A Detailed Review:
The Status Of U.S. Broadband
and The Impact of Fiber Broadband

Based On New 2022 U.S. Consumer Research And Past

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I. Foreword

2022 has become a pivot year for the advancement of fiber broadband in North America and around the world. The pandemic has created a seismic shift in broadband from being access to entertainment to becoming mission critical for work-from-home, online education, remote healthcare, economic development, and overall quality of life. This year’s U.S. Consumer Research Study highlights the breadth and magnitude of demand and the positive community impact of fiber broadband deployment.

The results of this study can be broken down into five key areas: Digital Equity, Performance, Economic Impact, Sustainability and Quality of Life / Personal Productivity. The following are some key takeaways from the study findings in each of those areas:

Digital Equity
- Low Income = Lowest Broadband Speeds
- Lowest density zip codes have service levels with 1/3 the bandwidth of high-density areas
- 58% of broadband adopters in the past 4 years are low income
- 37% of broadband adopters in the past 4 years are non-white households

Performance
- Average broadband speeds are 121 Mbps (D/L) /26 Mbps (U/L)
- Fiber has 45% faster download and 4.7x faster upload speeds than Cable
- In-Home Experience
  - Wired/Ethernet to PC has average speeds of 338 Mbps
  - Wi-Fi Mesh has average speeds of 249 Mbps
- Fiber has half the latency of Cable
- Fiber is superior in low jitter
- Fiber providers Net Promoter Scores are significantly better

Sustainability
- Fiber has 40% less carbon footprint of Cable

Economic Impact
- 47% of Rural moves are to areas with Fiber

Quality of Life / Personal Productivity
- 72% of consumers rank broadband as very important
- Fiber broadband is important for Work-From-Home
- Broadband is a top 3 attribute for selecting a community (in addition to safe streets / low crime and affordable living)
- More Work-From-Home employees use Fiber than other options
- More Fiber Work-From-Home employees are in the Tech industry
- More occasional Work-From-Home employees use Fiber
- Fiber-based Home Businesses have higher revenue
- Homes with Fiber have better access to Health Care
- Homes with Fiber have better access to Education
These key highlights further illustrate why the U.S. and countries around the world have begun the largest fiber broadband investment cycle in history. Nearly $130 billion in federal, state, and local subsidies are being invested from CAA, ARPA, FCC RDOF, Coronavirus Capital Projects Fund, NTIA, USDA RUS RECONNECT and most recently the Investment in Infrastructure and Jobs Act (IIJA).

This investment in fiber as the critical broadband infrastructure for the nation’s future when further accelerate innovation and the next phase of the internet – the Metaverse. As every American become connected with future-proof fiber broadband, consumers and businesses will begin to leverage the amazing future that is in store for all of us, closing the digital equity gap once and for all.

Gary Bolton  
President and CEO  
The Fiber Broadband Association
II. STUDY OVERVIEW

The Internet and “Broadband” (higher performance forms of the Internet) have obviously had a tremendous impact on the life of consumers in North America, especially over the past 30 years. While reasonably good data is available from many sources, there is still a great need for deeper and more objective data on the status and impact of residential Internet. This includes measuring the current progress and landscape for Internet access overall in more detail, the share and performance of different types of Internet delivery, and the life and community aspects of Internet use – especially high-quality broadband.

The goal of this research is to provide the most objective and thorough data ever assembled on these topics.

This report is primarily built on RVA consumer research which has been annually sponsored by the Fiber Broadband Association or FBA (formerly FTTH Council North America) since 2006. RVA consumer studies focusing on U.S. (and Canadian) Internet use have been conducted each year among online consumers with sample sizes ranging from 2,000 - 4,500. The 2022 edition, conducted in March, has a sample size of 3,000.

This FBA/ RVA study is probably the longest running and most comprehensive U.S. consumer Internet research in existence. Besides covering a wide range of questions, it includes important innovations such as directly sampling respondent speed, latency, and now jitter (variations of latency). There is no other known nationwide random sampling of speeds and latency by broadband type. (Speed testing service data, although important, is not randomly sampled. It can be biased somewhat in that those subscribing to higher speed tiers are more likely to take speed tests, and speed tests can come from both home and/or business locations.)

It has always been the goal of this study to be totally objective and accurate in reporting and interpreting results.

