Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Fostering Innovation and Investment in the Wireless Communications Market	)	GN Docket No. 09-157
	)	
	)	
A National Broadband Plan For Our Future	)	GN Docket No. 09-51

COMMENTS OF GOOGLE INC.

Richard S. Whitt, Esq.
Washington Telecom and Media Counsel

GOOGLE INC.
Public Policy Department
1101 New York Avenue NW
Second Floor
Washington, DC 20005

E. Ashton Johnston
Mark J. O'Connor
Joanna I. Georgatsos

LAMPERT, O'CONNOR & JOHNSTON, P.C.
1776 K Street NW, Suite 700
Washington, DC 20006
(202) 887-6230 tel
(202) 887-6231 fax

Counsel for Google Inc.

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Google Inc. ("Google"), by its attorneys, hereby files comments in response to the Notice of Inquiry ("NOI") in the above-captioned proceedings.[1] Consistent with the purposes of the NOI, Google seeks to assist the Federal Communication Commission ("FCC" or "Commission") to better understand factors that encourage innovation and investment in wireless communications, and identify concrete steps the FCC can take to encourage innovation and investment in this area as it prepares and implements the National Broadband Plan ("NBP") over the coming months and years.

I. INTRODUCTION AND SUMMARY

Our nation's electromagnetic airwaves constitute a precious public resource, replenished and available for use again and again, every second of every day. And yet the vast majority of viable spectrum in the United States simply goes unused, or is grossly underutilized. According to one study performed for the National Science Foundation, actual utilization of our airwaves in any given geographic area averages barely five percent of total available spectrum.[2] Unlike

[1] *Notice of Inquiry*, GN Docket No. 09-157, FCC 09-66 (rel. Aug. 27, 2009).

[2] See Shared Spectrum Company, Spectrum Occupancy Measurements, *found at* http://www.sharedspectrum.com/measurements. SSC studied spectrum occupancy at each band

other natural resources that exist for only a limited duration and then are gone, there is little benefit, and much opportunity cost, to allowing spectrum to lie fallow. If utilized more efficiently, the airwaves can provide tremendous economic and social benefits.

There are many reasons why spectrum is not used efficiently today. In some cases, while the legal rights to use spectrum have been allocated and assigned, networks have not yet been built out, due to lack of capital, lack of equipment, or other reasons. In other cases, there simply is little or no incentive for efficient use. In any event, this situation constitutes an entirely avoidable waste of valuable spectrum, one that stems largely from government policies originally fashioned for older technologies. Google believes that our government should adopt and implement measures that enable technology to maximize the efficient and innovative uses of radio spectrum, rather than further exacerbate its history of scarcity.

Optimally, the Federal government should have in place a highly flexible, marketplace-driven spectrum regime that increases innovation and investment in the wireless ecosystem by facilitating greater spectrum efficiency and balances competing uses of spectrum. Google's own experience amply demonstrates that reliance on market mechanisms, in concert with open communications platforms, leads to a virtuous cycle of innovation and investment, and brings maximum benefits to both providers and users.

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from 30 MHz to 3000 MHz at six locations, and found that the average spectrum occupancy over all locations was 5.2%, with a maximum total spectrum occupancy of 13.1% (at the New York City location) and a minimum total spectrum occupancy of 1.0% (at the National Radio Astronomy Laboratory location. *See also* Shared Spectrum Company, Spectrum Occupancy Measurements: Chicago, Illinois, November 16-18, 2005, *found at* http://www.wtapas.org/final-papers/ChicagoSpectrum-McHenry-Session-I-1.pdf (the study, funded by the National Science Foundation, concludes that observed low spectrum occupancy rates in the downtown Chicago area "indicates that a [Dynamic Spectrum Sharing] radio system could access a huge amount of prime spectrum.").

As discussed in greater detail in these comments, Google recommends that the Commission meet these objectives by: (1) adopting and implementing as Federal policy maximizing efficient usage of spectrum by increasing the transparency of and increasing access to information about spectrum usage and availability, promoting access to unutilized spectrum, and increasing access to government spectrum for both licensed and unlicensed uses; (2) redefining interference standards through adoption of an interference temperature approach, providing Part 15 intentional radiators with greater access to spectrum, removing unnecessary adjacent channel operation constraints, and other measures; and (3) promoting openness of wireless broadband networks.

II. FEDERAL POLICY SHOULD PROMOTE MAXIMIZING EFFICIENT USAGE OF SPECTRUM

There is substantial agreement that demand by the more than 270 million users of mobile devices, services, and applications in the United States will continue to grow rapidly.[3] The public record is not clear, however, as to whether that demand may be met most effectively in the near-term by reallocating or repurposing additional spectrum for commercial uses,[4] or

[3] According to CTIA, approximately 270 million people in the United States subscribe to a wireless plan of some sort. GN Docket No. 09-51, Comments of CTIA—The Wireless Association®, June 8, 2009, at 4-5. Of course, these subscribers and others also make extensive use of innovative wireless services, devices, and applications using unlicensed spectrum.

[4] *See, e.g.*, NBP Staff Workshop, Aug. 12, 2009, Comments of Neville Ray, Senior Vice President Engineering, T-Mobile USA, Tr. at 12-13 ("[T]he ongoing deployment and success of wireless broadband … hinges on more spectrum being available in a number of bands…. "[N]ew spectrum is critically important, not only to improve the speed of service that we can deliver to consumers, but also the quality and capacity."); NBP Staff Workshop, Aug. 13, 2009, Comments of Sten Andersson, Ericsson North America, Tr. at 11 ("more spectrum … needs to made available somewhat urgently"); Comments of Scott Corson, QualComm, Tr. at 17 ("the technology doesn't matter so much, it's simply about the availability of licensed spectrum in which to deploy the technology. The problem is there's not enough of that as far as we can see either and so we need more.") & Tr. at 19 ("We think that more spectrum should be available through auction fundamentally."); Comments of Tom Anderson, Alcatel-Lucent, Tr. at 26 ("it's

whether more efficient use of current allocations may be sufficient.[5] Nonetheless, most stakeholders acknowledge that current allocations of spectrum can be used more efficiently through a host of emerging technologies.[6] The Commission therefore should focus on maximizing the efficient usage of finite spectrum resources by all users as the key to unlocking the inherent value of the nation's airwaves.

As discussed below, Google supports efforts to identify spectrum that may be reallocated or repurposed for commercial uses. Inherent in such a process, however, is the need for a factual record on which to base ultimate decisions that reflect sound Federal spectrum policy. The process itself must be transparent and comprehensive, and outcomes – such as the identification of specific spectrum blocks – must be data-driven.[7] As an initial step, Google urges the Commission to collect data that will allow all interested stakeholders – innovators and investors, the private sector and government, manufacturers, services providers and consumers – to make informed decisions about the efficient use of both private investment capital and public sector resources.

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going to be essential that we have additional spectrum on the market, large blocks of spectrum.").

