10 Myths and Realities of Broadband Internet

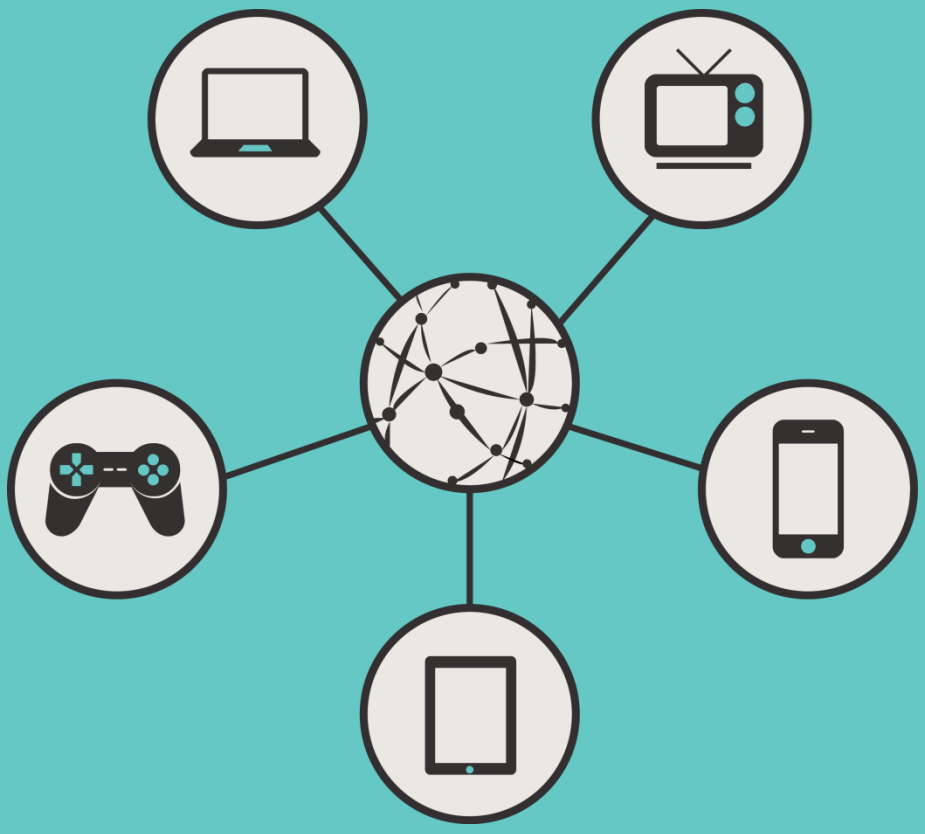

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Table of contents

Introduction

In spite of growing internet penetration, internet investment, and increasing digitization of the American economy, it is interesting that there has been a rise in books and articles claiming that America is falling behind in broadband. These negative assessments defy the data and the everyday experience of the thousands of Americans with whom we interact on a weekly basis. How can a country that is leading the world in the internet be falling behind in the internet?

Having the advantage of perspective we observe that the "America falling behind" mantra is trotted out at least once a decade along with a litany of books and articles. There is a business in peddling bad news, the proverbial *crise du jour*.

More specifically this kind of naysayer-ism that sells books and magazines is a genre called "airport economics", referring to a type of business literature frequently sold at airports. Books such as *Trading Places - How We Are Giving Our Future to Japan and How to Reclaim It* (1993) are designed be read in the length of a cross-country flight. When you take off in New York, the world is coming to an end, but by the time you land in Los Angeles, all will be righted if the author's recommendations are implemented.

When America went through a recession in the 1980s, Japan was vilified for exporting too many high quality electronics and automobiles to the US. *Japan Inc.* was the evil zaibatsu writ large, and when the Mitsubishi Group bought Rockefeller Center, it was a considered game over for the USA. None of these books predicted that the Japanese bubble would burst and the subsequent 25 year recession.

The next wave of America falling behind literature was typified by Tom Friedman's *The World is Flat*. India and China are eating our lunch, we were told. Friedman talked about the 10 flatteners including offshoring and outsourcing. But nearly 10 years since this book was published, the reality is that the US is still leading in software innovation and internet enabled companies.

Then there were a succession of warnings about emerging countries, the Asian Tigers, the BRICs, the Next 11, CIVETS and so on.

Now that we have run out of nations in the "America is falling behind" literature, naysayers turn to issues. Cardozo Law School professor Susan Crawford is the current leader, and she has been joined by journalists David Cay Johnston, David Carr, John Judis and Eduardo Porter, among others. In publications such as the *New York Times*, *New Republic*, *Wired*, *Bloomberg News*, and *Huffington Post* and dozens of other publications, it has become fashionable to write that American broadband internet is unavailable, slow, and expensive and that telecom companies are holding back the future—even though the data shows otherwise. It certainly sells newspapers and books.

After some months, the *New York Times* finally published two op-eds[1] which offered a counter view to the "America is falling behind" mantra.

Academics and authors need to develop a raison d'être for their research. There is fierce competition in academic world for funding, and teachers with bestselling books are assured resources for their institutes, research assistants, and so on. Thus there is a pressure to make an a blockbuster. Having a controversial position which lends itself to headlines and storytelling builds an academic's visibility and brand. Best-selling professors are part of universities' star power, winning them favor with funders, students, and the media.

We have reviewed the various books and articles claiming that America is falling behind in broadband and distilled their messages into 10 myths. For each myth, we provide the relevant data, an explanation as to why the myth persists, an analysis of the myth from different perspectives, and a conclusion about the reality in spite of the myth.

We also provide an international angle. Many of the critics say that broadband is better in other countries, so we have investigated some of these countries and provide studies where we test the assertion that America is falling behind. We hope that this report enlightens readers and encourages them to investigate the issues further.

