

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

In the Matter of	)	
	)	
International Comparison and Consumer	)	
Survey Requirements in the Broadband	)	GN Docket No. 09-47
Data Improvement Act	)	
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
	)	
Inquiry Concerning the Deployment of	)	
Advanced Telecommunications Capability to	)	
All Americans in a Reasonable and Timely	)	GN Docket No. 09-137
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	)	
	)	

**COMMENTS OF FREE PRESS – NBP PUBLIC NOTICE #1**

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## I. INTRODUCTION AND SUMMARY

In the *NBP Public Notice #1* the Commission seeks comment on how to define the term “broadband” for the purposes of developing the Congressionally-mandated National Broadband Plan, and for implementing the mandate of Section 706 of the Telecommunications Act of 1996, as well as implementing certain sections of the Broadband Data Improvement Act. On an issue of such central importance, the law alone should guide the Commission’s actions. Though the term “broadband” is used 48 times in the American Recovery and Reinvestment Act (ARRA) and 66 times in the Broadband Data Improvement Act (BDIA), neither piece of legislation explicitly defines “broadband.” Nor does either piece of legislation direct the Commission or any other agency to develop a formal definition of the term. There are only two explicit examples of a legal definition of the term broadband in the law.<sup>1</sup> The first is found within the Telecommunications Act of 1996. In defining the term “advanced telecommunications capability” in Section 706 of the Act, Congress stated that:

“The term ‘advanced telecommunications capability’ is defined, without regard to any transmission media or technology, as high-speed, switched, **broadband** telecommunications capability that enables users to *originate and receive high-quality voice, data, graphics, and video* telecommunications using any technology” (*emphasis added*).<sup>2</sup>

The second example is found within the Food, Conservation, and Energy Act of 2008, which amended the Rural Electrification Act of 1936.<sup>3</sup> This law defined the term “broadband service” by stating:

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<sup>1</sup> Only 29 enrolled bills enacted by the House and the Senate contains the term “broadband.” Of these 29, only the 1996 Telecom Act and the 2008 Farm Bill deals directly with the broadband definitional issue.

<sup>2</sup> Public Law 104-104, Section 706(c).

<sup>3</sup> Public Law 110-246, commonly known as the “2008 Farm Bill”. Congress passed H.R. 2419 by overriding a Presidential veto, but had inadvertently excluded a title from the enrolled

“The term ‘**broadband service**’ means any technology identified by the Secretary as having the capacity to transmit data to enable a subscriber to the service to *originate and receive high-quality voice, data, graphics, and video*” (*emphasis added*).<sup>4</sup>

The above two definitions were written a dozen years apart, but are virtually identical. From these legal definitions, we see Congress clearly views broadband as a technology that is characterized by the ability to allow users (or “subscribers”) to engage in high-quality multimedia *two-way* communications. Therefore, for the purposes of implementing the ARRA and BDIA, as well as evaluating the Section 706 test, the Commission must establish form, characteristics and performance indicators, as well as thresholds that -- at a minimum -- adhere to the definitional standards set in 1996 Telecom Act and the 2008 Farm Bill.

In other words, if the Commission chooses to formalize a definition of broadband, it must look at the applications that a particular technology enables end-users to utilize. This means that the Commission must consider not only performance indicators like delivered bandwidth (i.e. “actual speeds”) and service latencies, but also other factors that impact the end-user experience such as adherence to the *Internet Policy Statement* and retail pricing practices. Below we discuss these indicators and factors in detail, proposing that at a *minimum*, broadband should be defined as a symmetrical telecommunications service that can reasonably deliver (at all times, including peak-use times) to *each* end-user of a connection, 5 megabits per second (Mbps) of bandwidth (in both the down and upstream directions), at latencies low enough to enable high-quality real time voice and video two-way communications. Such connections must be offered in a manner consistent with the 2005 *Internet Policy Statement*, and must be affordable, as measured by

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bill. To account for this error, both chambers re-passed the farm bill conference agreement as H.R. 6124.

