Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
	)	
Providing Eligible Entities Access to Aggregate Form 477 Data as Required by the Broadband Data Improvement Act	)	GN Docket No. 09-47
	)	
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	)	GN Docket No. 09-137
	)	
Comment Sought on Defining Broadband: NBP Public Notice #1	)	

To: The Commission

COMMENTS OF CTIA – THE WIRELESS ASSOCIATION®
NBP PUBLIC NOTICE #1

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SUMMARY

CTIA's comments in response to the questions presented in the Commission's Public Notice reflect some consistent and important themes. First, the Commission's effort to define broadband must recognize the value of mobile wireless broadband to consumers. Mobile wireless providers do not just deliver broadband to the premises, they deliver broadband to the *person*. As a result, mobile broadband is more convenient and more useful. And consumers are responding by adopting mobile broadband in greater numbers. Indeed, mobile wireless broadband connections are the fastest-growing category of broadband connections by a large margin. Given the value that consumers place on mobility, broadband must be defined in a way that "works" with wireless technology.

Second, the definition of broadband must account for the constraints that mobile wireless broadband providers face as they deliver broadband over limited allocations of radio spectrum. All broadband delivery platforms share capacity among services and users to a certain degree, but wireless carriers alone cannot "build their way out" of capacity limitations. While technology continues to increase spectral efficiency, only significant additional spectrum allocations can address wireless broadband providers' capacity constraints.

As a result, the Commission should adopt a specific definition of broadband for the mobile wireless context. Because this definition will be specific to wireless, more than one definition will be necessary (to accommodate the other definition or definitions used in the wireline context). In the context of wireless networks, the definition should be based on currently deployed wireless data technologies rather than any arbitrary set of applications. Specifically, for purposes of wireless networks, the Commission should define broadband as *all* of the wireless data technologies that are currently in use by consumers or that are being deployed by carriers. This includes GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX. Consumer demand for these technologies demonstrates their performance in the broadband marketplace to deliver the applications that consumers need and want. Thus, defining broadband in terms of the technologies used to provide it makes the most sense in the wireless context. At the same time, the definition should evolve over time to reflect both the availability of new wireless broadband technologies, as they are deployed, as well as the eventual obsolescence of older technologies over time. This updating process is discussed in greater depth in response to Question 3.

Finally, the Commission's effort to define broadband should also be used as an opportunity to simplify the reporting process and ease burdens on both providers and the Commission. The existing efforts, including the FCC Form 477, the Section 706 process, and the CMRS Competition Reports, should be streamlined.

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To: The Commission

COMMENTS OF CTIA – THE WIRELESS ASSOCIATION®
NBP PUBLIC NOTICE #1

CTIA – The Wireless Association® ("CTIA")[1] submits the following comments in response to the Public Notice seeking "tailored comment" on the definition of "broadband."[2] Consistent with the direction in the Public Notice, these comments "adhere to the organization

[1] CTIA – The Wireless Association® is the international organization of the wireless communications industry for both wireless carriers and manufacturers. Membership in the organization covers Commercial Mobile Radio Service ("CMRS") providers and manufacturers, including cellular, Advanced Wireless Service, 700 MHz, broadband PCS, and ESMR, as well as providers and manufacturers of wireless data services and products.

[2] *Comment Sought on Defining "Broadband" – NBP Public Notice #1*, GN Docket Nos. 09-47, 09-51, 09-137, Public Notice, DA 09-1842 (rel. Aug. 20, 2009) (the "Public Notice").

and structure of the questions" in the Public Notice.[3] CTIA has treated each question as distinct, and has minimized cross-references so that each response is self-contained. Because the questions sometimes overlap, these comments include some repetition intended to facilitate the Commission's review of the responses to each individual question.

1. Form, Characteristics, and Performance Indicators

a. The form that a definition of broadband should take

As the Commission correctly notes in the Public Notice, "download and upload throughput are important, but neither is precise or diverse enough to describe broadband satisfactorily."[4] As discussed in more detail below, the definition of broadband should reflect the technological differences between wired and mobile wireless platforms, and appropriately account for *all* the ways that consumers value and use broadband.

