

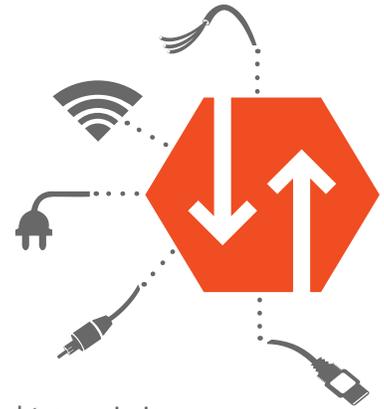
Executive Summary

What Is Broadband?

In the simplest definition, broadband is a fast connection to the internet that is always on. In the most complicated definition, broadband means all forms of high-speed digital communications among people, organizations and machines. It means billions of devices running billions of apps transmitting enormous volumes of voice, text, image, numeric and video content through wires, cables, cell towers and satellites to computer servers located all over the globe.

Use of this vast digital network is exploding, pushing ever more data through ever more connections to ever more devices. Industry experts agree that wired broadband will not be able to meet this growing demand, and wireless devices and transmission technologies will play a larger and larger role in meeting users' apparently insatiable desire to communicate – and to draw useful information from all these communications.

Broadband communication comes to people through wires, satellites, cell towers – and often a combination of the above – on its long journey from source to your computer or tablet or cell phone.



Broadband Trends

What does the future of internet use look like? No one knows, or can possibly predict. Between 2000 and 2012, internet use worldwide increased by more than 550%.² With constantly emerging new ways to use data, that rate is likely to accelerate. The only clear prediction is that tomorrow will be different. Several recent trends, however, reveal general patterns of use that should guide state policy toward broadband development.

- **Ubiquity:** Ubiquity means that the network is available everywhere and always on.
- **Crowdsourcing & Broad Collaboration:** Crowdsourcing is the process of distributing tasks to a geographically dispersed group of people.
- **Big Data:** The term “big data” encompasses several trends, but at its heart refers to the capacity to access and analyze massive amounts of information from different sources.
- **Mass Customization & Individual Choice:** With ubiquity and big data comes the ability to understand, market to, or serve anyone anywhere with tremendous accuracy.
- **Application Hosting & Cloud Computing:** Thanks to greater adoption of broadband, the economics and infrastructure of hosting software in a central location and letting users access it remotely (instead of selling it to them on shrink-wrapped discs) has become common.
- **Remote Sensing, Monitoring & Tracking:** Devices that are linked to distance diagnostic or data-processing centers – like EZPass transponders, cameras, thermometers, or blood testing kits – have created opportunities to reduce the bottlenecks and expense of collecting remote information.

² World Internet Usage and Population June 30, 2012, <http://www.internetworldstats.com/stats.htm>

Broadband In Maine Why It Matters

In Maine, increased broadband use and availability can save money and increase choice by offering:

More Jobs for Maine.

- 21% of economic growth in developed economies from 2004 to 2009 is attributed to the internet³
- 97% of American consumers look online for purchases⁴
- Start-up businesses can save \$16,500 annually by making use of internet-based services⁵
- Companies that make extensive use of broadband internet grow more quickly than companies that don't⁶

Better and More Affordable Health Care.

- More individual control of care
- Faster access to experts
- Lower insurance costs due to more efficiency

Individualized, Interactive, Affordable Education.

- Student access to the best teachers
- Quality diagnostic information available to teachers
- Individualized learning programs

Responsive, Affordable Government.

- No waiting in line for licenses and permits
- Interactive feedback to elected officials about current proposals
- Lower cost to taxpayers for back office functions like assessing, billing, etc.
- Reduced paperwork and administrative costs



Where We Are

Maine's broadband problem is not that we don't have enough "high-tech" businesses. Nor is it that we don't have "fiber to every home and every business." Our problem is that we don't even come close to fully utilizing the broadband capacity we already do have. In the face of the dramatic opportunities for business growth available through more and better utilization of the internet, 59% of Maine's 141,000 small and intermediate size businesses do not have a website, and 55% see no need for using the internet.⁷

When asked why they don't make greater use of broadband, 54% of Maine households and 55% of Maine businesses responded that they didn't see any value in such use. Another 18% of households and 18% of businesses said that the cost of higher levels of service was too great.⁸

