

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of	)	
	)	
International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act	)	GN Docket No. 09-47
	)	
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 Fashion	)	GN Docket No. 09-137
	)	
	)	

**COMMENTS OF VERIZON AND VERIZON WIRELESS ON DEFINING  
BROADBAND CAPABILITIES**

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## **I. Introduction and Summary**

Context is critically important to developing an appropriate “definition” for broadband. Broadband refers to a broad range of networks and services, put to a wide range of uses, and exhibiting many complex technical attributes that are often in flux (particularly in the case of best-efforts services accessing the “network of networks” that makes up the public Internet) as a result of factors that can be either inside and outside of any particular network. No single definition of broadband will make sense for all purposes – either from the perspective of end-users or of policymakers.

In the context of defining broad national goals towards which this country’s broadband marketplace and policymakers should work, the Commission should set aggressive, long-term targets which can be periodically revisited and revised to account for changes in technology and the continuing evolution of consumers’ and the public’s uses of broadband. For example, setting a broad objective of moving toward a downstream target of 50 Mbps for fixed services and 5 Mbps for mobile services would be an aggressive longer term goal, recognizing that as the marketplace continues to develop there will continue to be variability in the levels of service available in particular areas for the foreseeable future based on a range of technological, geographic, economic and other factors. Verizon<sup>1</sup> itself is investing billions of dollars towards those goals. Appropriate broad goals should distinguish between fixed and mobile services because, while mobile services provide consumers the significant benefit of mobility, inherent technical limitations will likely always mean that such services are subject to particular performance constraints that differ from fixed services.

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<sup>1</sup> In addition to Verizon Wireless, the Verizon companies participating in this filing (“Verizon”) are the regulated, wholly owned subsidiaries of Verizon Communications Inc.

By the same token, for purposes of broadband reporting and tracking progress towards any such broad long term goals, the existing definition employed by the Commission, the National Telecommunications and Information Administration (NTIA), and the Rural Utilities Service (RUS) continues to make sense. Today, the Commission collects information both on the availability of services that meet its threshold definition for a basic first generation level of broadband service, as well as on the availability of services that meet a number of upstream and downstream speeds above that threshold level. The current threshold definition, therefore, establishes a workable baseline for use in identifying where basic first generation broadband services are and are not available. This straightforward definition also effectively captures the range of services available to consumers over all different broadband platforms, and it has the benefit of being consistent with the Commission's existing data collection efforts (thus facilitating comparisons over time) and with the definition used for purposes of the broadband mapping and infrastructure projects under the NTIA and RUS stimulus programs. In addition, when combined with the Commission's practice of collecting data over multiple ranges of upstream and downstream speed tiers above the threshold level, this approach will enable the Commission to have a thorough and textured understanding of the broadband marketplace at a very granular level. The Commission and other policymakers can use this information to track progress, at a very localized level, towards the dual goals of promoting the availability of some level of broadband service to consumers throughout the country and of promoting the availability of more advanced, higher-speed services over time.

## II. Responses to Commission's Questions

As requested in the Public Notice<sup>2</sup>, Verizon provides the following responses to the Commission's questions concerning the definition of broadband:

### 1. Form, Characteristics, and Performance Indicators for Defining Broadband.

#### a. The Form That a Definition of Broadband Should Take

Although broadband services are multi-faceted and evolving, the Commission should not attempt to capture every aspect of broadband through complex "definitions" that are divorced from the context in which the definitions are to be employed.

In setting out national goals concerning the direction of U.S. broadband marketplace, the Commission should define ambitious long-term targets that encourage more widespread availability of next-generation fixed and mobile broadband networks capable of supporting an expanding range of innovative applications. As explained in more detail below, separate targets for fixed and mobile services are needed in light of the technological differences that affect the performance constraints and present other unique challenges for mobile providers.<sup>3</sup> For example, setting a broad objective of moving toward a downstream target of 50 Mbps for fixed services and 5 Mbps for mobile services would be an aggressive longer term goal, recognizing that as the marketplace continues to develop there will continue to be variability in the levels of service available in particular areas for the foreseeable future based on a range of technological,

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<sup>2</sup> *Comment Sought on Defining "Broadband,"* Public Notice, DA 09-1842 (Aug. 20, 2009).

