flows within Oregon. This includes microwave capability as well as fiber capability.

Among the uses to which this system is put are two-way radio communication, generation, and/or transmission energy management, along with implementing and monitoring responses to power disturbances, inter-connections with other utilities, and security operations. Speeds range from a low of 64 Kbps to faster speeds of 1,000 Mbps on the high end.

[31] See: http://www.portlandgeneral.com/our_company/pge_glance/quick_facts.aspx

Appendix D
Summary of Broadband Capability for Reporting Oregon Cooperative Owned Utilities

Canby Utility Board
This utility leases DSL capability for a SCADA link between a substation and the Operations Center to monitor and control some distribution system and substation functions.

Central Electric Cooperative
This utility uses a fiber network for some substation monitoring via SCADA. They currently are in the process of installing Advance Metering Infrastructure (AMI)/Smart Metering via a USDOE Smart Grid Grant through Pacific Northwest Generating Cooperative (PNGC). They also have a subsidiary business that provides retail and wholesale broadband services in central Oregon to medical, education, government, and business.

Central Lincoln PUD
This utility owns Fiber Optic for substation monitoring and control. They also have various dark fiber leases to public and private entities. They also lease some dark fiber leases from Bonneville Power Administration.

They are in the process of installing an AMI/Smart Metering system via a USDOE Smart Grid Grant. In the future, they plan to expand the fiber system to increase redundant connections and improve reliability for the monitoring and control network.

Columbia Basin Electric Cooperative
This utility relies on third-party fiber service using about 40 miles of fiber for their AMI system that is currently being utilized for automatic meter reading.

Consumers Power, Inc. (CPI)
This utility currently utilizes third-party provided high speed broadband service for some substation monitoring via remote meter reading and SCADA controls. They are in the process of installing an AMI/Smart Metering system via a USDOE Smart Grid Grant through PNGC.

Coos Curry Electric Cooperative
This utility uses an AMI system and information on system conditions are delivered using a third-party.

Douglas Electric Cooperative
Douglas utilizes SCADA, video surveillance, and is installing an AMI/Smart Metering system via a USDOE Smart Grid Grant through PNGC. Between the customer meter and substation is moderately low speed power line carrier (PLC). Between their substations and command center is a 100 Mbps point-to-point Ethernet VLAN based MPLS. Most of this capability is in Douglas County, with lesser amounts in both Coos and Lane counties.

Their broadband capability is provided by its subsidiary and internally owned fiber optic networks. Their subsidiary business provides retail and wholesale broadband services in Douglas County to medical, education, government, business and residences. In addition to its existing 295 mile fiber optic network, their expansion plans include 42 miles fiber optic builds to south Douglas County and 40 miles fiber optic builds in north Douglas County. Internet and Ethernet WAN services include speeds of 1 Mbps to 10 Giga-bits-per- second (Gbps).

Emerald PUD

This utility uses a Cannon power line carrier system that extends from the substations to the retail meters for their AMR system. Most of the substations have telephone service so that BPA can read its meters. These are plain old telephone service (POTS). They do not use leased lines or DSL. Phone lines are supplied by Qwest at all substations but one, which is supplied by Century Link.

They also rely on wireless communication at the main office and most of the substations for the purpose of obtaining the AMR data. This is regular wireless service; no portion of this system is leased by or otherwise dedicated to Emerald PUD. Service is provided by Unwired West.

Emerald is in the process of installing a SCADA system. The communication system for this will be Verizon wireless modems (i.e.-Essentially the same thing as aircards, but in a different package). Due to the locations, they expect the speed to normally be 56k; a few sites may achieve the advertised maximum of 256k.

This utility is also undertaking two pilot programs for load management. Both programs involve installing controllable water heaters and/or thermostats in customer homes. One system will utilize pagers to communicate to receivers in the customer homes. This system will not be bidirectional. The paging service has not yet been selected. The second system is actually a Bonneville Power program. They will arrange to use the customer's broadband internet connection.

Eugene Water & Electric Board

This utility interconnects a majority of their substations and local generating facilities with approximately 100 miles of fiber-optics. This operational network is used for monitoring and control of electric substations and generating facilities; relay protection; radio backhaul; water system monitoring and control; and corporate network connectivity to remote facilities. They plan to deploy some form of communications network to customer meters with future implementation of Advanced Metering Infrastructure in our service area.

Lane Electric Cooperative

This utility has an AMI system in place with two-way metering infrastructure using narrow bandwidth power line carrier between for some substation and meter reading. They also rely on third-party for sub-station monitoring.