3 McKinsey Global Institute, Internet matters: Is this The Net's sweeping impact on growth, jobs, and prosperity, May 2011 by Matthieu Pélissier du Rausas, James Manyika, Eric Hazan, Jacques Bughin, Michael Chui, Rémi Said, http://www.mckinsey.com/insights/high_tech_telecoms_internet/internet_matters

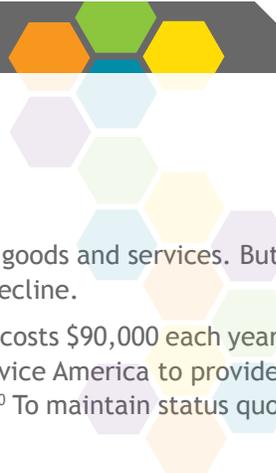
4 BIA/Kelsey's (www.bia.com and www.kelseygroup.com) User View Wave VII, 2010

5 Wednesday, April 18, 2012, Broadband Saves Entrepreneurs More Than \$16,000, <http://www.internetinnovation.org/press-room/broadband-news-press-releases/broadband-saves-entrepreneurs-more-than-16000/>

6 McKinsey Global Institute, Internet matters: Is this The Net's sweeping impact on growth, jobs, and prosperity, May 2011 by Matthieu Pélissier du Rausas, James Manyika, Eric Hazan, Jacques Bughin, Michael Chui, Rémi Said, http://www.mckinsey.com/insights/high_tech_telecoms_internet/internet_matters

7 James W. Sewall Company for the ConnectME Authority, Developing Broadband in Maine: Baseline Update 2013, Volume 1, Retrieved from <http://www.maine.gov/connectme> (publication pending)

8 Ibid.



The Danger of Falling Behind

If Maine lags behind in the adoption of broadband internet, our economy will lose out.

- **Maine will lose jobs to the competition:** 97% of American consumers look online for goods and services. But 59% of Maine businesses don't even have a website. This is a formula for economic decline.
- **Maine's families will sink under the burden of health and government expenses:** It costs \$90,000 each year to pay for nursing home care.⁹ It costs \$5,000 a year for Damariscotta-based Full Service America to provide equivalent long-term care in the home, using simple telecommunication technology.¹⁰ To maintain status quo in Maine will cost \$200 million more each year in MaineCare expenses alone.¹¹
- **Maine students will fall behind:** The U.S. Department of Education has found that "students who took all or part of their course online performed better, on average, than those taking the same course through traditional face-to-face instruction."¹²
- **The choice is simple:** Embrace the communications revolution that surrounds us, or lose out. The world is passing us by. Every minute we delay, the cost of catching up accelerates. We must act now.

What's the Smart Way To Proceed?

Many observers believe that enormous public benefit will flow from more extensive investments in internet connections; their philosophy is, "Build it, and they will come." A Maine-based commentator puts it starkly: "It's long past time for us to connect *every* home and business in Maine to the existing fiber networks. If that ever happens, we will see an economic boom..."¹³ Fiber to every door, in the commentator's view, will be our economic salvation.

A second way of looking at the public policy question is to focus on the demand side. While supply-siders believe that building a publicly subsidized network is the first step to increasing broadband use, demand-siders believe that informed, engaged users of broadband who see the benefits of increased service will help pay for network extensions.

Demand-siders focus on enabling entrepreneurs to develop business models based on the internet, and letting them lead providers to the demand those efforts create. Demand-siders say, "Put whatever public resources may be available into encouragement for entrepreneurs, not into subsidies for providers." While nobody on either side disputes the public benefit of widespread internet connections, demand-siders focus less on the initial physical placement and type of infrastructure.

The demand side implications for the task force are two-fold:

- **Increase Use:** Maine's broadband problem is not that we don't have fiber to every home and business, but that we don't even come close to fully utilizing the broadband capacity we already do have; and
- **Build Demand:** Therefore, the central goal of Maine's public policy toward broadband should be to encourage entrepreneurs who will build demand.

