

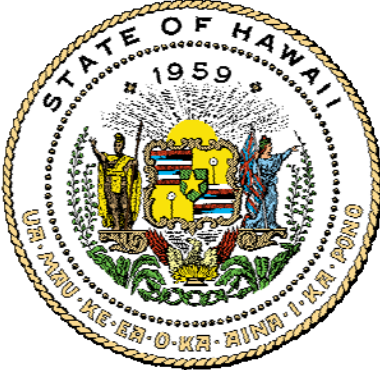
# **HAWAI'I BROADBAND TASK FORCE FINAL REPORT**

**A Report to the  
Governor  
and the  
Legislature of  
the State of  
Hawai'i**

The Auditor  
State of Hawai'i  
and  
RHD Consulting, LLC

December 2008

**THE AUDITOR  
STATE OF HAWAI'I**



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## Foreword

Through Act 2 of the First Special Session of Hawai‘i 2007, the Legislature created the Hawai‘i Broadband Task Force with the primary purpose of 1) removing the barriers to broadband access, including gaining wider access to public rights-of-way; 2) identifying opportunities for increased broadband development and adoption, including very high speed broadband services; and 3) enabling the creation and development of new advanced communication technologies in Hawai‘i. The Act required the Office of the Auditor to provide research and organizational support services necessary to assist the task force in achieving its purpose. This is the final report of the task force’s activities since its inception.

On behalf of the task force as well as my office, we wish to express our appreciation for the cooperation and help of the many individuals who assisted us with the issues that surround the concepts of broadband and broadband availability. We would also like to thank our contractor, Mr. Robert Doeringer, for his technical assistance and dedication to this project.

Marion M. Higa  
State Auditor



## HAWAII BROADBAND TASK FORCE

David Lassner, Chair  
Ken Hiraki, Vice Chair

### Chair's Message

Gordon Bruce  
Gary Caulfield  
Sen. Will Espero  
Sen. Carol Fukunaga  
Jennifer Goto Sabas  
Sen. David Ige  
Rep. Marcus Oshiro  
Henk Rogers  
Clyde Sonobe  
Rep. Gene Ward  
Kiman Wong  
Rep. Kyle Yamashita

Aloha:

Hawaii's Broadband Task Force, as created by Act 2 of the First Special Session of 2007, is pleased to submit this final report of task force activities. This report includes our findings and four major recommendations that we believe are necessary for Hawaii to achieve broadband capability comparable to the world's leaders. With the completion of this report, the task force looks forward to recommending implementing legislation supported both by the task force and by the governor and her administration for consideration by the 2009 Legislature.

The task force vote to adopt this Report was unanimous, although two of our members expressed reservations. In each case that a member had a concern over a specific aspect of a recommendation, the rest of the Task Force supported the recommendation. The specific concerns are each noted in the official minutes of the task force. I want to express my personal appreciation for their willingness to support this consensus report in spite of the specific details with which they each disagreed.

The task force began our work not much more than a year ago and the completion of our Report couldn't be more timely. In his radio address on December 6, 2008, President-elect Barack Obama stated, "As we renew our schools and highways, we'll also renew our information super-highway. It is unacceptable that the United States ranks 15<sup>th</sup> in the world in broadband adoption. Here, in the country that invented the Internet, every child should have the chance to get online, and they'll get that chance when I'm President – because that's how we'll strengthen America's competitiveness in the world."

Indeed, broadband has emerged not only as critical infrastructure for advancing every aspect of our society, but as a key element in our recovery from today's economic malaise. I am confident the implementation of these recommendations will enable increased broadband capabilities, penetration and usage throughout the State of Hawaii in support of our economic development and increased capacity for education, health care, public safety and government services.

I would like to express my personal thanks to each member of the task force, current and past, and the members of the working groups who volunteered their personal time and expertise to help us finish on time and under budget. The gracious and generous participation of all task force members enabled us to meld our diverse views and perspectives into a coherent whole that I believe will be not only serve Hawaii well for years to come but provide a model for other states seeking to advance their capabilities as well.

David Lassner, PhD., Chair  
Hawaii Broadband Task Force

## **Hawaii Broadband Task Force**

Senator Will Espero, State Senate  
Senator Carol Fukunaga, State Senate  
Senator David Ige, State Senate  
Representative Marcus Oshiro, House of Representatives  
Representative Gene Ward, House of Representatives  
Representative Kyle Yamashita, House of Representatives  
Mr. Gordon Bruce, Chief Information Officer, City & County of Honolulu  
Mr. Gary Caulfield, Vice Chairman, First Hawaiian Bank  
Dr. David Lassner, Chief Information Officer, University of Hawai`i, Chair  
Mr. Ken Hiraki, Vice President of Government and Community Relations, Hawaiian Telcom,  
Vice Chair  
Mr. Henk Rogers, Blue Planet Software  
Ms. Jennifer Goto Sabas, Office of Senator Daniel K. Inouye  
Mr. Kiman Wong, General Manager – Digital Phone, Oceanic Time Warner  
Mr. Clyde Sonobe, Administrator, Department of Commerce & Consumer Affairs

### **Former members:**

Mr. Joel Matsunaga, Vice President, Hawaiian Telcom  
Mr. Nate Smith, Oceanic Time Warner  
Mr. Nam Vu, Chief Technology Officer, ShakaNet, Inc.

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# Executive Summary

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The Hawai‘i Broadband Task Force was established by the 2007 Legislature to provide recommendations on how to advance broadband within the State of Hawai‘i. As the task force completes its work, it greets with great enthusiasm the words of President-Elect Obama on December 6, 2008: *“It is unacceptable that the United States ranks 15<sup>th</sup> in the world in broadband adoption. Here, in the country that invented the Internet, every child should have the chance to get online, and they’ll get that chance when I’m President - because that’s how we’ll strengthen America’s competitiveness in the world.”*

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## Broadband is Vital to Hawai‘i

Broadband is critical infrastructure for Hawai‘i’s 21<sup>st</sup> century advancement in education, health, public safety, research & innovation, economic diversification and public services. One national study estimated the positive economic impact of advanced broadband in Hawai‘i at \$578 million per year. *The task force recommends that Hawai‘i establish an aggressive and forward-looking vision that positions the State for global competitiveness.*

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## Driving Broadband Deployment

The task force found that the U.S. as a whole is dramatically lagging the leaders in the developed world in our broadband capabilities and pricing, and is falling farther behind each year. While Hawai‘i is doing well on some measures relative to some other parts of the U.S., the State also falls to the bottom in many national broadband studies. *The task force recommends that the State consolidate all relevant regulatory and permitting responsibilities in a new, one-stop, broadband advancement authority that promotes Hawai‘i’s policy objectives and provides advocacy at all levels of government.*

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## Maximize Hawai‘i’s Connectivity to the World

Hawai‘i’s “lifeline” for broadband to the rest of the world is expensive submarine fiber. While Hawai‘i was once the crossroads for trans-Pacific telecommunications, all of the new fiber systems built across the Pacific since 2001 have bypassed Hawai‘i. *The task force recommends that Hawai‘i aggressively promote the landing of new trans-Pacific submarine fiber in Hawai‘i, including a shared access cable station that reduces barriers to fiber landing in Hawai‘i.*

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## **Stimulate Broadband Adoption and Use**

The task force believes supplying advanced broadband at affordable prices is just one side of the equation. *The task force recommends that Government lead by example in demonstrating the value of broadband to our citizenry, deploying broadband services to the public, and ensuring that we do not leave behind the economically disadvantaged members of our communities who may be inhibited from full participation in the 21<sup>st</sup> century.*

With the completion of this Report, the task force looks forward to recommending implementing legislation supported both by the task force, the governor and her administration, and the counties.



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# Hawai‘i Broadband Task Force Report

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## Findings, Conclusions, and Recommendations

The Hawai‘i Broadband Task Force was established by the 2007 Legislature to provide recommendations on how to advance broadband within the State of Hawai‘i. The task force began its investigations and research and soon established a vision:

*Hawai‘i understands that advanced broadband services are essential infrastructure for an innovation economy and a knowledge society in the 21st century. As a result of proactive policy initiatives, Hawai‘i residents and businesses throughout the State have access to advanced broadband services of the caliber and at the pricing available in the leading developed nations of the world.*

This Final Report of the task force shares our findings and recommendations on how to achieve that vision so that Hawai‘i can receive the social and economic benefits possible today and into the future.

## **Broadband is vital to Hawai‘i**

Broadband is critical infrastructure for Hawai‘i’s 21<sup>st</sup> century advancement in education, health, public safety, research & innovation, economic diversification and public services. Senator Daniel K. Inouye summarized the imperative in a September 16, 2008 Congressional Hearing on “Why Broadband Matters.”

*“Broadband matters because broadband communications have become the great economic engine of our time. Broadband deployment drives opportunities for business, education, and healthcare. It provides widespread access to information that can change the way we communicate with one another and improve the quality of our lives. This is why our discussion today is not about pipes and providers. It is about people; our citizens stand to gain the most from universal broadband adoption. By some estimates, universal broadband adoption would add \$500 billion to the U.S. economy and create more than a million new jobs. ... Add to this hundreds of millions of dollars in savings through e-government and telemedicine initiatives and untold riches we can reap by tapping the genius of web-based entrepreneurs in every corner of this country. The case for better broadband is clear.”*

One national study documented the positive economic benefits of accelerating broadband deployment including the creating and saving of jobs, and estimated the positive economic impact in Hawai‘i at \$578 million per year (see page 16). Ubiquitous high-speed broadband

can enable dramatically improved services and can enable Hawai‘i to significantly reduce greenhouse gas emissions and the stresses on our transportation systems by reducing the need to travel for work, school, or services. A number of key applications are described more fully in the body of this report.

***Recommendation 1: Establish a Forward-Looking Vision to Make Hawai‘i Globally Competitive***

*Enact legislation that enshrines in statute a forward-looking vision to guide policy and action: Hawai‘i recognizes broadband as critical infrastructure for the 21<sup>st</sup> century. Public and private sectors shall strive together to enable every home and business in the State to access 100mbps upstream and downstream broadband service at prices comparable to those in leading economies of the world by 2012 with expandability to 1000mbps thereafter. Every home and business shall be capable of using this capability for educational, economic, social, cultural and medical advancement.*

***Funding Approach:*** \$0 required to establish the vision

***Driving broadband deployment***

The task force found that the U.S. as a whole is dramatically lagging the leaders in the developed world in our broadband capabilities, and falling farther behind each year. The following table is just one of the many examples of the data summarized more fully in the Background section of this report.

Year	U.S. International Rank— Broadband Subscribers per 100 People
1999	3rd
2000	5th
2001	7th
2002	11th
2003	15th
2004	18th
2005	19th
2006	20th

Source: EDUCASE white paper  
“A Blueprint for Big Broadband,” by John Windhauser

This lag is primarily due to the lack of proactive national policy in the U.S. While many services can be deployed on today’s capabilities, advanced services will increasingly rely on video, including high-definition, and will increasingly be bi-directional. This will drive the

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need for more bandwidth both upstream and downstream, including from remote and rural areas where Hawai‘i wants and expects innovation to thrive.

With broadband available to as many as 99% of Hawai‘i households, Hawai‘i is doing well on some measures relative to some other parts of the U.S. Nonetheless, the first two Akamai quarterly “State of the Internet” reports ranked Hawai‘i dead last among all 50 states in the percentage of broadband subscribers with effective bandwidth of 5mbps or more (<http://www.akamai.com/stateoftheinternet>) and a recent PC Magazine report ranked Hawai‘i 49<sup>th</sup> in effective speed (<http://www.bizjournals.com/pacific/stories/2008/12/01/daily18.html>). The task force firmly believes that in order to achieve global competitiveness Hawai‘i must look to the international leaders rather than simply strive to catch up with other states, which have been similarly hampered by our country’s lack of national broadband policy.

Hawai‘i’s commercial broadband providers have identified many ways in which current public policy makes it more difficult and more expensive than necessary to deploy broadband infrastructure. The State currently operates multiple regulatory authorities over different agencies for different services offered by the same provider. Providers also cite as significant barriers the substantial time and expense of obtaining multiple permits and approvals required for infrastructure deployment and the widely varying practices associated with gaining access to various facilities including poles, easements and rights-of-way.

The task force found that the international leaders achieved their successes by not only removing barriers, but through intentional public policy focused on advancing broadband capability at affordable prices. The leaders have been implementing initiatives, incentives and/or investments in support of broadband infrastructure and services, often with open-access.

The primary policy shift needed is to view broadband as essential infrastructure rather than leaving it to be deployed only when private investors believe they can obtain favorable returns relative to other opportunities for their capital. The task force notes that we do not leave private investors solely responsible for the financing and decisions concerning when and where to deploy other shared infrastructure such as roads, highways, sewers, water and power distribution systems. The task force notes with interest, the trend to a smart power grid that separates power distribution from power generation. Rather than relying solely on the power company for generation, this new grid will enable more variety, innovation and geographic distribution of power generation including by members of the public. The shift to shared open-access fiber infrastructure can similarly enable anyone to develop, provide or

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consume advanced information and communication services rather than rely solely or primarily on the interests and capabilities of infrastructure operators for these services.

The task force found that the most advanced utility telecommunications infrastructure is based on fiber optic cabling to the premises. This is the approach taken in Japan, one of the world leaders, where KDDI has recently launched a 1 gbps symmetric service at a price similar to U.S. services that are about one hundredth the speed.

### **KDDI to launch 1Gbps fiber-optic service in Oct**

Saturday 27th September, 05:46 AM JST

**TOKYO** — KDDI Corp will launch a fiber-optic communications service with upload and download speeds each of up to one gigabit per second on Oct 1. The new service will target people living in single-family homes and low-rise apartment buildings. The traffic speeds will be the fastest in eastern Japan, up drastically from the current 100 megabits per second.

With the service, KDDI aims to catch up with Nippon Telegraph & Telephone Corp, which has a share of over 70% in the market for fiber-optic broadband services for single-family houses.

KDDI will charge 5,985 yen in basic monthly fees for Internet and telephone services, down 1,155 yen from the current price, if a user subscribes for two consecutive years.

KDDI will start offering its fiber-optic services, which are now available only in six prefectures in the Kanto region and nearby Yamanashi Prefecture, in four cities in the northern prefecture of Hokkaido.

JCN

Both of the major facilities-based providers in Hawai‘i have deployed fiber to the premises in some of their large, more recent private projects where they expect to obtain adequate return on their investment. As stated by Mr. Jim LaClair, Hawaiian Telcom VP for Engineering, in the October 2008 issue of Hawai‘i Business magazine, “As Hawaiian Telcom rolls out service to new developments, its strategy is fiber-optic to the home.”

Shared open-access infrastructure can lower costs to bandwidth providers and lower barriers of entry for services, which results in greater competition, innovation, diversity of offerings and ultimately lower prices to consumers. There are an increasing number of jurisdictions around the world with competitive shared access to local fiber loops. This has led to greater capacity at lower costs while offering tremendous expandability for the future. These experiences in other locations indicate that, with appropriate planning, a modern fiber-to-the-premises infrastructure can be shared by multiple competitive service providers. There are several technical approaches and multiple business models including structural separation, private concessions and other forms of public-private partnerships.

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A recent report by the International Telecommunications Union, the United Nations Telecom Organization, advocates maximal sharing of infrastructure as a critical strategy for reducing costs and prices, especially in difficult economic times ([http://www.itu.int/newsroom/press\\_releases/2008/35.html](http://www.itu.int/newsroom/press_releases/2008/35.html)). The associated ITU press release is included in Appendix A. The task force notes that construction of new residential and/or mixed use developments may offer the most immediate opportunities in Hawai‘i to implement modern open fiber optic networks that support competitive world-class services at reasonable prices, and recommends that Hawai‘i might achieve its first successes with new architectures in these settings.

While some propose wireless as the alternative, the task force believes that “wired or wireless?” is the wrong question to ask. Fiber optic cable provides the greatest capability with nearly-unlimited expandability to fixed locations, while wireless provides tremendous advantages in mobility as well as more cost-effective deployment of basic broadband to some rural and remote locations. Most broadband wireless systems rely on wired capabilities for at least some of their backbone connectivity. The task force believes the right answer for Hawai‘i is “wired AND wireless.”