[1] http://www.nytimes.com/2013/06/16/opinion/sunday/no-country-for-slow-broadband.html?_r=1& and http://www.nytimes.com/2013/06/21/opinion/how-the-us-got-broadband-right.html

Ten Myths and Realities of Broadband Internet in USA

Myth	Reality
America is falling behind in broadband.	The data shows that America is picking up in broadband. Plus America is leading in the world in LTE, the high speed mobile standard.
Carriers are gouging consumers and enriching themselves with the profits.	Consumers can get broadband internet packages at all budget levels. Financial returns of American carriers are in line with the rest of the world. Globally the telecom industry faces declining profitability, return on capital, and annual revenue per user (ARPU).
There is no competition for broadband internet.	Americans enjoy robust competition between different types of network carriers.
Carriers are holding back the future	Carriers are in a race for the future.
Faster broadband is inherently better.	It's not the speed that matters; it's in the way that you use it.
Americans want internet access but can't get it.	Almost every American who wants broadband can get it. The barriers of price and usability are falling all the time.
Americans are missing out on applications because high speeds are not available.	The speeds and capacity of broadband are adequate for the applications available.
People in rural areas should pay the same for broadband as people in cities.	The price of broadband varies with the economics of deployment, but satellite broadband is available to nearly all Americans for the same price.
The government should invest in internet infrastructure.	The government should invest in digital literacy.
Broadband itself is the key to economic growth.	Broadband is one of many important factors for economic growth.

1. America is falling behind in broadband

Myth

The USA, once the world's leader in broadband internet networks, lags behind in broadband speed as other countries, namely South Korea, Japan, Sweden and Denmark which do a better job to deploy high speed networks.

Where this myth comes from

This charge has been mentioned intermittently in the media in the last few years. It was the fact that America ranked #22 in Akamai's measurement in 2009. Since then, the U.S. has risen to #8 in that study and is rising faster than its competitors. The book *Captive Audience: The Telecom Industry and Monopoly Power in the New Gilded Age* by Cardozo Law School professor Susan Crawford uses the 2009 figure, and that old number is frequently repeated in the media.

Other quoted data comes from the Organization for Economic Cooperation and Development (OECD). While it offers the most comprehensive data set on different aspects of broadband, some measures maybe four or five years old.

Some explanations on why the myth persists in spite of data

Journalists misunderstand the data or quote outdated statistics. There are many studies of broadband speeds, deployment, adoption and investment. Some are published every two years. Each study has a different methodology and may focus on different variables: subscriptions, speeds, prices, bundles and so on. Also, country comparisons are not necessarily meaningful. Not all countries are created equally. Thus differences in geography, population, market structure, population density, education, income, taxation and so on can drive one country to perform well on one measure but poorly on another. Holding other variables constant, a study measuring broadband per capita vs. household subscription will have different outcomes. At any one time, it is possible to cherry pick the data to prove that America is doing well or poorly. The point, however, is too look at the trend in reliable data over time.

Facts

As for the leading studies of broadband, America ranks...

- #6 in in the percentage of users with performance faster than 10 Mbps (OECD).
- #7th in "High Speed Broadband Adoption" (the proportion of IP addresses with an Average Connection Speed greater than 10 Mbps), a tie with Sweden (OECD).
- #7 in increase in broadband penetration (OECD).
- #8 in fastest internet broadband speeds, and America is moving faster than 9 of the top 10 nations (Akamai).
- Broadband connections of at least 6 Mbps increased by 24% and connections of at least 10 Mbps increased by 26% (FCC).

- The average network capacity of all broadband connections in the United States was 31.5 Mbps in the fourth quarter of 2012 (Akamai)-
- ISPs continue to closely meet or exceed the speeds they advertise (FCC).
- 1 million new broadband subscriptions were added in the first quarter of this year in the USA (Leitchman Research)

But many will not be satisfied with these results. They want to America to be #1 regardless of the circumstances. In that case they should measure the speeds of some US cities. New York, Washington, and San Francisco have *faster* broadband speeds than the current fastest countries South Korea, Japan, and Denmark.

Data

- The Akamai State of the Internet Q4 2012 measures actual internet speeds and reports them every quarter. Akamai, the world's leading content delivery network (CDN), collects over 1 billion unique IP addresses per day. This report is differs from the OECD which compiles comparisons based upon government surveys, not live traffic data. Bear in mind that Akamai measures actual speeds, not possible speeds. The possible speeds could be higher. A subscriber may have the option to purchase 50 Mbps but only choses 10 Mbps. It works like a speed meter on a highway. The meter measures the actual speed of the car at the time, but the car could travel much faster at a different point but not be captured by the meter. Using only Akamai to judge speeds can lead to the wrong conclusions, as it does not capture the possible speeds that pass a household. http://www.akamai.com/stateoftheinternet/

- The OECD Broadband Portal offers a wealth of information on countries around the world and is the most comprehensive, albeit imperfect, data set. The OECD gathers its information by sending a survey to the national government of each country. Depending on the measure, the data may come from different years, but many kinds of data are collected and help to create a holistic picture for each country. http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm#Coverage

- The FCC provides a series of reports on broadband and updates them frequently. See the International Broadband Data Report (IBDA) from August 2012. This report is compiled by FCC staffers who collect the broadband data published on national websites around the world http://www.fcc.gov/document/international-broadband-data-report. Measuring Broadband in American from February 2013 gives valuable insight to different kinds of competition and providers in the USA. http://www.fcc.gov/measuring-broadband-america/2012/july

- Network equipment providers such as Cisco Systems Inc. and cohorts Alcatel-Lucent, Ericsson and others are in a position to collect valuable data because they provide the network equipment across which data travels.

- The Information Technology & Innovation Forum (ITIF) provides an excellent report "The Whole Picture: America's Broadband Networks", deconstructing the leading studies and

helping to put the different variables in perspective. It notes "Of the nations that lead the United States in any of the four key metrics (deployment, adoption, speed and price), no nation leads in more than two".[2]

Analysis

Why are there two opposing views? America can't be both picking up and falling behind in broadband. To a certain extent, any person can cherry pick data to create a particular story. However, it's the trends over time that matter as well as a holistic understanding of the date. Yes, we can find at any one moment or on a particular measure that the US isn't doing so well, but it's the long term trends that matter across the broadband performance (deployment, adoption, speed and price). The data tells a consistent story: the U.S. is doing well and getting better.

Psychologists talk about a phenomenon called "attitude polarization". This is when a person sees data that contradicts his beliefs, he does not revisit his position, but holds to his beliefs even more. If a person has built a brand on telling a particular story, then he will be reluctant to revisit his position.

You can always fall back on your own experience. How is your internet today compared to 10 years ago? How much would it cost for your to get content and communication services if you didn't have broadband? Consider what you spend per month on internet service in context of other expenses. For most people, it's about the same as their daily Starbucks allowance.

Reality

The data shows that America is picking up in broadband. Plus America is the undisputed leader in the deployment and adoption of LTE, the high speed mobile standard.