McMinnville Water and Light

This utility owns a fiber optic network that links control to substation facilities. They plan to

deploy fiber as their system expands.

Midstate Electric Cooperative
This utility relies on communications to sub-stations at gigabit speeds for supervisory control. They are planning additions in Fort Rock, Christmas Valley, and Klamath. Midstate is in the process of installing an AMI system with two-way metering infrastructure using RF Mesh between the meter and aggregation points. Backhaul is a combination of iNet MDS radios (up to 512 kbps) and licensed microwave (4.5 mbps). All systems are internally-owned.

Milton Freewater Light and Power
This utility owns fiber connecting their electric substations and SCADA system.

Salem Electric
This utility has installed fiber from the substation to their headquarters for SCADA for purposes of control, communication and security of the substation. Their plan is to expand that system within the next several years.

Springfield Utility Board
This utility has installed dark fiber for SCADA for sub-station monitoring. They currently do not have any broadband connecting to meters or power plants.

Umatilla Electric Cooperative
This utility has installed AMI and Wireless connectivity to SCADA. They also rely on third-party systems for some applications. Their plan is to expand a fiber network for substation monitoring. They also have a subsidiary business that provides retail and wholesale broadband services in Umatilla and Morrow Counties to medical, education, government, business, and residential.

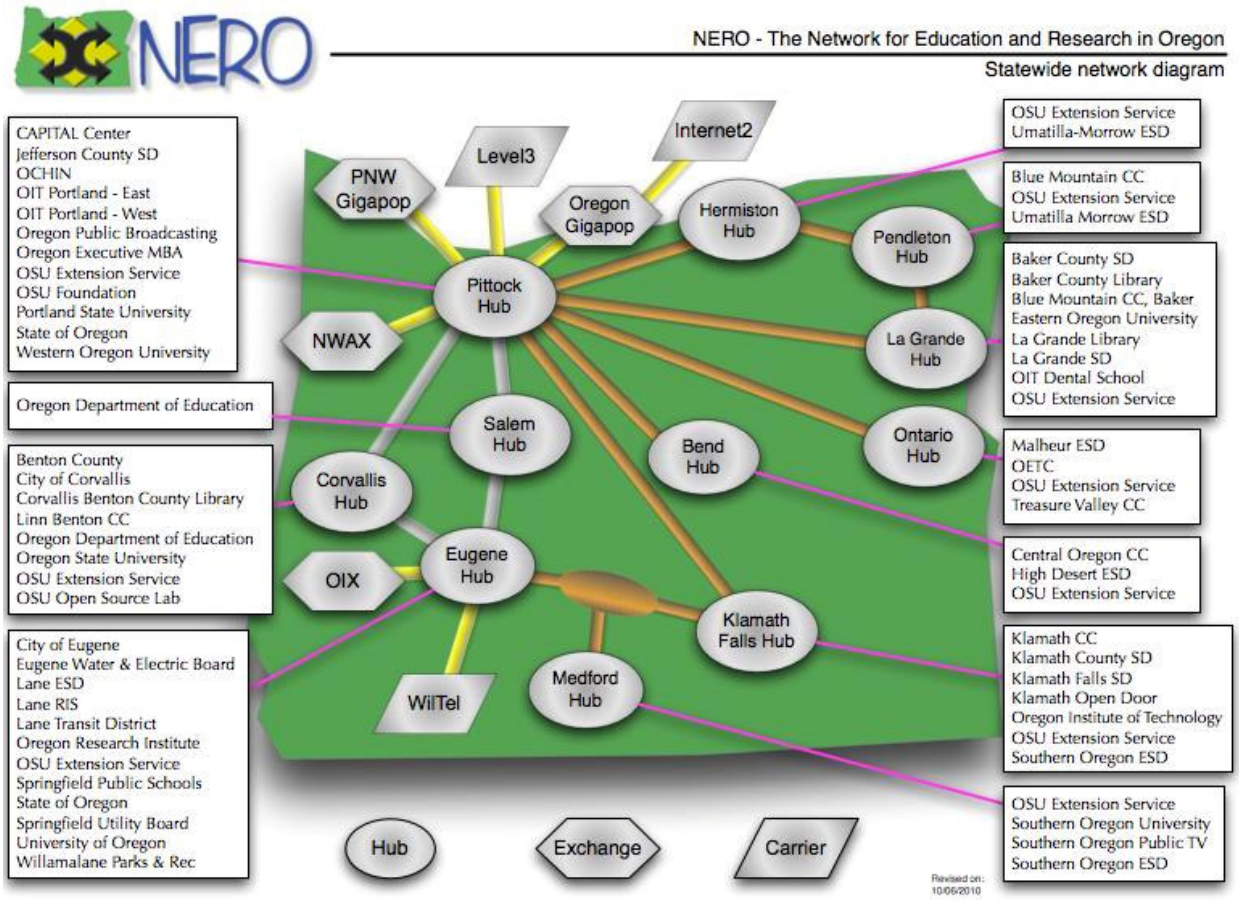
Appendix E
Summary of Broadband Capability for Natural Gas Investor Owned Utilities
with Oregon Customers

