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EXHIBIT A

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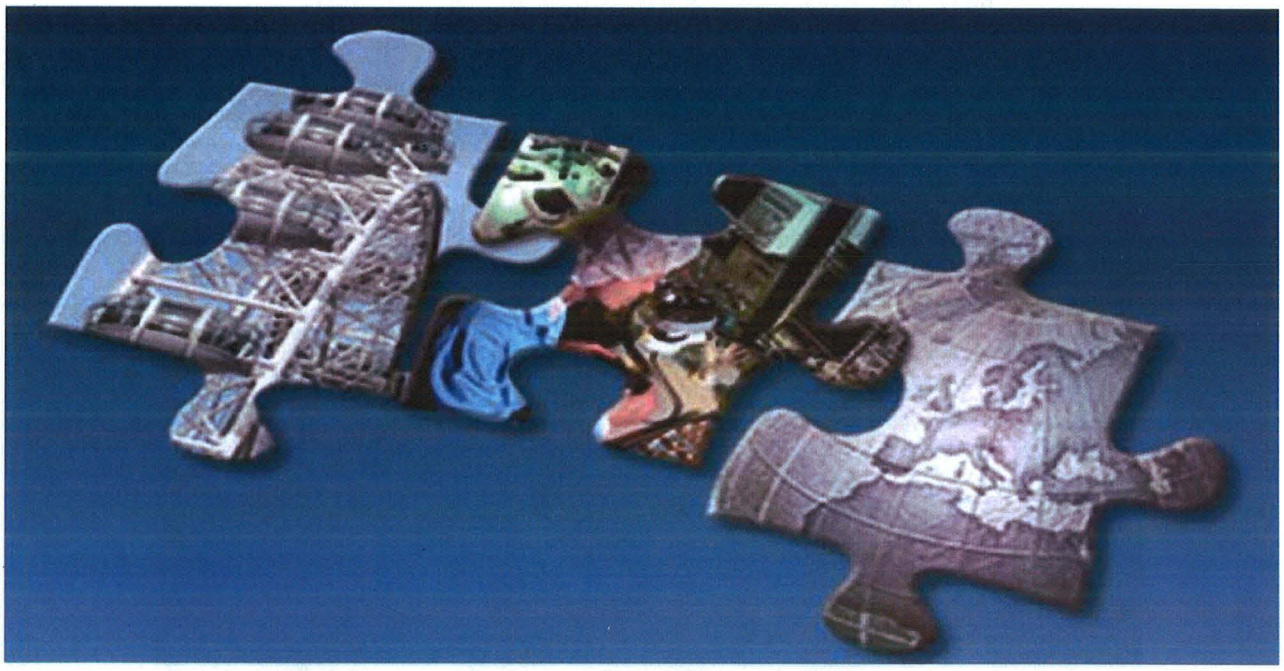
Connecting to Our Future: Portland's Broadband Strategic Plan



City of Portland

Prepared by the Office of Cable Communications & Franchise Management

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CONNECTING TO OUR FUTURE: PORTLAND'S BROADBAND STRATEGIC PLAN

Broadband Strategic Plan Leadership Team

Brendan Finn, Chief of Staff to City Commissioner Dan Saltzman

Skip Newberry, Economic Development Policy Advisor to Mayor Sam Adams

Tim Crail, Budget and Legislative Policy Advisor to City Commissioner Amanda Fritz

Aaron Johnson, Policy Advisor to City Commissioner Randy Leonard

Sonia Schmanski, Staff Representative to City Commissioner Nick Fish

Mark Greinke, Chief Technology Officer for the City of Portland

David Olson, Director, Office of Cable Communications and Franchise Management

Mary Beth Henry, Broadband Strategic Plan Project Manage

IBI Group with affiliate NetCity Inc. provided consulting for the Portland Broadband Strategic Plan under the direction of the Office of Cable Communications and Franchise Management. Nancy Jesuale, NetCity Inc. and IBI Group, was the Project Consultant.

Table of Contents

CONNECTING TO OUR FUTURE: PORTLAND'S BROADBAND STRATEGIC PLAN

Introduction

> Understanding the impacts of enhanced Broadband Networks on the city of Portland and its citizens leads to strategic investment, partnerships and policymaking to protect our economy, society, jobs and the livability of Portland.

The advancement of technologies and infrastructure associated with Broadband will play a key role in Portland's economic future and quality of life. We are at a critical juncture where establishing an effective Broadband policy has the potential to create more jobs for Portlanders, increase opportunities for the region's companies, enhance public safety, and provide greater educational opportunities throughout our community[1]. The creation of a Broadband Strategic Plan is about keeping Portland competitive so that our workforce can continually innovate locally and collaborate globally. This requires robust, affordable broadband infrastructure plus realistic adoption and utilization strategies. Broadband Networks (including the Internet, as well as infrastructure and devices) are producing cataclysmic change in global, national and local societies, markets and institutions around the world. These networks are interconnected and pervasive in their reach, and for the purposes of this plan will be referred to as simply "the Network." The Network allows change to happen so quickly that we are often surprised by the deep societal changes we see and are unaware of great impacts that are just around the corner. Yet, the Network is transforming societies, threatening national and local boundaries, challenging markets, and impacting wealth, work, education, health and public safety. So it is important for us to learn what the Network is, how it impacts society, and set a strategic course for our economic and social development.

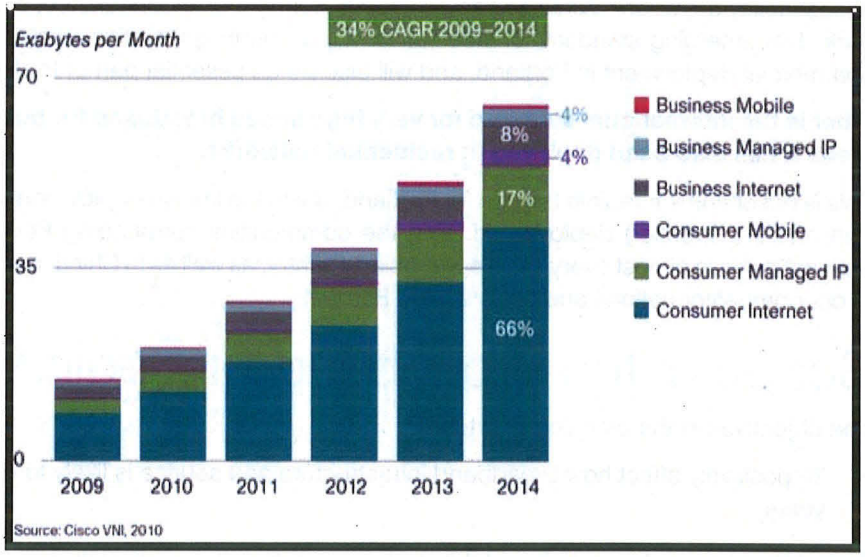
Like the introduction of electricity, Broadband Networks are fundamentally changing our environment and society in ways that were not anticipated. Much like electricity, which was invented to turn on the lights but powered the transformation to an industrial society, the Network is powering another transformational global shift into a technological and informational society. It was impossible to know in advance that electrification would provide the critical infrastructure to power computers, radio and television, financial markets, home appliances, manufacturing, electric vehicles and many more unforeseen innovations.

1 The Future of Cities, Information and Inclusion http://www.portlandonline.com/cable/index.cfm?c=54038&a=334344

Broadband is Critical Infrastructure

Broadband provides the high-capacity Internet connections which have rapidly become fundamental infrastructure. Just as electricity was the pivotal innovation in the last century, broadband networks are having rapid, widespread and dramatic impacts on our society in this century. The Network has become integral to both the working and personal lives of most households, families and businesses. This has been demonstrated by these functions now moving online:[2]

- The majority of job listings
- Most higher education admissions applications and requests for references
- Critical health care functionality, including benefits claims
- Many billing statements, bank statements, etc. that a household receives
- Bus schedules, traffic information, and road conditions
- Ordering, shipping and postal tracking
- News, particularly newspaper content



Broadband refers to the capacity of the networks to carry data traffic (the size of the access "lanes" on the Network). A broadband network has large capacity to transmit information globally, although the definition of Broadband is changing quickly too. The Federal Communications Commission (FCC) has proposed in the *National Broadband Plan (NBP)*[3] that broadband should be defined as 50 Mbps "downstream" (to the consumer) and 20 Mbps "upstream" (from the consumer into the network) by 2015. Given the growth trends in network traffic this definition is conservative (See Figure 1 above). Cisco and other scientific companies talk about the network in terms of "terabytes" of capacity in the network center, or "core". Businesses today routinely require symmetrical gigabit service between their locations. Global Internet traffic grew 45 percent during 2009 alone. **Global network traffic will quadruple from 2009 to 2014.** The average monthly traffic in 2014 will be equivalent to 32 million people streaming Avatar in 3D, continuously for the entire month. Overall, as projected by Cisco Systems, Internet Protocol (IP) traffic will grow at a compound annual growth rate (CAGR) of 34 percent[4].

For the City's Broadband Strategic Plan, the NBP's capacity goals represent a "floor" rather than a ceiling. While these are higher than Portland's basic and mid-tier services today, the goals set forth in this plan will require greater capacity in the future. **A shortage or deficit of broadband capacity will cause Portland to be at a competitive disadvantage in meeting economic development goals[5].** This plan does not suggest a specific broadband capacity target for Portland in the future. This plan does, however recognize Broadband service as a **necessary service** (both wireless and wireline) to sustain economic growth, maintain quality educational and governance institutions, protect citizens and property and to create employment opportunity.

2 See the Broadband Briefing Book provided by the Office of Cable and Telecommunications Franchise Management, City of Portland (2011) at http://www.portlandonline.com/cable/index.cfm?c=54013 (last accessed 7-18-2011)

3 National Broadband Plan, Federal Communications Commission, Washington, D.C. (2010) see http://www.broadband.gov/plan/ (last accessed 7-18-2011)

4 www.cisco.com

5 http://www.sngroup.com/what-exactly-are-we-stimulating/

Fiber and Wireless Broadband: The Technological Future

The future of telecommunications technology is not wireless or fiber optics—it is a combination of both. **Fiber and wireless are both essential[6].** These two technologies inherently complement each other and work together. Fiber offers theoretically infinite capacity, which is essential for institutional and high bandwidth users, and for the backhaul of wireless data and voice from cellular towers to the network infrastructure. The key advantage of wireless is that it offers mobility and connectivity during movement, untethering the user and giving them network accessability anywhere. Wireless can be used to connect to an ambulance, a bus, or a resident's laptop in a public park. The emerging standard for wireless is 4G, or fourth-generation wireless; it is on the short-term horizon for commercial deployment in Portland, and will also be an essential part of Portland's public safety wireless future.

Fiber is the international standard for very high speed broadband for businesses and institutions. In many areas it has also been deployed in residential networks.

This is not on the immediate horizon for Portland, given the known deployment plans of the private sector. However, Verizon (now Frontier) deployed FTTP in the communities surrounding Portland. FTTP is being deployed on a national basis in almost every developed Asian country, as well as in China, and it is also being deployed extensively in our competitor nations and cities across Europe.

Scope of the Broadband Strategic Plan

The objectives of the planning effort are:

- To positively affect how broadband infrastructure and service is likely to develop in Portland over the next ten years.
- To plan for optimal broadband adoption and deployment for Portland.
- To identify key short (3-year), mid (7-year) and long-term (10-year) broadband policies and initiatives that the City can put in place that coordinate and guide the actions of City Bureaus, Offices and Committees toward a unified technology policy direction.
- To positively impact the policies, actions and directions of other Oregon communities and of the state as a whole.

Five Goals of the Broadband Strategic Plan

Through the strategic planning process, the following five goals were identified for the Broadband Strategic Plan.

1. Strategically invest in broadband infrastructure to attract innovative broadband-intensive businesses and institutions that create knowledge jobs in Portland.
2. Eliminate broadband capacity, equity, access and affordability gaps so Portland achieves near universal adoption of broadband services for all residents, small businesses and community-based organizations.
3. Develop highly technology-skilled and employable residents, students, small businesses and workforce.
4. Promote and plan for the use and wide-spread adoption of broadband technologies in government, energy conservation, transportation, health, education and public safety.
5. Create future-oriented broadband policy, modernize government organizations and institutionalize digital inclusion values throughout the region.

The Broadband Strategic Plan is a vision for Portland's future that recognizes the social, economic and political importance of Broadband in our livability, prosperity, sustainability, and equity goals.

The Portland Broadband Strategic Plan Vision Statement

6 Columbia Telecommunications Corporation (CTC), various documents. See http://ctcnet.us/

Requirements for Success: Vision, Partnerships and Leadership

This Broadband Strategic Plan represents a milestone in urban planning for the City of Portland. For the first time, the City has taken steps to include Broadband as an essential, critical infrastructure in the planning fabric, along with transportation, telecommunications, parks, power, and water/sewer infrastructure. A robust broadband ecosystem of infrastructure, competitive providers, services and devices is necessary for economic growth, job creation, education, livability, sustainability, public safety and civic engagement. However, achieving the goals outlined in this plan cannot be accomplished by City policy and actions alone. The City must engage a host of regional and statewide players with its vision, and must create partnerships that can move together in a strategic direction. The partnerships require both public and private sector entities.

Effective policy changes and transformation of the City government and its institutions requires strong and committed leadership. The Broadband Strategic Plan describes significant changes in government structures, relationships and technology. These cannot be implemented easily, and the steadfast commitment of the City's elected officials and top managers is necessary throughout the change process.

Strategic Planning Process

The City of Portland began its Strategic Planning for Broadband in late 2010, after the City Council passed a resolution recognizing "high-speed, accessible and affordable broadband is now mission-critical infrastructure for job creation, education, health care, the enhancement of safe and connected communities, civic engagement, government transparency and responsiveness, reduced carbon emissions, and emergency preparedness[7]".

The Portland City Council directed the Office of Cable Communications and Franchise Management to work with the Portland Development Commission, the Bureau of Technology Services, the Fire Bureau, the Police Bureau, the Public Safety Systems Revitalization Program, the Office of Planning and Sustainability, and Mayor and Council Offices to ensure that a comprehensive, informed and inclusive broadband planning effort was undertaken that emphasizes equitable provision of services, business vitality and job creation. The Office of Cable Communications and Franchise Management engaged a consultant, IBI Group and its affiliate Nancy Jesuale of NetCity Inc., to assist with the Plan. A leadership team composed of staff from each City Council Office and the Bureau Directors of key City Bureaus was formed. Phase I of the work plan called for the formation of five sector workgroups (economic development, education and health, digital equity and inclusion, planning/transportation/sustainability and public safety) to participate in an eight-week facilitated planning process. This process was kicked- off with a session in City Hall in January 2011 that included presentations by Commissioners Dan Saltzman and Amanda Fritz, City Officials, community representatives and telecommunications providers offering broadband services in Portland. The five sector workgroups included City Bureau Managers, Directors and executive employees, Council Office liaisons, Multnomah County, Tri-Met, Metro, non-profits, small and large businesses, social activists, K-12 and higher education representatives and health professionals. This report represents the outcomes of those meetings, engagement with the community and research and consultation with broadband experts on best practices.