Another important report on Internet use (referenced in section II) is an annual survey from PEW conducted since the year 2000. It is an important complement in that it is based on a methodology to randomly recruit both non-Internet users and Internet users, thus allowing PEW to report the percentage of active Internet users overall.
III. IN-DEPTH REVIEW: STATE OF U.S. RESIDENTIAL INTERNET

A. Residential Internet Access

About 93% of Americans now use the Internet (based on data from Pew Research surveying both online and offline consumers). RVA estimates approximately 92% have Internet access at home – including 77% with wired service and 15% with wireless service (the majority with wireless service via mobile phones).

Assuming 129.9 million households in total, 119.5 million have access to the Internet.

Besides primary residences, there are approximately 8.2 million second homes and short-term rental homes (Air B&B, etc.) in the U.S. Based on the 2022 RVA study, 81% of these structures have Internet – or 6.6 million homes.

Thus, we estimate there are about 126.1 million residential structures in the U.S. with Internet access.

B. Perceived Broadband Importance

Based on a question asked in the FBA/RVA survey since 2019, the perceived importance of broadband has been increasing. Utilizing a five-point scale, the percent rating broadband “very important” increased from 60% in 2019 to 72% in 2022.

Part of this increase, no doubt, relates to the Pandemic of 2020 and 2021. Many have noted the perceived need for high quality Internet increased during this period.
C. The Performance Of Internet In The United States

The average download speed experienced by users as tested in the annual FBA/ RVA random survey of Internet users (which, as noted in the overview, is the only known test among a randomly selected sample) – has increased from about 4 Mbps download to 121 Mbps from 2009 to 2022.

It should be noted that speeds are real-world speeds impacted by network quality, the distance to testing points, and home elements such as Wi-Fi and the computer device itself.

Average U.S. upload speeds have increased from about 0.4 Mbps to 26 Mbps in the same period. The upload to download ratio was 11% in 2009 and has increased to 26% in 2022.

The cost per provided Mbps (cost divided by the number of Mbps received downstream) has decreased very dramatically from about $9.00 to about $0.55 since 2010.
The dramatic 90% reduction in broadband pricing since 2012 is in sharp contrast with most other essential home consumer services (that increased in price from 3% to 40% over the same period).

D. The Status and Equality Of Internet Service

Reviewing tested broadband speeds by various demographic categories shows some differences. These differences can be related to both the availability of higher capability broadband to any subscriber, as well as the adoption of high-capacity broadband of those higher speed tiers from a given provider. (Of course, adoption can correlate to factors such as affordability.) “Blended” speeds, shown here, are the average of download and upload speeds based on testing during the 2022 RVA survey. (Upload is usually 20-30% of download, on average.)

Speeds are clearly lower capacity in more low-density rural areas, based on density per square mile. In this case, the primary problem is the lack of high-quality broadband in such areas. The problem is currently being actively targeted with new government programs.
Those with lower incomes also have somewhat lower speeds. This is likely related to both adoption of higher speed tiers, and in some cases, the area availability of higher quality broadband.

The high speeds tested among Asians in the U.S. may correlate to both availability (given fairly high urban living), as well as adoption. (Adoption could be related to education desires and an international culture of access to high quality broadband. Asian countries have the highest rate of FTTH deployment in the world.) Further, Asians in the U.S. are fairly young. Based on a 2019 PEW study, only 25% of Asians were above age 52, compared to 36% of Caucasians.

The higher speeds among Hispanics is interesting and correlates with a high level of raw broadband adoption indicated in the Pew Study. One likely factor contributing to use and adoption is average age. Only 17% of Hispanics were above age 52 in the 2019 PEW study – less than half the number as Caucasians.

Internet adoption by those of low income and from minority groups has been very strong in the past few years. Based on the FBA/RVA study, among those who began using the Internet in just the past four years, 37% were non-white and 58% had household incomes below $50,000 per year.
The 2022 data shows market share for both primary homes with Internet, currently estimated at about 119 million, and secondary residences/short-term rentals (Air B&B etc.), currently estimated at about 8 million.

Cable modem continues to lead in primary residences, followed by FTTH.

Important note: Home mobile broadband users are included in these numbers (users who say their primary Internet at home is mobile service – either for a hotspot or simply to a smartphone).

