# *Broadband Strategic Planning Briefing Book For Workgroup Appointees*

## Introduction

### Project Objectives:

- To positively affect how Broadband is likely to develop in Portland over the next ten years
- To plan for optimal broadband development 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 lead the way with the Portland Broadband Strategic Plan in order to positively impact the policies, actions and directions of other Oregon communities and of the state as a whole.

This briefing book is intended to provide plan participants with the background necessary to deliberate on policies, actions and directions that the City of Portland can take to positively impact the future of the Broadband infrastructure and services to citizens in the future.  The briefing book is compiled using excerpts from the 2010 Federal Communications Commission's National Broadband Plan (NBP)[1], as well as the following sources:

- Mt. Hood Cable Commission's Community Technology Needs Ascertainment[2]
- PDC Strategic Plan 2010
- Metro's Regional Transportation Plan
- Portland Public Schools Technology Plan
- PSSRP Next Generation Public Safety Network Planning Documents
- Community Fiber Networks – Feasibility Studies
- Google Wired Cities documents

The first sections of this briefing book excerpt relevant information from Chapters 1-4 of the NBP and from the Mt. Hood Cable Communication's Community Technology Needs Ascertainment.  The following sections of this briefing book will provide specific research from both the NBP and other documents that are specific to each workgroup.  Sections are prepared for:

- Economic Development
- Planning/Sustainability and Transportation
- Citizen Involvement
- Public Safety
- Health and Education

## Section 1:  Overview of Broadband

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[1] *www.**broadband**.gov/**plan/***
[2] http://www.mhcrc.org/docs/MHCRC_Communications_Technology_Needs_Ascert_Report%2804-21-10%29FINAL.pdf

Persuasive research indicates that connecting our city and region to broadband will bring remarkable economic, social, cultural, personal, and other benefits to our citizens.  Portland now has to compete globally as well as regionally for jobs and clean industry.  Quality of life is linked not only to natural beauty, great education and opportunities, good housing, but also to access to the digital infrastructure that makes all of these elements possible and sustainable.

## Excerpted from the National Broadband Plan Chapter 1

Infrastructure networks unite us as a country, bringing together parents and children, buyers and sellers, and citizens and government in ways once unimaginable. Ubiquitous access to infrastructure networks has continually driven American innovation, progress, prosperity and global leadership. Communications infrastructure plays an integral role in this American story. In the 1920s, '30s, '40s and '50s, telephony, radio and television transformed America, unleashing  new opportunities for American innovators to create products  and industries, new ways for citizens to engage their elected officials and a new foundation for job growth and international  competitiveness.  Private investment was pivotal in building most of these networks, but government actions also played an important  role. Treasury bonds and land grants underwrote the railroad, the Rural Electrification Act brought electricity to farms and the federal government funded 90% of the cost of the interstate  highways.  In communications, the government stimulated the construction of radio and television facilities across the country by offering huge tracts of the public's airwaves free of charge.  It did the same with telephony through a Universal Service  Fund, fulfilling the vision of the Communications Act of 1934  "to make available, so far as possible, to all the people of the  United States, a rapid, efficient, Nation-wide, and world-wide  wire and radio communication service with adequate facilities  at reasonable charges."

Today, high-speed Internet is transforming the landscape of America more rapidly and more pervasively than earlier infrastructure networks. Like railroads and highways, broadband accelerates the velocity of commerce, reducing the costs of distance. Like electricity, it creates a platform for America's creativity to lead in developing better ways to solve old problems. Like telephony and broadcasting, it expands our ability to communicate, inform and entertain. Broadband is the great infrastructure challenge of the early 21st century. But as with electricity and telephony, ubiquitous connections are means, not ends. It is what those connections enable that matters. Broadband is a platform to create today's ever before. Yet there are still critical problems that slow the progress of availability, adoption and utilization of broadband. Recognizing this, one year ago Congress echoed the Communications Act of 1934 and directed the FCC to develop a National Broadband Plan ensuring that every American has "access to broadband capability." Specifically, the statute dictates: "The national broadband plan required by this section shall seek to ensure that all people of the United States have access to broadband capability and shall establish benchmarks for meeting that goal. The plan shall also include:

➤an analysis of the most effective and efficient mechanisms for ensuring broadband access by all people of the United States,

➤a detailed strategy for achieving affordability of such service and maximum utilization of broadband infrastructure and service by the public,

➤an evaluation of the status of deployment of broadband service, including progress of projects supported by the grants made pursuant to this section, and

➤a plan for use of broadband infrastructure and services in advancing consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, worker training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes."

Nearly 100 million Americans do not have broadband today.  Fourteen million Americans do not have access to broadband infrastructure that can support today's and tomorrow's applications. More than 10 million school-age children do not have home access to this primary research tool used by most students for homework. Jobs increasingly require Internet skills; the share of Americans using high-speed Internet at work grew by 50% between 2003 and 2007, and the number of jobs in information and communications technology is growing 50% faster than in other sectors. Yet millions of Americans lack the skills necessary to use the Internet. What's more, there are significant gaps in the utilization of broadband for other national priorities.

In nearly every metric used to measure the adoption of health information technology (IT), the United States ranks in the bottom half among comparable countries, yet electronic health records could alone save more than $500 billion over 15 years. Much of the electric grid is not connected to broadband, even though a Smart Grid could prevent 360 million metric tons of carbon emissions per year by 2030, equivalent to taking 65 million of today's cars off the road. Online courses can dramatically reduce the time required to learn a subject while greatly increasing course completion rates, yet only 16% of public community colleges—which have seen a surge in enrollment—have high-speed connections comparable to our research universities. Nearly a decade after 9/11, our first responders still require access to better communications.

Unless we reform our approach to these gaps, we will fail to seize the opportunity to improve our nation, and we will fall behind those countries that do. In fact, other countries already have adopted plans to address these gaps. The ways that other countries have confronted this challenge help inform how we might approach the problem. But each country's experiences and challenges have critical differences. Our solutions must reflect the unique economic, institutional and demographic conditions of our country.

The United States is distinct in many ways. For example, many countries have a single, dominant nationwide fixed telecommunications provider; the United States has numerous providers. Cable companies play a more prominent role in our broadband system than in other countries. The U.S. is less densely populated than other countries. Unlike most other countries, we regulate at both the state and federal levels. Our plan should learn from international experiences, but must also take into account the distinguishing realities of broadband in the United States. Our plan must be candid about where current government policies hinder innovation and investment in broadband. Government or influences critical inputs needed to build broadband networks— such as spectrum, universal service funds and rights-of-way—yet all are structured to serve the priorities of the past, not the opportunities of the future. In addition, current government policies maintain incentives for our schools, hospitals and other public interest institutions to use outdated technologies and prac-

> **What outdated policies do Portland and the State have that could be revised?**

tices, disadvantaging our people and hindering our economy. Just as this plan should build on the distinctive attributes of the American market, it should also correct the problematic policies found here.

