

**Before the
Federal Communications Commission
Washington, D.C. 20554**

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

REPLY COMMENTS OF MICROSOFT CORPORATION

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I. Introduction and Summary

The Commission’s Notice of Inquiry (NOI) on developing a National Broadband Plan elicited an extraordinary number and range of comments. Across the hundreds of filings and thousands of pages, some consensus has emerged. First, there is broad agreement that the Commission’s broadband definition should support applications and services citizens use to participate effectively in e-society. Moreover, commenters generally agree that the definition of broadband should not be static, but should be periodically updated as more capabilities come online and become more widely available. Many commenters also agree on the importance of ensuring that schools, libraries, hospitals, and other key community hubs have robust, future-proof broadband connectivity. Second, there is broad agreement that subsidy programs should be holistically reformed, transitioning from a group of disjointed mechanisms primarily focused on maintaining voice connectivity to a unified system focused on ensuring that high-quality broadband connectivity is available and affordable throughout the country. Third, there is some agreement that the FCC should reform spectrum policy to include: (1) An assessment of whether existing spectrum allocations are being fully utilized and stepping up efforts to increase access to underutilized spectrum; (2) Regular updates to rules to encourage efficiency-enhancing breakthroughs, such as software-defined radios and adaptive operations

like those approved in the Commission's white spaces decision; and (3) All the while, ensuring that spectrum allocations and policies are harmonized internationally. Finally, to achieve these ambitious goals, the Commission should evolve to a more convergence-aware and principles-based policymaking framework.

II. Defining Baseline Broadband Services

Few dispute the difficult threshold task of actually defining what broadband is. The country's broadband landscape varies widely. Different technologies (*e.g.*, third or fourth generation mobile wireless broadband and fiber-based wireline broadband) deliver different capabilities with their own positive and negative attributes, and those capabilities have different degrees of upward scalability. For purposes of the Commission's plan, there is consensus, however, that the definition of broadband should be based on experiences that are essential to consumer participation in e-society.¹ There is also broad agreement that the notion of minimum broadband expectations is not static, and should evolve accordingly as more capabilities come online and become widely available across the country.²

The definition of baseline broadband should have four components: downstream speed; upstream speed; quality of service; and monthly data-consumption allowances. Microsoft urges that the baseline broadband definition for households be defined as at least 4 Mbps downstream, 1 to 2 Mbps upstream, and the ability to consume at least 50 Gigabytes per

¹ *See, e.g.*, Center for Democracy & Technology Comments at 21-22, Cisco Systems Comments at 10-12, CFA & CU Comments at 14-17, Google Comments at 8, Kodiak Kenai Cable Company Comments at 7, NASUCA Comments at 13, NATOA Comments at 7, US Telecom Comments at 9-10.

² *See, e.g.*, California PUC Comments at 8, Cisco Systems Comments at 5-6, Coalition for Organizations for Accessible Technology Comments at 10-11, Comcast Comments at 7-17, CWA Comments at 6, Fiber-to-the-Home Council Comments at 13, Google at 22, ITTA Comments at 8-9, MSS-ATC Coalition Comments at 2, NECA Comments at 8, OPASTCO Comments at 4, Sprint Nextel Comments at 4, TDS Comments at 5.

month. The Commission should adopt a modified definition of baseline broadband for wireless services to reflect the physical limits of spectrum based services.³

In addition to supporting narrowband applications like e-mail, Web surfing, search and access to basic online services, our proposed baseline broadband definition for households enables modest amounts of video streaming, cloud-based storage, and the movement of larger files (*e.g.*, high-resolution images). Anchor institutions, such as K-12 schools, higher education institutions, libraries, hospitals and other key community hubs, should receive a higher level of baseline service – 100 Mbps, to be adjusted for the size of the institution, and preferably symmetrical, to encourage deployment of future-proof technology like fiber.⁴ At first blush, defining baseline broadband for anchor institutions as delivering throughput of at least 100 Mbps may sound ambitious, but one should consider the average throughput that would be delivered to an individual user in such a shared environment. In a typical school environment with about 1,000 students and staff, one third of the students and staff may be using the network at the time of peak usage and must share the 100 Mbps of capacity. 10 Mbps may support one third of the school concurrently reading email, but will be completely inadequate for any video-learning experiences. Our proposed definition of baseline broadband for anchor institutions, therefore, is modest when one considers the types of video and advanced data applications necessary in today's e-learning environment.