U.S. consumers have shown they value mobility and, increasingly, mobile broadband. So too should the Commission's definition. Wireless is not a third pipe into the *home*, but rather the preferred pipe to the *person*, wherever he or she is, whenever he or she wants access to information. In a National Consumer Study conducted last year, MyWireless.Org® found that, if forced to choose, a majority of consumers would keep their wireless phone service instead of their landline phone service.[5] Mobile broadband additions are driving the growth of high-speed lines overall, and mobile broadband utilization rates are accelerating at breakneck speed. According to the FCC's most recent High-Speed Internet Access Services Report, the number of Americans with access to high-speed mobile broadband more than doubled from December 2006

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[3] Public Notice at 3.
[4] Public Notice at 2.
[5] MyWireless.org® National Consumer Survey (conducted March 17-19, 2008).

to December 2007, and the number of mobile broadband users with "advanced services lines" more than tripled in that same time period.[6] The report further demonstrates that wireless broadband additions from December 2006 to December 2007 outpaced, by nearly three to one, the additions for cable companies and wireline telephone companies combined.[7]

Moreover, mobile broadband usage is skyrocketing. As Nielsen Mobile observed, "In the U.S., Mobile Internet has become a mass medium."[8] One study recently estimated that data traffic will grow at a rate about one hundred times greater than voice traffic over the next ten years.[9] Thus, the Commission's definition of broadband must appropriately account for this significant and pervasive evidence of the value that consumers place on mobile broadband.

Moreover, the Commission's definition should not dismiss the consumer benefits that are derived from "first generation data" as the Commission has defined it in the FCC Form 477 context. Wireless broadband users' needs run the gamut of uses, from routine email delivery to bandwidth intensive streaming video.[10] If the definition of wireless broadband is keyed to commercially deployed wireless technologies, neither of these customers' broadband usage will be excluded arbitrarily from the metric.

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[6] Industry Analysis and Technology Division, Federal Communications Commission, *High-Speed Services for Internet Access: Status as of December 31, 2007* tbls. 1 & 2 (January 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-287962A1.pdf.

[7] *Id.*

[8] Nielsen Mobile, "Critical Mass: The Worldwide State of the Mobile Web," at 3 (July 2008).

[9] Peter Rysavy, "Mobile Broadband Spectrum Demand," at 11 (Dec. 2008).

[10] The "Pareto Principle" applies to wireless broadband, just as it does to the overwhelming number of consumers who prefer the MP3 format over CDs with higher fidelity. *See, The Good Enough Revolution: When Cheap and Simple Is Just Fine*, Wired Magazine (Aug. 24, 2009), http://www.wired.com/gadgets/miscellaneous/magazine/17-09/ff_goodenough?currentPage=1 (last visited August 31, 2009).

b. Whether to develop a single definition, or multiple definitions

In order to reflect the significant *value* that consumers place on mobile broadband,[11] the Commission should adopt multiple definitions of broadband in order to recognize the technological differences between wired and wireless broadband. The simple facts remain clear that wireless broadband networks are fundamentally different than other broadband networks for many reasons. As noted above, they are different in part based on how subscribers use them – wherever and whenever.[12] They are also different in part because of their reliance on spectrum to provide last-mile connections to end-users and because the core functionalities – the delivery of broadband service as well as voice (including 911) and data – are shared by the same platform. An impact due to data usage *will* impact voice usage. For these and other reasons, the Commission should not attempt to shoehorn modern, innovative wireless broadband services into a definition crafted for use with wireline technologies. We urge the Commission to affirmatively recognize the different circumstances that militate against attempting to apply a wireline-centric approach to a wireless world.

The underlying infrastructure of wireless networks, including spectrum, as well as the tight and coordinated integration of customer equipment with the network, make wireless significantly different from wired broadband networks:

- **Because of spectrum limitations, wireless providers cannot "build their way out" of capacity constraints.** Unlike wired services that can add capacity through greater build-out, constraints on expansion of network capacity are currently a reality for spectrum-based services. In the absence of significant additional spectrum allocations, wireless broadband networks face capacity constraints that are unique among broadband providers.

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[11] *See supra* response to Question 1.a.

[12] *See supra* response to Question 1.a.

- **The capacity of a wireless cell site is shared between all users in that cell.** Wireless users must share the available bandwidth with other users in their vicinity.[13] Given the unique capacity constraints under which wireless carriers labor, and the mobility of wireless users, this increases the variability of users' experiences – making a rigid broadband definition impractical in the wireless context.

- **The capacity of a cell is shared among all services running over the network.** Voice and data use share the capacity of the cell, so high data use on a wireless network has the potential to exhaust the capacity of a cell to make voice calls. Particularly given the limitations on wireless capacity due to spectrum constraints, this too can affect the consumer broadband experience, making a flexible and wireless-specific definition necessary.

- **The performance of the network depends on the performance of the customer's mobile device.** Because mobile devices include radio transceivers, processing chips, interface screens, and other equipment that is engineered to function in a particular way at the time it is manufactured, it is often necessary to upgrade *both* the network and the device before a consumer experiences the benefit of improvements in technology. And consumers access mobile broadband services over a much more varied array of devices than they use to access wireline broadband.