<sup>4</sup> 7 U.S.C. 950bb. Public Law 110-246 amended Section 601 of the Rural Electrification Act of 1936 to reflect this definition of broadband service.

actual market uptake. This bare-minimum threshold standard should apply irrespective of technology, and should serve as a baseline for both mobile and fixed services. As we discuss below, this standard reflects the bandwidth and latencies currently required to engage in a two-way video communications with a vertical resolution of 720 non-interlaced pixels and a scan rate of 24 frames per second, utilizing the current most-efficient compression technology -- the MPEG-4 codec. But as we discuss below, this standard is the bare-minimum per user, who is engaging in nothing other than video communications. In reality, today's (and certainly tomorrow's) typical household is a multi-user/multi-tasking environment that requires multiples of the per-user bandwidth thresholds described above.

Thus, while the threshold we suggest above is appropriate for the purposes of fulfilling the Section 706 mandate, we believe that for the purposes of the National Broadband Plan the Commission should place less emphasis on the minimum thresholds, and more emphasis on an aspirational definition of broadband -- one that embodies the ARRA's frame of broadband as critical infrastructure. Such an aspirational definition would require symmetrical bandwidths on the order of 100Mbps, with longer term uses (i.e. beyond the next 5-10 years) easily requiring each line to deliver symmetrical bandwidth on the order of 1 gigabit per second (Gbps). Therefore, as it formulates the National Broadband Plan, we strongly urge the Commission to be guided by the requirements of the law, and adopt definitions that reflect the use of current and potential future high-bandwidth applications and services -- services that will be a key driver of the American economy for the next century.

## II. FORM, CHARACTERISTICS AND PERFORMANCE INDICATORS

### A. Broadband Definitions Should be Based on Delivered, not Advertised Speeds

As recognized in the instant *Public Notice*, advertised download and upload speeds do not properly measure the quality or utility of broadband services.<sup>5</sup> What limited empirical evidence exists suggests that advertised speeds can differ substantially from actual delivered speeds (particularly during primetime peak use periods)<sup>6</sup> and fail to capture the impact of latency, congestion, contention ratios, and other features that impact the quality of the end-user experience on a variety of multi-media applications.<sup>7</sup>

Any definition on broadband must be rooted in actual delivered speeds, because delivered speeds -- not advertised speeds -- influence the practical utility of the broadband connection. As the Commission suggests in the *Public Notice*, one component of the evaluation should be whether a given broadband connection can support a set of applications.<sup>8</sup> We agree that the definition of broadband should be rooted in the potential uses of connections, and indeed, this approach is exactly how Congress has previously defined broadband. Section 706 of the Telecommunications Act of 1996 directs the Commission to promote the timely deployment of

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<sup>5</sup> “Comment Sought on Defining ‘Broadband’: NBP Public Notice #1,” DA 09-1842, FCC Public Notice, August 20, 2009 (*NBP Public Notice #1*).

<sup>6</sup> See Ofcom, "UK broadband speeds 2009: Research Report," July 28, 2009, p. 8; Organization of Economic Co-operation and Development, "OECD Communications Outlook 2009," August 2009, pp. 108-113. The latter offers data from experiments conducted in OECD countries that indicated that DSL, Cable modem, mobile data, FTTH, and satellite respectively offered actual speeds at 65%, 77%, 57%, 48%, and 53% of advertised speeds.

<sup>7</sup> Advertised speeds that do not account for the degree of last-mile bandwidth sharing (expressed most commonly by a contention ratio) portray a misleading picture of local network capacity actually available to end-users, as shared network connections suffering from excessive oversubscription can result in substantial resource constraints that directly impact usability. This is not to say that residential consumers should receive so-called Service Level Agreements (SLAs), but consumers should be informed about the level of local oversubscription, how that relates to other technologies and other network providers, and consumers should be offered an estimate of what they can reasonably expect to receive during typical peak use periods.

<sup>8</sup> NBP Public Notice #1, page 3.

“advanced telecommunications capability” throughout the United States<sup>9</sup> -- defined as “high-speed, switched, *broadband* telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology.”<sup>10</sup> Similarly, the 2008 Farm Bill defined “broadband service” as any technology “having the capacity to transmit data to enable a subscriber to the service to originate and receive high-quality voice, data, graphics, and video.”<sup>11</sup> Advertised speeds of broadband connections simply do not allow users or the Commission to determine whether a particular service is capable of originating or receiving high-quality video telecommunications. Although knowledge of contention ratios in conjunction with advertised speeds would be more informative, actual speeds are the only method for fully determining the practical capabilities of a service.