9 Univita 2010 Cost of Care Survey, <http://www.univitahealth.com/media/2010-Cost-of-Care-Survey-Final.pdf>

10 Damariscotta doctor working to care for elderly in their homes," Dec 17, 2010 <http://www.wch6.com/news/local/story.aspx?storyid=141108>

11 Planning Decisions Inc. estimate (see chart on page 17)

12 U.S. Department of Education. (2010). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. <http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf> as cited in Research on the Effectiveness of Online Learning. (2011).

13 Sullivan, D. (2012, August 6). Politicians: Connect Maine to the internet. *Bangor Daily News*.



Technology First vs. Solutions-Based Approach

We need to make broadband available to everyone in Maine. But we shouldn't pick winners when it comes to different types of technology. The popular technology today may be outdated tomorrow – think of the desperate attempts to find programmers for aging, obsolete computer systems. Maine policymakers should create an environment that allows all players equal footing in broadband expansion, and allow the private market to choose the winners.

What Are the Benefits of Moving Ahead?

If the recommendations presented in this report are carried out over the coming decade, the impact in year 10 will be:

- Creation of over 11,000 additional jobs in Maine
- Paying nearly \$500 million of new income in Maine
- Generating over \$70 million of new state & local tax revenues in Maine

Recommendation 1: Help Maine Businesses Move to the Internet

The State of Maine should provide a three-year tax credit for all Maine small and medium businesses for internet-related staff training and marketing expenditures.

97% of American consumers look online for goods and services. But 59% of Maine businesses don't even have a website. This needs to change.

The result would be a cumulative increase in sales of nearly \$270 million, supporting nearly 1,500 new jobs. The key to meeting this goal is business education. Maine's business owners and operators must more fully embrace the digital world. The best way to do this is to make the leap less fearful and expensive.

Recommendation 2: Help Maine's Elderly Stay at Home

Use in-home technologies to reduce the proportion of elderly on MaineCare receiving long-term care in institutions from 65% to 40% by 2015, and to 20% by 2020. This will allow seniors to stay home longer – which is what they want – and at the same time save Maine taxpayers over \$100 million in 2015, and over \$250 million annually in 2020.

The average cost of a nursing home bed is about \$90,000 each year and few seniors prefer living in an institution. Telemedicine has been adopted by many providers here in Maine and around the country to improve care and save money. Dr. Chip Teel of Damariscotta developed an approach that takes telemedicine a step further, using simple broadband communication technologies to help elderly stay in their homes for about \$5,000 a year by allowing them (and their children) to use simple off-the-shelf technology like cameras and Skype for 24-hour communication. But it's not all technology. Home visits, volunteering, transportation help, and neighbor check-ins are also essential to creating a high quality of life for participants in the program.¹⁴

¹⁴ Teel, A. S. (2011). *Alone and invisible no more: How grassroots community action and 21st century technologies can empower elders to stay in their homes and lead healthier, happier lives*. White River Junction, Vt: Chelsea Green Pub.



However, Maine’s Department of Health and Human Services has policies that are more restrictive than other states regarding reimbursement for expenses for such new approaches under MaineCare, so even though these techniques have been pioneered in Maine, other states are now moving ahead faster in implementation.¹⁵ Maine needs to apply for federal waivers that would allow the reimbursement of new in-home technologies in order to reduce the proportion of elderly on MaineCare receiving long-term care in institutions.

Recommendation 3: **Educate Health Data Analysts**

Develop a talent pool of health informatics specialists to expand Maine’s competitive advantage in health information systems by:

- **Building a broad-based data analytics competency in Maine’s K-12 schools** by creating statewide education policies and incentives that reward innovation in teaching curricula and demonstrate student competency in the command of data analytic methods.
- **Further investing in more specialized knowledge in health informatics at the university level** by undertaking an assessment of university assets in healthcare and data analytics to discern and prioritize gaps, focusing particularly on which segments of health data analytics are central to this new growth strategy.

Information technology has permeated every aspect of our economy and lives, generating a volume and diversity of data that can be made readily available and useful through the internet. Those who know how to access and use these data are opening doors to a wealth of unprecedented, and often disruptive, opportunities. Virtually every enterprise and job is vulnerable. Yet Maine and the nation as a whole are not prepared. McKinsey Global Institute projects that the U.S. will face a shortage of 140,000 to 190,000 data analytic specialists¹⁶ within only a few years. And this shortage speaks only to the specialists. The ability to gather, manipulate and interpret data is fast becoming a line item of nearly every job description, specialist or not.