[2] http://www2.itif.org/2013-whole-picture-america-broadband-networks.pdf

2. Carriers are gouging consumers and enriching themselves with the profits

Myth

Compared to other countries, Americans are paying more for slower speeds. Carriers are using the profits to enrich their shareholders, not to improve their services or to invest in infrastructure.

Where this myth come from

Americans recall the antitrust action against AT&T where it was shown that the company had overcharged consumers and blocked competitors. For 10 years, AT&T had to report to the courts about their activities. AT&T's market power is sufficiently tamed by competitors today, and this blog explains why.

Possible explanations why this myth persists

People may confuse revenue with profit. There is no doubt that large telcos such as AT&T earn a lot of cash. With millions of customers and businesses as subscribers, they earned $127 billion in 2012. However, they also have operating costs of more than $114 billion, as well as the cost of rolling out an LTE network across the USA.[3] Things add up when you are running an operation of fixed line and wireless service and employing 241,000 people. They ended 2012 with an unaudited profit margin of 5.7%[4], hardly a profit margin that would be considered a "gouging of customers".

It is easy to use the internet to check list prices for broadband internet in other countries, but without proper adjustment, these numbers do not make a fair "apples-to-apples" comparison.

Many don't know how to check for other providers in their location. The National Broadband Map at broadbandmap.gov is a handy tool to find competing providers as well by entering "broadband" plus one's zip code as a search query. Satellite broadband with at least 15 Mbps is also available to nearly all Americans.

Being on the internet, people are habituated to things being "free". For example, free calling on Skype and free searches on Google. People deduce that internet connections should be free, without understanding that these services require investment in real equipment and infrastructure. Moreover the so called free services on the internet may entail tradeoffs in privacy.

Facts

- Americans pay more for mobile service than Europeans (an average of $69 in the USA versus $39 in Europe), but they use five times as many voice minutes and twice as much data. (GSM Study)
- Entry-level pricing for American broadband is the second lowest in the OECD, behind Israel. (OECD, Berkmann)
- American cable companies had 82% more additions in Q1 of 2013 than in 2012, nearly 800,000 new subscriptions in total (Leichtman Research).

[3] http://www.att.com/Investor/ATT_Annual/2012/downloads/att_ar_2012_financials.pdf
[4] http://www.att.com/gen/landing-pages?pid=5718

- American DSL companies had 99% more additions between the same two periods, some 315,000 new subscriptions. (Leichtman Research)

Analysis

The telecom industry has been on a seven year decline globally for returns on invested capital (ROIC) and average revenue per user (ARPU). Financial analysts ascribe this to increased competition and deregulation. ”Operators have to invest in their networks or they'll disappear -- competition is too cut-throat not to," notes Stéphane Téral, principal analyst for mobile infrastructure at Infonetics Research.

Comparing prices for telecommunications services across countries is a slippery slope. The market price of two different countries may not reflect the same inputs. The price can vary for many reasons including the network type, the network speed, the type of subscriber (individual, business, company etc), whether the item is sold in bundle, whether the subscriber has a certain exemption, taxes, and other factors. Economists and financial analysts who study prices have to build dynamic models to reflect these factors. It is a quite a different matter than simply checking the internet for a carrier in another country and making a meaningful comparison.

While many may mention low prices in Japan and South Korea, the reality is that consumers there actually pay for their broadband three times: once with their taxes (broadband networks are subsidized), once through their rent (landlords required to pay for upgrades), and once on their broadband bill. Compared to the US which is mainly a private carrier-funded market, Americans only have to pay once, and they pay what it costs.[5] So Americans who don't want to connect to the internet, don't have to pay for it at all.

Consider it another way. There is nothing wrong with paying more for something that is faster and better. Cars cost more today than they did 10 years ago, but we don't complain about the increased cost. We pay more because we get more: design, speed, safety and so on.

As cursory comparison on cable prices between America and Europe shows that Americans typically get more channels and content than their European counterparts.[6] Plus many European countries impose taxes as high as 25% on telecom and cable services. Don't forget that television in Europe was largely public until twenty years ago. There was one station, the public TV channel, and that was paid for through taxes.

As for mobile prices in the last ten years, we have had nothing less than a **6 million fold improvement** in mobile broadband prices. In 2003 a mobile broadband data plan cost $1.75/MB. It took 150 hours (about a week) and $1200 to download a CD of music. Today we can get 5 GB of mobile broadband on a 4G with speeds of 20 Mbps or higher. To stimulate adoption of new LTE networks, providers offer LTE at the same price as 3G; consumers are therefore getting tomorrow's technology at today's prices. Read the recent study by GSM, the global trade association for the mobile industry. They are worried that Europe is lagging behind the US.

[5] This video offers and overview of the statistics on broadband. Watch ITIF Senior Policy Fellow Richard Bennett describe how the numbers stack up. http://www.itif.org/media/whole-picture-where-americas-broadband-networks-really-stand#video

[6] http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2258747

The bottom line is that American broadband scales with usage. Americans who want an entry level internet connection can only get it cheaper in only 2 countries. Thereafter, if they want faster speeds, they pay for it. That is only fair. This means that for as little as $20, people can be assured bandwidth to do essential email and web browsing for job applications, online banking, and so forth. Having access to real time entertainment is not a human right, and it is not fair that other network users should subsidize bandwidth so others can watch movies and share pirated content.

As for high speed broadband which customers spend upwards of $100 per month or more, those prices are not out of line with a daily Starbucks beverage. What is the value of all the content and applications, as well as the ability to communicate via voice, email, and other ways? Certainly as much as a latte.

As for carriers that take risks in investing in new technologies, it is also fair that they should receive a return on their investment. Shareholders won't invest in a company otherwise. The telecom industry invests upwards of 13% of sales back into their infrastructure, significantly higher than other equipment industries. In some years, American carriers have invested even more.

At the end of the day, people would not buy subscriptions if they felt that broadband packages were too highly priced and/or not worthwhile. The fact of the matter is that the number of new broadband subscriptions is increasing year over year. More people are more getting broadband, not less.

Data

- Read the GSM study on mobile http://www.gsmamobilewirelessperformance.com/

- The OECD broadband portal has the most comprehensive study of prices across the world. http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm#Coverage

- Yochai Benkler of Harvard's Berkman Center made a definitive study of broadband policy globally. He observed that American entry level prices for broadband are some of the lowest. See page 59. http://transition.fcc.gov/stage/pdf/Berkman_Center_Broadband_Study_13Oct09.pdf

- Merrill Lynch Bank of America has a department dedicated to the analysis of the global telecommunications industry. They collect all the available public information on the telecom industry and collate it into a massive database. Their position is that the long term profitability of telecommunications is declining on account of competition, regulation, and regulatory uncertainty.

