Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20054

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

COMMENTS OF MOTOROLA, INC.

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COMMENTS OF MOTOROLA, INC.

I. INTRODUCTION AND SUMMARY

Motorola, Inc. ("Motorola") respectfully submits these comments in response to the Commission's *Notice of Inquiry*, which is the critical first step in formulation of the National Broadband Plan ("Plan") mandated by the American Recovery and Reinvestment Act of 2009 ("ARRA" or "Recovery Act").[1] The importance of the Commission's work in preparing the Plan cannot be understated.

Because of the complexity and cost involved in deploying broadband and with the myriad of broadband needs, the Plan must incorporate a properly structured strategy for increasing broadband deployment in the United States. Otherwise, the benefits of broadband will not be fully realized. As a global communications leader providing wireless, cable, fiber, and wired broadband access solutions for consumers, government and public safety first responders, commercial and industrial enterprises, and commercial operators, Motorola is uniquely situated to provide information critical to the Commission's efforts in preparing the Plan.

In developing any plan to facilitate the deployment of broadband, the Commission must ensure that the basic resource building blocks are available and that an appropriate regulatory

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[1] *A National Broadband Plan For Our Future*, Notice of Inquiry, GN Docket No. 09-51, FCC 09-31 (rel. April 8, 2009) ("*Notice of Inquiry*").

structure is in place to create the incentives and cost structure necessary for deployment and sustained operation of broadband networks. The absence of either of these critical components creates unnecessary and potentially insurmountable barriers to creating and maintaining a vibrant and competitive broadband environment meeting the needs of a wide variety of users.

Spectrum is a core building block for wireless broadband, and the Commission should place a high priority on ensuring that sufficient spectrum is made available in a manner that enables the greatest overall benefits from the use of the spectrum. Wireless solutions provide a cost effective method of providing broadband services and may be the only practical alternative in doing so in some areas and situations. In addition, there are a host of critical users and enterprise businesses that form the backbone of the nation's economy for which additional spectrum is required in order to serve. To extract the maximum benefit of the spectrum, the Commission should allocate spectrum under a variety of licensed and unlicensed regulatory structures that are compatible with the needs of the full range of users, including operators, consumers, public safety, critical providers and the nation's enterprise businesses.

Just as critical to enabling deployment of broadband systems using a variety of technologies – whether wireless, cable, fiber, or wired -- the Commission must establish appropriate incentives for network providers to invest the billions of dollars required to deploy broadband infrastructure ubiquitously across the United States, and there are four specific measures the Plan should incorporate in this regard. First, it should continue the "light touch" broadband regulatory policy that Congress mandated in the Telecommunications Act of 1996 ("1996 Act") and that the Commission has followed in the intervening thirteen years. Second, the Plan should include a recommendation that Congress adopt tax credits for broadband investments, which are essential to creating the proper incentives to deploy broadband networks

in areas that may be otherwise uneconomical to serve. Third, the Plan should extend federal universal service support to broadband, a proposal that enjoys broad support. Fourth, the Plan must ensure technological neutrality in implementing broadband initiatives, so that decision-makers are free to utilize the broadband technology that best suits their needs and that can be economically supported.

The Plan also should include policies that promote the deployment of increased broadband speeds by facilitating the digitization of cable networks. Digitization, which is the process by which the cable industry is transitioning from analog to digital transmission, frees up bandwidth that can be used to offer greater broadband speeds and other digital services, such as high definition programming. The Commission's policies should facilitate, not impede, the cable industry's digitization efforts.

The Plan should address the unique broadband needs of public safety and homeland security. In particular, the Plan should ensure access to spectrum that supports both operability and interoperability and appropriately recognizes the local nature of public safety service. In addition, the Commission's policies should recognize that the deployment and operation of public safety networks and emergency communications are fundamentally different from other broadband networks designed to service the general public. While commercial technologies can be leveraged, the deployment and operation of those technologies must be designed to meet public safety requirements.

With respect to energy, the Plan should recognize that broadband can help to improve efficiencies in energy production, distribution, and consumption, such as Smart Grid technology. In order to realize these efficiencies, however, the Plan must provide incentives for Smart Grid

investments, establish adequate coordination with other federal agencies on Smart Grid deployments, and ensure sufficient spectrum for Smart Grid uses.