[5] *See, e.g.,* NBP Staff Workshop, Aug. 13, 2009, Comments of Jim O'Connor, Director, CPE Engineering and Planning, Open Range Communications, Tr. at 133-34; GN Docket No. 09-51, Comments of Microsoft Corp., June 8, 2009, at 8-9; GN Docket No. 09-51, Comments of Verizon and Verizon Wireless, June 8, 2009, at 70-75. *See also* Public Notice, Comment Sought on Spectrum for Broadband, DA 09-2100 (rel. Sept. 23, 2009) (seeking comment on these issues).

[6] *See, e.g.,* WT Docket No. 09-51, Comments of Verizon & Verizon Wireless, June 8, 2009, at 69-70 (supporting a spectrum inventory carried out by the FCC to discover inefficiently used spectrum bands).

[7] It would not be appropriate or necessary, for example, for the government to dictate outcomes by determining that a specific amount of spectrum or specific frequency band be reallocated from government use to non-government commercial use, without a concurrent analysis of spectrum efficiency.

A. Increase Transparency of Spectrum Usage and Availability

Just as Congress, States, and the Commission have recognized that the implementation of general policies promoting broadband availability – as well as responsible expenditure of public and private capital – cannot be achieved without comprehensive broadband mapping,[8] the Commission should acknowledge that any discussion of promoting wireless innovation and investment must begin with accurate data about the current extent of spectrum utilization. The Commission must ensure that such data is collected and published in a comprehensive and transparent manner.

The NOI asks a relatively narrow set of questions about the potential benefits of a generic data compilation that comprises information on spectrum utilization and availability, including whether the Commission should assume responsibility for facilitating information sharing "in the event that the private sector does not succeed in creating a database that effectively promotes widespread information sharing on licenses."[9] Google is not aware of any such private sector initiatives, but in any event Google believes this is an area in which the Commission can and should take the lead, given its mandated role and the benefits that will follow once innovators gain access to the accumulated data. 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."[10] Not only do the agency's general powers include "encourag[ing] the larger and more effective use of radio in the public interest,"[11] the FCC

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[8] *See, e.g.*, American Recovery and Reinvestment Act of 2009 ("Recovery Act"), Pub. L. No. 111-5, 123 Stat. 115 (2009).

[9] NOI, ¶43.

[10] Communications Act of 1934, as amended (the "Act"), 47 U.S.C. §§ 151, 301(a).

[11] 47 U.S.C. § 303(g).

affirmatively may require spectrum users "to keep such records of … transmissions of energy, communications or signals as it may deem desirable,"[12] and "to cause 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."[13] Thus, there can be no question that the Commission has ample authority to compile a database of usage and availability as envisioned by the NOI;[14] moreover, exercise of that authority is consistent with the Commission's statutory obligations.

As an initial matter, the Commission should improve access to information that already exists in the Universal Licensing System ("ULS"), Broadcast Radio and Television Electronic Filing System ("CDBS"), and other licensing databases as well as in the Table of Frequency Allocations. In particular, the Commission should establish a publicly available online database that enables users to determine quickly and accurately, across the entire RF spectrum, what spectrum is available and if so whether it is available for use on a licensed or unlicensed basis; whether the spectrum has been licensed; licensee ownership and contact information; license

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[12] 47 U.S.C. § 303(j).

[13] 47 U.S.C. § 303(p).

[14] Given the Commission's existing authority and the Recovery Act's mandate to develop the NBP, specific legislation authorizing and directing the FCC to perform an "inventory" of spectrum subject to its jurisdiction (*e.g.*, H.R. 3125, Radio Spectrum Inventory Act; S.649, Radio Spectrum Inventory Act) is not necessary. With respect to spectrum allocated for government use and subject to the jurisdiction of the National Telecommunications and Information Administration ("NTIA"), NTIA has similar broad authority, including a mandate to "foster[] full and efficient use of telecommunications resources, including effective use of the radio spectrum by the Federal government, in a manner which encourages the beneficial uses thereof in the public interest." National Telecommunications and Information Administration Organization Act, P.L. 102-538, 106 Stat. 3533 (codified at 47 U.S.C. § 901 *et seq.*) ("NTIA Act"). If, however, the Commission concludes that it cannot conduct a spectrum inventory without more explicit Congressional authority, then the NBP should include an express request that such a mandate be given immediately.

term and conditions, including buildout conditions; and licensee filings such as buildout showings, renewal applications, and modifications. The database should permit user searches by multiple parameters, such as frequency band or geographic area, thus making it possible for a user to readily determine, for example, all licensees within a specified frequency range, or all licensed spectrum within a particular market.

The Commission also should collect information about licensed spectrum usage. In particular, each licensee should compile and submit, with respect to each service area or market designation (*e.g.*, MTA, BTA, MSA, RSA, etc.) and census tract for which it is licensed, information such as the frequencies on which operations have been conducted; location and operating parameters of each transmitter; whether each transmitter operated continuously or intermittently; and spectrum occupancy measurements. Initial reports could be filed by all users not later than August 1, 2010, and annually thereafter.

Once collected, the data should be compiled in a publicly accessible database, searchable by market designation, census tract, frequency band, or spectrum user name, and linked to (or, ideally, combined with) other Commission databases such as ULS that contain information about the license term and expiration date, buildout requirements and status, conditions, and licensee contact and ownership information. The Commission should set a goal of September 1, 2010, for the database to be operational.

Although not specifically addressed in the NOI, it is apparent that a comprehensive Federal government spectrum policy must promote efficient uses of all spectrum, including spectrum allocated to government users. Therefore, a comparable database of Federal government spectrum users should be compiled under the auspices of NTIA, with appropriate measures to prevent disclosure of classified information, and linked to the FCC's database.

Such a database would, as suggested by the NOI,[15] and in conjunction with other policies, encourage spectrum sharing. However, the benefits would be much broader. Once the initial database is complete, ideally less than one year from now, both the private sector and the government will have substantially more and better data on which to base a discussion about whether or not particular spectrum bands are being used efficiently, whether current and future uses could be better accommodated by relocating to other spectrum bands, and which spectrum bands could or should be reallocated or repurposed. All of this information in turn will foster additional advancements in spectrum access technologies.

B. Promote Spectrum Access Through Market-Driven Mechanisms

As the NOI observes, lack of access to spectrum can be an insurmountable barrier to innovation.[16] The Commission is absolutely correct to focus on how access to spectrum can affect innovation and deployment, particularly given the barriers posed by the high cost of spectrum at auction.[17]

Eli Noam observed nearly 15 years ago that there are intrinsic problems with the U.S. spectrum auction model, a model that remains largely unchanged today. Among other things, auctions divert capital away from infrastructure build-outs, require advance payments that create unnecessary barriers to entry – especially for smaller firms and innovative technologies – and arguably constitute a tax by removing money from the private sector.[18]

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[15] NOI, ¶43.

[16] *See* NOI, ¶20.

[17] *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, WT Docket No. 08-27, *Thirteenth Report*, DA 09-54 (WTB, rel. Jan. 16, 2009), at ¶¶ 65-68.