Although wireless networks are affected by these other factors disproportionately, wireless broadband networks deliver consistently reliable performance. Independent testing by PC World magazine found, for example, that wireless carriers consistently delivered on advertised current generation broadband speeds (typically between 768 kbps and 1.5 Mbps).[14]

Affirmative recognition of the differences between wired and wireless networks, as CTIA has advocated, and as echoed by several other parties in their comments in this proceeding,[15]

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[13] *See* Opposition of CTIA, RM-11361 (filed Apr. 30, 2007), Attachment C (Jackson Paper) at 3.1.1; *see also* Marius Schwartz and Federico Mini, "Hanging up on *Carterfone*: The Economic Case Against Access Regulation," Mobile Wireless, May 2, 2007, at 19.

[14] "A Day in the Life of 3G," PC World Magazine (June 28, 2009), *available at* http://www.pcworld.com/article/167391-2/a_day_in_the_life_of_3g.html.

[15] *See, e.g.*, Comments of CTIA, GN Docket No. 09-51 (June 8, 2009), at 27-30; *see also* Comments of Google Inc., GM Docket No. 09-51 (June 8, 2009), at 28-29; *see also* Comments

(continued on next page)

necessitate recognition that a single definition of broadband is ill-suited for application to diverse network technologies.

c. Whether an application-based approach to defining broadband would work, and how such an approach could be expressed in terms of performance indicators

In the context of wireless networks, the definition should be based on currently deployed wireless data technologies rather than any arbitrary set of applications. Specifically, for purposes of wireless networks, the Commission should define broadband to include *all* of the wireless data technologies that are currently widely deployed and in use by consumers.[16] This includes General Packet Radio Service ("GPRS"), Enhanced Data for GSM Evolution ("EDGE"), Evolution – Data Only ("EV-DO"), Wideband Code Division Multiple Access ("WCDMA") / High-Speed Downlink Packet Access ("HSDPA"), Long Term Evolution ("LTE"), and WiMAX. Consumer demand for these technologies demonstrates their performance in the broadband marketplace to deliver the applications that consumers need and want. Thus, defining mobile broadband in terms of the technologies used to provide it makes the most sense in the wireless context.

The current FCC Form 477 reporting framework uses a tiered approach that accounts for advances in broadband technology while acknowledging the continuing value of earlier generation data services. Specifically, carriers report broadband subscribers in categories that

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of Mobile Future, GN Docket No. 09-51 (June 8, 2009), at 14-15; *see also* Comments of Motorola, Inc., GN Docket No. 09-51 (June 8, 2009), at 21; *see also* Comments of Verizon and Verizon Wireless, GN Docket No. 09-51 (June 8, 2009), at 103-107.

[16] *See infra* response to question 1.d.

include "first generation data," "basic broadband tier 1," and various subsequent tiers.[17] The Commission's definition of mobile wireless broadband should work in a similar way, recognizing earlier-generation technologies such as GPRS, but also identifying more advanced categories of mobile broadband, such as EV-DO, HSDPA, and WiMAX.

d. The key characteristics and specific performance indicators that should be used to define broadband

The Commission's definition should recognize that "broadband" is not a binary distinction. Broadband comes in many speeds, technologies and implementations suited to meet different consumer needs. As discussed above, there are significant differences between wireline and mobile wireless broadband networks, and a specific definition of broadband should be applied in the wireless context.[18]

For purposes of wireless networks, the Commission should define broadband as *all* of the wireless data technologies that are currently in use by consumers or that are being deployed by carriers. This includes GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX. This is consistent with the acknowledgement by NTIA and RUS for purposes of American Recovery and Reinvestment Act funding that the definition of broadband should "encompass[] all major … wireless technologies."[19] This approach to defining wireless broadband is analogous to the Commission's mandate to define universal service as an "evolving level" of services that "have,

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[17] *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 VoIP Subscribership,* WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9701 n.66 (2008).

[18] *See supra* response to Question 1.b.

[19] Rural Utilities Service (RUS), Department of Agriculture, and National Telecommunications and Information Administration (NTIA), Department of Commerce, Notice of Funds Availability (NOFA) and Solicitation of Applications, 74 Fed. Reg. 33104, 33130 (July 9, 2009).

through the operation of market choices by customers, been subscribed to by a substantial majority of residential customers," and "are being deployed in public telecommunications networks by telecommunications carriers."[20] In the same way, wireless broadband should be defined in terms of the actual services that real-world consumers value. This is best defined with reference to the specific, actual technologies available in the highly competitive wireless marketplace.