There is no dispute that broadband is essential to advancing education. By promoting increased broadband deployment in unserved and underserved areas and by giving decision-makers the maximum flexibility to deploy and manage broadband networks, the Plan will deliver the educational benefits that broadband has to offer.

Finally, broadband is a critical component of efforts to modernize the healthcare system in the United States. Remote diagnostics and the sharing of electronic medical records are examples of the health care benefits of broadband, which can improve the quality of care and reduce costs. But these benefits will not be realized (or will be significantly diminished) if the Commission adopts regulatory policies that create disincentives to network investment or if adequate security measures are not implemented to protect sensitive health and other personal information.

II. ENSURING SUFFICIENT SPECTRUM FOR WIRELESS BROADBAND

A. The Plan Should Recognize That Wireless Provides A Cost Effective Method Of Providing Broadband Services And May Be The Only Viable Solution In Some Rural Areas.

Wireless technology today provides true broadband connectivity in both the fixed and mobile environments. WiMAX and LTE technologies will deliver high speed mobile broadband.[2] Technologies such as those used in Motorola's wireless broadband devices provide

[2] WiMAX 802.16e with migration to 802.16m will share similar performance capabilities with LTE as both technologies exploit similar wireless and IP design techniques to approach the maximum spectral efficiencies defined by Shannon's Law (approximately 6 bits per hertz). With 802.16e operators can deliver upwards of 3.5 bits per hertz today (35 Mbps per sector for a 10 MHz channel) while 802.16m and LTE will advance that to over 5.0 bits per Hertz (greater than 100 Mbps per sector for a 20 MHz channel) as has been already demonstrated in a number of field tests. *See* Motorola whitepaper "Driving 4G: WiMAX & LTE",

a broadband pipe to the home providing up to 21 Mbps.[3] As the Commission has correctly recognized, a diversity of wireless solutions are being used to provide rural broadband today, and there is great promise not only to provide new service to unserved areas, but also to expand facilities-based competition through wireless broadband services.[4]

The Commission has done much to facilitate wireless deployment and competition. Over the past four years, the FCC has made significant spectrum available for mobile wireless broadband services to the general public through auction and flexible use policies.[5] The Commission conducted rulemakings and spectrum license auctions in the 700 MHz and Advanced Wireless Services ("AWS-1") bands, which previously were occupied in part by federal spectrum users and analog television broadcasters. In the 700 MHz band -- which is well suited for wireless broadband because of its ability to carry significant amounts of data, penetrate walls, and travel significant distances -- the FCC auctioned a total of 1098 licenses

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http://www.motorola.com/staticfiles/Business/Solutions/Industry%20Solutions/Service%20Providers/Wireless%20Operators/Wireless%20Broadband/wi4%20WiMAX/_Document/StaticFile/a%20Driving_4G__WiMAX_and_LTE.pdf?localeId=33.

[3] *See* "Motorola Wireless Broadband Point-to-Multipoint (PMP) Solutions", http://www.motorola.com/staticfiles/Business/Products/Wireless%20Networks/Wireless%20Broadband%20Networks/Point%20to%20Multi-point%20Networks/Unlicensed/_Documents/Static%20Files/PMP%20Overview.pdf?localeId=33.

[4] *See Bringing Broadband to Rural America: Report on a Rural Broadband Strategy*, Federal Communications Commission, ¶ 10 (May 22, 2009) (available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf) ("*Rural Broadband Report*"); *see also id.*, ¶ 142 (noting that "wireless broadband service can offer cost-effective connectivity where no broadband exists, as well as complementary or competitive service where it does").

[5] *Moving Forward: Driving Investment and Innovation While Protecting Consumers*, Federal Communications Commission, at 10 (Jan. 15, 2009) (*available at* http://www.fcc.gov/fcc-moving-forward-report.pdf) ("*Moving Forward*").

(Auction 73), with four licenses covering every location in the nation.[6] In 2005, the agency modified the AWS-1 band (1710-1755MHz and 2110-2155MHz) to allow for smaller licenses and, over the course of two subsequent license auctions (Auction 66 and 78), offered and sold some 1,122 licenses authorizing use of 90 megahertz throughout the entire nation.[7] By 2008, wireless carriers began to deploy third generation (3G) wireless systems on AWS-1 spectrum, and the 700 MHz spectrum is expected to support fourth generation (4G) wireless broadband offerings.