[18] Eli M. Noam, Taking the Next Step Beyond Spectrum Auctions: Open Spectrum Access (October 10, 1995).

In Google's view, many of these problems can be alleviated by a more open and market-driven spectrum access policy. Indeed, Federal policy should allow – if not encourage – any spectrum that is unused at a particular place and time to be eligible for secondary uses by any lawful devices. With the opening of the TV White Spaces to unlicensed devices,[19] the Commission took an important step in promoting access to unused spectrum. That step – although "conservative" by the Commission's own admission[20] – nonetheless has spurred investment by some of this country's largest technology companies, including Google, Microsoft, Motorola, Dell, and others, that will allow the development of "new and innovative products and services, including broadband data services for businesses and consumers."[21] The explosive growth of Wireless Local Area Networks and Wi-Fi equipment to deliver wireless broadband services[22] also provides convincing evidence that when the Commission makes unused spectrum accessible on an unlicensed basis, the Commission does, in fact, significantly promote investment and innovation.

However, for the full potential of the TV White Spaces to be realized the Commission should take action promptly to resolve open issues regarding inefficient legacy uses of that

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[19] *In the Matter of Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd. 16807 (2008).

[20] *Id.*, ¶1.

[21] *Id.*

[22] *See, e.g., In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, WT Docket No. 05-71, Tenth Report, 20 FCC Rcd 15908 (2005), at ¶¶ 201-203; *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, WT Docket No. 02-379, Eighth Report, 18 FCC Rcd 14783 (2003), at ¶¶ 180-184.

spectrum. In particular, the Commission should, as requested by Google and others,[23] eliminate the spectrum sensing requirement for devices operating under the management of a geolocation database, which is a deterrent to investment and undermines the goal of new and innovative spectrum uses. At the same time, in order to provide an allocation for wireless microphones that is more compatible with the prompt deployment of White Spaces devices and to eliminate sensing, the Commission should expand the safe harbor protection for wireless microphone users to include the first available channel on each side of Channel 37 in all markets, rather than only 13 metropolitan markets.[24]

The Commission also should move ahead immediately with implementation of a TV bands database by issuing a Public Notice seeking comment on issues related to database administration. Google notes that the White Spaces Database Group, which includes Google and more than a dozen other technology companies and organizations, is actively engaged in ongoing work towards the development of a geolocation database that will successfully support the safe and secure operation of White Spaces devices.[25] By bringing to fruition the operation of a viable geolocation database, the Commission in turn will foster increased investment in the development of White Spaces devices.

The Commission also can promote access to unused spectrum by adopting policies that promote the use of intelligent devices to resolve spectral access contention. One example is a real-time dynamic auction mechanism, where an entity would provide access to spectrum on an as-needed basis. For each available spectrum band, the licensee could bestow the right to

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[23] *See* ET Docket No. 04-186, Opposition and Comments of Google Inc. (May 8, 2009).

[24] *See id*. at 9-10.

[25] *See, e.g.*, ET Docket No. 04-186, *Ex Parte* Letter of Google Inc. (Sept. 18, 2009); *Ex Parte* Letter of the White Spaces Database Group (Apr. 10, 2009).

transmit an amount of power for a unit of time, with the total amount of power in a given location limited to a specified cap. The cap would be enforced by measurements made by the communications devices. For channel capacity efficiency reasons, bands allocated should be as large as possible. The auction could be managed via the Internet by a central clearinghouse. Payments would be made in perpetuity as the spectrum is being used, rather than months or even years in advance as under the current auction-first, build-later model. Such a dynamic auction would remove barriers to entry for smaller and more innovative entities, facilitate infrastructure build-outs, and leave additional money in the private sector to build out infrastructure and deliver services. From the consumer's perspective, these real-time wholesale platforms will help reduce retail prices, engender a host of new service offerings, and spread mobile broadband Internet access.

In 2007, at Google's request, the Commission confirmed that 700 MHz licensees are not prohibited from conducting dynamic spectrum management techniques, including dynamic auctions, such as those described above.[26] The Commission now should further promote such innovation, which will speed the development and use of cognitive radios and other technologies that make possible more efficient uses of spectrum.[27] In particular, the Commission should confirm that any licensee of a permitted service under the spectrum leasing rules,[28] not just 700 MHz licensees, may engage in these types of dynamic spectrum transactions, and should consider permitting other spectrum users to do so as well.

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[26] *In the Matter of Service Rules for the 698-746, 747-762, and 77-792 MHz Bands*, WT Docket No. 06-150, Second Report and Order, 22 FCC Rcd. 15289 (2007), ¶241.

[27] *See* NOI, ¶41 (seeking comment on whether the FCC should take additional steps to promote dynamic spectrum leasing arrangements). *See also id*., ¶33 (asking what barriers or impediments exist to the efficient operation of secondary markets generally).

[28] 47 C.F.R. §§ 1.9000 *et seq*.

As the NOI acknowledges, greater access to spectrum also can be achieved by the recognition of "underlay" technologies, such as femtocells, that allow low-power applications to co-exist with existing licensed operations in a given band.[29] The Commission should promote access to user-installed devices that, as with TV White Spaces devices, will increase the use of spectrum efficient technology and provide new opportunities for shared spectrum use. Further, the proliferation of inexpensive, user-installed devices designed using femtocell concepts and technology will permit a greater diversity of service offerings and more competitive choices for consumers.

C. Promptly Address Other Barriers to Entry and Innovation

In addition to addressing limitations on access to spectrum, the Commission may take other actions immediately to lower barriers to entry and innovation. Today's capital-intensive wireless industry too often is characterized by "command and control" spectrum policies that have an unfortunate tendency to lock in incumbent users and uses, while locking out new entrants and innovative new uses of spectrum. As noted in the NOI, some possible actions the Commission may take to promote innovation and investment relate to issues currently pending in other proceedings.[30] Consistent with the NOI,[31] Google will not repeat arguments already made in those proceedings but will comment briefly on certain issues, and urges the Commission to resolve them prior to consideration of the record on this NOI.

1. *Access to Infrastructure*. Lack of access to critical infrastructure – including poles, conduit, and rights-of-way – is a significant barrier to investment and competition. A substantial record now exists before the Commission of the myriad ways in

[29] *See* NOI, ¶26.

[30] *See* NOI, ¶7.