Economic Development

The City of Portland's economic goal is job creation, including providing access to a skilled workforce. The City recognizes four traded-sector industry clusters in the Economic Development Strategy, including advanced manufacturing, athletic and outdoor, clean tech, and software, as well as a fifth, functional cluster focused on research and commercialization.[8] The City's Economic Development Strategy also recognizes the importance of vibrant communities and small neighborhood businesses to Portland's economy.[9] Wilf Pinfold, Director of Extreme Scale Projects at Intel said "if we really want to create an engine for job creation, Portland must have particular competence in Broadband. We need to look at standards and best practices." Sheldon Renan, a consultant in technology issues said "we have to address infrastructure. It doesn't have to be, and probably shouldn't be either publicly owned or privately controlled, but rather we should be setting up cooperative partnerships between the

7 http://www.portlandonline.com/cable/index.cfm?c=54013&a=334327

8 These are described at http://pdxeconomicdevelopment.com/industries.html

9 See the Portland Development Commission's Neighborhood Economic Development Strategy at http://www.pdc.us/bus_serv/ned.asp

public and private sectors to improve infrastructure and access to broadband generally for businesses and the workforce." Business needs broadband as its lifeblood. Local government has an enormous role to play to ensure that broadband resources get placed in our communities, by providing funding, support, and resources. Skip Newberry, of the Mayor's Office noted that the City "wants to help entrepreneurs, very small businesses (11-99 employees) and micro businesses (under 10 employees) because these businesses create most of the new jobs in Portland. Certain parts of the city, like the central eastside, have a concentration of start-ups and PDC is looking at ways to direct urban renewal and other resources to help these small businesses grow." The economic development workgroup wanted to find incentives for developers to include broadband in their buildings, and for providers to extend high bandwidth services in areas where business clusters. They discussed both regulatory and financial incentives to developers and providers. Rich Bader, CEO of EasyStreet OnLine Services suggested the need to "marry high tech businesses and anchor institutions, such as government and universities" to leverage their demand for very high bandwidth into "markets" for broadband providers. Wilf and Sheldon proposed that the City should actively work to attract research and development institutions, with very high bandwidth requirements to pump demand into the City and establish the City as a research-friendly high bandwidth ecosystem.

Portland must innovate by establishing partnerships with industry, education, and other government bodies, and by reforming our government institutions.

Broadband and the Transformation of Working and Employment

According to the Aspen Institute's Communications and Society Program's recent publication, "The Future of Work", (2011)[10] "Work in the future will be organized in ways that are far more decentralized." Work is no longer confined to a specific time and place. Technology is blurring the lines between work and home and between work and personal life. Tens of millions of people now work at home offices, telecommute or participate in "virtual companies" whose members are scattered across the country or the globe. Many others work for startup firms in improvised settings. Open platforms for the "crowdsourcing" of work mean that work is becoming an activity that can occur anywhere, and at any time. The implications of this transformation affect our urban architecture (who will occupy high-rise buildings?), tax structure (what is the correct structure for taxing business when its location is the Network, not the City) and our economic development strategies (how can we attract companies to locate in Portland, if they are in fact virtual rather than physical?) The Aspen Institute report predicts the transformation of corporations or "firms" into markets, where skills are outsourced and workers are much more likely to be contractors or affiliated with markets than specific firms. Particularly in scientific, cognitive and creative work, the knowledge worker may work for employers who are not located within the region at all. Conversely, employers located in Portland may hire workers from anywhere on the globe, depending on their skills rather than their ability to report to a specific location at a specific time.

Broadband and the Transformation of the Worker

Employees will be expected to be highly conversant with digital networking and virtual collaboration on the platform referred to as "cloud computing."[11] As cloud computing becomes more pervasive, Peter Jackson, Chief Scientist and Vice President of Corporate Research and Development at Thomson Reuters, envisions that "once the cloud becomes a reality and people have raw, undifferentiated computing power available to them as a utility, they will be able to stop worrying about infrastructure and platforms. Then they will be able to start thinking about intangibles: innovation and imagination – the things that build higher quality services. This will raise everybody's game." (Aspen, p.17) This is the new reality that Portland must develop a strategy to accomplish. Our city must be a location among the first and best in the Country to provide the computing power and platforms as a utility, to attract the innovation and imagination of the economic markets. Portland's economy cannot prosper without institutions that innovate, and infrastructure that allows global connectivity wherever those institutions and their workers choose to locate. Legacy hierarchies and institutional structures are bottlenecks to developing the new economy. Portland

10 http://www.aspeninstitute.org/publications/future-of-work

11 "Cloud Computing" is defined as the use of network connections to access most data and applications from servers provided by a third party that reside in cyberspace, rather than using servers and applications locally to store and access data and applications.

must innovate in both, by establishing partnerships with industry, education, and other government bodies, and by reforming our government institutions and policies to root out silos of control and resistance to change.

The Aspen Report points out that in the networked environment, the mindset and disposition of workers will matter more than ever (p. 22). Workers must be prepared to embrace change. They must desire to be "on the edge" of breaking developments, and must have passion to probe a question or problem (a passion for inquiry). These mindsets and dispositions cannot be taught, but must be cultivated, according to John Seely Brown, of the Deloitte Center for the Edge. Work is becoming a lifestyle and identity, not just a paycheck (Aspen p.24).

Sustainability, Transportation and Urban Planning

The Network will have pervasive effects on our social networks and our physical habits, perhaps most notably our commutes. The increase in available capacity to do work and make social and political contacts on the network, combined with the increasing real and social costs of commuting means that more work will be performed without requiring commuting. Home offices, neighborhood "office-environments" (like the coffee shop, library or community center) will draw workers when commuting is inconvenient or impossible. Beyond convenience, knowledge workers who are based "on the net" will choose to live where they want, in social and physical environments that enhance their lifestyle and are affordable, since work can and does take place anywhere, and at all hours. Families will seek communities offering a lifestyle, knowing that their work is portable. Affordability will be critical, but also access to cultural activities, recreation, educational opportunities and community for children and adults, and the ability to shop, dine, and interact will attract knowledge workers.

Aging: Our society is also aging, and families will be concerned with the care of seniors as well as children. Telemedicine will advance to the household, offering health worker visual and auditory monitoring of seniors, medication inventories, vital sign monitoring, motion detection, and other types of in-home monitoring and assessment using the network[12]. Today many seniors take most of their outings out of the home to physician appointments. Many of these check-ups will be performed via the network, allowing seniors to function for days and weeks and months without visiting a hospital or doctor's office for care. Seniors separated from their family members will be able to visit daily and check in with children and grandchildren as well as caregivers through the network.

Legacy hierarchies and institutional structures are bottlenecks to developing the new economy.

Internet of Things: Household systems will be connected to the network, not just for communication, entertainment or work, but in an "Internet of Things". Devices will connect and communicate their status and health, monitoring and controlling energy consumption, making shopping lists of items running low in the fridge, and scheduling events, maintenance, and replacement of everything from tires to furnace filters without human intervention. The power grid itself will be a "smart-grid" managing demand according to available supplies in an automated effort to control power consumption[13].

Transportation: Urban travel will be most convenient and affordable on public transportation, but even private automobiles will be connected to a network. The network will monitor their status and performance, notifying drivers of hazards, delays and mechanical issues. Anti-collision technology will brake and steer through road hazards, and prevent operation of vehicles by inebriated drivers.

Urban Planning: For Portland planners, understanding the power the network will have on urban form and function is critical. Neighborhoods will be designed around affordable and sustainable transportation options, and network access will be as important to the function, form and livability as power, roads and water. Tim McHugh, Chief Information Officer of TriMet notes that there will be three layers of communications infrastructure in the transit system; the equipment imbedded in vehicles, systems for vehicle tracking and real time information on conditions and location, and customer information access and applications. These three layers will also apply to buildings,

"High bandwidth nodes are just like freeway interchanges"

12 See for instance http://www.nursingcenter.com/library/JournalArticle.asp?Article_ID=425466 (last accessed 7-18-2011)
13 http://www.infoworld.com/print/167184 July 18, 2011

homes and other structures. An "Internet of Things" will tie the systems within the structures together to monitor and control energy use, inventories, locks and security, temperature, etc. Control systems will be accessible through the network "cloud", which will aggregate information for trending and real-time energy-load, transportation and supply chain control. Consumers will access their systems real time, through mobile devices wherever they are to turn the lights on or off, defrost dinner, or say hello to their children when they put their key in the lock after school. Gary Odenthal, Senior Planner for the City, noted that "everything is going mobile. The network has to go where people go." Brendan Finn, Chief of Staff for Commissioner Dan Saltzman noted that "Infrastructure is driving where people are going to locate. It drives where companies are locating. High bandwidth nodes are just like freeway interchanges." Chris Smith of the Portland Planning and Sustainability Commission noted that Broadband networks could be "commons goods" or "private goods." Chris advocates for broadband to be a commons good in Portland, something all have access to as a privilege of being here, and not something that is a luxury available only at a premium. Scott Robinson, Deputy Chief Operating Officer of Metro suggests that broadband should be included in every regional planning effort from climate action to transportation to housing, community development and education. Alex Bejarano of the Portland Bureau of Transportation noted that "Broadband is essential to our quality of life and vision of the future. It's a utility, and so much more." Don Stastny, an architect from StastnyBrun Architects in Portland was very concerned about equity issues. "Broadband, if not ubiquitous will create further divides between the haves and have-nots. Broadband access is a matter of social equity and social policy, indivisible from modeling neighborhoods. We have to consider the impact on individual citizens."

Digital Inclusion and Civic Engagement

Don Stastny's concerns were echoed throughout the workshop sessions and in every workgroup in the Portland process. According to the Aspen Report, "New sorts of government leadership are needed to address social inequality, education and training, and improvements in governments services... There is a keen imperative, in short, for serious institutional innovation."

The biggest dangers are greater inequalities of wealth and potentially destructive social polarization. These trends make it imperative that government, education and social institutions learn how to respond to the emerging networked environment.

Civic Engagement: Brian Hoop, of the Office of Neighborhood Involvement (ONI) shared ONI's goals for improving civic engagement: increasing and diversifying access to government, strengthening the capacity of community organizations, expanding public impact on government (improving transparency) and improving neighborhood livability and safety. Cece Hughley, Executive Director of Portland Community Media noted that a major part of their role is to promote digital literacy. She notes that it is a natural role for non-profits to help cities accomplish transparency. She also noted that video storytelling provides a powerful context when discussing policy. Without broadband, individuals and communities have limitations on their ability to see and distribute video communications. Russell Senior of Personal Telco commented that the overarching goal is to facilitate everyone to be a producer of Internet content as well as a consumer.

Transparency: Julie Omelchuck, of the Portland Office of Cable Communications and Franchise Management noted that broadband technologies are "the only way to make transparency affordable." She commented that all city government documents should be on-line for public access. However, Rick Nixon, Technology Manager for the City's Bureau of Technology Services suggests that that idea doesn't go far enough. Government documents need to be on-line but they need to be in a useful, standardized format, that is searchable, indexed, and where data can be lifted or exported to other programs and platforms for analyses and general use. Rick also noted that the City has outdated policies for maintaining the City's web site, and for access to technology. Julie and Rick emphasized that the City needs to provide more transactional opportunities for citizens to do all of their business with government over the Network. Public records laws, public meeting laws and other standing policies and regulations need to be reformed. Public meetings will not continue to be "physical in a given place and time" but will be conducted over a period of time over the network, to allow residents with all kinds of schedules to participate in dialog and decision-making." Portland could be a leader in instituting these improvements.

Culture: Abdiasis Mohamed, Program Coordinator for IRCO spoke about trends in Portland's immigrant communities. He notes that there is a generational difference among these communities, where youth are adapting

mobile Internet and smart phone technologies very quickly, but older populations don't adapt to the networked society. Access and affordability of broadband are key for these communities to be able to connect and engage with civic life, and to remain connected with their native cultures. Julie noted that it is important to focus on mobile applications, because mobile internet is being adopted faster and is more pervasive through smart phones than fixed internet.

There was extended discussion of the role of the City in ensuring affordable access to broadband for residents of Portland. Many participants felt that broadband access is becoming a right, not a luxury, and that access is an equity issue. Some supported the idea of a publically funded open access infrastructure platform over which private entities could compete. There were many other proposals to find ways to subsidize needy and low income households to pay for broadband including requiring public buildings to offer free broadband service and providing incentives to carriers to serve low income neighborhoods. Digital literacy continued to emerge as a necessary element to empower communities and individuals. Access to broadband, while necessary, is not sufficient in itself.

Broadband technologies are "the only way to make transparency affordable."

Public Safety

Several public safety leaders in Portland participated in the Broadband and Public Safety work group. Mark Ellwood, IT Manager for the Portland Police Bureau noted that "everything" is moving to video for law enforcement, including camera-equipped police cars, video interrogation, traffic stops and speeding tickets, and live ambulance links to hospitals. Mark Greinke, Portland's Chief Technology Officer commented that the systems in use already are limited by the lack of broadband wireless capacity. The group noted the benefits that sensor-nets can provide for situational awareness in fires, emergencies, car wrecks and other events, but that current networks and devices don't support the City's ability to activate even the sensors they already have. Chief Klum, the Portland Fire Chief points out that firefighters need building plans, maps and videos of locations to provide "a Google street view of a building, only from the inside." Firefighters should have access to private WiFi systems that exist in buildings when they respond. The 911 system cannot receive or process videos from citizens, even though as Carmen Merlo, Director of the Portland Office of Emergency Management (POEM) points out, "the public is our eyes and ears" in emergencies. Though mobile network costs are high, the cost of not having high availability of information is response time, mistakes and delay. Karl Larson of the Public Safety Regional Radio Project (PSSRP) points out that broadband is "cheaper than gas." The participants discussed the specific needs and standards of the first responder community. "Our needs for reliability and ubiquitous coverage demand are higher standards than commercial networks have met in the past. Moreover, we require interoperability between networks, and priority access to networks. This group would like to see policies which develop seamless roaming and regional reliability, coverage and availability of networks with pre-emption for public safety." The group notes that there are publicly owned assets that could be leveraged to help commercial providers build reliable networks with better coverage, such as City-owned towers, buildings, fiber plant and spectrum. They would like to find technology companies willing to launch pilot projects to develop better public safety networks.

Though mobile network costs are high, the cost of not having high availability of information is response time, mistakes and delay.

Education and Health

Workers cannot expect to enjoy a "steady job" with a lifelong employer in the future. The concept of a single company giving an employee the skills they need as work changes is gone. Workers will need continuous training and mentorship, but new sources for their education and affiliations must develop. The Aspen report notes that new types of private/public partnerships to help address the need for education, training and lifelong learning must develop. It was also noted that it is an open question where and how education should happen, when "exceptional competencies occur where human knowledge is created, at the cutting edge, in a community of practice." Dr. Miles Ellenby of OHSU Pediatric Medicine notes that digital literacy and digital skills should be taught to young children

as early as possible. Such education programs could focus on teaching independent problem solving and inquiry while also teaching about privacy and safety on-line. Nick Jwayad, Chief Information Officer of Portland Public Schools noted that K-12's key outcome in this conversation is ensuring access for ALL kids and families. A single example of the schools' dependency on the Internet from home is the PPS "EdBox"; a suit of online teacher tools that includes a grade book, curriculum planner, data dashboard, collaboration portal and professional development planner. The EdBox is designed to connect teachers to students, teachers to parents and teachers to teachers in a new and meaningful way via the Internet. The EdBox is just one example of many dependencies schools have on the Internet to improve student outcomes, close the achievement gap and deliver better learning opportunities for all the students we serve.