- Valueline makes a survey of return on capital (ROC) of 120 industries and 25,000 firms globally. In 201 it listed the global telecommunication industry with an ROIC of 12.65%. Computer software (e.g. companies such as Microsoft) had the highest ROC of 43%; internet companies are 21.54%, and entertainment technology, 19.51% Telecom services fall in the

lower bottom half of all global industries, 13.66% in ROC, placing it just above the publishing industry. http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/roe.html

- The Leitchman Research Group publishes quarterly data on broadband subscriptions. http://www.leichtmanresearch.com/press/052113release.html

Reality

Consumers can get broadband internet packages at all budget levels. Financial returns of American carriers are in line with the rest of the world. Globally the telecom industry faces downward trends of profitability, return on capital, and annual revenue per user (ARPU).

3. There is no competition for broadband internet service

Myth

Americans are held captive by just two wire line broadband providers and just two wireless broadband providers.

Where this myth comes from

Susan Crawford uses this literary trope in her book to create an archetypal dichotomy. It is a literary invention that makes for a good story but is not grounded in the facts.

Possible Explanations

In common discourse people like to talk about monopoly and duopoly to make a dramatic effect or to emphasize a pre-existing belief. It's a shorthand, but an incorrect one. The reality is that the broadband market is more complex.

Facts

The OECD ranks the USA #3 in the world for competition between carriers of different types of technology. Americans can access broadband in many ways: cable, DSL, fiber, mobile, and satellite. Plus broadband providers also face competition from communication technologies on top of their networks.

Analysis

The fact from the OECD demonstrates that innovation creates competition better than regulators. A network can expire just like a gallon of milk. Providers have to upgrade their network, or they lose customers.

Competition between different types of networks drives companies to upgrade. The DOCSIS innovation, a format that allows more data to travel faster, made cable companies broadband providers. That development forced the traditional broadband providers, the DSL companies, to upgrade their networks so they didn't lose customers. Not only do DSL companies offer TV over copper, they are teeing up the next innovation, vectored DSL, a technology that is cheaper and maybe even faster than fiber. All wire line players face competition from wireless providers. New mobile technologies get people online who would have never subscribed to broadband over DSL or cable.

Here is a way to think about it. If you want to go from New York to Los Angeles, you have a few options: you can take a car, bus, train, or plane. This is called intramodal competition, or competition between types of technologies. If you choose flying, you have a number of airlines to choose from. The broadband market has this similarity with the transportation market.

Competition also affects the broadband market in the form of applications, specifically a class called "over the top" or OTT. Consider Skype, a novel application that succeeded in nothing less than forcing the price for long distance to plummet around the world. Carriers used to make much of their revenue from long distance, but

no more. Skype competes for consumers for communication services by using the very carriers' wires with whom its competing.

On demand video is another innovation that consumers love. OTT video providers include Netflix, Hulu and Amazon. Netflix takes up one-third of all downstream wire line traffic in the US today. It is pushing the cable industry to improve its offering. Cable companies now offer videos for rent as well as different kinds of content and programming to compete with Netflix. Like Skype, Netflix competes with the cable company on the cable company's own wires, as it were.

WhatsApp and Facebook are other OTT applications. Instead of buying an SMS package from a carrier, people use these free applications. The revenue carriers used to earn from SMS is all but disappearing because of free message services that are frequently more cool and fun than traditional SMS. With Facebook, you already have your address book on the platform. There's no need to enter phone numbers.

To be sure, there are important issues about how to divide the spectrum. Historically regulators wanted to maximize the revenue for the government. Companies such as Sprint, MetroPCS, and Clearwire paid so much for licenses that they had no money left to run their businesses. On top of that, they made strategic mistakes in choosing the wrong technologies (CDMA, WiMAX etc). Susan Crawford points out that people are leaving the upstarts to go to the incumbents. But should we should hardly blame the incumbents for their competitors' missteps. It is not the role of regulators to compensate for companies that can't run their businesses well.

In any case, it's not the number of competitors that matters; it's the level of technology. The difficulty for many consumers is not in suffering under a monopoly, but rather making sense of new innovations and providers. They feel overwhelmed by too many choices. That itself has become a business opportunity solved by clever device companies.

Part of Apple's success was making beautiful, simple products that people could understand. Once the iPhone appeared, people finally grasped the meaning of a smartphone. With the iPad, people who never got online before, now send emails and share pictures. Compared to the early days of dial-up, the internet experience today is cool and fun, and getting online is as simple and intuitive as buying a cup of coffee.

Data

The National Broadband Map maintained by the FCC and the National Telecommunications and and Information Administration (NTIA.) www.broadband.gov. In many communities, consumers have three or more choices for broadband access for the same network type.

Reality

Americans enjoy robust competition between different types of carriers.

4. Carriers are holding back the future

Myth

Carriers don't want to invest in new technologies or in expanding their network. They simply want to "harvest" returns from existing customers and infrastructure installed decades ago.

Where this myth comes from

New York Times journalist David Carr interviewed Susan Crawford in an article titled "Telecom's Big Players Hold Back the Future".

Facts

- North American carriers make up one quarter of the world's internet infrastructure investment (Infonetics).
- America leads the world in the adoption of 4G/LTE mobile broadband (FCC).
- American carriers made the largest fiber buy in 2011, some 18 million miles of fiber optic cable. In the last few years American firms bought more fiber optic cable than all of Europe combined.[7]

Analysis

Cable companies used to offer only pay TV. The innovation called DOCSIS (data over cable service interface specification) allowed cable TV providers to turn themselves into broadband players. In addition to TV, they offer broadband internet and voice/telephone services. They could not compete if they didn't upgrade their network. Furthermore the DSL provider now has to offer you TV to stay competitive with the cable company.

"We're seeing a telecom capex hike as operators around the world ramp their spending like crazy to launch LTE networks, modernize their mobile networks, and carry out national wire line broadband initiatives," notes Stéphane Téral, principal analyst for infrastructure at Infonetics Research.