[31] *Id*.

which zoning boards, utilities, and others with control over infrastructure are thwarting the deployment of new wireless facilities by denying access. The time has come to establish national rules resolving the many open proceedings in which access issues are pending.[32] This Commission no longer should countenance practices that delay or deny access to bottleneck infrastructure, thwarting new investment and competition while protecting incumbents' sunk costs.[33] As many disparate parties have noted, reforming the pole attachment, rights-of-way, and other infrastructure access rules will spur deployment of and investment in wireless broadband.[34]

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[32] *See, e.g., In the Matter of Implementation of Section 224 of the Act, Amendment of the Commission's Rules and Policies Governing Pole Attachments*, WC Docket No. 07-245, Notice of Proposed Rulemaking, 22 FCC Rcd. 20195 (2007) (seeking comment on changes to rules implementing Section 224 of the Act); Reply Comments of the DAS Forum, WC Docket No. 07-245 (filed Apr. 22, 2008) (noting support for fair and nondiscriminatory access to utility poles by operators of distributed antenna systems and other wireless interests); Level 3 Communications' Petition for Declaratory Ruling that Certain Right-of-Way Rents Imposed by the New York State Thruway Authority Are Preempted Under Section 253, WC Docket No. 09-153 (filed July 23, 2009) (requesting preemption of exorbitant rents sought for access to state rights-of-way that effectively preclude investment in new facilities); CTIA – The Wireless Association®, Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt Under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance ("CTIA Petition"), WT Docket No. 08-165 (filed July 11, 2008) (requesting, *inter alia*, resolution of open questions regarding the time frames in which zoning authorities must act on siting requests); Petition for Rulemaking of Fibertech Networks, RM-11303 (filed Dec. 7, 2005) (requesting adoption of "best practices" addressing competitor access to poles and conduit); Reply Comments of ClearLinx Network Corp., LLC, RM-11303 (filed Mar. 1, 2006) (supporting reasonable and timely access to public rights-of-way and utility pole infrastructure for implementation of wireless networks).

[33] It is generally recognized that high sunk costs of an incumbent constitute a barrier to entry by new competitors. *See, e.g.*, Larson, An Economic Guide to Competitive Standards in Telecommunications Regulation, 1 CommLaw Conspectus 31, 52 (1993) ("if entry requires the incurrence of capital costs, and a 'high' proportion of these are sunk costs for entrants, then entry barriers exist."). As the Supreme Court has noted, parties seeking access to such infrastructure "have found it convenient, and often essential to lease space … on telephone and electric utility poles. Utilities, in turn, have found it convenient to charge monopoly rents." *National Cable & Telecom Ass'n. v. Gulf Power Co.*, 534 U.S. 327, 330 (2002).

[34] *See, e.g.*, GN Docket No. 09-51, Comments of the United States Telecom Association (Sept. 24, 2009), at 2; Comments of the American Cable Association (June 8, 2009), at 8-9; Comments of PCIA/DAS, June 8, 2009, at 4-9; Comments of Windstream Communications, Inc. (June 8,

In particular, Google urges the Commission to clarify and affirm its rules regarding nondiscriminatory and reasonable rates for pole and conduit access to allow for increased access to infrastructure by both licensed and unlicensed providers.[35] Google agrees with CTIA that the Commission should affirm its tentative conclusion to establish a unified rate for providers of broadband service (to be set at a rate as low as possible for utility companies to receive just compensation), and establish that pole-tops are "usable space" for wireless attachments.[36] The FCC also should resolve the issue of whether pole attachment and other access rights should apply when an entity is solely providing wireless broadband Internet access.[37] Google also urges the Commission to adopt proposals in the CTIA Petition to establish a "Shot Clock" for local authorities to act on tower siting and wireless facility applications, and to clarify that zoning authorities may not deny an application of one provider because another wireless provider already has a presence in the area.[38]

Finally, Google notes that its recommendation[39] to include in the National Broadband Plan a proposal to lay fiber, or simply to install conduit for later fiber deployment, during the federally-funded construction or repair of roads, as well during similar public works projects

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2009), at 18-23; Comments of Wireless Communications Association International, Inc. (June 8, 2009), at 25-30; Comments of CTIA (July 21, 2009) at 14-15.

[35] *See* GN Docket No. 09-51, Comments of CTIA, at 20.

[36] *Id.*, at 20-23.

[37] *See Appropriate Treatment for Broadband Access to the Internet Over Wireless Networks*, WT Docket 07-53, Declaratory Ruling, 22 FCC Rcd. 5901, ¶62 (2007) (citing RM-11303).

[38] CTIA Petition, supra n.31, at 14-16 (filed July 11, 2008). *See also* GN-09-51, Comments of CTIA (filed June 8, 2009), at 16.

[39] *A National Broadband Plan For Our Future*, GN Docket No. 09-51, Comments of Google Inc. (June 8, 2009), at 36-37.

including utility lines for water, electricity and gas, will benefit significantly the deployment of wireless broadband service by lowering providers' costs for backhaul transmission.

2. *Reform CMRS Roaming Regulations*. For nearly two years the Commission has had a complete record in its *Roaming Reform* proceeding.[40] Google urges the Commission to promptly issue an Order extending the automatic roaming requirement[41] to all wireless services, and not just voice services. The record is clear that such a rule will further competition in the mobile services market.[42] Moreover, "carriers and manufacturers will have a greater incentive to invest in the development of technological solutions that facilitate seamless data roaming when they know carriers are obligated to provide roaming."[43] Similarly, the Commission should grant pending petitions for reconsideration[44] of the home-market exception to the automatic roaming requirement[45] which, by interrupting seamless roaming, harms consumers[46] and undermines the very purpose of the rule.[47]

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[40] *In the Matter of Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers*, WT Docket No. 05-265, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd. 15817 (2007) ("Roaming Order").

[41] 47 C.F.R. § 20.12(d) ("Upon a reasonable request, it shall be the duty of each host carrier subject to paragraph (a)(2) of this section to provide automatic roaming to any technologically compatible home carrier, outside of the requesting carrier's home market, on reasonable and non-discriminatory terms and conditions.").

[42] *See, e.g.*, WT Docket No. 05-265, Comments of Leap Wireless International, Inc. (Oct. 29, 2007), at 5; Comments of MetroPCS Communications, Inc. (Oct. 29, 2007), at 5-6.

[43] WT Docket No. 05-265, Comments of MetroPCS Communications, Inc., Oct. 29, 2007, at 15.

[44] *See, e.g.*, WT Docket No. 05-265, Petition for Reconsideration of Leap Wireless International, Inc., filed Sept. 28, 2007; Petition for Reconsideration of T-Mobile USA, Inc., filed Oct. 1, 2007.

[45] 47 C.F.R. § 20.12(d).

[46] *See* WT Docket No. 05-265, Letter from Gigi Sohn, Public Interest Spectrum Coalition, to Marlene Dortch, FCC (Aug. 13, 2008).

[47] *See* Roaming Order, 22 FCC Rcd. at ¶3.

3. *Expand the Flexible Use Policy*. Flexibility of spectrum use should be an integral part of Federal spectrum policy because it increases innovation and competition and helps to ensure that spectrum is devoted to its highest and best uses. The Commission adopted a flexible use policy in 1996 in order to allow CMRS providers greater flexibility to provide innovative wireless services to meet consumer demands, including combining fixed and mobile technologies into integrated service offerings.[48] As intended, the policy has "stimulate[d] wireless competition in the local exchange market, encourage[d] innovation and experimentation in development of wireless services, and lead to a greater variety of service offerings to consumers."[49]

The Commission should continue to relax antiquated and burdensome spectrum use restrictions that "silo" specific service offerings within limited frequency bands and result in "inefficient spectrum use and reduced technological innovation."[50] In particular, the Commission should relax use restrictions, first adopted in 2003,[51] on mobile satellite service licensees' use of spectrum for terrestrial operations.

