

Burlington's Gigabit Opportunity

*Foreword by Blair Levin
Author of the National Broadband Plan*

Foreword

By Blair Levin

In his sweeping work “Electrifying America,” historian David Nye leads us through the last century’s spread of electricity in the United States—how it permeated and redefined every aspect of American society. Electrification created the modern city, led to an industrial expansion and is responsible for the way we live and work today. We enjoy access to inexpensive food and goods because of rural electrification and the electrified assembly line. We experience “nightlife” because of the attraction of the great American streets lit up in electrical experiments and praise our “energetic” entrepreneurs because electricity taught us to value speed and dynamism.

And so it is in our time with broadband. In our not so distant past, American communities had to learn how to benefit from new modes of power or transportation—from water and steam to electricity and combustion engines. Now, owing to revolutions in computing power, storage capacity, and bandwidth, we are creating an economy learning how to benefit from bandwidth. We are transitioning to an economy that is asset-light; we’ve exchanged atoms for bits, bandwidth and chips. And we are moving quickly; 40% of U.S. GDP is produced by companies that didn’t exist 30 years ago.

Access to abundant electricity transformed this country by making innovation technically possible. But, Nye reminds us that “[a] technology is not merely a system of machines with certain functions; it is part of a social world.” We need to start thinking of our world—and our communities’ opportunities for growth—in terms of data as a fundamental input. Unfortunately, our data transfer rates—broadband speeds—have not kept up with processing power, or other parts of the world. The majority of the cities with the world’s fastest connections are in Asia, and we should not count on other countries waiting to play catch-up.

To continue to lead the world as our country did when it introduced the commercial Internet, we need world-leading connections. In particular, as the National Broadband Plan recommended, we need a critical mass of communities with next generation speeds—gigabit and higher—to be that place where the world learns what happens when lack of bandwidth is not a barrier to innovation.

We can glimpse a range of potential places for innovation just over the horizon:

4K, the next generation of video is emerging and its successor, 8K, is scheduled to arrive in 2020. This ultra-high definition video has wide ranging applications,

“...we need a critical mass of communities with next generation speeds—gigabit and higher—to be that place where the world learns what happens when lack of bandwidth is not a barrier to innovation.”

from in home health care to quality collaboration and training amongst distributed employees. Genetic sequencing, enabled by ultra high data transfer, may ultimately help save cancer patients facing a death sentence. Educators envision how immersive gaming can increase the effectiveness of education and job training. Entrepreneurs and business owners visualize the dawning era of Big Data that will revolutionize all manner of collaboration, from the most advanced science to small business services.

But, as an undergraduate student at the University of Maine said at the announcement of a gigabit network for Orono, Maine, “what is most exciting is what we don’t know yet.”

Who will be the Lewis & Clark of this journey? We also don’t know that yet. But what we do know is that that journey is likely to occur in those communities that take it upon themselves to make sure their citizens’ creativity is not subject to bandwidth constraints. We already see it happening in places like Kansas City and Chattanooga. We hope to see it soon in those Gig.U communities in the process of organizing to catalyze new deployments. And we are similarly excited about communities like Burlington, Vermont taking the initiative—such as through the many ideas discussed in this publication—to create the community of next generation broadband discovery.

Like the journey of Lewis & Clark, it will not be easy. There will be false starts and setbacks. Some will get discouraged and urge us to turn back. But like all great journeys, this one doesn’t come with a map. The point is to make the map. This document is an early version of a map that will point the way for Burlington, and then for many others, as our communities transform themselves once again to take advantage of the world’s most valuable resource—information.

Congratulations on stepping up to lead the way.

Blair Levin was the Executive Director of the team that wrote the National Broadband Plan and currently is the Executive Director of Gig.U, a consortium of three-dozen research university communities working together to support educational and economic development by accelerating the deployment of next generation networks.

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Preface

This document is authored as part of BTV Gig (<http://btvgig.org/>), an initiative to leverage gigabit Internet speeds for the benefit of the community of Burlington, Vermont. A special thanks is due to the Kansas City Mayors' Bistate Innovations Team, creators of the Google Fiber Playbook (<http://marc.org/assets/GoogleFiberPlaybook.pdf>), for the inspiration to create this document. The development of this document is intended to be a collaborative effort among members of the community. All are welcome to contribute to this document. This work (excluding Blair Levin's foreword and the BTV Gig logo) is licensed under the Creative Commons Attribution 3.0 Unported license (<http://creativecommons.org/licenses/by/3.0/>). This license allows other communities to use, share, and remix this document for their own purposes.

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The Opportunity

“To stay on top, Vermont must follow the steps of our predecessors, who refused to be led by history, but instead had the courage and imagination to shape it. If we stand by, if we fail to innovate, and if we refuse to change, we will slip behind.”

“We stand on the shoulders of leaders who, at defining times, chose to be bold. As we continue our slow recovery from a devastating recession and a devastating storm, I believe Vermont is again poised to lead.”

