Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
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A National Broadband Plan for Our Future	)	GN Docket No. 09-51
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To: The Commission

COMMENTS OF THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION

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INTRODUCTION

The Telecommunications Industry Association (TIA) submits these comments in response to the FCC Workshop on the issue of *Broadband Metrics*, which took place on September 2, 2009 as part of the Commission's ongoing development of a National Broadband Plan (the "Plan") pursuant to the American Recovery and Reinvestment Act of 2009, and for related purposes.[1] The workshop addressed various metrics or benchmarks for evaluating the various dimensions of broadband across geographic areas and across time. The goal of the workshop was to identify metrics that are most likely to be useful in assessing the broadband sector, tracking changes in the U.S. broadband sector over time, and comparing U.S. broadband performance against that of other countries.

TIA is the leading trade association for the ICT industry. Its 500 member companies manufacture or supply the products and services used in the provision of broadband and broadband-enabled applications. TIA members' products and services empower communications in every industry and market, including health care, education, security, public safety, transportation, government, the military, the environment and entertainment and are directly impacted by the Commission's definition of broadband.

TIA appreciates the opportunity to assist the Commission in crafting such metrics. For the reasons outline below, TIA encourages the Commission to develop a tiered analysis for defining broadband that accounts for all technologies and the capabilities they promote. This type of approach will allow the Commission to focus on the public policy objectives enabled by broadband rather than focusing one narrow and arbitrary

[1] *See A National Broadband Plan for Our Future*, Notice of Inquiry, GN Docket No. 09-51 (rel. Apr. 8, 2009).

definition. TIA also advocates that consumers should receive meaningful information regarding their broadband service plans that extends beyond advertised speeds.

I. A TIERED APPROACH TO A TWO-WAY BROADBAND DEFINITION ALLOWS THE COMMISSION TO ACCOUNT FOR ALL TECHNOLOGIES AND THE CAPABILITIES THEY PROMOTE.

TIA recommends, as it has in previous filings, that that the Commission not limit itself to one narrow and arbitrary definition of broadband.[2] Instead, the Commission should recognize all technologies playing an important role in our broadband market, and the capabilities they promote. A tiered speed analysis, as adopted in the Commission's broadband data collection Form 477 proceeding, allows the Commission to take into account current and future technologies and recognizes the diverse uses and benefits of broadband and broadband-enabled products and services.

In an effort to achieve these goals and develop a tiered analysis, the Commission should focus on the demand or requirements of a given application. The Commission should also take into account that the ability to deliver end-to-end capacity and the appropriate applications encompasses more than the first mile technology. The Commission should then craft tiers in a manner that allows for the use of all technologies to achieve various policy objectives. This approach will allow the Commission to avoid attaching goals to speeds not capable or that are not necessary for delivering the application or service required to meet that particular goal.[3]

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[2]TIA *Ex Parte* Letter, *Comment Sought on Defining "Broadband"*, GN Docket Nos. 09-47, 09-51, 09-137, Public Notice, (rel. Aug 20, 2009) (filed Aug. 31, 2009) (" Defining Broadband Notice"); TIA Comments, *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 07-45 (submitted May 16, 2007) ("Section 706 NOI").

[3] TIA *Ex Parte* Letter, *Defining Broadband Notice* at 2.

TIA also continues to assert that any definition of broadband must include two-way transmission capability.[4] This is not to suggest that such two-way transmission must be symmetric. However, each tier should identify a downlink speed and an uplink speed. The uplink speeds should be proportional to the corresponding downlink speed in each tier.

