**BEFORE THE**
**FEDERAL COMMUNICATIONS COMMISSION**
**WASHINGTON, DC 20554**

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| In the Matter of | ) | |
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| Review of Media Bureau Data Practices | ) | MB Docket No. 10-103 |
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| Review of Wireless Telecommunications Bureau Data Practices | ) | WT Docket No. 10-131 |
| | ) | |
| Review of Wireline Competition Bureau Data Practices | ) | WC Docket No. 10-132 |
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# REPLY COMMENTS OF GOOGLE INC.


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September 13, 2010

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# REPLY COMMENTS OF GOOGLE INC.

Google Inc. ("Google") hereby replies to comments filed in response to the Public Notices[1] regarding the collection, use, and dissemination of data by the Media Bureau, Wireless Telecommunications Bureau, and Wireline Competition Bureau in connection with the Federal Communications Commission's (the "Commission" or "FCC") ongoing Data Innovation Initiative.

## INTRODUCTION AND SUMMARY

Google strongly supports the Commission's efforts to improve its data collection and analysis to more effectively fulfill its statutory oversight responsibilities. The initial comments

[1] Public Notice, MB Docket No. 10-103, *Pleading Cycle Established for Comments on Review of Media Bureau Data Practices*, 25 FCC Rcd. 8236 (2010); Public Notice, WT Docket No. 10-131, *Pleading Cycle Established for Comments on Review of Wireless Telecommunications Bureau Data Practices*, 25 FCC Rcd. 8337 (2010); Public Notice, WC Docket No. 10-132, *Pleading Cycle Established for Comments on Review of Wireline Competition Bureau Data Practices*, 25 FCC Rcd. 8213 (2010) (collectively, "Notices"). Unless otherwise noted, all Comments referred to in these Reply Comments were submitted on August 13, 2010 in MB Docket No. 10-103, WT Docket No. 10-131, and WC Docket No. 10-132.

include numerous suggestions that will improve the Commission's data collection activities, ease burdens on industry participants and Commission staff, and benefit consumers.

Google has participated in several prior Commission proceedings regarding data collections,[2] and is well-positioned to respond to questions posed in the Notices and to the initial comments. Google applauds the Commission for its continuing focus on improving its data collections to better inform policymakers and the public as the agency addresses the continuing evolution of the communications sector.

As discussed in Section I herein, the Commission should seek to maximize transparency of and access to its broadband data collection and analysis. The Commission should make data easily accessible by consumers, researchers, and industry. It also should make data readily available in "raw" form and maximize the transparency of its measurement techniques, so that anyone can independently verify the data, provide feedback on its methods and analysis, and build on the results.

In Section II, Google recommends improvements to specific data collections. In particular, the Wireline Competition Bureau should collect from wireline and wireless facilities-based broadband providers data useful for measuring broadband availability, adoption, and competition, including information regarding providers' service offerings and network management practices. The Wireless Telecommunications Bureau should collect and make available data on licensed spectrum usage that will assist the Commission's spectrum planning

[2] *See, e.g.,* Comments of Google Inc., MB Dkt. 10-91(filed July 13, 2010); Comments of Google Inc., CG Dkt. 09-158 (filed July 8, 2010); Comments of Google Inc., GN Dkt. 09-51 (National Broadband Plan Public Notice #26) (filed Dec. 22, 2009); Comments of Google Inc., GN Dkt. 09-51 (National Broadband Plan Public Notice #27) (filed Dec. 22, 2009); Comments of Google Inc., GN Dkt. 09-51 (National Broadband Plan Public Notice #24) (filed Dec. 14, 2009); Comments of Google Inc., GN Dkt. 09-157 (filed Sept. 30, 2009); Comments of Google Inc., GN Dkt. 09-51 (National Broadband Plan Public Notice #1) (filed Aug. 31, 2009); Reply Comments of Google Inc., GN Dkt. 09-51 (filed July 21, 2009).

and policy efforts. The Media Bureau should collect and publish data on interoperability and retail availability of video navigation devices. Google also recommends that facilities-based broadband providers submit semiannual reports on broadband deployment and uptake.