As a nationally recognized leader in using health information technology,¹⁷ Maine can and should be a national leader in developing this high-value talent thanks to its unique assets in health data systems and health policy education. Developing this talent locally will have a compounding benefit to Maine’s private and public institutions, driving growth and high-value job opportunities.

Recommendation 4: **Make the UMaine System a Model for Blended Learning**

UMaine should get 25% of its courses online by 2015, revise its financial incentives to reward online learning, and create consolidated degree programs when possible.

Research has shown that the most effective learning environment is one that combines the best of online learning with face-to-face classroom teaching.¹⁸ The University of Maine system has faculty, facilities and students all around the state, including up to 150,000 adults who started – but have yet to complete – their

15 Ten states now authorize telemedicine coverage under Medicaid, but not Maine - see American Telemedicine Association 2013 *State Telemedicine Legislation Tracking*. Retrieved from <http://www.americantelemed.org/docs/default-source/policy/state-telemedicine-legislation-matrix.pdf?sfvrsn=48>

16 Manyika, James, et. al. “Big data: The next frontier for innovation, competition, and productivity”, McKinsey Global Institute, May 2011.

17 *Maine one of three states nationally recognized for use of health information technology* | HealthInfoNet. Retrieved from <http://www.hinfor.net.org/news-events/news/maine-one-three-states-nationally-recognized-for-use-health-information-technology>

18 *Research on the Effectiveness of Online Learning*. (2011). The Future of State Universities. <http://www.academicpartnerships.com/research/ap-white-paper-compilation-research-online-learning>



college studies.¹⁹ It has high speed broadband connecting all of the campuses. UMaine is the ideal laboratory for developing the new model of college education, one that will serve adult learners equally as well as young high school graduates.

Recommendation 5: **Provide Every Elementary and High School Student an Internet Connected Device**

Expand Maine’s laptop program to all students K-12, and pay for this expansion with savings that result from switching to 100% digital textbooks.

In 2002, Maine became the first state in the nation to provide a laptop to every 7th and 8th grade student. Research by David Silvernail has shown that laptop use in middle schools has contributed significantly to improvements in student test scores in writing and math.²⁰ Teachers reported that it helped them to respond better to individual students. A recent review of what is working in schools around the country found that schools employing a 1:1 student-computer ratio outperform other schools.²¹

Paper textbooks are heavy, expensive, and become out of date quickly – many students use textbooks that are 7-10 years old and often contain outdated materials. Digital textbooks are more flexible, more effective, and less expensive. Digital instructional materials are interactive and personalized, allowing students to explore content more deeply. Recent U.S. Department of Education studies have found that technology-based instruction can reduce the time students take to reach a learning objective anywhere from 30 to 80 percent. The annual cost savings from switching to digital instructional materials are estimated at \$600 per student. With 184,685 K-12 students in Maine, that would amount to more than \$110 million in annual savings.

The Maine Department of Education has estimated that the state spends approximately \$285 per student, per year, for the existing middle school program, including a device, technical support, professional development, and warranties. At \$285 per student, per year, expanding the program to include all K-6 and 9-12 students would cost an additional \$44 million per year. A portion of the local savings from the switch to digital textbooks (\$110 million annually) could pay for the increased expense.

Recommendation 6: **Save Tax Dollars by Shifting Administrative Functions Online**

Adopt a formal target of reducing the growth rate of state and local government administrative spending per person by 25% over the coming decade. Achieving this goal would produce a relative savings in 2020 of over \$47 million and a cumulative saving over the decade of over \$260 million.

The early Maine experience with online government administration has been positive. Reserving state park campsites online has saved campers hours of waiting in line and the Maine Bureau of Parks hundreds of thousands of dollars. Filing state income tax returns online has gotten refunds into the pockets of taxpayers faster and has saved Maine Revenue Service hundreds of thousands of dollars each year.