<sup>3</sup> Fixed wireless may be characterized by some of the same constraints on throughput as mobile broadband, as discussed below. Fixed wireless generally offers better performance efficiencies than mobile, however, because services are associated with particular service addresses (and thus more predictable demands) and do not have to manage services to accommodate mobility.

geographic, economic and other factors.<sup>4</sup> The Commission could revisit those targets periodically as it tracks the country’s progress and monitors the changing needs of consumers.

For purposes of reporting and tracking the broadband marketplace, however, a broader “definition” that provides a more comprehensive view of the broadband marketplace is needed. For these purposes, the Commission should continue to consider broadband services of all types that offer advertised speeds of at least 768 kbps downstream and 200 kbps upstream. Maintaining this existing straightforward, threshold definition would provide many benefits to policymakers and the public. First, there is substantial value in maintaining a threshold that will enable the Commission to identify a baseline of areas where first-generation broadband services are available. Doing so will facilitate the Commission’s ability to collect comprehensive data across the full range of services available to consumers over time using comparable data. As NTIA and RUS recently concluded, the current broadband speed threshold “is the most technologically-neutral option (because it encompasses all major wired and wireless technologies).”<sup>5</sup> Moreover, by using this threshold in conjunction with the data that the Commission collects on a large range of upstream and downstream speed tiers, the Commission and other policymakers would have a full and meaningful view of the broadband marketplace generally, but also be able to assess progress on a very localized level towards the dual goals of promoting the availability of some level of broadband service to all consumers and of promoting more widespread availability of more advanced, higher-speed services over time.

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<sup>4</sup> For example, as the Commission is aware, certain low density, hard-to-serve areas have no broadband service today. These areas also will be challenging in supporting investments to increase the speeds or capabilities of services to reach these aggressive target levels.

<sup>5</sup> NTIA, *Broadband Technology Opportunities Program*, Notice of Funds Availability and Solicitation of Applications, 74 FR 33104, 33130 (July 9, 2009) (“Broadband NOFA”).

Second, using this approach will ensure consistency between federal government agencies as they address broadband issues. For example, NTIA and RUS will soon be funding “broadband” infrastructure projects – and state-level initiatives will be mapping broadband at the local level – based on the 768 kbps/200 kbps definition. In fact, NTIA and RUS settled on this threshold, in part, because “it leverages the FCC’s expertise [and] utilizes an established standard.”<sup>6</sup> It would be disruptive and introduce confusion if the Commission were to now create a new and different definition of “broadband” that might not even include broadband projects being funded under the Recovery Act or that made less relevant the data being assembled through broadband mapping efforts.

Third, one of the significant benefits of this approach is its simplicity, making it relatively easy for policymakers and the public to understand and work with. Any definition that seeks to incorporate numerous different technical variables beyond advertised speed for purposes of reporting and tracking purposes would quickly become unworkable. For example, although latency and jitter may affect the performance of certain applications, as discussed below, they are also inherent in best-efforts Internet access services and can be influenced by a wide range of factors at different points within the network of networks making up the public Internet. Measuring “actual” speeds presents many of the same issues. Moreover, these types of factors are hard to measure and vary considerably over time. They do not lend themselves to any easy snapshot number that could be used to determine whether particular services could be reported as “broadband.” Establishing the relative significance of the many potential variables would further frustrate efforts to track broadband using a multi-variable definition. For example, how would any definition weigh the benefits of increased speed or mobility against other potential factors,

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<sup>6</sup> Broadband NOFA at 33129-130.

such as latency or jitter? While consumers should be free to make such assessments and select services that best serve their interests and uses – and providers have every incentive to ensure that services meet their subscribers’ expectations and enable the applications that they want to use – the Commission should avoid unwieldy, new regulatory definitions that seek to do too much.

Fourth, and relatedly, incorporating additional technical variables beyond advertised speed for purposes of broadband reporting and tracking would not be technologically neutral, and would raise questions about whether a particular service would be considered “broadband” in some cases but not others. For example, would a satellite service be defined completely out of “broadband” based on inherent latency attributes? Would a cable modem service qualify as “broadband” in one neighborhood but not another, if the second neighborhood happened to include a user whose activity increased the overall level of jitter or latency? Would a mobile service cease to be broadband if the user travels from one cell site to another that happens to be experiencing higher demand?