Above all, an American plan should build on American strengths. The first of these strengths is innovation. The United States maintains the greatest tradition of innovation and entrepreneurship in the world—one that combines creativity with engineering to produce world-leading applications, devices and content, as well as the businesses that bring them to market. Our national plan must build on this strength to ensure that the next great companies, technologies and applications are developed in the United States. U.S. leadership in these spheres will advance our most important public purposes. A healthy environment for innovation will enable advances in health care, energy, education, job training, public safety and all of our national priorities. Creativity is a national virtue that has catalyzed American leadership in many sectors. America's plan should unlock that creativity to transform the public sector, too. We have just begun to benefit from the ways broadband unleashes innovations to improve American lives. a job seeker in South Bend telecommuting for a company in the Deep South; a medical specialist in Chapel Hill providing medical consultations to a patient in the Hill Country; grandparents in Cleveland videochatting with their grandchildren in Colorado Springs; firefighters downloading blueprints of a burning building. The applications that broadband enables provide innovative, efficient solutions to challenges Americans confront every day.

> **How can Portland help create such "world-leading" applications?**

Many international broadband plans emphasize speeds and networks, focusing only on technical capacity as a measure of a successful broadband system. Our plan must go beyond that. While striving for ubiquitous and fast networks, we must also strive to use those networks more efficiently and effectively than any other country. We should lead the world where it counts—in the use of the Internet and **in the development of new applications that provide the tools that each person needs to make the most of his or her own life. The United States is well positioned to lead in creating those applications.** We have leading health research centers; we should also lead the world in effective health care applications. We have leading educational institutions; we should also lead the world in effective educational applications. We should seize this opportunity to lead the world in applications that serve public purposes. The second great American strength is inclusion. As a country, we believe that to march ahead we don't need to leave anyone behind. We believe that all deserve the opportunity to improve their lives. We believe that where you start shouldn't dictate where you finish, that demography isn't destiny, that privilege isn't a necessary prologue to success. This ideal doesn't just compel us to rebuke discrimination; it compels us to be proactive. It inspires us to live up to an obligation we have to each other—to ensure that everyone has an opportunity to succeed.  This desire for equal opportunity has long guided our efforts to make access to technologies universal, from electricity to telephony, from television to radio. Today, as technology continues to change the way the world interacts, to be on the outside is to live in a separate, analog world, disconnected from the vast opportunities broadband enables.  While broadband adoption has grown steadily, it is still far from universal. It lags considerably among certain demographic groups, including the poor, the elderly, and some racial and ethnic minorities, those who live in rural areas and those with disabilities. Many of these Americans already struggle to succeed. Unemployment rates are high, services like job training are difficult to obtain and schools are substandard. Broadband can help bridge these gaps. Today, millions of students are unprepared for college because they lack access to the best books, the best teachers and the best courses. Broadband-enabled online learning has the power to provide high-quality educational opportunities to these students—

opportunities to which their peers at the best public and private schools have long had access. Similarly, with broadband, people with disabilities can live more independently, wherever they choose. They can telecommute and run businesses from their homes or receive rehabilitation therapy in remote and rural areas. Of course, access to broadband is not enough. People still need to work hard to benefit from these opportunities. But universal broadband, and the skills to use it, can lower barriers of means and distance to help achieve more equal opportunity. Absent action, the individual and societal costs of digital exclusion will grow. With so many Americans lacking broadband access or the skills to make it matter, the Internet has the potential to exacerbate inequality. If learning online accelerates your education, if working online earns you extra money, if searching for jobs online connects you to more opportunities, then for those offline, the gap only widens. If political dialogue moves to online forums, if the Internet becomes the comprehensive source of real-time news and information, if the easiest way to contact your political representatives is through e-mail or a website, then those offline become increasingly disenfranchised.

> **What can Portland do to insure its digital platforms improve citizen involvement?**

Until recently, not having broadband was an inconvenience. **Now, broadband is essential to opportunity and citizenship.** While we must build on our strengths in innovation and inclusion, we need to recognize that government cannot predict the future. Many uncertainties will shape the evolution of broadband, including the behavior of private companies and consumers, the economic environment and technological advances. As a result, the role of government is and should remain limited. We must strike the right balance between the public and private sectors. Done right, government policy can drive, and has driven, progress. In the 1960s and '70s, government research funding supported the development of the technology on which the Internet is based. In the 1990s, the Federal Communications Commission acted to ensure that telephone providers would not stall use of the Internet. An act of Congress stimulated competition that caused cable companies to upgrade their networks and, for the first time, offer broadband to many Americans. Auctions for public spectrum promoted competitive wireless markets, prompting continual upgrades that first delivered mobile phones and, now, mobile broadband.

Instead of choosing a specific path for broadband in America, this plan describes actions government should take to encourage more private innovation and investment. The policies and actions recommended in this plan fall into three categories: *fostering innovation and competition in networks, devices and applications; redirecting assets that government controls or influences in order to spur investment and inclusion; and optimizing the use of broadband to help achieve national priorities.* A thoughtful approach to the development of electricity, telephony, radio and television transformed the United States and, in turn, helped us transform the world. Broadband will be just as transformative. The consequences of our digital transformation may not be uniformly positive. But the choice is not whether the transformation will continue. It will. The choice is whether we, as a nation, will understand this transformation in a way that allows us to make wise decisions about how broadband can serve the public interest, just as certain decisions decades ago helped communica-

> **Can Portland focus on the same three categories to foster innovation and competition, redirect assets that the City controls and optimize the use of broadband to help achieve local priorities?**

tions and media platforms serve public interest goals. This plan is the first attempt to provide that understanding—to clarify the choices and to point to paths by which all Americans can benefit.

The importance of broadband continues to grow around the world. High-performing companies, countries and citizens are using broadband in new, more effective ways. We should be the leading exporter of broadband technology—high-value goods and services that drive enduring economic growth and job creation. And we should be the leading user of broadband-enabled technologies that help businesses increase their productivity, help government improve its openness and efficiency, and give consumers new ways to communicate, work and entertain themselves.