19 *A Stronger Nation Through Higher Education: Maine.* (2012, March). Retrieved from http://www.luminafoundation.org/publications/state_data/2012/Maine-2012.pdf

20 Silvernail, D. L., & MLTI Research and Evaluation Team at the Maine Education Policy Research Institute, University of Southern Maine Muskie School of Public Service. (2011, August). *A Middle School One-to-One Laptop Program: The Maine Experience.* Retrieved from http://www.usm.maine.edu/sites/default/files/cepare/MLTIBrief20119_14.pdf, pg 23-25.

21 Greaves, T.; Hayes, J.; Wilson, L.; Gielniak, M.; & Peterson, R., *The Technology Factor: Nine Keys to Student Achievement and Cost-Effectiveness*, MDR 2010



If current trends continue, the per-person cost of administering state and local government in Maine would increase to \$527 by 2020. At this rate, even with Maine’s slowing population growth, state and local administrative costs will exceed \$700 million in 2020. If Maine can slow the current 37% per decade increase in the per-person costs of administering its state and local government programs, the savings would amount to tens of millions of dollars each year and, over the course of a decade, accumulate to hundreds of millions of dollars.

Recommendation 7: **Make the Maine Turnpike a Model for Smart Roads**

The Maine Turnpike Authority and the State of Maine should become a model for Smart Road transportation by:

- Installing fiber optic cable along the length of the Maine Turnpike
- Establishing a Center for Digital Transportation Services to identify and develop cost-saving, service-enhancing projects from Smart Road transportation data
- Developing and adopting a state Dig-Once policy to expand broadband infrastructure cost-effectively

Smart Roads are highways that use wireless technology to monitor traffic conditions, communicate those conditions directly to vehicles (“traffic accident 5 miles ahead”), and to send information about those conditions to emergency responders, road maintenance crews and the traveling public.

A second opportunity for broadband and the Maine Turnpike is utilizing the massive amounts of data already collected by the EZPass program. In 2012, Maine Turnpike traffic count was 60,596,022, and 65% of vehicles used EZPass electronic tags attached to vehicles to calculate distance traveled and charge tolls. The tag relays the vehicle’s entry and exit locations. In aggregate, this data could be used by the trucking industry to determine the best possible times to schedule travel. It could also be used by the tourism industry to analyze origins and travel patterns of visitors, and to forecast numbers of tourist arrivals.

A third opportunity lies in the cost of installing broadband infrastructure. According to the Federal Communications Commission (FCC), most of the cost of installing fiber optic cable for broadband usage is not for the cable itself – it is for the digging and placement of the cable into the ground or under the road. Estimates suggest that in rural areas, there is a cost savings of roughly 15.5% per mile when conduit and fiber are installed during rather than independent of a road project. Savings are greater in densely populated areas where complexity and cost of construction are highest.

A Dig-Once policy would make the installation of broadband conduit a regular practice in road construction projects. This would decrease the costs of deploying fiber and eliminate the need for multiple excavations.

Recommendation 8: **Redeploy Existing Funds to Support Broadband Growth**

Companies receiving Maine State Universal Service Fund assistance should support broadband expansion as well as landline telephone service.

The State of Maine should look comprehensively at all of its telecommunications funds to see whether they offer the proper incentives for broadband expansion and upgrading, and whether there are opportunities to increase the effectiveness of these efforts through fund consolidation.



Maine has a Universal Service Fund for telephone service, just as the federal government has. The federal government, through the Federal Communications Commission (FCC), has chosen to redirect its Universal Service Fund from the subsidy of telephone landline extension to broadband support, e.g. Connect America Fund. The FCC is now laying the groundwork for this change, and by next year there could potentially be tens of millions of dollars coming into Maine for broadband expansion, telehealth support, and lifeline support for broadband for low-income families.

By contrast, Maine’s Universal Service Fund has not undergone the same rethinking. In 2013, the fund distributed \$8 million for landline rural service. This amount could increase dramatically in future years. By contrast, the ConnectME Fund for broadband service is about \$1 million a year. The Maine Legislature should require that “provider of last resort” services subsidized under this program support broadband as well as telephone service.

We also recommend that the ConnectME Fund be allowed to support broadband expansion projects with a major economic impact – even if the project does not involve extending service to an unserved area.