

January 20, 2015

Ms. Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 Twelfth Street, SW  
Washington, DC 20054

*Via Electronic Filing*

**Re: GN Docket No. 14-126, Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act**

Dear Ms. Dortch,

I<sup>1</sup> offer these comments to aid the Commission in properly analyzing the deployment of advanced networks in the United States.

The Notice asks a number of questions regarding the measurement of broadband “speed” (the better word is “capacity”), latency, deployment, adoption, price, and usage patterns. These are subjects that have been analyzed in depth in a number of scholarly papers, including some that I’ve written.<sup>2</sup> The Commission is well advised to familiarize itself with the analyses of American and foreign broadband networks, especially the works that rely on measurement as mine do.

The Notice proposes to create a usage model and to evaluate capacity according to its output. Any such exercise is prone to abuse because the answer to the question Congress has asked the FCC – whether broadband is being deployed in a reasonable and timely manner – has implications for the role and power of the FCC now that the court has determined that the Congressional request is a grant of authority. By setting the threshold

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<sup>1</sup> I am an independent network engineering consultant and policy analyst, presently working at the American Enterprise Institute as a Visiting Scholar and at High Tech Forum as editor and founder. These remarks are offered in my personal capacity, do not necessarily represent the opinions of AEI or of any client or sponsor, and have not been reviewed by anyone but myself. I have previously offered comments in the “Protecting and Promoting the Open Internet”, “Framework for Broadband Internet Service”, “Preserving the Open Internet”, and “Broadband Industry Practices” dockets, GN 14-28, GN 10-127, GN 09-191 and WC 07-52 respectively, and offered testimony at the [FCC En Banc Public Hearing on Broadband Network Management Practices in Cambridge on February 25, 2008](#) as an invited technical expert. My CV is available at <http://www.bennett.com/resume.pdf>.

<sup>2</sup> Richard Bennett, *G7 Broadband Dynamics: How Policy Affects Broadband Quality In Powerhouse Nations* (Washington, D.C: American Enterprise Institute, November 2014), <http://www.aei.org/wp-content/uploads/2014/11/G7-Broadband-Dynamics-Final.pdf>; Richard Bennett, Luke A. Stewart, and Robert D. Atkinson, *The Whole Picture: Where America’s Broadband Networks Really Stand* (Washington, DC: Information Technology and Innovation Foundation, February 12, 2013), <http://www.itif.org/publications/whole-picture-where-america-s-broadband-networks-really-stand>.

for “advanced telecommunications capability” artificially high, the Commission increases its power, and setting it artificially low reduces the Commission’s power. Thus, the FCC has a conflict of interest. But that’s where we find ourselves.

For this and other reasons, I would suggest that measurement of actual usage patterns is a better course to take than the creation of arbitrary thresholds. The FCC knows how to measure broadband speed, and has done so through the Measuring Broadband America program in the Office of Engineering and Technology (OET). In the most recent report from that activity, we find guidance toward the determination of the appropriate capacity threshold for the most common Internet application, web browsing:

- **Web browsing.** In specific tests designed to mimic basic web browsing—accessing a series of web pages, but not streaming video or using video chat sites or applications—the total time needed to load a page decreased with higher speeds. However, the performance increase diminishes beyond about 10 Mbps, as latency and other factors begin to dominate. For these high speed tiers, consumers are unlikely to experience much if any improvement in basic web browsing from increased speed—i.e., moving from a 10 Mbps broadband offering to a 25 Mbps offering. To be sure, this is from the perspective of a single user employing a web browser. Higher speeds may provide significant advantages in a multi-user household, or where a consumer is using a specific application that may be able to benefit from a higher speed tier.<sup>3</sup>

In terms of diminishing returns, *Measuring Broadband America 2014* says that 10 Mbps is the most relevant threshold. If consumers are “unlikely to experience much if any improvement” above that capacity, there is little to no argument for raising the threshold above that level, at least for single-user web surfing. The reason that 10 Mbps is the point of diminishing returns is partly down to latency, but mainly due to “other factors” such as web server capacity. For the time being, web server capacity is beyond the FCC’s scope, but pending actions in the Open Internet docket may change this.

But OET leaves two issues open: multiuser capacity needs and “specific applications that may be able to benefit from a higher speed tier”. Additional web users have little impact on each other at the typical household size in the US (2.58 persons, including infants, toddlers, and others who are not heavy Internet users) because web access is an aperiodic activity in which periods of access are punctuated by periods of non-access during which contents are read and otherwise digested. It’s reasonable to expect an average of two users at a time because some people don’t use the Internet at all and others do other things. Two web users sharing a connection don’t interfere with each other in a meaningful way. This claim can be confirmed through measurement.

Similarly, the use of “specific applications that may be able to benefit from higher speeds” can be determined by expansion of the SamKnows program to identify these

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<sup>3</sup> FCC Office of Engineering and Technology and Consumer and Governmental Affairs Bureau, *Measuring Broadband America - 2014*, Measuring Broadband America (Washington, DC: Federal Communications Commission, 2014), <http://www.fcc.gov/reports/measuring-broadband-america-2014>.

applications. Rather than guessing about advanced applications in a way that will inevitably be construed as serving the agency's interests, an expansion of the measurement program can determine the actual needs empirically.

Once the SamKnows program is enhanced to determine application use (by Deep Packet Inspection), it can also report on latency in the appropriate way, that is it can determine variations in latency that are indicative of overloaded networks, overloaded servers, and overloaded interconnection points. Latency is mainly a function of distance, but variations in latency are a function of load.

Better measurement is in fact the only serious way to resolve the question of threshold setting. It nearly goes without saying that the measured user population must be a representative sample of the U. S. Internet user population.

The Notice also raises a number of ancillary questions such as price and adoption. Pricing surveys are easy to do through polling, but the Commission generally prefers other methods. I would suggest adopting price measurement surveys – if they are necessary at all, and I don't see where Congress has asked for them – that are consistent with the EU method outlined in *G7 Broadband Dynamics*.

Adoption surveys are also interesting, but many organizations do these already and Congress hasn't asked for them. Their value for the current exercise is limited to determining that the proposed representative survey of application use, performance, and latency is indeed representative.

In conclusion, I reiterate that Congress appears to have asked for an empirical study rather than an arbitrary opinion from the FCC. It would enhance the Commission's credibility if it were to respond in that light.

Sincerely,

Richard Bennett, Consultant.