In order to craft these tiers, the Commission must have a thorough understanding of the capabilities of current and future technologies and how they are being used to achieve the public policies goals enumerated for the National Broadband Plan, such as consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, worker training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes.[5]

For example, broadband connectivity and communications are revolutionizing the healthcare industry through high-speed networks used at hospitals and medical centers used for video teleconferencing and electronic records and mobile devices used for remote patient care and monitoring. New broadband applications and services for telehealth are being developed and implemented at a rapid pace. The Intel® Health Guide next generation remote patient monitoring system offers healthcare providers the ability to customize care, gather timely information about their patients, and interact with their patients at home via video conferencing and rich educational material over broadband networks, at speeds as low as 200 kbps. Qualcomm offers its services to CardioNet, a company that uses 3G connectivity for cardiac monitoring. Cisco HealthPresence™ is a

[4] *Id.;* TIA Comments, *Section 706 NOI* at 5.
[5] *In the Matter of A National Broadband Plan for Our Future,* Notice of Inquiry, GN Docket No. 09-51, FCC 09-31, at para. 9 (rel. April 8, 2009).

patient care delivery concept that combines Cisco TelePresence and medical devices to enable caregivers and patients who may be miles apart to interact in a clinical setting.[6]

Also in the area of Health IT, Harris Corporation has developed solutions for enterprise and the government that improve health outcomes through the delivery of secured information to the right person, on the right device, at the point of care. The Harris Digital Pathology Station creates a virtual digital pathology environment where pathologists and the tissue samples they study need not be in the same place and allows pathologists to view and manipulate pathology images, annotate the images with digital notes, and delineate special areas of interest on the sample, such as a cluster of tumor cells, as if they were looking through a microscope at the actual slides. By simply accessing a local or wide area network, multiple pathologists can view, pan across, and zoom into digital images without any delay or latency, hence augmenting the diagnostic process and mitigating the probability that the one of a kind pathology samples will be lost or damaged. The Harris technology enables pathologists to visualize very large images—an average of 20 gigabytes in size—over a large distance, at speeds starting at 54 Mbps.

Harris is also leading the U.S. Department of Health and Human Services' ("HHS") Nationwide Health Information Network ("NHIN") CONNECT Gateway project, creating a solution for secure interoperable information exchange. The NHIN, which will by in large ride over the Public Internet, will enable federal healthcare agencies including the Military Health System, Department of Veterans Affairs, Social Security Administration, Indian Health Service, National Cancer Institute, Centers for

[6] Cisco HealthPresence uses high-quality collaboration which requires speeds of at least 8 Mbps in both directions.

Disease Control, and private healthcare service providers to exchange patient information seamlessly with security and privacy, improving the quality of care, and reducing costs.[7] Bandwidth requirements over the Connect Solution will vary based on the size of information being transmitted. For purposes of transferring basic text files, such as a Continuity of Care Document ("CCD")—averaging 10 kilobytes in size—speeds of 2.68 Mbps have proven sufficient to complete a successful transfer. However, faster speeds will be needed in the near future to facilitate the transfer of more complex data files, audio, or images.

Broadband is also transforming our education system through virtual classrooms and courses that allow students to receive degrees online, computer- and web-based training, Virtual Learning Environments (VLE), and increased access to information. This is made capable by a variety of technological solutions that utilize and require increased speed and mobility. For example, an end user taking online classes, which rely heavily on video, could easily consume 40 to 60 Gigabytes in one month.[8] Qualcomm has created the Wireless Research Initiative that promotes the socially beneficial uses of mobile broadband technology. The initiative supports Project K-Net, a project in rural North Carolina which used smartphones operating on a mobile broadband network to teach math to at-risk high school students.[9] The Northern Michigan University (NMU) recently launched a new mobile high-speed campus-wide WiMAX network built with Motorola wireless broadband infrastructure, becoming the first university in the U.S. to

[7] Reply Comments of Harris Corporation, *National Broadband Plan* at 2 (submitted July 21, 2009).
[8] Comments of Microsoft, *National Broadband Plan* at 4 (submitted June 8, 2009).
[9] Comments of Qualcomm, *Defining Broadband Public Notice* at 6 (submitted August 31, 2009).

deploy a fully functional Motorola WiMAX network.[10] The start of the new broadband service coincided with the 10th anniversary of the school's laptop program, which provides WiMAX enabled laptop computers to all students as part of their tuition.