Avista Utilities
This utility reports they have no owned or leased landline, DSL, fiber, or satellite broadband for purposes of system monitoring in Oregon. In addition, they have no plans to deploy broadband for purposes of managing energy flows in Oregon.

Cascade Natural Gas
This utility reports that Cascade does not own nor is it in the process of installing any broadband capabilities at this time. Nor do they lease Broadband services at this time. Lastly, they have no plans to utilize broadband services.

Northwest Natural Gas (NWNG)
This utility reports they have no owned or leased broadband for SCADA functions. They rely on narrow band, 25kHz or less. NWNG is currently evaluating the deployment of private Ethernet to several gas storage facilities for more effective monitoring and remote controls. The narrow band capability is used to monitor gas pressure, flow, temperature, odorant injection functions, gas quality and building security.

Appendix F
Network for Education and Research in Oregon
Oregon University System Last Mile Facilities



Oregon University System Last Mile Facilities

School	Connection to NERO	Internet Bandwidth
University of Oregon	10 Gbps +	1 Gbps +
Oregon State University	10 Gbps +	1 Gbps +
Portland State University*	1 Gbps	N/A
Southern Oregon University	1 Gbps	100 Mbps
Western Oregon University	1 Gbps	100 Mbps
Eastern Oregon University	1 Gbps	30 Mbps
Oregon Institute of Technology	1 Gbps	30 Mbps

*NERO connection not primary

Appendix G
Local and Tribal Government Broadband Survey Responses

Tribal Responses:

Burns Paiute Tribe	Confederated Tribes of Grand Ronde
Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians	Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of Warm Springs	Cow Creek Band of Umpqua Tribe of Indians

City Responses:

Albany	Arlington	Bandon	Banks	Bay City
Beaverton	Brownsville	Canby	Cave Junction	Clatskanie
Coquille	Cornelius	Corvallis	Creswell	Detroit
Dufur	Elgin	Eugene	Florence	Gaston
Gervais	Gold Beach	Grants Pass	Greenhorn	Heppner
Hillsboro	Hines	Idanha	Independence	Island City
Jefferson	Johnson City	Lonerock	Madras	Malin
Maupin	Medford	Mitchell	Newberg	Oregon City
Pendleton	Port Orford	Portland	Powers	Redmond
Reedsport	Rogue River	Roseburg	Salem	Scio
Shady Cove	Sherwood	Siletz	Sodaville	Sublimity
Sumpter	The Dalles	Troutdale	Veneta	Wasco
Waterloo	Wheeler	Willamina	Yachats	

County Responses:

Clackamas County	Clatsop County	Columbia County	Coos County
Crook County	Curry County	Deschutes County	Gilliam County
Harney County	Hood River County	Jackson County	Klamath County
Lane County	Lincoln County	Marion County	Morrow County
Multnomah County	Tillamook County	Union County	Wallowa County
Wasco County	Washington County	Yamhill County	

"Other" Responses:

Langlois RFPD	LOC	State of Oregon

Grey text highlighting means broadband Internet service was reported as unavailable by the survey respondent.

Responses:

Typical **download** speed	No. of Cities	Oregonians served
768 Kbps to 1.5 Mbps	11	145000
1.5 Mbps to 3 Mbps	4	34000
3 Mbps to 6 Mbps	5	81000
6 Mbps to 10 Mbps	10	98000
10 Mbps to 25 Mbps	7	778000
50 Mbps to 100 Mbps	2	267000
Unknown	6	22000
Blank	7	148000

Typical **upload** speed	No. of Cities	Oregonians served
200 Kbps to 768 Kbps	8	60000
768 Kbps to 1.5 Mbps	10	142000
1.5 Mbps to 3 Mbps	5	30000
3 Mbps to 6 Mbps	4	210000
6 Mbps to 10 Mbps	5	36000
10 Mbps to 25 Mbps	6	853000
50 Mbps to 100 Mbps	1	86000
Unknown	6	
Blank	7	