In Section III, Google recommends improvements to the Commission's data collection and analytic processes. For example, the Wireline Competition and Wireless Telecommunications Bureaus should seek to determine the actual levels of service being delivered to users and what factors contribute to performance levels, as well as verify data collected from service providers. In addition to conducting their own measurements, the Bureaus should encourage deployment and use of open, independent measurement tools and incorporate the resulting data in the Commission's analyses.

## I. THE COMMISSION SHOULD MAXIMIZE THE OPENNESS AND TRANSPARENCY OF DATA AND UNDERLYING COLLECTION TECHNIQUES

Markets rely on information to function properly. Data collection and measurement tools can inform the policymaking process, empower consumers and companies to make well-informed decisions and help to hold market actors accountable.[3]

Google has long advocated that FCC data collections be transparent and broadly accessible to the public.[4] As the Commission has acknowledged, "accurate information plays a vital role in maintaining a well-functioning marketplace that encourages competition, innovation,

[3] *See generally* Richard S. Whitt, *Adaptive Policymaking: Evolving and Applying Emergent Solutions for U.S. Communications Policy*, 61 F.C.L.J. 483, 585-88 (2009). *See also* Federal Communications Commission, *Connecting America: The National Broadband Plan*, GN Dkt. 09-51, at 35 (rel. Mar. 16, 2010) *("National Broadband Plan"* or *"NBP")* ("Increased transparency will likely drive service providers to deliver better value to consumers through better services.").

[4] *See, e.g.*, Comments of Google Inc., MB Dkt. 10-91, at 13-14 (filed July 13, 2010); Comments of Google Inc., GN Dkt. 09-51 (Public Notice #26), at 6 (filed Dec. 22, 2009); Comments of Google Inc., GN Dkt. 09-51 (Public Notice #27), at 12 (filed Dec. 22, 2009); Comments of Google Inc., GN Dkt. 09-157 at 6 (filed Sept. 30, 2009).

low prices, and high-quality services."[5] Google therefore supports initial comments that urge the Commission to promote greater transparency of and access to its broadband data collection and analysis.[6]

Information obtained through the Bureaus' various updated and improved data collections will provide powerful and useful insights into broadband service offerings. In order to increase this information's value, the Commission should adopt policies and processes that maximize openness and transparency of its broadband measurements. Providing greater access to broadband data collections would serve the public interest by enabling third parties to study the data in ways that supplement the Commission's own analyses.[7]

Open data and methodologies are crucial to enabling robust measurement. To use a common engineering trope, open code means that all bugs are shallow – that is, making it easy for myriad people to analyze both the tools and data will make it easy to identify flaws, shortcomings, and confounding variables. Indeed, the only way to properly evaluate data's utility is if they are as open and accessible as possible so that many people can analyze them.[8] The Commission should not set as its benchmark that measurement tools must be absolutely

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[5] *See In the Matter of Consumer Information and Disclosure; Truth-in-Billing and Billing Format; IP-Enabled Services*, Notice of Inquiry, 24 FCC Rcd. 11380, ¶ 5 (2009).

[6] *See, e.g.*, Comments of The Sunlight Foundation at 1 (responding to inquiries regarding how best to implement the *National Broadband Plan* recommendation that the Commission have a "general policy of making the data it collects available to the public, including via the Internet in a broadband data repository," and urging the Commission to increase the online availability of its datasets through the Reboot initiative, http://fcc.gov/data) (citing Notices at 2).

[7] *See* Comments of Free Press at 7-8.