While the definition should include the most advanced wireless technologies, it should not dismiss the consumer benefits that are derived from "first generation data" as the Commission has defined it in the FCC Form 477 context. For every wireless broadband user that cannot survive without the ability to stream on-demand video to her netbook, there is another whose demands relate to sending and receiving email on a PDA, uploading pictures to a social network, or accessing less bandwidth intensive content and services. If the definition of wireless broadband is keyed to commercially deployed wireless technologies, neither of these customers' broadband usage will be excluded arbitrarily from the metric.

The current FCC Form 477 reporting framework uses a tiered approach that accounts for advances in broadband technology while acknowledging the continuing value of earlier generation data services. Specifically, carriers report broadband subscribers in categories that include "first generation data," "basic broadband tier 1," and various subsequent tiers.[21] The Commission's definition of wireless broadband should work in a similar way, recognizing

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[20] 47 U.S.C. § 254(c)(1).

[21] *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 VoIP Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9701 n.66 (2008).

earlier-generation technologies such as GPRS, but also identifying more advanced categories of mobile broadband, such as EV-DO, HSDPA, and WiMAX.

At the same time, the definition should evolve over time to reflect both the availability of new wireless broadband technologies, as they are deployed, as well as the eventual obsolescence of older technologies over time. This updating process is discussed in greater depth in response to Question 3.

e. What segment(s) of the network each performance indicator should measure, such as the local access link to the end user, or an end-to-end path

Because CTIA proposes to define wireless broadband not in terms of performance metrics but instead in terms of wireless data technologies deployed and in use by consumers, it is not necessary to identify a segment of the network that any performance metric should measure.

In any event, however, CTIA urges the Commission not to adopt an approach that measures the performance of broadband networks on an end-to-end basis. Broadband performance across the public Internet is affected by many factors that providers cannot control, such as backbone congestion or performance issues at the accessed website. Carriers cannot be held accountable for factors beyond their control.

f. How factors such as latency, jitter, traffic loading, diurnal patterns, reliability, and mobility should specifically be taken into account

As noted above, U.S. consumers have shown they value mobility and, increasingly, mobile broadband. So too should the Commission's definition. Wireless is not a third pipe into the *home*, but rather a pipe to the *person*, wherever he or she is, whenever he or she wants access to information. In a National Consumer Study conducted last year, MyWireless.Org® found

that, if forced to choose, a majority of consumers would keep their wireless phone service instead of their landline phone service.[22] Mobile broadband additions are driving the growth of high-speed lines overall, and mobile broadband utilization rates are accelerating at breakneck speed. According to the FCC's most recent High-Speed Internet Access Services Report, the number of Americans with access to high-speed mobile broadband more than doubled from December 2006 to December 2007, and the number of mobile broadband users with "advanced services lines" more than tripled in that same time period.[23] The report further demonstrates that mobile wireless broadband additions from December 2006 to December 2007 outpaced, by nearly three to one, the additions for cable companies and wireline telephone companies combined.[24]

Moreover, mobile broadband usage is skyrocketing. As Nielsen Mobile observed, "[i]n the U.S., Mobile Internet has become a mass medium."[25] One study recently estimated that data traffic will grow at a rate about one hundred times greater than voice traffic over the next ten years.[26] Thus, the Commission's definition of broadband must appropriately account for this significant and pervasive evidence of the value that consumers place on mobile broadband where it is available. To do so, the Commission should define broadband for purposes of wireless networks as *all* of the wireless data technologies that are currently in use by consumers or that

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[22] MyWireless.org® National Consumer Survey (conducted March 17-19, 2008).

[23] Industry Analysis and Technology Division, Federal Communications Commission, *High-Speed Services for Internet Access: Status as of December 31, 2007* tbls. 1 & 2 (January 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-287962A1.pdf.

[24] *Id.*

[25] Nielsen Mobile, "Critical Mass: The Worldwide State of the Mobile Web," at 3 (July 2008).

[26] Peter Rysavy, "Mobile Broadband Spectrum Demand," at 11 (Dec. 2008).

are being deployed by carriers. This includes GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX.[27]

With respect to factors such as latency, jitter, traffic loading, and diurnal patterns, CTIA urges the Commission to avoid setting metrics for the definition of broadband that cannot be easily quantified in the wireless context. For example, the throughput, latency, network load, and other factors of wireless broadband service, even when measurements are taken from the exact same location, can vary based on time of day, atmospheric conditions, wireless CPE, and other factors.