County responses:

Typical **download** speed	No. of Counties	Oregonians served
768 Kbps to 1.5 Mbps	1	318000
1.5 Mbps to 3 Mbps	2	32000
3 Mbps to 6 Mbps	5	322000
6 Mbps to 10 Mbps	6	442000
10 Mbps to 25 Mbps	3	399000
25 Mbps to 50 Mbps	1	527000
Greater than 100 Mbps	1	379000
Blank	4	783000

Typical **upload** speed	No. of Counties	Oregonians served
200 Kbps to 768 Kbps	1	7000
768 Kbps to 1.5 Mbps	1	318000
1.5 Mbps to 3 Mbps	3	81000
3 Mbps to 6 Mbps	3	266000
6 Mbps to 10 Mbps	7	467000
10 Mbps to 25 Mbps	2	554000
50 Mbps to 100 Mbps	1	347000
Blank	4	783000

Tribal responses:

Typical **download** speed	No. of Tribes	Tribal members served (not all tribes reported populations)
768 Kbps to 1.5 Mbps	1	1500
1.5 Mbps to 3 Mbps	1	600
10 Mbps to 25 Mbps	3	4000
Blank	1	?

Typical **upload** speed	No. of Tribes	Tribal members served (not all tribes reported populations
200 Kbps to 768 Kbps	1	1500
3 Mbps to 6 Mbps	2	600
6 Mbps to 10 Mbps	1	4000
10 Mbps to 25 Mbps	1	?
Blank	1	?

Are the Internet access services subscribed to by your gov't reasonably and affordably priced?	Please provide commentary related to your response about price: [16 "<blank> responses, 10 "No" responses, 70 "Yes" responses].
No	No broadband services available - The City of Detroit still uses dial-up, which is reasonably priced but cannot keep up with today's practice to have services such as classes, workshops, manuals, invoices, etc. available online only. Satellite high-speed internet is an option that brings about frequent outages up here in the mountains due to windstorms, thunderstorms and snow.
No	There is no broadband access within Idanha.
No	The City of Lonerock accesses the internet by way of the city clerk's personal satellite service.
No	It is very expensive, we have DSL through Qwest.
No	Service price is high in our area due in part to limited competition but the DSL provider does offer 7 / 24 phone support.
No	We are winners of a 7.8 Million Federal Grant and we will be putting a 192 Fiber Strand Fiber Ring throughout the county. You can read about it on the federal BTOP WEB site.
No	All broadband connections are higher priced with less throughput than in other less rural areas. Lack of competition. Pricing prohibitive for DSL adoption in all cities but one.
No	Not available at any price. We have even offered to pay a surcharge--no providers will serve the community and we are near the telephone

	central office, and the Charter cable goes right past the building!
Yes	We get 10 megs of bandwidth paid for by Comcast franchise fees.
Yes	$14,000 per year with 7x24 support including IDS and firewall support.
Yes	$45 per month.
Yes	Comcast has a base rate for 10/100 service available to public agencies in Washington County through MACC.
Yes	NERO services are reasonably rated.
Yes	It is more expensive here than most other areas.
Yes	Service for city is part of the franchise negotiation.
Yes	They are reasonably and affordably priced.
Yes	We have a variety of services available.
Yes	DSL service provided by Peak Internet (using Qwest lines) at $35 every couple months.
Yes	We could always use lower prices.
Yes	They are reasonably priced, but limited in speed, capacity and reliability.
Yes	Considering the cost of dial up internet service, it is a bargain at current prices. Dial up costs only $25 per month or so, and is worth much less. Even if prices were higher than our current rates, it would be a bargain after dealing with the frustration of dial up or satellite.
Yes	We received competitive pricing through an RFP process.
Yes	We have a telephone association and they try to give the best prices to their members.
Yes	$660 / month with a fully redundant circuit and failover; 10mg up and down; burstable.
Yes	But it could always be less.
Yes	We pay a monthly rate of $1,350 for 15 Mbps download/ 100 Mbps upload.

Yes	No additional comments.
Yes	Except for the Hughes Net - it's over $100/month for the one slow connection.
Yes	We shopped the services, and discovered that we could obtain substantially better service than the state provided by using private carriers. We have - I believe - at or near the best price/service ratio we can obtain.
Yes	We are now getting 20m download for the same price we were getting 3m last year.