However, the Commission's work is not done. In particular, in order to maximize the benefits of wireless broadband technology, the Commission should include in the Plan specific measures that will ensure and promote the availability of both licensed and unlicensed spectrum under a variety of regulatory approaches compatible with the broadband needs of a multitude of providers and users, including enterprise businesses. Demand for increasing amounts of data and ever higher data rates is driving the deployment of wider bandwidth technologies and, in considering future spectrum allocations and the evolution of use of existing frequency bands, the Commission should take into consideration the need for allocations and rules capable of accommodating wider bandwidth technologies so that higher speed wireless broadband can continue to flourish. The Commission should also facilitate rapid deployment of wireless broadband by adopting the tower siting rules proposed by the wireless industry.[8]

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6 *Id.* at 12.

7 *Id*. at 14.

8 *Notice of Inquiry*, ¶¶ 42-46.

B. **The Plan Should Ensure Access To Sufficient Amounts Of Licensed Spectrum.**

In the past, the FCC has worked diligently to address the needs of the commercial carriers, and with the AWS and 700 MHz auctions, a relatively large amount of spectrum has been recently made available. However, available spectrum has not kept pace with the explosion in wireless data usage. According to CTIA, more than 78 percent of U.S. wireless consumers have a wireless device that is capable of accessing the Internet, and approximately 40 million American consumers are "active users" of mobile Internet services – a 75 percent increase from just two years earlier.[9]

In addition, consumers increasingly are using wireless devices to access bandwidth-intensive applications, such as video, Internet gaming, and social networking to name a few high growth segments. The bandwidth required for such mobile data applications can be between 1 and 5 Mbps, as compared to 6 to 12 kbps for a mobile voice call.[10] These types of mobile data applications can place significant strains on a wireless network.[11]

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[9] *The United States and World Wireless Markets: Competition and Innovation Are Driving Wireless Value in the U.S.*, at 15-16 (May 2009), attached to Ex Parte Letter from Christopher Guttman-McCabe, Vice President – Regulatory Affairs, CTIA, to Marlene Dortch, Secretary, FCC, RM-11361, GN Docket No. 09-51, WC Docket No. 07-52 (May 12, 2009). According to one study, U.S. wireless web use ranks first in the world, accounting for more than 29 percent of all mobile web surfing worldwide. *Id.* (citing study by Bango, a firm that tracks statistics of web sites optimized for mobile users).

[10] Rysavy Research, Mobile Broadband Spectrum Demand, at 16 (December 2008) ("*Rysavy Spectrum Report*").

[11] *Id.* (noting that "several users within the same cell sector engaging simultaneously in high-throughput applications (e.g., video streaming) can quickly strain the network impacting the user experience for every consumer accessing the network, even if they are not themselves engaging in bandwidth-intensive activities"); *see also* Ben Charny, "AT&T Chief Defends His Network," *Wall Street Journal* (May 27, 2009) (attributing statement by AT&T Chief Executive Randall Stephenson that "U.S. wireless networks aren't prepared for the surge in smart phones

With increased wireless data usage and increased demand for bandwidth-intensive wireless applications, the spectrum available to provide commercial service is insufficient to meet the future requirements for broadband. The International Telecommunication Union ("ITU") has conducted a comprehensive analysis of the spectrum needs of emerging wireless networks, projecting a total spectrum requirement of as much as 840 MHz by 2010, 1300 MHz by 2015 and 1720 MHz by the year 2020; even at a more modest rate of market development, ITU projects a total spectrum requirement of 760 MHz by 2010, 1300 MHz by 2015 and 1280 MHz by 2020.[12] Because in the United States, the total theoretical amount of spectrum that has been allocated specifically for CMRS is 354 MHz and the total amount of licensed spectrum theoretically available for mobile services is approximately 680 MHz,[13] additional licensed spectrum for new broadband services is sorely needed.

In addition to licensed spectrum for commercial mobile services, there is also a need to consider the needs of other users. One example is the licensed spectrum available for internal use by enterprise businesses and critical infrastructure entities. Only about 30 MHz of spectrum across multiple frequency bands is available for internal use by enterprise operations and critical infrastructure users outside the public safety category. It is these operations on which Americans

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use that has already shown signs of choking their networks") (*available at* http://online.wsj.com/article/SB124344227596159029.html).

