

The Real Benefits of Gigabit Networks Have Nothing to do with Speed

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The netosphere is atwitter about the transformative power of gigabit networks. Sure, streaming HD video requires less than 5 mbps, and even the FTTH Council of Europe admits that so far no applications come close to requiring those kinds of speeds,¹ but think of the possibilities! As Stacey Higginbotham said in a recent GigaOm post, “you don’t need a gig today, but you need one for tomorrow.”²

Well, maybe.

The truth is that nobody knows which direction technology will evolve, and the debate over speed is distracting us from deeper thinking about the related relevant policy question, which is whether speed is the key quality metric or whether other, largely ignored, quality attributes are more important to innovation. The focus on speed also obscures the real benefits of new high-speed networks like Google Fiber, which include new competition and revealed information about how local rules and regulations can hamper entry into the broadband market.

Internet Quality is About More Than Speed

Speed is but one of many broadband quality attributes. Others include latency, jitter, packet loss, and reliability, to name a few. A minimum level of speed does indeed matter for certain applications, although that minimum is much less than many think, as evidenced by, for example, the relatively small bandwidth needed to stream HD video. To be sure, the faster your connection, the faster you can download large files, as long as the server has the capability to send it faster. However, no evidence yet suggests that slow speeds are a barrier to innovation.

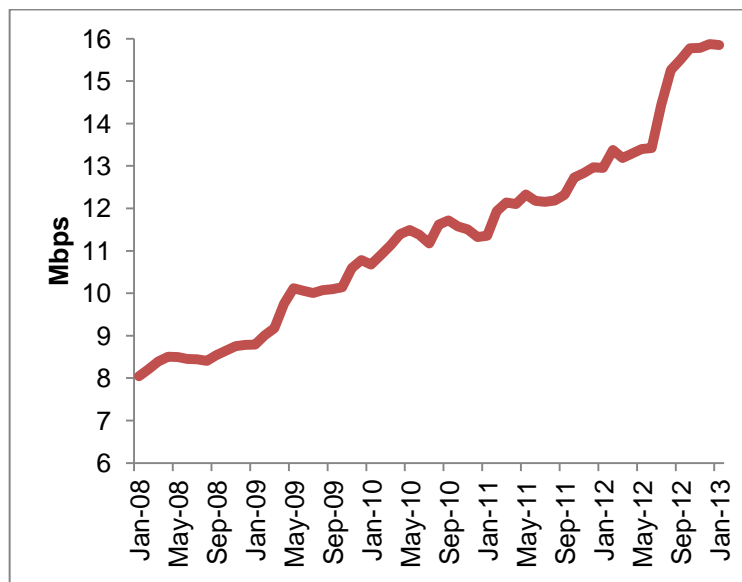
One reason speed may not be a barrier to innovation is that speeds have actually been increasing steadily for years. Figure 1 shows average speeds in the United States increasing from about 8 Mbps in January of 2008 to 16 Mbps in January 2013. Akamai’s most recent State of the Internet measured average U.S. speed at 7.4 Mbps, which was 2.3 percent higher than the previous quarter and 28 percent higher than a year earlier.³

¹ Robert Kenny documents the FTTH Council’s comments on the issue from 2011-2013 here: <http://commstought.blogspot.co.uk/2013/03/compelling-applications-for-fibre-are.html>.

² <http://gigaom.com/2013/04/06/as-austin-readies-for-google-fiber-heres-why-you-need-a-gig-even-if-you-dont-think-you-do/>

³ Akamai, *The State of the Internet, 4th Quarter 2012*, 2013, fig. 10. By comparison, Akamai measures the average broadband speed in France at 4.8 Mbps, Japan at 10.8 Mbps, and Korea at 14.0 Mbps. Akamai’s measures are always lower than Speedtest’s measures for any given country. Their trends, however, are the same.

Figure 1: Average Measured U.S. Broadband Download Speeds 2008-2013



Source: Derived from Speedtest.net raw data. Speeds adjusted for distance to testing server.

This consistent upward trend means that the relevant question for policy is not whether speeds are fast enough, but *whether the cost of increasing the rate of increase in speed is worth the benefits*. To date, and to over-simplify, one side of the debate contends that speeds are fine and there is no reason to want more, while the other side contends that we must do something to increase speeds. In fact, to the extent that increasing speed takes real resources, the question is whether getting to some arbitrary speed faster than we would otherwise is worthwhile.