**The plan recommends that the country set the following six goals for 2020 to serve as a compass over the next decade.**

**Goal No. 1:** at least 100 million U.S. homes should have affordable access to actual download speeds of at least 100megabits per second and actual upload speeds of at least 50 megabits per second. This will create the world's most attractive market for broadband applications, devices and infrastructure. The plan has recommendations to foster competition, drive demand for increased network performance and lower the cost of deploying infrastructure. **These recommendations include providing consumers with information about the actual performance of broadband services, reviewing wholesale access policies and conducting more thorough data collection to monitor and benchmark competitive behavior. Reforming access to rights-of-way can lower the cost of upgrades and entry for all firms. Increased spectrum availability and use for backhaul can enable more capable wireless networks that will drive wired providers to improve network performance and ensure service is affordable. Government can also help create demand for more broadband by enabling new applications across our most important national priorities, including health care, education and energy, and by ensuring consumers have full control of their personal data.**

*As a milestone, by 2015, 100 million U.S. homes should have affordable access to actual download speeds of 50 Mbps and actual upload speeds of 20 Mbps.*

> **What should Portland's milestone for access and speed be?**

**Goal No. 2:** the United States should lead the world in mobile innovation, with the fastest and most extensive wireless networks of any nation. Mobile broadband is growing at unprecedented rates. From smartphones to app stores to e-book readers to remote patient monitoring to tracking goods in transit and more, mobile services and technologies are driving innovation and playing an increasingly important role in our lives and our economy. Mobile broadband is the next great challenge and opportunity for the United States. It is a nascent market in which the United States should lead.

> **This will result in more wireless Broadband. How can we make sure that new networks are built in Portland?**

Spectrum policy is the most important lever government has to help ensure wireless and mobile broadband thrive. Efficient allocation of spectrum consistent with the public interest will maximize its value to society. It will lower network deployment costs, making it easier for new companies to compete and enabling lower prices, more investment and better performance. Today, the FCC has only 50 megahertz of spectrum in the pipeline that it can assign for broadband use, just a fraction of the amount that will be necessary to match growing demand. As a result, companies

representing 5% of the U.S. economy asked the FCC to make more spectrum available for mobile broad-band, saying that "without more spectrum, America's global leadership in innovation and technology is threatened." To achieve this goal of leading the world in mobile broadband, the plan recommends mak-ing 500 megahertz of spectrum newly available for broadband by 2020, with a bench-mark of making 300 megahertz available by 2015. In addition, we should ensure greater transparency in spectrum allo-cation and utilization, reserve spectrum for unlicensed use and make more spectrum available for op-portunistic and secondary uses.

**Goal No. 3:** Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose. Not having access to broadband applications limits an individual's ability to participate in 21st century American life. Health care, education and other impor-tant aspects of American life are moving online. What's more, government services and democratic par-ticipation are shifting to digital platforms. This plan recommends government use the Internet to increase its own transparency and make more of its data available online. Getting everyone online will improve civic engagement—a topic this plan also addresses by re-commending a more robust digital public ecosystem. Three require-ments must be satisfied to ensure every American can take advan-tage of broadband. First, every American home must have access to network services. Second, every house-hold should be able to afford that service. Third, every American should have the opportunity to develop digital skills. The plan recommends reforming existing support mechanisms to foster deploy-ment of broadband in high-cost areas: specifically, the Universal Service Fund and intercarrier compen-sation. To promote affordability, this plan also proposes extending the Lifeline and Link-Up programs to support broadband. To promote digital skills, we need to ensure every American has access to relevant, age-appropriate digital literacy education, for free, in whatever language they speak, and we need to create a Digital Literacy Corps. Achieving this goal will likely lead to an adoption rate higher than 90% by 2020 and reduced differences in broadband adoption among demographic groups. To the end, govern-ment can make broadband more accessible to people with disabilities. And it can ensure small business-es— many of which are owned by women and minorities—have the opportunity to purchase broadband service at reasonable rates.

> **Are there pockets in Portland where broadband is not avail-able?**

**Goal No. 4:** every American community should have affordable access to at least 1 gigabit per second broadband service to anchor institutions such as schools, hospitals and government buildings. Schools, libraries and health care facilities must all have the connectivity they need to achieve their purposes. This connectivity can unleash innovation that improves the way we learn, stay healthy and interact with government. If this plan succeeds, every American community will have affordable access to far better broadband performance than they enjoy today. To do so, the plan makes recommendations about reforming the E-rate and the Rural Health Care support programs. Second, non-profit and public institutions should be able to find efficient alternatives for greater connectivity through aggregated efforts. What's more, unleashing the power of new broadband applications to solve previously intractable problems will drive new connectivity demands. The plan makes numerous recommendations, including

> **How can Portland le-verage its Integrated Regional Network En-terprise to expand giga-bit connectivity in the community?**

reforming incentive structures, licensing and data interoperability, to ensure public priorities take advantage of the benefits broadband networks, applications and devices offer. If they are implemented, demand for connectivity in hospitals, schools, libraries and government buildings will soar. In some communities, gigabit connectivity may not be limited to anchor institutions. Certain applications could also require ultra-high-speed connectivity at home. And once community anchors are connected to gigabit speeds, it would presumably become less expensive and more practical to get the same speeds to homes.

**Goal No. 5:** to ensure the safety of the American people, every first responder should have access to a nationwide, wireless, interoperable broadband public safety network. In June 2004, the 9/11 Commission released its final report about events of September 11, 2001. The report found that "the inability to communicate was a critical element" at each of the "crash sites, where multiple agencies and multiple jurisdictions responded." They concluded: "Compatible and adequate communications among public safety , current networks do not take advantage of broadband capability, limiting their capacity to transmit data and hindering potential innovations in public safety that could save lives. The country should create a nationwide, wireless, interoperable broadband public safety network by 2020. The network should be robust enough to maintain performance in the aftermath of a disaster, and should allow every first responder, regardless of jurisdiction or agency, to communicate with each other and share real-time data over high-speed connections.

> **What actions should Portland and the region take to insure that a broadband public safety network is built in our community sooner rather than later?**

**Goal No. 6:** to ensure that America leads in the clean energy economy, every American should be able to use broadband to track and manage their real-time energy consumption. America can no longer rely on fossil fuels and imported oil. To improve national security, reduce pollution and increase national competitiveness, the United States must lead, not follow, in the clean energy economy. Encouraging renewable power, grid storage and vehicle electrification are important steps to improve American energy independence and energy efficiency; to enable these technologies at scale, the country will need to modernize the electric grid with broadband and advanced communications. Studies have repeatedly demonstrated that when people get feedback on their electricity usage, they make simple behavioral changes that save energy. Real-time data can also inform automated thermostats and appliances, allowing consumers to save energy and money while helping the country reduce the need for expensive new power plants. Chapter 12 outlines specific recommendations to ensure that consumers can use broadband to gain access to and improve their control of their real-time energy information. With strong cyber-security and privacy protections, consumers and their authorized third parties should be able to get access to real-time usage information from smart meters and historical billing information over the Internet.

> **What actions can Portland take to encourage applications for citizens to get feedback on their electricity usage?**

## Excerpted from the Mt. Hood Cable Commission's Community Technology Needs Ascertainment

The Mt. Hood Cable Regulatory Commission (MHCRC or "Commission")[3], has conducted an extensive community communications technology, including cable-related, needs and interests ascertainment covering a wide variety of Communities of Interest (Communities) within the jurisdictions that are members of the MHCRC (Cities of Fairview, Gresham, Portland, Troutdale and Wood Village and Multnomah County, Oregon). The term "Communications Technology" was broadly defined and included infrastructure, services, service platforms, end-user devices and applications. An emphasis was also placed on cable communications-related needs and interests since the MHCRC is currently engaged in the cable franchise renewal process, which requires an understanding of such needs and interests as part of the overall ascertainment.