[12] Estimated Spectrum Bandwidth Requirements for the Future Development of IMT-2000 and IMT-Advanced, Report ITU-R M.2078 (*available at* http://www.itu.int/publ/R-REP-M.2078-2006/en).

[13] *Rysavy Spectrum Report*, at 23-24 (noting that the 354 MHz of total theoretical spectrum allocated specifically for CMRS is comprised of the cellular, broadband PCS, SMR, AWS-1, and 700 MHz bands; the 680 MHz of total licensed spectrum theoretically available for mobile services is comprised of 50 MHz of cellular spectrum, 24 MHz in the SMR bands, 120 MHz of broadband PCS spectrum, 90 MHz in the AWS-1band, 70 MHz in the 700 MHz bands, 195 MHz in the BRS and EBS bands, and 132.425 MHz of MSS ATC spectrum).

rely for the availability of electric power, natural gas to heat their homes, potable water to sustain life, transportation systems, the manufacture of all the consumer goods, and the provision of many other services in the market. Further, it is these enterprise and critical infrastructure organizations that have a significant effect on the availability of jobs and the state of the economy. Enterprise businesses and critical infrastructure entities will be relegated to internal communications systems that provide only voice and low speed data unless the Commission acts to provide additional spectrum. It is incorrect to assume that the broadband needs of these users will be adequately met by commercial mobile services providers, which cannot readily satisfy the unique coverage, service, or application requirements of enterprise businesses and critical infrastructure entities.

Accordingly, the Plan should establish a process to identify and make available the next generation of spectrum for wireless broadband services. A spectrum inventory would be an important tool to assist in identifying potential new frequency bands to meet the growing demand for broadband services and in identifying spectrum that would be used more efficiently. While a strong focus of the inventory should be on bands below 6 GHz to support mobile services, higher frequency bands also would be valuable in supporting fixed connections, including the backhaul connections necessary to deploy wireless networks. Given the diversity of requirements, any spectrum inventory should encompass a broad range of frequencies. In developing any spectrum inventory, it is important for the Commission to work cooperatively with NTIA to include both Federal and non-Federal spectrum. Only by being inclusive can a full understanding of spectrum use and options be developed. As the process of identifying how spectrum should be reallocated or used more efficiently, it must be recognized that Federal users also have an increasing need for broadband applications and that these often critical requirements must be fully met.

C. The Plan Should Promote The Use Of Unlicensed Spectrum.

While Motorola is a strong supporter of licensed spectrum use, it also supports expanding spectrum for unlicensed use. In the last few years, Motorola has invested significantly in unlicensed broadband products, which have proven to be an effective way to deploy cost-effective broadband solutions in certain segments of the marketplace. This is a key component in meeting the broadband needs of rural areas and other unserved or underserved communities.

Advances in technology have led to new ways to share spectrum and make additional spectrum for unlicensed use. For example, in the 5 GHz band, spectrum sensing combined with Dynamic Frequency Selection have opened up spectrum globally for unlicensed use.

Even greater benefits are possible in the broadcast television spectrum through the Commission's "TV white spaces" initiative.[14] However, as described in Motorola's Petition for Reconsideration in that proceeding, changes must be made to the Commission's rules for use of this spectrum in order to provide true benefits for broadband deployment. Restrictions in the current rules greatly limit the potential for any deployments and greatly increase the cost and difficulty of deploying any solution in the spectrum. The Commission should move quickly to adopt Motorola's proposals, which would unleash the great potential of this spectrum while fully protecting incumbent operators.

D. The Plan Should Facilitate Rapid Deployment of Wireless Broadband.

One of the primary obstacles to the deployment of wireless broadband is the ability of providers to access towers and other structures for the deployment of network facilities. The

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[14] *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).

Plan should address this by adopting the tower siting rules proposed by the wireless industry, which would facilitate more rapid deployment of wireless broadband services.[15]

III. CREATING INCENTIVES FOR BROADBAND INVESTMENT

A. The Plan Should Promote Broadband Deployment By Creating Incentives For Investment In Broadband Networks

There is little question that broadband is a national imperative. Broadband is critical to the economy and job creation, as numerous studies have confirmed.[16] Furthermore, ubiquitous broadband deployment and increased broadband adoption is necessary to maintaining this country's role as the world's technology leader and to achieving the Administration's policy goals in the areas of public safety, energy, education, and healthcare.