Finally, as NTIA and RUS recently recognized in selecting the current 768 kbps/200 kbps definition for purposes of broadband stimulus programs, such services “facilitate[] the use of many currently common broadband applications (*e.g.*, web browsing, VOIP, and one-way video).” Broadband NOFA at 33129-130. Many of the applications supported at this level can facilitate other services that further important national interest, including improved access to governmental services and basic distance learning and telemedicine applications. Moreover, given the fact that the deployment of next-generation networks is impractical in some areas at this time given various technological, geographic, and economic considerations, this threshold

definition takes into account that some services at this level remain “cost-effective solutions for difficult-to-service areas.” Broadband NOFA at 33130.

Of course, recognizing a straightforward threshold definition of what constitutes first-generation broadband for tracking and reporting purposes should not confuse the floor with the ceiling for broadband policy more generally. As noted above, more ambitious national objectives concerning the movement towards higher speed services can help to make that clear. Moreover, in most areas of the country, multiple broadband providers exist and already offer a range of services well above any baseline level for broadband reporting purposes, and competition in those areas continues to drive providers to increase both the reach and capabilities of their services. For example, Verizon continues its rollout of its FiOS services and is preparing for the rapid deployment of its 4G mobile wireless service using LTE technology. Verizon’s competitors are responding in kind by upgrading their own services to better compete.

b. Whether to Develop a Single Definition, or Multiple Definitions

Any “definition” related to broadband must be considered in connection with the context in which the definition will be used. As discussed above, in the context of setting longer term national objectives, the Commission should set ambitious targets for both fixed and mobile broadband services, recognizing that as the marketplace continues to develop a variety of technological, geographic and economic considerations would have to be considered.

For purposes of collecting data and tracking the nation’s progress towards longer term broadband goals, however, the Commission should maintain the threshold definition that it, NTIA, and RUS currently apply. This sets out a straightforward and easily administrable threshold based on advertised speeds that minimizes confusion, facilitates reporting and tracking of broadband, and maintains consistency with other federal broadband programs. In conjunction

with the Commission's practice of collecting granular speed tier data above this threshold, the Commission and other policymakers would be able to track progress towards higher national broadband goals, both at the national level and in particular locations.

c. Whether an Application-Based Approach to Defining Broadband Would Work

Given the variation, and continued evolution, in applications, the Commission should not define broadband strictly by reference to the requirements of applications. In setting national objectives towards which the country should move, however, the Commission should take into account the evolving demands placed on broadband networks and services by new or emerging applications. For example, the Commission could appropriately consider that more advanced and emerging applications, such as the streaming of HD video clips, would be possible with mobile broadband services offering 5 Mbps of speed and that 50 Mbps fixed services could support more advanced telemedicine services or telepresence services.

In order to facilitate a clearer understanding of the demands placed on broadband networks and services by new and evolving applications – and also to help ensure informed choices as consumers consider which applications to use – the Commission should encourage application developers fully and clearly to disclose to consumers the foreseeable effects of their applications on a subscriber's broadband service, on the consumers' devices or other applications, on the broadband network, and on other broadband subscribers. Such information would facilitate informed consumer choice.

d. Key Characteristics and Specific Performance Indicators that Should Be Used to Define Broadband

As explained above, given the many types and sources of variation among different broadband services (or even the same service over time), the most sensible and workable way of defining broadband is by reference to advertised speeds. In addition to providing a consistent

and workable baseline, this approach is the most meaningful to consumers. Other technical characteristics such as “actual” speeds, latency or jitter of services – while potentially relevant to a particular application’s performance at a point in time – are more difficult to measure and more likely to vary over time, in the case of best-efforts Internet access services, as a result of network conditions both within and outside of a provider’s network. As such, other performance indicators are not well-suited to be included in any broadband definition adopted by the Commission. That notwithstanding, it is critical that broadband providers continue to have every incentive to engineer and manage their networks and provide their services in a manner designed to meet their subscribers’ reasonable expectations. Moreover, ensuring that providers can continue to offer differentiated services – such as the offering of prioritization for particular latency- or jitter-sensitive applications – is a vital aspect of addressing shortcomings associated with best-efforts Internet services, as well as meeting subscriber needs and expectations.