Governor Peter Shumlin¹

The community of Burlington, Vermont has a unique opportunity with the availability of gigabit-per-second symmetric Internet speeds through its municipally-owned fiber-to-the-home network (Burlington Telecom)². Only a handful of communities across the United States have access to this caliber of super-fast connectivity. Gigabit is over 100 times as fast as both the average national broadband speed³ and Vermont’s statewide average broadband speed⁴. As the country’s telecommunications infrastructure is expanded and Internet speeds increase, the window will close on our opportunity to leverage this resource for the full benefit of our community.

Gigabit represents an opportunity for our community to lead on issues of global, national, and local importance. Seizing this opportunity will require the leadership of individuals and organizations within the public, private, and non-profit sectors of our community. The plan presented in this document is designed to be implemented by the community, for the community.

The National Broadband Plan identifies the following issues as priorities⁵:

- Economic Opportunity
- Education
- Health Care
- Energy and the Environment
- Government Performance
- Civic Engagement
- Public Safety

1. Shumlin, Governor Peter. “Second Inaugural Address.” <http://governor.vermont.gov/blog-gov-shumlin-second-inaugural-address-state-of-the-state-january-10-2013>, Jan. 2013.

2. Dampier, Phillip. “Beleaguered Burlington Telecom Making a Comeback with 1Gbps Broadband: \$149/Month,” *Stop the Cap!* <http://stopthecap.com/2012/11/05/beleaguered-burlington-telecom-making-a-comeback-with-1gbps-broadband-149month/>, Nov. 2012.

3. Higginbotham, Stacey. “State of the Internet: The broadband future is faster, but still unevenly distributed,” *GigaOM*. <http://gigaom.com/2013/01/22/state-of-the-internet-the-broadband-future-is-faster-but-still-unevenly-distributed/>, Jan. 2013.

4. “Gov. Shumlin, Karen Marshall Outline Progress Expanding Broadband Access in Vermont,” *Office of the Governor*. <http://governor.vermont.gov/Gov-Shumlin-Karen-Marshall-outline-progress-expanding-broadband-access-in-Vermont>, Dec. 2012.

5. “The National Broadband Plan” *Federal Communications Commission*. <http://www.broadband.gov/plan/>, Mar. 2010.

Gigabit represents an opportunity for Burlington to lead on these issues and others that are important to our community such as digital inclusion, network neutrality, free speech, participatory media, and cultural enrichment.

Just as the Internet has affected every aspect of our society, so will super-fast broadband connectivity. Gigabit is our community's opportunity to participate in creating and shaping the future. For example:

- Healthcare organizations could use gigabit for telemedicine applications.
- Game developers could create new experiences only possible with super-fast broadband.
- Cultural institutions could use gigabit to provide wider access to their works.
- Startups could use Burlington as a test bed for discovering how consumers will use the Internet in the future.
- Government agencies could use gigabit to create new opportunities for citizen engagement.
- Community media organizations could use gigabit to facilitate a further shift towards participatory media.
- Colleges and universities could use gigabit to provide broader access to educational opportunities.
- Filmmakers and videographers could use gigabit for cloud-based video editing, reducing production costs.

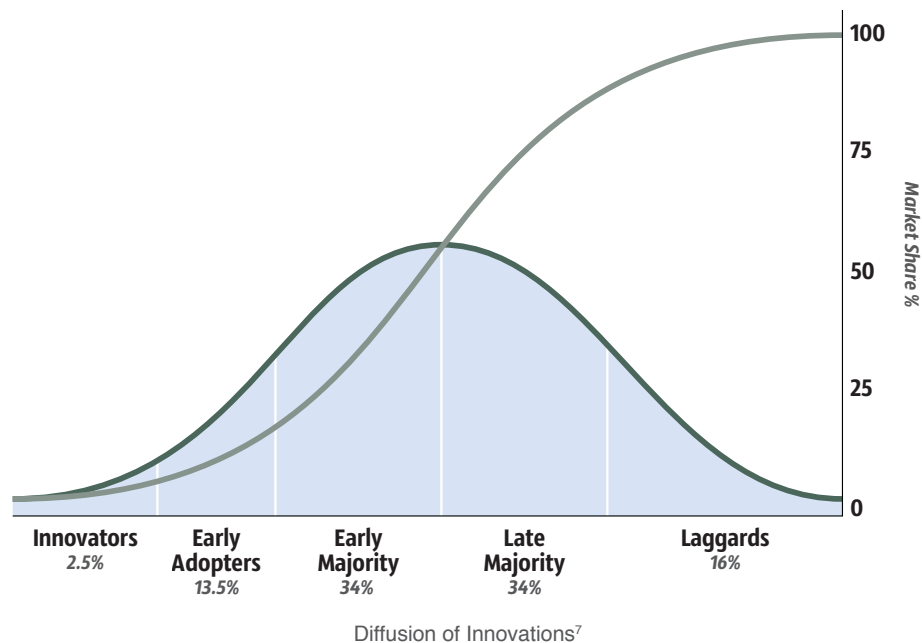
Developing a Culture of Innovation

VISION

“American economic history teaches a clear lesson about infrastructure. If we build it, innovation will come. The U.S. needs a critical mass of gigabit communities nationwide so that innovators can develop next-generation applications and services that will drive economic growth and global competitiveness.”