As an important first step, the ARRA appropriates more than $7 billion for broadband grants, loans, and loan guarantees.[17] While significant, this amount is "still just a down payment

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[15] *See 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*, Petition for Declaratory Ruling, WT Docket No. 08-165 (filed July 11, 2008).

[16] *See Rural Broadband Report*, ¶ 16 (citing one study which "estimates that communities having access to mass-market broadband grew disproportionately in employment, the number of information technology-oriented businesses, and the number of businesses overall"); *see also* Jeffrey Eisenach, "The Telecom Sector and the Economy: How U.S. Broadband Policies Are Working for America" (Sept. 2008) (noting that the information and communications technology (ICT) sector accounted for more than half of all jobs created in the United States between April 2007 and April 2008); Robert Crandall, William Lehr and Robert Litan, "The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data" *Issues in Economic Policy* No. 6 (Brookings Institution, July 2007); Robert D. Atkinson, Daniel Castro and Stephen J. Ezell, "The Digital Road to Recovery: A Stimulus Plan to Create Jobs, Boost Productivity and Revitalize America" The Information Technology & Innovation Fund, at 5, 8 (Jan. 2009) (finding that each $10 billion increase in broadband infrastructure investment produces nearly 500,000 new jobs, and that for every one-percentage point increase in broadband penetration in a state, employment increases by approximately 293,000 jobs nationally).

[17] American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009).

on the broadband needs of the country …,"[18] and it represents only a fraction of the investment necessary to deploy broadband ubiquitously in the United States.

Ultimately, the ubiquitous deployment of broadband will require substantial investments in broadband networks. In order to create the proper incentives for such investments, the Plan should: (a) continue the "light touch" for broadband regulation; (b) recommend that Congress adopt tax credits for broadband investments; (c) extend federal universal service to broadband; and (d) ensure technological neutrality in implementing broadband initiatives.

B. The Plan Should Continue The "Light Touch" For Broadband Regulation, Which Has Been The Hallmark Of The United States' Broadband Policy For More Than A Decade.

In the 1996 Act, Congress declared it the policy of the United States "to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation."[19] As the Commission has noted correctly, "Congress recognized in the 1996 Act that the Internet was then flourish[ing] under a minimum of government regulation, and declared that the Internet should, to the extent possible, remain unfettered by Federal and State regulation."[20] Consistent with this congressional mandate, the Commission has embraced a "light touch" in regulating broadband services in the intervening thirteen years.[21]

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[18] *Rural Broadband Report*, ¶ 4.

[19] 47 U.S.C. § 230(b)(2).

[20] Brief of the Federal Petitioners at 29, *NCTA v. Brand X Internet Services*, 545 U.S. 967 (2005) (citations and internal quotation marks omitted) (the "FCC's *Brand X* Brief").

[21] FCC's *Brand X* Brief at 29-30 (noting that the "Commission has determined that establishing a minimal regulatory environment for broadband services will most effectively further the statutorily grounded policy of encourag[ing] ubiquitous availability of broadband to all Americans") (citations and internal quotation marks omitted); *see also* Reply Brief of the

As a result of the Commission's "light touch" regulatory policies, broadband has flourished. Since 2000, the number of high-speed broadband lines has increased more than 1600 percent, from approximately 6.8 million lines in December 2000 to more than 121 million lines in December 2007.[22] In 2007, all but 62 of the nation's 30,152 geographic zip codes had at least one broadband provider, and more than 50 percent had seven or more broadband providers.[23]

Fiber broadband facilities are increasingly being deployed. According to the Fiber-to-the-Home Council, fiber-to-the-home ("FTTH") networks currently pass more than 15 million households in North America with a penetration rate of those households of approximately 30 percent; this means that FTTH networks are now available to more than 13 percent of North American households, with end-to-end fiber connections now being used by nearly four percent of the residential telecommunications market.[24]

Federal Petitioners at 18, *NCTA v. Brand X Internet Services*, 545 U.S. 967 (2005) (emphasizing that the broadband market "has shown enormous growth under a hands-off regulatory regime" (citations and internal quotation marks omitted); *see also Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, Report and Order, 20 FCC Rcd 14853, ¶¶ 1-3 (2005) ("*Wireline Broadband Internet Access Order*") (establishing "a minimal regulatory environment for wireline broadband Internet access services to benefit American consumers and promote innovative and efficient communications"), *aff'd Time Warner Telecom v. FCC*, 507 F.3d 205 (3d Cir. 2007); *Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks*, 22 FCC Rcd 5901, ¶ 2 (2007) ("*Wireless Internet Access Order*") (establishing "a minimal regulatory environment for wireless broadband Internet access service that promotes our goal of ubiquitous availability of broadband to all Americans").