e. What Segment(s) of the Network Each Performance Indicator Should Measure

For purposes of considering a public Internet access provider’s service, the relevant network segment is the local access link. Any measurement that goes deeper into the network – such as end-to-end measurements – is likely to be affected by factors outside of the provider’s control. For example, in the case of traffic travelling over a best-efforts Internet connection, congestion in other networks or at a server being accessed by the end-user may result in slower speeds or increased latency or jitter, but that fact is outside of the control of the broadband Internet access provider and says nothing about the provider’s network or service.

f. How Other Factors, Such as Latency and Jitter, Should Be Taken into Account

A range of technical attributes and other aspects of broadband usage potentially can affect the performance of any given broadband service at a point in time, potentially affecting the

functioning of certain applications. This is particularly so in the case of any best-efforts Internet access service, as factors throughout the network of networks that makes up the public Internet can affect performance. Given the complexity, variability, and difficulty of measuring such factors, however, they do not lend themselves to inclusion in any definition of broadband.

**Latency and Jitter.** Factors such as latency and jitter are inherent in all best-efforts Internet access services, and, much like the “actual” speeds of services, may be affected by a wide range of issues ranging all of the way from the consumer’s computer, to the consumer’s network connection, to the routers and servers traversed and accessed throughout the Internet, to the level of general Internet congestion. Latency – the measure of how long it takes for packets to be delivered from an originating end-user to their intended destination – is always present to some extent, if for no other reason than packets can travel no faster than the speed of light. Jitter – a measure of variations in the delivery of a series of packets – is also common to some extent with best-efforts services as packets are routed over the network of networks that make up the public Internet. The level of latency and jitter – which affect the performance of some applications (and not others) – may be affected by many things some of which may be addressed by providers, and many of which are beyond a provider’s control.

For example, the applications being used by subscribers affect both the level of latency and jitter and its significance. So the use of high-bandwidth applications or applications that initiate multiple sessions over a shared link, such as some P2P applications, could increase the level of latency and/or jitter experienced by that subscriber or others who share that same link. If a subscriber is using latency-sensitive application such as VoIP or gaming or a jitter-sensitive application such as streaming video, this increase could potentially affect performance. On the other hand, if the subscriber is using e-mail, P2P, or transferring files, the effect may be

negligible. Moreover, the levels of latency or jitter are dynamic, so levels would decrease when the user of applications that trigger increased latency or jitter goes offline. As noted above, such disparate effects from different applications show why consumers, broadband providers and others would benefit from more robust disclosures from application developers concerning effects of using particular applications.

Latency and jitter will also vary depending on where the subscriber is trying to go on the Internet, and on the conditions of the networks, routers, and servers all along the way. If a subscriber seeks to access data on a server on the other side of the country, the packets may well have to travel over several networks and pass through numerous routers – or “hops” – along the way, each of which could potentially contribute to latency or jitter. Likewise, the performance of the server being accessed, and the routing of the traffic returned to the subscriber will affect the level of latency and jitter. And the performance of those networks and routers will be affected by the overall level of traffic or congestion at the particular point in time. Of course, some of these networks and routers may belong to the Internet access provider, but many will not.

Finally, both the laws of physics and the related, inherent limitations of certain technologies may further influence the level of latency or jitter that a subscriber experiences. Packets can travel no faster than the speed of light. So it takes somewhat longer for packets to travel around the world (even ignoring the increased number of hops that packets likely have to traverse along the way) than around the block. Similarly, it takes some time to deliver traffic to and from a satellite, or even the air link in mobile broadband services, and this contributes to some level of latency.

Given the complex and constantly changing mix of factors that can influence latency and jitter – and the fact that the contributors to this mix can come from many sources throughout the

Internet – measuring latency and jitter and accounting for these factors in any broadband definition would be impractical. The same is generally true in the case of “actual” speeds of services at a particular point in time.

Instead of trying to address these concerns in the context of defining broadband, the Commission should encourage industry and other stakeholders to continue collaborate to develop innovative solutions that address the causes of latency, jitter, and other similar factors that may limit the usefulness of the public Internet for some purposes. For example, effective network management practices can help to minimize the effects of such factors in order to improve the overall performance of a network. Similarly, differentiated service offerings could help to ensure the functioning of latency- or jitter-sensitive applications in ways not possible with pure, best-efforts Internet services. Indeed, such possibilities help to illustrate some of the potential harms to consumers of “net neutrality” proposals that would freeze in place the best-efforts model or tie the hands of network managers.