The Communities ascertained were broad-based and covered a variety of components and sectors of large communities such as residential, government, education, non-profits, community media, immigrant and refugee, ethnic and cultural, business and others. A variety of ascertainment methodologies were utilized , including a statistically valid telephone survey, a variety of on-line surveys, focused discussions (from small group to workshop), interviews and review of a wealth of related studies, technology plans, and other materials and research.

### *Access to Technology*

Access to communications technology in Multnomah County was explored from a variety of perspectives including: the level and type of technology access; who does and doesn't have access from both a demographic and geographic perspective; the characteristics of technology adoption and lack of adoption, including issues like affordability and technology literacy; and where a digital divide exists, ways that can promote digital inclusion.

Critical findings under this category include:

**Finding: Multnomah County residents face equity issues in access to communications technology similar to other communities across the country –** Consistent with nation-wide trends noted by the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC) in recent studies, the lower the household income, education level and perceived value of communications technologies, the lower the adoption rate of such technologies. Seniors, women, non-caucasian and non-english speaking households also tended to have lower adoption rates. The inequities noted caused a significant divide among school age children and reduced technology access also results in reduced economic opportunity.

**Finding: Public libraries continue to play a key role in providing technology access throughout the geographic area –** Twenty percent (20%) of respondents to the residential telephone survey, both with access at home and those without, indicated that they access the internet at a public library. Multnomah County libraries public access computers are in use 90+% of the time across all locations.

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[3] This report was prepared in conjunction with CBG Communications, Inc. (CBG) and its team partners, Riley Research Associates and Dr. Constance Book of Elon University

**Finding: Affordability is the single biggest factor across Communities of Interest concerning whether they are able to access the communications technologies that they need –** One in four residents are not able to access the communications technologies that they need. The primary reason (60%) was affordability. Consistent with this, one in six cable subscribers indicate affordability as the reason that they choose a basic cable service package. Similarly, organizational communities indicated significant challenges in overcoming affordability issues related to access to communications technology for both their organization and their constituencies that they serve.

**Finding: The affordability of the network bandwidth provided on the Institutional Network (I-Net) has enabled schools, libraries and local governments to expand related network services –** I-Net users indicated that use of the network must remain affordable to publically funded organizations as bandwidth capacity will need to expand to provide for the increasing demands from their constituencies.

**Finding: Community media producers and nonprofits identified PCM and Metro East as an affordable way to access multimedia communications technology –** There is significant value to the affordable (no or low cost) assistance that PCM and MetroEast provide multiple communities of interest concerning access to video production and multimedia technology and distribution of content over the cable channels and the internet. This value further extends to the constituencies that these communities serve.

**Finding: Technology literacy and training opportunities and outreach must increase in order to increase communications technology adoption in Multnomah County –** Such an increase would especially be helpful to older populations, immigrants and refugees and non-english speaking households.

**Finding: Many Communities of Interest expressed the need for a common understanding about communications technology literacy standards –** Such standards would be helpful to have a common understanding when someone has achieved communications technology literacy. Such standards could also be set as basic requirements to meet in school, thus contributing to an increase in overall technology literacy in the community.

**Finding: There is a significant need to increase the capacity of residential internet access networks to provide higher connection speeds –** One in six respondents to the public on-line survey indicated that they were not satisfied with their speed. These respondents indicated a wide range of current needs spanning up to 15 Gigabits per second (Gbps). Residents indicated that they did not have such speeds now because their provider doesn't offer them or the speed they need is too expensive.

**Finding: The use of mobile devices and technology is high and on the rise in Multnomah County –** Residents report a high ownership of mobile devices, with the highest being cell phones. It was indicated by many communities that mobile phones and their related data capabilities provide an affordable "access point" to communications technology for many in Multnomah County.

**Finding: It will take the continued and increased work of multiple communities to expand digital inclusion in Multnomah County –** For example, local government must continue their critical role in fostering public access to the internet, such as through the public library as well as providing support for other organizations that provide public internet access. Educational entities need to continue to push for equity in access, including providing expanded capabilities at school and perhaps keeping schools open in the evening in order to provide an environment where students could continue to have access

and continue to learn beyond the regular school day. Community groups and non-profits need to continue their work to promote digital inclusion, including providing access to technology and increasing the literacy skills of underserved populations.

Additionally, the Community Access Capital Grant program should be continued and expanded because grantees indicate that the funding that they received has helped overcome factors that create inequities in access to and use of communications technology.

## *Content*

Populations within Multnomah County desire to access and use communications technology to send and receive content. Accordingly, it is important to understand how that content is created, distributed and accessed, as well as the roles that relevancy, localism and the interactive nature of the content play in the need for varying types of content.

**Finding: Lack of perceived relevancy is the second largest factor contributing to non-adoption of communications technology in Multnomah County –** Just over 1 in four Multnomah County residents indicated that they do not have internet access at home. After cost, the next most frequent reason was don't need or want. Relevancy, though, is defined differently by various populations, which means that specific strategies to boost relevant content for particular segments of the population are needed. For example, the development of relevant content in the Spanish language would be one way to address significantly low levels of internet adoption by Hispanic populations in Multnomah County. Additionally, relevant on-line content for older populations would also help increase their relatively low level of internet adoption.

**Finding: Local community media, local community programming and other local content is seen as highly important across Communities of Interest, especially by and for marginalized and underserved populations –** Seventy-two percent (72%) of cable subscribers watch local community channels. It is notable that high viewers include Latinos, seniors, the disabled, and those with low income, showing the importance of local community media to those segments of the population. Additionally, non-profit organizations indicated the high value of community media to their organizations. Moreover, ethnic and cultural representative organizations indicated that funding, training and technology provided to diverse populations is facilitating development of diverse local content.

**Finding: Critical local emergency communications content is facilitated by the cable system and the institutional network –** Local government and educational entities indicated that the current use of the cable and institutional networks were helping to supply emergency communications. This needs to continue to be maintained and updated, including providing capabilities to facilitate delivery of reverse 911 information.

**Finding: Access to content operates along a continuum of users and technologies –** Because of the broad spectrum of levels of communications technology usage and adoption, content providers in Multnomah County must be prepared to provide everything from traditional and basic services and content to content in formats and over platforms that appeal to high-end, ground-breaking users. This enables the content provider to remain technologically relevant and facilitates meeting the needs and interests of all types of content recipients.

**Finding: Cloud computing will be increasingly utilized to access content in the future –** By making software and applications a centralized resource, they can be provided more efficiently and accessed by those that can't otherwise afford them on an individual basis. It will also expand the reach of variety of computing resources.