FCC Chairman Julius Genachowski⁶

Gigabit is an opportunity to develop a thriving culture of innovation across a diverse range of constituents within Burlington. Gigabit is currently in the *innovators* phase of the technology adoption lifecycle, a theory described by Everett Rogers in his 1962 book *Diffusion of Innovations*. The theory describes how knowledge and use of a new technology diffuses through successive groups until finally reaching the saturation level. By attracting and cultivating *innovators*, Burlington can be an incubator for the discovery and refinement of new applications of gigabit technology.



6. “FCC Chairman Genachowski Issues Gigabit City Challenge,” *Federal Communications Commission*. <http://www.fcc.gov/document/fcc-chairman-genachowski-issues-gigabit-city-challenge>, Jan. 2013.

7. Based on Rogers, E. (1962) *Diffusion of innovations*. Free Press, London, NY, USA. http://commons.wikimedia.org/wiki/File:Diffusion_of_ideas.svg

Technology diffusion starts with the *innovators* (2.5%) who love technology and will use the new technology even if its practical applications are very limited or even non-existent. Use of the technology by *innovators* allows for discovery of the first practical uses of the new technology, leading to the *early adopters* (13.5%) phase. However, the first practical applications are typically only useful to specific niches. Use of the technology by *early adopters* allows for further discovery and refining of its applications, opening the door to mainstream usage represented by the *early majority* (34%) phase. When the technology becomes commonplace and standard, it reaches the *late majority* phase (34%). At some point, the *laggards* (16%) have no choice but to use the technology.

Assuming a saturation level equal to the entire broadband market (85,630,000 fixed/wired subscribers in December of 2011⁸), gigabit is currently used by far fewer than 2.5% of this market (fewer than 1,000 subscribers globally in March of 2012⁹). This puts gigabit well within the *innovators* phase of the technology adoption lifecycle.

Of course, failed technology diffusions are possible. Will all broadband subscribers eventually have access to and upgrade to gigabit service, whether as *innovators*, *early adopters*, *early majority*, *late majority*, or *laggards*? In 1998, Nielsen's Law of Internet bandwidth correctly predicted that, similar to Moore's Law of processing power, bandwidth for high-end home users would grow by 50% every year¹⁰. If this trend continues, gigabit will be available to high-end home users (arguably *early adopters* in the technology adoption lifecycle) by 2018.

It's worth noting that there are arguably those whose interests are aligned with a failed or delayed diffusion of gigabit technology. Gigabit is a potentially disruptive technology to the media industry. Netflix's streaming video service accounts for one-fifth of downstream Internet traffic in the United States during peak times¹¹. Bandwidth-intensive technologies, such as streaming video, represent a threat to the established media industry. A merger between Comcast and NBCUniversal was finalized in 2011¹², giving the country's largest Internet service provider¹³ ownership of one of the largest global media conglomerates. This merger leaves the monopoly with little incentive or competitive pressure to offer faster Internet speeds¹⁴.

8. "Total fixed and wireless broadband subscriptions by country (December 2011)," *Organisation for Economic Co-operation and Development*. <http://www.oecd.org/dataoecd/22/15/39574806.xls>, Dec. 2011.

9. Savage, Joe. "Residential Gigabit Subscribers: Services, Applications and Attitudes," *Fiber To The Home Council Americas*. <http://www.ftthcouncil.org/d/do/2>, Mar. 2012, p. 5.

10. Nielsen, Jakob. "Nielsen's Law of Internet Bandwidth," *Jakob Nielsen's Alertbox*. <http://www.nngroup.com/articles/niensens-law-of-internet-bandwidth/>, Apr. 1998.

11. Reisinger, Don. "Netflix grabs 20 percent of peak time U.S. traffic," *CNET News*. http://news.cnet.com/8301-13506_3-20020434-17.html, Oct. 2010.

12. Arango, Tim & Stelter, Brian. "Comcast Receives Approval for NBC Universal Merger," *NYTimes.com*. <http://www.nytimes.com/2011/01/19/business/media/19comcast.html>, Jan. 2011.

13. "ISP Usage and Market Share," *StatOwl.com*. http://www.statowl.com/network_isp_market_share.php.

14. Crawford, Susan. "Merger Made Comcast Strong, U.S. Web Users Weak," *Bloomberg*. <http://www.bloomberg.com/news/2012-12-25/merger-made-comcast-strong-u-s-web-users-weak.html>, Dec. 2012.

VALUES

While this is a nascent initiative, many values can be inferred from discussions had by its early participants (at the Gigabit Salon and Gigabit Tweetup) and the values of Vermonters in general as documented by the Council on the Future of Vermont's "Imagining Vermont: Values and Vision for the Future" report.