**Traffic Loading, Diurnal Patterns, Reliability.** The Commission also asks about the relevance of traffic loading (*i.e.*, network congestion), diurnal usage patterns (*i.e.*, peak hours) and reliability for purposes of any broadband definition. Here too, inclusion of these factors would only complicate any definition unnecessarily.

Traffic loading, the existence of diurnal patterns, and the level of reliability are all factors on the forefront of network operators’ minds as they design and operate their networks to satisfy their subscribers’ expectations. Given the constantly evolving and changing uses of broadband both generally and in particular geographic locations, network engineers must monitor and adjust their networks in order to identify locations within their networks with unacceptable levels of congestion and to mitigate the causes. Verizon, for example, monitors the various links within

its networks, and makes adjustments – such as adding capacity in particular locations – as necessary, and other providers must do the same. This is a quintessential and ongoing part of building and operating broadband networks, but not a part that may be easily converted into metrics or plugged into a definition.

**Mobility.** The Commission also asks about mobility. As explained below, mobile services present a unique set of challenges for network operators above and beyond those present in fixed networks. The constantly changing mix of subscribers and services served by a cell site, the hand-off between sites and subscribers, and the inherent challenges of managing these services over a finite and shared spectrum resource all distinguish mobile broadband networks. As noted above, if the Commission maintains the threshold for first-generation broadband services at advertised speeds of 768 kbps/200 kbps for purposes of reporting and tracking the availability of broadband, most mobile broadband services can meet this same definition. In the context of defining more ambitious national broadband objectives towards which the country should move, however, it should recognize these differences between fixed and mobile broadband and address each separately.

g. Whether Different Performance Indicators or Definitions Should Be Developed Based on Technological or Other Distinctions, Such as Mobility

As noted above, one of the benefits of sticking with the current threshold definition for first-generation broadband as a baseline is that it captures all of the primary types of broadband services that are generally offered today. As such, this approach is technologically neutral and captures the relevant universe of services. Therefore, no technological distinctions or separate performance indicators would be necessary with respect to this baseline definition used for purposes of broadband reporting and tracking.

In the case of longer term national objectives for higher speed services, however, the Commission should distinguish between fixed and mobile services. As explained more fully in Verizon's previous filings in this proceeding, while mobile broadband services provide consumers the significant and valued benefit of mobility, they also are subject to a range of technical characteristics and other differences that distinguish them from fixed services and affect their capabilities, thus warranting separate targets.<sup>7</sup>

First, mobile broadband systems are shared bandwidth systems, with the subscribers accessing a particular cell site sharing a radio link.<sup>8</sup> All customers on a wireless network in the same area share that same spectral resource, meaning that the more one customer uses, the less that is available for all others attempting to use or access the network.<sup>9</sup> The bandwidth that can be delivered is spread across all the active customers on the same base station antenna and is constrained by the strength of the radio signal at the device as well as its quality, both of which vary with geography, weather, traffic, speed, and the position of the people and objects near the device. Resource-intensive use by one mobile wireless broadband customer can and will impact the speeds at which others can communicate and their ability to access the network. This is unlike the dedicated user access technology used in many fixed broadband systems, where sharing of capacity occurs only at more central points in the network.

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<sup>7</sup> See, e.g., Comments of Verizon and Verizon Wireless, *A National Broadband Plan for Our Future*, GN Docket No. 09-51, at 103-107 (June 8, 2009).

<sup>8</sup> See George Ou, Information Technology & Innovation Foundation, *Managing Broadband Networks: A Policymaker's Guide*, [http://www.itif.org/files/Network\\_Management.pdf](http://www.itif.org/files/Network_Management.pdf), at 36 (Dec. 2008).

<sup>9</sup> See Brian Higgins, "Verizon Wireless Technical Statement in Response to Skype Petition," Comments of Verizon Wireless, *Skype Communications S.A.R.L.; Petition to Confirm A Consumer's Right to Use Internet Communications Software and Attach Devices to Wireless Networks*, RM-11361, Attachment C at 22-23 (Apr. 30, 2007).