Mobile wireless broadband is particularly susceptible to factors that affect throughput and speed – many of which are outside carrier control. In addition to the factors that impact all broadband connections, other factors contribute to varying broadband connection speeds for mobile wireless broadband customers, including spectrum availability, cell congestion (*e.g.*, the number of mobile users accessing the cell at a given time), weather conditions, foliage, geography, handset design, air interface used, and many other factors. Because these conditions change so rapidly, and because mobility adds another factor to the analysis that is not present with other broadband technologies, the actual throughput speed a customer receives can vary from location-to-location, from minute-to-minute, and from customer-to-customer in the same location. As a result, analysis of a wireless broadband network must account for a variety of users, uses, and network conditions. Although wireless networks are affected by these other factors disproportionately, wireless broadband networks deliver consistently reliable performance. As noted above, independent testing by PC World magazine found, for example,

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[27] *See also supra* response to Question 1.d.

that wireless carriers consistently delivered on advertised broadband speeds (typically between 768 kbps and 1.5 Mbps).[28]

A government definition involving granular reliability metrics for wireless broadband is also unnecessary and potentially counter-productive because service quality is an axis on which wireless broadband providers compete with one another, to the benefit of consumers. Since network reliability and reach are pivotal to the ability to compete to serve customers, wireless carriers large and small collectively invest billions of dollars each year to improve the coverage, quality and capacity delivered by their networks.[29] In 2008, U.S. wireless carriers' reported incremental capital expenditures in their operational systems amounted to $20.17 billion, resulting in a total cumulative capital expenditure in operational systems of more than $90 billion

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[28] "A Day in the Life of 3G," PC World Magazine (June 28, 2009), *available at* http://www.pcworld.com/article/167391-2/a_day_in_the_life_of_3g.html.

[29] *See e.g.*, "Cellular One Announces 35th New Cell Site in Montana," Press Release, Mar. 18, 2009, *available at* http://www.cellonenation.com/media/releases/Cellular%20One%20Announces%20New%20Cell%20Site%20in%20Condon%20Montana.pdf (last accessed June 2, 2009); *see also* "Tower Releases," Appalachian Wireless, *available at* http://www.appalachianwireless.com/?page=towers (releases noting network upgrades in Eastern Kentucky, Virginia and West Virginia) (last accessed June 2, 2009); *and see* "Wireless – New Cell Site" page of Union Wireless, *available at* http://www.unionwireless.com/Cellular.aspx?page=Cellular&subpage=New-Cell-Site (last accessed June 2, 2009)(listing new cell sites deployed in 2008 and 2009, with clickable maps to allow viewing of cell sites) (last accessed June 2, 2009); *see also* "Leap Expands Cricket Network in Texas; Offering Texas-Sized Unlimited Plans to Subscribers; Cricket Brings Variety of Unlimited Wireless Services to Beaumont, Brownsville, Corpus Christi, Laredo and McAllen, Expanding Its Texas Footprint to More Than 25,000 Square Miles, Press Release, May 6, 2009, *available at* http://phx.corporate-ir.net/phoenix.zhtml?c=191722&p=irol-newsArticle&ID=1139647&highlight=; *see also* "SouthernLINC Wireless Adds New Tower Sites in Fourth Quarter" Press Release, Dec. 16, 2008, *available at* http://www.southernlinc.com/pressroom/press_Q408towers.asp (new sites enhance cellular coverage in rural areas of Alabama and Georgia)*; and see* "SouthernLINC Wireless Adds Eight New Tower Sites in the Third Quarter," Press Release, Oct. 27, 2008, *available at* http://www.southernlinc.com/pressroom/press_towers.asp (the deployment of new cell sites improves "capacity and coverage" and "will help keep customers better connected.").

over the last four years (not including the billions of dollars paid to the federal treasury for spectrum, or investment in pre-operational systems).[30] In addition to CTIA's measurement of this investment, the U.S. Census also tracks wireless investment through its Annual Capital Expenditures Survey ("ACES"). The Census data provides investment broken out between equipment and structures, as well as between new and used structures and equipment.[31] The ACES includes data on a variety of industries including wireless telecommunications. As part of its "Capital Expenditures for Structures and Equipment for Companies With Employees by Industry for 2007," released January 22, 2009, ACES reported that wireless carriers spent approximately $22.23 billion in 2007. Of that $22.23 billion more than $7.25 billion was spent on structures and more than $14.97 billion was spent on equipment.[32] The competitive market continues to drive wireless broadband providers to improve service quality; an arbitrary and inappropriate definitional reliability metric could mislead consumers.

g. Whether different performance indicators or definitions should be developed based on technological or other distinctions, such as mobility or the provision of the service over a wired or wireless network

As noted above, in order to reflect the significant *value* that consumers place on mobile broadband,[33] the Commission should recognize the technological differences between wired and wireless broadband and should adopt multiple definitions. The simple facts remain clear that wireless broadband networks are fundamentally different than other broadband networks for many reasons. They are different in part because of their reliance on spectrum to provide

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[30] *See* CTIA's Wireless Industry Indices Report at 124.