Vermonters:

- "point to innovation as the cornerstone of future prosperity and the way to attract youth and retain young Vermonters"¹⁵
- "express fears that divisions will grow in Vermont as the rich get richer and the poor get poorer and people of different groups live in less connected circles"¹⁶
- "fiercely defend and celebrate the freedom of the individual"¹⁷
- believe that "both Vermont's identity and ability to innovate rely on active artistic expression and presentation"¹⁸
- "engage in participatory government."¹⁹

This gigabit opportunity is connected to principles held dearly by members of our community. Network neutrality, digital inclusion, free speech, participatory media, and civic engagement are relevant values that can be inferred from the discussions had to date and the values of Vermonters in general. The following assertions can arguably be made based on these values:

- A free and open Internet that allows equal access to all participants is the only way to foster innovation and ensure free speech rights online.
- We must actively work to ensure that all people are included in the digital society of the 21st century.
- Everyone has the right to communicate his or her opinions and ideas, including in digital mediums, free of censorship.
- Media created by individuals (many-to-many) is just as important as media created by broadcasters (one-to-many).
- Civic engagement is fundamental to a functioning democracy.

MISSION

The community of Burlington must take this opportunity to leverage symmetric gigabit Internet connectivity for the largest possible public benefit. Burlington Telecom is the only infrastructure that exists into the foreseeable future that can

15. "Imagining Vermont: Values and Vision for the Future," *Council on the Future of Vermont*. http://vtrural.org/sites/default/files/library/files/futureofvermont/documents/Imagining_Vermont_FULL_Report1.pdf, 2009, p. 76.

16. "Imagining Vermont: Values and Vision for the Future," *Council on the Future of Vermont*. http://vtrural.org/sites/default/files/library/files/futureofvermont/documents/Imagining_Vermont_FULL_Report1.pdf, 2009, p. 42.

17. "Imagining Vermont: Values and Vision for the Future," *Council on the Future of Vermont*. http://vtrural.org/sites/default/files/library/files/futureofvermont/documents/Imagining_Vermont_FULL_Report1.pdf, 2009, p. 38.

18. "Imagining Vermont: Values and Vision for the Future," *Council on the Future of Vermont*. http://vtrural.org/sites/default/files/library/files/futureofvermont/documents/Imagining_Vermont_FULL_Report1.pdf, 2009, p. 21.

19. "Imagining Vermont: Values and Vision for the Future," *Council on the Future of Vermont*. http://vtrural.org/sites/default/files/library/files/futureofvermont/documents/Imagining_Vermont_FULL_Report1.pdf, 2009, p. 41.

provide this level of connectivity to our community. Given the reality of Burlington Telecom's financial situation, it is critical that the community take full advantage of this resource or else face losing it and all of the potential public benefits of gigabit.

While economic development is the most obvious form of public good that can come out of utilizing gigabit connectivity, all forms of public benefit must be explored. Cultural enrichment, educational advancement, and civic engagement (to name a few) are just as important to our community as economic development. The entire community must work together to discover, leverage, and promote the public benefits of gigabit connectivity.

Why Burlington Telecom?

Implementation of gigabit technology within our community by other Internet service providers is welcome. However, this is unlikely to happen anytime soon. The infrastructure deployed in our community by existing telephone and cable providers cannot currently support gigabit Internet speeds. On the other hand, the infrastructure deployed by Burlington Telecom can provide gigabit Internet speeds today and even faster Internet speeds in the future.

Burlington Telecom's fiber-to-the-home network was designed to serve our community and neighboring ones decades into the future. Its network operations center can support 100,000 subscribers²⁰, enough capacity to serve every home and business in Chittenden County²¹. The network could be upgraded to handle symmetric speeds of 10 gigabits per second—with technology commercially available today—using the fiber-optic cables already on utility poles²². Based on technology experimentally verified but not yet commercially available, the network could be upgraded to handle symmetric speeds of 1 terabit per second (1,000 gigabits per second) to every subscriber²³. This means that, if Nielsen's Law of Internet bandwidth holds true, Burlington Telecom's fiber plant can continue to handle leading-edge bandwidth speeds for at least the next 30 years.

It should also be noted that the price for gigabit from Burlington Telecom is relatively affordable at \$150/month for residential service. This is more expensive than Google Fiber's \$70/month in Kansas City, but half the price of EPB's \$300/month in Chattanooga. While Burlington Telecom has not yet announced gigabit pricing for businesses, all signs point to it being much more affordable than the

20. "Stratum Report to Blue Ribbon Committee (public version)," *Stratum Broadband*. [http://www.burlingtonvt.gov/Mayor/DMS-Documents/BT---DMS-Documents/Stratum-Report-to-Blue-Ribbon-Committee-\(public-version\)/](http://www.burlingtonvt.gov/Mayor/DMS-Documents/BT---DMS-Documents/Stratum-Report-to-Blue-Ribbon-Committee-(public-version)/), Feb. 2010, p. 13.

21. "Chittenden County QuickFacts," *U.S. Census Bureau*. <http://quickfacts.census.gov/qfd/states/50/50007.html>, Dec. 2012.

22. Le Maistre, Ray. "BBWF 2010: Huawei's 10G GPON Coup," *Light Reading*. <http://www.lightreading.com/video/240116714>, Oct. 2010.

23. Cvijetic, N. "Terabit Optical Access Networks Based on WDM-OFDMA-PON," *IEEE Xplore*. <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6062625>, Feb. 2012.

\$8,000/month estimated for a gigabit circuit based on the market rate for lower speed circuits offered by other carriers²⁴.