Dr. Sharon Blanton, Chief Information Officer of Portland State University noted that distance learning, or network-centered learning is the future of higher education, providing students with the ability to integrate learning with work and lifestyle, without requiring commuting. As networking and computer power grow, the virtual classroom, including engagement with other students will begin to be an experience much closer to being in the same room at the same time. Workforce training and education is moving toward an on-line virtual experience as well. In fact, Dr. Blanton, Nick Jwayad and others in the Education and Health focus group note that like firms and corporations, educational institutions must adapt to the networked world, offering education when people can use it, rather than at a specific time and place, and making sure it is culturally relevant to the communities served. The group suggested that we need the "digital education equivalent of drivers ed" for all students.

Key Themes

The questions raised in the course of Portland's workgroup discussion process are more numerous than the answers. There are many interconnected issues, although clearly a profound transformation of local civic life, opportunity and work is underway, both in Portland and globally. The challenge that faces us is to identify the ways the powerful forces unleashed by the new networked economy can be directed toward inclusion, equity, sustainability and prosperity through public policy and civic action. As the participants focused on action proposals, several key themes emerged:

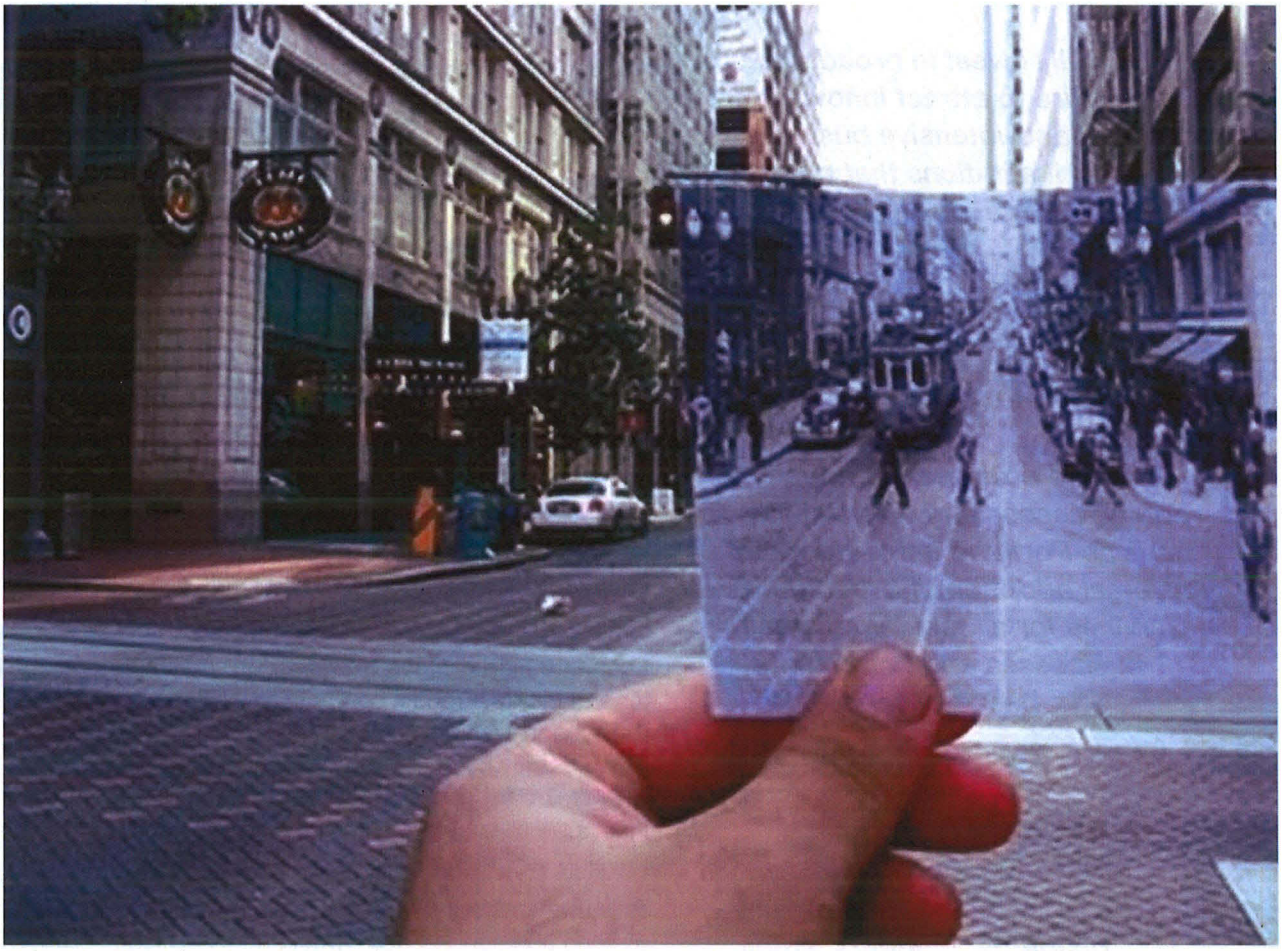
- ✓ Portland and its partners must take bold actions to ensure the development of world-class network infrastructure in the City.
- ✓ Affordability and ubiquitous availability are keys to adoption.
- ✓ Adoption across all age groups, cultures, races and economic classes is crucial to relieve social and economic inequities
- ✓ Economic and societal health depends on education, training and mentoring to create lifelong learners who can embrace rapid change and work and prosper in the new economy
- ✓ Portland must become a technology-centered economy, attracting innovators, research and development centers and employers seeking a tech-savvy environment

The conclusion of the Aspen report notes, "Government and public policy can play a tremendously helpful role in guiding the forces that are emerging. But historically, government and public policy have tended to be more reactive and short-term oriented, not pro-active and visionary... New sorts of government leadership are needed to address social inequality, education and training, and improvements in governments services...There is a keen imperative, in short, for serious institutional innovation."

The imperative for leadership and institutional innovation is central to the goals and strategies included in the Portland Broadband Plan. We have also tried to focus both on the "low hanging fruit", by identifying short-term, high-impact actions that the City can take to make a big difference in government transparency and broadband availability and affordability, as well as remain focused on long-term strategic change and vision.

Portland's Strategic Broadband Goals and Key Strategies

Portland's five Strategic Broadband Goals, and the fourteen key strategies, which will accomplish these goals are outlined below. Following the summary table, each goal is discussed along with the key strategies that will enable the goal to be met. Specific actions recommended for the short-term, medium-term and long-term are provided for each goal.

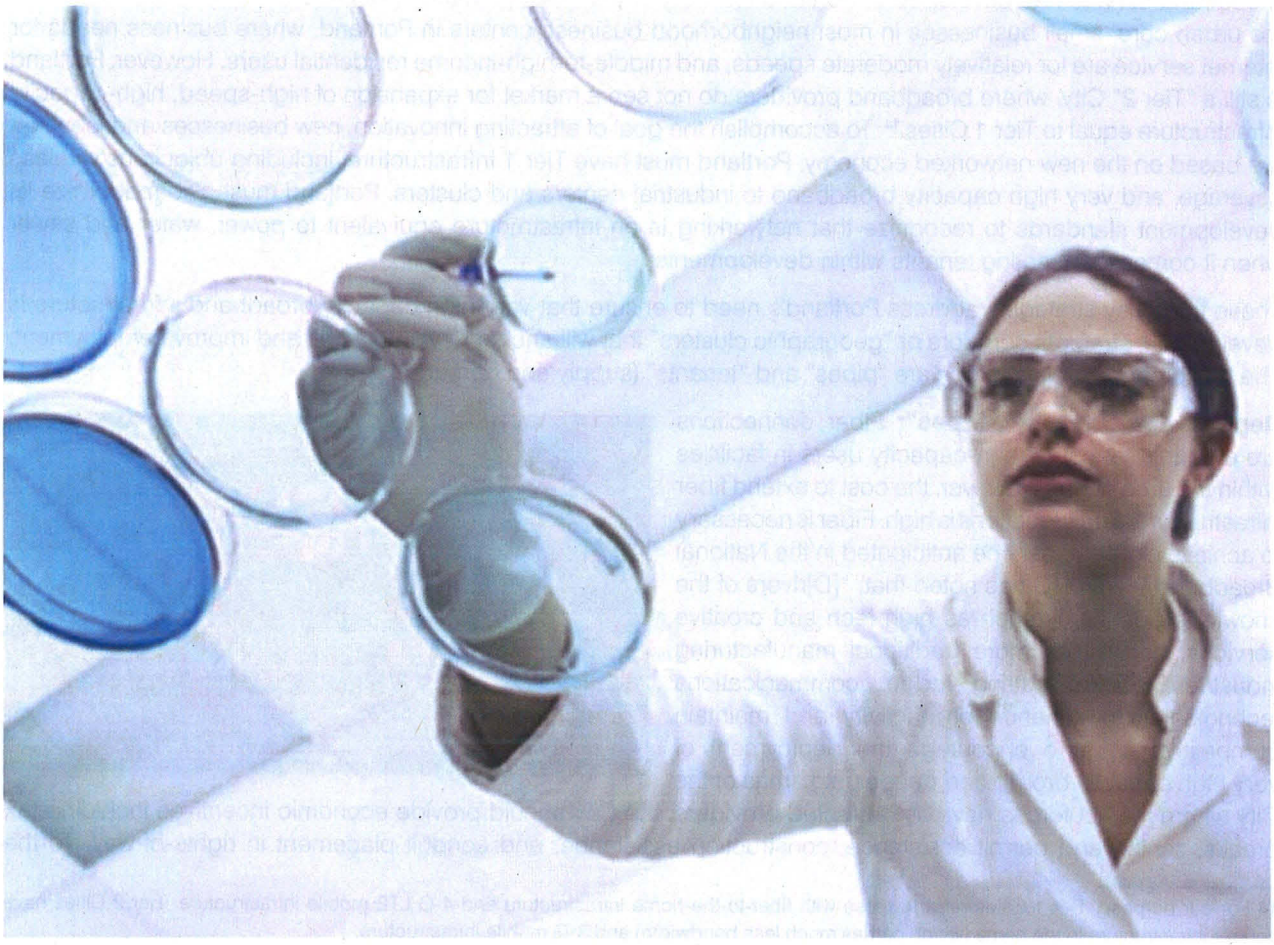


BROADBAND STRATEGIC GOALS AND KEY STRATEGIES

STRATEGIC GOAL	KEY STRATEGIES
Strategically invest in broadband infrastructure to attract innovative broadband-intensive business and institutions that create knowledge jobs in Portland.	• **Prioritize "Big Pipe" Capacity:** Plan and incentivize very high bandwidth Broadband deployment through clustering and co-locating very large capacity users, and providing economic incentives to providers to serve these areas. • **Attract R&D:** Work with institutional partners, including OHSU, PSU, PDC, the State and others to attract at least one major research and development facility whose work requires very high capacity broadband infrastructure and globally-based research. • **Standards and Best Practices:** Partner with Education, Industry and Research Organizations to encourage involvement in standards development, open architecture and the evolution of work and markets
Eliminate broadband capacity, equity, access and affordability gaps so Portland achieves near universal adoption of broadband services for all residents, small businesses and community-based organizations.	• **Establish Neighborhood Broadband Hubs:** Create high-capacity access points within neighborhood community centers. • **Expand City Capacity to Address Digital Equity:** Improve equity through dedicated funding and staff resources and community partnerships. • **Facilitate Marketplace Competition:** Advocate for and facilitate robust competition in Portland's Broadband marketplace.
Develop highly technology-literate and employable residents, students, small businesses and workforce.	• **Create Broadband Centers of Excellence:** Create innovative alliances, partnerships and incentives to develop advanced services and applications locally. • **Promote Technical Literacy and Skills:** Leverage existing and support new investment in life-long technology education and training. • **Modernize and Adopt Telecommuting and Remote Work Strategies and Policies.**

BROADBAND STRATEGIC GOALS AND KEY STRATEGIES

STRATEGIC GOAL	KEY STRATEGIES
Promote and plan for the use and wide-spread adoption of broadband technologies in government, energy conservation, transportation, health, education and public safety.	• **Energize a Dynamic City Technology Culture:** Foster a change in the culture of City bureaus so that the use of technology and civic engagement is facilitated, embraced and cultivated. • **Adopt Information Technology Standards:** to improve the efficiency and effectiveness of the buildings, streets, parks and health services in the City. • **Adopt Regional Public Safety Standards for Wireless Networks:** that incorporate Public Safety's needs for reliability and ubiquitous coverage, interoperability and priority access.
Create future-oriented broadband policy, modernize government organizations and institutionalize digital inclusion values throughout the region.	• **Establish a Regional Task Force on Digital Inclusion Policy.** • **Advocate for legislation, regulation and adoption of open network platforms and open data standards.**



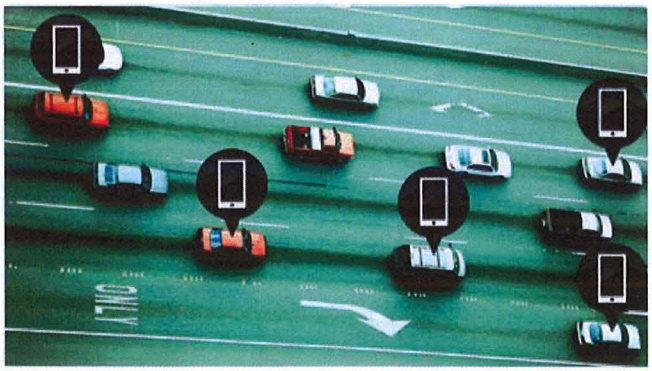
Discussion of Broadband Key Strategies

Goal 1

GOAL 1	KEY STRATEGIES
Strategically invest in broadband infrastructure to attract innovative broadband-intensive business and institutions that create knowledge jobs in Portland	• **Prioritize "Big Pipe" Capacity:** Plan and incentivize very high bandwidth broadband deployment through clustering and co-locating very large capacity users, and providing economic incentives to providers to serve these areas. • **Attract R&D:** Work with institutional partners, including OHSU, PSU, PDC and the State and others to attract at least one major research and development facility whose work requires very high capacity broadband infrastructure and globally-based research. • **Standards and Best Practices:** Partner with Education, Industry and Research Organizations to encourage involvement in Standards development and the evolution of work and markets.