[8] Of course, the degree of transparency may differ depending on the particular measurement data collected. When it comes to "active" measurements that generate test traffic in a pre-determined way – as in the case of SamKnows and M-Lab, discussed in Section III, *infra* – the Commission should seek to make the data fully available. In contrast, "passive" measurements – which assess the user's own traffic such as his or her Web traffic or other activity online – may need to be anonymized first, with limits on appropriate data sharing, in order to protect user privacy.

perfect before they are used – rather, it should rely on several complementary methodologies, combine insights to get a more fulsome picture of the broadband environment, and iterate its methodology as measurement improves. Good network research – like any other scientific field – requires experimentation and improvement over time.

With this in mind, the Commission should make data easily accessible by consumers, researchers, and industry through a functional web-based Commission "dashboard" to evaluate and compare wireline and wireless broadband service offerings. In particular, consumers should have access to clear, accurate, and useful information about broadband access offerings to understand the parameters of the services to which they subscribe or could potentially subscribe. Thus, Google agrees with commenters that the Commission should, to the maximum extent feasible, publish data in user-friendly, machine-processable formats.[9]

In addition, the Bureaus should make the data readily available for others to access and re-use in "raw" form. Some of the most useful insights may come from network researchers engaging in deep analysis of the data, as well as examination and comparison of different data sets. For example, MIT computer scientists recently completed a study of several broadband measurement tools, including the Network Diagnostic Tool ("NDT") provided through Measurement Lab ("M-Lab"), which the Commission used for its Consumer Broadband Test. By analyzing the rich logs of NDT, the researchers were able to "track the evolution of the connection state over time" and to identify how the receiver window set by a user's operating

[9] *See* Comments of The Sunlight Foundation at 1-2; Comments of New America Foundation, WC Dkt. 10-132, at 14.

system affects broadband speed.[10] While such logs may not initially lend themselves to a "dashboard," additional analysis can yield insights useful on a much broader basis.

Along with maximizing access to data, the Bureaus should enable third parties to effectively "look under the hood" of the measurement tools and techniques on which the Bureaus rely, so that researchers and others can independently verify the data and provide feedback on their methods and analysis. Open tools also will help third parties build on the results,[11] thereby helping to foster development of broadband measurement tools that will ultimately enhance the Bureaus' iterative processes.

## II. RECOMMENDED IMPROVEMENTS TO DATA COLLECTIONS

### A. Wireline Competition Bureau Collections: Form 477 and Broadband Data

The Commission has an ongoing obligation to determine whether broadband is being deployed to all Americans in a reasonable and timely fashion.[12] Although the Commission acknowledges that "[c]omprehensive broadband data are essential" to making this determination,[13] historically the Commission has relied primarily on the limited data collected on FCC Form 477. While the Commission's most recent report "relied on more comprehensive

[10] *Understanding Broadband Speed Measurements*, Massachusetts Institute of Technology, *available at* http://mitas.csail.mit.edu/papers/Bauer_Clark_Lehr_Broadband_Speed_Measurements.pdf ("*MIT Measurements Study*"), at 30, 33-34.

[11] *See* Comments of National Cable & Telecommunications Association ("NCTA") at 15 ("When the Commission relies on data sources, whether staff-compiled reports or data acquired from third parties, the Commission should make these sources available to the public.").

[12] Telecommunications Act of 1996, Section 706(b) (codified at 47 U.S.C. § 1302(b)) ("Section 706").

[13] *See 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, as Amended by the Broadband Data Improvement Act*, Sixth Broadband Deployment Report, 25 FCC Rcd. 9556, ¶ 17 (2010).

broadband data" than prior reports,[14] there remains a lack of reliable, up-to-date, and readily-accessible information about broadband service offerings available in the marketplace today.[15]

As the Commission has recognized, Form 477 does not collect certain basic data that would better enable it to fulfill Congressional objectives.[16] The primary goal should be ensuring that the Commission has appropriate data sets to determine, as required by Section 706, whether broadband is being deployed to all Americans in a reasonable and timely fashion. Thus, Google supports calls in the *National Broadband Plan* and by commenters in this proceeding to revise Form 477 to collect data relevant to broadband availability, adoption, and competition.[17]

Form 477 should collect from facilities-based broadband providers information regarding their service offerings, including rates, terms, and conditions.[18] The collection should encompass information about features, including average and minimum speeds, average and maximum

[14] *Id*. ¶ 16 (referencing broadband subscribership data collected on Form 477, the broadband availability model created as part of the National Broadband Plan, U.S. Census Bureau demographic data, and a consumer survey).