Another note regarding cable modem share: Some sources which report public data showing subscribers of top providers would seem to infer a much higher share for cable (as high as 69%). The apparent 20% difference from RVA data is explained as follows: Cable Internet subscriber numbers include business customers, second homes, and cable customers served via FTTH. For a market share analysis of delivery methods, “cable” Internet numbers should include only primary home coaxial (HFC) cable Internet customers (i.e. not customers served by FTTH or other technologies) and should also include all cable companies, large and small. Likewise, the base of all primary home Internet users must include users from all sizes of providers and include all types of Internet used at home – even delivery from mobile wireless towers.

Reviewing broadband delivery market share over time showcases the dramatic changes in Internet history (as measured by the FBA/RVA study in 2006-2022, as well as other sources from 1996-2005).

As early as the late 1990s some analysts referred to the Internet lines as “dumb pipes” with the implication that such conduits would become a commodity and would not be valuable to the companies that operated them. By contrast, pipes carrying unique content were called “smart pipes” with the proposition that they could be better monetized. This, in part, set off a wave of vertical integration and network operators began purchasing media companies.

In truth, creating unique marketable content has been difficult, and creating “smart pipes” is difficult to actualize given the concept of net neutrality. On the other hand, there has been demonstratable differentiation and business success based on delivery method.
To date there have been four distinct U.S. “Internet marketing eras” based on differentiated delivery methods:

1) 1995-2000: Dial-up Internet leads

2) 2000-2006: Dial-up leads, but cable (cable modem) and DSL were winning where available

3) 2007-2009: Cable and DSL tie for the lead, but FTTH was starting to win where available

4) 2010-2022: Cable leads, but FTTH is winning where available. (In 2022, at the lower end, 5G fixed wireless/ 5G mobile is taking share - especially from DSL.)
IV. THE USER EXPERIENCE BY BROADBAND TYPE

A. Tested Performance By Internet Delivery Method

Different Internet delivery technologies have very different performance profiles for the average user.

Based on the FBA/ RVA 2022 Study, FTTH has the highest tested download and upload speed, while DSL has the lowest.

It should be noted that such effective speeds include the capability of the technology itself, the speed tier selected by the customer, and various constraints such as types of in-home connections.

We did not receive a sufficient sample of new low-earth-orbit (Leo) satellite customers to analyze, but can note anecdotally that speeds from a few Leo users were only slightly higher than Geo satellite users (though latency was far better for the Leo users).

FTTH, on average, has maintained its lead in download speeds since 2009 (the first year all services were tested for download speeds by the FBA/ RVA).

Cable, on average, has maintained a reasonably close second position for download speeds throughout this same period.

Speeds from wireless (both fixed wireless and mobile wireless used at home) have increased significantly and are now clearly surpassing DSL (and satellite) speeds. On the other hand, there is no evidence, even in the best individual tests, of wireless speeds approaching a gigabit or more as originally promoted in many early media articles about 5G. (It has been a pattern for new wireless technologies to be presented to the media at aspirational speeds for the standard - such as 1 Gbps for 4G or 20 Gbps for 5G). Based on the experience of past wireless generations, tests in optimum laboratory conditions finally reach about 50% of the aspirational speed after ten years, and real-world
results reach about 10-15% of the laboratory speeds after ten years – i.e., only about 5-8% of the aspirational speed even after ten years.

The constraints of in-home connections, especially Wi-Fi, tend to handicap technologies with higher speeds, such as FTTH and cable modem. Thus, the real speed difference between, say, FTTH and DSL is, no doubt, higher than shown.

As an example of the differences the type of connection can make, FTTH tested speeds were highest when a respondent reported being directly connected to a computer via an ethernet cable and lowest when connected via a single Wi-Fi device.

In terms of tested upload speeds, FTTH continues to pull further away from other technologies, and, on average, is nearly five times better than its next rival, cable.

Based on the FBA/ RVA study, while the majority of Internet traffic continues to be on the download side (because of video streaming, web surfing, etc.), for the average consumer, upload is as important or more important about 20% of the time. The study also shows that upload Internet performance differences are noticed by the consumer.
Latency, the time it takes for an individual packet to travel to its destination is especially important for activities such as two-way communication, gaming, and virtual reality. As an example, PubNub reports that multi-player gaming performance starts to be seriously impacted at over 100 Ms, and the game is unplayable at over 300 Ms.

The latency of different technologies is also clearly lowest for FTTH.

Median latency may be the best measure to review because about 10% of the tests for each technology in the study had a latency tail that spiked into thousands of milliseconds.