³ Shannon's law combines with limited spectrum availability to make the bandwidth of wireless more limited when compared to fiber-based approaches. Spectrum places a hard limit on capacity, which must be rationed in order to deliver a consistent customer experience. For example, it might not be reasonable to expect a wireless broadband provider to deliver a 50 Gigabytes monthly data consumption allowance utilizing current state-of-the-art technology.

⁴ In very limited circumstances (for example in sparsely populated areas), point to point microwave may be the only feasible solution, but fiber should be the presumption.

Many parties have stressed the importance of ensuring that schools, libraries, hospitals, and other key community hubs have robust broadband connectivity.⁵ By establishing a more robust definition of broadband for anchor institutions, the FCC can help modernize education and healthcare and improve our country's long term global competitiveness. These definitions will ensure that every community in the nation has multiple, credible on-ramps to a new Internet "highway" system and will allow network operators to leverage that higher-bandwidth connectivity for further distribution of broadband connectivity to households.

Our proposal is consistent with, and we would support, other parties' proposals for more aggressive definitions of baseline broadband for households and anchor institutions. For example, Google has proposed that the initial benchmark should be to provide all Americans with symmetric, always-on Internet capacity to residences of at least 5 Mbps.⁶ EDUCAUSE has proposed that the goals should be 100 Mbps to each home and business; 100 Mbps to 1 Gbps for smaller anchor institutions like schools and libraries; and multi-Gigabit speeds for larger institutions such as colleges and hospitals.⁷ IEEE-USA states that the Commission's National Broadband Plan should seek the achievement of at least 20 Mbps bidirectional speed, and 90 percent availability throughout the nation within five years and at least 100 Mbps bidirectional speed with availability to all businesses and households within 10 years.⁸ Generally, our proposal should be viewed as an achievable minimum baseline.

⁵ See American Library Association Comments at 6-7, American Telemedicine Association Comments at 2, California PUC Comments at 9, 22, Comcast Comments 45-47, 65-66, CWA Comments at 6, 33-35, CCIA Comments at 2-3, CFA/CU Comments at 13-14, Cox Comments at 8-10, EDUCAUSE Comments at 3, Google Comments at 37-39, New America Foundation Comments at 5-8, One Economy Comments at 23, USTelecom Comments at 10.

⁶ See Google Comments at 5, 21.

⁷ See EDUCAUSE, Internet2, and ACUTA Comments at 3.

⁸ See IEEE-USA Comments at 2.

While any capacity-based definition is inherently debatable, we disagree with those who suggest that there be no performance metric in the Commission’s broadband definition.⁹ If the FCC does not quantify what it is trying to achieve, it will not be able to accurately measure the success of its policies. We also disagree with those who argue that benchmarks like those we suggest are biased against certain technologies merely because those technologies cannot today offer the capacity we would define as baseline broadband. This argument would lead to a lowest common denominator approach, and it would fail to put the country on a path to be a global leader in broadband capability. In contrast, robust broadband benchmarks will set the stage for all broadband technologies. With significant broadband deployed to households and to anchor institutions, a mesh of varying broadband technologies will ultimately enable consumers to use broadband in a variety of ways and with a variety of technologies suited to their particular circumstances.

The National Telecommunications and Information Administration (“NTIA”) and the Rural Utility Service (“RUS”) recently released a Notice of Funds Availability (“NOFA”) adopting the FCC’s current definition of broadband – providing two-way data transmission with advertised speeds of at least 768 kilobits per second (kbps) downstream and at least 200 kbps upstream to end users.¹⁰ Such an approach may promote some network investments, but it will not take full advantage of the opportunity presented by the stimulus funding. We believe that the stimulus funding provides a unique opportunity to significantly move our country forward in broadband deployment. This is a time for fundamental change, not incremental

⁹ See, e.g., Alcatel Lucent Comments at 5, Qualcomm Comments at 22.

¹⁰ See Department of Agriculture, Rural Utilities Service, Broadband Initiatives Program, RIN: 0572-ZA01, Department of Commerce, National Telecommunications and Information Administration, Broadband Technology Opportunities Program, RIN: 0660-ZA28 (rel. Jul. 1, 2009). We note that NTIA and RUS will award additional points to applications promising to deliver speed tiers that exceed the minimum speed requirement under the broadband definition. See *id.* at 61, 66.

improvement. In our view, creating a new, robust broadband baseline will best serve the interests of all consumers and seize the opportunity to become a leading country in broadband deployment.