D. Increase Licensed and Unlicensed Access to Government Spectrum

As noted above, numerous parties, including the largest incumbent holders of licensed spectrum, assert the need for substantial additional licensed spectrum in order to fully meet

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[48] *See Amendment of the Commission's Rules to Permit Flexible Service Offerings in the Commercial Mobile Radio Services*, WT Docket No. 96-6, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd. 8965 (1996), ¶3.

[49] *Id*.

[50] *Id.* at ¶22.

[51] *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1. 6/2.4 GHz Bands*, IB Docket No. 01-185, Report and Order and Notice of Proposed Rulemaking, IB Docket No. 01-185, 18 FCC Rcd. 1962 (2003), Order on Reconsideration, 18 FCC Rcd. 13590 (2003).

demand for 4G services and applications. Recent estimates of commercial spectrum needs range from 100 MHz up to 1,280 MHz,[52] and various entities have urged that this spectrum be reallocated from the Federal government.[53]

Given that the government has exclusive access to a substantial amount of spectrum, and even more spectrum is designated for government/non-government shared use,[54] it is highly likely that spectrum suitable for reallocation for commercial and other purposes can be identified. Google supports a reallocation of government spectrum, provided the FCC and the public also have access to the database discussed above in order to better assess how efficiently spectrum is being used under current allocations. Efforts to identify spectrum suitable for reallocation therefore should proceed in parallel with efforts to make available a spectrum usage database. Ultimately, the Commission should ensure that reallocated spectrum becomes available to users on both a licensed and unlicensed basis. By continuing to foster access to

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[52] *See, e.g.*, WT Docket No. 09-51, Comments of T-Mobile, June 8, 2009, at 16-17 (200 MHz should be auctioned; Comments of Consumer Electronics Association, June 8, 2009, at 7-8 (same); NBP Staff Workshop, Sept. 17, 2009, Comments of Bill Stone, Executive Director, Network Strategy, Verizon Wireless, Tr. at 87 (noting that Verizon would like to acquire "north of 100 megahertz"); NBP Staff Workshop, Sept. 17, 2009, Comments of Kris Rinne, Senior Vice President, Architecture and Planning, AT&T, Inc., Tr. at 32 (discussing the ITU's estimate that an additional 1,280 MHz will be required by 2020).

[53] *See, e.g.*, WT Docket No. 09-51, Comments of T-Mobile, June 8, 2009, at 16-17 (100 MHz should be reallocated from NTIA); Comments of Consumer Electronics Association, June 8, 2009, at 7-8 (same); NBP Staff Workshop, Sept. 17, 2009, Comments of Coleman Bazelon, Principal, The Brattle Group, Tr. at 94 ("We all suspect that the federal government controls spectrum that could more efficiently be used in the private sector.").

[54] *See* 47 C.F.R. § 2.106 ("United States Table," comprised of the "Federal Table" and "Non-Federal Table"). According to one FCC study, of the spectrum bands between 300 MHz and 3000 MHz, 22.4% is allocated for Federal government purposes, 34.7% is allocated for non-Federal government purposes, and 34.7% is allocated for shared Federal and non-Federal government purposes. *See* U.S. Spectrum Allocations 300-3000 MHz, John R. Williams, Federal Communications Commission (Nov. 2002), http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp38chart.pdf.

spectrum for unlicensed uses, the Commission will promote diversity of ownership, business models, and technology. The innovation and investment that is occurring in the TV White Spaces, for example, fully justifies an increased focus on unlicensed uses and spectrum efficiency, and the Commission should take a balanced approach to licensed and unlicensed uses when making future allocation decisions.

Google urges the FCC to take a more active role in promoting efficient government spectrum use generally, including by working with the NTIA to identify spectrum suitable for reallocation. A structure for such cooperation already exists. The NTIA and the FCC are required to meet at least biannually to conduct joint spectrum planning, including future spectrum requirements for public and private uses, spectrum allocation actions necessary to accommodate those uses, and actions necessary to promote efficient use of spectrum, including shared use of spectrum as a means of increasing commercial access.[55] Moreover, NTIA[56] is expressly authorized to reallocate spectrum from government to non-government users,[57] and to allow non-government licensees to share spectrum allocated on a primary basis for government use "for the purpose of facilitating the prompt implementation of new technologies or services and for other purposes."[58]

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[55] 47 U.S.C. § 922.

[56] NTIA, assisted by the Interdepartment Radio Advisory Committee ("IRAC"), assigns frequencies to, and establishes policies concerning spectrum assignments and use by, government-operated stations. 47 U.S.C. § 902(b)(2)(A),(K). IRAC members are appointed by the Departments of Agriculture, Army, Air Force, Commerce, Energy, Transportation, Homeland Security, Interior, Justice, Navy, State, Treasury and Veteran's Affairs; the U.S. Coast Guard, the FAA, the GSA, NASA, the National Science Foundation, the Broadcasting Board of Governors, and the U.S. Postal Service. Each agency independently prepares and files an application with the NTIA for consideration by IRAC's Frequency Assignment Subcommittee.

[57] 47 U.S.C. § 927(a).

[58] 47 U.S.C. § 927(b)(1).

Unfortunately, information about government spectrum use is difficult to obtain; no database exists that allows third parties to determine which bands have been assigned, users' geographic/coverage areas, or other relevant information that would increase opportunities for spectrum sharing and the introduction of innovative technologies across broader frequency ranges. Google encourages the FCC, as part of its joint spectrum planning process with NTIA, and consistent with the obligations of both agencies, to identify government spectrum that can be made available on either a shared or exclusive basis for commercial use.

III. REDEFINE INTERFERENCE: NO HARM, NO FOUL

Google agrees that "[t]he resolution of disputes about potential or actual interference in rulemakings can pose a major impediment to the introduction of new services"[59] and that the "technical characteristics of incumbent radio systems have a direct impact on the availability of spectrum for other services, both within band and in adjacent bands."[60] Google believes the Commission should re-examine the current balance struck between protections for licensees and the efforts to open new spectrum usage for innovators, and should consider efficient and timely ways to address actual interference disputes that arise under the revised interference standards.

To re-examine interference protection, the Commission must begin with its statutory and policy underpinnings. The Act establishes that "[i]t shall be the policy of the United States to encourage the provision of new technologies and services to the public"[61] and it is the Commission's duty to "encourage the larger and more effective use of radio in the public interest."[62] Interference protection is not an unqualified right conferred on FCC licensees, and,

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[59] NOI, ¶34.

[60] *Id.*, ¶36.

[61] 47 U.S.C. §157(a).