**Finding: Local community media channels need to be displayed and be able to be accessed on the cable system through the on-screen menu system –** This will enable subscribers to easily access the channel programming information and the channels' content. The majority of residents indicated that the digital on-screen menu guide along with their remote is the preferred way that they utilize to find out when a show is on and to be able to access it.

**Finding: PCM and MetroEast provide the facilities, training and assistance needed to successfully create content –** The vast majority of individual community media producers are either "very satisfied" or "satisfied" with MetroEast's and PCM's operations, including the training and education and facilitation assistance that they have received. In order to continue to fulfill this critical content creation assistance role, PCM and MetroEast and other community media providers will need a significant investment in capital equipment and advanced technologies.

**Finding: Video is increasingly used by multiple communities to distribute content -**
There were numerous examples of the rapidly growing use of video. This includes school districts for both classroom and staff training use; city and County use for outreach and training; immigrant and refugee and multicultural communities for outreach, storytelling, community engagement and civic participation and the non-profit and small business community for both internal and constituent service operations.

**Finding: Capacity for local community access is needed across multiple distribution platforms –** Community media producers, providers and viewers all indicated the importance of ensuring that distribution platforms for community media are able to advance with technology. This includes expanding online, streaming and on-demand distribution. In fact, cable based video on-demand viewership of local community programs has more than doubled in the past year. It also means the need for high definition distribution of local community programs and use of other emerging distribution platforms in the future.

**Finding: The interactive component is increasing for communications both on the internet and through television –** The internet is increasingly being used for high capacity downloads and uploads and television is moving to integrate interactive applications. It will be important for local community media organizations to incorporate interactive television (iTV) applications as their audience migrates its viewing preferences to iTV content.

## Excerpted from the National Broadband Plan Chapter 3

## NETWORKS

Network service providers are an important part of the American economy. The 10 largest providers have combined annual revenue of more than $350 billion and annual capital investments in excess of $50 billion. These investments have led to the deployment of multiple networks that today

bring fixed and mobile broadband to end-users via the telephone, cable television, satellite and third-generation (3G) and fourth- generation (4G) mobile networks.

## Terrestrial Fixed Broadband Availability

Today, 290 million Americans—95% of the U.S. population— live in housing units with access to ter-restrial, fixed broadband infrastructure capable of supporting actual download speeds of at least 4 Mbps. Of those, more than 80% live in markets with more than one provider capable of offering actual download speeds of at least 4 Mbps. Meanwhile, 14 million people in the United States living in 7 million housing units do not have access

> **Communications networks need as much as ten to 100 times what capacity is now available in Multnomah County**

to terrestrial broadband infrastructure capable of this speed. Although housing units without access to terrestrial broadband capable of 4 Mbps download speeds exist throughout the country, they are more common in rural areas Businesses and community anchor institutions are often served by broadband. Ninety-six percent of all business locations have access to Digital Subscriber Line (DSL) service, and 92% have access to cable broadband service. In addition, 99% of all health care locations with physicians have access to actual download speed of at least 4 Mbps. Finally, 97% of schools are connected to the Internet, many supported by the federal E-rate connectivity programs.

But crucial gaps exist: More than 50% of teachers say slow or unreliable Internet access presents obstacles to their use of technology in classrooms, and only 71% of rural health clinics have access to mass-market broadband solutions. Further, many business locations, schools and hospitals often have connectivity requirements that cannot be met by mass-market DSL, cable modems, satellite or wireless offers, and must buy dedicated high-capacity circuits such as T-1 or Gigabit Ethernet service. The availability and price of such circuits vary greatly across different geographies, and many businesses and anchor institutions face challenges acquiring the connectivity to support their needs. Typical advertised broadband speeds that consumers purchase have grown approximately 20% each year.

This growth has been driven by a shift in consumer preferences to faster, more advanced technologies, improved performance of different technologies and large investments by service providers in network upgrades. Both telephone and cable companies continue to upgrade their networks to offer higher speeds and greater capacities. Many have announced specific upgrades. For example, Verizon plans to pass over 17

> **How can Portland incent FTTP providers to serve Portland?**

million homes by the end of 2010 with its FiOS fiber-to-the-premises (FTTP) service, three million more than today. AT&T has announced it will build fiber-to-the- node (FTTN) infrastructure to serve 30 million homes by 2011, 11 million more than today. In addition, many smaller companies plan to aggressively build FTTP networks. If the targets in these public announcements are met, at least 50 million homes will be able to receive peak download speeds of 18 Mbps or more from their telephone company within the next 2 years. Cable companies have also announced that over the next 2–3 years they will upgrade

> **Will Portland achieve DOCSIS 3.0, and when?**

their networks to DOCSIS 3.0 technology, which is capable of maximum download speeds of more than 50 Mbps. One analyst predicts that by 2013, leading cable companies will cover 100% of the homes they pass with DOCSIS 3.0. The top five cable companies currently pass 103 million housing units, or about 80% of the country's homes. As noted in a

recent report from the Columbia Institute for Tele-Information (CITI), history suggests that service pro-viders will meet these announced targets. So it is likely that 90% of the country will have access to ad-vertised peak download speeds of more than 50 Mbps by 2013. The affordability and actual perfor-mance of these networks will depend on many factors such as usage patterns, investment in infrastruc-ture, and service take-up rates. However, these major announced build outs target areas already served by broadband. It is unlikely there will be a significant change in the number of un-served Americans based on planned upgrades over the next few years, although some small companies may upgrade their networks to support broadband in currently un-served areas.

The performance of fixed broadband connections is often advertised in terms of maximum "up to" download and upload speeds. For example, an end-user with a connection for which download speeds are "up to 8 Mbps" can expect to reach 8 Mbps download speeds, but not necessarily reach and sustain that speed all or even most of the time. Data show that actual speeds experienced by end-users differ considerably from the "up to" speeds advertised by service providers. This distinction is important because it is the actual experience of the consumer (not theoretical technical capabilities) that enables or limits the use of different applications by end-users. Estimates of the average advertised "up to" download speed that Americans currently purchase range from 6.7 Mbps to 9.6 Mbps, with the most detailed data showing an average of approximately 8 Mbps and a median of approximately 7 Mbps. As noted, the average advertised speed purchased by broadband users has grown approximately 20% each year for the last decade. Upload speeds are significantly lower, as the advertised "up to" upload speed typically is closer to 1.0 Mbps.  However, the actual experienced speeds for both downloads and uploads are materially lower than the advertised speeds. Data indicates the average actual download speed in American households for broadband is 4 Mbps (median actual is 3.1 Mbps). Therefore, the actual down-load speed experienced on broadband connections in American households is approximately 40–50% of the advertised "up to" speed to which they subscribe. The same data suggest that for upload speeds, actual performance is approximately 45% of the "up to" advertised speed (closer to 0.5 Mbps). Actual download speeds vary by technology as well. While median actual download speeds for fiber and cable are 5–6 Mbps, median actual download speeds for DSL are 1.5–2 Mbps, and under 1 Mbps for satellite. Despite this variation in performance across technologies, on a percentage basis, the gap between ad-vertised and actual speeds experienced by consumers is consistent and prevalent across all types of connection technologies. This performance gap between advertised "up to" speeds and actual perfor-mance is consistent with reports published in a number of other countries. A study in the United King-dom found that average actual speeds were typically about 57% of average advertised speeds. Studies in New Zealand, Australia, Italy and Ireland have shown similar results.