STRATEGY

Like the architecture of the Internet itself, this initiative is intended to be implemented in a distributed fashion. No single organization or person is responsible for the implementation of this strategy. This document intentionally excludes the details of how the tactics to follow will or could be implemented, leaving these details to those who choose to participate. Your participation is necessary for the implementation of the ideas outlined in this document. If you have a suggestion to improve this strategy, see “ways to contribute” at the beginning of this document.

The ultimate goal of this strategy is for our community to benefit from gigabit technology. This will require a diverse range of individuals and organizations working towards discovering innovative uses of gigabit right here in Burlington. These discoveries will come from research and development efforts in the public, private, and non-profit sectors of our community, as well as use of gigabit by individuals.

Without the fiber-to-the-home infrastructure of Burlington Telecom, none of this would be possible. Explaining the value of this network is imperative as organizations and individuals will not participate in these efforts if they do not understand its value to our community. It’s critical that as many people as possible within our community have access to, and knowledge of, the benefits this network can provide. Outreach and education can help ensure that everyone sees the potential opportunities that this network and gigabit present to our community.

“It’s very cool what you and your community are trying to do in Burlington. I’m jealous in fact and I live in San Francisco! You’d think we’d be on the cutting edge but cable is the best I can get in my apartment.”

Will Barkis, Ph.D. of Mozilla Ignite (<https://mozillaignite.org/>)

24. Mitchell, Christopher. “Learning from Burlington Telecom: Some Lessons for Community Networks,” *Institute for Local Self-Reliance*. <http://www.muninetworks.org/sites/www.muninetworks.org/files/bl-lessons-learned.pdf>, Aug. 2011, p. 8.

Tactics

The following tactics are organized around three areas of focus: outreach, innovation, and digital inclusion. Outreach tactics are designed to sustain and advance the BTV Gig initiative itself. Innovation tactics are those intended to foster a culture of innovation. Digital inclusion tactics are dedicated to ensuring that all within our community can benefit from the technological advancements represented by gigabit. These tactics ultimately lead towards Burlington being an incubator for gigabit technology, opening the door for the real benefits of gigabit.

Implementation of most of these tactics do not require anyone's permission, including the authors of this document. In fact, you are encouraged to take any of these ideas and run with them. If you would like help finding collaborators for any of these tactics, or others, you are welcome to send an email to info@btvgig.org.

OUTREACH

A group of individuals and organizations organized around a set of principles, ideals, and goals is a prerequisite to any effective action being taken on leveraging gigabit for the benefit of our community. Through ongoing discussions, education, and outreach a group can coalesce able to take action and advance the strategy outlined in this document. The aim is to create a robust coalition through a process of consensus decision-making.

Anchor Events

Goal: Attract and inspire participants

Events such as the Gigabit Salon and the Gigabit Tweetup have served to start and continue the conversation on how our community can benefit from gigabit Internet speeds. Anchor events such as these should continue to be held to bring new people into the conversation. Event ideas include:

- Gigabit Breakfasts
- Gigabit Salons
- Gigabit Tweetups
- Gigabit Hackfests

Potential Collaborators:

- Office Squared
- Vermont Community Access Media (VCAM)
- Regional Educational Technology Network (RETN)
- CCTV Center for Media & Democracy
- Champlain College
- HackVT

- ECHO
- Institute for Local Self-Reliance
- Free Press (media reform organization)
- US Ignite
- Mozilla Ignite
- Gig.U

Gigabit Education

Goal: Cultivate a group of well-informed citizens

“An educated citizenry is a vital requisite for our survival as a free people.”

Thomas Jefferson (attributed)

Education around gigabit technology and related issues is necessary for our community to realize the full public benefit of this infrastructure. The technology and policy around gigabit Internet technology can be complex. A core group of well-educated gigabit ambassadors can help to ensure a productive dialogue.

Educational ideas include:

- A Gigabit Reading Club
- Virtual Seminars by and for Gigabit Communities

Potential Collaborators:

- Phoenix Books
- Fletcher Free Library
- Vermont Technology Alliance
- ECHO
- Gigabit City Summit

Constituency Groups

Goal: Community members collaboratively exploring uses of gigabit technology within their respective fields of practice or interest

Applications of gigabit technology will likely vary across different constituency groups. A facilitator should gather groups of constituents based around communities of practice²⁵ and communities of interest²⁶. These groups can discuss possible applications of gigabit technology within their practices or interests. Some example communities include:

- Educators (K-12)
- Technologists

25. “Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.” Wenger, Etienne. “Communities of practice.” <http://www.ewenger.com/theory/index.htm>, June 2006.

26. “A community of interest is a gathering of people assembled around a topic of common interest. Its members take part in the community to exchange information, to obtain answers to personal questions or problems, to improve their understanding of a subject, to share common passions or to play.” Henri, F. & Pudelko, B.. “Understanding and analysing activity and learning in virtual communities.” <http://hal.archives-ouvertes.fr/docs/00/19/02/67/PDF/Henri-France-2003.pdf>, 2003, p. 478.