Another goal of the Broadband Plan is to create jobs and spur economic growth, and broadband can facilitate this through applications that promote telework, foster participation in the global economy, and decrease the cost of doing business. Cisco Telepresence is a high definition conferencing system that provides a life-like experience through the use of multiple high-quality cameras, directional audio, and displays at twice of the resolution of HDTV. It works across and IP network using the same technology as VoIP and requires symmetrical connections of over 12 Mbps.[11] Motorola's broadband solutions are enabling service providers to bridge the digital divide and stimulate economic development for thousands of rural businesses and residents. Air Advantage, a wireless Internet service provider is leveraging Motorola's portfolio of wireless broadband solutions to extend service to rural and underserved communities across eastern Michigan, providing up to 14 Mbps of throughput.[12]

Internet2 has pioneered new broadband technologies, including design and operation of uncongested networks that are designed to accommodate new application innovations in real time. Internet2 has also deployed next generation technologies such as IPv6 and multicast. Internet2's next-generation nationwide 100 Gbps network can be used to achieve a variety of public policy goals as it connects over 60,000 anchor

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[10]Northern Michigan University Launches WiMAX Service on Motorola Network (Aug. 20, 2009), *at* http://mediacenter.motorola.com/content/detail.aspx?ReleaseID=11704&NewsAreaID=2#.

[11] Comments of Cisco, *National Broadband Plan* at 17 (submitted June 8, 2009).

[12]Motorola's Broadband Solutions Provide Rural Michigan Communities with Reliable High-speed Internet Access (May 7, 2009), *at* http://mediacenter.motorola.com/content/detail.aspx?ReleaseID=11270&NewsAreaID=2.

institutions and in the United States and interconnects with over 80 international research and education networks.[13]

Broadband clearly offers solutions to many of the nation's public policy goals, such as healthcare, education, public safety, and job creation, but one of the Commission's primary goals is to ensure all Americans have access to advanced telecommunications. Broadband consumption by the average consumer will vary greatly from that of businesses, government, and anchor institutions and will even vary greatly depending on the individual consumer. Further, in today's market the majority of consumers want broadband in their homes and on the go. It is important the Commission recognize that there are unique broadband markets served by different solutions. The National Broadband Plan should encourage ubiquitous broadband availability that can serve not only to achieve the public policy objectives of the Plan but will result in consumer choice in both residential and mobile broadband services.

II. THE QUALITY OF A CONSUMER'S BROADBAND EXPERIENCE IS AFFECTED BY FACTORS OTHER THAN SPEED AND THE COMMISSION SHOULD GATHER MEANINGFUL INFORMATION ON THESE METRICS BEFORE ATTACHING REGULATIONS.

Attempts at defining broadband are often done in the context of speed and bandwidth, which clearly play vital a role in the quality of a consumer's broadband experience. However, this experience is based on a variety of technical factors in addition to speed. These factors may include latency, jitter, traffic loading, diurnal patterns, reliability, and

[13] Comments of Internet2, *Defining Broadband Public Notice* at 3. The 60,000 anchor institutions include K-12 schools, community colleges, colleges and universities, federal and corporate research laboratories, libraries, museums, hospitals, and clinics.

mobility. In the recent Public Notice on *Defining Broadband,* the Commission seeks comment on the effects of such network characteristics and their relevancy in regard to certain applications.[14]

Each of the metrics listed in the Public Notice can affect the consumer's broadband experience; however, TIA will focus on the role of latency. Latency refers to the time it takes information to transmit across a network and can be caused in several ways, including propagation delay, transmission delay, processing delay, and rotation delay .[15] These delays are affected by a variety of factors, including the network components and architecture, the size of the packet, the distance the packet must travel, and the end-user application.