But of course the Commission cannot itself practically determine the actual speeds of all U.S. high-speed Internet connections. But it can establish a standard for classifying delivered speeds. We suggest that such a measure would be the bandwidth that service providers can be reasonably expected to deliver to end users on their own networks during peak-use times. For example, if the Commission chooses to define broadband as a low-latency non-discriminatory telecommunications service that operates at minimum symmetrical bandwidth of 5Mbps, then that 5Mbps should not be an advertised theoretical speed, but the speed that ISPs can deliver to end users 95 percent of the time during primetime hours under typical usage conditions.<sup>12</sup>

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<sup>9</sup> 47 U.S.C. § 157nt.

<sup>10</sup> *Ibid* (emphasis added).

<sup>11</sup> 7 U.S.C. 950bb.

<sup>12</sup> *Supra* note 7. As a part of the National Broadband Plan, the Commission should explore regulatory and other methods for changing how U.S. ISPs currently advertise their high-speed Internet services. The lack of regulatory oversight and market clarity in the advertisements for high-speed Internet service is yet another example of how America lags behind our overseas counterparts. For example, the U.K. regulator OfCom has established a “Code of Practice” on advertised broadband speeds. Some overseas ISPs have shifted from publishing “up to” speeds

## **B. Broadband Should be Defined as Those Services With Latencies Low Enough to Facilitate High-Quality Real-Time Voice and Video Communications**

The application-based definitions of broadband contained in the 1996 Telecom Act and the 2008 Farm Bill require the consideration of latency as well as bandwidth. Both legal definitions of broadband are centered around high-quality two-way voice and video communications -- digital “conversations” that require low latencies in order to be considered as “quality.” Though the level of latency needed to facilitate a quality real-time voice or video communication is somewhat subjective, it is on the order of 100 milliseconds (ms).<sup>13</sup> Cable modem, DSL and fiber optic wireline technologies routinely deliver latencies below 100ms. Terrestrial wireless connections are on the cusp of acceptability, with mobile wireless data connections having latencies near 150ms<sup>14</sup> (but suffer from other sustained bandwidth delivery-related reliability issues).<sup>15</sup> However, satellite-based broadband services as currently offered do

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to disclosing “speed bands.” The Finnish Consumer Agency now requires ISPs to give a realistic portrait of speeds in marketing materials, and to disclose geographic constraints. In the Czech Republic consumers are given a choice of contention ratios within a single speed tier. All these examples point to methods that would offer consumers more accurate information concerning the products they purchase in the marketplace. Given that nearly all U.S. high-speed Internet ISPs offer higher levels of service (based on advertised speeds) for higher prices, it is reasonable for consumers in the higher more expensive tiers to expect to receive a higher level of service relative to the lower priced offerings.

<sup>13</sup> For VoIP “A rule of thumb is that one-way latency should not exceed 150 milliseconds.” See “How To Determine Bandwidth Requirements,” inGate, July 8, 2008, available at [http://www.ingate.com/files/Application\\_Note\\_Bandwidth.pdf](http://www.ingate.com/files/Application_Note_Bandwidth.pdf).

<sup>14</sup> See Dan Meyer, “Network speed Tests shootout: AT&T, Verizon, Sprint modems go head-to-head,” *RCR Wireless News*, Sept. 11, 2008. See also

<sup>15</sup> The issue of “reliability” is particularly important when considering shared last mile networks, particularly wireless networks. In a recent field test, *PC World* magazine tested 3G services on a variety of factors, including “reliability”, which was defined as “the percentage of tests for a given city in which we could detect a signal, connect at a reasonable speed (faster than dial-up), and sustain an uninterrupted connection for the duration of a 1-minute streaming test.” In this test, some 3G networks had reliability levels as low as 52 percent. See Mark Sullivan, “A Day in the Life of 3G,” *PC World*, June 28, 2009. Available at <http://www.pcworld.com/printable/article/id,167391/printable.html>.

not meet the current legal definition of broadband, either from a bandwidth or latency perspective. While such services may be the only option for the most remote locations, they have no place in an aspirational National Broadband Plan.