## Excerpted from the Mt. Hood Cable Commission Community Technology Needs Ascertainment

### ♦ *System Capacity*

The exploration of system capacity focused on the capacity that communications systems in Mult-nomah County currently have as well as the system capacity that is necessary for the future in order to meet the needs of Multnomah County residents and organizations. This included a review of: emerging technologies; bandwidth capacity and management; universal coverage; connectivity; mobility; and transport systems.

**Finding: Four key emerging and evolving technologies are most likely to drive increased system capacity in the near and long term -** This includes 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.

**Finding: 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.

**Finding: Communications networks need substantial increases in bandwidth capacity to handle the current and future applications demonstrated/documented by Multnomah County populations –** This includes exponential expansion in bandwidth requirements for networks in general, as much as ten to 100 times what capacity is now, as well as specific growth for:
> • Wired backhaul networks to support wireless network growth
> • A higher capacity institutional network for users whose data transport requirements are nearly doubling every 18 months The predominant need is for symmetrical bandwidth versus the current dominant provision of asymmetrical bandwidth.

**Finding: Fiber-to-the-Premises (FTTP) is the current and future infrastructure which is able to meet the full range of demonstrable needs of the community in terms of interactive, scalable, network capacity –** Because of the exponential growth forecast by residential, business, non-profit and institutional users of the internet for multiple, interactive, basic and advanced services, the highest capacity technology, FTTP, will be needed to meet the needs demonstrated. Regarding residential fiber-to-the-home infrastructure (FTTH), currently this type of capacity is generally not available in Multnomah County, except in certain East County areas where Verizon provides FIOS.

**Finding: Local government should spur development of, or expansion of existing, high capacity communications systems in order to help pursue universal coverage –**
Many communities expressed a desire for local governments to be involved in efforts to expand and develop higher capacity communications systems at an affordable cost for their constituencies, including everything from developing robust public infrastructure to creating an environment that would be attractive to capital investors that would, in turn, stimulate more competition.

**Finding: The Institutional Network has provided the network connectivity that school districts and government locations need to facilitate both administrative operations and services to students, residents, businesses and customers –** The current network provides reliable stable connectivity that will facilitate current public entity applications related to video , voice and data systems and access to the internet. It is further seen as a highly reliable transport system. I-Net users also note that key factors contributing to reliable stable transport include regular maintenance and upgrades to the network, and a stable cost for service.

## Excerpted from the National Broadband Plan Chapter 3

## Mobile Broadband Availability

As of November 2009, according to data from American Roamer, 3G service covers roughly 60% of U.S. land mass. In addition, approximately 77% of the U.S. population lived in an area served by three or more 3G service providers, 12% lived in an area served by two, and 9% lived in an area served by one. About 2% lived in an area with no provider. These measures likely overstate the coverage actually experienced by consumers, since American Roamer reports advertised coverage as reported by many carriers who all use different definitions of coverage. In addition, these measures do not take into account other factors such as signal strength, bit rate or in-building coverage, and may convey a false sense of consistency across geographic areas and service providers. As with fixed broadband, most areas without mobile broadband coverage are in rural or remote areas. In fact, 3G build out is significantly lower in several states—in West Virginia, only 71% of the population has 3G coverage and in Alaska only 77% have coverage. Additionally, American Roamer also suggests that 98% of businesses have 3G coverage today, although the data have similar limitations regarding signal strength, bit rate and in-building coverage. While most businesses have wireless broadband coverage, nearly 9% of rural business sites still do not have access, compared to less than 1% of business sites in urban or suburban areas. Finally, while a business location may have coverage, the value in mobile broadband comes when employees can access applications everywhere, which limits the importance of this particular coverage metric.

Several operators have announced upgrades to 4G broadband with Clearwire, Sprint plans to use WiMAX as its 4G technology. WiMAX has been rolled out in a few markets already, and Clearwire plans to cover 120 million people with WiMAX by the end of 2010. Mobile broadband network availability will change rapidly because of these deployments. Improved spectral efficiencies and significantly lower network latencies are some of the features of 4G networks that could lead to a better mobile broadband experience. For example, the spectral efficiency of mobile broadband networks could improve by over 50% with a transition from early 3G networks to 4G, while improvements relative to state-of-the-art 3G networks are likely to be a more modest 10–30%. The extent to which the effect of these advances are

> **4G Networks are much faster and more capable than the 3G networks we have now.  How can we make sure Portland is covered with 4G?**

reflected in users' experiences will depend on a variety of factors, including the total amount of spectrum dedicated to mobile broadband and the availability of high-speed backhaul connections from cellular sites. Evaluating network availability and performance is much harder for mobile than for fixed broadband. For instance, the quality of the signal depends on how far the user is from the cell tower, and how many users are using the network at the same time. Therefore, the fact that users are in the coverage area of a 3G network does not mean they will get broadband-quality performance. Still, as with fixed broadband, it is clear that the speeds experienced on mobile broadband networks are generally less than advertised. Actual average download speeds have been reported to be as low as 245 kbps, while speeds in excess of 600 kbps are advertised. Actual average upload speeds as low as 106 kbps have been reported, versus advertised rates of 220 kbps or higher. Both mobile network performance and the availability of mobile broadband rely on the availability of spectrum. Carriers and other broadband-related companies agree that more spectrum will be needed to maintain robust, high-performing wireless broadband networks in the near future.

## Excerpted from the Mt. Hood Regulatory Commission's Study on Communications Needs, April 2010

**Mobility**
- The use of mobile devices and technology is high and on the rise in Multnomah County Mobile phones and their related portable data capabilities provide an "access point" to communications technology for many in Multnomah County

## Excerpted from the National Broadband Plan Chapter 4

### Competition in Residential Broadband Markets

Competition provides consumers the benefits of choice, better service and lower prices. This section begins by analyzing the available data to assess the current state of competition among wireline broadband services and mobile wireless broadband services, and the competitive dynamics across different broadband technologies. It does not analyze the market power of specific companies or reach definitive conclusions about the current state of competition for residential broadband services. The section then discusses how new technologies and network upgrades present both opportunities and challenges to competition in the near future. It concludes with several recommendations to promote competition and to improve the data the government collects to assess the state of competition in broadband markets in the future.