Commissioner Copps has described the FCC's current definition of broadband as "absurdly dated"¹¹ and we agree. The Commission should take the opportunity that this and the Section 706 Proceeding present to adopt a more contemporary definition of baseline broadband that reflects widely available consumer and non-residential, wireline (and wireless) offerings. In defining baseline broadband for both households and anchor institutions, it would be imprudent for the Commission to continue using a broadband definition based on ADSL throughput speeds widely available to consumers a decade ago. Current generation cable modem and fiber, as well as evolving 3G EvDO and HSPA mobile wireless broadband, and 4G WiMAX mobile wireless broadband connectivity, promise far greater throughput. Next generation broadband connectivity platforms, such as mobile broadband's LTE and cable's DOCSIS 3.0, also promise greater throughput.

The NOFA also inexplicably fails to meaningfully prioritize funding for community anchor institutions such as schools, libraries, and healthcare institutions, despite statutory language recognizing that community anchor institutions increasingly need broadband. It also ties funding to unserved and underserved areas even though the American Recovery and Reinvestment Act does not require the link. We urge the Commission to recognize expressly what NTIA and RUS have overlooked – the critical importance of delivering higher-bandwidth

¹¹ See Statement of Commissioner Michael J. Copps, Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscriberhip Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscriberhip, WC Docket 07-37 (Jun. 12, 2008).

broadband connections to anchor institutions, such as schools and libraries. We ask the Commission to focus its National Broadband Plan on all areas including adopting a plan for ensuring that **ALL** anchor institutions are connected to high capacity broadband of 100 Mbps or more. Given that in the near-term there is insufficient dollars to connect everyone, this is the highest and best use of limited resources. By prioritizing broadband connectivity for anchor institutions, the Commission will enable the e-learning and e-health experiences that will modernize these social services, improve their efficiency and drive economic growth. It will provide access for large numbers of those who are unserved and underserved and make greater bandwidth available in all communities. This bandwidth can then be used as interconnection points for enabling high capacity broadband to Main Street and into neighborhoods.

III. Reforming Subsidies

Across the hundreds of comments, there is strong consensus that the many universal service and other programs that subsidize connectivity today should be refocused, updating them to include support for broadband connectivity.¹² The core goals of these programs should be to ensure: (1) That broadband is available in high-cost areas at prices comparable to baseline broadband service in urban and suburban markets;¹³ and (2) That those without financial

¹² See, e.g., Alcatel-Lucent Comments at 19, AT&T Comments at 86-88, Benton Comments at 44, Cisco Comments at 22, Comcast Comments at 53-61, CWA Comments at 17, CCIA Comments at 9, CFA and CU Comments at 9, CTIA Comments at 39-49, Ericsson Comments at 21-22, Google Comments at 23, Media and Democracy Coalition Comments at 1, Motorola Comments at 3, 20, NASUCA Comments at 44-45, NATOA Comments at 22, NECA Comments at 2, NTCA Comments at 9-16, One Economy Comments at 22-23, OPASTCO Comments at 19-20, Public Knowledge Comments at 21, Qwest Comments at 3, RCA Comments at 5, TDS Comments at 15-16, USTelecom Comments at 16.

¹³ See, e.g., AT&T Comments at 88, CTIA Comments at 39-49, Free Press Comments at 254-256, NASUCA Comments at 50, One Economy Comments at 23, RCA Comments at 18-22, TDS Comments at 15-16, TIA Comments at 26.

resources have affordable access to baseline broadband connectivity (for example, via a voucher program).¹⁴

We also agree with many commenters that fulsome data collection about broadband availability and subscription is an essential element of a meaningful National Broadband Plan.¹⁵ To develop a complete picture, we agree that the FCC should rely on a number of sources.¹⁶ These should include network operators, consumers, grassroots groups, and federal, state, and local agencies. We also support the development of a highly granular and updatable map of nationwide broadband availability. To make such a map meaningful for consumers, we support gathering data on actual broadband connection speeds experienced by consumers.¹⁷ Such data gathering should necessarily include independent verification by field engineers.