Latency greatly affects the subscriber's quality of experience for most classes of applications, but there are certain services and applications that are latency sensitive. Latency sensitive applications are typically those which require a relatively large number of Network Round Trips in order to complete a transaction. Examples of latency sensitive applications include custom transactional based applications, database queries, Voice over Internet Protocol (VoIP), IPTV, and online gaming. These applications are highly interactive and the quality of the experience is dependent on perception by the human eye and ear. If the user perceives delay, the experience can be severely degraded.

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[14] *Defining "Broadband,"* Public Notice, GN Docket Nos. 09-51, 09-47, 09-137 (rel. Aug. 20, 2009).

[15] Harry Newton, Newton's Telecom Dictionary 543 (2008). Propagation delay is the length of time it takes information to travel the distance of the line. This period is mostly determined by the speed of light; therefore; the propagation delay factor is not affected by the networking technology in use. Transmission delay is the length of time it takes to send the packet across the given media. The transmission delay is determined by the speed of the media and the size of the packet. Processing delay is the time required by a networking device for route lookup, changing the header, and other switching tasks. In some cases, the packet also must be manipulated; for instance changing the encapsulation type, changing the hop count, and so on. Each of these steps can contribute to the processing delay. Rotation delay is the delay in accessing data which comes from waiting for a disk to rotate to the currant location.

TIA suggests that the Commission should collect information on latency to gain a technical understanding of its effects on the user's broadband experience prior to defining the term or establishing a latency requirement for network providers. The Commission should gather information on latency across the entire network to identify the sources of delay in data transmission and how they may vary depending on the network segment. For example, most delay on access networks is not cause by speed-of-light propagation over very long distances, as it is on the IP backbone. Instead, it is caused by a number of factors that tend to be unique to the access infrastructure.[16] The Commission should also gather information on the effects of latency as they relate to varying classes of applications.

Due to the complex nature of this issue, it is important the Commission develop a record focused on the technical causes for latency, how such variables impact application performance and end-user experience, and to what extent service providers can control the impact of latency on their customers. After the Commission establishes such a record, it can then determine whether latency should be included as part of the definition of broadband and, if so, whether the Commission should establish latency requirements and in what form.

III. THE COMMISSION SHOULD ENCOURAGE AND FACILITATE MORE CONSUMER DISCLOSURE IN REGARD TO THEIR BROADBAND PLAN THAT EXTENDS BEYOND ADVERTISED SPEEDS.

Regardless of the metrics used to define broadband, whether it be minimum speeds or latency requirements, the Commission should encourage increased disclosure on these

[16] Comments of ADTRAN, *Defining Broadband: Network Latency and Application Performance,* White Paper, *National Broadband Plan* at 8 (filed June 23. 2009).

issues. TIA has continually advocated that consumers should receive meaningful disclosure of information regarding their broadband service plans.[17] Increased disclosure on quality parameters that affect a consumer's broadband service, such as latency or delivered (versus advertised) speeds, will facilitate a greater understanding on behalf of consumers when choosing their service. Currently, information on a broadband plan is provided in terms of the speeds a network can deliver at optimal performance. However, this is not usually the speed the consumer receives on average, and service providers do not include information on latency or other technical factors that can affect the quality of service.[18] Individual consumers have varying expectations of their broadband service and place emphasis on the importance of different aspects of service, such as speed or price. Lower latency and higher speeds may affect the decision of consumers who use their broadband service for online gaming or videos but may not be important to consumers who use their broadband primarily to check e-mail. However, disclosure on these issues will only serve to empower the consumer in making an informed decision when choosing a broadband service.

CONCLUSION

For the foregoing reasons, TIA encourages the Commission to adopt a Broadband Plan that includes metrics consistent with the recommendations set out above.

Respectfully submitted,

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

[17] TIA *Ex Parte* Letter, *Defining Broadband Notice* at 2; Comments of TIA, *Broadband Industry Practices*, WC Docket No. 07-52, at 9, June 13, 2007.

[18] Service providers usually advertise the maximum potential download speed but this may not be achievable during peak network usage times.

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