[15] For instance, very little robust data exists about actual – as opposed to advertised – broadband speeds. *See, e.g., National Broadband Plan* at 43.

[16] *See id*. Numerous commenters, including NCTA, agree that the gap between Form 477 data collection and analysis could be narrowed. Comments of NCTA at 11; Comments of Free Press at 5-6; Comments of Sunlight Foundation at 3.

[17] *See National Broadband Plan* at 43; Comments of Verizon and Verizon Wireless at 7; Comments of T-Mobile at 4; Comments of NCTA at 9, 11; Comments of Communications Workers of America at 9; Comments of Free Press at 4; Comments of Minority Media and Telecommunications Council ("MMTC") at 6.

[18] *See also* Comments of MMTC at 13 (Form 477 data collection should include tier pricing information from commercial providers); Comments of Telogical Systems, WC Dkt. 10-132, at 2-3 (Bureau should collect and disseminate data on pricing and other service terms).

intra-network latency, and availability of service.[19] Form 477 should be revised to collect this type of data to measure both wireline and wireless broadband availability.[20]

Furthermore, Form 477 should collect information concerning network management practices that will (1) directly impact the performance of particular applications, content, or protocols or (2) reduce the speed or quality of the connection below the provider's advertised measures for the service offering. Relevant network management practices include traffic prioritization, traffic blocking or throttling, processes to address traffic congestion such as usage download or upload restrictions, content/message examination processes (e.g., deep packet inspection), and traffic routing processes that are based on sender/receiver, or type of traffic. Because such practices likely will affect broadband availability, adoption, and competition, the Commission should have access to clear, accurate, and useful information about them. Applications developers, content providers, and other Internet users should have access to this data, as such practices impact their ability to design and invest in their offerings.

Such data collection and disclosure requirements need not be unduly burdensome. Most ordinary network adjustments would not fall into the two categories above. For those that do, a broadband provider should be required to disclose the consequences of the network management, but not highly specific details about particular technologies used. For example, consider a practice that prioritizes traffic from a particular application. A broadband provider should disclose *what* application is being prioritized and *how* that will impact performance (e.g., this application will have a guaranteed low latency, even at times of congestion). A provider would

[19] *See* Comments of Google Inc., CG Dkt. 09-158 (July 13, 2010).

[20] Comments of Free Press at 5 (FCC should collect wireline and wireless broadband availability data). As T-Mobile notes, Form 477 is wireline-centric and focuses on subscribership (collecting, among other information, data about broadband connections to end user locations) rather than availability. Comments of T-Mobile USA, Inc. ("T-Mobile"), WT Dkt. 10-132, at 4.

not, however, have to disclose the exact networking equipment, router configurations, or algorithms that achieve this impact.

Google also recommends that facilities-based broadband providers be required to submit semiannual reports to the Commission providing comprehensive data about broadband deployment and uptake, and to ensure that such information is accurate and up-to-date. Disclosure of this information on the Commission's website would provide a single source for users, researchers, and regulators to use to determine a given provider's practices, and allow for easy analysis and comparison of service offerings. Should a dispute arise, the Commission also would possess information regarding the practice and any policy/practice description at issue, thereby ensuring better compliance with rules and swifter enforcement, if necessary.

### B. Wireless Telecommunications Bureau Collections: Spectrum Usage Data

As Google previously has argued, the Commission should conduct a comprehensive inventory of licensed spectrum usage.[21] Google is encouraged that the Chairman has initiated such an effort,[22] and that the Commission's Spectrum Dashboard, launched as part of the *National Broadband Plan* and Reboot.fcc.gov, has facilitated access to and analysis of spectrum usage data sets.