The comments diverge along different strategies for containing the cost of broadband subsidies and for assessing subsidy fees. We agree with those who suggest that funding be capped so that the programs' burden on the rest of society does not grow out of control.¹⁸

¹⁴ See, e.g., CCIA Comments at 12, Cox Comments at 6, Cricket Comments at 7, CTIA Comments at 39-41, Ericsson Comments at 3, Free Press Comments at 242, Hughes Comments at 8-9, IEEE Comments at 4, ITTA Comments at 23, Intel Comments at 9-13, 19, NAACP Comments at 1-2, NASUCA Comments at 66, NCTA Comments at 32, NRTC & DigitalBridge Comments at 15, NTCA Comments at 41-46, One Economy Comments at 22, OPASTCO Comments at 34, Qualcomm Comments at 17-18, Qwest Comments at 16, RCA Comments at 23, TIA Comments at 26, Time Warner Comments at 21, T-Mobile Comments at 25, TracFone Comments at 7-8, USTelecom Comments at 10, Windstream Comments at 23-25.

¹⁵ See, e.g., American Cable Association Comments at 11-12, AT&T Comments at 24, Broadband Diversity Supporters Comments at 12-13, California PUC Comments at 42-44, Cisco Comments at 23-24, Coalition of Organizations for Accessible Technology Comments at 11-13, Comcast Comments at 48-49, CWA Comments at 20, CCIA Comments at 24-25, Cox Comments at 4, Free Press Comments at 30, Google Comments at 11-12, Intel Comments at 6, Media and Democracy Coalition Comments at 2, NASUCA Comments at 73, NATOA Comments at 53, One Economy Comments at 29, Public Knowledge Comments at 42, TIA Comments at 14, U.S. Chamber of Commerce Comments at 5-6.

¹⁶ See, e.g., AT&T Comments at 24, Broadband Diversity Supporters Comments at 46, Cisco Comments at 23-24, Coalition of Organizations for Accessible Technology Comments at 11-13, Google Comments at 12, One Economy Comments at 29.

¹⁷ See, e.g., CWA Comments at 20, Free Press Comments at 285-86, Google Comments at 15, Intel Comments at 6, Media and Democracy Coalition Comments at 2, NATOA Comments at 53.

¹⁸ See, e.g., Comcast Comments at 56-57, Free Press Comments at 209, NCTA Comments at 33, Verizon Comments at 112-113.

Smart deployment of new wireless technologies operating at higher power levels and utilizing spectrum with greater propagation characteristics can dramatically reduce the cost of extending broadband connections into high-cost areas. And additional, ongoing advances in information technology will continue to drive down the cost of infrastructure and maintenance. So, a cap on overall funding makes sense.

We also agree with those who want to stimulate competition in underserved areas by auctioning off access to subsidy streams.¹⁹ We disagree with those commenters that go so far as to suggest that incumbent operators *must* retain their exclusive franchises and subsidy streams.²⁰ Lack of competition for high-cost support continues to be an inherent deterrent to ongoing modernization of broadband infrastructure. We recommend conducting Dutch auctions for the right to receive subsidy flows, which will stimulate efficiency-producing competition in high-cost areas. Within the context of a competitive process, there should be no more than two high-cost fund recipients in a given market – one wireless carrier and one wireline carrier. While wireline and wireless voice services are substitutable, wireless and wireline broadband connectivity remain complementary from a consumer and network deployment perspective, with their own positive and negative attributes. Limiting funding to no more than two network operators in a particular geographic area (along with a cap on overall funding) also reduces the possibility that unlimited, overlapping subsidy streams will rapidly increase subsidy costs. To ensure that competition is not foreclosed where it would naturally occur, subsidized facilities should be subject to interconnection requirements.

¹⁹ See, e.g., Ad Hoc Users Group Comments at 9-10, Comcast Comments at 61, Verizon Comments at 114-115. Likewise, other parties support a competitive process akin to government procurement. See AT&T Comments at 87, Free Press Comments at 232.

²⁰ See NCTA Comments at 18-19, OPASTCO Comments at 22-27.

Universal service and other fee collection should be based on connections, a change that the Commission proposed more than seven years ago.²¹ Under such a mechanism, assessments would be based on increments of bandwidth consumption. A sliding scale would address concerns that a connection-based charge would be regressive. Under this proposal, higher-layer voice, data, and video applications and services that ride over broadband facilities would not be taxed, which is important given their rapid innovation and their ever-changing nature. Because a connections-based methodology only assesses the physical connection between a customer and its chosen network operator, it would provide consumers the unlimited freedom to utilize web-based content, applications and services and therefore would not tax the Internet.