In addition to network upgrades, carriers race to the future by ensuring that consumers adopt the new technology. Carriers create incentives to get consumers to upgrade to new technologies. These incentives include

1. Free and reduced priced equipment, such as set top boxes, as part of cable packages
2. Free and reduced price handsets. The iPhone would have never become the success it is if carriers offered the phone at full price.
3. Free content delivery to content providers. The business models of websites on the internet are predicated on free delivery of their content to end users. Having to pay for content delivery would cripple Google and Netflix.

[7] CRU International Ltd, *CRU Monitor: Optical Fibre and Fibre Optic Cable* (London, September 2012), http://www.crugroup.com.

Data

"Service Provider Capex, Revenue, and Capex by Equipment Type Biannual Worldwide and Regional Market Size and Forecasts: 1st Edition". Infonetics Research, 2012.

Reality

American carriers are in a race to for the future by upgrading their networks and incentivizing consumers.

5. Faster broadband speed is inherently better

Myth

America is suffering because it's not number #1 on Akamai's State of the Internet report.

Possible Explanations

American society is obsessed with numbers. People have a fetish with ranking and focus on quantity at the expense of quality.

Facts

- The U.S. ranks #8 in fastest broadband speeds and is moving faster than 9 of the top 10 nations (Akamai).
- Some cities and states in the US have faster speeds than the fastest countries.

Analysis

Remember that Akamai measures actual speeds, not possible speeds. Many Americans could subscribe to 100 Mbps today but choose not to. They are likely served by their current package.

The biggest problem with focusing on speeds is that it provides an artificial feeling of scarcity.[8] Many countries could all have the same speed, but it would not necessarily strengthen or diminish their economic position.

Economist Hal Singer, author of the new book *The Need for Speed: A New Framework for Telecommunications Policy for the 21st Century*[9], aptly observes that complaints about broadband speed is like quibbling over the top marathoner who clocks in at 4.43 minutes versus a steady runner who can hold a 6 minute mile.[10]

If speeds were all that matter, then the internet should be dominated South Korea, Japan and Hong Kong. Why didn't Google, Facebook, and Amazon come from these countries? Alternatively, why hasn't the world taken up their version of these platforms? Why is #4 fastest Latvia not an economic powerhouse? It may have fast broadband speed, a showcase fiber investment from Telia, but that hasn't transformed the economy.

To be sure, the country with the fastest broadband speeds has bragging rights. A broadband target of 100 Mbps or greater is politically expedient, but not necessarily meaningful. It's not the speed that matters; it's in the way that you use it.

In South Korea with a speed of 45 Mbps, the primary uses of broadband are by far entertainment for consumers and video conferencing for businesses. The problem with these two applications is that they drive little revenue versus the traffic they consume on the web. Much of real time entertainment is piracy, and the money in games is largely in the hardware. As for online gaming, less than 5% of players pay for games. Video

[8] http://www2.itif.org/2013-whole-picture-america-broadband-networks.pdf
[9] http://www.amazon.com/The-Need-Speed-Telecommunications-ebook/dp/B00B7M4NXK
[10] http://www.forbes.com/sites/halsinger/2013/02/26/is-the-u-s-losing-the-broadband-race-as-it-turns-out-we-look-a-lot-like-danica-patrick/

conferencing was thought to be a great revenue opportunity, but it is another bandwidth intensive service that can largely be enabled for free. So these two endeavors don't generate the cash flow that create jobs.

Broadband has enabled some industrial productivity and supports a marginal "Gangam Style" entertainment economy in South Korea. It is estimated that performer Psy made about $8 million from his famous song, including the 1.6 billion YouTube views, the iTunes sales and so on.[11] Few performers will achieve that level of success. Indeed his But is not a replicable business model, let alone a business case for broadband.

Make no mistake: the real money in South Korea's economy still comes from electronics, automobiles, shipbuilding, semiconductors, steel, and chemicals — the same growth engines from the pre-broadband days. Ditto for Japan and Sweden.

In South Korea the national broadband project has not yielded the jobs that were expected. Broadband has enabled entertainment but not employment. A new report by the Korea Information Society Development Institute, "A Study on the Impact of New ICT Service and Technology on Employment," bemoans the situation of "jobless growth." The government is also concerned about internet addiction, which afflicts some 10 percent of the country's children aged between 10 and 19, who essentially function only for online gaming but not in other areas of society.

What people should care about is how broadband makes an economy and its workforce more productive. The USA, even without having the fastest broadband speeds, has been able to create global internet companies. Plus the networks were built by private investment, so taxpayers were not on the hook. That could be called broadband bang for the buck. This has a lot to do with everyday Americans having broadband access and producing and consuming a range of goods and services via broadband.

In her recent remarks at the AllThingsD conference, Mary Meeker of Kleiner Perkins Calufield Byers reviewed the world's top internet companies. The US has the most, 14 of the top 25; China, 3; Japan, 2; South Korea, 2; Russia, 2; and the UK and Argentina, each have 1.[12] The point is that the USA, with just a fraction of the world's internet users, has been able to leverage broadband into over $1 trillion of market value in 2013 with just 14 companies. This does not take into account all of the small and medium sized companies that would have never existed without broadband.

Indeed broadband speed in itself does not a strong economy make. It's broadband efficiently delivered and effectively applied. Eric Clapton had it right: It's in the way that you use it.

Data

- Akamai State of the Internet Report http://www.akamai.com/stateoftheinternet/

[11] http://prezi.com/yd_nufg9y0nw/software-is-eating-the-world/?utm_source=website&utm_medium=prezi_landing_related_solr&utm_campaign=prezi_landing_related_author
[12] http://www.kpcb.com/insights/2013-internet-trends

- OECD Internet Economy Outlook, 2012. http://www.keepeek.com/oecd/media/science-and-technology/oecd-internet-economy-outlook-2012_9789264086463-en

Reality

It's not the broadband speed that matters; it's in the way that you use it.

6. People want internet access but can't get it

Myth

More than one-third of Americans lack internet access because the price is either too high or the service is not available where they live.

Where this Myth comes from

Susan Crawford makes this charge in her book, but she misreads a report from the National Telecommunications and Information Administration (NTIA), an agency of the Department of Commerce. The report cites people not being interested in broadband as the #1 reason why they don't subscribe, not price or availability.