Mobile wireless networks, unlike fixed networks, also enable customers to change locations and still gain access, or even to communicate while traveling. The mobile wireless network has to be built to accommodate subscribers as they are on the move, all while also providing a reasonable quality of service. A mobile service network has to be able to hand off a customer's call or data session seamlessly from one cell site to another as the customer travels and to "find" the customer when he or she accesses the network from a new location. Managing mobility puts a type of bandwidth tax or overhead on the system. There must always be a small reserve of capacity at each cell site in order to prepare for either the next user to originate a session or for a current session to make the next handoff. This limits the spectrum resource that can be allocated to any one user and to all users within the area served by a certain cell. The need to accommodate portability and mobility thus puts unique network management demands on mobile wireless networks because of the dynamic, constantly changing mix and location of traffic.

Moreover, mobile wireless networks include cell sites that serve a variety of geographic areas ranging from areas as small as a few city blocks or as large as many square miles. These cell sites see a constantly changing mix and volume of voice and data uses, which put varying strains on the available spectrum resources. The network has to respond to these variations with real-time, dynamic management of the wireless connections to end-users.

Mobile wireless networks also face management challenges because they operate with more constraints than do more advanced fixed networks. Since the radio link to the user must compensate for interference from other users and noise, the attainable throughput for mobile wireless broadband is significantly less than fixed networks, even on comparable bandwidths. As a result, the throughput capabilities of wireless services are much more constrained than in

the wireline environment. As compared to the 50 Mbps services available over Verizon's FiOS network, Verizon Wireless' 3G wireless broadband service, using EV-DO Rev. A technology, offers downloads at typical speeds of 600 kbps to 1.4 Mbps, and uploads at 500-800 kbps. Although 4G wireless technologies, such as LTE and Wi-MAX, will substantially improve those speeds, they will still lag behind the speeds available using next-generation fixed networks.

The differences between mobile and fixed services cannot simply be solved by adding more capacity for mobile wireless services. Most fixed networks are limited only by existing technology and financial resources. Spectrum, in contrast, must be obtained from the federal government and is ultimately finite. While the Commission has allocated considerably more spectrum in recent years, today the government and broadcasting still occupy a significant amount of spectrum and the amount of spectrum available for mobile broadband is limited. Fixed networks simply do not have similar constraints on accessing local connections to their customers.

Any longer term national goals adopted by the Commission should reflect these substantial technical differences by distinguishing between fixed and mobile services.

#### h. Feasibility and Verifiability of Measuring Different Performance Indicators

The difficulty of measuring and tracking the various potential performance indicators – and the fact that these indicators are often affected by factors from various points throughout the Internet and are constantly in flux in the case of best-efforts Internet access services – militates in favor of maintaining a straightforward baseline definition of broadband based on advertised speed. To track many of these factors – such as actual speeds, latency and jitter – providers would typically have to insert additional network equipment for purposes of monitoring, and even this would not necessarily tell much about the overall consumer experience, given the many

factors outside of the provider's control that can contribute. And any definition that attempted to include the resulting data would be unwieldy (and not particularly meaningful for consumers). Rather than doing so, the Commission should encourage industry and other stakeholders to continue to identify and address the full range of factors that can influence the consumer experience, and allow network operators the flexibility to manage their networks and offer differentiated services that can meet consumers' needs by mitigating concerns such as latency or jitter.

## **2. Thresholds**

### **a. What Minimum Thresholds Should Be Assigned**

For the reasons explained above, in the context of defining broad national goals towards which this country's broadband marketplace and policymakers should work, it makes sense for the Commission to set aggressive, long-term targets which could be periodically revisited and revised. For example, setting a broad objective of moving toward a downstream target of 50 Mbps for fixed services and 5 Mbps for mobile services would be an aggressive longer term goal, recognizing that as the marketplace continues to develop there will continue to be variability in the levels of service available in particular areas for the foreseeable future based on a range of technological, geographic, economic and other factors.

But for purposes of broadband tracking and reporting, the Commission should maintain the threshold definition for first-generation "broadband" the definition currently used by the Commission, NTIA and RUS – advertised speeds of at least 768 kbps downstream and 200 kbps upstream – while continuing to also collect and analyze data concerning upload and download speed tiers above the threshold level.

b. Minimum Thresholds Necessary for Broad Classes of Applications to Function Properly

The threshold definition currently used by the Commission, NTIA and RUS for purposes of identifying first-generation broadband services can support a broad range of the applications most commonly used today. As NTIA and RUS recognized in selecting the current 768 kbps/200 kbps definition for purposes of broadband stimulus programs, such services “facilitate[] the use of many currently common broadband applications (*e.g.*, web browsing, VOIP, and one-way video).” Broadband NOFA at 33129-130.<sup>10</sup>