Similarly, Hawai‘i need not choose between world-class access in highly populated areas and universal access including rural and remote areas. While it is more cost-effective to deploy infrastructure in densely populated areas, the social benefits of broadband can be substantial in the most remote and rural areas where broadband can enable improved access to education, health-care and government services. The task force believes that universal access need not imply uniform access; different approaches and infrastructure may be appropriate in different places.

The task force recognizes that achieving pervasive open-access fiber to every premise will not be fast or easy, and believes that a variety of short-term actions can be taken to advance Hawai‘i’s capabilities. To support both short-term and long-term efforts, Hawai‘i needs comprehensive quantitative and qualitative data, maintained on an ongoing basis, regarding geographic broadband availability and uptake. Unfortunately, the task force lacked sufficient funding to initiate a project to collect detailed, service level data for Hawai‘i comparable to that available in some other states. Readily available mapping data on geographic availability of broadband is provided in Appendix B. Examples of best practices from other states are also included in this report.

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The task force greets with great enthusiasm the comments of President-Elect Obama on broadband:

*“Barack Obama believes that America should lead the world in broadband penetration and Internet access. As a country, we have ensured that every American has access to telephone service and electricity, regardless of economic status, and Obama will do likewise for broadband Internet access. Obama and Biden believe we can get true broadband to every community in America through a combination of reform of the Universal Service Fund, better use of the nation’s wireless spectrum, promotion of next-generation facilities, technologies and applications, and new tax and loan incentives.”*

<http://change.gov>

The Office of the President-Elect

The task force firmly believes that there will be a significant shift to a more proactive national policy on these matters over the next several years. The election of a new “wired” President and the appointment of broadband-savvy members in a new administration is complemented by increasing concern in Congress and widespread recognition of broadband advancement as a key element of the nation’s economic recovery. In addition to adopting a strong vision, Hawai‘i must position itself with committed and focused statewide broadband leadership that will be nimble and empowered to lead Hawai‘i’s internal efforts and leverage federal opportunities. The task force recommends that a permanent Broadband Advancement Authority be established with the tools and authority to take both short-term and long-term actions to continually improve Hawai‘i’s capacity.

***Recommendation 2: Create a One-Stop Broadband Advancement Authority***

*Enact legislation that consolidates any and all State and County, wired and wireless, voice, data and video regulation, franchising and permitting functions into a one-stop self-funded expert broadband advancement authority in the State Department of Commerce and Consumer Affairs that provides primary leadership for achieving Hawai‘i’s broadband vision through both short-term and long-term strategies. Headed by a Broadband Commissioner and guided by a statewide advisory group including County representation, this office would:*

- *Consolidate all broadband-related activities currently in the PUC (telephony) and DCCA (cable TV) along with applicable County functions to serve as a one-stop shop that expedites processing for all regulatory, franchising and permitting functions normally available to state and local governments,*

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- *Create a level playing field for broadband providers by rationalizing fees and requirements to the extent permissible under federal law,*
  - *Promote maximum sharing and equitable access to all elements of broadband infrastructure through permitting, regulation, building codes and other means permissible under federal law,*
  - *Implement efficient, consistent and equitable policies on behalf of the state and all counties while remitting revenue for all leases and easements to the appropriate entities,*
  - *Offer incentives that promote competitive broadband access at affordable costs,*
  - *Provide advocacy at all levels of government on behalf of broadband service providers to help overcome unnecessary barriers to progress,*
  - *Implement an ongoing program of data collection and mapping to enable Hawai‘i’s policy-makers to monitor progress in achieving the committee’s broadband vision, and*
  - *Proactively develop new partnerships with the federal government to implement modern approaches to advancing broadband infrastructure and services throughout Hawai‘i, including in rural and underserved areas.*

***Funding Approach:*** *The Authority would consolidate existing positions, resources and functions to increase efficiency and would use a self-funding model by reallocating existing applicable regulatory fees, e.g. at PUC and DCCA to support its activities. No new appropriations would be required or requested.*

### ***Maximize Hawai‘i’s connectivity to the world***

Hawai‘i’s sole “lifeline” for broadband to the rest of the world is expensive submarine fiber, which is a disadvantage faced by only one other State. While Hawai‘i was once the crossroads for trans-Pacific telecommunications, all of the new fiber systems built across the Pacific since 2001 have bypassed Hawai‘i. This reduces Hawai‘i’s supply of connectivity to the rest of the world and contributes to higher costs.

*“Hawai‘i has developed a reputation as a difficult place to land a new submarine fiber. With the advances in technology that permit longer fiber spans, the small size of the local Hawai‘i market, and many other geographic options for*



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*interconnection in Guam, Asia and the U.S., most new fiber systems will continue to bypass Hawai‘i unless they have a specific reason to land there.”*

John Hibbard

Leading Fiber Optic Project Consultant in the Asia-Pacific Region

The improvements in fiber optic transmission technology that have made stopping in Hawai‘i optional have an effect similar to what Hawai‘i experienced in air travel when the flying range of jets increased. The permitting processes required for each new cable landing in the current environment are not conducive to encouraging private investment in submarine fiber to Hawai‘i. Only two current projects (Asia Americas Gateway and Telstra Hawai‘i) are planning new projects to O‘ahu, but none of the other pending major trans-Pacific systems plan to land in Hawai‘i.

Even within the State, Hawai‘i faces unique challenges. While other states use less-expensive terrestrial fiber, Hawai‘i is the only state that must rely on submarine fiber for our intra-state high-speed communications.

***Recommendation 3: Welcome Trans-Pacific Submarine Fiber to Hawai‘i***

*Reduce the barriers to landing new fiber in Hawai‘i through a shared-use, open-access, fiber-ready, international submarine cable landing station on O‘ahu that is made available to all projects on a fair and equitable basis. The station should be privately managed with users sharing in the costs, and could be a new or existing physical facility. Government might provide land, permitting assurances and other assistance identified through an open RFI/RFP process to identify one or more private partners interested in building and/or operating a station that could welcome new fiber systems to Hawai‘i. The task force recommends that the University of Hawai‘i lead an RFI/RFP process to create this facility with State and County assistance and support.*

***Funding & Approach:*** *Costs unknown until the RFI/RFP is issued.*

***Stimulate broadband adoption and use***

Finally, the task force believes that “building it” is not enough. Proactive initiatives are required to stimulate demand and educate the public as Hawai‘i increases our broadband capabilities. Government can lead by example by providing advanced services that use broadband to improve the quality of life for our citizenry and continue to encourage economic development in broadband-related sectors.



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The task force is also concerned that a growing broadband gap may particularly inhibit lower-income citizens from full participation in the 21<sup>st</sup> century. Many homes, especially lower-income homes with children, do not have broadband-connected computers.

The task force notes with interest the proposed framework for a National Broadband Strategy in December 2008 by a diverse array of America's communications providers, high technology companies, manufacturers, consumers, labor unions, public interest groups, educators, state and local governments, utilities, content creators, foundations, and many other stakeholders. That document notes a variety of strategies for stimulating high-speed broadband adoption and use that can be adopted in Hawai'i as funding permits. The "Call to Action" document is included in Appendix C.

***Recommendation 4: Stimulate Demand for Broadband***

*All government agencies should actively develop and deploy public services that apply broadband capabilities in their areas of responsibility. In addition, a pilot program should be established to provide training and repurpose surplus computers from Hawai'i's businesses and government departments for use in low-income homes, schools, libraries, parks and community centers. This could be done in partnership with the Department of Public Safety Corrections Division and education and social service agencies.*

***Funding & Approach:*** *Initially focus on services where cost-savings and efficiency gains are greatest.*

**Next steps**

The task force believes that immediate action is essential for Hawai'i to position ourselves competitively, improve our sustainability, and provide our citizens with the economic, educational and social opportunities needed in the 21<sup>st</sup> century. With the completion of this Report, the task force looks forward to recommending implementing legislation supported by the task force, the governor and her administration, and the counties. Draft legislation will be available for submittal to the Legislature in January 2009, and the task force stands ready to assist in the legislative deliberations during the 2009 Legislative Session.

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**Background**

The Legislature of the State of Hawai'i found that offering affordable Internet access services is an essential element of a long-term strategy to invest in the State's workers, residents and the future of Hawai'i's children. Act 2 of the First Special Session of 2007 established a broadband task force whose primary purpose is to:

- 
- 1) Remove barriers to broadband access, including gaining wider access to public rights-of-way,
  - 2) Identify opportunities for increased broadband development and adoption, including very high speed broadband services, and
  - 3) Enable the creation and development of new advanced communication technologies in Hawai'i.

Act 2 further states that the intent of the task force is to:

- 1) Identify actions that will produce increased investment in and the availability of advanced broadband capabilities at more affordable costs by using new approaches to broadband deployment, including through increased access to public rights-of-way and shared fiber infrastructure;
- 2) Identify administrative actions that will promote broadband access and usage within the state;
- 3) Make specific recommendations on how Hawai'i can leverage federal, state, and international opportunities for and eliminate any related barriers to broadband access and adoption;
- 4) Focus special attention on how broadband can be used to substantially benefit educational institutions, healthcare institutions, community-based organizations, and governmental institutions;
- 5) Consult with public and private stakeholders to coordinate statewide efforts to obtain and maximize loan funding available for broadband deployment and development projects in the state;
- 6) Consult with private sector stakeholders to leverage opportunities to increase investments in state-of-the-art technologies, and new approaches to advancing capabilities at reduced costs;
- 7) Identify best practices to establish a database that identifies current and prospective projects for deploying broadband;
- 8) Encourage all state and county agencies to lead by example by obtaining the necessary equipment for broadband usage and have full access to broadband service; and
- 9) Encourage all state and county agencies to study the feasibility of and utilize various services that broadband provides such as streaming video technologies to broadcast public meetings over

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the Internet, videoconferencing, wireless Internet access in state and county facilities that are most used by the public, and the deployment of voice over Internet protocol.

The Legislature further found that the deployment of broadband networks and advanced communication services throughout Hawai‘i is essential for the State to keep pace with global changes in economic diversification, energy and environmental technology, healthcare, public safety, and education. Additional information about Act 2 is available in Appendix E, and the full Act is available on-line at: [http://www.capitol.Hawai‘i.gov/session2007/bills/HB310\\_CD2\\_.htm](http://www.capitol.Hawai‘i.gov/session2007/bills/HB310_CD2_.htm)

In accordance with Act 2, the House Speaker and Senate President initially appointed the members of the task force. At its first meeting, the task force elected Dr. David Lassner, Vice President and Chief Information Officer of the University of Hawai‘i, as Chair and Mr. Nam Vu, Chief Technology Officer of ShakaNet, as Vice-Chair. At the June 26, 2008 meeting, it was announced that Vice-Chair Nam Vu had resigned, that Mr. Kiman Wong would be replacing Mr. Nate Smith as the representative from Oceanic Time Warner, and that Mr. Ken Hiraki was replacing Mr. Joel Matsunaga as the representative from Hawaiian Tel Com. Mr. Hiraki was then elected as the new Vice-Chair at the July 18, 2008 meeting.

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## Vision for Hawai‘i

The working vision statement for the task force is:

*Hawai‘i understands that advanced broadband services are an essential infrastructure for an innovation economy and a knowledge society in the 21st century. As a result of proactive policy initiatives, Hawai‘i residents and businesses throughout the State have access to advanced broadband services of the caliber and at the pricing available in the leading developed nations of the world.*

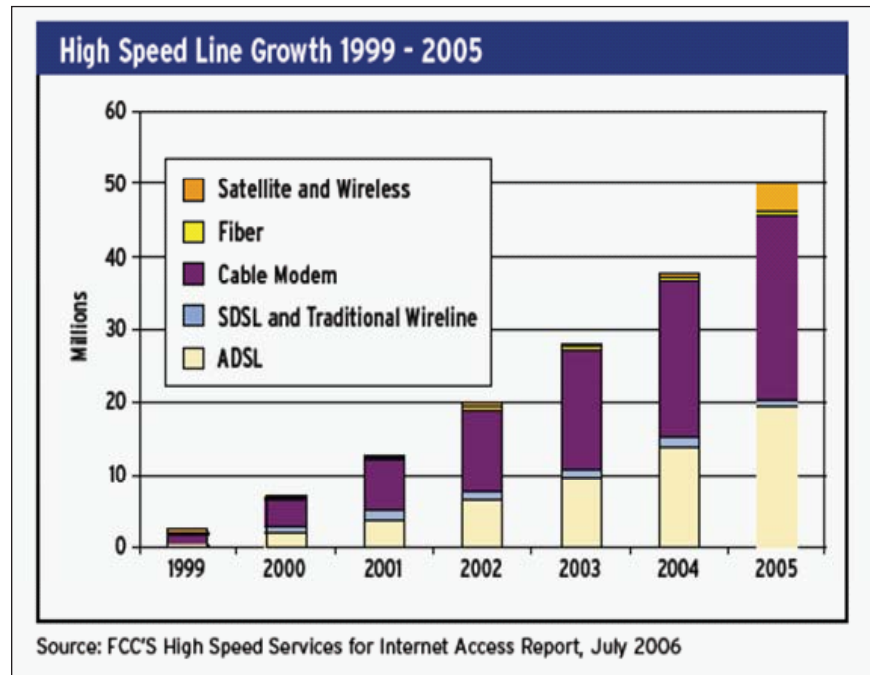
This vision statement is supported by the task force’s belief that Hawai‘i’s future depends on becoming a leader in broadband infrastructure and services through the adoption of best practices.

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## Broadband’s Relevance to the Community

Today’s Internet has evolved from a text-based medium for email and information to a video and media-rich experience with enormous potential for new applications involving entertainment, education, health applications, public safety, unified communications, and social services.

These new and exciting uses of enhanced broadband capability have resulted in increased demand for and delivery of faster Internet service, as seen in the following graph:



High-speed broadband deployment is emerging as the most important new infrastructure for the 21<sup>st</sup> century. Having access to broadband capability increasingly shapes business productivity and global competitiveness, enhances individual creativity, and drives delivery of new health, education and social services applications. Public safety and transportation challenges underscore the benefits that use of high-speed broadband can provide across multiple levels of government, public/private partnerships and U.S./international partnerships. Broadband has become the next infrastructure challenge for our communities, along with the availability of roads, power and water.

At the September 16, 2008 national broadband hearings in Washington D.C., Senator Daniel Inouye stated: “Broadband matters because broadband communications have become the great economic engine of our time. Broadband deployment drives opportunities for business, education, and healthcare. It provides widespread access to information that can change the way we communicate with one another and improve the quality of our lives. This is why our discussion today is not about pipes and providers. It is about people; our citizens stand to gain the most from universal broadband adoption. By some estimates, universal broadband adoption would add \$500 billion to the U.S. economy and create more than a million new jobs. Add to this hundreds of millions of dollars in savings through e-government and telemedicine initiatives and untold riches we can reap by tapping the genius of web-based

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entrepreneurs in every corner of this country. The case for better broadband is clear.”

Within the last two to three years, many states have established their own broadband access projects, in the form of task forces, coalitions or broadband authorities, or tax/financial incentives, in an effort to accelerate their access to high-speed broadband capacity. For example, California’s Broadband Task Force completed a comprehensive set of recent recommendations for how California can take advantage of opportunities for and eliminate any related barriers to broadband access and adoption.

In November 2007, a Sacramento Regional Research Institute (SRRI) study, entitled *The Economic Effects of Increased Broadband Use in California* reported that an increase in California’s broadband Internet usage could lead to “...*significantly higher levels of employment and payroll in the state.*”

The study shows that with a 3.8 annual percentage point increase in the proportion of the adult population using broadband, California could see a net cumulative gain of 1.8 million jobs and \$132 billion of payroll over the next 10 years. “There is a clear connection between investing in broadband technology and job growth,” said Dr. Kristin Van Gaasbeck, Assistant Professor of Economics at California State University, Sacramento and one of the authors of the report.

SRRI used statistical models, as well as economic and broadband usage data from 2001 through 2005 to analyze twenty four major regions of California and project future growth. Other findings from the study include:

- The percentage of Californians using a broadband connection has tripled since 2001, and
- Between 2002 and 2005 broadband use generated approximately 198,000 jobs and approximately \$11.6 billion of payroll in California.

According to the study, a boost in broadband use would affect all regions of the state, from major metropolitan areas to more rural communities.