Facts

Read the following facts in the FCC Internet Access Service Report of June 30, 2012
http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0520/DOC-321076A1.pdf

1. The total the number of broadband connections has increased to 100 million. Between June 2011 and June 2012, broadband connections increased by 54% and the percentage of fixed connection speeds qualifying as broadband increased to 64%.
2. Consumers are continuing to migrate to faster broadband speed tiers.
3. Satellite broadband is available today to 99% of Americans. This service continues to improve.

Read the report that Susan Crawford references in her book http://www.ntia.doc.gov/report/2011/exploring-digital-nation-computer-and-internet-use-home

Analysis

To build her case for the "more than one-third of Americans without internet access", Crawford cites the report from the U.S. Department of Commerce, "Exploring the Digital Nation: Computer and Internet Use at Home", a survey based on some 55,000 households, which is to be representative of America. Crawford fails to point out that the number one reason why one third of Americans don't have internet is not because they can't afford it, but because *they don't want it* (47%). The issues of affordability (24%) and an inadequate computer (15 %) affect fewer Americans.

The largest group of people who don't have internet access claim that the internet has no value for them, not because they can't afford it or because it is not accessible. Crawford exaggerates the number of people who claim that they can't afford or access broadband internet.

With the rise of inexpensive smartphones and tablets, we can see that the remaining unconnected Americans will have a better chance to get internet access. The report was published in 2010, and today, more than half of all Americans have a smartphone.

There remains a subset of Americans who lack basic English and literacy skills, and they will likely never subscribe to broadband until they can read English, or Spanish for that matter. So there is still work to be done to teach English. It is the first step in digital literacy.

In developed countries, some 10-15% of the adult population does not get online. Similarly to the US, there are people who are just not interested in the internet. They may like to do other things with their time: enjoy the outdoors, work with their hands, or spend time with family and friends offline. It may be that they may shun computers. Perhaps they feel alienated by technology. However, with mobile devices, people who have never been online, get online.

Reality

Almost every American who wants broadband can get it. The barriers of price and usability are falling all the time.

7. Americans are missing out on applications because high speeds are not available

Myth

We need 100 Mbps broadband internet to access new and important applications.

Where this myth comes from

This myth rest on a number of assumptions that are not necessarily true.

- Next generation applications can't function on current broadband speeds
- New applications can only be designed to be bandwidth-hogs
- New applications require fast wire line networks
- There is network congestion which can only be alleviated by more network build out and faster speeds.

Facts

- A high definition film (900 MB) is almost 1 million times as "dense" as an email (10 kb).
- Real time entertainment is the overwhelming driver of internet traffic in the world today. This is essentially film, TV shows and videos online. Netflix (32.25%) and YouTube (17.11%) account for half of all downstream traffic on fixed line networks in North America. BitTorrent, a file sharing application for accessing movies and music, accounts for another 5.57%. Ordinary web browsing is just 11.11%. For mobile networks in the US, real time entertainment accounts for 43% of all traffic.[13]
- Video conferencing applications such as Skype comprise relatively small portion of the internet. For an ordinary video call Skype recommends 500 kbps, with up to 1.5 Mbps for high definition. [14]

Analysis

Let us look more closely at two examples of broadband applications, online video and telemedicine. Netflix is the single largest source of traffic in the USA today. Telemedicine is a variety of information and communication technologies to provide health care at a distance.

The 2010 U.S, Census reports that there are about 85 million households with internet access in the US.[15] Netflix, with 29 million subscribers, appears in roughly every third American home. Netflix provides performance reports of how well it service runs on different networks, noting that a 2.5 Mbps connection is

[13] http://www.sandvine.com/news/global_broadband_trends.asp
[14] https://support.skype.com/en/faq/FA1417/how-much-bandwidth-does-skype-need
[15] http://www.census.gov/hhes/computer/publications/2010.html

sufficient for high quality experience. Furthermore Netflix is constantly making its service more efficient, and it has developed its own content delivery network to cache and speed content to its users.

As for the leading websites, Google, Facebook, YouTube, Amazon; they want to have as wide exposure as possible, so they are not necessarily trying to make their applications take up more bandwidth. Even YouTube, which takes up a disproportionate share of network traffic, tries all the time to make its platform leaner.

There is no inherent business model in making a high bandwidth consuming application. On the contrary, application providers attempt to make their applications "light" to improve their distribution across a range of networks and speeds. Furthermore there is no application on the horizon that consumes more bandwidth than online video.

The Norwegian Centre for Integrated Care and Telemedicine, the world's leading institute for telemedicine, has studied telemedicine for 25 years. They note that most applications run fine on average broadband levels (for example, video consultation), and even the most advanced app would require no more than 10 Mbps. Indeed the limiting factor for telemedicine is not broadband deployment but rather health care providers who are resistant to change. The other requirements for telemedicine are mobile networks and devices, so investing in wire line network is not necessarily an enabler for telemedicine.

Telemedicine can eliminate trips to the doctor and speed diagnosis. It can also provide some important preventive and life-saving functions, such as heart monitoring for people at risk for heart attacks.

But put telemedicine into perspective of health care spending. In the USA today, more than 60% of medical spending is for chronic disease. Americans would improve health outcomes drastically just by eating better, exercising, and quitting smoking. Here is where behavior trumps technology. We get more bang from our buck from changing our habits than buying more gadgets.

The question we should be asking is not how do we get more bandwidth but rather how well are we using the bandwidth we have today? Is real time entertainment so important to us? Do we keep on consuming music and movies like digital junk food? Perhaps less Netflix and a walk outdoors instead may be the better choice for health.

Here's a perspective from another country. Denmark is a highly digital society with advanced egovernment and financial applications. The Center for Communication, Media and Information Studies in Copenhagen published a report titled "Broadband Bandwidths in a 2020 Perspective". The report notes that in Denmark, one of the perennial top performing countries in the OECD for broadband, 65% of homes are passed by a broadband technology that can deliver 100 Mbps, but only 0.7% subscribe.[16] In any case Danes can get what they need from lesser speeds, and the price of the faster service is not justified from their perspective.

[16] http://www.cmi.aau.dk/News/Show+news//broadband-bandwidths-in-a-2020-perspective.cid87641

Reality

We have more than adequate speed and capacity for the applications available today. Application providers attempt to make their applications “light” to improve their distribution across a range of networks and speeds.

8. People in rural areas should pay the same for broadband as do people in cities

Myth

There should be one price for broadband for everyone.