[22] *See High-Speed Services For Internet Access: Status As of December 31, 2007*, Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, Table 1 (2009) (available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-287962A1.pdf) ("*Broadband Internet Access Report*").

[23] *Moving Forward*, at 5.

[24] These statistics are from an April 2009 report prepared by Render Vanderslice & Associates for the Fiber-to-the-Home Council, which is available at http://www.ftthcouncil.org/?t=316.

Wireless broadband also has grown exponentially. According to the Commission's most current data, there were more than 51 million fixed and mobile wireless high-speed broadband connections as of December 2007, as compared to approximately 3.4 million high-speed wireless broadband connections two years earlier.[25] As of mid-2008, mobile wireless broadband services were available to over 92 percent of the U.S. population, as compared to approximately 25 percent of the population in mid-2005.[26]

Minimal broadband regulation has spurred network investment. Telecommunications companies were expected to make $50 billion in capital expenditures on broadband in 2008-2009, and investment in fiber-related telecommunications equipment -- which is increasingly being used for services from television, Internet access, telephony, security, and meter reading -- is expected to grow by almost $13.5 billion annually in the next three years, despite current economic conditions.[27]

As the Commission's approach to broadband has demonstrated, minimal regulation, evenly applied, drives investment, encourages adoption of emerging technologies, promotes competition among providers, and spurs innovation that delivers diverse solutions. The Commission has allowed broadband providers to differentiate themselves and succeed in the market by providing new services and market offerings. In turn, consumers have benefited from

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[25] *Broadband Internet Access Report*, Table 1.

[26] *Moving Forward*, at 15-16. According to the Commission, the number of mobile wireless broadband-capable devices in use in the United States grew from just under 400,000 in June 2005 to more than 35 million in June 2007, while the percentage of mobile devices with browser capabilities rose from 22 percent to 75 percent between 2005 and 2008. *Id.* at 19.

[27] *Id.* at 2.

fierce competition and the rapid build-out of broadband networks. This same approach should guide the creation and implementation of the Plan.

The establishment of onerous regulatory requirements -- such as mandatory infrastructure sharing or prescriptive net neutrality requirements -- would create significant disincentives to investment in broadband networks.[28] Deploying highly reliable, high-capacity broadband is a capital-intensive proposition, and attracting risk capital necessary to deploy such networks, particularly under current economic conditions, is a daunting undertaking. But as a result of the Commission's "light touch" regulatory policies, wireless providers, for example, have made large-scale investments in an already competitive broadband marketplace by spending billions of dollars in deploying next-generation 3G and 4G networks that provide consumers with a viable alternative to traditional wireline broadband options. Burdensome regulation would threaten such investments and hamper broadband innovation, as the Commission repeatedly has recognized.[29]

Indeed, Section 706 requires the Commission to "remove investment disincentives that apply to broadband services in order to encourage the construction of next generation facilities to

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[28] *Notice of Inquiry*, ¶¶ 47-48.

[29] *See, e.g.*, *Wireless Internet Access Order*, 22 FCC Rcd 5901, ¶ 4 (rejecting calls for imposing greater regulatory requirements on wireless providers because doing so "could have slowed development of these broadband services"); *Wireline Broadband Internet Access Order*, 20 FCC Rcd 14853, ¶ 72 (finding that reduced regulation of the wireline industry will make it "more likely that wireline network operators will take more risks in investing and deploying new technologies than they are willing and able to take under the existing regime"); FCC's *Brand X* Brief at 31 (recognizing that imposing regulatory obligations on a broadband provider could "discourage investment in facilities by competing Internet access providers") (citations and internal quotation marks omitted).

customers nationwide."[30] By virtue of the deregulatory mandate of Section 706, the Commission has issued a series of decisions -- affirmed by the courts -- which eliminated mandatory sharing and other burdensome regulatory requirements that hampered broadband investment. A good example concerns the *Computer Inquiry* regime, which was created in the 1960s to address efforts by incumbent local exchange carriers ("ILECs") to offer services beyond their regulated telephone operations.[31] Consistent with Section 706, the Commission declined to extend the *Computer Inquiry* regime to cable operators providing broadband Internet access service, correctly reasoning that "broadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market" – a decision upheld by the United States Supreme Court in *Brand X*.[32]