Similarly, a recent study in February 2008 conducted by Connected Nation estimated that a seven percentage point increase in broadband adoption in Hawai‘i could lead to an annual positive economic impact of \$578 million, which includes an increase or savings of over ten thousand jobs, and over sixteen million hours savings in unproductive time. In summary, this impact was composed of the following:

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- 1) \$397 million from direct income growth
  - 2) \$2.85 million from average annual healthcare cost savings
  - 3) \$28 million from average annual mileage savings based on approximately 58 million miles saved at \$0.485 per mile
  - 4) \$150 million savings from 16 million hours of lost productivity

Thus, the formation of Hawai'i's Broadband Task Force in 2007 could not have happened at a more opportune time. With the U.S. Congress now seeking more meaningful data on the extent of high-speed broadband capacity and deployment within the United States, states like Hawai'i may be able to leverage future federal resources and pursue their own initiatives to increase the level of broadband deployment within the state.

The Hawai'i Broadband Task Force identified a number of promising high-speed broadband applications in Hawai'i. These include significant opportunities involving high-speed broadband applications in health, public safety and education. The following summary presents highlights of several of these areas:

### ***e-Health broadband applications***

In 1998, prominent Maui businessman Pundy Yokouchi was the first patient to benefit from the Weinberg Telemedicine Network when his Maui Memorial physician was able to send a digital angiogram image to Queen's Hospital specialists on O'ahu within minutes. His subsequent surgery and recovery dramatically demonstrated the value of Hawai'i's telemedicine network, which had just been completed via a \$10 million Weinberg Foundation grant linking HHSC hospitals with health care facilities on O'ahu. Hawai'i was one of the first states at the time to use telemedicine on a comprehensive scale because of its robust telecommunications infrastructure and partnership with the Weinberg Foundation, GTE HawaiianTel (now Hawaiian Telcom), GST Hawai'i and Oceanic Communications.

More recently, Dr. Stan Saiki, Director of the Pacific Telehealth and Technology Hui, identified several federal telehealth applications with the potential to transform Hawai'i's delivery of health services and to position Hawai'i as a model for the rest of the continental United States. Given Hawai'i's remote location in the Pacific, its multi-island needs (as opposed to the contiguous United States) and challenges of rural neighbor island communities, the telehealth applications are an exciting step towards a potentially promising e-health future for Hawai'i.

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The Veterans Administration (VA) in Hawai‘i has several ongoing telemedicine applications requiring high-speed broadband deployment. From the central “hub” at VA’s main clinic on the campus of Tripler Army Medical Center (TAMC), telemedicine activities at peripheral clinics on Kaua‘i, Maui, the Big Island in Hilo and Kona and in American Samoa and Guam provide community-based clinic beneficiaries with a wide range of specialists in dermatology, dietetics, cardiology, general surgery, vascular surgery, orthopedic surgery, endocrinology, pulmonology, psychology and psychiatry.

High-speed broadband deployment also enables remote viewing of electronic health records, radiologic images and the use of remote telepharmacy. This allows veterans to receive medications dispensed at the clinics and gain counseling from the pharmacists over communications networks. The system also connects the O‘ahu, neighbor island and western Pacific clinics to U.S. mainland surgical specialty clinics for preoperative and postoperative care when patients need to be transported to the mainland. VA National is in the process of establishing a radiology support activity here in Hawai‘i. Similar to the “Nighthawk’s” initiative, with the time differential radiologists on duty in Hawai‘i can support overnight and after hours radiology needs over broadband to institutions on the mainland.

Tripler’s broadband telemedicine activities also include the Pacific Island Health Care Initiative. This initiative supports “store and forward,” web-based telemedicine consultations to clinicians in rural areas in Hawai‘i and western U.S./western Pacific. The “electronic ICU” system can link TAMC intensive care experts with intensive care units in Guam and Korea. Telemetry, digital imaging, echocardiography and other clinical information can be exchanged and reviewed over broadband video and data telecommunications systems. Expert consultation from clinicians unavailable to patients in rural areas can thus be provided in a real-time setting.

In the area of medical training and education, emerging use of the Access Grid, an initiative led by the National Computational Science Alliance, supports educational activities and clinical/diagnostic applications. It has been used by University of Hawai‘i John A. Burns School of Medicine (JABSOM) and TAMC and numerous educational programs at the University of Hawai‘i (UH). This application provides multiple interactive video streams and supporting digital media to permit people at multiple locations around the world to work together as though they are in one room. It demonstrated great value in e-Health, but is very bandwidth intensive. Thus, the costs of this initiative could not be maintained beyond the demonstration project unless the State of Hawai‘i made its own investments in high-speed broadband capability.



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A Department of Defense (DoD) funded project, Pacific Rim Applications and Grid Middleware Assembly (PRAGMA) Avian Flu Grid program is illustrative of why broadband matters. In the era of “systems biology” and the explosion of research and new applications brought by the Human Genome Project, computational requirements and broadband inter-connectivity will quickly outstrip current capacity and availability. According to Dr. Saiki, “...the State of Hawai‘i must keep up if Hawai‘i hopes to participate in this revolution, let alone play a role.”

This “grid-based” demonstration project, which is funded by the Department of Defense, brings together investigators from UH, Korea, Taiwan, Malaysia, Japan and China to develop a computational grid platform that will enable the study of the H5N1 avian influenza virus. The approach is to develop three-dimensional virtual models of the avian flu molecular subunits that will allow the exploration of subunit interaction and the interaction of these complex molecules with diagnostic and therapeutic agents.

Such initiatives require huge amounts of computational cycles that are best provided by supercomputers. The project is developing not only the methods to study the molecules computationally, but also the broadband communications systems that will allow sharing of huge amounts of data and computational capacity by investigators. Much of biologic science is starting to be conducted in ways that rely heavily on high-speed bandwidth and supercomputing capability. As pointed out by Dr. Saiki, “the computational assets and very large broadband communications channels will be necessary if we hope that Hawai‘i will be able to be a biotechnology participant and leader.”

In November 2007, Hawai‘i received a new federal grant of up to \$4.9 million over three years to build a broadband network linking 96 rural and urban healthcare providers throughout Hawai‘i and the Pacific island region. The project’s area extends 6,200 miles from the continental U.S. to American Samoa, Guam and the Commonwealth of the Northern Mariana Islands.

According to a recent Honolulu Advertiser article (November 25, 2007), “...this is something that is fantastic news for us,” said Dale Moyer, telehealth manager at Hawai‘i Pacific Health, which runs Straub, Kapi‘olani, Pali Momi and Wilcox hospitals. “All the partners (in the project) have wanted to do something like this for years.”

Once the network is running, rural healthcare providers will be able to tap the expertise of modern medical centers, concentrated in urban areas, at speeds of up to 1 billion bytes of information a second.



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The federal grants, which total \$417 million for all states over the next three years, will be used to connect more than 6,000 public and nonprofit healthcare providers nationwide. The grants cover up to 85 percent of the cost of the projects.

The Hawai'i project will interconnect the State Telehealth Access Network to several others serving the state government and the UH. It also will interconnect networks of major healthcare providers, including the state's Department of Health, the Hawai'i Health Systems Corp., the Hawai'i Pacific Health System, the Department of Veterans Affairs Pacific Island Health Care System and the American Samoa Medical Center.

Further information is available in, the Internet Innovation Alliance White Paper, *Advancing Healthcare Through Broadband: Opening Up a World of Possibilities* by Neal Neuberger, CISSP President, Health Tech Strategies, LLC.

### ***Public safety broadband applications***

Given Hawai'i's remote location in the Pacific and its strategic position in the Department of Defense's global telecommunications infrastructure, any investments designed to meet public safety needs can provide innumerable benefits to state residents and businesses as well. Hawai'i Broadband Task Force member Mr. Gordon Bruce, Chief Information Officer of the City & County of Honolulu, provided one example of a public safety pilot project that the City & County of Honolulu recently participated in.

Mr. Bruce noted that the city of Honolulu faces distinctive challenges in providing public safety. The 13<sup>th</sup> largest city in the United States, Honolulu is home to 1.2 million citizens (72% of the state's population), as well as hosting an additional 500,000 tourists and military personnel at any given time. Emergency preparedness and homeland security for a population this size requires effective inter-agency communication and collaboration: "Honolulu has excellent resources for incident response because we are home to agencies from every branch of government: city, state, and federal," Mr. Bruce stated. But the profusion of agencies in Honolulu also complicated inter-agency collaboration. Various agencies use radio networks that do not interoperate with each other, preventing communication, a problem brought to public attention by disaster response efforts in other cities. Among the voice communications systems in use by Honolulu's public safety agencies are push-to-talk (PTT), VHF, UHF, and 800 MHz as well as five different telephone systems.

The Honolulu Public Safety Oversight Committee had attempted to address the interoperability challenge by pre-establishing talk groups,

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or subgroups of radio users from different agencies who collaborate during different types of incidents. However, the range of incidents that Honolulu agencies respond to was so wide-ranging, from grass fires, to stadium evacuations, to hazardous materials spills, that the list of talk groups had grown to more than 350. If too many talk groups were activated at once, the network would be unmanageable, bringing vital emergency communications to a halt. “We needed a less risky and more manageable alternative to communications interoperability across the chain of command,” says Mr. Bruce. “We preferred a solution that would not only address our immediate tactical need for voice interoperability, but also our long-term strategic goals for video and data interoperability.”

Replacing the disparate voice systems was not a cost-effective option because Honolulu agencies had already invested as much as tens of millions of dollars in training, applications, and equipment for their existing radio systems, which typically have life spans of a decade or more. In addition, agencies wanted the freedom to choose additional devices such as wireless laptops or PDAs based on their needs and preferences rather than having the choice imposed on them in order to avoid interoperability problems.

The need for an interoperability solution became more urgent in 2004, when Honolulu began making plans for extensive repairs to its 24 aging radio towers. To ensure communications resilience, the city and county wanted to augment its radio infrastructure with communications tools that would capitalize on Honolulu’s existing investments in an island-wide fiber optic infrastructure and approximately 100 WiFi hot spots.

In 2005, multiple agencies in the City and County of Honolulu, including fire, emergency medical services, and police, civil defense, and the department of information technology began testing an Internet-based system for interoperable voice communications. They piloted the Cisco® IP Interoperability and Communications System (IPICS) technology. In its initial release, IPICS enables interoperable voice communications among different radio systems and Internet Protocol (IP) devices, including both IP phones and PCs using the Cisco IPICS Push-to-Talk (PTT) Management Console (PMC) software, which emulates a multi-channel PTT radio. “With an IP network you can carry traffic from a PC, camera, or cell phone, so why not an 800-MHz radio?” asks Mr. Bruce.

Participants in Honolulu’s pilot included public safety operations personnel as well as government officials. The devices they used included Nextel PTT radios, VHF radios, UHF radios, 800-MHz radios, IP telephones, and the Cisco IPICS PMC software. “The use of the technology demonstrated how Honolulu public safety personnel from multiple agencies could talk to each other over IP networks on the island, including PTT radio, and IP-enabled devices,” said Bruce, “...we’re

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committed to building a communications network that allows the people who serve the public on the front lines to exchange vital information through voice, text, and video.”

Among the operational benefits cited in the City’s pilot project were:

- Increased preparedness through inter-agency collaboration and communication - Voice interoperability improves Honolulu’s preparedness for emergencies requiring inter-agency collaboration, ranging from weather emergencies to terrorist threats and disease outbreaks,
- Communications resilience for greater service effectiveness - The ability to communicate using a variety of devices provides more resiliencies, and the Internet-based technologies allow for a reliable communications alternative by taking advantage of Honolulu’s robust fiber-optic infrastructure and WiFi networks, and
- Investment protection – the Internet-based solution could be used to extend the life of city agencies’ investments in existing radio systems, devices and applications.

For its next steps, Honolulu’s IT department extended interoperable communications through the use of other technologies to many other interested agencies. It also plans to capitalize on future support for video and data integration capabilities to send video and sensor information to first responders, for even more effective emergency preparedness. One plan is to broadcast video of traffic accidents to first responders’ in-vehicle PCs, as well as government officials PC’s to increase situational awareness. Another plan is to send graphical GIS information to dispatchers’ consoles so they can determine if field personnel are in areas of the island with weak radio coverage and, if so, use an alternate means of communication.

Mr. Bruce foresees opening talk groups to people outside the geographic area, extending the City and County’s reach to global resources. “An expert on disease in Los Angeles, New York, or one of Honolulu’s sister cities in Asia, for example, could provide real-time guidance to field personnel from any Internet-connected PC. “The solution provides more than radio interoperability,” Mr. Bruce concluded. “It actually changes the way we look at dispatch. If another city is using a similar IP-based communications system, we can tap their resources to help our agencies help our citizens. We look at this technology as a way to meet Honolulu’s tactical need for voice interoperability, while building a strategic foundation for comprehensive rich media interoperability in the future.” The City and County of Honolulu presently has interoperable

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communications with over twenty agencies from all branches of government and has begun expansion to private sector organizations, such as hospitals.

### ***First responder systems***

First responder services address the areas of public security: Emergency Medical Services (EMS), fire, and related life and property protection; emergency management and disaster, and to some extent the criminal justice services.

The mission of public security agencies throughout the world is that of reducing crime and its impact on the health and welfare of families. In recent years, the most successful anti-crime weapon in the law enforcement arsenal has been the implementation of community-based policing. The heart of a community-based program is getting officers out of cars and into the community, whether it is on foot, bicycle, Segways, or horseback. Community-based policing programs put an extraordinary demand on public safety communications systems because they require portable coverage throughout the community. Local Law Enforcement Officers (police, constables, peace officers) provide the public's frontline exposure and access to law enforcement services. They are required to respond to incidents of misdemeanors, felonies, domestic violence, vehicular accidents, crowd control, break-ins, robberies, and medical emergencies. They are also required to provide a reassuring presence while in their vehicles or while on foot patrol.

Law enforcement officers need constant access to wired & wireless command, control, communications, and informational support. The support is needed not only for the safety and duties of the officers but to provide the ready response of assistance, advice, and law enforcement functions to the public's requirement of life and property protection. The bulk of today's information exchange is through voice communications. Many officers already rely on data exchange via text messages with dispatchers and among officers, remote data retrieval and data entry for information from criminal and civil records databases, and remote forms entry for administration purposes. Demand now exists for the exchange of images, photographs, and video, which all are important components in their tactical operations.

The mission of the Fire, Emergency Medical and Related Life and Property Protection Services includes those public entities that provide services to the public, encompassing emergency life saving and the critical care of individuals with requests for medical assistance, emergency care to injured individuals, triage support for mass trauma victims, as well as emergency property protection. Historically, these services have been categorized as Fire Service and Emergency Medical Service (EMS). In many jurisdictions all or part of the functions

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contained herein are managed exclusively by Fire and EMS providers. Today, a number of agencies provide a broad scope of services, including fire suppression and prevention, emergency medical paramedics, hazardous materials, urban search and rescue, technical and mountain search and rescue, swift water rescue, and ocean lifeguard services. This broadening scope of services displays significant growth from the historic perspective of fire suppression and first aid. Furthermore, this broadening scope requires transmission of secure information in such applications as property access and patient medical data.

Local EMS Agencies provide the emergency response for health care to patients before and during delivery to the hospital. Units are dispatched in response to Emergency Calls 911 for medical help, to natural disaster sites, and to accident sites. EMS personnel need to provide emergency care physicians with vital characteristics of patients, with descriptions and pictures of trauma conditions, and continuous status conditions while in transit to the hospital. Fire Departments provide the firefighting equipment and experience to control and suppress fires and explosions that occur within structures, also at natural disasters, and at accident sights. In order to do their job efficiently and effectively, the fire fighters need current maps, complete building plans (including, electrical, fire suppression, water, sewage, HVAC, structural, interior design and layout, and interior and exterior access points), hazard and chemical control information, and fire source and movement information. State Natural Resources and Forestry Agencies provide prevention and suppression of wildfires within state forestry areas and partner with federal agencies to suppress wildfires on adjacent federal and state forests. Video and thermal images of the fire areas that are sent to the command center in real time provide important information in locating and controlling fires. Simple Command and Control is critical to both the fire suppression and fire support activities. Future technology will no doubt include the extensive use of robotics.

All of these agencies require broadband wired and wireless command, control and communications support which are crucial to assure quality of life and property protection and to create the safest possible working environment for fire, emergency medical and related life and property protection services personnel. Wireless technologies are the emerging backbone of command, control, communications, and the computerized synthesis of intelligence gathering and distribution.