Of course, more advanced services do require more bandwidth. For example, streaming HD video currently requires bandwidth in the range of 5 Mbps or more, and video conferencing or telepresence services may require even more. Likewise, more advanced telemedicine or distance learning applications may only be possible at higher bandwidth. As a result of consumer demand and the emerging significance of these more advanced broadband applications, most broadband providers are already upgrading to offer higher levels of service that will enable such applications as they become more common. But the Commission should likewise consider the requirements of more advanced and emerging applications as it sets longer term national objectives related to broadband. Fixed services at 50 Mbps and mobile services at 5 Mbps, for example, would provide enough speed to support most of the most advanced applications available today, and higher targets may be appropriate in the future as new applications emerge.

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<sup>10</sup> See also Adtran, “Defining Broadband Speeds: An Analysis of Required Capacity in Network Access Architectures,” *attached to* Letter from Stephen L. Goodman, Adtran, to Marlene H. Dortch, FCC, GN Docket No. 09-51, at 3, 5 (June 23, 2009) (noting that YouTube standard definition video requires approximately 300 kbps and that VoIP and gaming applications typically have “low bit rate requirements”).

c. Whether to Adopt Multiple, Escalating Tiers of Minimum Thresholds.

As explained above, the Commission should adopt national objectives for higher speed fixed and mobile broadband services that the country should move towards over time. For purposes of tracking broadband, however, a single threshold for assessing the availability of first-generation broadband is appropriate. As is already its practice, however, the Commission should continue to collect and view information concerning multiple, escalating “speed tiers” in order to have a more thorough and meaningful view of the broadband marketplace as it continues to evolve.

**3. Updates**

a. What Ongoing Process Should Be Put in Place to Update the Definition or Threshold Levels

As suggested above, for purposes of tracking and reporting on broadband, the Commission should maintain a relatively stable, threshold definition of first-generation broadband that works in conjunction with data collection on higher speed tiers in order to provide a more meaningful view of broadband availability and of progress towards longer term national objectives for higher speed services. While frequent changes to this “definition” would not serve the public interest, the Commission should commit to periodically revisiting the broader national broadband objectives periodically as it prepares its annual report to Congress pursuant to Section 706.

b. How Often Should Such Updates Occur

The Commission should revisit its longer-term national objectives for higher-speed broadband services periodically, and in years in which it does so, it can include such consideration as part of its annual report to Congress pursuant to Section 706. That report provides an opportunity to take into account the continuing evolution of the broadband

marketplace at regular intervals and to make adjustments to targets as appropriate. As noted above, however, the Commission should alter its threshold speed for defining broadband for tracking and reporting purposes less frequently. Frequent changes to the “definition” of broadband for these purposes would complicate data collections and comparisons, confuse consumers, and create potential inconsistencies with other federal government broadband programs.

c. What Criteria Should Be Used to Adjust Thresholds over Time

As the Commission revisits longer-term national objectives concerning the in the higher-speed services towards which our country should move, it should focus primarily on the purposes to which broadband is being, or could be, put to use. For example, the Commission should consider the uses consumers make of broadband, as well as additional uses that would be facilitated by additional broadband capabilities. It also should consider the evolution of broadband technology and how technological changes affect the reasonable expectations for broadband services. Finally, the Commission should consider the demands placed on broadband services by both existing and potentially emerging applications.

d. How Modifications over Time Will Affect the Commission’s Ability to Collect and Publish Meaningful Data on Broadband Deployment and Adoption.

One of the significant benefits of maintaining the threshold definition of first-generation broadband for purposes of tracking and reporting on broadband is that by doing so, the Commission will more easily be able to collect and analyze comprehensive information concerning broadband services, while avoiding apples-to-oranges comparisons. Coupling this threshold definition of first-generation broadband with the Commission’s ongoing practice of collecting information concerning multiple “speed tiers” of service ensures comparability while enabling meaningful analysis of the evolution of the broadband marketplace over time.

Likewise, the setting of more robust longer term objectives for higher-speed broadband would demonstrate that the threshold definition for reporting purposes is a floor, not a ceiling, and that services well above the threshold definition will be required in order to fulfill broadband's ultimate potential in our nation.



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