**C. Mobility is an Important Sector of the Data Communications Industry and its Growth Should Be Nurtured. But Mobile Data Services Should Not Be Defined Separately From Fixed Services.**

Although mobility is an increasingly important and highly valued premium feature for data services, mobility is nowhere to be found in the current legal definitions of broadband as laid out in the 1996 Telecom Act and the 2008 Farm Bill. Mobility is valuable for some applications but not for most. Furthermore, mobility is not currently well defined (how fast over what distance serves as the dividing line between fixed and mobile wireless services?) Mobility is also not a valuable indicator for many Congressional and FCC policy goals, including measuring the ongoing deployment of broadband services (Section 706 contains nothing that speaks to the need for mobility -- if a service is capable of facilitating the origination and receipt of high-quality video content, then the Section 706 test is met. This binary question is answered without regard to whether or not the service also offers this capability while an end-user is in motion). Thus we strongly urge the Commission to adopt performance indicators for bandwidth, latency, reliability and other features that speak to a technology's application capability (such as usage restrictions), and ignore pleas to establish separate standards for services simply because they offer mobility. Defining a separate threshold for "mobile broadband" does not fit the goal of tailoring broadband definitions to the utility of the service. Internet access services, whether mobile or fixed, must still be measured against the same applications and uses. Attempts to establish a lower mobile speed threshold for broadband Internet access services, in order to lend a hand to wireless services to allow them to qualify more easily for funding or other purposes,

would place a thumb on the scale of competition without any corresponding benefits in service utility.

**D. Performance Indicators Such as Speeds Should be Defined in the Path Between an End-User and First Point of Interconnection.**

The Commission should define broadband Internet access speeds of an end-user Internet access connection based on the infrastructure's capabilities in the portion of the communications path that is under the control of a particular ISP. This includes the so-called "last mile" (i.e. the "line" that carries data to/from an end-user to the first point of aggregation, be it a central office, remote terminal, node, headend, or wireless tower). But the portion of the network under the control of an ISP extends beyond this final/first segment of the network, over the so-called "middle-mile" portion of the networks that lead from the first point of aggregation to the first point of interconnection (usually at a public Internet Point of Presence (POP) or private peering point).<sup>16</sup> The *Public Notice* asks whether to measure the local access link or an end-to-end path, among other options. The *Public Notice* also asks about the feasibility and verifiability of performance indicators, which are particularly relevant here. Although the utility of a broadband

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<sup>16</sup> For the purposes of characterizing performance indicators it is logical to measure the factors that are under the direct control of any individual ISP. It is not ISP A's fault if ISP B runs a poor quality network. Defining performance indicators between *any* two endpoints may appear to be reasonable (as it relates to the full end-user experience), but it is impractical from a policy standpoint. However, certain potential performance indicators lose their meaning when carried from the end-user to the first point of interconnection. Contention ratios are most informative when measured from the end-user to the first point of aggregation, not when measured across a single ISP's network topology (which likely includes many redundant middle-mile network paths). In previous filings, we have encouraged the Commission to collect granular contention ratio data, defined from the points between end-user and first point of aggregation. See Further Reply Comments of Consumers Union, Consumer Federation of America, Free Press and Public Knowledge, *In the Matter of Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscriber Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscriber Data*, WC Docket No. 07-38, Sept. 2, 2008, at p. 17.

Internet access service can be impacted by multiple stages along the entire pathway between two network nodes, measuring a single end-to-end path or even a set of end-to-end paths cannot provide a complete picture of the utility of an end user broadband Internet access service along other paths. However, speeds of connections between end-users and first interconnection points contribute clear and consistent information to the speed and utility of all Internet communications pathways, as these are the connection points under direct control of individual ISPs. Defining broadband speeds over this portion of the network will promote consistency and predictability of measurement, and thus more useful information for consumers and the Commission.

**E. The Commission Should Define Broadband Pegged to Both Baseline and Aspirational Standards and Thresholds**

As the Commission suggests, there is no “magic number” speed threshold that identifies broadband Internet access for all of the Commission’s various policy purposes. However, it seems valuable to identify thresholds for two categories of Commission purposes. First, the 2008 Farm Bill and Section 706 in the 1996 Act both indicate that “broadband” Internet access should be able to support high-quality two-way voice, data, and video communications. This utility-driven threshold can be considered a “baseline” threshold for purposes of meeting the statutory obligations of measuring deployment under section 706. In addition, this baseline minimum threshold should guide Commission broadband policymaking activities such as any future efforts to modernize the Universal Service Fund to extend broadband Internet access into unserved areas. But for the purposes of the National Broadband Plan itself -- a plan that should aim to restore the role of the United States as a world leader in broadband -- the Commission should establish an evolving and aspirational “target” threshold that, if reached widely throughout the country, would represent a truly world-class “future-proof” network. This target