- Entrepreneurs
- College Students & Educators
- Community Media
- Public Media
- Healthcare Providers
- Gamers
- Software Developers
- Photographers
- Videographers
- Filmmakers

Case Studies

Goal: Educate small businesses, government agencies, and non-profits on the benefits of gigabit

Although gigabit is a very new technology, there are some tangible benefits to adopting gigabit today. Case studies, or more informal stories, could help spark the imagination of entrepreneurially-spirited individuals. Some practical uses of gigabit (or high-bandwidth) broadband speeds today include:

- Cloud Backup
- Telepresence
- File Transfer
- Cloud-based Video Editing

Potential Collaborators:

- Burlington Business Association
- Lake Champlain Regional Chamber of Commerce

Neighboring Communities

Goal: Create demand for gigabit service in neighboring communities

As noted earlier, Burlington Telecom’s network operations center has enough capacity to serve every home and business in Chittenden County. When Google Fiber’s gigabit network plans were announced, over 600 communities submitted a request for information and more than 190,000 individuals responses were generated²⁷. This demonstrates a desire for faster Internet speeds and a willingness for people to organize in order to bring gigabit Internet speeds to their communities.

If people can rally to bring a private company to their city, then why not organize to remove the financial and regulatory barriers to bringing Burlington Telecom’s gigabit service to their communities? The Stratum Report to the Blue Ribbon

27. Bosker, Bianca. “Over 600 Cities Vie For Google Fiber Network,” *HuffPost Tech*. http://www.huffingtonpost.com/2010/03/26/google-fiber-network-comp_n_515356.html, May 2010.

Committee identified the following surrounding communities as candidates for the expansion of Burlington Telecom’s service area:

- South Burlington
- Essex
- Winooski
- Colchester

An expansion into South Burlington, as an example, would require an \$8.1 million upgrade to Burlington Telecom’s fiber plant²⁸.

Conversations

Goal: Diffuse knowledge and use of gigabit technology through one-on-one conversations

Likely if you are reading this document then you have a good sense of how gigabit technology can benefit our community. A simple thing that you can do is to have a one-on-one conversation with someone you know who is not yet aware of gigabit technology and its availability here in Burlington. Explain to him or her how gigabit represents a unique opportunity for our community.

INNOVATION

Being one of a handful of communities with gigabit, the statistical likelihood is high that innovative uses of gigabit technology will be discovered here. However, this will not happen unless we actively work to develop a culture of innovation around gigabit technology. Burlington has the opportunity to become a center of innovation across the public, private, and non-profit sectors. Public sector innovations can transform how citizens engage with government. Private sector innovations can result in local economic growth. Non-profit sector innovations can enrich the common good.

Gigabit Stories

Goal: *Innovators* and *early adopters* learning from one another how they can benefit from gigabit

Gigabit technology is still very new. How are organizations and individuals benefiting from the availability of high-bandwidth? Stories of high-bandwidth uses should be cataloged and made available to others who want to look for potential uses of gigabit technology. These stories should be documented and made available in a variety of mediums.

Potential Collaborators:

- Vermont Community Access Media (VCAM)
- Regional Educational Technology Network (RETN)

28. “Stratum Report to Blue Ribbon Committee (public version),” *Stratum Broadband*. [http://www.burlingtonvt.gov/Mayor/DMS-Documents/BT---DMS-Documents/Stratum-Report-to-Blue-Ribbon-Committee-\(public-version\)](http://www.burlingtonvt.gov/Mayor/DMS-Documents/BT---DMS-Documents/Stratum-Report-to-Blue-Ribbon-Committee-(public-version)), Feb. 2010, p. 13.

- CCTV Center for Media & Democracy
- Vermont Technology Alliance

Gigabit Incubators

Goal: Increase the likelihood that new and innovative uses of gigabit technology are discovered and refined within our community

Gigabit incubators are spaces where *innovators* and *early adopters* can discover and explore uses of gigabit technology. These could be physical spaces, such as existing incubators, coffee shops, or co-working spaces. These could also be conceptual spaces. For example, a gigabit incubator service plan could be made available to researchers and startups at a reduced cost. While there is a cost to this, it is a small cost relative to the potential economic benefits.

Potential Collaborators:

- Office Squared
- Burlington Spaces
- Vermont Center for Emerging Technologies
- FreshTracks Capital
- Burlington Telecom
- Office of the Creative Economy
- Vermont Technology Alliance
- Burlington Business Association
- Lake Champlain Regional Chamber of Commerce

Telemedicine

Goal: Discover and refine innovative uses of telemedicine provided over a gigabit network

Fletcher Allen Health Care already has a telemedicine program in place. New health insurance regulations make it easier for healthcare professionals to practice telemedicine²⁹. Gigabit provides the bandwidth necessary for pretty much any telemedicine applications conceivable today.

Potential Collaborators:

- Fletcher Allen Health Care

Live Streaming

Goal: Demonstrate one possible use of symmetric gigabit Internet connectivity at community venues

Live streaming of events such as concerts can provide an opportunity to demonstrate uses of gigabit Internet technology. Symmetric gigabit provides enough bandwidth for a broadcast quality full HD video stream.