[31] U.S. Census Bureau, 2007 Annual Capital Expenditures Survey, rel. Jan. 22, 2009, Table 4a, *available at* http://www.census.gov/csd/ace/xls/2007/Full%20Report.htm.

[32] *Id.*

[33] *See supra* response to Question 1.a.

last-mile connections to end-users as well as because the core functionalities – the delivery of voice (including 911) and data – are shared by the same platform. An impact due to data usage *will* impact voice usage. The Commission should not attempt to shoehorn the modern, innovative mobile wireless broadband industry into a definition crafted for use with wireline technologies. We urge the Commission to affirmatively recognize the different circumstances that militate against attempting to apply wireline rules to a wireless world.

The underlying infrastructure of wireless networks, including spectrum, as well as the tight and coordinated integration of customer equipment with the network, make wireless significantly different. As described further in response to Question 1.b., these include:

- **Because of spectrum limitations, wireless providers cannot "build their way out" of capacity constraints.** Unlike wired services that can add capacity through greater build-out, constraints on expansion of network capacity are currently a reality for spectrum-based services. In the absence of significant additional spectrum allocations, wireless broadband networks will face capacity constraints that are unique among broadband providers.

- **The capacity of a wireless cell site is shared between all users in that cell.** Wireless user must share the available bandwidth with other users in their vicinity.[34] Given the unique capacity constraints under which wireless carriers labor, and the mobility of wireless users, this increases the variability of users' experiences – making a rigid broadband definition impractical in the wireless context.

- **The capacity of a cell is shared among all services running over the network.** Voice and data use share the capacity of the cell, so high data use on a wireless network has the potential to exhaust the capacity of a cell to make voice calls. Particularly given the limitations on wireless capacity due to spectrum constraints, this too can affect the consumer broadband experience, making a flexible and wireless-specific definition necessary.

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[34] *See* Opposition of CTIA, RM-11361 (filed Apr. 30, 2007), Attachment C (Jackson Paper) at 3.1.1; *see also* Marius Schwartz and Federico Mini, "Hanging up on *Carterfone*: The Economic Case Against Access Regulation," Mobile Wireless, May 2, 2007, at 19.

Although wireless networks are affected by these other factors disproportionately, wireless broadband networks deliver consistently reliable performance. Independent testing by PC World magazine found, for example, that wireless carriers consistently delivered on advertised broadband speeds (typically between 768 kbps and 1.5 Mbps).[35]

Affirmative recognition of the differences between wired and wireless networks necessitate recognition that a single definition of broadband is ill-suited for application to diverse network technologies.

h. The feasibility and verifiability of measuring different performance indicators

CTIA proposes to define broadband, in the wireless context, with reference to the specific wireless data delivery technologies deployed today or being deployed by wireless carriers (GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX). These broadband delivery platforms are known quantities with published standards. Thus, CTIA's proposal would be feasible and verifiable to measure.

In addition, with respect to factors such as latency, jitter, traffic loading, and diurnal patterns, CTIA urges the Commission to avoid setting metrics for the definition of broadband that cannot be easily quantified in the mobile wireless context. For example, the throughput, latency, network load, and other factors of wireless broadband service, even when measurements are taken from the exact same location, can vary based on time of day, atmospheric conditions, wireless CPE, and other network factors. Mobile wireless broadband is particularly susceptible to factors that affect throughput and speed – many of which are outside carrier control. In

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[35] "A Day in the Life of 3G," PC World Magazine (June 28, 2009), *available at* http://www.pcworld.com/article/167391-2/a_day_in_the_life_of_3g.html.

addition to the factors that impact all broadband connections, other factors contribute to varying broadband connection speeds for mobile wireless broadband customers, including spectrum availability, cell congestion (*e.g.*, the number of mobile users accessing the cell at a given time), weather conditions, foliage, geography, handset design, air interface used, and many other factors. Because these conditions change so rapidly, and because mobility adds another factor to the analysis that is not present with other broadband technologies, the actual throughput speed a customer receives can vary from location-to-location, from minute-to-minute, and from customer-to-customer in the same location. As a result, analysis of a wireless broadband network must account for a variety of users, uses, and network conditions.