In addition to these efforts, Google encourages the Wireless Telecommunications Bureau to collect data that will enhance understanding of whether spectrum has been allocated

[21] *See, e.g.,* Comments of Google Inc., GN Dkt. 09-157, at 7 (filed Sept. 30, 2009).

[22] *See* Letter from Julius Genachowski, Chairman, FCC, to Hon. John D. Rockefeller IV, Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate (July 14, 2010) (noting that Commission staff have begun work to create an inventory of the use of spectrum by licensees and users under the FCC's jurisdiction, and to coordinate with NTIA to generate a comprehensive spectrum inventory). *See also* Presidential Memorandum: Unleashing the Wireless Broadband Revolution (June 28, 2010) (directing the FCC, in collaboration with other executive departments, agencies, and offices, to complete by October 1, 2010 a plan for making available 500 MHz for wireless broadband use).

efficiently to further develop and implement spectrum policy. There can be no question that the Bureau has ample authority to obtain licensee data regarding spectrum usage, and that exercise of that authority is consistent with the Commission's statutory obligations.[23] In particular, the Bureau should collect from each licensee, on an annual basis, information covering the previous 12-month period with respect to each service area or market designation and census tract for which it is licensed; data about the frequencies on which operations were conducted; the location and operating parameters of each transmitter; whether each transmitter operated continuously or intermittently; and spectrum occupancy measurements. Once collected, the data should be made publicly accessible through the Spectrum Dashboard.

Only by obtaining specific data about spectrum usage will the Commission be able to deliver on its promise of completing a comprehensive inventory. Doing so will enable the Commission to fulfill its statutory mandate[24] and promote the innovation, investment, and other benefits likely to follow from access to the accumulated data sets.

### C. Media Bureau Collections: Video Devices

Innovation in devices that merge traditional television and Internet content on converged platforms is an important component of a healthy broadband marketplace.[25] Indeed, as the Commission has recognized, "[t]he convergence of the television and content delivered by IP

[23] Given its existing authority, the Commission need not await specific legislation directing it to perform these collections.

[24] The FCC alone is charged with "regulating interstate ... communication by ... radio" and "maintain[ing] the control of the United States over all the channels of radio transmission," Communications Act of 1934, as amended (the "Act"), 47 U.S.C. §§ 151, 301(a), and the agency's general powers include "encourag[ing] the larger and more effective use of radio in the public interest," *id*. § 303(g), requiring spectrum users "to keep such records of ... transmissions of energy, communications or signals as it may deem desirable," *id*. § 303(j), and "caus[ing] to be published such ... data as in the judgment of the Commission may be required for the efficient operation of stations subject to the jurisdiction of the United States and for proper enforcement of this Act," *id*. § 303(p).

[25] *See* Comments of Google Inc., MB Dkt. 10-91 (filed July 13, 2010).

make this a critical time to promote innovation in set-top devices that could support the Commission's effort to drive broadband adoption and utilization."[26] The ability to access Internet video and content through a platform available in almost every household[27] could eliminate the need for additional equipment, thereby driving broadband utilization and adoption. Consumers would be well-served by having available at retail inexpensive universal adapters featuring an easy-to-use, common interface and employing nationwide interoperability standards to connect to a variety of smart video devices.

The Bureau should collect and analyze data on the current state of interoperability of video devices available for lease by multichannel video programming distributors ("MVPDs") and those available at retail to help drive the development of a competitive marketplace.[28] For example, data regarding the availability and quality of digital broadcasting receiver service information ("SI") for analog and digital channels, i.e., the metadata that supports receiver tuning, would aid consumer understanding about the performance of cable-ready devices. Google believes the Commission should publish aggregated information about the availability of this metadata (but not the metadata itself).