Shortly after *Brand X*, the Commission proceeded to eliminate the *Computer Inquiry* requirements for telephone companies providing broadband Internet access services over wireline facilities.[33] The Commission reasoned that the "access mandate" of *Computer Inquiry*

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[30] *Petition of Qwest Corp. for Forbearance Pursuant to 47 U.S.C. § 160(c) in the Omaha Metropolitan Statistical Area*, Memorandum Opinion and Order, 20 FCC Rcd 19415, ¶ 107 (2005) (citing 47 U.S.C. § 706).

[31] Under the *Computer Inquiry* regime, all facilities-based carriers were required to provide pursuant to tariff the same underlying basic transmission services at the same prices, terms, and conditions to all information service providers, including their affiliates. *See Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry)*, Final Decision, 77 FCC 2d 384, ¶ 231 (1980) ("*Computer II*"). In addition, Bell operating companies were required under *Computer Inquiry* to comply with nonstructural separation requirements. *See, e.g., Wireline Broadband Internet Access Order*, 20 FCC Rcd 14853, ¶¶ 26-28.

[32] *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798, ¶ 5 (2002), *aff'd in part and rev'd in part, Brand X Internet Services v. FCC*, 345 F.3d 1120 (9th Cir. 2003), *rev'd*, *NCTA v. Brand X Internet Services*, 545 U.S. 967 (internal quotations omitted).

[33] *See Wireline Broadband Internet Access Order*, 20 FCC Rcd 14853, ¶¶ 42-44.

imposed "additional costs" that diminished "a carrier's incentive and ability to invest in and deploy broadband infrastructure investment," which, according to the Commission, was contrary to the "view of Congress' clear and express policy goal of ensuring broadband deployment …."[34]

Congress's directive that the Commission remove disincentives to investment also has guided the Commission's implementation of the unbundling requirements of the 1996 Act. For example, in deciding which network facilities ILECs must unbundle under 47 U.S.C. § 251(c)(3), the Commission relied upon Section 706 in declining to mandate that fiber-based loops be unbundled.[35] The Commission reached a similar conclusion in forbearing from the requirement that the regional Bell operating companies ("RBOCs") unbundle the same broadband facilities under Section 271.[36]

More recently, the Commission granted substantial forbearance relief with regard to the ILECs' existing packet-switched broadband services and optical transmission services.[37] In so

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[34] *Id.* at ¶ 44.

[35] *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd. 16978, ¶¶ 176-78, 242, 272-95, (2003) ("*Triennial Review Order*"), *aff'd in part and rev'd in part, United States Telephone Ass'n v. FCC*, 359 F.3d 554 (D.C. Cir. 2004) ("*USTA II")*. Not surprisingly, investment in fiber increased exponentially after the *Triennial Review Order*. According to the Fiber-to-the-Home Council, there were slightly more than 180,000 FTTH homes passed in North America as of September 2003; by September 2005 the number of FTTH homes passed was approximately 2.7 million. *See* Ex Parte Letter From Thomas Cohen, Counsel, Fiber-to-the-Home Council, to Marlene Dortch, Secretary, FCC, MB Docket No. 05-311, Attachment 2 (May 23, 2006) (citing study by Render Vanderslice & Associates).

[36] *Petition for Forbearance of the Verizon Telephone Companies Pursuant to 47 U.S.C. § 160(c),* Memorandum Opinion and Order, 19 FCC Rcd 21496, ¶ 25 (2004) (noting the "investment disincentives" that "arise from Section 271 unbundled access requirements"), *aff'd Earthlink Inc. v. FCC*, 462 F.3d 1 (D.C. Cir. 2006).