threshold may also track the utility demands of less common but valuable high-capacity Internet applications, including remote medical diagnostics and other high-performance tools. Such an aspirational target would serve the other myriad of network purposes envisioned in other portions of the ARRA. These purposes such as smart grids, distance learning and telehealth, collectively have transformed the view of broadband as just another consumer service, to an essentially infrastructure, one that the 21st economy will be built upon. This new paradigm requires the Commission focus less on minimum thresholds and more on long-term aspirational infrastructure goals.

Finally, some areas of Commission policy, including mapping and fundamental consumer protections, should explicitly include all data services regardless of whether or not they meet the definition of broadband for the purposes of the National Broadband Plan. For example, offering a “slow” Internet access service should not become a definitional safe harbor to allow providers to trample on the rights of consumers under the *Internet Policy Statement*.<sup>17</sup>

#### **F. Broadband Definitions Should Consider Explicit Limitations to Services**

The Commission should define broadband Internet access services as only those services that provide access to the full Internet. More specifically, Internet access services with arbitrary limitations on the content that can be accessed or the applications that can be used should not be placed in the same definitional category as services without such limitations.<sup>18</sup>

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<sup>17</sup> See *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, CC Docket No. 02-33, Policy Statement, 20 FCC Rcd 14986 (2005) (Internet Policy Statement).

<sup>18</sup> See *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691 (2008) (*2008 Form 477 Order and FNPRM*), note 85, stating that the Commission would only collect information on mobile data connections that provided unfettered access to the full Internet (“In particular, a device which can access only a limited set

Such a distinction is necessary to realize the utility-based definition of broadband Internet access services. If, for example, the terms of service of a broadband Internet access service prohibit the use of a Voice over Internet Protocol program such as Skype, then the technical capability of the service to offer the throughput and the latency required to operate Skype means nothing. If the purpose of establishing a definition for broadband is to identify what that connection can and cannot do, then artificial limits on usage imposed by the service provider have the same practical effect as capacity limits imposed by network architecture. In this vein, the low daily or monthly bandwidth caps like those currently imposed on satellite and mobile wireless services cripple the practical utility of such connections, and any such limitations should be factored into the definition of broadband for the purposes of the National Plan.

### **III. THRESHOLDS**

#### **A. Section 706 and the 2008 Farm Bill Establish the Proper Minimum Baseline Standard for Broadband Service**

As discussed above, the Commission should set a minimum baseline threshold definition for broadband at 5 Mbps downstream and 5 Mbps upstream in order to adequately reflect the requirements of current law, as enacted in the 1996 Telecommunications Act and the 2008 Farm Bill. Of course, based on the record in past proceedings, we fully recognize that incumbents for the most part will scoff at a symmetrical definition; some will scoff at bandwidth requirements above 0.768Mbps; while others will likely acknowledge the definitional language in Section 706 and the Farm Bill, but will try and convince the Commission to not place a rigid interpretation on these sections of the law. But the Commission must ignore any such self-serving pleas for watered-down standards. There is simply no getting around the fact that the only existing legal

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of websites optimized for wireless device usage, such as a device which can only download ringtones and games or send messages, does not permit access to the full Internet”).

definitions of broadband offered by Congress both center around the delivery of symmetrical bandwidth that enables high-quality multi-media communications. These two sole definitions were enacted 12 years apart, but are virtually identical. Neither contains a number, as Congress rightly recognized the inherent evolution of subjective terms such as “high-quality.” In 1996 high-quality video was not the 1080p, 60fps high-definition (HD) video we associate with the term today. Similarly, current HD standards will not be considered “high-quality” in the future.<sup>19</sup>