While the upward trend in speed is encouraging, we act as if that is the only quality feature that matters when, as mentioned above, speed is only one component of broadband quality, and not even the most important one for many applications. Gaming, for example, does not require extremely high bandwidth but does require low latency. That is, when you shoot your digital weapon, you want the game and the other players around the world to see that action immediately.⁴

Latency also matters for activities arguably more important than gaming. Alcatel-Lucent, for example, notes that services like telesecurity require very low latency to be effective.⁵ Latency can also affect everyday usage. One report noted (citing other studies) that “every drop of 20 [milliseconds] of network latency will result in a 7-15% decrease in page load times” and that Google and Amazon reported reduced sales and traffic when latency increased.”⁶

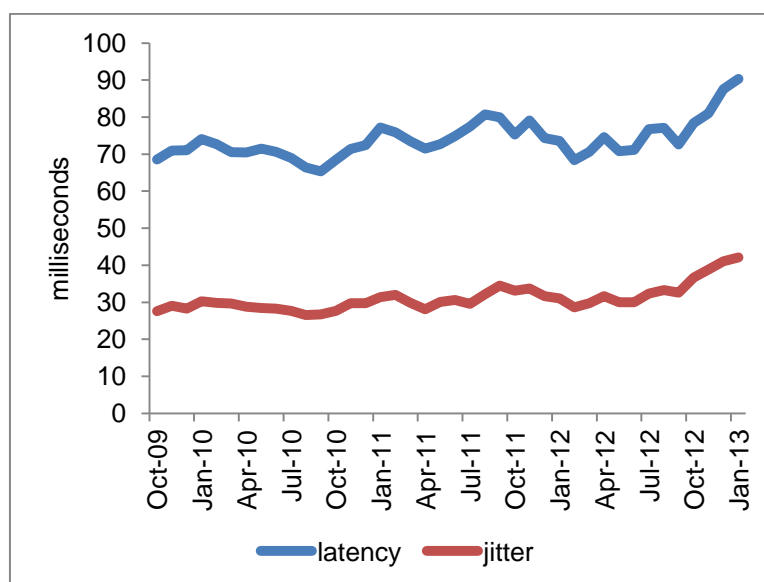
⁴ For Internet users, latency is the time it takes a data packet to travel from the user’s Internet device to the server and to receive a response from the server. An inherent limiting factor is the speed of light, so the farther a packet needs to travel the longer the trip will take, all else equal.

⁵ http://enterprise.alcatel-lucent.com/private/images/public/si/pdf_smartChoice.pdf

⁶ Jelle Frank van der Zwet, *Cracking Latency in the Cloud* (Datacenter Dynamics, January 8, 2013), <http://www.datacenterdynamics.com/focus/archive/2013/01/cracking-latency-cloud>.

While we've been obsessing over speeds, latency may have been quietly deteriorating. Data from Speedtest.net show increases in latency and its cousin, jitter, since 2012 (Figure 2).

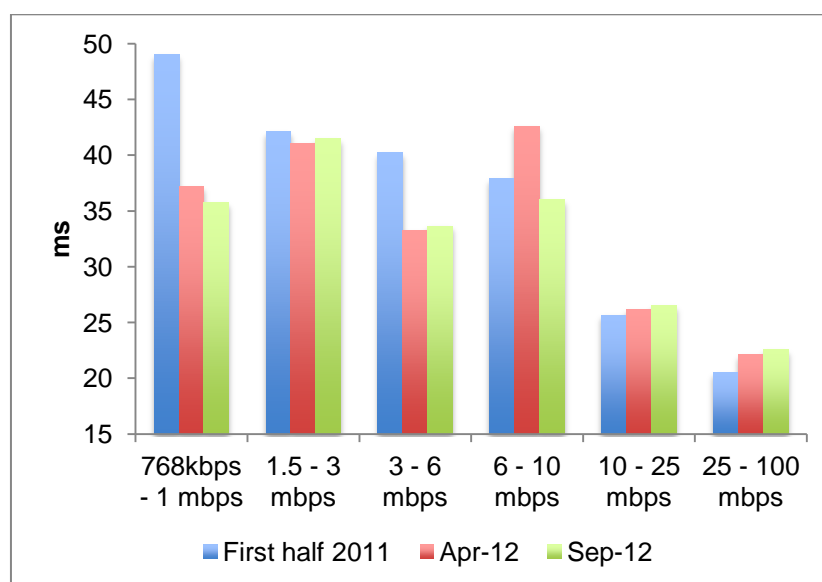
Figure 2: Measured Latency and Jitter 2009-2013



Source: Derived from raw speedtest.net data.