Broadband service has developed in Portland for most of the "Middle Market", defined as businesses located in the urban core, small businesses in most neighborhood business centers in Portland, where business needs for Internet service are for relatively moderate speeds, and middle-to-high-income residential users. However, Portland is still a "Tier 2" City, where broadband providers do not see a market for expansion of high-speed, high-capacity infrastructure equal to Tier 1 Cities.[14] To accomplish the goal of attracting innovation, new businesses and jobs that are based on the new networked economy, Portland must have Tier 1 Infrastructure, including ubiquitous wireless coverage, and very high capacity broadband to industrial centers and clusters. Portland must also modernize its development standards to recognize that networking is an infrastructure equivalent to power, water and sewer when it comes to attracting tenants within developments.

These three key strategies address Portland's need to ensure that very high capacity broadband infrastructure is developed in strategic corridors or "geographic clusters" that will anchor new industries and improve employment. The two prongs of this strategy are "pipes" and "tenants" (supply and demand).



Deploy High-Capacity "Pipes": Fiber connections are available for some high-capacity users in facilities within the urban core. However, the cost to extend fiber infrastructure to new locations is high. Fiber is necessary to achieve high-end service anticipated in the National Broadband Plan. PDC has noted that: "[D]rivers of the knowledge economy such as high tech and creative services, as well as more traditional manufacturing industries...require cutting edge communications technologies to enhance productivity and maintain competitiveness." To encourage the deployment of very high capacity broadband deeper into areas of the City where market forces have not attracted providers, the City should provide economic incentives including tax breaks, zoning and permit assistance, construction assistance, and conduit placement in rights-of-way. To the

14 For our purpose, Tier 1 Cities refer to those with fiber-to-the-home infrastructure and 4-G LTE mobile infrastructure. Tier 2 Cities have copper infrastructure to the home (which carries much less bandwidth) and 3-G mobile infrastructure.

extent allowable by Federal law, the City should work with providers to subsidize, waive or reduce building entry fees to establish fiber connectivity, and should work with building developers and owners to participate in the industry cluster strategy.

Attract Broadband Anchor Tenants: Locating one or more very large anchor tenant in strategic cluster areas will spur the development of broadband infrastructure by providing demonstrable demand for a higher level of speed and capacity. The City must attract research institutions, data centers, media companies or other entities that require broadband skilled workforces and high quality broadband services to create the anchor tenancy for a cluster area.

Standards and Best Practices: Standards and Best Practices for industrial buildings, commercial developments and neighborhood planning need to be updated to reflect the new necessities for accessibility that exist for large businesses today and tomorrow. Today, a business locating in a building is responsible for bringing any information technology it needs to the site. Tomorrow's standards will require that buildings are pre-wired for both mobile and fixed networking, with much higher standards of wiring and in-building coverage for wireless networking. The City should work with building owners and developers to ramp up connectivity in the City's urban infrastructure and commercial centers.

Goal 1 Action Recommendations

By 2013	• Identify urban development areas for high capacity broadband infrastructure deployment. • Establish a policy to drop conduit into all street trenching in identified areas. • Create a program with Industry to identify economic incentives to encourage fiber core build-outs to cluster areas. Such a package might include low cost power, free or reduced cost access to City owned or financed assets (such as conduit, roof-tops, permits, etc.).
By 2017	• Create an assistance program for very high capacity users to finance initial installation of fiber infrastructure, and to provide subsidies for high capacity bandwidth to spur job creation, and industry relocation to the clusters. • Include Broadband infrastructure development in public works projects, such as streets, sewers, etc. to diffuse high capacity infrastructure throughout the City and region. • Leverage the IRNE fiber assets, City streets, sewers and other rights of way to place publically owned infrastructure assets at the disposal of service providers who agree to deploy very high bandwidth services at lower than market cost to industry and employers.
By 2020	• Work with PDC, Higher Education, the State and other potential partners to incentivize research partnerships that require large pipe broadband. Develop projects that will anchor a large pipe "campus" such as a genomic research project, Central Eastside URA for mid-to-small business cluster projects, and/or other URAs such as North Macadam and Interstate. • Actively recruit "Network Centric" businesses and workers to Portland through an innovative program of incentives and marketing.

Goal 2

GOAL 2	KEY STRATEGIES
Eliminate broadband capacity, equity, access and affordability gaps so Portland achieves near universal adoption of broadband services for all residents, small businesses and community-based organizations.	• **Establish Neighborhood Broadband Access Centers:** Create high-capacity access points within neighborhood community centers. • **Expand City Capacity to Address Digital Equity:** Dedicate funding and staff resources and develop community partnerships. • **Facilitate Marketplace Competition:** Advocate for and facilitate robust competition in Portland's broadband marketplace.

Until recently, not having affordable broadband was an inconvenience. Now, broadband is a prerequisite to economic opportunity for individuals, small businesses and communities. Those without broadband and the skills to use broadband-enabled technologies are becoming more isolated from the modern American economy. Broadband provides students and families access to global and local educational resources, immigrant and minority communities access to cultural connections, and small businesses the ability to achieve operational scale more quickly.

NEIGHBORHOOD ACCESS

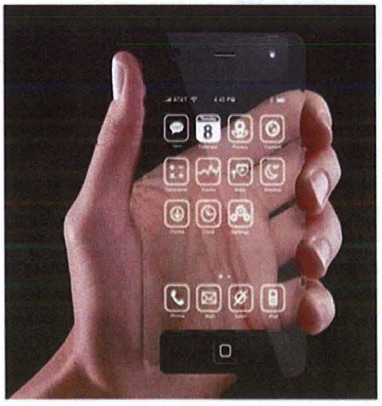
The vision for neighborhood broadband access centers includes state of the art mobile and fixed broadband services, with training and affordable access close enough to residents and small business that they don't have to commute to it. These can be extended within existing centers, such as neighborhood libraries, community centers, shopping centers, parks or schools. Providing access to advanced services and training at the neighborhood level will help reduce pollution and energy consumption caused by travel.

The first key strategy adds high capacity broadband access to the Portland Plan's vision for "healthy connected neighborhoods" where all services necessary for livability are within a 20- minute walking distance of home.

Broadband access centers provide tools to those who cannot afford, or do not have access to them in their household. It allows communities to "move information not people," connect diverse communities, promote tele-medicine and telework, level inequities in civic participation and educational opportunities, and reduce geographic and economic challenges including commuting and other travel.

DIGITAL EQUITY AND INCLUSION

The difference between those with no or very limited access to communications technology and those in the higher access categories is the "digital divide". Attempting to create an environment to counteract the divide is often known as "digital inclusion".



Portland should continue its critical role in working to overcome inequities in access to communications technology – Multiple communities in Multnomah County have indicated the need for local government to continue its current central role in providing public access to communications technology and the internet, such as through the Public Library and through public access organizations[15]. Without increased access, many in the community will have even less opportunity to learn the skills necessary to work and participate in

15 http://www.mhcrc.org/docs/MHCRC_Communications_Technology_Needs_Ascert_Report(04-21-10)FINAL.pdf

the networked society. Companion actions needed include dedicated funding and staff resources to assist non-profit organizations to provide digital content, access to technology and training to those with limited resources, and wireless broadband access.

Community groups and non-profits need to continue to work for digital inclusion, but need increased support from City government to fulfill that role – For example, representatives of immigrant and refugee organizations in Multnomah County talk about the value of public access at government locations like libraries and schools. These groups also need to have greater support to increase literacy skills, education, employment, civic engagement, cultural participation and healthcare.

The second key strategy establishes dedicated funding and City staff to support community groups and institutions that can work in partnership with the City to close the digital divide. This strategy will establish practices and policies to create equity for all communities to access broadband services.

INCREASED COMPETITION

Competition provides consumers the benefits of choice, higher bandwidth, better service and lower prices. Building broadband networks—especially wireline—requires large sunk investments. Policies decreasing the fixed cost of infrastructure and spurring greater demand may encourage new network expansion and new competitors.

The National Broadband Plan notes that broadband competition is both fragile and insufficient to keep pricing affordable, and to push advanced services into all markets and neighborhoods. The NBP also notes that current Federal policies may be ineffective at driving true competition in broadband, and that local public policy is a determinant of the level of competition locally.

The third key strategy addresses ways that the City of Portland can leverage its public assets (rights-of-way, IRNE, spectrum), fiscal and franchising policy, tax incentives and its substantial public sector market demand to encourage a robust broadband marketplace served by multiple, competitive providers.

The greatest deterrent to competitive broadband is the cost of deploying infrastructure. Broadband providers can expand high capacity infrastructure when access to land and property costs are reduced, bringing down the provider's fixed cost of plant. The City and its infrastructure partners (TriMet, ODOT) together own miles of fiber plant that is underutilized. These include conduit, building entries, fiber termination points and dark fiber that, to date, are reserved under several layers of local and Federal policy for the exclusive use of the public sector. The City should investigate ways to change these policies and leverage these assets to help expand broadband services to the City's residents through public/private partnerships. Much of the new residential construction in Portland in the next 25 years will be multi-family. The per-door economics of getting fiber to multi-family new construction are much more favorable than for single family. The City should consider policies to incent a fiber to the dwelling standard for multi-family new construction.

Broadband providers appear to invest more heavily in network upgrades in areas where they face competition. Providers generally offer faster speeds when competing. Next generation wireless broadband networks—for instance, Long Term Evolution Systems (LTE)—could offer speeds between 4 and 12 Mbps which can compete with mid-tier fixed broadband speeds and rates. The competition policy for Portland must include incentives to ensure that multiple wireless providers serve the entire City, and the metropolitan region.

Goal 2 Action Recommendations

By 2013	• Work with non-profits and NGOs to increase access to broadband tools for underserved communities. • Identify funding and revise rules for local grants to allow support for training and access to broadband services. • Convene a planning committee with the provider industry to identify and leverage incentives for broadband service expansion including complete neighborhood coverage for wireless. This could include access to public sector assets (rooftops, conduit, fiber etc) and tax reductions, etc. • Advocate at local, state and federal levels for robust competition in broadband markets. • Study ways to lower the cost of infrastructure deployment including working with industry to pool or share core infrastructure builds (towers, conduit, spectrum, etc.) to move the model toward competition with collaboration. • Conduct a study to demonstrate the impact of broadband availability on property values. • Promote a subsidy or grant program for low income or distressed communities to allow them to obtain commercial service at affordable rates, to pull latent demand for service into the marketplace.
By 2017	• Partner with non-profit community groups to provide technology grants to communities. • Establish a fund for Broadband Equity. Develop a stable funding stream for access subsidies through a strategy such as a 1% universal service fee. • Begin distributing City workforce from office buildings to neighborhoods, where they are connected digitally to City Hall. • Provide free WIFI at all public buildings in each neighborhood. • Negotiate a service agreement for public safety levels of reliability, capacity and coverage with a provider. • Identify and commit to policy and financial incentives such as franchise fee credits, shared trenching, City-provided conduit, grant programs, or other means to reach accessibility goals and objectives. • Develop a fiber to the dwelling standard for multi-family new construction. • Aggregate public sector demand among several institutions and entities (higher education, government, transit, K-12) to incentivize development of service providers in underserved areas. • Work with PPS to achieve online student portfolios/academic planners, 1:1 Netbooks for remote access to PPS tools/services and online credit recovery/general credit options for High School students.
By 2020	• Work with the County, Higher Education and Portland's public schools to build telework centers and resources within community centers, K-12 schools or community college campuses that align with "healthy connected neighborhoods." • Become a "city without walls" where all city services, meetings and records are available to all residents and constituents on interactive digital platforms so that it isn't necessary to travel to a city office to conduct business, provide testimony or participate in City business. • Conduct all City public meetings, hearings, etc. via interactive video so that residents can participate without travel.

Goal 3

GOAL 3	KEY STRATEGIES
Develop highly technology-skilled and employable residents, students, small businesses and workforce.	• **Create Broadband Centers of Excellence:** Create innovative alliances, partnerships and incentives to develop advanced services and applications locally. • **Promote Technical Literacy and Skills**: Leverage existing and support new investment in lifelong technology education and training. • **Modernize and Adopt** Telecommuting and remote work strategies and policies

Several key emerging and evolving technologies are driving digital adoption and the Internet economy in the near and long term - These include expanded video use in all of its forms; in-home services accessed remotely; evolution and rapid growth of applications for portable mobile devices; and collaborative, real-time, high capacity applications. **Emerging technologies will positively impact several key network attributes** – This includes ease of use; highly scalable bandwidth; centralized data storage and network reliability and redundancy. The combination of evolving attributes will make network tools central to social interaction, employment, medicine and treatment options, transportation, and household management. While the network will free us from many unproductive and wasteful activities, it will also cause the obsolescence of a majority of policies and practices developed to support hierarchies of management of systems, people and institutions. These must be replaced with adaptive policies and systems, which empower innovation and flexibly support change.

CENTERS OF EXCELLENCE

Portland cannot wait for innovations to trickle down to second-tier cities if it wishes to have the advantages of innovation. Oregon is a nationally recognized center for the open-source software movement, and software start-ups and mobile and cloud-based computing. Portland needs to leverage the skills of the tech-savvy professionals it has "in residence" to develop a digital services economy. A key to this strategy is the development of technology "Centers of Excellence" within Portland institutions which will establish the area's leadership in new economy innovations – in software, management, standards, buildings, telecommuting and education. Also key is investment in research and development in science and technology, which require very high bandwidth connectivity.

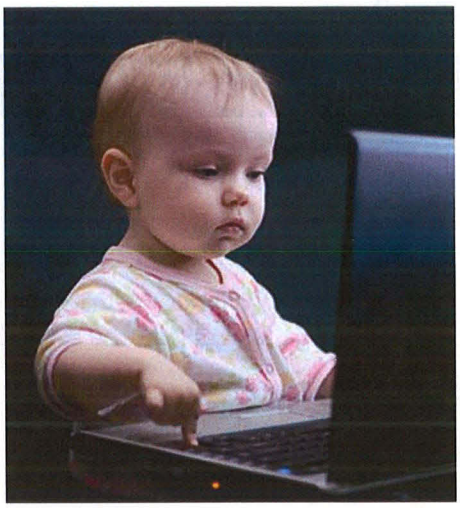
The first key strategy will demonstrate Portland's ability to innovate and accelerate technology developments to accomplish desirable social outcomes. This strategy focuses on ways to propel innovation into Portland's structures, institutions and educational and social fabric.

TECHNOLOGY LITERACY AND LIFELONG LEARNING

Broadband and Internet access are essential for student achievement and workforce development. The current workforce development system is fragmented and relies heavily on bricks-and-mortar facilities to deliver services. This physical infrastructure makes it difficult to adjust to changes in demand, resulting in inconsistent supply, quality and information distribution.

- ✓ Delivering services online through a scalable platform can expand the reach of One-Stops to everyone who has access to the Internet. Additionally, adopting content and service standards would ensure every participant receives consistent high-quality service.
- ✓ Broadband-enabled solutions address time, information and technology barriers faced by disadvantaged Americans seeking jobs and training.
- ✓ Research shows that unemployed workers who receive re-employment services land a job and exit unemployment insurance approximately one week sooner than those who do not receive such services.

Computer and Internet access alone do not produce greater student achievement. Access needs to be combined with appropriate online learning content, systems and teacher training and support. Some school districts are finding that online systems can help decrease high dropout rates. In addition to dropout prevention, online systems provide flexibility to students who cannot be in school for health, child-care, work or other reasons.