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[26] *See* Public Notice, *Comment Sought on Video Device Innovation* at 2, DA 09-2519, GN Dkt. 09-51 (rel. Dec. 3, 2009) ("*NBP PN #27*"). *See also National Broadband Plan* at 50 ("set-top boxes are becoming increasingly important for broadband as video drives more broadband use, and further innovation could lead to ... [h]igher broadband utilization.").

[27] Substantially more American households have televisions than have computers (99% to 76%). *See NBP PN #27* at 2.

[28] Such a collection would be consistent with the Commission's desire to "better effectuate the intent of Congress as set forth in Section 629" of the Act by considering ways to further retail market competition for smart, set-top video devices that are compatible with all MVPD services. *In the Matter of Video Device Competition*, MB Dkt. 10-91, Notice of Inquiry, 25 FCC Rcd. 4275 (2010) ("*Video Device NOI*"). Section 629 requires the Commission to adopt regulations to ensure the commercial availability of navigation devices used by consumers to access services from MVPDs, and covers "equipment used by consumers to access multichannel video programming and other services offered over multichannel video programming systems." 47 U.S.C. § 549(a).

In addition, MVPDs should provide consumers clear information about the installation and rental fees for leased video navigation devices, and the Commission should collect and publish information about competitive retail video device options. Only if consumers know the real cost of equipment will they be able to make informed choices about or between navigation devices leased from MVPDs and those available at retail. As Telogical Systems notes, access to such pricing information is fully consistent with the Commission's consumer protection role.[29]

## III. RECOMMENDED IMPROVEMENTS TO COLLECTION AND ANALYTIC PROCESSES

Google supports commenters' calls for the Bureaus to improve their data analysis and access to underlying data.[30] Broadband measurement is necessary to improve transparency and analytic processes. As part of their data review, the Wireline Communications and Wireless Telecommunications Bureaus should independently determine the actual level of service being delivered to users – including the speed, latency, and impact of network management practices – and verify data collected from providers. Such information can advance network research and empower users to diagnose and address problems with their connections. Measurement data should be collected for both wireline and wireless network platforms.

Additionally, the Bureaus should attempt to measure and analyze what factors contribute to a certain level of performance. For instance, the Bureaus should seek to understand not simply *what* speed a user achieves, but *why* that speed was achieved and the operative

[29] *See* Comments of Telogical Systems, WC Dkt. 10-131, at 2.

[30] *See* Comments of Free Press, Appendix A, at 6-8. *See also* Comments of New America Foundation, Appendix A, at 5 ("A FCC-led effort to collect measurements of broadband networks offers an unprecedented opportunity to provide rigorous empirical data against which to validate theory, modeling, and support for scientific research, development of new measurement technology and evaluation of proposed future Internet architectures.").

bottlenecks to performance on the network or the device. This can be done in a number of ways, including by using tools like the NDT.[31]

The Bureaus also should build on existing measurement efforts and data sources. For example, M-Lab is an open, distributed server platform that allows researchers to deploy Internet measurement tools as the server back-end for its tests. The M-Lab server's technical specifications are publicly accessible and were developed by researchers to allow for robust measurement. All M-Lab tools' source code is published for review by third parties, and M-Lab makes all measurement results available for the public to re-use.[32] M-Lab also can accommodate mobile broadband tests; NDT, for example, has been converted for use on the Android platform,[33] as has "WindRider" (released by researchers at Northwestern University and currently available for Windows Mobile devices), which "attempts to detect whether your mobile broadband provider is performing application or service specific differentiation, i.e., prioritizing or slowing traffic to certain websites, applications, or content."[34]

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[31] Recently, MIT scientists completed a study of several broadband speed tests, including NDT, and noted that "the value of the NDT data is in understanding the sources of the performance bottlenecks for today's network users." *MIT Measurements Study* at 30.