The mission of the Emergency Management and Disaster teams is to provide the functions of Mitigation, Response and Recovery to both planned, large events and unexpected, major disasters. In order to accomplish these functions, the teams must provide proper preplanning prior to a major incident and then to provide the necessary resources to carry out incident management or disaster recovery during and after the

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incident. With major events like the Olympics, political conventions, international meetings, and with major incidents like terrorist bombings, the major airlines crashes, or natural disasters, Emergency Management and Disaster agencies must be able to respond to situations as they arise based upon prepared processes. During an event or as a result of a disaster, the agencies will need communications and capabilities to reach remote informational resources to control and respond to situations.

Local government agencies provide the initial response to emergencies by assessing the potential damage, determining immediate emergency resources, and requesting additional support of other governmental agencies. The emergency management requires preplanning before the incidents and adequate command, control, and information during the incident. State government agencies (Emergency Management Division, Public Safety Division, etc.) provide the next level of response and emergency management after the local government response resources are expended. The agencies are responsible for actions to develop the management oversight of the preparedness initiatives, ensure coordination among the functions and levels of government, acquire, maintain, and train in the use of specialized resources and build public support for, and understanding of, the importance of disaster preparedness.

Preplanning is imperative for Emergency Management operations with defined resources that can provide information on emergency situations with instantaneous responses. Wireless command, control and communications support is required to assess and respond to the emergency situation with law enforcement, fire, and EMS operations. The ability to expand the control of the operations to the next higher level of governmental involvement is required.

The mission of the Criminal Justice Services includes those public entities that provide services to the public of enforcing the criminal laws, apprehending and prosecuting suspects, incarcerating convicted violators, and rehabilitating offenders. The Criminal Justice System has objectives to protect the public from criminal activities, to swiftly and justly prosecute criminal law offenders, and to reintroduce ex-offenders to productive, public activities. In order to accomplish these objectives, Criminal Justice needs reliable, secure, and timely methods of information exchange that protects individuals' privacy and unauthorized access to the information in criminal reports and evidence. To carry out their individual responsibilities, all components of the Criminal Justice System must have rapid and complete access to those sources of information that are crucial to fulfilling their mission.

Law Enforcement (identification services, laboratory, law enforcement operations, juvenile department, etc.) provide public protection, law

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enforcement, identification, investigation/evidence gathering, arrest, and filing of charges of suspects. Prosecution (District Attorneys, etc.) provide review of evidence, prosecution decision, suspect's rights, bail recommendations, and trial preparation of criminal suspects. Defense (public defenders, private attorneys, etc.) provide review of evidence, response to charges, suspect's rights, bail recommendation, timeliness, and trial preparation of suspects. Courts (court administrations, judges, bailiffs, court recorders, municipal courts, etc.) provide evaluation of evidence, fairness, impartiality, and timeliness of suspects' prosecution. Corrections (institution, community corrections, jails, juvenile corrections, etc.) provide inmate welfare, rehabilitation, incarceration, and timeliness of offenders' sentence and restitution. Probation and Parole (parole board, probation officers, etc.) provide reintegration, victim notification, oversight, and timeliness of ex-offenders' reentry into public activities.

Broadband wireless command, control and communications support is required to start the criminal justice process of alerting law enforcement operations, identifying and gathering evidence of criminal activities, and arresting suspects. This includes providing law enforcement officers with information of reported and suspected criminal activity, allowing officers to access and retrieve records from criminal background data sources, providing officers with surveillance information for individual identification and association, and recording and preserving evidence. As suspects move through the criminal justice system, the other components need access to the evidence and criminal reports to swiftly and justly resolve the cases.

### ***Education and broadband***

Just as e-health broadband applications are revolutionizing the delivery of services, diagnosis and consultation among physicians or their patients, and speeding the compilation and management of medical records, high-speed broadband offers promising opportunities to turn traditional classroom experiences into comprehensive e-learning within the near future.

The task force received several briefings and demonstrations that illustrated the range of new, educational broadband applications that have recently become available in Hawai'i. This includes the development of the "Hawai'i Virtual Learning Network", which is a collaborative effort between the Hawai'i Department of Education, UH, Hawai'i Pacific University and the Myron B. Thompson Academy. This online learning alternative offers students standards-based courses on a more flexible 24/7 schedule, gives them access to highly qualified teachers, and provides a new venue to receive needed credits towards a BOE Recognition Diploma as well as Advance Placement courses. It is the goal of the Department of Education that within three years, 10,000 of



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Hawai'i's public secondary school students will take at least one online course during their school experience and 250 of Hawai'i's teachers will have completed training in online teaching. The Thompson Academy principal, Ms. Diana Oshiro, believes that the goal of expanding opportunities for online learning can be achieved much sooner than we think.

Several emerging broadband initiatives may help accelerate Hawai'i's e-learning strategies. For example, Ms. Edgy Lee's Pacific Network Television ([pacificnetwork.tv](http://pacificnetwork.tv)) features Hawai'i-themed original programming. The new Internet based network includes the use of high-definition cameras to produce news, entertainment, original programming, vintage television, sports, travel information, and educational and public service programs, all provided free to the public. "This is the first network of its kind and we've built it completely in Hawai'i. There is no Internet site like this in the world," Ms. Lee said. "Pacific Network streams interactive broadcast-quality programming where 30% of the content will focus on Native Hawaiian issues and 70% on Hawai'i-centric programming tied to global issues such as sustainability and cultural preservation."

Another initiative involves Ulua Media and PeopleBridge, who are working with Time Warner Cable to create a "Hyper local" video on demand (VOD) application for broadband Internet and digital cable. It will enable Hawai'i residents to upload rich media content onto the web and television. The video content will be "hyper local", that is, it will be video content created by folks locally for local use. Broad categories include latest information on what's happening in neighborhoods, arts and culture, education (early literacy), and innovation throughout Hawai'i.

Another example of this is Makaha Studios, a startup company that was born from a multimedia program in a Waianae High School classroom and has become a fledgling video production and multimedia design company on O'ahu's Leeward Coast. Makaha Studios utilizes a client web site which allows them to post media projects online so their clients, some of which are international, can view works-in-progress and give feedback during the post-production process.

In October of 2007, the State of Kentucky, which had completed an evaluation of the state's broadband deployment needs, unveiled its new Kentucky Education Network (KEN), a high-speed broadband network that will link the state's 174 school districts to a high-speed, reliable, secure and cost-effective Internet network. "Technology in schools means that learning is no longer bound within the walls of a classroom or the pages of a textbook," said Kentucky Education Secretary, Ms. Laura Owens. "This new network will open more educational opportunities



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to our students and prepare them for the technology challenges of tomorrow.”



*Brainstorming at Makaha Studios are sales director Linda Brock and creative director John Allen III, in the foreground, with motion graphic artist Chad Brown, at left, Web developer/intern Bill Evangelista, 20, and college intern Jonalyn Arao, 18.*

**Photos by JEFF WIDENER  
The Honolulu Advertiser**



Among KEN's features are the Kentucky Virtual School system, the Individual Learning Plan, online tutoring services, the GoHigher Portal, online advising services, a KCTCS course applicability system, KET's EncycloMedia and a lifelong learning portal. (Kentucky Launches Statewide High-Speed Education Network, *Government Technology*, October 31, 2007). Similar networks are already available in many other states.

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Looking to the future, using the Internet and social networking are increasingly a central part of teenagers' lives. A December 2007 Pew study, *Teens and Social Media*, offered these remarkable statistics:

- Some 93% of teens use the Internet, and more of them than ever are treating it as a venue for social interaction – a place where they can share creations, tell stories, and interact with others,
- The Pew Internet & American Life Project has found that 64% of online teens ages 12-17 have participated in one or more of a wide range of content-creating activities on the Internet, up from 57% of online teens in a similar survey at the end of 2004,
- 39% of online teens share their own artistic creations online, such as artwork, photos, stories, or videos, up from 33% in 2004,
- 33% create or work on web pages or blogs for others, including those for groups they belong to, friends, or school assignments, basically unchanged from 2004 (32%),
- 28% have created their own online journal or blog, up from 19% in 2004,
- 27% maintain their own personal webpage, up from 22% in 2004, and
- 26% remix content they find online into their own creations, up from 19% in 2004.

The percentage of those ages 12-17 who said “yes” to at least one of those five content-creation activities is 64% of online teens, or 59% of *all* teens.

In addition to those core elements of content creation, 55% of online teens ages 12-17 have created a profile on a social networking site such as Facebook or MySpace; 47% of online teens have uploaded photos where others can see them, though many restrict access to the photos in some way; and 14% of online teens have posted videos online.<sup>1</sup>

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1 Amanda Lenhart, Mary Madden, Alexander Rankin Macgill, Aaron Smith, Teens and Social Media: The use of social media gains a greater foothold in teen life as they embrace the conversational nature of interactive online media, Pew Internet & American Life Project, December 19, 2007.

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## **Higher education and research**

American higher education serves a public mission of education, research, service and economic development. In Hawai'i, the UH system is the sole provider of public higher education. As a knowledge-based enterprise, broadband has become essential infrastructure to every aspect of UH's activities.

Perhaps the most compelling example of broadband is the UH Hawai'i Interactive Television System – Version 2 (HITS2) service. HITS2 was reengineered in 2000 from an analog video delivery system to a fully interactive distance learning system. Using then-emerging MPEG2-over-IP technology, UH developed the first Internet-based interactive full-motion broadcast-quality distance learning system in the nation. The system is reliant on advanced Internet technologies, including multicast and quality-of-service (QoS) that will likely be fundamental to the delivery of converged services on IP networks to the public. Thousands of students are served throughout the state each semester, and graduation ceremonies now regularly recognize those who earn degrees and certificates from campuses on islands other than where they live. While UH has developed some 35 HITS2 sites at all its campuses and education centers (including Moloka'i, Lana'i, Hana, Lahaina, Kona, Waianae), the requirements of the system exceed what can be delivered over consumer broadband services.

While high-quality interactive video can provide a classroom-like experience for students without physical access to the educational opportunities they need, much more e-Learning is being developed online. As one example, Honolulu Community College pioneered an online remedial math (Algebra I) curriculum to assist students required to enhance their math skills when entering community colleges. Honolulu Community College partnered with the Cisco Global Learning Network to pilot the use of their latest technology, which is deployed via the web and requires broadband for high-quality video imagery. Projects like these address Hawai'i's educational needs and position Hawai'i as an innovator, ideally bringing resources in from elsewhere to support Hawai'i's requirements. This type of activity can result in savings for colleges, which are overwhelmed by the need to provide remedial education to the extent that it decreases the availability of resources for core curricula and offerings. And of course, this can help address Hawai'i's Science, Technology, Engineering and Mathematics (STEM) education needs, include outreach to high schools and those in remote/rural communities.

There are many examples from research as well. UH manages the Maui High Performance Computing Center (MHPCC) for the U.S. Government. When MHPCC's newest supercomputer was unveiled in 2006, it was the 11<sup>th</sup> most powerful supercomputer in the world and the most powerful in the Department of Defense's shared resource

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base. However, because of the cost of connectivity to Hawai‘i, it was and continues to have one of the lowest speed connections of any of the high-powered supercomputers in the world. While all new connections into mainland-based research supercomputers deployed by the National Science Foundation (NSF) or Department of Energy are connected by at least 10 billion bits per second (gbps), MHPCC’s connection is about 1/15 of that, at 622 million bits per second (bps).

Projects such as the Avian Flu Grid noted above typify the new approach to science and research, using what NSF has termed “cyberinfrastructure.” Massive databases are managed with components in multiple locations (distributed databases) and processed by shared supercomputer resources in multiple locations (grid computing) by teams of scientists distributed around the globe using technologies such as the Access Grid, noted above, or telepresence, a new form of high-resolution, low-latency videoconferencing that truly blurs distance. Another example is astronomy. Hawai‘i’s telescopes are among the most massive data collection devices in the State. They serve scientists throughout the globe who increasingly work on a collaborative basis to answer the deepest questions about the universe using data integrated from multiple instruments and processed with high performance computers. These new scientific paradigms are driving the academic and commercial research that is vital to our future health and welfare – both socially and economically.

The UH actively avoids rolling out new high-bandwidth services that will require capacities that exceed currently available inter-island and mainland link capacities. These have included numerous experiments with uncompressed High Definition TV (HDTV) over the Internet, and the emerging work on digital cinema, which requires 4 times the capacity of HDTV. Hawai‘i is simply unable to participate in major national supercomputing initiatives, such as the NSF TeraGrid, due to the lack of bandwidth (or funding to overcome this fundamental structural limitation). Upgrades to the HITS2 network to more modern video technology have been awaiting inter-island bandwidth upgrades that were heretofore unaffordable.

In Hawai‘i, government facilities, public schools and university campuses have had network capabilities since the early 1990’s through a combination of leased services and an Institutional Network (INet) developed under the state’s franchise agreements with Oceanic Time Warner. However, what was once a pioneering leadership initiative has now been overtaken by the emergence of statewide fiber-based research and education networks throughout the country. Supported by states as an investment in education and economic development, these networks generally provide multiple strands of fiber to key locations throughout the state. And unlike Hawai‘i’s network, these are interconnected with

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dark fiber to national research & education backbones like Internet2 and National LambdaRail to support compelling emerging applications, such as telepresence (high-resolution, low-latency videoconferencing with high-fidelity audio that creates the illusion of being across the table), on a national scale.

### ***Implications for economic development***

Hawai'i's economic development can be viewed in the context of educational and social development as well. As noted in many of the preceding examples, there is pioneering work being done in Hawai'i that could be shared with the world, if the necessary network capability was available and our educational and support systems permit.

Hawai'i is developing a strong capability among our students and community in digital communications. This is supported with work in the public schools and at the UH, and continues on into the media initiatives noted above. As the world moves to more peer-to-peer networking and user-generated content, Hawai'i's unique opportunities may be stifled if the content our students and professionals create cannot be affordably shared using emerging Internet-based services.

Hawai'i's computer gaming industry has also been highlighted in the press. Avatar Reality hopes to revitalize local gaming industry with its new virtual reality game, Blue Mars. Among other initiatives, Blue Mars will attempt to tap into the booming market for online gaming.

Another example of information-based innovation is the pioneering work by ConvergenceCT, a Hawai'i-based global company that links patient data at healthcare institutions with Pharmaceutical and Biotech companies' data needs for clinical trial planning and recruitment processes, and research for global markets. ConvergenceCT's core business involves massive databases and processing on a global basis over high-speed networks.

A key issue for any of these emerging initiatives is that very high-speed communications are required between Hawai'i and the world for services to be provided to and delivered from Hawai'i. In order to enable people to engage in these opportunities from their homes and small businesses anywhere in the state, high-bandwidth services must be universally available and affordable. In short, access to higher speed broadband will be essential if residents of Hawai'i are to participate in the national and global economy and society.