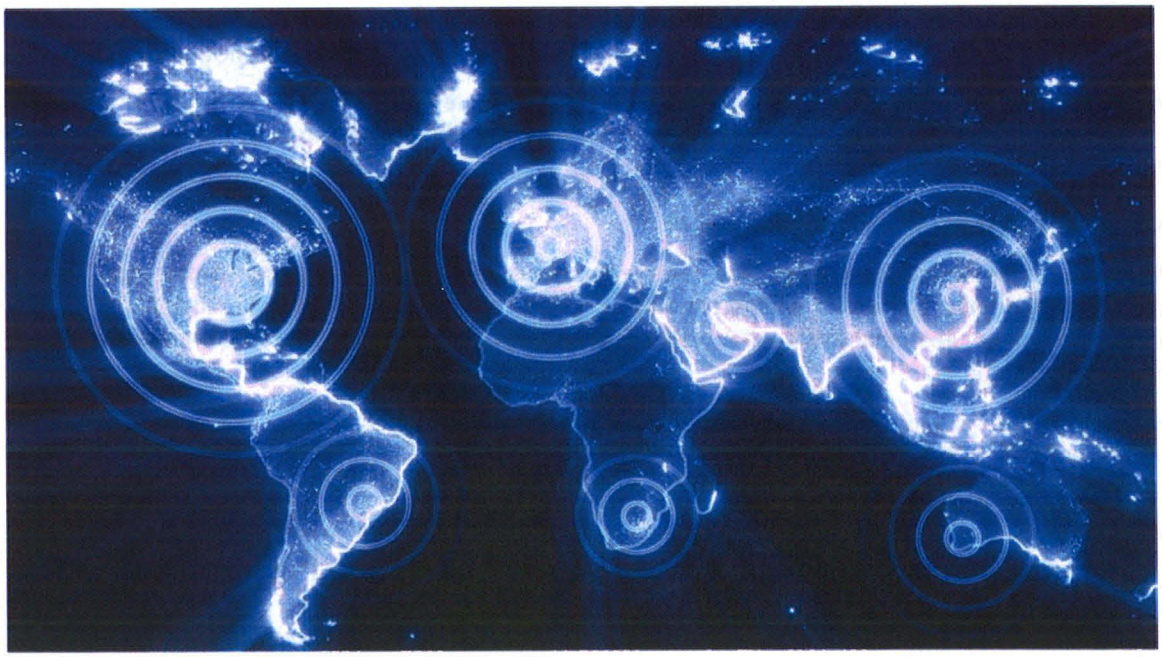
However, the Network has changed the way workers and students need to be educated and mentored. Sitting in a classroom, learning from dusty textbooks, and taking standardized tests will not support the economic future of students and workers. They must be trained in a new way, by institutions built on a foundation of global collaborative instruction and research, and flexible, on-demand instruction, tutoring and mentoring. Portland must work with every educational provider in the region to impress modernization and flexibility into their structures, student services and governance models.

The second key strategy establishes regional partnerships aimed at making sure that Portlanders are well trained and well educated at the earliest possible age to thrive in a digital economy. We need to focus on literacy, content and mentoring, not just technology to create a population that is ready for the new economy.

TELEWORK

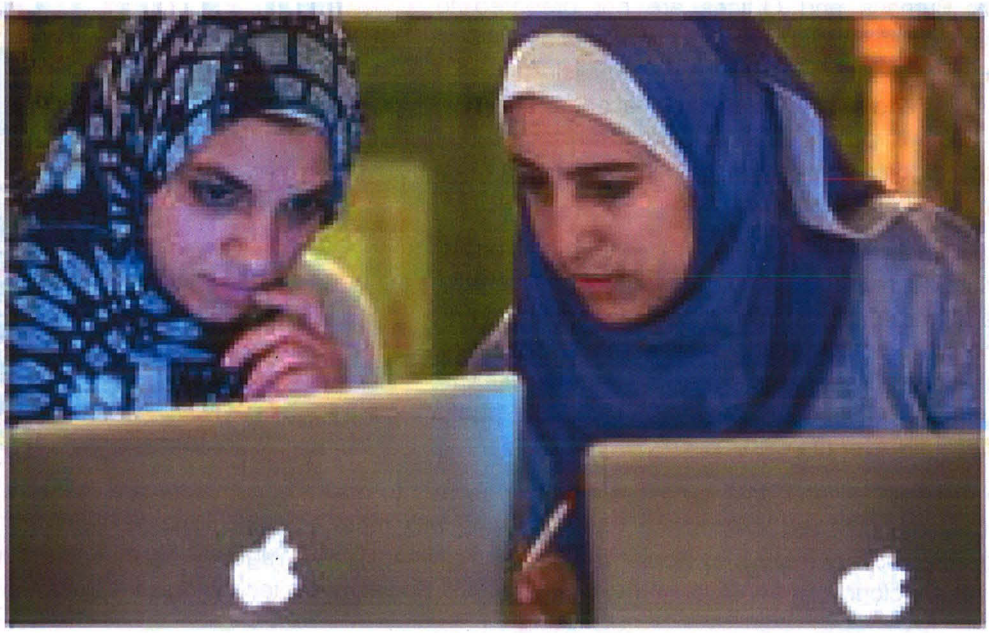
Telework and telecommuting can reduce congestion, pollution and energy consumption. If we eliminate the need to travel to work, for civic engagement and for meeting basic communication needs we can also reduce carbon emissions and congestion. The knowledge "class" of workers and employers will not be focused on geographical proximity to the "office" or direct line-of-sight control over workers. The future of professional work is that it will be done "anywhere" and will not require a fixed location. The corollary reality is that Portland must attract workers and employers by having the Network they need and the lifestyle and environmental attributes they desire in order to locate here.

The third key strategy modernizes our approach to work in order to foster and encourage remote work and telework, rather than to marginalize and "test" it. This strategy focuses on management issues as well as network issues to promote remote work styles and opportunities.



Goal 3 Action Recommendations

By 2013	• Work with PDC, Higher Education, the State and other potential partners to incentivize research and development partnerships in software, applications and digital services. • Establish a clearinghouse for digital information access and resources. • Develop telework resources, including training, technical assistance and technology subsidies for small businesses and large employers. • Work with Higher Education to create HR resources and advisors for employers who wish to promote telework. • Provide tax incentives to employers who embrace telework solutions using broadband, decreasing commuting.
By 2017	• Support K-12 and ongoing digital literacy programs in libraries, schools and other institutions. • Develop small business training for owners and employees in the use of digital tools. • With the medical community, establish a pilot project for aging-in-place that features affordable high-capacity Broadband for patient/physician connectivity and information exchange. • Assist local educational institutions and school districts to modernize technology and teacher training in on-line instruction.
By 2020	• Partner with Industry and Education to establish "Centers of Excellence" which promote innovation in Digital Communities and undertake research and development in advanced applications and economic and social change. • Partner with state and local workforce development providers to create learning centers for small businesses and job seekers. • Work with Portland's education institutions to extend and enhance distance learning platforms.



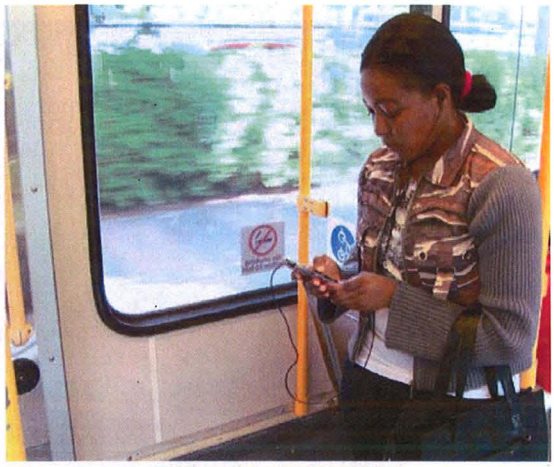
Goal 4

GOAL 4	KEY STRATEGIES
Promote and plan for the use and wide-spread adoption of broadband technologies in government, energy conservation, transportation, health, education and public safety.	• **Energize a Dynamic City Technology Culture:** by fostering a change in the culture of City bureaus so that the use of technology and civic engagement is facilitated, embraced and cultivated. • **Adopt Information Technology Standards:** to improve the efficiency and effectiveness of the buildings, streets, parks and health services in the City. • **Adopt Regional Public Safety Standards for Wireless Networks:** that incorporate Public Safety's needs for reliability and ubiquitous coverage, interoperability and priority access.

Broadband can facilitate a vast change in government and government's impact on urban planning. Once we understand that broadband is the lifeblood of advanced systems of all types, it is clear that broadband is essential in the design, monitoring, and control of our entire infrastructure – including communications, water and sewer, roads, buildings, energy systems, manufacturing systems and payroll and inventory systems. Like some private companies, government can make its services available 24 hours a day, seven days a week, 365 days a year across departments and across different levels of government. Moreover, communications technologies are the arbiters of transparency and inclusion. Recent social unrest across the globe has illuminated just how important it is for citizens to trust the transparency and equity of government. Elected officials and executive management must realize that there is no longer a delay between action and reaction in policy, politics and service. The network interjects a powerful new force in public policy and politics, and we don't yet employ it to gain its advantages. The longer the City waits to understand and employ technology, the further behind it will fall.

ENERGIZING OUR TECHNOLOGY CULTURE

Portland's City Bureaus and Offices are not prepared to embrace innovation and rapid technology change for a variety of reasons, including the cost to change, current policies, current management styles and structures and internal operating rules. However, the City will continue falling behind the technology curve if it doesn't identify these constraints and remove them from City culture and practices.



One of the most important ways the City can improve is in its use of networking technology for civic engagement. Currently, the City's use of web-enabled technologies is inefficient and ineffective, and could be improved. The City does not have an integrated web-enabled service delivery platform for citizens, and it does not conduct public business or provide public information effectively over the web.

The City also operates several data centers and many servers to maintain computer and network systems for its Bureaus. New technologies will replace these systems with more efficient generations of information and communications technology. A study by Booz Allen Hamilton estimates that an agency that migrates its infrastructure to a public or private cloud **can achieve savings of 50-67%**[16]. Social media technologies provide the government

16 http://www.boozallen.com/media/file/Economics-of-Cloud-Computing.pdf

another platform to spur innovation and collaboration. The private sector has come to recognize the efficiency gains and other benefits of social media within the workplace. Today, **out of the 36% of Americans involved in a civic or political group, more than half of them (56%) use digital tools to communicate** with other group members. Government must take advantage of these trends to encourage citizens to communicate with government officials more often and in richer ways. City managers and officials must encourage, not discourage the migration to digital platforms.

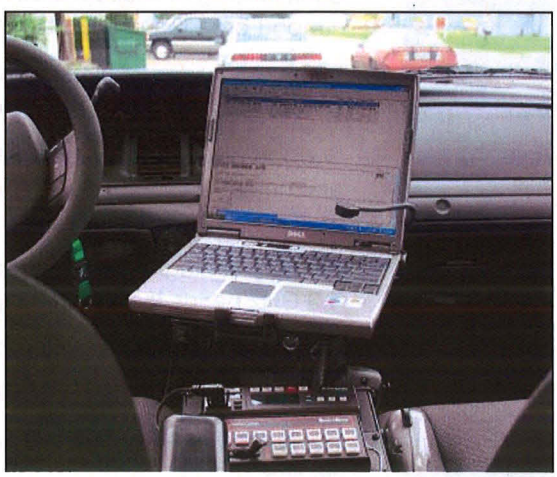
The first key strategy addresses the application of broadband tools to improve City operations and services, especially to improve public access to government services and public safety services. This strategy also addresses productivity improvements and cost reductions through the adoption of advanced broadband applications in City government.

ADOPT INFORMATION TECHNOLOGY STANDARDS

The infrastructure Bureaus of the City, including Environmental Services, Transportation, Planning, Facilities and the Portland Development Commission –should be working toward understanding and adopting information technology standards to underpin the development of the City's infrastructure. Knowing with certainty that broadband infrastructure will be necessary in every structure and system built in the City is a clear mandate that standards and practices for integrating this technology in an efficient way into the urban fabric is essential.

The second strategy addresses the requirement for standards setting and cooperation and collaboration between the City, developers and manufacturers to ensure that new technology platforms which underpin our urban structure are efficient and ubiquitous.

ADOPT REGIONAL PUBLIC SAFETY STANDARDS FOR WIRELESS NETWORKS



The core function of City government is public safety. The City is responsible for firefighting, search and rescue, law enforcement, policing, 911 services and emergency planning. These functions represent nearly three quarters of the expenditures of the general fund. Yet our police and firefighters have less sophisticated wireless technology than most schoolchildren carry in their backpacks. The tools for first responders are dated, but even more distressing is their network access. Police and fire wireless networks and the 911 network, currently only carry voice calls, and very limited textual data. They cannot text or access the web from handheld devices. Callers to 911 cannot provide videos or text to call-takers. Though the City has access to a large amount of licensable wireless spectrum for broadband, it does not have the means to finance or plan a broadband network for public safety. Moreover, the public safety community as a whole has not provided standards or operational requirements for using wireless broadband. There is an immediate need for the City and its regional partners to develop wireless standards for interoperability, capacity and coverage requirements, and work with the carrier and equipment industries to develop next-generation wireless services that meet or exceed these requirements.

Sensors that can monitor chemical spills, water levels, heart and lung function, location and other essential data are available, but the wireless network to transmit the information from the sensors to response officials don't exist. The Portland Fire Bureau reports that it has sensors in its equipment today, but they can't be used because there is no network to support them. Video cameras around the City, whether located at traffic lights or in apartment building corridors could provide essential situational awareness during accidents, emergencies, fires or crimes in progress, but their signal is not available in real-time to incident command. These systems can be improved through standards, procedures, partnerships and investment.

The third key strategy addresses the need for public safety broadband services to improve response time, lower costs and save lives.

Goal 4 Action Recommendations

	• Lead a "culture change" within City government to promote full utilization of digital tools, especially to provide public access to civic engagement and city services. • Begin a standards process with the public safety community on a regional level to develop public safety standards for commercial wireless use, so that public safety could become an anchor tenant on a 4-G wireless infrastructure.
By 2013	• Create City policies, practices and funding mechanisms to foster greater adoption and utilization of digital tools. • Put wireless broadband accessible to the public in all public buildings. • Investigate any health hazards, e-waste issues associated with broadband deployments and issue credible study results to inform the public and decision-makers. • Improve use of social media to engage citizen involvement in local public safety efforts.
By 2017	• With the transit community, develop smart applications to assist in traffic management, traffic safety, commuter connections and fuel conservation. • Emphasize the adoption of digital tools in City government through modernized equipment, software, data storage techniques and workforce education. Adopt best practices from emerging technology-rich business models and social media platforms. • Seek funding or redirect existing funds to modernize the City's technology and software to support broadband utilization and workforce mobility, especially for public safety. • Encourage video within buildings for safety, using smoke detector model. Incentivize in partnership with home insurance industry. • Support wide adoption of "wired household or Smart Home" standards. Incentivize builders and homeowners through expedited review or financing through an energy conservation trust model. • Develop strategic spectrum plan for spectrum licenses available to the City in the 700 MHz, 4.9 GHz bands that will serve public safety and promote Citywide broadband goals. • Investigate and adopt "smart building" codes. • Implement a fully-functional, Web 2.0 enabled "311" service online. • Place all government information in standardized, usable, searchable, accessible formats on-line.
By 2020	• Increase municipal telework-force and telework hours over time so that only mandatory commuting happens. • Address and change city culture (personnel and management policies, workforce technology, incentives and rules) to reward higher levels of telework in Bureaus. Calculate and monitor direct and indirect savings and other benefits (such as reduced carbon emissions, longer "hours of operation", family and quality of life and other benefits) from telework. • Adopt cloud computing platforms where prudent and feasible to replace data centers, equip public buildings with energy sensors to reduce energy use. • Implement next-generation 911, including text and video call-taking.