[62] 47 U.S.C. §303(g).

as Commission precedent recognizes, overprotective interference standards are inefficient and a misuse of scarce public resources.[63] Instead, the Commission and its wireless licensees are obliged to use the public's spectrum in a manner that is efficient and that maximizes benefits for the American public.[64]

The interference standards and processes should value any and all spectrum usage unless it is demonstrated to cause a licensee a "*significant* risk of harmful interference."[65] Licensees undertaking the privilege of using the public's spectrum should make no "doomsday" potential interference claims about other uses of the spectrum not proven to inflict a material degradation of the licensee's service.[66] In addition, a balanced approach must reflect that competing spectrum uses (including unlicensed services) serve a critical role in our Nation's economy and,

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[63] *See In the Matter of Allocations and Service Rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands*, Memorandum Opinion and Order, 2005 FCC LEXIS 2780, ¶¶ 22-25 (2005) (on reconsideration, FCC eliminated interference requirement to address "over protect[ion]" of existing licensees, finding that other interference protections are adequate and that elimination of overprotective requirement "will best serve the public interest.").

[64] *In the Matter of Amendment of Part 95 of the Commission's Rules to Provide Regulatory Flexibility in the 218-219 MHz Service*, Report and Order and Memorandum Opinion and Order, 15 FCC Rcd. 1497 (1999) (Commission declined to adopt more proscriptive interference standards to protect TV Channel 13 licensees from new wireless entrants because additional rules would threaten to "undermine this [new] service's flexibility" and "this approach toward interference management will avoid imposing restrictions that may be overprotective or unnecessary in many cases").

[65] *In the Matter of Amendment of Parts 15 and 90 of the Commission's Rules to Provide Additional Frequencies for Cordless Telephones*, Report and Order, 10 FCC Rcd. 5622, ¶16 (1995) (Part 15 cordless phones pose no "significant risk of harmful interference" requiring additional interference protections for FCC licensees, even if some interference may occur under some scenarios); *id*., ¶18 (use of spectrum by Part 15 devices is "compatible" with operation of TV receivers where the potential for interference is "limited" or "very low"). Part 15 defines "harmful interference" as "[a]ny emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this chapter." 47 C.F.R. §15.3(m).

[66] *AT&T v. FCC*, 270 F.3d 959, 964 (D.C. Cir. 2001) ("Absent harmful interference, [the new entrant's] system does not trammel upon petitioners' rights as licensees.").

when the Commission approves new entrant technology, it is the duty of all licensees to support the Commission's spectrum development policies.[67] Unfortunately, however, claims of protection from potential interference are too often used today as a talisman for incumbent licensees to block or deter other additional uses of the spectrum that are unlikely to result in a material disruption of the licensee's service.

Indeed, the Commission should reform its standards by building on precedent that holds overprotective interference requirements to be inefficient and a misuse of scarce public resources.[68] Ultimately, overprotective interference standards inflict a pervasive blow to the investment in and deployment of new technologies in the United States. In some cases, this means that vast areas of the country, especially in major metropolitan areas, are "false positive" interference zones that preclude deployment. In other places, such as rural areas, overprotective interference standards set for the most crowded RF environment can prevent lower-cost deployment at higher power levels even where interference in the context of the rural environment is exceedingly unlikely to occur. As the Commission has recognized, regulatory

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[67] The interference standards and processes should better reflect that the public interests in "bringing broadband services to the public are sufficiently important and significant so as to outweigh the limited potential for increased harmful interference that may arise." *In the Matter of Amendment of Part 15 Regarding New Requirements and Measurement Guidelines for Access Broadband over Power Line Systems*, Memorandum Opinion and Order, 21 FCC Rcd. 9308, ¶55 (2006), *remanded in part, aff'd in part, ARRL v. FCC*, 524 F.3d 227 (D.C. Cir. 2008).

[68] *See In the Matter of Allocations and Service Rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands*, Memorandum Opinion and Order, 2005 FCC LEXIS 2780, ¶¶ 22-25 (2005) (on reconsideration, FCC eliminated interference requirement to address "over protect[ion]" of existing licensees, finding that elimination of overprotective requirement "will best serve the public interest."); *In the Matter of Amendment of Part 95 of the Commission's Rules to Provide Regulatory Flexibility in the 218-219 MHz Service*, Report and Order and Memorandum Opinion and Order, 15 FCC Rcd. 1497 (1999) (Commission declined to adopt more proscriptive interference standards to protect TV Channel 13 licensees from new wireless entrants because additional rules would threaten to "undermine this [new] service's flexibility" and "this approach toward interference management will avoid imposing restrictions that may be overprotective or unnecessary in many cases").

actions that "decreas[e] development and manufacturing costs" for new wireless devices "lead manufacturers to develop a wide range of new and innovative unlicensed devices and thereby increase wireless broadband access and investment."[69] These deployment costs and limitations imposed by FCC RF interference policies have adversely impacted manufacturers and consumers alike, and contribute to spectrum inefficiency, contrary to the sound Federal spectrum policy objectives.

In order to implement a more balanced interference standard, Google recommends that the Commission give serious consideration to reforming its rules and policies consistent with the following concepts:

A. Adopt Interference Temperature Approach

The Commission should re-open the proceeding to examine adopting the interference temperature model as a more balanced and efficient means of quantifying and managing interference among competing users of the RF spectrum.[70] As the Commission has noted, an interference temperature model "could better allow the Commission to enable future uses of the spectrum, while possibly providing a greater degree of certainty to incumbents regarding the RF environment in which they will continue to operate."[71] For the wireless innovator, the interference temperature model would enhance access to spectrum as "opportunities would exist for additional operation by 'underlay' transmitters equipped to monitor the interference

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[69] *In the Matter of Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Report and Order, 18 FCC Rcd. 24484, ¶1 (2003) ("*U-NII R&O*").

[70] *In the Matter of Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, Notice of Inquiry and Notice of Proposed Rulemaking, 18 FCC Rcd. 25309 (2003).

[71] *Id.*, ¶8.

temperature and to control their operations so that they do not contribute to a condition where the interference temperature cap would be exceeded. Thus spectrum access for unlicensed users and devices would be increased."[72] While the prior Commission in 2007 – incorrectly, in Google's view -- decided to terminate the proceeding "without prejudice to its substantive merits" because the record supposedly had become outdated,[73] recent academic research and technological innovation support a fresh look at the interference temperature approach.[74]

An interference temperature approach would also improve upon the Commission's existing but largely *ad hoc* legal standard of what constitutes potential harmful interference in a prospective rulemaking context and so permit the Commission to provide greater non-interfering access to spectrum in a timely manner. As one scholar has noted,

> The test of the Commission's flexible definition of "harmful interference" certainly suggests that harmful interference represents something more serious than mere "interference." But the definition includes several undefined terms and concepts that make it difficult to apply consistently. When does interference endanger the functioning of another radio? What does seriously degrade or obstruct mean in practical terms? . . . What if the interference can be mitigated by some simple and inexpensive action by the interferee? The FCC rules do not answer these questions.[75]

As a result, the traditional interference standard fails to answer "whether an impermissible level of interference *might occur* in the future if a certain band plan is adopted or a new technology

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[72] *Id.*, ¶16.