2. Thresholds

As discussed above, CTIA proposes to define broadband, in the wireless context, with reference to the specific wireless data delivery technologies deployed or being deployed by carriers and demanded by consumers, including GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX.[36] These broadband delivery platforms are known quantities with published standards. Thus, under this definition of wireless broadband, it would not be necessary to set "thresholds" beyond the description identified in the definition. The current FCC Form 477 reporting framework uses a tiered approach that accounts for advances in broadband technology while acknowledging the continuing value of earlier generation data services. Specifically, carriers report broadband subscribers in categories that include "first generation data," "basic broadband tier 1," and various subsequent tiers.[37] The Commission's definition of wireless

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[36] *See supra* responses to Question 1.

[37] *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership*
(continued on next page)

broadband should work in a similar way, recognizing earlier-generation technologies such as GPRS, but also identifying more advanced categories of mobile broadband, such as EV-DO, HSDPA, and WiMAX.

At the same time, the definition should evolve over time to reflect both the availability of new wireless broadband technologies, as they are deployed, as well as the eventual obsolescence of older technologies over time. This updating process is discussed in greater depth in response to Question 3.

3. Updates

a. What ongoing process should be put in place to update the definition, particularly the threshold levels;

As discussed above, CTIA proposes to define broadband, in the wireless context, with reference to the specific wireless data delivery technologies deployed by carriers and demanded by consumers, including GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX.[38] While the definition of wireless broadband should be set with reference to mobile wireless broadband technologies that consumers are demanding in the marketplace today, the definition should evolve over time to reflect both the availability of new wireless broadband technologies, as they are deployed, as well as the eventual obsolescence of older technologies over time.

The Commission already has a robust system in place for monitoring the evolution of wireless broadband technologies that are deployed by carriers and demanded by consumers. The Commission elicits information on the status of and changes in wireless broadband technology

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Data, and Development of Data on Interconnected VoIP Subscribership, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9701 n.66 (2008).

[38] *See supra* responses to Question 1.

regularly in the FCC Form 477 broadband data reports, the Section 706 Report proceedings, and the CMRS Competition Reports. These processes should utilize a unified definition which will simplify reporting and serve as the basis for an evolving definition of wireless broadband.

The current FCC Form 477 reporting framework uses a tiered approach that accounts for advances in broadband technology while acknowledging the continuing value of earlier generation data services. Specifically, carriers report broadband subscribers in categories that include "first generation data," "basic broadband tier 1," and various subsequent tiers.[39] The Commission's definition of wireless broadband should work in a similar way, recognizing earlier-generation technologies such as GPRS, but also identifying more advanced categories of mobile broadband, such as LTE, and WiMAX.

By regularly identifying, through the regular broadband data collection process, the wireless broadband technologies that carriers are deploying and consumers are demanding, the Commission can easily update the definition of wireless broadband as necessary. As the data collection identifies new wireless broadband technologies, they should be added to the definition. As older technologies are phased out of the marketplace – *i.e.*, they are no longer offered by carriers or demanded by consumers – they should be removed from the definition. Even though wireless broadband is a young medium, earlier wireless data services (such as CDPD service) already have been phased out of the marketplace, just as the AMPS and TDMA air interfaces

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[39] *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 VoIP Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9701 n.66 (2008).

have both been effectively phased out of the voice marketplace in the face of newer, more efficient technologies. We can expect to see the same evolution in the wireless broadband arena.

The combination of Commission reporting of broadband availability through FCC Form 477, combined with the Commission's new annual Section 706 inquiries providing a chance to redefine broadband when technologies have advanced, will enable the Commission to remain nimble and current when addressing the issue of broadband.

b. How often should such updates should occur

The FCC Form 477 broadband data reports, the Section 706 Report proceedings, and the CMRS Competition Reports already monitor the evolution of wireless broadband technologies that are deployed by carriers and demanded by consumers on a regular basis (semi-annually for the FCC Form 477 process, and annually for the Section 706 and CMRS Competition Reports). These reports should utilize a unified definition which will simplify reporting and serve as the basis for an evolving definition of wireless broadband.