Jitter was measured for the first time in the study this year. Jitter is significant because it shows variations in delays. Such variations are important because they can significantly reduce the quality of streaming video, video calls, virtual reality feeds, etc. and cause glitches and noticeable gaps in the communication.

The Jitter test in the study shows the average variation over ten tests from the lowest latency measure.
B. The Personal Impacts Of Internet Performance

Performance differences have real-world impacts. The survey asked respondents, “About what percent of your online time do you typically have to wait for things to come up (gear turning/computer ‘working’)?” The responses averaged 12.3%.

The estimates of time lost clearly correlate with download speeds (based on dividing respondents into five download speed performance groups from slowest to fastest). The difference in time lost between the lowest and highest groups was two-thirds of an hour per day – or amazingly almost a month out of a year considering 16-hour waking days.

As would be expected, this difference also correlates to technology – fiber broadband has the lowest time lost, followed by cable. DSL and wireless show the highest time lost. Besides personal lost time, such differences have very significant productivity consequences for companies relying on employees working full time or part time at home.

Performance differences also correlate to the degree of satisfaction for any technology. The study has measured net promoter scores (NPS) – an important measure of customer satisfaction - since 2016. While NPS scores for all types of Internet technology have been increasing since 2018, fiber continues to maintain a significant advantage over other types of Internet delivery. (Wireless took a jump in 2022, probably as some consumers changed from previous low capability wireless and DSL delivery to providers using the latest “5G” wireless standards.)
V. THE ECONOMIC AND SOCIAL IMPACTS OF FIBER BROADBAND

A. Analysis Notes

The goal of this section is to measure some of the actual impacts of the highest quality broadband, fiber broadband, versus other types of Internet delivery using data from the 2022 FBA/ RVA study. FTTH societal benefits have often been noted anecdotally and in some regional quantitative studies, but the goal here is to highlight any benefits that are quantifiably verifiable and statistically significant on a national level.

In most of the following analysis, users with fiber Internet are compared to users with other types of Internet service.

As will be seen, every effort has been made to control for various types of potential biases, and to present the impacts of high-quality broadband fairly and correctly.

In many of the following cases, age is limited to those age 25-65 to avoid including those in college and those in traditional retirement years. Income also is limited to $60,000 to help control for the potential biases of different allocations of Internet technology by income, since income variation could explain at least part of economic and social impact differences. (Fiber is used somewhat more among those of higher incomes.)

One additional note: While most of the following analyses show a correlation between fiber use and a positive economic or other societal outcome, it should be noted that correlation does not necessarily prove causation. In other words, in cases where a better outcome is correlated to fiber use could indeed relate to a fiber advantage causing the outcome to be better, but in other cases, the relationship could represent correlation without causation because of other factors at play. (An example could be low-income parents, particularly concerned about better education for their children, finding ways to get into better schools and also selecting fiber Internet because they hear it to be better.) While correlation does not prove causation, it seems safe to assume that much of the correlation shown in the study also represents causation.

Finally, most of the following fiber impact cases show enough difference that the chance the better outcome was simply caused by sampling error (versus the true population) would be less than 5% (the common test for “statistical significance”).

B. Economic Impacts Of Fiber Use

Some basic possible economic impacts of fiber were tested. Comparing the level of unemployment among fiber and other users did not show a significant difference, although the lower income fiber Internet users had a slightly lower unemployment rate versus other Internet users. Of course, proving statistical significance for unemployment rates could be especially difficult currently, in this time of a tight labor market, where most of those who truly want work can find it.

Fiber did, however, have a statistically significant impact on some occupations, particularly those in technology.
Lower income FTTH users are more likely than others to have an information technology job. Information technology and the broader information economy are often cited as a key component of both current and future occupations. There is a need to broaden the workforce to prepare for an increased percentage of these types of jobs in the future.

Lower income FTTH workers are also more likely to say they work for a “high technology firm” than are users of other Internet delivery methods.
FTTH workers who say they could potentially work from home (i.e. they are not place restricted because they work at, for example, construction sites or a retail store counter) are much more likely to say they at least sometimes work from home.

Besides working for an employer from home, many operate a home-based business (often a side business). The percentage of respondents with a home-based business was higher for FTTH users than for other users (though by itself, this statistic is not statistically significant).
Likewise, the average home-based business income reported from those with FTTH is higher than for those using other Internet delivery.