[73] *In the Matter of Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, Order, 22 FCC Rcd. 8938 (2007).

[74] *See, e.g.*, T. Charles Clancy, "Dynamic Spectrum Access Using the Interference Temperature Model, *Annals of Telecommunications*, vol. 64, (7), pp. 573-585 (Aug. 2009), *found at* http://www.cs.umd.edu/~clancy/docs/itma-at08.pdf.

[75] R. Paul Margie, "Can You Hear Me Now?: Getting Better Reception from the FCC's Spectrum Policy," 2003 Stan. Tech. L. Rev. 5 (2003).

licensed. In these cases, the definition's flexibility leads to vagueness and inconsistency . . . ."[76] Google submits that the regulatory delay and uncertainty associated with these issues pose a continuing and significant barrier to entry for wireless innovators, especially those seeking to "underlay" an innovative new service that requires non-interfering usage of spectrum already allocated to existing licensees.

B. Provide Part 15 Intentional Radiators With Greater Access to Spectrum

Google recommends that the Commission permit Part 15 unlicensed intentional radiators to operate at low power levels across the RF spectrum, either through underlays or overlays. Thus, as also explained in the FCC's 2002 Spectrum Policy Task Force Report,[77] access to otherwise licensed and exclusive-use spectrum bands should also be made available to non-interfering "underlay" users. Part 15 regulations could harmonize the two uses of the spectrum by providing that the unlicensed user must either (a) operate at a pre-defined low-power level or (b) reach an agreement with the affected licensee concerning usage at higher-power levels.

C. Remove Unnecessary Adjacent Channel Operations Constraints

As the NOI noted, "a service that uses receivers that respond to RF signals far into adjacent spectrum bands may impede or prevent effective operation of new services in those bands or necessitate that limits be placed on the types of operations provided in the adjacent band(s)."[78] Google recommends that the Commission review carefully whether interference protections designed to address so-called adjacent channel interference are in all cases necessary

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[76] *Id*.

[77] *See* FCC Spectrum Policy Task Force, Report of the Unlicensed Devices and Experimental Licenses Working Group, ET Docket No. 02-135 (Nov. 15, 2002), at 16.

[78] NOI, n.36.

or are, in some cases, overprotection of adjacent channel licensees,[79] including through the use of antiquated and inadequate receiver equipment, and thus harmful and ineffective.

D. Encourage the Use of Higher Quality Receivers in Order to Reduce Interference Potential

As the Commission has noted, "incorporation of receiver performance specifications could serve to promote more efficient utilization of the spectrum and create opportunities for new and additional use of radio communications by the American public" which may "lead to consumer benefits in the form of innovation, competition and choice among services and devices."[80] While the Commission inadvisably "terminat[ed] this proceeding without prejudice to its substantive merits" it is now time to review these actions and to initiate a further review and, as the Commission suggested in 2007, at least begin that review process by adopting receiver standards "that are frequency band or service specific."[81] As NTIA researchers have observed, "[i]n recent years, there have been a growing number of cases of non-cochannel interference that has been caused by inadequate performance of receivers instead of by transmitter performance. One element in the prevention of non-cochannel interference is the design and use of quality receivers that are less susceptible to interference."[82] In fact, while

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[79] *See, e.g.*, Opposition and Comments of Google Inc., ET Docket Nos. 04-186 and 02-380, at 16 (May 8, 2009) (opposing Shure Communications' request to reduce power levels of White Spaces devices (WSDs) because "[u]nnecessary constraints on adjacent channel operation and power levels would severely constrain widespread deployment, limiting market opportunities for WSD providers in major markets and making deployment in rural areas cost-prohibitive.").

[80] *Interference Immunity Performance Specifications for Radio Receivers*, Notice of Inquiry, 18 FCC Rcd. 6039 (2003). *See also* Spectrum Policy Task Force, Report, ET Docket No. 02-135, at 31 (rel. Nov. 15, 2002).

[81] *Interference Immunity Performance Specifications for Radio Receivers*, Order, 22 FCC Rcd. 8941 (2007).

[82] *Receiver Spectrum Standards Phase 1 – Summary of Research into Existing Standards*, NTIA Report TR-03-404 (Nov. 2003), Executive Summary at iv, *found at* http://www.its.bldrdoc.gov/pub/ntia-rpt/03-404/.

NTIA incorporates both transmitter and receiver standards for federal users of RF spectrum, the FCC has failed to provide industry with appropriate standards.

E. Implement Light-Touch Licensing for Additional Point-to-Point Usage

Google commends the Commission on the licensing approach taken in the *70-80-90 GHz Order*[83] and in the *3.65 GHz Order*.[84] In both cases, the Commission implemented important concepts designed to minimize interference potential without overburdening new licensees with additional regulatory limitations, while allowing the marketplace to work out some interference and siting matters. In both cases, the Commission implemented an approach of "a non-exclusive licensing scheme combined with the site-specific coordination and registration process…."[85] With regard to interference protection in the 70-80-90 GHz band, the Commission adopted a plan of registering links with one or more third-party administrators, public access to the registration databases, and a first-in-time rule on actual interference complaints with resort first to the third-party administrator(s). Google believes that many aspects of this sensible licensing and interference approach should be used for new and existing frequency allocations, which would allow the marketplace to sort out frequency interference and usage and would employ the Commission's complaint processes only when necessary.

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[83] *In the Matter of Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Report and Order, 18 FCC Rcd. 23318, (2003) ("*70-80-90 GHz Order*").

[84] *In the Matter of Wireless Operations in the 3650-3700 MHz Band; Rules for Wireless Broadband Services in the 3650-3700 MHz Band; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band; Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, Report and Order and Memorandum and Opinion Order, 20 FCC Rcd. 6502 (2005).

[85] *70-80-90 GHz Order*, ¶45.

IV. PROMOTE OPENNESS

Openness should be a component of the Internet access available over all broadband networks, including wireless broadband networks. While the FCC may approach its openness objectives somewhat differently in the wireless context, as wireless is different than wireline in terms of both technical constraints and market structure, the Commission should acknowledge that the principles set forth in the *Internet Policy Statement*[86] apply to all broadband platforms and are legally enforceable. Ultimately the question comes down to whether the end user's experience of the openness of the Internet changes appreciably for the worse when moving from a wireline connection to a wireless device. When mobile operators voluntarily offer Internet access to their customers, the principle of end-to-end openness should not simply be swept to the curb. Instead, Google believes that the Commission should not hesitate to take a more active role in ensuring that U.S. mobile consumers have unfettered access to the rich diversity of content and applications offered on today's Internet. To that end, Google strongly supports Chairman Genachowski's statement of September 21, 2009, acknowledging the "clear policy" goal of an open Internet, which correctly should extend to Internet access when provided by wireless operators to their customers.[87]

It is now beyond question that the FCC's 700 MHz C Block open platform requirements have helped catalyze innovation and investment in the wireless market, and have led to significant progress toward open mobile platforms. In the proceeding adopting service rules for 700 MHz spectrum, Google and others urged the Commission to take the relatively narrowly-

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[86] *See Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, Policy Statement, 20 FCC Rcd. 14986, ¶4 (2005) ("*Internet Policy Statement*").