29. Associated Press. "Doctor Tele-consults Boosted By New Regulations," *VPR News*. http://www.vpr.net/news_detail/96989/doctor-tele-consults-boosted-by-new-regulations/, Jan. 2013.

Potential Collaborators:

- Big Heavy World
- Vermont Community Access Media (VCAM)
- Regional Educational Technology Network (RETN)
- CCTV Center for Media & Democracy
- Flynn Center for the Performing Arts
- Office of the Creative Economy

Anchor Institutions

Goal: Ensure that every anchor institution in our community has gigabit broadband speeds

One of the goals of the National Broadband Plan is to ensure that every community has access to gigabit broadband speeds at anchor institutions such as schools, libraries, healthcare facilities, and government buildings. From the plan:

“This connectivity can unleash innovation that improves the way we learn, stay healthy and interact with government.”³⁰

A list of anchor institutions in our community should be identified. If these anchor institutions do not already have gigabit, we should work to remove the barriers to bringing gigabit to these locations. We should then position our community ahead of the national broadband plan and target 10 gigabit broadband speeds for these anchor institutions.

Potential Collaborators:

- Burlington Telecom
- Burlington School District
- Burlington College
- Champlain College
- University of Vermont
- Saint Michael’s College
- Community College of Vermont
- Fletcher Free Library
- Fletcher Allen Health Care
- City of Burlington
- State of Vermont
- Vermont Community Access Media (VCAM)
- Regional Educational Technology Network (RETN)
- CCTV Center for Media & Democracy
- Big Heavy World
- Flynn Center for the Performing Arts
- ECHO

30. “National Broadband Plan - Chapter 2: Goals for a High-Performance America,” *Federal Communications Commission*. <http://www.broadband.gov/plan/2-goals-for-a-high-performance-america/>, Mar. 2010.

FCC Gigabit City Challenge

Goal: Participate in the FCC's Gigabit City Challenge by being an innovation hub with ultra-fast Internet speeds

FCC Chairman Julius Genachowski says that the United States needs more gigabit communities:

"To maintain U.S. leadership in innovation, we need to keep pushing for faster broadband networks, and we need a critical mass of innovation hubs that offer homes and businesses access to gigabit broadband. This would bring supercomputing power to Internet users, and would drive inventions we can only barely anticipate.

"We've already begun to see the promise of gigabit connectivity to drive innovation and investment in a handful of forward-looking U.S. communities."³¹

The FCC Chairman called for at least one gigabit community in all 50 states by 2015. He issued a "Gigabit City Challenge" at the U.S. Conference of Mayors Winter Meeting in January of 2013. In attendance at this conference was Mayor Miro Weinberger (according to his public appearance schedule for January 12-18, 2013). The FCC will hold workshops on gigabit communities convening leaders from the gigabit community ecosystem.

Potential Collaborators:

- FCC
- Mayor Miro Weinberger
- Burlington City Council
- Burlington Telecom

Code for America Brigade

Goal: "Deploy, maintain, and sustain civic technology and open data infrastructure"³²

The "Code for America Brigade is an organizing force for local civic engagement – a national network of 'civic hackers' who contribute their skills toward using the web as a platform for local government and community service." Establishment of a local brigade requires the commitment of a brigade captain. Brigade captains are asked to develop a year-long strategic plan focused one or more of the Code for America Brigade's core activities:

- Open Data
- Civic Software
- Open Government

Brigade captains are responsible for rallying local participants, sharing stories of local activities, and recruiting new members.

31. Genachowski, Julius. "Faster, Sooner: Why The U.S. Needs 'Gigabit Communities,'" *Forbes*. <http://www.forbes.com/sites/ciocentral/2013/01/18/faster-sooner-why-the-u-s-needs-gigabit-communities/>, Jan. 2013.

32. "About the Brigades," *The Code for America Brigade*. <http://brigade.codeforamerica.org/pages/about>.

Recruiting Employees

Goal: Recruit and retain employees for local organizations

Burlington is already a desirable place to live and work. For competitive and difficult-to-staff positions, such as software developers, the availability of a world-class fiber-to-the-home network and gigabit Internet speeds can be one factor that tips the scales in favor of moving to Burlington. Local employers should be aware of the availability of gigabit in Burlington and use it as a tool to attract and retain the best talent.

Potential Collaborators:

- Community & Economic Development Office
- Office of the Creative Economy
- Vermont Technology Alliance
- Burlington Business Association
- Lake Champlain Regional Chamber of Commerce

Recruiting Telecommuters

Goal: Recruit and retain telecommuters

Telecommuters often have the choice to live almost anywhere. However, a stable and fast Internet connection is an absolute requirement. The availability of gigabit makes Burlington an attractive place for these bandwidth-hungry Internet users.

Potential Collaborators:

- Community & Economic Development Office
- Office of the Creative Economy
- Vermont Technology Alliance
- Office Squared
- Burlington Business Association
- Lake Champlain Regional Chamber of Commerce

US Ignite Partnership

Goal: Have our community participate in the development of the next generation of the Internet

US Ignite is a nonprofit with a mission to foster “the creation of next-generation Internet applications that provide transformative public benefit.” US Ignite is focused on six areas of national priority, which are:

- Education & Workforce
- Energy
- Health
- Public Safety
- Transportation
- Advanced Manufacturing

US Ignite’s five year goal is to create an ecosystem with 60 next-generation applications, 200 community test beds, and a forum for collaboration. With gigabit technology, our community has an opportunity to generate some of these next-generation applications, provide one or more test beds, and participate in the US Ignite forum.