Where this Myth comes from

It's easy to compare prices in different locations using the internet. People like to think of broadband as a commodity and assume that they should simply have the lowest price without any regard the characteristics of their location. The inputs of a modern telecom infrastructure are complex as are the economics of broadband deployment.[17]

Data

We can understand on a basic level the information from the 2010 US Census showing that about 80% of America lives in an urban area with an average of 2,343 Residents per Square Mile (RPSM). The remaining 20% live in what can be defined as rural with density of 17 residents per square mile. But as a new report from National Telecommunications and Information Administration (NTIA) and the Economics and Statistics Administration (ESA) shows, understanding the market for broadband as simply a question of urban versus rural is an oversimplification.

The report "Broadband Availability Beyond the Rural/Urban Divide"[18] breaks down the country into five classifications: Central Cities (2,754 Residents per Square Mile (RPSM)), Suburbs (1,970 RPSM), Small Towns (1,447 RPSM), Exurbs (37 RPSM), and Very Rural (11 RPSM). The report notes that the driving factor for broadband is proximity to a central city. As such, it can be the case that a person living in the exurbs of a central city could have access to faster speeds than one living a small town. Futhermore the price of high speed broadband in a central city and the exurbs may be very close, if not the same, even though the cost of deployment in the exurbs may be more than in a central city.

The report notes that broadband deployment is improving in the US. Density is by no means destiny for rural locations. This report references an earlier study by the United State Department of Agriculture published a report "Broadband Internet's Value for Rural America" in 2009.

> *Areas with low population size, locations that have experienced persistent population loss and an aging population, or places where population is widely dispersed over demanding terrain generally have difficulty attracting broadband service providers. These characteristics can make the fixed cost of providing broadband access too high, or limit potential demand, thus depressing the profitability of providing service. Clusters of lower service exist in sparsely populated areas, such as the Dakotas,*

[17] **Deployment** is how a network provider builds and delivers infrastructure and services to end users. **Adoption** is how end users consume network services. They may require purchasing of equipment such as computers, laptops, smartphone or tablets, as well as a subscription. This also requires that end users have a minimum level of income, education, literacy and interest to subscribe.

[18] http://www.ntia.doc.gov/blog/2013/breaking-down-urban-rural-broadband-divide

eastern Montana, northern Minnesota, and eastern Oregon. Other low-service areas, such as the Missouri-Iowa border and Appalachia, have aging and declining numbers of residents. Nonetheless, rural areas in some States (such as Nebraska, Kansas, and Vermont) have higher-than-expected broadband service given their population characteristics, suggesting that policy, economic, and social factors can overcome common barriers to broadband expansion.

The report provides further insight into the economics of broadband deployment in rural areas. Naturally the USDA is interested in the agricultural sector staying competitive. "The more multifaceted the farm business, the more the farm used the Internet," notes the report.[19] They also look at other regions which are not farms.

In summary the features of rural broadband deployment include

- Rural areas are less populous than urban areas. There are fewer people to spread the costs of network equipment.
- Rural areas also have fewer businesses and government operations. In practice, these entities subsidize network development for consumers by purchasing larger amounts of network service. Corporate entities may also pay higher rates for certain kinds of network service.
- Rural broadband customers also have higher maintenance costs than urban customers, as the infrastructure is spread over longer distances.

Analysis

There are tradeoffs to living in the city versus a rural area. People in cities generally have a higher cost of housing. Their transportation costs may vary depending on whether they own an automobile, take public transportation or walk/cycle.

Many people chose to live in rural areas because they don't like city life. Many move because the cost of housing is so much cheaper. Rural areas have less build out of internet infrastructure, but also fewer job opportunities, shopping malls, restaurants, cultural attractions, sporting events and other things. In any case, people who move to rural areas certainly save more than enough on housing to pay for any increase in monthly broadband fees.

About 80% of Americans live in urban areas, with the remainder in differing degrees of population density of rural areas. Having one price for broadband means that people in the city subsidize those in rural areas. It is not necessarily right or fair that urban dwellers who face higher housing costs should subsidize those who live in cheaper housing locations but with less favorable conditions for broadband.

However there is one egalitarian solution: satellite broadband. Almost all Americans can access this broadband technology at the same price. A package of 10-15 Mbps download starts at $40-$50/month. There is fee for equipment (for example a $10/month), or the equipment can be bought outright.

[19] http://www.ers.usda.gov/media/155154/err78_1_.pdf

Satellite broadband is more than adequate for web browsing and email, what people need to look for jobs as well as housing. It also works for video streaming. In fact the only real downside is that it gives latency on video games. See the video of how well a 20/6 Mbps satellite broadband connection works in comparison to a fiber network.

Reality

The price of broadband varies with the economics of deployment, but satellite broadband is available to nearly all Americans for the same price.

9. The government should invest in internet infrastructure

Myth

Internet infrastructure is far too important to be left to the private sector. The government should invest in internet infrastructure.

Where this myth comes from

There is an ideological view that certain industries and services should be under government control.

Analysis

Let's say for argument sake that we ensure that every last mile of rural America has high speed broadband. We would still not be assured that everyone will use the internet. Why? Because we can't be assured that people will get online. Deployment and adoption are two different things.

Deployment is how a network provider builds and delivers infrastructure and services to end users. **Adoption** is how end users consume network services. They may require purchasing of equipment such as computers, laptops, smartphone or tablets, as well as a subscription. This also requires that end users have a minimum level of income, education, literacy and interest to subscribe.

Here are 6 reasons we should not support government investment in internet infrastructure and instead allow the private sector to do its job.

1. Public utilities are not a utopia.

There is no reason to believe that government provision of internet infrastructure will be better than what we have today. If we look at the public utilities in the USA, there is plenty of frustration, disappointment, and calls to privatize, if not decentralize, certain resources. The key problem with public goods is that they lend themselves to what Garret Hardin described in his book the *Tragedy of the Commons*. Public resources will be overexploited with open access.

This is not to say that government will always be ineffective, but we cannot be assured that there be innovation by socializing internet infrastructure. Indeed once the ARPANET was up and running, the government was keen to turn it over to industry because it didn't want the responsibility to manage the network.

2. The private sector does a good job.

Carriers invest infrastructure to provide consumers with internet service. They may go to capital markets for financing and they may also use revenues to fund expansion. In the US, carriers invest some $70 billion annually in internet infrastructure. North America accounts for a quarter of the world's internet infrastructure

investment.[20] This is an impressive figure when one considers that America's share of internet users are just a fraction of the total. This means Americans are getting best in class infrastructure.