Does your government expect to expand use of broadband in the next 2-5 years?	Please provide brief detail for your response related to broadband expansion: [17 “<blank> responses, 30 “No” responses, 1 “No/Yes” response (two individuals from Heppner responded and their responses differed), and 48 “Yes” responses].
	Unknown.
	Unknown.
No	We are constrained to 10 megs of bandwidth due to the financing by the Metropolitan Area Communications Commission (MACC) grant program that uses Comcast franchise fees.
No	Extend fiber infrastructure to the City economic zone (near to Corvallis Airport).
No	We do not have access to broadband
No	The City of Idanha does not have the money to provide or use broadband service.
No	Not until it becomes available, then we will consider its use.
No	The City has not spoke of any plans to improve or expand in this area

No	Not unless it becomes available here.
No	We have been told that we don't have enough years left in our lives to see broadband service in the community of Langlois
Yes	Multi media and social networking.
Yes	Clatskanie PUD and and Cascade networks were just awarded a multi-million grant form the Feds to provide Broadband.
Yes	Video/audio coverage of meetings, more cloud-computing with web-hosted applications (i.e. accounting), more citizen services.
Yes	Working with other cities in Lane County to take advantage of a fiber network that was installed several years ago. Would partner with MINET to offer triple play for homeowners and to offer higher bandwidth over the fiber in order to offer versatility to business and possibly recruit businesses to the city.
Yes	We plan to double the subscription - i.e. 20-40 mbps.
Yes	Lane Council of Governments has received a grant for bringing "middle mile" fiber backbone to several key government buildings (police, city hall, public works, and our event center/emergency shelter).
Yes	Video/audio coverage of public meetings.
Yes	Moving toward a web-based government with all government documents and access to services provided electronically.
Yes	We'll seek improved bandwidth for more community-facing self-service information applications.
Yes	More use of video-teleconferencing, marketing of internet capability for business.
Yes	It is anticipated the use of the Internet will grow in the future and on site visits will drop accordingly.
Yes	We will be providing expanded Internet service and adding public safety camera, both for internal and public use.
Yes	We plan to install VoIP phone system. We would like to do video

	conferencing to avoid driving to meetings, etc.
Yes	The adoption of Cloud based service will have a large impact on broadband throughput needs.
Yes	Utility billing, streaming video for public meetings.
Yes	Would like to get "real" broadband coverage and speeds.
Yes	Likely we'll just increase our consumption of bandwidth.
Yes	SCTC is currently installing fiber lines within the city of Sublimity.
Yes	Use of social network.
Yes	We expect to expand public access to the Internet based services.
Yes	A fiber ring running approximately 186 miles throughout Clackamas County. Read about it on the Federal BTOP web site.
Yes	TBD
Yes	Connect Health dept and Sheriff Office to network. We have 6 strands of fiber running to the fire hall ... so possibly providing them broadband internet access.
Yes	We expect our utilization of bandwidth to increase. We typically open 3 to 5 new facilities per year.
Yes	More online or hosted applications. Possibility of VoIP.
Yes	Use of the Internet is ever growing.
Yes	We plan on expanding usage in several areas, We are looking at VoIP, Cloud Computing, and out sourcing services. We are also looking to establish a redundant backup path,
Yes	Cloud computing, social media.
Yes	We are always looking to go forward. We don't have a specific project in mind at this time.
Yes	Expanded use would focus on providing more access to information and automation of the most common services via a public web site.

Yes	E-government applications (e.g. permits and licensing, tax collection).
Yes	Expanding use of IP-based video conferencing Expecting a range of cloud-based/Software as a Service based applications across multiple business units.
Yes	We are constantly looking for ways to continue to expand electronic services. We can successfully "push" services out to our citizens through the use of electronic means.
Yes	Removing any non Gbps connections and updating those connections.
Yes	Add usage of Video/Audio conferencing.

Key terms:

LATA (Local Access and Transport Area)

LEC (Local Exchange Carrier)

ILEC (Incumbent Local Exchange Carrier)

CLEC (Competitive Local Exchange Carrier)

ATM – Asynchronous Transfer Mode

SONET – Synchronous Optical Network

OC – Optical Carrier

SHNS – Self Healing Network Service

DSL – Digital Subscriber Line

Appendix H
Innovative e-Government Activities by Survey Respondents

List of innovative e-Government activities undertaken by survey respondents:

1. Added online bill payments
2. Calendar, Job postings, Council audio minutes, Newsletter. Department info
3. Implemented SharePoint as the primary Internet facing portal.
4. Indexed video of City Council agenda items, additional blogs, more forms of electronic payment, crime statistics, automated emergency alerts
5. Just adding more information regarding city activities and links to other agencies such as ODOT
6. No innovation. Dial up service is pretty much worthless these days. You cannot even download anything. The lines are so poor that the servers on the other end sense inactivity and drop the connection anyway.
7. No major initiatives, except a redesign of the "look".
8. None - still looking into some sort of affordable high-speed internet system to offer the services citizens need and want
9. Not much innovation here. We learn from the experiences of others. Why reinvent the wheel? We don't have dedicated I.T. staff, so applications have to become somewhat more mainstream before we can learn about and implement them.
10. On-line document library for all public documents community calendar for every business and non-profit in town virtual tours of attractions in our area A virtual "yellow pages" of the entire town - all businesses and non-profits have their own accounts and can post updates about their services, products, events, and meetings.
11. RSS feeds
12. Social media blogs, City envisioning project, Citizen vacation data for Police watching homes when citizens go on vacation, Beaverton Urban renewal partnerships, Sustainable Program site, Adult summer reading registration, Fundraising for various charitable event, various citizen volunteer initiatives
13. Still putting the site together
14. Tax Payments Parks Reservations Utility Payments Job Applications Contractor Permits
15. Too lengthy to list right now. Call for more information if you wish.
16. Video program as previously discussed

Appendix I
Report on American Recovery and Reinvestment Act of 2009 (ARRA)
Funded Oregon Based Broadband Projects

ARRA Oregon Project Award Summary

Award Recipient	ARRA Program	Grant	Loan	Federal Funds Total
Oregon based projects				
Canby Telephone Association	BIP	$ 496,090	$ 248,046	$ 744,136
Cascade Networks, Inc.	BIP	$ 578,316	$ 578,316	$ 1,156,632
Cascade Utilities, Inc.	BIP	$ 3,898,299	$ 1,299,433	$ 5,197,732
City of Sandy	BIP	$ 374,537	$ 374,548	$ 749,085
Monroe Telephone Company	BIP	$ 4,241,050	$ 1,413,684	$ 5,654,734
Trans-Cascades Telephone Company	BIP	$ 1,770,294	$ 590,099	$ 2,360,393
Warm Springs Telephone Company	BIP	$ 2,722,960	$ 2,722,960	$ 5,445,920
				$ -
Bend Cable Communications	BTOP	$ 4,418,765		$ 4,418,765
Clackamas County	BTOP	$ 7,804,181		$ 7,804,181
Crook County	BTOP	$ 3,908,064		$ 3,908,064
Gervais Telephone Company	BIP/BTOP	$ 314,430	$ 314,430	$ 628,860
Lane Council of Governments	BTOP	$ 8,325,530		$ 8,325,530
				$ -
Public Utility Commission of Oregon	SBDD	$ 2,108,302		$ 2,108,302
Public Utility Commission of Oregon	SBDD	$ 3,550,000		$ 3,550,000
	TOTAI	$ 44,510,818	$ 7,541,516	$ 52,052,334

*These are Oregon based projects indicating that the applicant is located in Oregon and that the project will be implemented in Oregon.

Notes:

- Portland State University's Lerner Web Partnership project is a multi-state project which was awarded $3,318,031 including $1,125,380 for Oregon (BTOP)

- There were several non-Oregon based projects that will bring in additional funds of over $1 million to Oregon.

Appendix J
Appendix Oregon Broadband Advisory Council Members – 2010

Rich Bader
President and CEO
EasyStreet Online Services

Ray Baum (Council Chair)
Commissioner
Public Utility Commission of Oregon

Jonathan Dolan
Associate Director, Network Services
Oregon State University

Miles Ellenby
Medical Director, Telemedicine Program
Oregon Health and Science University

Ted Ferrioli
Senator
Oregon State Senate

Joseph Franell
General Manager and CEO
Eastern Oregon Telecom

Kathy George
Commissioner
Yamhill County

Adam Grzybicki
President
AT&T Oregon

Mary Beth Henry
Deputy Director, Office of Cable Communications and Franchise Management
City of Portland / Mt. Hood Cable Regulatory Commission

Jeff Johnson
Chair
State Interoperability Executive Council

Lonny Macy
Planning Department
Confederated Tribes of Warm Springs

Dugan Petty
Chief Information Officer
Oregon Department of Administrative Services

Tobias Read
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Oregon House of Representatives

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Testimony of Christopher Tamarin before the Before the Oregon House Committee on Sustainability and Economic Development, March 19, 2009.

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