Goal 5

GOAL 5	KEY STRATEGIES
Create future-oriented broadband policy, modernize government organizations and institutionalize digital inclusion values throughout the region.	• **Establish a Regional Task Force on Digital Inclusion Policy:** Portland must innovate both by establishing partnerships with industry, education, and other governmental bodies, and by reforming our government institutions and policies to root out silos of control and resistance to change. • **Advocate for legislation, regulation and adoption of open network platforms and open data standards.**

The conclusion of the Aspen report notes, "Government and public policy can play a tremendously helpful role in guiding the forces that are emerging. But historically, government and public policy have tended to be more reactive and short-term oriented, not pro-active and visionary…New sorts of government leadership are needed to address social inequality, education and training, and improvements in governments services…There is a keen imperative, in short, for serious institutional innovation."

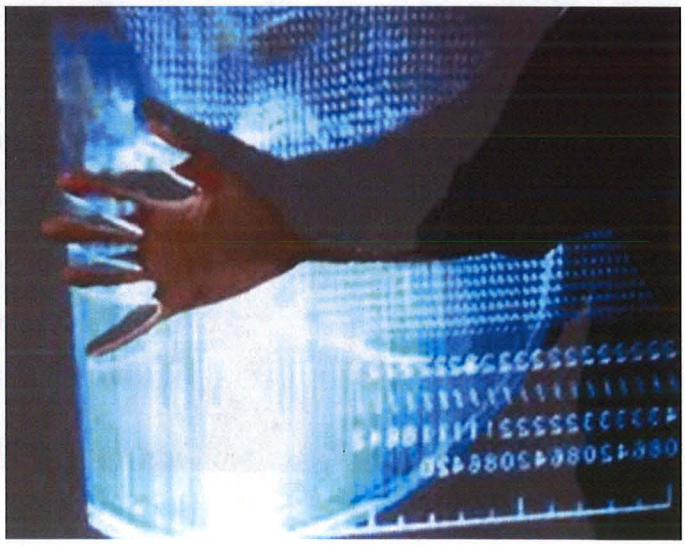
The imperative for leadership and institutional innovation is central to the goals and strategies included in the Portland Broadband Plan.

The strategies proposed in this plan are based on expectations for radical changes in society, local and national government and economic opportunity. The pace of change is assumed to be rapid – much faster than our current government models, practices and structures can respond to. This plan is also visionary – attempting to forecast our social and political needs into the future on a landscape that we imagine is coming quickly. Though there are many short-term actions suggested in this plan, the preparation for longer-term change must also begin now.

The pervasive reality of the networked society breaks down traditional barriers and roles, and reassigns new ones. So the City must adapt with collaboration and advocacy. We need regional partners with a similar and harmonious vision of the future to work with us to accomplish the goals in this plan.

These two key strategies address the need for Portland to advocate as well as innovate. Public policies must be changed within the institutions around us (higher education, state and federal government, private industry) to allow the other goals of this plan to be realized.

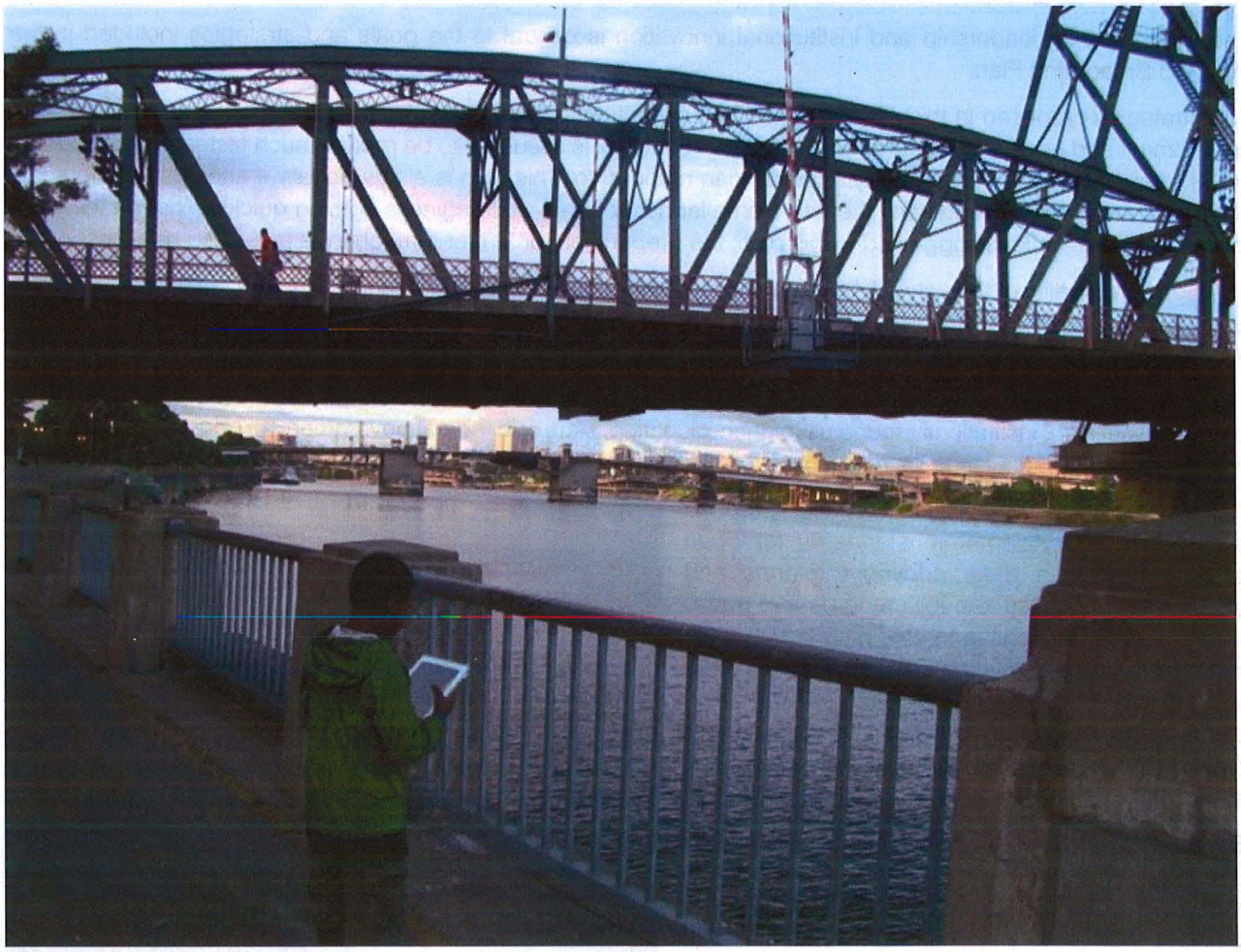
Advocacy for changes in policy must produce evolution in everything from standards for open access and open data, copyright reforms and affordability of access to public records and public meeting laws. Leadership in changing government institutions across government levels to promote education and equity are essential. Also essential is the institutionalization of the value that broadband is critical infrastructure and that public access to it is a social goal.



Several participants in the Portland broadband planning workshops supported the idea of a publically funded, open access infrastructure platform over which private entities could compete to provide service in an equitable and affordable manner to every household in Portland.

Goal 5 Action Recommendations

By 2013	• Establish a task force on digital policy that includes representatives from local, regional and state government. • Review and update the City's comprehensive approach to wireless facilities in the City including a database and mapping. • Compile an action agenda for policy review of internal City policy that must evolve. • Create a public/private working group on digital equity issues. • Advocate for open access platforms.
By 2017	• Introduce legislation at the State level to create digital equity standards statewide. • Advocate at the Federal level for broadband standards in publicly-funded infrastructure.
By 2020	• Re-structure local government institutions for the digital age.



Conclusion and Next Steps

The Portland Broadband Strategic Plan represents the vision of Portland's City Council, its Bureau Directors and executives, and most importantly the needs and desires of Portland's diverse communities for quality, inclusion and equity. Once the strategic plan is adopted, a work plan for 2012-2013 will be developed through the City's budget process. It is this first work plan which will launch the activities that stem from the goals and key strategies.

Success Metrics

As the City begins the implementation process, key measures of success will be developed for the plan. This Plan will inform other plans in development including the Portland Plan and the Climate Action Plan. This Broadband Plan lays the foundation for understanding, embracing and adapting to the digital economy.

Attachment 1: Workgroup Participants

CONNECTING TO OUR FUTURE: PORTLAND'S BROADBAND STRATEGIC PLAN ROUNDTABLE PARTICIPANTS	
ECONOMIC DEVELOPMENT/BUSINESS VITALITY	
NAME	**ORGANIZATION**
Skip Newberry	Mayor
Gerald Baugh	Portland Development Commission
Sheldon Renan	Renan & Associates
Vince Porter	Governor's Film Office
Rich Bader	Easystreet OnLine Services
Wilf Pinfold	Intel Corporation
Matt Nees	Oregon Software Association
Andy Frazier	Frazier Hunnicutt Financial
Bernie Foster	The Skanner Newsgroup
Naomi Pierce	North Portland Multimedia TrainingCenter
EDUCATION AND HEALTH	
NAME	**ORGANIZATION**
Kali Ladd	Mayor Adams
Sherry Swackhamer	Multnomah County
Don Westlight	Network Engineering, OHSU
Nick Jwayad	Portland Public Schools
Sharon Blanton	Portland State University
Eileen Argentina	Parks
Christine Blouke	Parkrose School District
Miles Ellenby	OHSU
David Olson	City of Portland
Leslie Riester	PCC/Tech Solution Svcs
DIGITAL INCLUSION/CIVIC ENGAGEMENT	
NAME	**ORGANIZATION**
Tim Crail	Commissioner Fritz
Cece Hughley	Portland Community Media
Doretta Schrock	NPNS
Abdiasis Mohamed	IRCO
Kayse Jama	CIO
Julie Omelchuck	MHCRC
Rick Nixon	BTS
Dylan Amo	Citizen
Brian Hoop	ONI
Sonia Schmanski	Commissioner Fish
Russell Senior	Personal Telco

CONNECTING TO OUR FUTURE: PORTLAND'S BROADBAND STRATEGIC PLAN ROUNDTABLE PARTICIPANTS

PLANNING/TRANSPORTATION/SUSTAINABILITY

NAME	ORGANIZATION
Brendan Finn	Commissioner Saltzman
Don Stastny	StastnyBrun Architects, Inc
Chris Smith	Portland Planning and Sustainability Comm
Gary Odenthal	Planning & Sustainability
Peter Koonce	PBOT
Alex Bejarano	PBOT
Mike Burnett	Hot Sky Consulting
Kate Miller	Kate Miller Studios
Michael Jung	Silver Spring Networks
Scott Robinson	Metro
Tim McHugh	TriMet

PUBLIC SAFETY AND EMERGENCY RESPONSE

NAME	ORGANIZATION
Aaron Johnson	Commissioner Leonard
Mark Greinke	BTS
Karl Larson	PSSRP
John Klum	Portland Fire & Rescue
Mark Elwood	Portland Police
Lisa Turley	BOEC
Carmen Merlo	POEM

Attachment 2: Broadband Strategic Plan Project Timeline

Phase I

1. Resolution at Council - September 22, 2010
2. Kick-Off Event - January 28, 2011
3. Roundtables – February & March 2011
    - Economic Development/Job Creation
    - Planning, Sustainability & Transportation
    - Public Safety
    - Education & Health
    - Digital Inclusion

Phase II

1. 1. Targeted Engagement with Under-represented Groups (Urban League, CIO, IRCO, NAYA) - July – August 2011
2. Industry Forum – June 3, 2011
3. Presentations of draft BSP – June 2011
    - PDXTECH4GOOD - May
    - Bureau Director Briefing – June 2
    - Planning & Sustainability Commission – June 14
    - Open Source Bridge June 23
    - Lunch 2.0 June 29
    - Small Business Advisory Committee (SBAC) July 13
    - Portland Business Alliance September 8
    - Eco-District Working Group

Phase III

1. Council Work Session – July 26, 2011 @ 9:30 am
2. Council Adoption – September 14, 2011 @ 2:00 pm

*Roundtable Participants & interested citizens updated throughout via web and email

Attachment 3: History of Broadband Policy in Portland

- Open Access to the Internet (1998-2000)
- IRNE (City's Wide Area Fiber Network) (construction c. 1999)
- Portland issues 1st RFI for community broadband provider (1999)
- Franchising/partnership discussions with broadband companies (2000-2002)
- IRNE - INET interconnection (low cost broadband to schools/libraries) (c. 2002 and continuing)
- Portland Community Fiber Network Feasibility Studies (Council Work Sessions 2005; Business plan 2007)
- Metro-Fi (2006-2008)
- Response to Google RFI (2010)
- BTOP Grant application (2010)
- Broadband Strategic Plan initiative (2010-2011)

Attachment 4: State of Broadband in Portland Today

Why does Speed Matter?

Broadband speeds in most networks in the US have been steadily increasing. In ten years' time, the Country has migrated from very slow dial-up connections to very fast Internet connections. In fact, high speed Internet connections are considered a necessity in most businesses and households in the US and abroad today. But limitations exist in the networks we have today that prevent efficient downloads and uploads of content. As the Network develops richer applications that include more real-time video "conferencing", video education, and other forms of rich content, the network we have today will simply be too slow to function. The traffic on the network is growing by 34% per year, threatening the ability of the network infrastructure to handle demand. On the consumer side, those without robust competition and fast reliable networks will be left out of the information economy and its opportunities.

Residential Broadband

Most households in Portland have a choice between two dominant providers of broadband service to the household – Comcast and CenturyLink. Comcast offers a cable DOCSIS-based technology which offers a choice of speed and pricing. Their least expensive offering provides 1.5 Mbps downstream and 384 kbps upstream for about $40/month. Their fastest offering in Portland is nearly 10 times faster: 105 Mbps/10 Mbps for $105 - $200/month. CenturyLink offers DSL-based technology which offers a choice of speed and pricing. One offering provides 12 Mbps downstream and 5 Mbps upstream for $37 per month.

One option not available to Portlanders, but offered in surrounding cities is Frontier's FIOS (Fiber-to-the-home) service which leaves Portland at a competitive and technological disadvantage. The highest speed offerings of these companies are compared in the table below. Verizon's FIOS "ultimate" is significantly faster than Comcast's highest bandwidth offering, and CenturyLink has nothing to compare to the speed of FIOS today.