How then should the Commission peg a bandwidth figure to the language of “high-quality video”? First, it is clear the language of “originate and receive” requires the standard to be symmetrical. Second, an examination of current video transmission technologies indicates that the Commission’s definition must be, at a minimum 5Mbps symmetrical. Using the MPEG-2 video compression standard (that used by cable TV providers), a user would need approximately 2 to 4 Mbps of upload speed to originate a *standard-definition* quality television video signal, and 30-40 Mbps of upload speed to originate a professional high- definition quality television video signal. The MPEG-4 codec, version h.264 (used notably by IP video service provider Apple) transmits 720p HD video with an approximate average bit rate of 4.5Mbps. Other providers offering 1080p quality HD IP video state that end-user connections should be between 8 and 10Mbps in order to ensure adequate quality.<sup>20</sup> Slingbox, a company that manufactures a consumer device that can be used to redirect a customer’s home HD television signal over the Internet, recommends that users have “sustained upload speeds” of at least 2 Mbps “for a *good*

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<sup>19</sup> For instance, standards have already been created that well surpass current HD standards such as 4K and Super Hi Vision. See Chris Foresman, “Beyond HDTV: 4K digital cinema might soon come home,” *Ars Technica*, April 27, 2009; also Adam Frucci, “Super Hi-Vision Makes Your HDTV Obsolete Already,” *Gizmodo*, May 29, 2007.

<sup>20</sup> Dan Rayburn, “Microsoft Xbox 360: 1080p Streaming Will Require 8-10 Mbps Connection for Full Quality,” *Seeking Alpha*, June 9, 2009.

streaming experience” -- though the end-users of the Sling product are most often watching the redirected content on a small computer screen.<sup>21</sup>

The term “high-quality” is inherently subjective, but pegging the standard to that used by commercial providers to originate high-definition video is consistent with the objectives and definitions contained in Section 706 of the 1996 Act and the 2008 Farm Bill. Furthermore, without compression, current HD would require bandwidth of 1.5 Gbps,<sup>22</sup> and over compression is a common complaint among consumers of current commercial HD video products. Whatever bitrate the Commission settles on should be influenced by the only current definitions contained in the law. The Commission should be wary of relying on the self-serving definitions offered by providers in previous comments.<sup>23</sup>

However, the definitions in both Section 706 and the Farm Bill do not speak directly to multitasking/multi-user environments. Pegging the broadband definition to 5Mbps symmetrical is adequate if we assume the “subscriber” (the term used in the Farm Bill definition) or “user” (the term used in Section 706) is a single computer performing a single task. But today’s typical wired home contains multiple users on a local area network, each who might be multitasking. Under such conditions, a 5Mbps symmetrical standard is inadequate for these “users” or “subscribers” to originate *and* receive high-quality voice *and* video *and* data content. In this light, it may be more appropriate for the Commission to set the minimum threshold somewhere between 10 and 50 Mbps symmetrical.

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<sup>21</sup> Emphasis added; note the use of the word “good” and not “high-quality” or “excellent”. See <http://support.slingmedia.com/get/KB-005850.html>.

<sup>22</sup> “Calit2 Steps up HD-Over-IP Telepresence Partnership With University of Washington,” Press Release, University of California – Jacobs, School of Engineering, Sept. 25, 2006.

<sup>23</sup> Comcast’s proposed definitions align very closely with their typical offerings in a market. Furthermore, Comcast proposes connections that increase in asymmetry as the speed rises. See Comments of Comcast Corporation, In the Matter of *A National Broadband Plan for Our Future*, GN Docket 09-51, p. 17 (2009).

## **B. The Commission Must also Develop an Aspirational Threshold Standard**

As discussed above, we strongly urge the Commission to set a higher aspirational target threshold for broadband Internet access speeds that would bring the United States in line with, or ahead of world leaders in broadband networks such as Korea and Japan. Today such a standard would be on the order of 50-100Mbps symmetrical. In the future, the target could be above 1Gbps symmetrical. The Commission must be bold. It cannot shy away from ambitious goals simply because they are well above what is likely to be commonly available in the U.S. market over the next few years. A symmetrical 50 or 100Mbps aspirational standard may seem lofty today, but such a threshold would still represent a step below services already deployed by South Korean and Japanese companies. Ubiquitous network infrastructure capable of delivering speeds exceeding 100Mbps will serve as the breeding ground for future application innovation, and will ensure America thrives and prospers in the rapidly evolving global digital economy.