Finally, the percentage of home-based business that comes from outside the community is also higher for those with FTTH.

Non-Local Home-Based Income
Under $60K Income, Age 25-65

- FTTH at home: 56.0%
- Other home Internet delivery: 40.0%

Statistically significant: significant at 98% confidence
Combining all these statistics shows the average home-based business income from those with a home-based business is 14% higher for those with FTTH versus those using other Internet delivery.

The difference is even greater as a percentage of all Internet users for each delivery type (28%).

Finally, an even greater difference (73%) is shown when looking at total income from outside the community by delivery type.

Using similar data for all home-based business (not just such operations among lower income users), the amount of income coming from outside the local area in an FTTH served community (assuming 10% have no Internet, and FTTH has a 40% market share among Internet users) is significantly higher. The FTTH community of 100,000 households would see an additional primary revenue inflow of over $78 million per year.

<table>
<thead>
<tr>
<th>HOME BASED PRIMARY (INFLOW) BUSINESS REVENUE TO A COMMUNITY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000 households (36,000 FTTH, 54,000 Other, 10,000 none)</td>
</tr>
<tr>
<td>100,000 households (90,000 Other, 10,000 None)</td>
</tr>
<tr>
<td>Increase in community primary revenue due to FTTH</td>
</tr>
</tbody>
</table>
C. Health and Educational Impacts

Lower income FTTH users are more likely to say they have very good access to health care than are those using other delivery methods.

![Graph showing access to health care](image)

Lower Income FTTH users with children at home in a metro area are more likely to say they have good access to education versus those using other deliveries. (In this case the difference does not meet the classic test for statistical significance, but the difference is significant at 91% confidence.)

![Graph showing access to education](image)
D. Migration Impacts

Those who said they moved into a rural area in the past year were more likely to move into rural areas with FTTH. (Rural areas were defined as a small town over 40 minutes from an urban area, or a truly rural area over 40 minutes from an urban area.) While FTTH was only available in 31% of such areas, nearly half of all the moves to or within such areas in the past year were to rural areas with FTTH availability.

Based on the FBA/ RVA survey and other sources, FTTH availability within more rural areas seems especially important given the dramatic changes in living desires that are currently occurring. As has been noted in an FBA whitepaper on rural digital divide, a century-long movement out of rural areas to urban areas began to reverse about ten years ago. Further, the trend to less dense living accelerated during the past three years according to many sources.

The FBA/ RVA report shows that while 33% live in downtown areas, only 18% prefer downtown living when given the premise, “If you could equally connect with work, education, or other needs from anywhere”. Meanwhile, the percent desiring a more rural small community or suburban area is higher than current living percentages.

It should be noted that while this shift appears to be very dramatic, it will likely be softened by the fact that moving takes time and hassle, connections to work and family remain important, and preferences or perceptions could change over time. Further, basic economic supply and demand factors also tend to soften such trends. For example, the 2022 FBA/ RVA research shows that while many people aged 45 and older did move out of cities in the past year, many younger people moved into cities (likely based on pent-up demand, more housing availability, reduced rental rates for a time, etc.).
As background, the study gives some insight into why migration changes are occurring as shown by the overall average response order. Those who would prefer to live in a rural community or rural area particularly value the top two rated factors overall - safety and affordability. Based on other research, many may also value nature and the outdoors. (The response in the study “greenspace, walking, jogging, biking trails” does not clearly show nature preference overall, as it is somewhat biased to the idea of natural elements within an urban area.)

It is interesting that the third most important community attribute overall, “very high-speed/ reliable Internet access”, is equally important across all living preferences.

Of note should be that preferences for some categories are much higher among some subgroups. As an example, younger respondents with children rate “great school system” much higher than the overall population.

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E. Environmental Impacts

The environmental impact of various wired Internet transmission methods was also reviewed for this report. The review was limited to the CO2 output from the primary Internet transmission itself and from CO2 output savings enabled by such transmission (work from home). Not considered are CO2 outputs from content creation, transmission prior to the central office, or device use at the end point (televisions, computers, and mobile devices).

Based on data gathered in a 2021 Prysmian study and a previous FBA whitepaper on operations expenses (“Operational Expenses for All-Fiber Networks are Far Lower Than For Other Access Networks” June 2020), there are two factors that relate to lower CO2 from FTTH transmission of Internet. The first factor is a reduced network power requirement. (FTTH as a largely “passive network” has far fewer powered points in the network.) The second factor is fewer truck rolls needed to service the FTTH outside plant versus other Internet delivery technologies.