[32] *See Measurement Lab Working Document*, Version 1 (Jan. 28, 2009), *available at* http://measurementlab.net/sites/default/files/discussion_document_mlab_10.pdf. Data from two of M-Lab's tools are already publicly available via Amazon Web Services, allowing anyone to make use of the information without restriction, under a "no rights reserved" Creative Commons Zero waiver. *See Calling All Researchers – M-Lab Data Now Available on Amazon EC2*, *available at* http://www.measurementlab.net/new/2009/dec/10/calling-all-researchers-m-lab-data-now-available-amazon-ec2. To be clear, M-Lab only collects and releases the results of measurement tests. While SamKnows collects personal information from users (e.g., name and contact information), this information is not collected or released by M-Lab.

[33] *See* NDT Source Code for Android Platform, *available at* http://code.google.com/p/ndt/source/browse/branches/android/Android/.

[34] *See WindRider Mobile Traffic Test*, *available at* http://www.measurementlab.net/measurement-lab-tools#tool6; *WindRider, a Mobile Network Neutrality Monitoring System*, *available at* http://www.cs.northwestern.edu/~ict992/mobile.htm.

The Bureaus should take advantage of multiple, complementary data sources and methodologies, rather than selecting a single methodology or tool. Because there are trade-offs with different techniques, the Bureaus should attempt to combine different measurements to best empower users and inform policymaking.[35] For example, they can "crowdsource" data through user-initiated, self-selected tests. To effectuate this, the Bureaus should build upon the Commission's beta-version release of the Consumer Broadband Test and continue to encourage deployment and use of independent user-run broadband performance tests.

That said, while self-selected, software-based tests yield useful data, they also have limitations, and the resulting data are not adequate to fully understand the state of the broadband marketplace. Because these tests can be designed to run relatively easily – often requiring just a single click from a user – they can facilitate testing across a large number of users and provide indicators of actual conditions. However, selection bias and other confounding factors limit the usefulness of the aggregate data.

The Bureaus, therefore, should incorporate additional options, including software- and hardware-based testing through well-designed customer panels across a representative sample of users. The SamKnows testing approach used to obtain comprehensive data measuring actual performance of broadband services in the U.S. provides a useful model.[36] SamKnows embeds its software-based tests in wireless routers, and the devices perform speed, latency, jitter, and other measurements at regular intervals. In this way, SamKnows can better control for certain factors

[35] Google agrees with Free Press that information obtained from third parties should complement, and not substitute for, data collections from service providers. *See* Comments of Free Press at 5.

[36] In 2008, in partnership with Ofcom, SamKnows conducted a comprehensive study of broadband providers in the United Kingdom, in which it deployed measurement tests embedded in wireless routers to a representative sample of broadband users. *See* Ofcom, *UK Broadband Speeds 2009* (July 28, 2009) *available at* http://www.ofcom.org.uk/research/telecoms/reports/broadband_speeds/broadband_speeds/.

that might affect test validity, such as the impact of a user's PC or other users on the broadband connection. SamKnows is planning to use the M-Lab platform, and, as with all M-Lab tools, raw data from its collections will be available to researchers.[37] As discussed below, this project's openness is essential to its value for the Commission and users, and the Commission should ensure that data are openly available for re-use and analysis.

Through both its Consumer Broadband Test and SamKnows' TestMyISP project, the Commission has taken welcome steps towards improved measurement. The Commission should build on these efforts not only in the wireline context, but also in wireless. The Wireless Telecommunications Bureau can take advantage of broadband measurement tools designed for the wireless context, such as those that are available through M-Lab. Furthermore, the Bureau should consider conducting usage measurements to determine to what extent spectrum is actually being put to use in given areas. Such measurements would serve a critical role in understanding how network availability and network performance impact actual performance experienced by users.

[37] *See* Public Notice, Comment Sought on Residential Fixed Broadband Services Testing and Measurement Solution, 25 FCC Rcd. 3836 (2010).

## CONCLUSION

Google urges the Commission to move ahead promptly to implement improvements to its data collection and analysis efforts, consistent with the foregoing.

Respectfully submitted,

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