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## Broadband Status in Other Countries

It is widely accepted and of great concern at the national level that the United States, which invented the Internet, is now lagging behind other developed countries and losing ground each year in broadband capability. It is interesting and significant to note that the President Elect Obama has stated on his web site that broadband leadership will be a key initiative for his administration:

*“Barack Obama believes that America should lead the world in broadband penetration and Internet access. As a country, we have ensured that every American has access to telephone service and electricity, regardless of economic status, and Obama will do likewise for broadband Internet access. Obama and Biden believe we can get true broadband to every community in America through a combination of reform of the Universal Service Fund, better use of the nation’s wireless spectrum, promotion of next-generation facilities, technologies and applications, and new tax and loan incentives.”*

Even more significantly, on his ‘Radio Address on the Economy’ on Saturday, December 6, 2008, he also stated the following:

*“Third, my economic recovery plan will launch the most sweeping effort to modernize and upgrade school buildings that this country has ever seen. We will repair broken schools, make them energy-efficient, and put new computers in our classrooms. Because to help our children compete in a 21st century economy, we need to send them to 21st century schools. As we renew our schools and highways, we’ll also renew our information superhighway. It is unacceptable that the United States ranks 15th in the world in broadband adoption. Here, in the country that invented the Internet, every child should have the chance to get online, and they’ll get that chance when I’m President – because that’s how we’ll strengthen America’s competitiveness in the world.*

*In addition to connecting our libraries and schools to the Internet, we must also ensure that our hospitals are connected to each other through the Internet. That is why the economic recovery plan I’m proposing will help modernize our health care system – and that won’t just save jobs, it will save lives. We will make sure that every doctor’s office and hospital in this country is using cutting edge technology and electronic medical records so that we can cut red tape, prevent medical mistakes, and help save billions of dollars each year.”*



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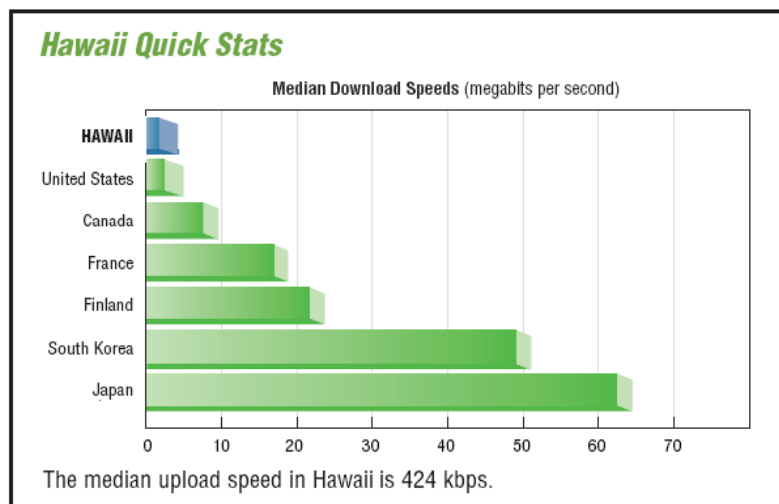
Three main measures of a country's broadband capability are:

- Broadband penetration,
- Speed of generally available technology, and
- Price per megabit per second.

The data paints a grim picture for the United States in all areas. The following summaries are derived from data released by the Organisation for Economic Co-Operation and Development (OECD) in June and October 2007.

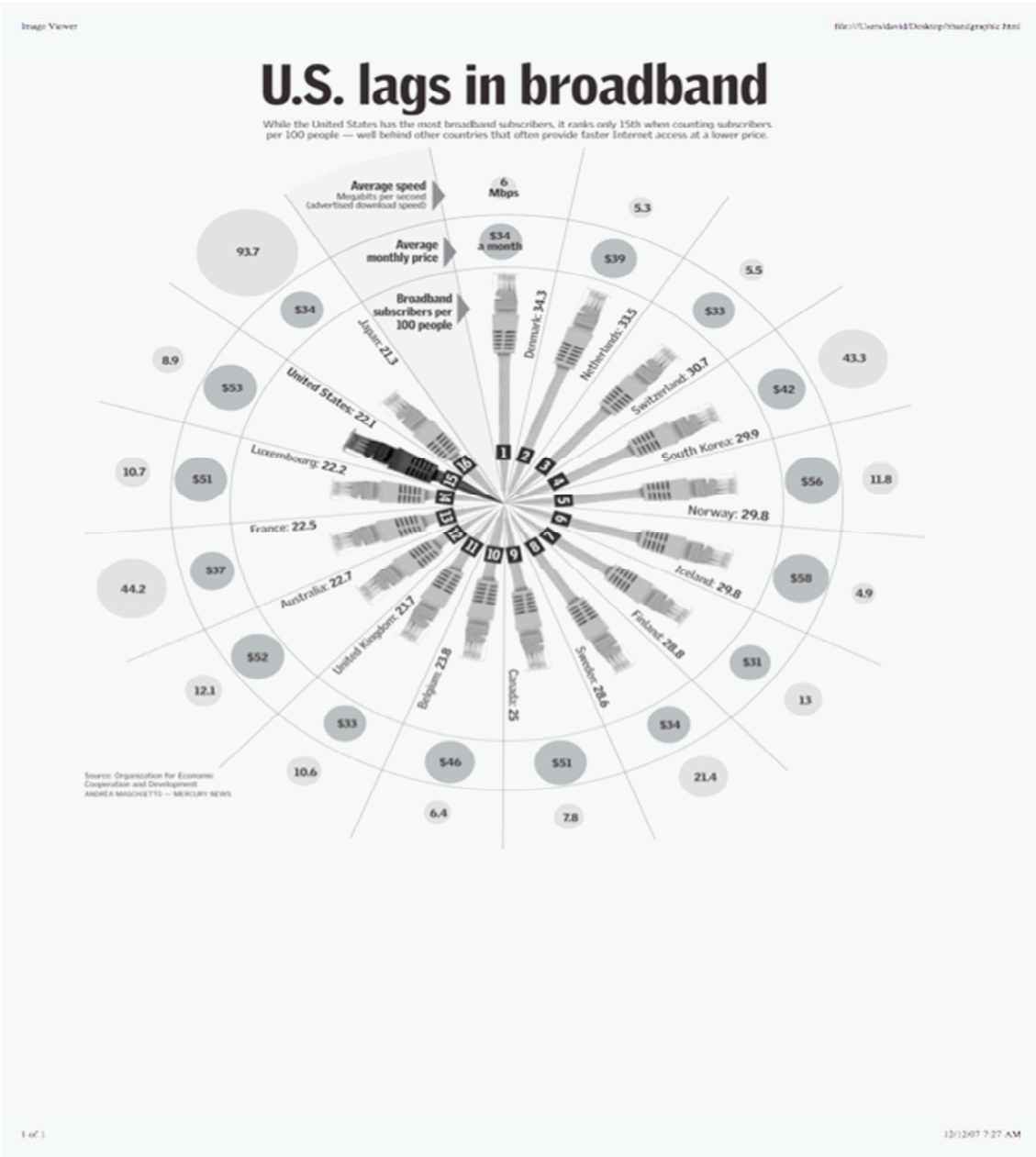
The United States (U.S.) is ranked 15<sup>th</sup> in the world in broadband penetration, behind most of Europe, Japan, Korea and Canada. Denmark is #1 with 31.9 subscribers per 100 inhabitants while the U.S. had 19.6. The OECD has been tracking this data over time and the U.S. has been losing ground since it was 4<sup>th</sup> in 2001, 8<sup>th</sup> in 2002, and 9<sup>th</sup> in 2003. The U.S. also ranked 19<sup>th</sup> in the world in the growth rate of subscribers at 4.21 percent, while the fastest growth rate came from Ireland at 6.6 percent.

Speed of transmission is measured by the number of binary digits, or bits, transmitted per second. In today's technology, data transmission is measured in thousands (kilo) of bits per second, or kbps, millions (mega) of bits per second, or mbps, and billions (giga) of bits per second, or gbps. The U.S. was ranked 19<sup>th</sup> with an average advertised download speed of 8.86 mbps. Japan was 1<sup>st</sup> at 93.693 mbps followed by France (44.157 mbps) and Korea (43.301 mbps). According to an August 2008 report from SpeedMatters.org, Hawai'i's median download speed is less than 2 mbps. In comparison, the median speed for the United States is 2.3 mbps while for Japan it is 63mbps, as shown in the following graph:



Price is another measure to compare Internet service. Purchasing Power Parity, as defined by the OECD adjusts prices to equalize the purchasing power of different currencies measured against a fixed basket of goods. The U.S. ranked 18<sup>th</sup> in price per mbps per month with a \$2.83 Pricing Power Parity (PPP). Japan had the lowest prices with a PPP of \$0.13 per mbps per month. Finland has the lowest Average Subscription Price at \$31.18 PPP, while the U.S. is ranked 22<sup>nd</sup> at \$53.06.

The following diagram portrays current OECD broadband data in a graphical format. Additional information can be found at: <http://www.oecd.org/sti/ict/broadband>





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## Broadband Activities in Other States

The task force notes that while Hawai'i is one of the early states to establish a task force focused on advancing broadband, there are already a number of other activities in place from which Hawai'i can learn. These include task forces and initiatives in California, Ohio, Missouri, North Carolina, Kentucky, Tennessee and most recently, New York. The task force initiated contact with broadband initiatives in California, Kentucky, North Carolina, and Ohio in an effort to understand their findings and recommendations. In summary, other states have initiated the following actions:

- 1) California: grant programs, access to rights-of-way, tax credits and consumer education
- 2) Georgia: Rural broadband grants
- 3) Idaho: Matching grants and tax credits
- 4) Kentucky: Grant and loan programs, and computer recycling initiatives aimed at under privileged children
- 5) Maine: Initiated a new fee on intrastate service
- 6) Minnesota: Public/private partnership
- 7) New York: Rural broadband grant program
- 8) North Carolina: Broadband grant program
- 9) Tennessee: New computer initiative aimed at under privileged children, public/private initiatives
- 10) Vermont: Issuing obligation bonds
- 11) Virginia: Tobacco settlement money used for broadband

The following web sites provide a glimpse of what is occurring in other states today:

NCSL briefing document: Broadband at the State Level

(<http://www.nextgenweb.org/nextgenweb-ncsl-briefing-documents/>)

The California Broadband Initiative

(<http://www.calink.ca.gov/default.asp>)

ConnectKentucky

(<http://www.connectkentucky.org/>)

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## Hawai'i's Broadband Landscape Today

Akamai, a leading global service provider for accelerating online content and business processes, released its first Internet speed report, *State of the Internet Report*, in May of 2008. According to Akamai, seven states had less than 10% of their Internet connections occur at speeds of greater than 5mbps. Hawai'i came in last place with only 2.4% of its connections occurring at speeds greater than 5mbps. In comparison, Delaware had 60% of its users achieving network speeds of greater than 5mbps.

Hawai'i's broadband needs are primarily serviced by two wired carriers, Hawaiian Telcom and Oceanic Time Warner, and by a number of wireless providers, such as Clearwire, Verizon Wireless, AT&T Wireless, and Sprint. Hawaiian Telcom provides various service levels ranging from \$29.99 (maximum download speeds of 3mbps and upload speeds of 0.768mbps) to \$49.99/month (maximum download speeds of 11mbps and upload speeds of 1mbps). Oceanic provides various service levels ranging from \$29.10/month (maximum download speeds of 5mbps and upload speeds of 1mbps) to \$54.05/month (maximum download speeds of 15mbps and upload speeds of 1mbps). Clearwire provides various wireless service levels ranging from \$29.99 (maximum download speeds of 1.5mbps and upload speeds of 0.256mbps) to \$44.99/month (maximum download speeds of 2.0mbps and upload speeds of 0.256mbps).

Oceanic Time Warner estimates that in the State of Hawai'i, their service cables pass an estimated 595,000 addresses. Since some addresses actually include multiple living units, this number is somewhat less than the number of households that could subscribe to their broadband service. They estimate that there is approximately a 1% difference between the number of addresses and living units passed. Of the 595,000 passings, broadband service is not deliverable to an estimated 16,000 addresses, or 2.7%, because of non-serviceability conditions of customer premises. On O'ahu, the number of passings is estimated to be 407,000 with 14,000 being unserviceable addresses, or 3.4%. Oceanic roughly estimates that approximately 1% of the residences in the state are not covered by either their TV or broadband services, which are usually delivered through the same cable to the residence.

It should be noted that newly emerging wireless services such as WiMax from Clearwire and Sprint, and 4G Long Term Evolution (LTE) from Verizon Wireless and AT&T Wireless may approach the wired broadband services available today and may challenge the present levels of cable modem and Digital Subscriber Line (DSL) services. Sprint recently announced the first U.S. launching of a WiMax network in Baltimore, Maryland. They are also expected to launch additional commercial

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WiMax networks in Washington, D.C. and Chicago later in 2008, and Portland, Oregon in first quarter 2009. These wireless environments offer the advantage of mobility as well as a cost-effective broadband solution for more rural and remote areas. WiMax has delivered peak data speeds of 40 mbps in some controlled lab tests. However, in a commercial environment, the actual speed experienced by users will depend on things such as distance from the transmitting towers, simultaneous users on the network, and general Internet performance. According to a Computerworld article by Mr. Brian Nadel on October 10, 2008, expected download speeds on WiMax networks are expected to be between 3mbps and 5mbps. This is similar to the performance delivered today by most cabled networks. However, the next generation of wired services is already being rolled out in the advanced nations of the world and in some American communities. These enhanced service offerings are typically based on fiber-to-the-home (FTTH) technologies that are advertised to support 100mbps or better download and upload speeds.

Recent announcements from Cisco regarding ultra high-speed channel-bonding technologies will be delivering broadband speeds of 100mbps over most existing cabling infrastructure. This new cable modem technology (DOCSIS 3.0 Channel Bonded Cable Modems) seems to have the capability to provide existing consumers with faster access to on-demand, feature-rich entertainment and communications applications with relatively low additional investments on the part of cable service providers. Recently, Comcast expanded its DOCSIS 3.0 service on the mainland by offering 50mbps downstream speeds and 10mbps upload speeds by using this bonded channel technology. Comcast recently reported a 22% penetration in the Chicago market for their high speed Internet service.

Both Hawaiian Telcom and Oceanic Time Warner have started to deploy some fiber optic cabling in some of their more recent and larger projects, locations where they expect to receive an adequate return on their investment. Under current business conditions and regulations, today's economic concerns make it difficult for these service providers to independently provide fiber optic cable to existing, older installations. However, leading governments such as Singapore have introduced models based on incentives and/or investments that support a shared and open broadband infrastructure. This is easier and more economical to achieve when implemented in areas of new construction and development.

In addition, the task force noted the need to focus on Hawai'i's uniqueness. Our island geography presents challenges faced by no other state. One challenge is the requirement of interisland fiber optic systems

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to provide advanced broadband capabilities throughout the State. Such submarine systems are much more expensive than the terrestrial fiber systems for intra-state infrastructure elsewhere in the country.

A second challenge is that Hawai‘i’s distance from the mainland and Asia make the entire state reliant on expensive trans-Pacific fiber optic systems to connect Hawai‘i to the rest of the country and the world. Contrary to the conventional notion that Hawai‘i enjoys rich connectivity due to being a hub for trans-Pacific fiber, the most recent fiber optic systems constructed to connect Asia to the U.S. have all bypassed Hawai‘i since 2001. Presently, there are two new submarine cables that are scheduled to come to Hawai‘i in the near future, one being the Sidney to Hawai‘i Testra fiber cable and the other being the Asia-American Gateway cable. When completed, these two new cables will use up O‘ahu’s existing cable attachment capacity at the Keaweula landing sight. The task force believes that appropriate action should be taken to reduce the barriers related to landing new fiber in Hawai‘i.

Much as aircraft no longer need to land in Hawai‘i on the routes from the U.S. to Asia or Australia, modern fiber optic systems no longer require a regeneration point in Hawai‘i. As advanced high-bandwidth digital information and communications services become more prevalent, the lack of dark fiber to Hawai‘i and disproportional cost of high bandwidth capacity will become an increasing barrier. While adding to the cost of all broadband services in Hawai‘i, this most notably affects advanced research and education today. It will become an increasing factor as more digital media services, particularly those involving content creation and delivery, migrate to Internet-based technologies.

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## Current Barriers and Constraints

The Hawai‘i Broadband Task Force received presentations from three of Hawai‘i’s broadband service providers (Oceanic Time Warner, Hawaiian Telcom, and Clearwire) which addressed existing barriers that make it more difficult and expensive than need be to deploy broadband infrastructure. The barriers included:

- the complexity of the permitting requirements and processes,
- duplicate regulatory authorities,
- fee structures,
- time consuming involvement of multiple regulatory agencies,
- lack of tax incentives, and
- the unavailability of government structures and rights-of-way as sights for the placement of broadband antennas and other infrastructure.

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Important additional components to understand are the elements that drive infrastructure costs such as: usage of underground and above ground rights-of-way, micro-tunneling, government buildings, spectrum, towers, conduits, public sector initiatives, and structural separation. All of the above mentioned issues fall under the control of the PUC, the DCCA, and the various County departments across the state. The task force sees a benefit in consolidating the various regulatory, franchising and permitting functions that normally need to be addressed when broadband infrastructure expansion is considered.

In a recent report released in November 2008, the International Telecommunication Union (ITU) advocated the sharing of infrastructure as a strategy for the reduction of costs associated with the expansion of high speed broadband networks (see Appendix A). The concept involves the sharing of necessary infrastructure costs while encouraging competitive service levels and associated charges. The infrastructure sharing might involve such components as rights of way, easements, ducts, pylons, masts, trenches, towers, poles, and cable landing stations. State and local governments can have a key influence in this area by establishing effective regulations and by the use of financial incentives. The resulting shared open-access infrastructure can lower costs to bandwidth providers and lower barriers of entry for services, which results in greater competition, innovation, diversity of offerings and ultimately lower prices to consumers.