PROVIDER	HIGHEST SPEED DOWN	PRICE (FROM WEB)	UPLINK SPEED
Comcast	105 Mpbs	$200/mo	10 Mbps
CenturyLink	40 Mpbs	$100/mo	5 Mbps
Frontier FIOS	150 Mpbs	$200/ mo	35 Mbps

For more mid-range services, there are more providers and closer competition, including Clearwire, which uses WiMAX wireless technology to provide service.

PROVIDER	MID-RANGE	PRICE (FROM WEB)	UPLINK SPEED
Comcast	15 Mbps	$30/mo	3 Mbps
CenturyLink	12 Mbps	$37/mo	5 Mbps
Clearwire	15 Mbps	$ 40/mo	1 Mbps
Verizon FIOS (Portland suburbs only)	15 Mbps	$50/mo	5 Mbps

Mobile Wireless

All major wireless companies and several smaller companies offer service in Portland. Facilities-based wireless providers include AT&T, Verizon, Sprint, T-Mobile, Clear, Cricket, Newpath and Next G. This industry has recently adopted a new broadband technology standard called "Long Term Evolution" or LTE. LTE has not been rolled out in Portland as yet (the standard was only adopted in 2009, and the first roll-outs were in 2010) but it is expected to be available in Portland in 2012. LTE is also known as the 4G (or fourth generation) standard for wireless. There are several 3G (third generation) "standards" including WiMAX, HSPDA, and others which provide high speeds, but LTE is a giant step forward for wireless networks, providing an option equivalent to wired services, but with total national and international mobility (if you don't mind roaming charges). The development of mobile broadband is perhaps the greatest driver for consumer demand for more and more bandwidth. Companies offering 3G, 3G+ or 4G services in Portland include Sprint/T-Mobile, AT&T, Verizon Wireless (2012). These services are delivering 10-12 Mbps download speeds today, and are expected to approach 50 Mbps within 24 months. Rate packages vary from $30-$80 per month depending on upload speeds. If mobile wireless LTE networks can really reliably deliver 50 Mbps wirelessly at these rates, they will pose a very real competitive challenge to cable, DSL and FIOS, hopefully causing both price and service competition.

Business Services

There are more options for business level services in Portland, than for residential service. Facilities-based wireline providers include AT&T Inc, Comcast, Sprint Nextel Corp., CenturyLink (Qwest), XO Communications, tw telecom, Integra, Level 3, Abovenet, McLeodUSA, Verizon, Tata, WCI, and 360 Networks. Businesses in Portland can purchase gigabit Ethernet services from a variety of companies, wireless Internet services and lit or dark fiber, depending on their location. There is a wide range of pricing options from $20 - $200 per month for DSL and Cable-type services. Ethernet transport can be significantly more expensive but provides 100 times the speed. Some business entities have reported difficulty in accessing fiber-based service providers in Portland, because fiber is not laid in every area of the City. While downtown businesses are more likely to have fiber available in their buildings, businesses outside of the City core are unlikely to find fiber available. These businesses may be able to purchase service from several wireless high-speed companies including Silver Star Telecom, Freewire Broadband, Portland Internetworks, and others.

The Pittock Internet Hotel and Competition

More competition is developing in both the business and residential markets as start-ups pursue using a combination of facilities-based fiber and DSL as well as wireless technologies like WiMAX, WiFi and point to point microwave. Tom Bechtell, Property Manager of the Pittock Internet Hotel in Portland says many companies have co-location facilities in the Pittock, allowing them to take advantage of the growing market for Internet services for small and medium size businesses as well as home-based businesses. He expects the market to "explode" as IP video services drive demand for more and more bandwidth to the consumer in both residential and business settings. The Pittock Internet Hotel, located in downtown Portland, is a meet point for all major fiber facilities in the nation. Local services who also locate hubs there can take advantage of on-site connections to very big Internet pipes and fiber connections around the world. This provides both small and large companies with the opportunity to access huge connections at very low costs. Companies like Stephouse Networks, Freewire, and others are then able to provide Internet to their customers at lower rates. Their distribution networks are often wireless technologies rather than cable or telephone wires. As these technologies are licensed for more and more broadband services, Bechtell expects rapid growth in provider options to continue. Today, Freewire offers up to Gigabit Ethernet services on its network for business subscribers. As television migrates to all digital, all IP platforms, the demand for high bandwidth connections will expand. Regional networks are forming, according to Bechtell, which take advantage of new IP video technology and fast internet over both wire and wireless delivery mechanisms. The video explosion is not limited to typical broadcast content. Bechtell points out a project between the National Science Foundation and the University of Washington which is placing wireless nodes, cameras and sensors in the ocean, and tying them back to the Pittock. The raw data collected for research will be distributed via Internet 2 to research centers across the globe. Eventually, consumers will have access to the data to learn about the ocean in real time as well.

Intel and Google TV are working on technology to provide Internet service directly to televisions, while reducing power requirements in data centers. They want to set up an experimental area in Portland, according to Bechtell. Freewire and Fibersphere are among other companies setting up alternative services to Comcast. These are hubbed at the Pittock. There is a push, according to Bechtell, to get "local guys" to provide services in the niche areas of the market.

CSI Digital, for instance, has installed big satellite dishes on the roof of the Pittock, which receive hundreds of television programming channels. These are resold to ISPs to offer over the Internet to compete with Netflix, Comcast, Roku, Amazon and others.

The IRNE Network

The Integrated Regional Network Enterprise (IRNE) is a fiber network operated by the City, serving hundreds of public buildings in Multnomah County, including offices, police precincts, fire stations, K-12 schools, universities and hospitals. IRNE is able to reach many of the public sector institutions through an interconnection with Comcast's Institutional Network (I-Net) and the emergency communications network. The IRNE provides high-speed data transport (up to 10 Gbps connections) and very low rates to public institutions throughout the County. The IRNE was constructed using fiber and conduit obtained by the City during franchise negotiations with telecommunications providers, as well as fiber constructed by the City, TriMet and ODOT for SCADA and intelligent transportation systems. The IRNE provides all voice and data for the City of Portland. The IRNE is exclusively non-commercial at this time.

Attachment 5: Industry Roundtable on the City of Portland's draft Broadband Strategic Plan

On June 3, 2011, the City of Portland sponsored a telecommunications industry roundtable to discuss the City's draft Broadband Strategic Plan. Several of the City's telecommunications providers attended, including CenturyLink, Comcast, TW Telecom, LS Networks and Integra Telecom. They were joined by EasyStreet OnLine Services and the Northwest Internet Exchange (NWAX). The purpose of the roundtable was to update the City on Broadband Services offered by these carriers, as well as their future plans, and to discuss ways that Industry could participate in advancing the goals of the plan through implementation partnerships and strategies.

Presentation Highlights:

The roundtable event began with an opportunity for each industry participant to briefly outline their current services within the City and any future plans for services. Rich Bader of EasyStreet began by describing their migration from providing Internet access services to the development of their green data center, and a focus on server hosting and cloud computing for business customers.

Chris Denzin of CenturyLink discussed consumer space services currently available, which include DSL services from 1.5 Mbps to 40 Mbps downstream and 1.5 Mbps to 20 Mbps upstream. Denzin described the CenturyLink network in Portland as a fiber-to-the-node architecture, which the company plans to modernize with a minimum investment over the next five years of $40M statewide. Speeds are planned to increase to 100 Mbps (downstream) and 40 Mbps (upstream). They are planning to introduce an IPTV service called Prism in several cities in the US. If Portland is chosen, there will be additional infrastructure investment. CenturyLink has introduced a "lifeline" service of lower speed broadband for $9.95/mo. which includes the ability to purchase a discounted computer. Business services include 40/20 Mbps DSL, Ethernet up to 10 Mbps and Ethernet Private Line service up to 10 Gbps. They also offer their Q-Wave DWDM Sonet over Fiber service up to 40 Gbps.

Theresa Davis of Comcast described their high speed DOCSIS network which currently provides up to 100 Mbps business service and 105 Mbps downstream to residential users at its highest tier of service. Since 2007, Ms. Davis reports that Comcast has invested $449 M in the region, $60M of that in Portland. She reports that Comcast reaches 100% of residences with its fiber to the node network, and 90% of Portland Businesses. Comcast provides 2000 local jobs. She notes that there are 250 I-Net sites in Portland. Comcast considers Portland a "pioneer market" and good test market where the company launches new services, such as its recent launch of Infinity high speed broadband services. In Fall, 2011, Comcast will launch its "Internet Essentials" service offering students who qualify for free lunches a basic broadband package which will include a low cost computer, and some training.

Jon Nicholson of TW Telecom described TW's business services (it is not a residential provider). TW is the largest competitive access provider in the Country. They operate in 75 markets, serving 14,000 buildings with 27,000 miles of fiber plant. Nicholson notes that TW spends 25% of total revenue on capital investment. They provide wide area and metro Ethernet services, and are moving into voice over IP service, and "up the stack" to managed services and managed applications. Customers have several options for business services, including Ethernet up to 10 Gbps, which is available in increments of 1 Gbps. Their network is engineered to expand infrastructure once it reaches 60% of capacity subscribed, so that the network avoids any congestion.

Integra Telecom, which began in Oregon invested $38M in network enhancements to its network in 2011. Steve Anderson reports that Integra is focused on small, medium and large business offerings, and does not provide residential service. Offerings include DSL up to 100 Mbps (soon) and Metro Ethernet up to 10 Gbps. They are considering moving into cloud services or cloud access services. They also provide wholesale services to other carriers.

Michael Weideman discussed LS Networks, which is a local company with a 600% increase in revenue of the last five years. LS Networks does not provide services within Portland because, Mr. Weideman stated, the fees and taxes in Portland are three times higher than in other areas of the State. Also, Mr. Weideman noted that unlike in Eugene, OR, the franchise fees in Portland do not get reinvested in telecommunications infrastructure, and

gaining access to right-of-way (such as TriMet right-of-way) is difficult. LS is owned by rural electrical cooperatives. It provides services from 10 Mbps to "10's of Gigabits for network interconnection services to rural telecom's throughout the State.

Don Westlight, representing the Northwest Regional Internet Exchange (NWAX) which provides a peering point for telecoms and internet providers at the Pittock Internet Hotel in downtown Portland, said that the City's Broadband Plan is essential to promote economic development in the region. NWAX allows members to trade traffic within the State, without charge. There are 31 networks plugged in so far. The exchange allows local internet traffic to stay local, thereby increasing throughput and reducing transit cost for providers of internet services. To illuminate the value of the exchange, Don highlighted the Oregon Health Network (OHN), which has 200 clinics, hospitals and medical treatment sites connected through the exchange. The OHN provides secure high speed private internet services, using EasyStreet Online's network operations center, allowing data traffic to remain in-state.

Discussion Topics

Following the brief presentations by each company on their services and planned services, the group convened a moderated discussion of topics raised in the Portland Broadband Strategic Plan. Nancy Jesuale, of NetCity (consultant to the project) moderated this discussion.

Status of Competition in Portland

In light of the information presented in the presentations by each company, Nancy Jesuale asked participants whether they felt that Portland had sufficient broadband competition, and whether there were "holes" in broadband accessibility for Portlanders. Jon Nicholson responded that he feels that among cities of similar size, Portland is one of the "most wired" in the Country. Theresa Davis agreed, calling Portland "a highly competitive market." She mentioned the National Telecommunications and Information Agency (NTIA) broadband mapping project. In preparation for the roundtable, Theresa looked at NTIA's broadband mapping in the Portland area. She noted that the purple color on the map shows fiber infrastructure and that "there was a lot of purple in Portland." She agreed with Jon that the Portland market does not "lack" in competition. Chris Denzin spoke about his belief that competitors rely on a strategy of "success-based investment" meaning that they invest where demand is evident to support a reasonable return on investment. He stated that "simply throwing money out there to build fiber and hope people show up is not a strategy. Adoption, utilization, attraction of new businesses and business districts are what we actually need". He noted that Mary Beth Henry had shown a slide earlier which stated that 20 percent of those living in Portland choose not to have broadband access, so to simply build fiber to every single home within Portland may not be a "best use of capital dollars for CenturyLink or any of us". He feels that the Plan's goal to develop a cluster strategy in key areas for economic development is the right direction to developing tenants and attracting citizens to the areas to serve. He believes this goal will build demand for broadband services and "when that demand materializes we will build into that. But to build into a demand that is not currently present today doesn't make a lot of sense."

Wireless as a substitute for wireline Broadband

Nancy Jesuale asked industry participations to weigh in on whether they think that the next generation of wireless technology for mobile broadband (4G) is going to provide another consumer competitive option for broadband to DSL and cable. Participants agreed that the demand for mobile, wireless internet connectivity and high speed broadband over wireless in growing at a very fast rate. Nancy Jesuale asked whether wireless is a way to get accessibility and competition into areas where it hasn't been before. Participants noted that accessibility to mobile data is really going to be critical to market growth in both residential and business settings. They note," for people that are embedded at desk all day long-- they want their gigabit connection, but how much did you put up with on your cell phone for the fact that it was mobile?"

Beyond the consumer demand for mobility the deployment of a wireless technology was seen by some as a way to lower cost to reach consumers where accessibility is an issue. "Feeding a number of cell sites rather than every premise that you pass is clearly more cost effective."

While clearly smart devices are proving to the market that consumers want to be "untethered", participants brought up the disadvantages of relying on wireless access for broadband. Specifically they noted the scarcity and cost of radio spectrum to support wireless services.

"If you fast forward 20 years to the projected growth of smart devices of every description there is no escaping the need for fiber." One participant felt "there is a place for public partnerships and things like that to do some base deployment in areas that wouldn't get a fiber backbone any other way and then turn the competition loose on riding on that platform to deliver services." Even though wireless is essential, participants felt that networks are going to need fiber to feed it. Fiber and wireless are complimentary, not competitive.

With respect to using a wireless delivery into areas that are difficult to justify fiber builds to households and businesses, participants mentioned the possibility of "some kind of public private partnerships either between the city and multiple companies or multiple public agencies and a company to forge a strategy into those targeted areas" that isn't necessarily based on any particular technology, but the best technology for that situation.

Partnerships

Rich Bader framed the question in terms of finding a balance between competing goals; for the City the goal is affordable access to every citizen, but to the companies the goal is return on investment. He restated the question of public private partnerships this way; "Are there things that we can structurally do within a public private partnership that help move us faster towards the public goals without disrupting the financial metrics of the private sector?" Are there structural things that we can do that are basically win-wins for both sides? Nancy Jesuale then asked whether others would agree that they would like to come to the table and jointly figure out solutions with the city when we have, for instance identified an accessibility hole or an affordability hole or a business access hole in broadband service?

There was general consensus that the Industry would like to tackle problems of broadband availability and affordability in partnership with the City.