> **Failure to keep pace with necessary bandwidth expansion will negatively impact Multnomah County, especially in the areas of economic development, education and healthcare**

### Competition in industries with high fixed costs

Building broadband networks—especially wireline—requires large fixed and sunk investments. Consequently, the industry will probably always have a relatively small number of facilities-based competitors, at least for wireline service. Bringing down the cost of entry for facilities-based wireline services may encourage new competitors to enter in a few areas, but it is unlikely to create several new facilities-based entrants competing across broad geographic areas. Bringing down the costs of entry and expansion in wireless broadband by facilitating access to spectrum, sites and high-capacity backhaul may spur additional facilities-based competition. Whether wireless competition is sustainable in driving innovation, investment and consumer welfare will depend on the evolution of technology and consumer behavior among many other factors.

Given that approximately 96% of the population has at most two wireline providers, there are reasons to be concerned about wireline broadband competition in the United States. ***Whether sufficient competition exists is unclear and, even if such competition presently exists, it is surely fragile. To ensure that the right policies are put in place so that the broadband ecosystem benefits from meaningful competition as it evolves, it is important to have an ongoing, data-driven evaluation of the state of competition. In general, broadband subscribers appear to have benefited from the presence of multiple providers.***

## Fixed broadband service

Unlike many countries, the majority of U.S. broadband subscribers do not connect to the Internet via local-access infrastructure owned by an incumbent telephone company. The U.S. cable infrastructure was advanced and ubiquitous enough to allow cable companies to offer broadband access services to large portions of the country, in many cases before the telephone companies. As a result, the U.S. market structure is relatively unique in that people in most parts of the country have been able to choose from two wireline, facilities-based broadband platforms for many years. Approximately 4% of housing units are in areas with three wireline providers (either DSL or fiber, the cable incumbent and a cable over-builder), 78% are in areas with two wireline providers, about 13% are in areas with a single wireline provider and 5% have no wireline provider. These data do not necessarily mean that 82% (78% + 4%) of housing units have two or three competitive options for wireline broadband service—the data used here do not provide adequate information on price and performance to determine if multiple providers present in a given area compete head-to-head.

Indeed, competition appears to have induced broadband providers to invest in network upgrades. Cable and telephone companies invested about $48 billion in capital expenditures (capex) in 2008 and about $40 billion in 2009. While it is very difficult to accurately disaggregate service provider capital expenditures into broadband and other areas, a review of analyst reports at Columbia Institute for Tele-Information (CITI) suggests that of this total, wireline broadband capital expenditures were about $20 billion in 2008 and expected to be about $18 billion in 2009. Companies channeled these investments into network upgrades in recent years.

Consumers are benefiting from these investments. Top advertised speeds available from broadband providers have increased in the past few years. Additionally, typical advertised download speeds to which consumers subscribe have grown at approximately 20% annually for the last 10 years.

***The presence of a facilities-based competitor impacts investment. Indeed, broadband providers appear to invest more heavily in network upgrades in areas where they face competition.*** Providers of broadband over any given wireline technology—Digital Subscriber Line (DSL), cable or fiber—generally offer faster speeds when competing with other wireline platforms. So, for example, available cable speeds are higher in areas in which cable competes with DSL or fiber than in areas where cable is the only option. DSL and fiber show similar results. Available speeds are even higher where three wireline providers compete (e.g., where a cable over-builder is also present).

New choices—at new, higher speeds—are becoming available, as well. Clearwire offers download speeds of up to 2 Mbps service in several cities and plans to have its WiMAX service available to about 120 million people by 2011. Two satellite providers plan to launch new satellites in 2011 and 2012, with ViaSat (WildBlue) expecting to advertise download speeds of up to 2–10 Mbps and Hughes Communications planning to advertise download speeds of up to 5–25 Mbps.

## Mobile broadband competition

Third-generation (3G) wireless service covers roughly 60% of U.S. landmass. In addition, approximately 77% of the U.S. population lived in an area served by three or more 3G service providers, 12% lived in an area served by two, and 9% lived in an area served by one. About 2% lived in an area with no provider.

These measures likely overstate the coverage actually experienced by consumers, since these figures report *advertised* coverage as reported by many carriers who all use different definitions of coverage. They may convey a false sense of consistency across geographic areas and service providers. As with fixed broadband, most areas without mobile broadband coverage are in rural or remote areas. Nonetheless, the data can help benchmark mobile broadband availability nationwide. In total, while United States service providers are building out mobile broadband coverage, the U.S. is far from having "complete" coverage.

Mobile data users typically receive download speeds ranging from hundreds of kilobits per second to about one megabit per second. Several competing firms offer mobile broadband. In addition to the nationwide service providers AT&T, Verizon, Sprint and T-Mobile (two of which are also leading providers of wireline broadband), new competitors such as Leap Wireless and MetroPCS have emerged in metropolitan areas in recent years. Like wireline broadband providers, these firms may compete along many dimensions including coverage, device selection, roaming and services. Many service providers have focused on network upgrades to 3G services.

While projections should be viewed cautiously, wireless broadband capital expenditures are expected to be about $12 billion in 2010 and increase steadily to $15 billion in 2015 as service providers roll out their 4G services. Mobile broadband services are relatively new and their competitive dynamics are changing rapidly. As new technologies such as High Speed Packet Access (HSPA), WiMAX and Long Term Evolution (LTE) are introduced and rolled out by different carriers, new devices support different uses and consumers turn to different applications.

## Wireline-wireless competition

Whether wireless broadband, either fixed or mobile, can compete with wireline broadband is an important question in evaluating the status of broadband services competition. The answer depends on how technology, costs and consumer preferences evolve, as well as on the strategic choices of firms that control wireline and wireless assets, including firms that offer both fixed and mobile broadband.

Consumers' preferences differ depending on how they use their broadband connections and how much they are willing to pay such use. Some value download speeds more than any other attribute, some value mobility and new converts from dial-up may still even value the simple "always on" connection. A user who values little more than e-mail and browsing news sites has, in principle, many choices— nearly any broadband access technology will do. But a user who streams high-definition video and enjoys gaming probably requires high download and upload speeds and low latency. That user will likely have few choices.

Wireless broadband may not be an effective substitute in the foreseeable future for consumers seeking high-speed connections at prices competitive with wireline offers. ***Given enough spectrum, however, a variety of engineering techniques may make wireless a viable price/performance competitor to wired solutions at far higher speeds than are possible today, further increasing consumer choice.***

The ongoing upgrade of the wireless infrastructure is promising because of its potential to be a closer competitor to wireline broadband, especially at lower speeds. For example, if wireless providers begin to advertise, say, 4 Mbps home broadband service, wireline providers may be forced to respond by lowering prices of their broadband offerings. This could be true even if wireless services are more expen-

sive, especially if the service is also mobile. Such an outcome is a possibility—for instance, Long Term Evolution Systems (LTE) could offer speeds between 4 and 12 Mbps, with sustained speeds of up to 5 Mbps.