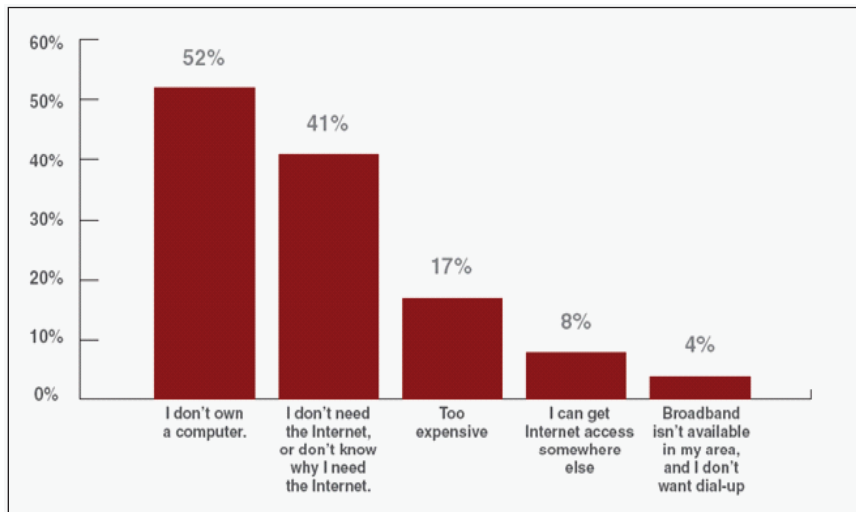
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## **No Child Left Offline**

One interesting project that was the result of the recent broadband initiative in the State of Kentucky was the ConnectKentucky's "No Child Left Offline" (NCLO) project. This program successfully facilitated cooperation among private companies, such as Microsoft, CA Inc., and Lexmark, corporate foundations and the state government in an effort to place computers into the hands of underprivileged and disadvantaged school children. The project has leveraged support from numerous organizations and foundations with cash and in-kind donations which have exceeded \$2.2 million. This project was a response to consumer research in that state that indicated that the lack of computer ownership was the primary barrier associated with Internet adoption, as presented in the February 21, 2008 Connected Nation Inc. report, *The Economic Impact of Stimulating Broadband Nationally*:

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## Barriers to Internet Adoption in Kentucky



This information was similar to that found in a 2004 study conducted by the National Telecommunications and Information Administration, United States Department of Commerce, entitled *A Nation Online: Entering the Broadband Age*, in which it was found that 56% of Americans who do not access the Internet indicated that the lack of a computer was the primary reason.

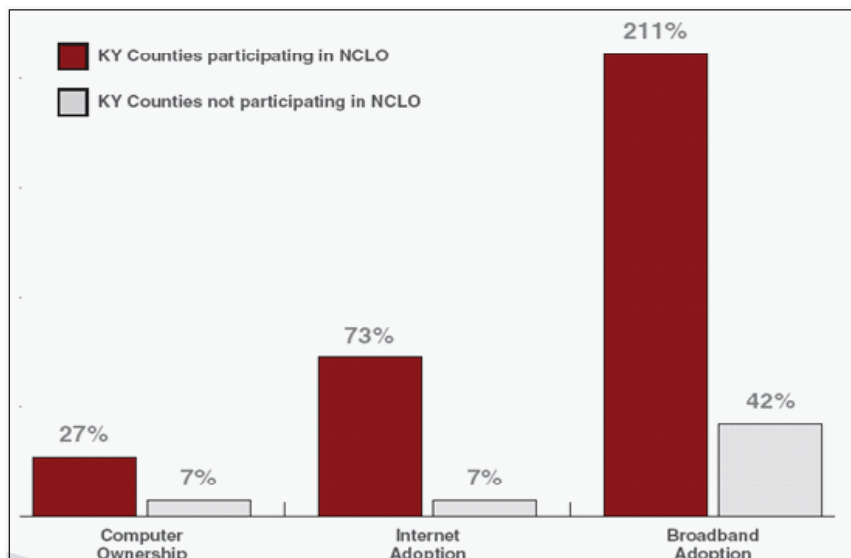
The NCLO program has had a noticeable impact on the computer ownership of low income families in those counties in Kentucky that have participated in the program. According to the ConnectKentucky 2005 and 2007 Residential Technology Assessments:

- In the last two years, computer ownership among low-income families in NCLO counties grew nearly four times faster than these families in other counties,
- During the same two-year period, Internet adoption among low-income families in NCLO counties grew more than ten times faster relative to these families in other areas of the state, and
- Broadband adoption among low-income families grew five times faster in counties that received computers through NCLO.

In the last two years, home broadband adoption among low-income families has grown by over 200% in these participating counties, as shown in the following graph:

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## Home Technology Adoption Among Low-Income Families



In a 2003 study conducted by the U.S. Bureau of the Census, it was found that children in low-income families are half as likely to have a computer as children in households with annual incomes over \$75,000, are a third as likely to have Internet access, and a sixth as likely to have access to broadband (U.S. Bureau of the Census, Current Population Survey, Internet and Computer Use, Oct. 2003). In the U. S. Census Bureau, *Current Population Survey 2005 Annual Social and Economic Supplement* report, it was stated that approximately 28,000 children living on Hawai‘i are living in poverty. There does not seem to be any reason that a similar program to the NCLO project in Kentucky or the Computers 4 Kids project in Tennessee would not work in Hawai‘i.

Tennessee’s Computer 4 Kids program has been implemented with the help of their Department of Children’s Services and their Department of Human Services. In this program, organizations sign up to become program sponsors and help to put brand new computers into the hands of children and families facing economic challenges, in the foster care system or struggling with behavioral disorders and other issues. These organizations also help to establish computer training labs where the students can learn the proper use of their new machines. The Computers 4 Kids project is intended to help those children who cannot afford a computer, thus allowing children and families the opportunity to participate in the educational, economic and civic opportunities available to them. The target recipients are needy children at the end of their 9<sup>th</sup> grade year and who meet specified behavioral and academic expectations. Since computer training may be a concern for the overall

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success of such a program in Hawai‘i, partnerships with non-profit organizations, such as ‘Ohana Komputer or ALU Like Inc. for example, may be beneficial to the final outcome of such a program. Another possibility could be a program that would include the involvement of the Department of Public Safety – Corrections Division - Office of Correctional Industries. Such a program could provide skills that might offer very beneficial, future employment benefits to the participants.

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## Expectations at the Federal Level

As telecom regulation in the U.S. is primarily a federal matter, this can impact some of what Hawai‘i may or may not do in the area of broadband deployment. Section 706 of the Telecommunications Act of 1996 requires the Federal Communications Commission (FCC) to promote the deployment of “advanced telecommunications” - broadband - to all Americans. Section 706 also requires that the FCC issue periodic reports on the availability of broadband. If the FCC finds that broadband is not being deployed to all Americans in a reasonable and timely fashion, the statute requires the FCC to “take immediate action to accelerate deployment” by “removing barriers to infrastructure investment” and to promote competition.

To date, the FCC has issued four Section 706 reports. These reports are largely based on data the FCC gathers from industry on a semi-annual basis, on a form known as FCC 477. The FCC has generally used this data to paint a rosy picture of broadband deployment. The discrepancy between the FCC’s portrayal of progress in the U.S. and international data has propelled lawmakers to pursue legislation that focuses on the FCC’s data gathering efforts as the first step in implementing the Section 706 mandate.

The FCC uses a 200 kbps standard to define broadband. Most would agree that 200 kbps is far too slow to be called “broadband”, let alone be considered the benchmark for progress. At 200 kbps, one cannot take advantage of full-motion full-screen video, much less innovative Internet services such as high-definition video. In contrast, consumers in Japan and Korea have easy access to over 100 mbps at lower costs on average. Hence, if the FCC were to revise its broadband threshold upwards, even to a modest 1.5 mbps, its 706 reports would likely paint a much bleaker picture of broadband deployment in the U.S.

Many also question the FCC’s statistical methodology which relies on zip codes. Basically, if one subscriber in a zip code receives broadband, the FCC assumes that broadband is available throughout the entire area. With this methodology, the FCC reports that broadband is available in 99% of the United States. The flaw in such logic is obvious. It would be comparable to stating that since one consumer in a given zip code



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area has a Mercedes, than all consumers have or could have a Mercedes automobile.

Change may be on the horizon. The FCC recently announced that it would seek comment on making changes to its broadband data gathering efforts focusing on the two areas set forth above, namely, the need to adjust the 200 kbps threshold and the need to address the shortcomings of its zip code assessment efforts. Addressing these changes may have been a result of the criticism over the years and/or recent initiatives in both houses of Congress to require the FCC to address these two issues.

The U.S. Senate Commerce, Science & Transportation Committee, of which Senator Inouye is the Chair, approved S. 1492, the Broadband Data Improvement Act which would require the FCC to:

- 1) Reconsider its current 200 kbps broadband standard,
- 2) Create a new second generation broadband standard for speeds capable of delivering high definition video,
- 3) Report on broadband availability by nine-digit zip codes (as opposed to five digits) for greater precision,
- 4) Conduct annual inquiries/updates into the deployment of broadband services, and
- 5) Authorizes a 5-year, \$40 million per year program to provide matching grants to state public-private partnerships to more effectively identify barriers and solutions to broadband adoption throughout the state.

The Broadband Data Improvement Act was passed by the House of Representatives on September 26, 2008 and passed by the Senate on September 29, 2008. It was signed by President Bush on October 10, 2008 and became Public Law No: 110-385. It is important to note that this Act takes proactive steps to encourage public/private partnerships to identify barriers to broadband adoption on the state level.

“As with all other states, an affordable and robust broadband infrastructure is critical to Hawai‘i’s advancement in the global innovation economy of the 21st century,” said Senator Inouye, chairman of the Senate Committee on Commerce, Science, and Transportation,

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which has jurisdiction over telecommunications issues. “Broadband access allows communities, whether in Kapolei, Keeau, or Kaunakakai to take advantage of distance education, and telehealth services. It also ensures a broader public safety net, and expands businesses through online sales. It means engaging technology-related businesses from all of our islands. An important step to realizing this goal is to collect data on the state of our broadband infrastructure, using consistent national standards. This is what the bill I sponsored sets out to do.”

It is essential that the United States creates a national broadband strategy as a broadband-enabled Internet is critical to the future of the country. It is quickly becoming a primary catalyst for innovation, economic growth, job creation, educational opportunity, and competitiveness on a global scale. The Internet has great potential that still remains to be fully realized and is essential to the future success of this country. In December 2008, a group of America’s communications providers, high technology companies, manufacturers, consumers, labor unions, public interest groups, educators, state and local governments, utilities, content creators, foundations, and many other stakeholders proposed a framework for such a strategy (see Appendix C). It is suggested that the framework for this proposed strategy should include:

- Goals,
- Policies to stimulate high-speed broadband investment,
- Policies to stimulate high-speed broadband adoption and use, and
- Assessment and accountability

The other federal area of interest relates to the Universal Service Fund (USF) which is intended to support carriers that serve rural and sparsely populated areas of the country where the cost of providing telephone service is high. In 2006, USF distributed about \$4.2 billion to support this effort. USF is funded through small contributions made by all customers on their interstate phone bills. At present, USF provides support for telephone service, both wired and wireless. Most of these funds are directed to small carriers serving rural communities and are based on the carrier’s embedded costs. Some, however, were provided for the larger Bell Operating Companies based on a formula model. For wireless carriers, the fund provides funding based on the support granted to the wired carrier in the area where the wireless carrier seeks to provide service. It is interesting to note that there has been a call for “reform” in this area because the wireless carriers receive similar levels of support without a comparable infrastructure burden.

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Under the FCC's current rules, USF is designed to support the cost of voice telephone service only. Critics argue that this limitation is dated and should be refocused to include broadband service. Opponents of expanding USF argue that because voice and data service are provided over the same network, the program is already indirectly supporting broadband service. There are cost and funding issues as well - additional revenues will need to be raised to be able to continue support of telephone service while adding broadband service to USF. Additionally, as a result of FCC's limited broadband data gathering, it is difficult to determine precisely where to direct USF moneys. Without knowing with some certainty where the broadband gaps lie, it may be difficult to distribute funds in a way that benefits those consumers who truly lack access to broadband.

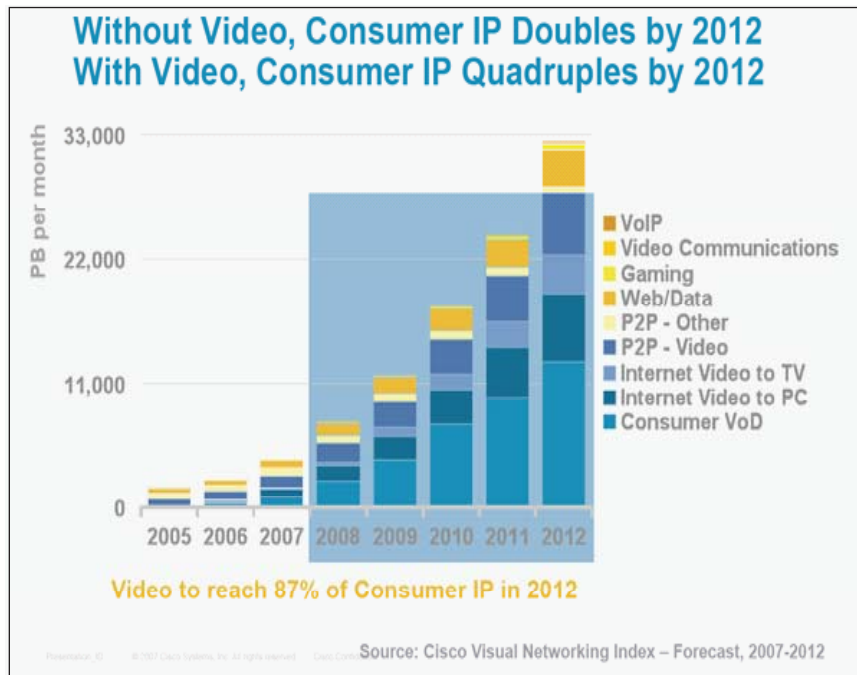
Recently, the Federal-State Joint Board on Universal Service, comprised of state and federal regulators, recommended to the FCC that the USF be divided into three separate programs - one focusing on traditional wired telephone service, one focusing on wireless or "mobility" service, and one focusing on broadband. By law, the FCC is required to act on the Joint Board's recommendation within one year.

In the Congress, there is consensus that USF is in need of reform, for all the reasons mentioned above. However, the consensus ends at that point. In the legislative session this year, Chairman Inouye's strategy will be to find those areas for which there can be a level of consensus or compromise, whether it involves a more equitable means to provide support between wired and wireless telephone carriers, and/or adding to the USF's revenue base to be able to include broadband service. A variety of other FCC policies relate to broadband. For example, the FCC's E-rate program helps fund broadband connections to schools and libraries across the country. Similarly, the FCC's rural healthcare program assists rural healthcare providers with the cost of broadband used for health service functions.