Potential Collaborators:

- US Ignite
- Burlington Telecom
- Community & Economic Development Office

Mozilla Ignite Challenge

Goal: Have our community participate in the development of innovative uses of gigabit technology

In partnership with US Ignite and the National Science Foundation, the goal of the Mozilla Ignite challenge is to “imagine and build apps that show the full potential of next-generation networks, in areas that matter – like healthcare, education, energy, manufacturing and public safety.” The Mozilla Ignite challenge is accepting app proposals and offering \$485,000 in prizes and support for participating teams.

Potential Collaborators:

- Mozilla Ignite
- Community & Economic Development Office

Gig.U University Community Next Generation Innovation Project

Goal: Have the University of Vermont and the surrounding community collaboratively explore applications of gigabit technology

The mission of Gig.U is to “accelerate the deployment of world-leading, next generation networks in the United States in a way that provides an opportunity to lead in the next generation of ultra high speed network services and applications.” The goal of Gig.U is to connect America’s research universities and surrounding communities to next generation networks. A partnership opportunity between Gig.U, the University of Vermont (a research university), and Burlington Telecom should be explored.

Potential Collaborators:

- Gig.U
- University of Vermont
- Vermont Center for Emerging Technologies
- Community & Economic Development Office

DIGITAL INCLUSION

Digital inclusion is social inclusion for the digital age, a proactive effort to mitigate the causes of social exclusion. While digital inclusion efforts are beneficial to those excluded from our increasingly digital society, our entire community benefits

from these efforts. Innovations often come from outsiders and newcomers³³. In this regard, digital inclusion can be thought of as a catalyst of innovation.

Reduced Cost Internet Access

Goal: Ensure that all within our community have access to information and communication technologies

Burlington Telecom already provides reduced cost high-speed Internet service to eligible families through its Edu-Net program at a price of either \$9.99 or \$19.99 per month. Our community should explore options to expand or augment this program. Expansion of this program could involve providing access to even more people or reducing the cost even further. Funding for expansion of this program will most likely have to come from the community.

Potential Collaborators:

- Burlington Telecom
- Vermont Community Foundation

Digital Literacy Programs

Goal: Ensure that all within the community are educated on the use of information and communication technologies

As some in our community gain access to super-fast gigabit Internet connectivity, digital literacy programs will be becoming increasingly critical to minimizing the digital divide. Digital literacy programs will require the development of:

- A Local Digital Literacy Corps
- Digital Literacy Teachers
- Instructor-Led Digital Literacy Classes
- Self-Directed Digital Literacy Training

Potential Collaborators:

- Fletcher Free Library
- Vermont Community Access Media (VCAM)
- Regional Educational Technology Network (RETN)
- CCTV Center for Media & Democracy
- Digital Literacy Corps

Reduced Cost Hardware

Goal: Ensure that all within our community have access to information and communication technologies

An Internet connection is useless without a computer and other hardware such as a router or Wi-Fi access point. Burlington Telecom has an existing partnership with ReSOURCE to provide affordable refurbished computers to those who

33. Millar, Erin. "How outsiders solve problems that stump experts," *The Globe and Mail*. <http://www.theglobeandmail.com/report-on-business/economy/growth/how-outsiders-solve-problems-that-stump-experts/article4104220/>, Jun. 2012.

qualify for Burlington Telecom's Edu-Net program. Our community should explore opportunities to provide the needed hardware to more people. Funding for this will most likely have to come from the community.

Potential Collaborators:

- Burlington Telecom
- ReSOURCE
- Vermont Community Foundation

Wi-Fi Access Points in Underserved Areas

Goal: Increase access to, and knowledge of the usefulness of, information and communication technologies

Underserved areas should be identified and targeted for deployment of Wi-Fi access points. Underserved areas are those that either don't have access to, or lack knowledge of the usefulness of, information and communication technologies. Wi-Fi technology cannot keep pace with the speeds and overall throughput of fiber-to-the-home. However, Wi-Fi access points can be a stopgap to a widening digital divide with the introduction of super-fast gigabit Internet connectivity.

Potential Collaborators:

- Burlington Telecom
- Laboratory B
- Burlington Housing Authority
- Vermont Community Foundation

Conclusion

Programmer and venture capitalist Paul Graham says that the best way to discover successful startup ideas is to “live in the future and build what seems interesting.”³⁴ This same advice can be applied to innovating in the public, private, and non-profit sectors. Communities like ours that have the infrastructure necessary for gigabit will be the incubators for the development of the next generation of the Internet. There is no doubt that gigabit Internet is the future; it’s just a matter of when this future will arrive. The only question remaining is, will our community seize this opportunity to be a part of creating the future?

34. Graham, Paul. “How to Get Startup Ideas.” <http://paulgraham.com/startupideas.html>, Nov. 2012.



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