Data from the FCC's Measuring Broadband America show a similar trend. While connections at speed tiers below 10 Mbps show no particular pattern, the 10 – 25 and 25 – 100 Mbps tiers show increasing latency between the first half of 2011 and September 2012.

Figure 3: Latency as Measured by the FCC | SamKnows



Source: FCC Measuring Broadband America reports. Weighted average by speed tiers, weights based on speed tiers and technology in Feb 2013 FCC broadband report, Table 10 (data as of Dec 2011).

The causes of this quality degradation aren't clear. It is conceivable that future data will reveal this apparent degradation to be merely a blip rather than a trend.⁷

Nevertheless, suppose that latency is deteriorating and that latency affects innovation in, for example, telemedicine, smart grid, or other areas more than speed affects innovation. In that case, by focusing on the wrong measure, policymakers and advocates are creating pressure for ISPs to also focus on the wrong measure while issues like latency get almost no attention.

To be clear, I am not arguing that latency is too high or that it is necessarily more important for innovation than is speed, reliability, or other quality attributes. Just as we have no evidence that slow speeds are harming innovation, we also have no evidence that latency or other quality attributes are harming innovation. Rather, the point is that we don't know which quality attributes matter most for innovation and that it is more important for policymakers to learn the answer to that question rather than setting arbitrary goals for one attribute.

The Real Benefit of Google Fiber: Competition!

The promise of superfast connections has driven most of the attention directed at Google Fiber and other initiatives like Gig.U. Because no existing applications actually require those speeds, the benefits of superfast will come in the future, if ever. Perhaps Google will consider its Fiber to be a success only if it yields new applications that require gigabit speeds. The rest of us, however, should already consider Google Fiber and other initiatives like Gig.U to be successful simply because more competition between broadband providers is good and we should celebrate when we see new entry. Moreover, their efforts have laid bare how local regulatory rules thwart entry into the broadband market. It has also revealed the costs of using regulation to achieve laudable social objectives, and how the market can help achieve those objectives.

New Entry Highlights How Local Rules Thwart Entry

As Milo Medin, Google's Fiber rollout guru explained in Congressional testimony, "picking the community in which Google would make this significant new investment highlighted for me exactly how regulation can get in the way of innovation and drive companies to seek out or avoid certain locales."⁸ He continued by explaining how issues like rules regarding pole attachments and access to rights-of-way make entry difficult, and that Google's nationwide competition for its fiber allowed it to choose places where those and other rules would not stand in the way.

⁷ Nevertheless, at least one other trend might explain this latency increase. Servers generally reside at centralized datacenters, which contain all the information and applications that make the Internet so useful and entertaining. The number of datacenters, however, is decreasing while the average datacenter size is increasing (<http://www.businesswire.com/news/home/20121009005038/en/U.S.-Datacenters-Growing-Size-Declining-Numbers-IDC>). A shrinking number of datacenters could mean that packets must travel further for a growing number of broadband subscribers, thereby increasing latency. Of course, latency can be affected by many factors along the data packet's route, and the declining number of datacenters being responsible for increased latency is an untested hypothesis. Nevertheless, it seems plausible and worth investigating.

⁸ Milo Medin, *Testimony of Milo Medin, Vice President of Access Services, Google Inc.* (Washington: U.S. House of Representatives, Committee on Oversight and Government Reform, Field Hearing on Innovation and Regulation, April 18, 2011), http://oversight.house.gov/wp-content/uploads/2012/01/TestimonyofMiloMedin_1.pdf.

Even incumbent providers may find their plans hampered by local rules and regulations when trying to improve their services. Comcast and Time Warner Cable, for example, are building out WiFi networks to complement their wired networks. Just as Google had to contend with pole attachment rules, so, too, may these incumbents face similar challenges to the extent that they need new access to utility poles to place Wi-Fi equipment.⁹

The FCC attempted to address the issue of pole attachments in 2011, by limiting the amount a utility can charge for attachments and reducing the amount of time the utility can take to respond to an attachment request. While the DC Circuit Court of Appeals recently upheld this rule,¹⁰ controversies over pole attachments are unlikely to die anytime soon, since utilities believe the costs to them are higher than the FCC limits, while telecom providers find themselves in the somewhat unusual position of arguing that they need infrastructure access at regulated rates. Regardless of the true costs of allowing easier access to utility poles, wired broadband entry without it is difficult.