[87] Julius Genachowski, Chairman, Federal Communications Commission, "Preserving a Free and Open Internet: A Platform for Innovation, Opportunity, and Prosperity," The Brookings Institution (Sept. 21, 2009), *found at* www.openinternet.gov.

tailored action of attaching open access conditions to the C Block license.[88] The Commission agreed, recognizing "a window of opportunity to have a significant effect on the next phase of mobile wireless technological innovation, and on the evolution of market and institutional arrangements."[89]

By any fair measure, the Commission's leadership in promoting the ubiquitous availability of pro-consumer broadband services has successfully catalyzed open wireless networks for competing devices and applications. The tailored C Block open access conditions already have produced important salutary effects on the commercial wireless services market. Even before the C Block auction began, Verizon Wireless announced that it would open its CDMA network as a platform for applications and devices supplied by third parties.[90] That carrier subsequently proceeded with its Open Development Initiative (ODI), which brings the potential of an open pathway for consumers to enjoy the innovative offerings of independent hardware and software providers. Other national wireless carriers, to varying degrees, also have taken steps to build business models premised on allowing consumers to utilize at least some third party devices and applications on their networks.[91] As noted recently by the IEEE-USA,

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[88] In early 2007, Skype presented to the FCC certain market failure concerns related to the wireless carriers' refusal to allow open handsets and applications on their networks. *See* In the Matter of Skype Communications S.A.R.L., Petition to Confirm a Consumer's Right to Use Internet Communications Software and Attach Devices to Wireless Networks, RM-11361 (Feb. 20, 2007).

[89] *See In the Matter of Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Second Report and Order, 22 FCC Rcd. 15289, ¶206 (2007).

[90] *See* News Release, "Verizon Wireless To Introduce 'Any Apps, Any Device' Option For Customers In 2008: New Open Development Initiative Will Accelerate Innovation and Growth" (Nov. 27, 2007) (available at http://news.vzw.com/news/2007/11/pr2007-11-27.html).

[91] For example, Sprint and T-Mobile both were founding members of the Open Handset Alliance and support the development and implementation of Android, the Alliance's open

the "closed nature of the wireless market is not a technological imperative, as shown by investment in the open platform and open source Android by Google."[92] These efforts are pushing at least some quarters of the wireless industry to re-think legacy closed business models and to deliver services for consumers that are "brimming with thousands of apps that have unleashed new waves of creativity and innovation."[93] The Commission rightfully should claim considerable credit for helping to spur these encouraging, but still incomplete, market developments.

Largely because it is consistent with the Internet approach to communications, many "edge" content/applications providers already invest in open solutions for innovators. Google's Android initiative in the wireless ecosystem is but one example.[94] T-Mobile today supports several mobile phones in the United States developed using the Android open-source platform.[95] Motorola also recently announced the release of the "Cliq" mobile handset which will be sold by T-Mobile in the United States and by France Telecom, Orange, Telefonica, and America Movil in other countries throughout the world.[96] As one report noted, "Google's partners in the Open

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mobile applications platform. *See, e.g.*, News Release, "Sprint Joins Open Handset Alliance, Committed to bringing new and innovative handsets and services to customers" (Nov. 7, 2007).

[92] Comments of IEEE-USA, WC Dkt. No. 09-51, at 12.

[93] Julius Genachowski, Chairman, Federal Communications Commission, Remarks to the Staff of the Federal Communications Commission, 2 (June 30, 2009).

[94] Android is an open mobile operating system built on the Linux Kernel that enables applications developers to create mobile applications that have equal access to a phone's capabilities. *See* Android Official Website, http://www.android.com/about/.

[95] *See, e.g.*, Tedeschi, Bob, The New York Times, *A Wi-Fi Alternative When the Network Gets Clogged* (Sept. 23, 2009) *available at* http://www.nytimes.com/2009/09/24/technology/personaltech/24smart.html?hpw (the T-Mobile MyTouch 3G and G1 operate on the Android software platform).

[96] *See* "Motorola Shares Jump on Hopes for Google Phone," Reuters (Sept. 11, 2009). *See also*, "Sprint to Start Selling Phone with Google Software," Associated Press (Sept. 3, 2009).

Handset Alliance have joined at such a rapid rate that the company hopes to have up to 20 Android-based phones available by the end of 2009. It could more than double that number by the end of 2010."[97]

The marketplace entry of the wireless broadband provider Clearwire also may prove significant. Clearwire has the express and investment-backed goal to deliver precisely what the Commission and Congress have been striving for: the emergence of a wholesale alternative to the existing wireless incumbents. Equally important, Clearwire has agreed not to block, degrade, or impair access, downloading, or utilization of any lawful, non-harmful Internet content, applications, or services on the network. This comparatively open network has at least the potential to greatly enhance consumer welfare by stimulating innovation and lowering prices for applications and devices.

The end-to-end nature of the Internet is largely responsible for its brilliant success. Historically, a stable and open wireline platform, including the lynchpin of a common carriage-style legal structure for last-mile access, has allowed content, device, and application providers on the "edge" of the network to take enormous risks by investing in a myriad of services and applications.[98] If end-user demand for these content/application services bears out in the marketplace, a new set of marketplace signals and incentives arises to address consumer tastes and wants. This "virtuous cycle" in the wireless applications marketplace can grow and develop, however, only for as long as wireless applications innovators take their economic signals from consumers, and are not dependent upon the prior permission of the wireless platform owners.

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[97] "Google Android Gaining as Mobile Phone Market Sleeper," eweek.com (Sept. 9, 2009).

[98] Kevin Werbach, Breaking the Ice: Rethinking Telecommunications Law for the Digital Age, 4 J. ON TELECOMM. & HIGH TECH. L. J. 59, 61-65 (2005) ("Intelligence moves to the edges of the network").

V. CONCLUSION

Google commends the Commission for initiating this proceeding. The wireless industry is a critical component of this country's economy, and the Commission's role in establishing and implementing Federal spectrum policy sets the stage for the industry's continued success. A spectrum policy that is data-driven and seeks to maximize efficient spectrum use will further Congressional and Commission goals and policies, including fostering the availability of broadband, and ensure that individual consumers and businesses continue to benefit from innovation.

Respectfully submitted,

E. Ashton Johnston
Mark J. O'Connor
Joanna I. Georgatsos

LAMPERT, O'CONNOR & JOHNSTON, P.C.
1776 K Street NW, Suite 700
Washington, DC 20006
(202) 887-6230 tel
(202) 887-6231 fax

Counsel for Google Inc.

Richard S. Whitt, Esq.
Washington Telecom and Media Counsel

GOOGLE INC.
Public Policy Department
1101 New York Avenue NW
Second Floor
Washington, DC 20005

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