Chris Denzin of CenturyLink cited specifically the recommendation in the draft plan to identify and implement a dig once policy. He related an example where the company was required to relocate aerial plant to underground conduit. He noted that "cost is what drives us and if something costs more it means we get less for what we paid for it." He suggested that a notification process coordinated by the City to notify all franchise holders when a street was going to be opened so that they could coordinate a low cost installation of infrastructure for all interested parties. Theresa Davis of Comcast agreed, and took the concept further, suggesting that the City could help to coordinate a uniform notification procedure that could be implemented across the region, or even across the State. There was concern that such a policy be fair. For instance Chris worried that if his company was bearing the cost of opening the trench, "and my competitor regardless of who it is can come through and for a $1.50 a foot to throw in conduit behind me and I'm bearing the majority of that cost, then that is not equal treatment." Jon Nicholson suggested a revision to the City's per foot permitting costs which apply no matter how many feet of infrastructure are being permitted and vault permit fees which are the same no matter what size vault is installed.

Incentives

This brought the conversation to a discussion of incentives. The Broadband Plan suggests that the City find ways to incentivize companies to take actions that will result in more affordable and ubiquitous broadband services throughout the City. Participants suggested that the city consider changes to franchise fees, right-of-way fees, and permitting fees and practices "as a way to promote growth." There was a comment that the City's franchise fees are disparate and inequitable. Mary Beth Henry asked participants if they were saying that "you'd like us to work with you to review whether there are some different strategies we should employ in setting franchise fees?" Jon Nicolson responded, "We'd absolutely love that. The other thing that we'd love for the city to do is to help us work with the building community because we would really like to have fair and equitable access to buildings as well."

Building Entry Standards or Best Practices

Nancy Jesuale asked, "What do you think about a standards process for city buildings, at least new development?"

At least one participant did not like the idea of standards for building entrance access. "I've dealt with over 200 buildings in the last two years and I think there are best practices that you can help drive, good habits, awareness of routes; but none of us are architects by trade. Several architecture firms that build buildings do come to us and they work with us. We need to point out what is the easiest means of access from the street for us--that helps in the planning; but you can't force them to fit just one mold. So you have to enforce best practices within that group. One practice wouldn't work because in truth four different providers – competitors--could be on four different sides of the street, so does that mean the architect has to build four different means of access so that each provider has equally fair entrance costs? What would be really nice – and what industry has asked for across the country for years is just equal treatment. Equal access into the buildings -- that's really key."

The group discussed whether building owners deny access to some carriers. It was confirmed by several participants that these situations do happen. There was a suggestion that perhaps the City could assist. Mary Beth Henry suggested that perhaps "the city and some of our partners should approach the development community and the building owners in Portland and talk about this issue and raise awareness."

Participants agreed that there could be a working group including carriers and property owners to encourage better practices. There has been some collaboration with the Portland Development Commission (PDC) in the last year on property renovations in the area, and this was seen as a "good first step" to try and drive more broadband deployment, bring in new businesses, economic opportunities for the community and grow small-medium businesses as well."

Rich Bader summarized; "So if were to put a cap on this piece of the discussion, from my point of view, I think that the way to accelerate accessibility of fiber and broadband services is to lower the cost of deployment for those services. I think we all agree lowering costs is a good thing. And then we have identified a couple of different mechanisms for lowering those costs: One is a dig once or some type of shared conduit or infrastructure strategy so that the overall cost of deploying broadband goes down--then there's the cost of getting in the building, whether it's standards, best practices, addressing the business relationships between the carriers and property owners all of that also provides barriers and then that last couple of feet of not only getting it in the building, but getting it to the tenant that they're looking for – addressing all of those costs will be should be a central part of the business aspect of delivering broadband in the Broadband Plan."

Ms Jesuale commented, "No matter whether it's for a business or a consumer the City has to have "some skin in the game" to help create incentives for broadband deployment. And things were brought up like permitting fees and franchise fees. Are there other incentives besides these?

Rich Bader remarked that "that's an interesting place where the financial dynamics that I described earlier about how the city wants deployment for free and the private sector is trying to make money...those roles now become reversed because the city is now dependent upon the franchise fees that all of you guys pay. And one of the ways to lower the cost to the private sector would be to take the franchise fees to zero. Just as in the extreme our services could be available for zero... I'm just painting the extremes to show the tension, so...lowering franchise fees, making it easier, making that relationship more frictionless..." There's a revenue stream that the city has as a result of this activity that they will want to balance--how much should franchise fees be before they impede the deployment of broadband in the city?

Mary Beth Henry noted that "I have yet to meet a person who says please, please let me pay fees and taxes--but what I have heard over and over again is if you're going to have a system of fees, please treat each provider equitably. That we can get behind 100%. But we could not defund Police, Fire and Parks– sorry, but providers depend on those services as much as the rest of us and it's your franchise fees/taxes that pay for them. Yet, I think we can partner with you on leveling the playing field and we would be happy to do that."

Social Equity

Nancy Jesuale then asked participants to talk about whether there were partnering opportunities beyond the lifeline

services introduced to consumers this year by Comcast and Century link to work with schools, the elderly and other populations to increase adoption of broadband services.

Chris Denzin remarked, "We've already established that every citizen of Portland can get high speed internet today, but do they want to use their resources personally, financially to go ahead and do so? And the answer has been proven with their wallets – the answer is no. Education on why it's important to get established online and what benefits it brings to their lives is essential and it needs to begin in the school system. There is no direct public broadband adoption assistance program and maybe it's time to think about creating some programs. You can't just build it and hope they use it – you have to teach people how to use it and how it benefits them."

Ms. Davis added, "From a Comcast perspective, yes we have our $9.95 program, but we've spent a lot of time and a lot of our community investment dollars in bridging the digital divide. We are starting a program this year with One Economy called Digital Connectors and we're developing a relationship with a non-profit where we're going to have kids learn how to be "digital connectors" for their community. Low income kids volunteer service hours where they get a laptop and a flip cam and learn how to use it. At the end they get a certificate from Cisco and they're certified in IT. It's a really great program where we're partnering to make sure that low income kids can get on the Internet and this way when they grow-up they will see a need for the Internet."

Nancy Jesuale then asked what things the City might do that would discourage the Industry from working with the City to accomplish the Plan goals? One participant remarked "competition we all agree is good, but competition between public and private is not good."

Participants felt that the best way to move forward is a collaborative model; "to succeed in Portland so that we can go out and tell other cities that this is how you do broadband strategic planning -- set your goals, work with industry, work with educators, work with public safety and get it done. But don't set up the dichotomy of "if I get what I want, you lose."

Steve Anderson summed up. "While we don't want a municipal competitor, we do want to work with the City to encourage investment from each one of us, who are all customers of each other."

Participants:

City of Portland

Brendan Finn, Chief of Staff to Councilmember Dan Saltzman

David Olson, Bureau Director, Office of Cable and Franchise Management

Mary Beth Henry, Deputy Director, Office of Cable and Franchise Management

Nancy Jesuale, NetCity Inc., project consultant

Industry

Steve Anderson, Integra Telecommunications

Stuart Taubman, Integra Telecommunications

Theresa Davis, Comcast

Chris Denzin, CenturyLink

Jon Nicholson, TW Telecom

Don Westlight, NWAX

Michael Weideman, LS Networks

Rich Bader, EasyStreet OnLine Services

Attachment 6: World Class Broadband: Experiences from Other Communities

Communities worldwide have demonstrated creative, innovative practices to develop world class broadband infrastructure. This range of successful initiatives can inform the City as to strategies to contemplate. Some are incremental and modest in scope, and can be immediately undertaken should the City decide to do so. Others are much more ambitious and broad—and thus may not be feasible at the current time—but they remain important reference points as the City contemplates its broadband future. The following is a brief survey of some of those strategies.

Align government policies to catalyze pro-broadband, market-led approach. In Hong Kong, the Office of Telecommunications Authority (OFTA) developed pro-competition, pro-consumer broadband policy objectives designed to catalyze investment by the private sector in providing the widest range of high speed telecommunications services as economically as possible to the broadest range of the population. These policies were successful in inducing a major investment by the Hong Kong Broadband Network (HKBN) which, after an initial period of construction, began in 2010 to offer gigabit-per-second fiber-to-the home broadband services to Hong Kong residents for around $25 (USD) month. HKBN was encouraged by government incentives in the early 2000s to take a long range view (7 years+) of payback requirements and a mass market, commoditized approach to broadband emphasizing the fastest possible broadband speeds to the greatest percentage of the population at very low cost. HKBN reached profitability in 2011, is now listed 3rd in the world in FTTP penetration, has outpaced the incumbent Hong Kong telecommunications companies in market penetration and deployment (HKBN is nearly 80% built out at this writing), and is well on the way to exceeding HKBN's own goal of becoming Hong Kong's dominant broadband provider by 2016, all with a unique mass market approach that emphasizes high speed deployment at the lowest possible cost, encouraged by an uncapped rate-of-return and government policies designed to encourage a market-led approach, lower the cost of deployment, and make certain everyone is served (e.g. OFTA sponsors a broadband subsidy program for low income Hong Kong families with children in school).

Aggressively court the private sector to invest in broadband locally. This strategy has been successful where the private sector has undertaken extremely ambitious investments. Fort Wayne, Indiana is one community that successfully courted private sector investment. Under the leadership of Mayor Graham Richard, Fort Wayne undertook an extremely ambitious campaign to lure Verizon to build fiber to the premises (FIOS) to Fort Wayne. This was as aggressive an economic development effort as has ever been launched by an American community, and entailed significant cost and effort on the part of the city. Part of what helped Fort Wayne is that it reached out to Verizon when Verizon was first planning its FIOS deployments and had not yet narrowed the range of communities where it would build.

Implement a "dig once" policy that cost-effectively enables gradual deployment of infrastructure. In this model, a community implements a policy mandating installation of conduit (or fiber) any time a trench or road is open in the public rights-of-way, thus enabling build-up of a critical mass of infrastructure at relatively low incremental cost. Ideally, the conduit and fiber are specified in advance and, of course, they must be impeccably mapped and recorded. Such a policy is most effective where there exists extensive planning and coordination among the various departments responsible for infrastructure and construction (public works, transportation, IT, permitting authorities, and utilities). It also helps to coordinate the construction timelines of various departments so as to facilitate cost-effective placement of conduit and fiber. This strategy enables deployment of infrastructure for backhaul and middle-mile fiber that can be leased to the private sector and stimulate offering of services. It can also enable placement of conduit directly to wireless facilities sites, thus facilitating not only deployment of next-generation wireless services but also reducing the cost for new competitors to enter the market. . This strategy recognizes that certain sections of our city are rich with fiber infrastructure such as in the Central Business District. If moved to the work plan stage, the "dig once" strategy will be planned for the sections of Portland that are currently deficient in fiber infrastructure.

A pioneer of this strategy, Mesa, Arizona, placed conduit opportunistically whenever trenches were open until it eventually completed a downtown ring. The city leases space in the conduit to the private sector, which only has to blow or push fiber through the existing conduit and thus saves significant construction costs. Among the many benefits to the city are the revenues, the reduced barriers to entry for the private sector, and the reduced damage to the roads and other public assets.

Another key pioneer in this area, the City of Santa Monica, built fiber wherever feasible and then connected local businesses over the fiber to competing providers. Santa Monica operates a 10 Gigabit per second network that connects the business community to 160 Internet Service Providers (ISPs) in Los Angeles data centers, thus enabling them to select among cost-effective competitors. Santa Monica built this fiber by extending its network during any city project, including roadwork, water and sewer main installations, and traffic signal system installation.

Build fiber to potential wireless tower sites. In this model, the community builds fiber to public sites that are promising for the siting of wireless facilities. The combination of fiber and high-value sites amounts to a desirable package for wireless providers, and thus both the fiber and the site could realize revenues in the form of lease payments from wireless service providers. The community-based non-profit, One Community, in northwest Ohio has very effectively partnered with wireless providers, and realized significant revenue by building fiber to logical tower locations—and has made this a centerpiece of not only the revenue flow of their network, but also their efforts to attract wireless providers to provide service to residents and businesses within their footprint.

Deploy a modest, scalable FTTH pilot as a platform for innovation and research. In this model, the community builds a small, inexpensive pilot area that can scale in size over time. This approach was pioneered by Case Western Reserve University in Cleveland, in partnership with local communities and non-profits (such as healthcare institutions and social service groups). The project has deployed one block of FTTH technology and provides free symmetrical gigabit service to all residences on the block. That single block has become an important test-bed for application providers to test and experiment and innovate in areas including energy/environment, health care, and education. As a result, this single block pilot is at the center of a number of initiatives headed by the Office of Science and Technology in the White House. For the cost of building out one block, the community has a platform for innovation, a platform for a variety of entities to test their applications, and a platform for research by local academic institutions.

Incrementally develop publicly-owned fiber using a variety of approaches. In this model, the community gradually, using a variety of mechanisms, builds a network that serves institutional needs and is publicly owned and controlled--such that there is no limitation on the services it can provide or the service providers it can support. This strategy enables the benefits of an I-Net such as IRNE, without the limitations imposed as a result of the cable franchise agreement. Over time, using the strategies suggested above, the District of Columbia has developed much of its own infrastructure to serve its own needs. As a result it has not only secured its network (i.e., no risk of losing the network to the private sector fiber owner), but has also dedicated capacity within the network to enable private sector competitors to enter markets at much lower cost—essentially lowering the barriers to entry.

Develop a public/private FTTH partnership. In this model, the community finds non-traditional partners to build and own fiber. For example, the City of Amsterdam wanted to see open access FTTH emerge, and had as its top priorities not only open access, but that it would reach all residents—not just those that were commercially desirable. The city agreed to make a significant investment that attracted investment from local real estate owners and banks to build open access fiber. The city has been able over time to reduce its ownership percentage of the underlying fiber because the policy requirements of open access and universal deployment had been met. In this way, the city was able to meet its public policy goals by partially, rather than fully, investing in a network.

Build a public FTTH network with a risk-sharing element. In this model, the community initially funds the network and effectively sells it to local operators over time—thus reducing operator risk and increasing incentives to participate. The government of New Zealand is the prime example of this model. Crown Fibre Holdings, the government's designated entity, has selected local partners—both public utilities and private sector companies—that will be funded by the government to build open access FTTH throughout the country. Eventually the network will reach one million homes and businesses. The business model requires open access, and also requires that as providers activate portions of the network and bring customers onto the network (i.e., as they begin realizing revenues), they will reimburse the government in part for the capital costs. Ideally the network will be very successful nationally and the government will be reimbursed in large part for many of the capital costs. An open access FTTH network throughout the country would not have been conceivable if the government had not taken the capital risk. The business model enables local providers to build and operate the network in a competitive environment, while sharing the financial risk with the government; that risk would likely have precluded those providers from building the network absent the government investment. Thus, even if the government is not fully reimbursed, it has still met its public policy goals.

Attachment 7: National Broadband Plan Summary

This link provides access to a "digest" of the National Broadband Plan prepared by the City's consultants, NetCity Inc. and IBI Group as a briefing book for workshop participants.

http://www.portlandonline.com/cable/index.cfm?c=54038&a=334313

To access the full National Broadband Plan published by the Federal Communications Commission in 2010, click on this link:

http://www.broadband.gov/plan/