Legislating Laudable Social Goals Can Deter Entry

The FCC, state, and local regulators often impose obligations on communications providers, such as build-out requirements, with the idea that such requirements ensure all residents have similar access to services. But those requirements increase the cost of entry into the market. Kansas City made no such request of Google, which allowed the company to roll out service in a more cost-effective manner, lighting neighborhoods only when a sufficient number of households commit to subscribing.

While build-out requirements and other obligations may yield benefits, policymakers should be clear that the cost of such rules is a higher barrier to entry. As such, policymakers need to consider if the requirements are indeed the best way to achieve social goals.

Competition Helps Achieve Social Goals

New facilities-based entry into a market creates competition in a variety of ways, including price, quality, and other factors like customer service. Because different consumers place different weights on different attributes, it is not possible to say that one type of competition is “better” than another. Nevertheless, one feature of Google’s fiber business model has gone largely unremarked but has the potential to lead to real changes.

The game changer is not necessarily the \$70 per month gigabit or the \$120 monthly gigabit plus video subscriptions, which seem to be the focus of much media coverage¹¹. Those are good prices, especially in Kansas City or Austin, but are not radically different from, say, Verizon’s FiOS plans elsewhere. For example, Verizon is currently advertising plans with 75 Mbps

⁹ Comcast, for example, routinely notes in its SEC reports that pole attachment rules pose an ongoing risk to their established business ([http://www.wikinvest.com/stock/Comcast_\(CMCSA\)/Pole_Attachments](http://www.wikinvest.com/stock/Comcast_(CMCSA)/Pole_Attachments)). It is easy to imagine that new attachments pose similar risks.

¹⁰ Sean Buckley, “FCC’s Pole Attachment Rules Upheld by D.C. Court,” *FierceTelecom*, March 1, 2013, <http://www.fiercetelecom.com/story/fccs-pole-attachment-rules-upheld-dc-court/2013-03-01>.

¹¹ See, for example, <http://arstechnica.com/business/2012/07/google-fiber-launches-in-kansas-city/>

downstream and 35 Mbps upstream for \$70 per month for a year and \$90 per month for the second year.¹² Given the lack of utility of a gigabit (or even 75 Mbps for that matter), Google's price is better and price competition is good, but (to mangle an over-used phrase) it isn't disruptively better.

Instead, Google's radical innovation may be its low-end subscription service. Households in Kansas City where Google Fiber is available can get 5 Mbps service with no monthly fee guaranteed for six years if they pay the \$300 installation fee.¹³ While the U.S. tends to have among the most affordable low-end broadband among industrialized countries,¹⁴ this plan is far cheaper than almost any competitors' while offering a speed fast enough for nearly every existing application.

It is conceivable that this type of pricing, should it prove to be part of a sustainable business model, could help close our income-based digital divide while also improving service quality at the low-end.

Conclusion

Our Internet speed fetish comes with costs and benefits. The costs are that we have collectively decided without evidence that speed matters more than any other quality attribute and that it is worth investing resources to reach certain arbitrary speed goals. It has distracted us from the much harder, but arguably more important, question of which Internet quality attributes actually matter more and how our networks perform along those lines. Just as "what gets measured gets done," as the cliché goes, it is conceivable that so, too, "what gets ignored gets worse" (cliché patent pending), as evidenced by recent deterioration in latency measures.

But the new gigabit networks are also bringing real benefits in the form of additional facilities-based broadband competition, which has long been the U.S. regulatory objective. Google Fiber is bringing a new model to low-end service, which has the potential to yield digital divide benefits, and has demonstrated how local rules and regulations hamper entry.

In short, we should celebrate the rise of new networks while keeping a skeptical eye on which aspects of those networks prove to be important.

¹² <http://www22.verizon.com/home/fios-fastest-internet/fastest-internet-plans/>

¹³ <https://fiber.google.com/about/>

¹⁴ Scott Wallsten and James Riso, "Residential and Business Broadband Prices Part 2: International Comparisons," Technology Policy Institute Working Paper, December 2010.