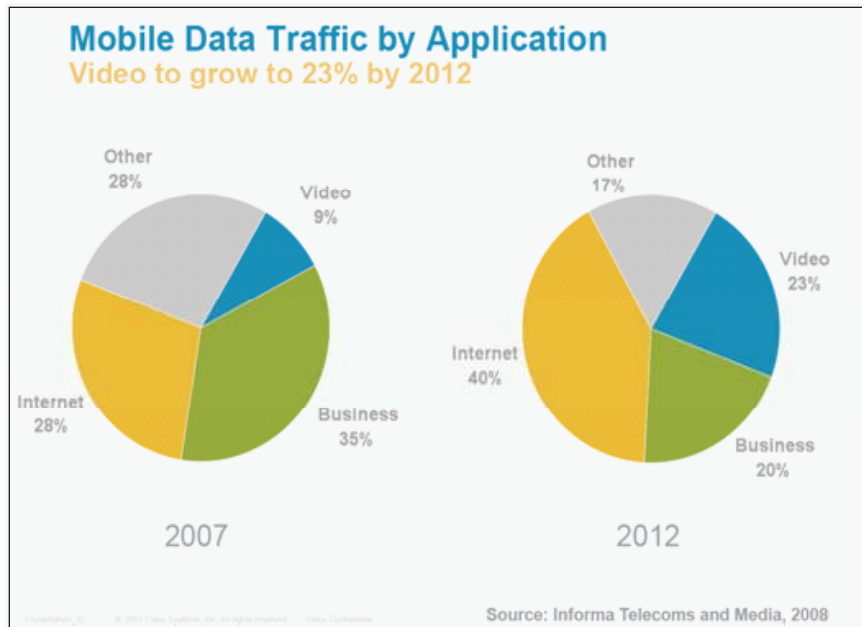
Recently, the FCC took its first steps toward making "white space" - empty TV channels on the public airwaves - available for wireless broadband services. There is also an upcoming 700 MHz auction of spectrum currently used by broadcasters that is expected to be vacated following the change to digital television in February 2009. It is possible that through such actions that a viable alternative to cable and DSL service can grow, making the broadband market more competitive and available to consumers. Another possible alternative would be to allow the FCC to turn this available spectrum over to the local communities rather than auctioning it off. The local communities could then partner with various providers to use this spectrum for broadband wireless purposes.

## Changing State of the Internet

Applications using the Internet are becoming more and more bandwidth intensive, and there is no reason to believe that this trend will not continue. A primary reason for this is the increased use of video content. Current video use today is of the YouTube variety while future video will include high definition in full frame with surround sound. This is shown in the following graph produced by Cisco Systems, Inc. which shows the expected Internet usage to the year 2012.



According to Cisco, Internet video in North America has jumped from 10 percent of consumer Internet traffic in 2006 to 24 percent of traffic in 2007. A similar increase in video content in Internet traffic is expected into the future on wireless networks through the increased use of the many mobile devices available today:



This continued increase in Internet traffic will create an ever increasing demand for faster Internet service to both business and residential desk tops. This need is best served by fiber-to-the-premise which has the capability of delivering speeds of 100 mbps or better as seen today in Japan, South Korea, and certain European countries.

It should be recognized that broadband is more than just a communications issue. It is an infrastructure issue that has significant ramifications on economic growth, productivity, health care, education, public safety, and the delivery of governmental services. As such, the development of broadband infrastructure should not necessarily be left solely to the business market because the profit incentives of this market may not necessarily have the long term welfare of the public at heart. Therefore, a public/private partnership approach to the support of infrastructure development is a model that should be considered. This cooperative approach can take the form of regulation adjustments that would lower infrastructure costs, reduce barriers, allow for the sharing of existing communication structures such as poles and buildings, and provide economic incentives to the various service providers involved. A shared infrastructure approach can open the way for lower development costs, lower barriers of entry, and lead to a more competitive service environment.

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## Appendix A

### ITU advocates infrastructure sharing to counter investment drought

#### *Trends in Telecommunication Reform Report explores lower costs for network rollout*

**Geneva, 27 November 2008** — ITU has published its annual report, *Trends in Telecommunication Reform 2008: Six Degrees of Sharing*, detailing a set of regulatory strategies designed to lower the costs of network rollout.

2008 has been marked by unparalleled numbers of voice and Internet consumers in both the developing and developed world, the result of network growth and expansion.

This year has also seen an unparalleled global financial crisis which may make it more difficult for investors to obtain financing for continuing network development. Sharing strategies, examined in the new ITU report, are seen as conducive for infrastructure development in the telecommunications/ICT sector, particularly in light of the deepening global financial crisis.

“Sharing strategies are increasingly necessary to ensure that operators can deploy their networks at low cost while guaranteeing that consumers have access to affordable services,” said Sami Al Basheer, Director of ITU’s Telecommunication Development Bureau. “Now, more than ever, sharing strategies make sense as operators are forced to reduce the costs of network deployment as they compete for scarce investment funds. This is a forward-looking perspective in light of the current financial and economic uncertainty.”

Sharing strategies include the sharing of civil engineering costs in deploying networks, promoting open access to network support infrastructure (poles, ducts, conduits), essential facilities (submarine cable landing stations and international gateways) as well as access to radio-frequency spectrum and end-user devices.

#### *Sharing infrastructure could counter impact of financial downturn*

The “Six Degrees of Sharing” theme was first discussed in Thailand during ITU’s 2008 Global Symposium for Regulators last March. Few observers could then have anticipated the rough ride that would be in store for financial markets a few months down the road.

Yet, the guidelines announced in March seem almost prophetic in today’s circumstances. Taking a broad and innovative view of sharing, the world’s regulators sought to capture the productivity of global networks and use it to expand the scope of opportunities for service and content providers and, ultimately, consumers. Developing countries embraced sharing to make more affordable the expansion of ICT networks to rural and under-served areas. Many developed countries are looking at sharing to reduce the cost of rolling out ultra high-speed broadband networks that reach customers’ homes and apartment buildings.

“Sound business and regulatory practices will contribute to extracting the greatest possible value from existing levels of investment in the telecommunication and ICT sectors,” said Al Basheer. “ITU is committed to working with Member States and to assist regulators in marshalling the regulatory expertise they need to navigate these rough seas.”

The booming volume of digital bits generated by the move to convergence and packet-switching has produced a need for increased network capacity. Regulators have a responsibility to create and maintain an environment in which operators and service providers can maximize network capacity and efficiency by fostering capital investment and market expansion as the sector continues to evolve.

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Mobile penetration showed high growth rates through 2008. By year end, mobile networks and subscribers will rise to an all time high, reaching an estimated 4 billion mobile subscribers worldwide. (See: [www.itu.int/newsroom/press\\_releases/2008/29.html](http://www.itu.int/newsroom/press_releases/2008/29.html)). The world also counts over 1.5 billion Internet users, a growing number of which use fixed and mobile broadband services. Dial-up is being replaced by broadband across developed and developing countries alike. In developing countries such as Chile, Senegal and Turkey, broadband subscribers represent over 90 per cent of all Internet subscribers.

A growing array of broadband wireless systems are now available, opening the way for users in developing countries to access the Internet on mobile phones and other handheld devices. At the same time, more developing countries are deploying national fibre backbones and backhaul networks to transport their growing data-rich traffic. In addition, several new international submarine cable networks are set to connect developing countries to the global network of Internet backbones — just as a group of high-tech entrepreneurs are working to revive plans for a constellation of broadband satellites to connect the developing world. The *Trends* report catalogues efforts by governments, and in particular ICT regulators, operators and service providers to expand the reach of affordable broadband services and meeting universal access goals.

### Timely steps for ICT sector

What had been foreseen as ideal strategies to extend broadband network access in developing markets may now be viewed as a prescription for the entire world. If the sources of capital for network investment suffer a temporary drought, policy-makers could take steps to make their markets more amenable to the shrinking pool of investment:

- Lower investment barriers that inhibit capital flows from one country to another,
- Reduce regulatory barriers (high licence fees or market-entry bans) that represent hostile environments for capital investment and market growth,
- Share essential facilities, such as cable landing stations, local switching centres or fibre backbone networks,
- Adopt rules to provide for infrastructure sharing, particularly “passive” sharing of towers, ducts, rights-of-way and other support facilities,
- Overhaul and streamline cross-agency processes to create a ‘one-stop shop’ for various network-related authorizations, such as land management, port access, environmental and safety permits,
- Add innovative spectrum management mechanisms that promote increased sharing and efficient use of spectrum,
- Amend regulatory frameworks to eliminate discriminatory rules that favour one company or industry over another in a converged services market, and
- Ensure that government policies and rules maximize the ability of incumbents and market entrants to choose between different opportunities for business plans and long-term strategies, including resale, wholesale, and niche markets.



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This year's edition of *Trends in Telecommunication Reform* comprises eleven chapters under the global theme of infrastructure sharing. It includes an ICT market and regulatory overview for 2008; promoting affordable network access and competition through sharing; the mechanisms and policies for extending access to national fibre backbones in developing countries; exploring new techniques to meet the escalating demand for spectrum to provide for a growing range of wireless services; opening up network bottlenecks and providing a level playing field; exploring the concept of international roaming as the “sharing” of customers by wireless operators; new challenges for regulators emanating from the convergence in Internet Protocol television (IPTV) and mobile television; and examining the end-user perspective, as policy-makers and equipment manufacturers create opportunities for ICT access by multiple users.

**For more information, see** [www.itu.int/dms\\_pub/itu-d/opb/reg/D-REG-TTR.10-2008-SUM-PDF-E.pdf](http://www.itu.int/dms_pub/itu-d/opb/reg/D-REG-TTR.10-2008-SUM-PDF-E.pdf)

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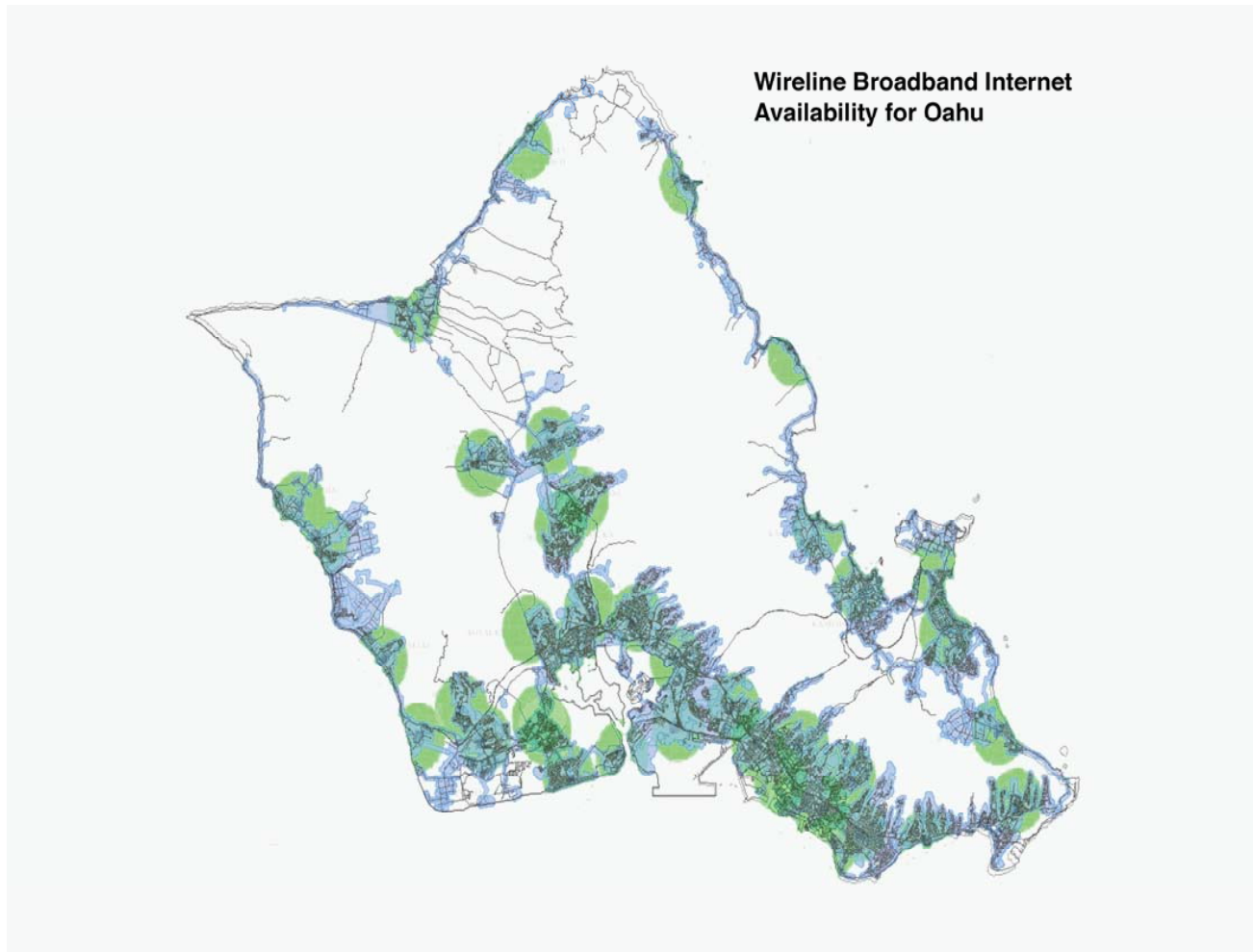
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## Appendix B

### Service Coverage Maps


The following are the service availability maps for the various islands as supplied by Hawaiian Telcom and Oceanic Time Warner. The green circles show the coverage area of DSL service and the blue shows the coverage area of Oceanic cable service. The black lines represent the shore lines and the roads.

Combined wired broadband services map for O'ahu:

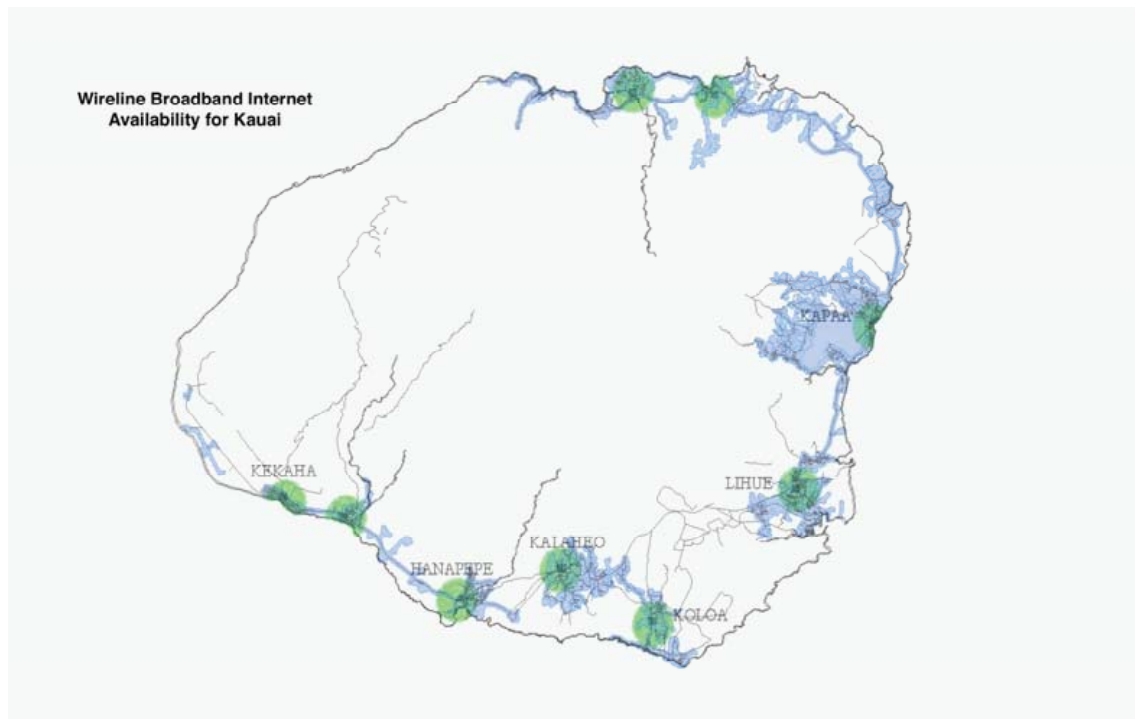


**Wireline Broadband Internet Availability for Maui and Lanai**

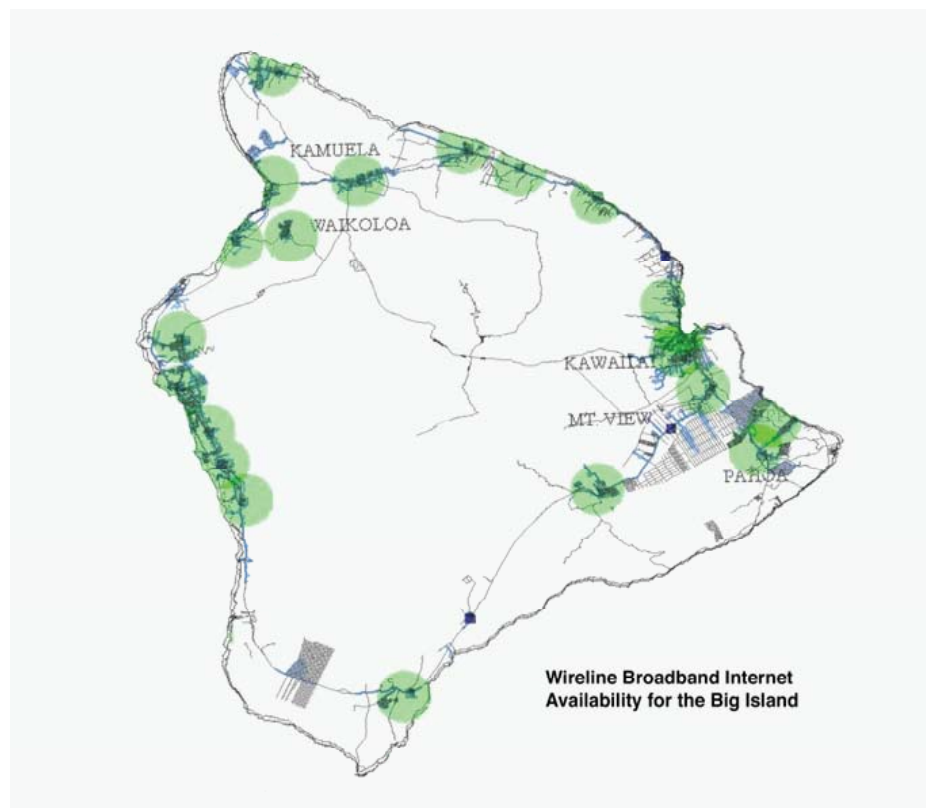
**Wireline Broadband Internet Availability for Molokai**



Combined wired broadband services map for Kaua'i:



Combined wired broadband services map for the island of Hawai'i:



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## **Appendix C**

### **A Call to Action for a National Broadband Strategy**

The undersigned, representing a diverse array of America's communications providers, high technology companies, manufacturers, consumers, labor unions, public interest groups, educators, state and local governments, utilities, content creators, foundations, and many other stakeholders in America's broadband future, call on President-elect Barack Obama and the next Congress to make the development and initial implementation of a comprehensive National Broadband Strategy a high national priority in 2009.