Together these factors show 18% more carbon savings for FTTH versus DSL and 39% more than Cable HFC.
It should be noted that there are likely additional carbon additional savings from FTTH not shown. As an example, other transmission methods may eventually have to be replaced with FTTH, adding resulting in additional construction related carbon costs. This is currently commonly occurring with DSL twisted pair systems, and is beginning to occur with coax cables from cable companies.

The analysis below shows that users of all types of Internet delivery are enabling carbon savings by working more from home. FTTH customers, however, save more than other Internet users. This difference relates to FTTH users being more likely to be employed and working more days from home versus those using other Internet delivery methods. (While part of this difference is simply related to user demographic differences between the technologies, it is also hypothesized that FTTH with its better performance and greater work efficiency enables, on average, more proclivity to work from home.)

![CO2 Reduction From Work From Home](image)

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2) CO2 SAVINGS FROM WORK FROM HOME BY TECHNOLOGY

<table>
<thead>
<tr>
<th>CO2 Grams saved from less driving</th>
<th>FTTH</th>
<th>DSL</th>
<th>Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Employed (5)</td>
<td>62.1%</td>
<td>60.9%</td>
<td>55.6%</td>
</tr>
<tr>
<td>Average days working from home all users (6)</td>
<td>5.9</td>
<td>4.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Miles per commute day (7)</td>
<td>27.8</td>
<td>27.8</td>
<td>27.8</td>
</tr>
<tr>
<td>Commute miles reduction per month (days x miles)</td>
<td>-101.2</td>
<td>-77.5</td>
<td>-73.4</td>
</tr>
<tr>
<td>Estimated decreased mileage savings from other driving (8)</td>
<td>33.4</td>
<td>25.6</td>
<td>24.2</td>
</tr>
<tr>
<td>Net miles decreased per month</td>
<td>-67.8</td>
<td>-52.0</td>
<td>-49.2</td>
</tr>
<tr>
<td>Grams of CO2 output per personal vehicle mile (9)</td>
<td>411</td>
<td>411</td>
<td>411</td>
</tr>
<tr>
<td>Total net CO2 grams saved from less commuting</td>
<td>-27,858.0</td>
<td>-21,352.3</td>
<td>-20,217.6</td>
</tr>
</tbody>
</table>

CO2 Grams from more home electric use

| Grams spent more electricity at home (1.793 per day WFH) (10) | 10,507.0 | 8,211.9 | 8,516.8 |
| Net CO2 grams saved from work at home                        | -17,351.1 | -13,140.3 | -11,700.9 |

(5)(6)(7) RVA 2022 consumer study

(8) Liberal Assumption - 33% of commuting driving

(9) EPA "Carbon emissions from a typical passenger vehicle" 2014 * 1.2

(10) Study from Sense energy monitors 2020
Overall, FTTH shows the highest net reduction in carbon based on transmission itself and the impact of enabling work from home.

Of course, adding carbon costs prior to the central office and after the home connection point, i.e. using televisions, computers and mobile devices, would almost certainly result in a net CO2 cost – even for FTTH users.

The important point is that FTTH has the most offset to other CO2 costs and the lowest overall CO2 output.
VI. STUDY CONCLUSIONS

Based on this study, Internet use continues to advance overall in the United States, with more adoption and more perceived importance over time. Over the past 14 years, based on random sampling, average real-world download speeds have increased from 4 Mbps to 121 Mbps. Upload speeds have increased from 0.4 to 26 Mbps. The real inflation adjusted average price for Internet alone has increased slightly from $59 to $67 over the period.

Evidence of the digital divide can also be seen. There are some differences in speeds experienced by demographic delineators such as income. Rural versus urban/suburban differences are especially pronounced.

An analysis of Internet market share since 1995 shows different technologies leading over time. Currently, Cable HFC leads, but FTTH is winning where available.

Reviewing data for tested performance by Internet delivery method, FTTH leads in terms of download and especially upload speeds, latency, and Jitter. These performance differences have real-world consequences in terms of productive time lost as well as user satisfaction (net promoter scores).

Finally, FTTH results in real positive societal and economic impacts such as more IT employment, more work from home, more income from home-based businesses, better health access, better educational access, enablement of migration trends, and less CO2 costs to the environment.
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