3. Evidence from other countries shows that the private sector also works.

Even in a country such as Denmark where there is a high tax rate and a heavily funded public sector for health, education and transportation, the internet infrastructure is nearly 100% privately funded[21]. Denmark is known to have high internet speeds, wide deployment, and wide adoption. What is also interesting to note is that 65% of homes are is passed by a speed of 100 Mbps or higher, but only 0.7% subscribe[22]. Telecommunications is clearly not an industry that needs government subsidy, and the low uptake from consumers actually shows that there is an oversupply of broadband.

4. Public investment in infrastructure is an unfair tax on a large portion of the population who don't use the internet.

This is an issue of fairness. Many Americans see no value in the internet and don't subscribe. With nearly two-thirds of internet traffic in the USA going just for real time entertainment[23], it is defendable position to decline public investment of a resource that supports private companies. Some Americans may want to stream Netflix on five televisions, but it is not fair that a grandmother who simply wants to check email should be footing the bill.

5. Governments at all levels are in deficit.

Governments in the US and in other countries have overextended themselves on on financial commitments and responsibilities. People are loath to pay more taxes. Cutting education for children or health care for the poor and elderly to pay for internet infrastructure does not seem like a good idea.

6. Government provision of infrastructure does not address end users' adoption, the important demand-side of the equation.

While government should not be responsible to investment in internet infrastructure, it can be play a important role in education and in job training, ensuring that students and professionals have the skills to be part of the broadband-enabled world. A major study by the U.S. Chamber of Commerce found that many American schools have the requisite level of broadband, but the bottleneck is teachers who are not up to speed on technology.[24] Thus, public funds may be better spent on digital literacy and teacher training than on internet infrastructure.

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[20] "Service Provider Capex, Revenue, and Capex by Equipment Type Biannual Worldwide and Regional Market Size and Forecasts: 1st Edition". Infonetics Research, 2012.
[21] Danish Finance Ministry, 2012.
[22] http://www.cmi.aau.dk/News/Show+news//broadband-bandwidths-in-a-2020-perspective.cid87641
[23] http://www.sandvine.com/news/global_broadband_trends.asp
[24] http://www.uschamber.com/sites/default/files/about/US_Chamber_Paper_on_Broadband_and_Education.pdf

Reality

The government should invest in education and digital literacy.

10. Broadband itself is the key to economic growth

Myth

Broadband internet is like water. Just add it to a community, and the economy will grow.

Where this myth comes from

There is no doubt that there are macroeconomic benefits to broadband. Studies from leading institutions demonstrate the positive outcome of broadband deployment and adoption. Various ratios are offered such as a certain percent of broadband investment yields a set increase in gross domestic product. Desperate politicians have seized these numbers to see how they might tap this magic relationship for their constituencies. However the reality of realizing economic growth at the local level may require several inputs, not just broadband.

Analysis

There is no doubt that information networks have a positive benefit for society. Just look at the transformation created from basic 2G mobile networks in developing countries. A fisherman uses an SMS as a contract with the village grocer. There are no shortage of stories about how mobile networks have improved labor markets and created transparency in food pricing, among other things.

But it's a long way from an African village to a post-industrial city in the United States where the economy is developed and mature. Just adding more broadband internet does not mean we will get more economic growth. With a fiber to the home connection maybe one can stream Netflix on five TVs, but it does not necessarily make one productive or increase income. It may be that we face diminishing marginal utility as we increase broadband speed, given the current state of applications.

Applying the macroeconomic effects to the broadband level is not a copy paste activity. Forthcoming research looks at the impact of broadband internet on employment on 8460 municipalities in West Germany. Over the last five years the German government has invested €454 million (almost $600 million) to bring broadband to the rural areas. Though there is an impact on local employment by local broadband infrastructure, the impact is very slight. An econometric study shows that an increase of DSL penetration by 10% yields between 0.03-0.16% increase in employment. What the research suggests is that broadband alone may not be enough to stimulate employment. Other factors such as level of education, professional skills, existing employment opportunities, types of extant industries and so on may also play a role in employment.

These findings are important to keep in mind when you hear politicians and other critics grandstanding about not enough broadband. In the US more than 80% of homes are passed by a high speed internet technology, but not everyone subscribes. The main reasons are lack of literacy, interest, or a computer. Satellite may be the solution to close the gap.

The question we should be asking ourselves before we authorize the government to spend more on broadband is whether we are making the most of the speeds we have today.

Reality

Broadband is one of many important factors for economic growth.

Conclusion

The broadband debate in America today is dominated by myths. The reality is more complex. A serious discussion requires moving beyond platitudes and tired refrains.

The American broadband market can be split into sic types of network providers: cable, DSL, mobile, satellite, fiber, and Wi-Fi. There is strong technical development on all these platforms and the fierce competition between them. This arms race for technology on networks has not been seen since the days of the Cold War. History shows that people will invest a lot of money to create new technological weapons to make them superior to their competitiors. For this reason America is one of the world's most interesting broadband markets.

Cable networks were to designed to deliver television, but with the DOCSIS innovation, cable can deliver extreme speeds. Cable will continue to be important in America because of the wide buildout, the large existing customer base, and continued innovation on new versions of the DOCSIS standard. Mobile carriers deliver mobility and speed cost effectively. To date mobile broadband has addressed certain segments, but mobile broadband will likely evolve to address bigger segments. Classic DSL providers will not let their copper network rust. The are investing in fiber in huge capacities--to the node, to the curb, and the dwelling. Their future is exciting. Satellite is now a broadband player, and firms are keen to tap the revenue enjoyed by their competitors.

Competition between the technologies and their development is driving down prices and improving bandwidths. All this is happening at a faster rate than consumers demand. We think it sad that those who focus on myths and cherry pick facts ignore the larger complexity. To focus on speed as if its the end all be all, without regard to what can be done with speed, and how well current networks are utilized, is a disservice. In the same way that comparing American labor cost versus Chinese labor cost is an oversimplification, the discussion of broadband speed should be how the American society can use ICT solutions to make itself more efficient and productive and how firms can take advantage of innovation.

In this report we have touched upon addressing the broadband needs of the poor and illiterate. This is an important topic, not just for the USA, but other countries. A full discussion is outside the bounds of this report, but the author investigates it in other reports.

Telecommunication is the foundation of modern society. Carriers today can deliver more bandwith than the consumer demands.