A decade ago, even the most imaginative futurists would have been hard pressed to imagine the myriad of applications and services developed for today's high-speed Internet infrastructure. This lesson of the past makes it quite clear that any attempt to predict possible innovations that could occur on a truly "broad" broadband network would be a fool's errand.<sup>24</sup>

However, it is clear that the applications that are currently being used by more and more consumers will require much more bandwidth than is currently available to the average U.S. households. One factor driving this increased bandwidth demand is the proliferation of Internet-enabled devices. Households increasingly have multiple computers, gaming systems and mobile devices -- all connecting to the Internet. Furthermore, many other devices such as femtocells,

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<sup>24</sup> One clear implication is that without preservation of Internet's openness many of those uses will never be realized. *See e.g.* Anick Jesdanun, "As Internet turns 40, barriers threaten its growth," *Associated Press*, Aug. 28, 2009.

home monitoring systems, Internet-enabled televisions, and Roku-style IP media-delivery devices are poised to gain widespread market use.

The growth in consumer familiarity with Internet-delivered video and frustration with inflexible traditional MVPD product bundles portends a large growth in the demand for bandwidth, particularly during primetime and weekend hours. With nearly half of American households now owning High-Definition televisions, a variety of new Internet video delivery applications are certain to gain widespread use among the consumers hungry for high quality content.<sup>25</sup> For example, Microsoft's Xbox 360 offers users the ability to stream HD content to their television -- so long as they have a broadband connection that can deliver minimum sustained speeds of 8 Mbps.<sup>26</sup> Such baseline bandwidth requirements are certain to grow as individual family members view separate content simultaneously<sup>27</sup> and consumer demand for

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<sup>25</sup> "50.5 million households own HDTVs, Centris says," *BroadcastEngineering*, Aug. 18, 2009.

<sup>26</sup> Dan Rayburn, "Microsoft Xbox 360: 1080p Streaming Will Require 8-10 Mbps Connection for Full Quality," *Seeking Alpha*, June 9, 2009.

<sup>27</sup> In his paper *A Blueprint for Big Broadband*, John Windhausen offered the following scenario:

"A home in middle America may include dad watching a live HDTV football game; daughter using the computer to access streaming video of a college course lecture; son playing a real-time interactive game; mom engaged in a videoconference for her home-based business; grandma, visiting for the holidays, downloading an episode of Masterpiece Theatre; and grandpa hooked up to an uninterruptable medical video feed to a remote monitoring facility... While all these uses are taking place, the home appliances are being monitored and video home security devices are sending video feeds back to an emergency alarm center. Together, this single home could easily consume 150 megabits of bandwidth with only the uses we can imagine today. Homes of the future will likely include even more imaginative products and services."

See John Windhausen, "A Blueprint for Big Broadband," Telepoly Consulting, EDUCAUSE white paper, January 2008.

lossless picture and sound quality require even sharper quality. In short the possibilities are only limited by the available bandwidth supply -- supply that exhibits a declining cost curve.<sup>28</sup>

The Commission must therefore ensure that the definition of “broadband” evolves with the habits of users -- both here and the markets of global broadband leaders. This evolution can be accelerated if the Commission and other policymakers view broadband as essential infrastructure -- one where the “egg” of the network drives the development of the “chicken” of applications and services. Only time will tell what uses emerge in coming years.<sup>29</sup> Even the industry has recognized that the Internet community will always take advantage of higher speed connections - “it is not so far-fetched to see 100 meg [Mbps] product becoming the norm in five or 10 years, and we expect our customers will find exciting ways to use that capacity.”<sup>30</sup>

### **C. Any Measure Must Account for Affordability**

The Commission must also consider the cost of end-user connections. For instance, a few operators do offer advertised downstream speeds as high as 50-100 Mbps.<sup>31</sup> Unfortunately, these offerings are only available at an extremely high price. For example, in the areas served by Verizon FiOS, consumers are able to purchase service with advertised download speeds of 50

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<sup>28</sup> However, none of these examples of potential bandwidth-intensive applications means that the Internet is going to quickly become an unusable congested mess absent some draconian pricing or network management intervention. Provider and vendor driven claims that an impending bandwidth “exaflood” will grind the Internet to a halt should be viewed with skepticism. Moreover, providers have yet to support these exaflood assertions with any actual data, nor have they provided any explanation as to why network upgrade costs cannot be covered by the tens of billions of dollars consumers already pay ISPs each year.

<sup>29</sup> The combination of low-cost large high-definition displays and the availability of high levels of low-cost bandwidth could drive applications innovation revolution. *See e.g.* “Blaise Aguera y Arcas demos Photosynth,” *TED*, May 2007.