### **Advanced Communications Capabilities are Essential for the 21st Century**

The broadband-enabled Internet is rapidly changing the world. It has become a catalyst for innovation, economic growth, job creation, educational opportunity and global competitiveness. It enhances public safety, homeland security, health care, energy efficiency, environmental sustainability and the worldwide distribution of millions of products, processes and services. It aids in revitalizing depressed urban and rural economies and addressing the special needs of senior citizens, individuals with disabilities, and young people. It creates a vehicle for enhancing the level of civic participation and discourse so important to a functioning democracy. Yet broadband as an enabling technology is still growing out of its infancy. It has unlimited potential that remains to be fully realized.

### **The United States Urgently Needs a Comprehensive National Broadband Strategy**

The United States is at a critical juncture. Too many Americans still do not have access to affordable broadband or lack the equipment or knowledge to use it effectively. If the United States is to remain a leader in the global economy, our broadband networks must also be robust enough to enable our people, businesses, and public and private institutions to take full advantage of emerging and future bandwidth-intensive and quality-sensitive applications.

The United States vies in an increasingly competitive global marketplace with Asian, European, and other nations that have recognized the transformative significance and competitive advantages of broadband. Many nations have implemented national strategies that treat advanced communications networks as strategic infrastructure, and they are using a variety of policies and practices to promote broadband deployment and adoption. These include tax incentives, low-interest loans, subsidies, public-private partnerships, competition policy, and many other forms of direct and indirect support by all levels of government. Such measures have led to increased broadband availability, faster speeds, lower prices, and high adoption rates. The United States should not ignore successful policies and practices from other countries, as it pursues a National Broadband Strategy that is aligned with our own unique history, culture, geography, and economy.

### **The Framework for a Comprehensive National Broadband Strategy**

- **Goals.** The National Broadband Strategy should set out several clear, forward-looking, and attainable goals that take into account the ability of broadband to generate huge benefits in education, environmental protection, scientific research, medicine, health care, energy efficiency, transportation, and overall economic vitality. These goals should include the following:



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- a. Every American home, business, and public and private institution should have access to affordable high-speed broadband connections to the Internet.
  - b. Access to the Internet should, to the maximum feasible extent, be open to all users, service providers, content providers, and application providers.
  - c. Network operators must have the right to manage their networks responsibly, pursuant to clear and workable guidelines and standards.
  - d. The Internet and broadband marketplace should be as competitive as reasonably possible.
  - e. U.S. broadband networks should provide Americans with the network performance, capacity, and connections they need to compete successfully in the global marketplace.

**Policies to Stimulate High-Speed Broadband Investment.** The federal government, in collaboration with state and local governments and the private sector, should play an active role in stimulating broadband deployment, particularly in unserved areas. Such support might include tax incentives, grants, low cost loans, loan guarantees, universal service subsidies, efficient use of spectrum, and other approaches.

**Policies to Stimulate High-Speed Broadband Adoption and Use.** The federal government, in collaboration with state and local governments and the private sector, must play an active role in stimulating adoption and use of advanced broadband connections. All Americans must have access to computers and the knowledge to use broadband technology effectively. Federal support might include programs, grants, subsidies, and other measures that foster broadband connectivity, computer access, education, and training.

**Assessment and Accountability.** Specific timetables and benchmarks should be established to help encourage successful implementation and advancement of national broadband policies, incentives or programs. A system for regular and timely collection and publication of data concerning the deployment, adoption, and use of high-speed broadband should also be instituted to ensure that our national goals and timetables are being met.

## **Our Next Steps**

While we urge policy makers and other citizens to adopt the framework presented above, it is only a first step in the process of developing a National Broadband Strategy. Representatives of the undersigned entities will continue to work together to address key issues and policy priorities. In the Spring of 2009, we will hold an event to present more specific policy recommendations to President Obama, Congress, and the American people.

### **A Call to Action for a National Broadband Strategy Signatories as of December 1, 2008**

ACUTA: The Association for Information Communications  
Technology Professionals in Higher Education  
Alcatel-Lucent  
Alliance for Digital Equality  
Alliance for Public Technology  
American Cable Association  
American Library Association  
American Public Power Association

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AT&T  
Benton Foundation  
Broadband Census  
Broadband Market Analysis  
Center for Creative Voices in the Media  
Cisco Systems, Inc.  
Chaffee Fiber Optics  
Civitium  
Clearwire Corporation  
Communications Workers of America  
CompTel  
Connected Nation  
CTIA - The Wireless Association  
East Central Vermont Community Fiber Network  
Educause  
Enablence Technology Inc.  
e-NC Authority of North Carolina  
Free Press  
Fiber to the Home Council  
Google  
Graham Richard Associates, LLC  
iSolon.org  
Intel Incorporated  
Information Technology and Innovation Foundation  
Internet2  
Lafayette Utilities System  
Media Access Project  
Mid-Pacific ICT Center  
National Association of Development Organizations  
National Association of Telecommunications Officers and Advisors  
National Cable & Telecommunications Association  
New America Foundation  
North American Council for Online Learning  
OneCommunity  
OneEconomy  
Optical Networks, Inc.  
Organizations Concerned about Rural Education  
Public Technology Institute  
Public Knowledge  
Telcordia Technologies, Inc.  
Telecommunications Industry Association  
Teletruth  
The Broadband Group  
Utilities Telecom Council  
Verizon  
Wireless Communications Association International  
Wireless Internet Service Providers Association  
XO Communications

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## Appendix D

### Glossary of terms

The following is a glossary of terms and expressions as used throughout this report:

**Broadband** – As defined by the Federal Communications Commission, it is any Internet connection greater than 200 kbps. In today’s communication environment, this is speed is thought by many to be insufficient to be used as the current definition of broadband.

**Dark Fiber** – Unused fiber optic lines available for use. Due to the high cost of installation, additional strands of fiber are usually laid during an installation. This provides for redundancy for backup purposes and for future expansion. Until they are put into service, they remain “unlit” or dark.

**Downstream** - refers to the transfer speed by which data can be sent over the Internet from the server to the [client](#) or user.

**DOCSIS** - Data Over Cable Service Interface Specification is an international standard developed by [CableLabs](#) and defines the communications and operation support interface requirements for a data over existing cable TV wiring systems. The latest version, DOCSIS 3.0, is capable of providing a theoretical maximum of 120 mbps speeds.

**DSL** – Digital Subscriber Line is a family of technologies that provides [digital](#) data transmission over the wires of a local [telephone network](#). This technology is used by the telephone companies to provide Internet services.

**FTTH** – Fiber-to-the-Home is a form of [fiber-optic communication](#) delivery in which an [optical fiber](#) is run directly onto the customers’ homes or premises to deliver very high speed broadband service.

**gbps** – Gigabit per second or billions of bits per second is a [unit](#) of [data transfer rate](#) equal to a billion bits per second.

**GIS** - Geographic Information System is an information system that captures, stores, analyzes, manages, and presents data that refers to or is linked to physical locations.

**Internet2** - A [non-profit consortium](#) which develops and deploys advanced [network](#) applications and technologies, for education and high-speed data transfer purposes.

**IP** - An abbreviation for [Internet Protocol](#). It is the [protocol](#) used for sending and receiving data across a [packet-switched network](#) using the [Internet Protocol Suite](#) TCP/IP.

**kbps** - kilobit per second is a [unit](#) of [data transfer rate](#) equal to 1,000 [bits per second](#).

**LTE** - An abbreviation for “Long Term Evolution” and is a 4G competitor of WiMax and currently being adopted by Verizon and T-Mobile.

**mbps** - Megabit per second is a unit of data transfer rate equal to 1,000,000 bits per second

**MPEG2** - MPEG is an encoding and compression system to provide compression support for TV quality transmission of digital video.

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UHF - Ultra high frequency designates a range or [band](#) of [electromagnetic waves](#) with [frequencies](#) between 300 [MHz](#) and 3 [GHz](#) (3,000 MHz).

Upstream - The speed at which data can be transferred over the Internet from the [client](#) or user to the [server](#).

VHF – Very High Frequency band of the radio spectrum in the range between 30 MHz to 300 MHz.

White Space - Refers to unused frequencies in the [radio waves](#) portion of the [electromagnetic spectrum](#)

WiFi - A popular telecommunications technology that provides for the wireless transmission of data over a shorter range network, typically tens of yards/meters, though its range can be extended to over a kilometer using directional antennas, and it uses unlicensed spectrum to provide access to a network. Speeds usually range from 11Mbps to 100Mbps.

WiMax - A 4G [telecommunications](#) technology that provides for faster wireless [transmission](#) of data over a long-range, covering many miles/kilometers, and typically uses licensed [spectrum](#) (although it is possible to use unlicensed spectrum) to deliver a point-to-point connection to the Internet from an ISP to an end user.

3G - Third generation of mobile standards and wireless [technology](#) which enables network operators to offer users a wider range of more advanced services including wide-area wireless voice [telephony](#), [video calls](#), and broadband wireless data.

4G - Fourth generation of mobile wireless standards and [technology](#) which enables network operators to provide a comprehensive IP solution where voice, data and streamed multimedia can be delivered users on a stationary or mobile basis, and at higher data rates than previous generations.

HOUSE OF REPRESENTATIVES  
TWENTY-FOURTH LEGISLATURE, 2007  
STATE OF HAWAII

**VETO**

H.B. NO. 310  
H.D. 2  
S.D. 2  
C.D. 2

## A BILL FOR AN ACT

**VETO OVERRIDE**

RELATING TO TECHNOLOGY.

ACT No. 2  
Approved: [Signature]  
Dated: July 10, 2007

**BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:**

1       SECTION 1. Technology is the key to success in today's  
2 economy. The legislature finds that removing barriers against  
3 broadband deployment by using a technology-neutral approach will  
4 encourage lower prices for broadband services and create more  
5 consumer choices. In addition, deploying broadband networks and  
6 advanced communication services throughout Hawaii are essential  
7 for the State to keep pace with global changes in economic  
8 diversification, energy and environmental technology,  
9 healthcare, public safety, and education.

10       The legislature further finds that Hawaii's enterprises do  
11 not have access to the types of low-cost, high-capacity digital  
12 transport services which are increasingly available in  
13 communities concerned about advanced affordable services. As a  
14 result, state action is needed to support investment in,  
15 stimulate the adoption of, and remove potential barriers to the  
16 development and availability of world-class and universally  
17 accessible broadband networks in Hawaii.

HB310 CD2 HMS 2007-4284



1       Offering affordable Internet access services statewide is  
2 an essential element of a long-term strategy to invest in the  
3 State's workers, residents, and most importantly, the future of  
4 Hawaii's children.

5       The purpose of this Act is to establish a Hawaii broadband  
6 task force to:

- 7       (1) Remove barriers to broadband access, including gaining  
8 wider access to public rights-of-way;  
9       (2) Identify opportunities for increased broadband  
10 deployment and adoption, including very high speed  
11 broadband services; and  
12       (3) Enable the creation and deployment of new advanced  
13 communication technologies in Hawaii.

14       SECTION 2. (a) There is established the Hawaii broadband  
15 task force. The task force shall be comprised of the following:

- 16       (1) Three members of the senate, appointed by the  
17 president of the senate;  
18       (2) Three members of the house of representatives,  
19 appointed by the speaker of the house of  
20 representatives;  
21       (3) Four representatives of federal, state, and county  
22 government entities having a role in infrastructure





1 deployment; management of public rights-of-way,  
2 regulation, and franchising; information technology;  
3 and economic development; and

4 (4) Five representatives of Hawaii's private sector  
5 technology, telecommunications, and investment  
6 industries, including the incumbent local exchange  
7 carrier;

8 provided that the members in paragraphs (3) and (4) shall be  
9 appointed jointly by the president of the senate and the speaker  
10 of the house of representatives.

11 (b) The members of the task force shall select the  
12 chairperson of the task force and shall be reimbursed for  
13 reasonable expenses, including travel expenses, necessary for  
14 the performance of their duties.

15 (c) The task force shall:

16 (1) Identify actions that will produce increased  
17 investment in and the availability of advanced  
18 broadband capabilities at more affordable costs by  
19 using new approaches to broadband deployment,  
20 including through increased access to public rights-  
21 of-way and shared fiber infrastructure;



- 1       (2) Identify administrative actions that will promote  
2       broadband access and usage within the state;
- 3       (3) Make specific recommendations on how Hawaii can  
4       leverage federal, state, and international  
5       opportunities for and eliminate any related barriers  
6       to broadband access and adoption;
- 7       (4) Focus special attention on how broadband can be used  
8       to substantially benefit educational institutions,  
9       healthcare institutions, community-based  
10      organizations, and governmental institutions;
- 11      (5) Consult with public and private stakeholders to  
12      coordinate statewide efforts to obtain and maximize  
13      loan funding available for broadband deployment and  
14      development projects in the state;
- 15      (6) Consult with private sector stakeholders to leverage  
16      opportunities to increase investments in state-of-the-  
17      art technologies, and new approaches to advancing  
18      capabilities at reduced costs;
- 19      (7) Identify best practices to establish a database that  
20      identifies current and prospective projects for  
21      deploying broadband;



(8) Encourage all state and county agencies to lead by example by obtaining the necessary equipment for broadband usage and have full access to broadband service; and

(9) Encourage all state and county agencies to study the feasibility of and utilize various services that broadband provides such as streaming video technologies to broadcast public meetings over the Internet, videoconferencing, wireless Internet access in state and county facilities that are most used by the public, and the deployment of voice over Internet protocol (VoIP).

(d) The office of the auditor shall provide the research and organizational support services necessary to assist the task force in achieving its purpose as required under this Act.

(e) The task force shall submit a report of its initial findings and recommendations regarding improved broadband capabilities and services to the legislature no later than twenty days prior to the convening of the regular session of 2008.

(f) The task force shall submit a final plan for the development of improved broadband capabilities and services,



1 including any proposed legislation, no later than twenty days  
2 prior to the convening of the regular session of 2009.

3 (g) The Hawaii broadband task force shall cease to exist  
4 after June 30, 2009.

5 SECTION 3. There is appropriated out of the general  
6 revenues of the State of Hawaii the sum of \$50,000 or so much  
7 thereof as may be necessary for fiscal year 2007-2008 for the  
8 purpose of supporting the work of the Hawaii broadband task  
9 force established in section 2.

10 The sum appropriated shall be expended by the office of the  
11 auditor for the purposes of this Act.

12 SECTION 4. This Act shall take effect on July 1, 2007.