IV. Ongoing Spectrum Review

In reviewing the comments, we were heartened but not surprised to see widespread support for spectrum reform. The essence of the comments is that, while some spectrum is being intensively used, the United States sits atop vast untapped spectrum resources that can readily be exploited to further the Commission's broadband goals and help bridge the digital divide.²² One can dispute why those resources remain untapped, but there is no disagreement that the Commission should make spectrum reform a centerpiece of its National Broadband

²¹ See *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45 (and related proceedings), Further Notice of Proposed Rulemaking and Report and Order, 17 FCC Rcd 3752 (2002).

²² See, e.g., California PUC Comments at 23, Cisco Comments at 16, CCA Comments at 22, CEA Comments at 6-9, CFA and CU Comments at 31, CTIA Comments at 26, Dell Comments at 11, Google Comments at 16-17, Intel Comments at 20-21, Motorola Comments at 6, New America Foundation Comments at 15-20, Public Knowledge Comments at 31-33, Southern Company Comments at 6-7, TIA Comments at 19, T-Mobile Comments at 16-18, Verizon Wireless Comments at 68-69.

Plan. As the Commission considers spectrum reforms, we agree with other parties that spectrum allocations and policies should be harmonized internationally.²³

A positive first step would be for the FCC and NTIA to begin the process of identifying underutilized private and governmental spectrum for potential reallocation for licensed and unlicensed uses. We and many other commenters believe that there is valuable spectrum going unused or underutilized, but to find it the FCC and NTIA must begin looking at actual spectrum usage.²⁴

We also share a belief with other commenters that the Commission should continue promoting efficiency-enhancing breakthroughs, such as software-defined radios and adaptive operations like those approved in the Commission's *White Spaces Report and Order*.²⁵ We encourage the Commission to evolve its spectrum management to accommodate super-smart agile radios in both licensed and unlicensed spectrum. Already, we have seen many societal benefits flow from Wi-Fi and Bluetooth devices, and we anticipate more "super Wi-Fi" capabilities emerging in the white spaces. Consumers will benefit from such innovation at the personal, local, and wide-area levels. Since ever-smarter radio technology will make spectrum-sharing more feasible with time, the Commission should continue to generate spectrum opportunities for new licensed and unlicensed devices.

V. Establishing a Convergence-Aware Policy Framework

The Commission should evolve to a more convergence-aware and principles-based policymaking framework. To account for consumers' fluid switching among screens and

²³ See, e.g., AT&T Comments at 142, Ericsson Comments at 19-20, TIA Comments at 20.

²⁴ To that end, we welcome spectrum inventory legislation currently under consideration in the U.S. Senate and House of Representatives. See Radio Spectrum Inventory Act, S. 649, H.R. 3125, 111th Cong. (2009).

²⁵ See, e.g., CCIA Comments at 23, Dell Comments at 8-12, Free Press Comments at 250, Google Comments at 41, IEEE Comments at 10, NATOA Comments at 28, New America Foundation Comments at 23-32.

networks, and the rapid diversification of applications and services, we urge the FCC to work with industry to evolve from a regulatory scheme based on platform and service silos to one that is suitably transport-agnostic and that does not undermine innovation. Such a framework should acknowledge that not all aspects can or should be “managed” through regulation.²⁶ In this new environment, regulation should shift its center of gravity from micro-managing via detailed rules to flexibly guiding behavior to achieve desired outcomes. Convergence-aware, principle-based policies, will lower the risk of adverse outcomes in the presence of complexity and uncertainty and will allow policymakers to act more quickly to address unanticipated adverse phenomena.

²⁶ An exception to this rule would be in the area of spectrum management, where policy makers play an important role in allocating and assigning limited spectrum resources to different uses and users and in establishing baseline interference protections.

Conclusion

Microsoft welcomes the opportunity to provide input on development of a National Broadband Plan. Across hundred of comments filed, there appears to be common agreement on some high-level issues: the Commission should establish a robust broadband definition that prioritizes higher-bandwidth connectivity to anchor institutions, reform subsidy programs to reflect current priorities, and actively manage spectrum resources to foster innovation. These building blocks can serve as the basis for convergence-aware and principle-based policymaking that puts the country on course to providing citizens ubiquitous access to robust, affordable and constantly improving broadband connectivity, so they can benefit from the evolving diversity of Internet applications and services, and so they can fully engage in the global economy.

Respectfully submitted,

/s/

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