<sup>30</sup> Brian Santo, “It’s the End of Cable As We Know It (And We Feel Fine),” *CED Magazine*, May 1, 2008.

<sup>31</sup> Karl Bode, “Cablevision 101Mbps: \$300 ‘Activation Fee’,” *DSLReports.com*, May 11, 2009.

Mbps and upload speeds of 20 Mbps (the highest upstream speeds of any major provider). But the monthly cost of this offering is \$164.95 -- more than double the cost of 25Mbps downstream/15Mbps upstream package.<sup>32</sup> Thus, despite higher speeds offerings being deployed in a few select areas, they remain *practically* unavailable to the average household. In crafting a national policy to encourage maximum utilization of the network, the Commission must focus on the issue of affordability and how current pricing practices discourage maximum utilization.

#### IV. UPDATES

##### **A. The Commission Should Update The Minimum and Aspirational Thresholds As it Issues the Congressionally-Mandated Annual Section 706 Reports**

With the Broadband Data Improvement Act Congress required the Commission to issue its Section 706 report annually, as opposed to the previously vague “periodic” timetable. This annually inquiry provides a reasonable and appropriate vehicle for ongoing re-evaluation of broadband definitional issues. The Commission’s procedures for developing its Section 706 report include a comment cycle, which provides an opportunity for public input on the issue of reasonable and timely deployment of broadband services. The Commission can use this public comment period to solicit input into the current performance thresholds and whether they should be updated. Through public comment, the Commission can seek input in response to pointed

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<sup>32</sup> Verizon’s current (as of August 31, 2009) published prices for its stand alone month-to-month FiOS service is as follows: 15Mbps down/5Mbps for \$64.99 per month; 25Mbps down/15Mbps up for \$77.99 per month; and 50Mbps down/20 Mbps up for \$164.99 per month. The company no longer offers a symmetrical service package. This pricing structure is certainly in no way reflective of the underlying cost of service, and appears to be designed to funnel most users into the \$77.99 tier, while reaping the surplus from those who are willing and able to pay more than double the cost for a doubling of downstream speed and only a slight increase in upstream speed in the 50Mbps/20Mbps package.

questions on the performance demands of new and developing Internet applications and services, and can gather data on international networks and typical global speeds.<sup>33</sup>

### **B. Maintain Consistency in Data Collections**

In the instant *Public Notice* the Commission also seeks comment on how modifications of the definitions will impact the Commission's ability to monitor broadband deployment and adoption. Fortunately, the Commission's recent modifications to Form 477 (the primary source of information used in monitoring broadband deployment and adoption) included an expansion of the "tiers" of speeds used for service reporting.<sup>34</sup> The discrete and distinct tiers of Form 477, which distinguish both download and upload speeds, will help ease the Commission's task of analyzing broadband services over time. As the speeds of broadband services increase over time, it is almost certain that the Commission will need to segment the current upper speed tier or tiers of Form 477 into more discrete bins, in order to better monitor broadband marketplace development. However, this future subdividing of current speed tiers can be done in a manner that still permit comparisons to older data via aggregation of the newly created sub-tiers.

## **V. CONCLUSION**

The question of how to define broadband is vital, but it is one that Congress has provided a clear and consistent answer to over the past dozen years. A single static number cannot define "broadband" -- it can only be captured by evolving standards that are based on what users can do with their connections. As embodied by the Recovery Act, "broadband" is about the process of

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<sup>33</sup> The Commission should aggressively monitor the real-world relevance and the utility of its target and baseline thresholds. If the aspirational thresholds becomes outpaced by foreign networks and would no longer establish the United States as a global broadband leader, then the Commission should update it. Similarly, if application demands have advanced to the point where the baseline threshold would not allow consumers to functionally use mainstream Internet applications and services, then the baseline threshold should be adjusted.

<sup>34</sup> See *Form 477 Order*, *supra* note 18.

two-way end-to-end communications over the public Internet -- communications that will take place over critical public infrastructure. Viewed through this lens it becomes clear that the Commission must set both a minimum baseline standard that is consistent with the current definitions of “broadband” contained in the law, and set an aspirational target standard that will ensure American prosperity in the global communications economy.

Respectfully submitted,

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