The simplified data collection process will permit the Commission to keep its finger on the pulse of technological evolution in the wireless broadband marketplace. As often as necessary in light of changes in technology and the marketplace, the Commission should consider modifying the list of technologies included in the wireless broadband definition. In particular, the annual Section 706 notice of inquiry presents an ideal opportunity to review the state of wireless broadband deployment and the definition of wireless broadband in light of changing conditions.

c. What criteria should be used to adjust thresholds over time

For purposes of wireless networks, the Commission should define broadband as *all* of the wireless data technologies that are currently widely deployed and in use by consumers. At all

times, the definition of wireless broadband should encompass then-current wireless data technologies deployed by carriers and demanded by consumers. This currently includes GPRS, EDGE, EV-DO, WCDMA/HSDPA, LTE, and WiMAX. This is consistent with the acknowledgement by NTIA and RUS for purposes of the American Recovery and Reinvestment Act funding that the definition of broadband should "encompass[] all major … wireless technologies."[40] The Commission should adapt the approach to defining mobile wireless broadband that is analogous to the Commission's mandate to define universal service as an "evolving level" of services that "have, through the operation of market choices by customers, been subscribed to by a substantial majority of residential customers," and "are being deployed in public telecommunications networks by telecommunications carriers."[41] In the same way, mobile wireless broadband should be defined in terms of the actual services that real-world consumers value. This is best defined with reference to the specific, actual technologies available in the highly competitive wireless marketplace at any given time.

While the definition should include the most advanced wireless technologies, the Commission's definition should not dismiss the consumer benefits that are derived from "first generation broadband" as the Commission has defined it in the FCC Form 477 context. Wireless broadband users' needs run the gamut of uses, from routine email delivery to bandwidth intensive streaming video.[42] If the definition of wireless broadband is keyed to commercially

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[40] Rural Utilities Service (RUS), Department of Agriculture, and National Telecommunications and Information Administration (NTIA), Department of Commerce, Notice of Funds Availability (NOFA) and Solicitation of Applications, 74 Fed. Reg. 33104, 33130 (July 9, 2009).

[41] 47 U.S.C. § 254(c)(1).

[42] The "Pareto Principle" applies to wireless broadband, just as it does to the overwhelming number of consumers who prefer the MP3 format over CDs with higher fidelity. *See, The Good Enough Revolution: When Cheap and Simple Is Just Fine,* Wired Magazine (Aug. 24, 2009),
(continued on next page)

deployed wireless technologies, neither of these customers' broadband usage will be excluded arbitrarily from the metric.

The current FCC Form 477 reporting framework uses a tiered approach that accounts for advances in broadband technology while acknowledging the continuing value of earlier generation data services. Specifically, carriers report broadband subscribers in categories that include "first generation data," "basic broadband tier 1," and various subsequent tiers.[43] The Commission's definition of mobile wireless broadband should work in a similar way, recognizing earlier-generation technologies such as GPRS, but also identifying more advanced categories of mobile broadband, such as EV-DO, HSDPA, and WiMAX.

By regularly identifying, through the regular broadband data collection process, the wireless broadband technologies that carriers are deploying and consumers are demanding, the Commission can easily update the definition of wireless broadband as necessary. As the data collection identifies new wireless broadband technologies, they should be added to the definition. As older technologies are phased out of the marketplace – *i.e.*, they are no longer offered by carriers or demanded by consumers – they should be removed from the definition. Even though wireless broadband is a young medium, earlier wireless data services (such as CDPD service) already have been phased out of the marketplace, just as the AMPS and TDMA air interfaces

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http://www.wired.com/gadgets/miscellaneous/magazine/17-09/ff_goodenough?currentPage=1 (last visited August 31, 2009).

[43] *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 VoIP Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9701 n.66 (2008).

have both been effectively phased out of the voice marketplace in the face of newer, more efficient technologies. We can expect to see the same evolution in the wireless broadband arena.

d. How modifications over time to the definition will affect the Commission's ability to collect and publish meaningful data on broadband deployment and adoption

CTIA's proposed definitional structure for wireless broadband, with reference to currently deployed wireless broadband technologies,[44] will be intrinsically integrated into the Commission's efforts to collect and publish data on broadband deployment and adoption. The definition will be derived from, and evolve with, the data that the Commission collects on broadband deployment and adoption.

The Commission's definitions of broadband should simplify Commission processes and ease the reporting burden on carriers. CTIA supports the Commission in its efforts to unify the many definitions that are currently used to define data services. Currently, data on wireless carriers' broadband deployment is provided through a variety of reporting processes, including the FCC Form 477 report, the Section 706 process, and the CMRS Competition Reports. The burdens on both carriers and Commission staff could be reduced by consolidating the definition of broadband and streamlining the reporting process. The Commission should recommend as such in the National Broadband Plan.

[44] *See supra* response to Question 1.

CONCLUSION

CTIA urges the Commission to adopt a definition of mobile wireless broadband consistent with these comments.

Respectfully submitted,

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