## Potential future issues for fixed broadband competition

Analysts project that within a few years, approximately 90% of the population is likely to have access to broadband networks capable of peak download speeds in excess of 50 Mbps as cable systems upgrade to DOCSIS 3.0. About 15% of the population is likely to be able to choose between two robust high-speed service services—cable with DOCSIS 3.0 and upgraded services from telephone companies offering fiber-to-the-premises (FTTP). Some evidence suggests that this market structure is beginning to emerge as cable's offers migrate to higher peak speeds.

As with fixed-mobile substitution, how the evolution of network capabilities affects competition depends on how pricing, consumer demand, technology and costs evolve over time. For example, if users continue to value primarily applications that do not require very high speeds (e.g., speeds in excess of 20 Mbps), and are not willing to pay much for vastly increased speeds, then a provider may not gain much of an advantage by offering those higher speeds. In contrast, if typical users require high speeds and only one provider can offer those speeds, and expected returns to telephone companies do not justify fiber upgrades, then users may face higher prices, fewer choices and less innovation. Because of this risk, it is crucial that the FCC track and compare the evolution of pricing in areas where two service providers offer very high peak speeds with pricing in areas where only one provider can offer very high peak speeds. The FCC should benchmark prices and services and include these in future reports on the state of broadband deployment.

## Excerpted from the Mt. Hood Cable Regulatory Commission's Study on Communications Needs, April 2010

**Bandwidth Capacity and Management (Key Findings)**

- Communications networks need substantial increases in bandwidth and capacity to handle current and future applications demonstrated/documented by Multnomah County populations
- The predominant need is for symmetrical bandwidth versus the currently dominant provision of asymmetrical bandwidth
- Fiber-to-the-Premises (FTTP) is the current and future infrastructure which is able to meet the full range of demonstrable needs of the community in terms of interactive, scalable, network capacity
- Failure to keep pace with necessary bandwidth expansion will negatively impact Multnomah County, especially in the areas of economic development, education and healthcare
- The management structure of the I-Net has positively contributed to the affordability and the reliability of network services for local schools, libraries and local governments

**Universal Coverage**

- State of the Art, Fiber-to-the-Home (FTTH) capacity is generally not available in Multnomah County, except in certain East county areas where Verizon has built its FIOS system
- High speed data and internet services are not universally available to all businesses in Multnomah County
- Local government should spur development of, or expansion of existing, high capacity communications systems in order to help pursue universal coverage

**Connectivity**
- The Institutional Network has provided the network connectivity that school districts and government locations need to facilitate both administrative operations and services to students, residents, businesses and customers
- The I-Net interconnect with the IRNE network has, and needs to continue to provide, valuable and cost effective network redundancy, access to critical public sites not on the I-Net and connectivity with ISPs for public agencies
- The I-Net interconnection capacity is currently meeting public user needs, but increasing network use will subsequently drive demand for higher interconnection bandwidth and connections with other networks

**Mobility**
- Growth in portable, mobile computing will continue to increase demand for ubiquitous, high capacity wireless networks
- Public institutions anticipate significant increases in their mobility needs in the future

**Transport Systems**
This subsection focuses on the Institutional Network as a transport system.

**Finding: The quality and reliability of the I-Net as a transport system is good -** The I-Net transport system quality and reliability have improved significantly over the past 2-3 years and respondents are generally satisfied. A future issue that some I-Net users would like to see addressed is Quality of Service (QoS) being managed for the whole network. Organizations that are using the I-Net for VoIP have had some problems related to QoS. For example, the David Douglas School District says overall that VoIP transport is good, but with the I-Net there have been and could be problems because QoS is not programmed or addressed for VoIP. The City of Gresham has also seen drop out on its 100 Mbps sites, while not experiencing this as much on its sites with 400 Mbps connections.[102]

**Finding: The useful life of the underlying physical I-Net infrastructure has a long term outlook as opposed to the life of the transport system electronics -** The physical fiber optic infrastructure has a lifespan, by some estimations, of at least 30 years. This means the existing network will provide the base physical infrastructure allowing growth to meet the users' needs for at least the next 15 years.

The electronic portions of the I-Net have a far lower useful life expectancy. Although this study did not specifically evaluate the I-Net equipment, it can be anticipated, based on industry experience that the electronic equipment may become obsolete long before it breaks down. Equipment must be upgraded in a timely manner to continually meet the bandwidth and reliability needs of the I-Net users.

**Finding: Key factors contributing to the I-Net being a stable transport system for public stakeholder users include regular maintenance and upgrades to the network, continued high reliability and stable costs for service -** I-Net users repeated these 3 themes concerning the continued stability of the I-Net as an efficient and effective transport system for their use:

- Reliability and redundancy are critical all the time as more functions are performed on the Internet and wide area networks. Increasingly important information is being carried on the networks such as public safety data, school curriculum and VoIP, as well as staff needing network access to successfully perform their jobs.
- Bandwidth will need to increase over time (some respondents said as much as 2-3 times in 18 months) to meet the needs of the increase in users and more data intensive applications.
- Stable pricing must remain in place to insure that organizations can provide their users with the needed network services going forward.

### Equity

**Finding: Multnomah County residents face equity issues in access to communications technology similar to other communities across the country -** It is instructive to consider equity issues by considering a profile of those who have not adopted internet access at home (28% of residents). An analysis of the data collected via a random telephone study in Multnomah County finds the characteristics of those who do not have internet access are similar to the trends being reported nationally. Residents without internet access in Multnomah County are more likely to report that their household earns less than $30,000 annually. Forty-seven percent (47%) of these residents reported not having internet access at home versus just 5% of County residents that reported earning more than $60,000 annually. Clearly, affordability of communications technology is a key barrier to equity in the County. A recent study issued by the Federal Communications Commission (FCC) similarly found that a wide gap exists in household incomes  related to broadband adoption. In their nationwide study, 60% of households that earned less than $20,000 reported not having broadband versus those that earned more than $50,000 annually with just 13% reported that they had not adopted broadband.

**Finding: Communities increasingly access the internet in a wide range of places -** While home is still the most popular place to access the internet, followed by work, the increasing prevalence of wireless 3G and 4G networks, Wi-Fi hotspots and free public access internet locations, has fostered an "access anywhere" environment. Those residential telephone survey respondents who indicated they had home internet access, also indicated they accessed the internet at the following locations:

Chart 1

| Locations for accessing the Internet | Total |
|---|---|
| | Percentage |
| Work/Employer | 22 |
| Public library/Other public | 20 |
| Home only | 19 |
| Mobile/Cell phone | 11 |
| Friend or family | 9 |
| Restaurant/Café | 6 |
| Wireless Broadband | 5 |
| School | 4 |
| Through someone else's service | 3 |
| Miscellaneous | 2 |