[37] *See* Verizon Tel. Companies' Petition for Forbearance from Title II and Computer Inquiry Rules With Respect to Their Broadband Services Is Granted by Operation of Law, WC Docket No. 04-440, News Release 2006 FCC LEXIS 1333 (rel. Mar. 20, 2006), *review denied*,

doing, the Commission was persuaded that elimination of *Computer Inquiry* requirements applicable to these broadband services would increase "incentives to invest in advanced network technologies . . . ."[38]

Whether couched as infrastructure sharing or nondiscrimination, the adverse impacts of such regulatory policies on broadband investment should be clear. As one recent study concluded, the FCC's unbundling regime reduced the going forward value of the RBOCs by approximately $19 billion, which reduced their expected future cash flows and deprived these companies of internal sources of funds for new investment.[39] As this same study notes, the forced sharing of network facilities under the guise of net neutrality would have a similar effect, causing "a significant reduction in capital investment by the network owners, ultimately threatening infrastructure and technology deployment."[40] Particularly with the current economic

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Sprint Nextel Corp. v. FCC, 508 F.3d 1129 (D.C. Cir. 2007); *Petition of AT&T Inc. for Forbearance Under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules With Respect to Its Broadband Services, Petition of BellSouth Corp. for Forbearance Under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules With Respect to Its Broadband Services*, Memorandum Opinion and Order, 22 FCC Rcd 18705 (2007), petitions for review pending, *Ad Hoc Telecommunications Users Comm. v. FCC*, No. 07-1426 (and consolidated cases) (D.C. Cir.); *Petition of Embarq Tel. Companies for Forbearance Under 47 U.S.C. § 160(c) From Computer Inquiry and Certain Title II Common Carriage Requirements*, Memorandum Opinion and Order, 22 FCC Rcd 19478 (2007); *Qwest Petition for Forbearance Under 47 U.S.C. § 160(c) From Title II and Computer Inquiry Rules With Respect to Broadband Services*, Memorandum Opinion and Order, 23 FCC Rcd 12260 (2008) ("*Qwest Order*").

[38] *Qwest Order* at ¶ 58.

[39] Jeffrey A. Eisenach, Paul S. Lowengrub, and James C. Miller III, "An Event Analysis Study of the Economic Implications of the FCC's UNE Decision: Backdrop for Current Network Sharing Proposals," 17 *Comm. Law Conspectus* 33, 60-61 (2008).

[40] *Id.* at 61; *see also* Scott Wallsten, "Reverse Auctions and Universal Telecommunications Service; Lessons From Global Experience," 61 *Fed. Comm. Law Journal* 373, 390 (2008-2009) ("mandatory sharing of network facilities is likely to lead to more intensive use for those facilities, but can also reduce the incentive to invest in the network itself"); *see also United*

crisis facing the United States, the Commission can ill afford to create disincentives to broadband investment by recycling discarded and discredited regulatory policies of the past.

C. **The Plan Should Recommend That Congress Adopt Tax Credits For Broadband Investments.**

Some areas that currently do not enjoy broadband service or that lack broadband alternatives will not attract significant economic investments if an economic return is not likely. This is particularly true in hard to serve rural areas. In those cases the government can reduce the risk and encourage investment by the use of tax credits. In order to create incentives for the buildout of broadband networks in these otherwise challenged environments, the Plan should recommend that Congress adopt tax credits for broadband investments.

Tax credits long have been used to stimulate investment. Recently, in 2008, tax credits for renewable energy were extended, a move which was credited with saving the domestic solar and wind energy industry. The credits, which were enacted in 2005, "created unprecedented growth across the United States where the amount of solar electric capacity installed in 2007 was double that installed in 2006."[41] Other tax credits, such as the Historic Preservation Tax Credit and the Low-Income Housing Tax Credit, have similarly increased investment and stimulated economic growth.[42] For example, as a result of these tax credits, a real estate group in Houston

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States Telecom. Ass'n. v. FCC, 290 F.3d 415 (D.C. Cir. 2002), *cert. denied*, 123 S. Ct. 1571 (2003) (noting disincentive to investment from forced sharing).

[41] "Wind, Solar Tax Credits Extended in $700 Billion Bail-Out," *Environment News Wire*, October 3, 2008, http://www.ens-newswire.com/ens/oct2008/2008-10-03-02.asp.

[42] Brantz, Lauren, Note: Federal Tax Credit Incentives as a Method of Promoting Brownfield Remediation, 4 *Rutgers J.L. & Pub. Pol'y* 695, 716 (2007) (citing nearly $33 billion in private investment from the historic preservation tax credit).

invested more then $300 million in various real estate development projects.[43] The New Markets Tax Credit program, a tax policy designed to revitalize deteriorating urban neighborhoods, also has been cited as "spur[ring] investment in these long long-neglected communities."[44]

A similar tax credit program is essential to ensuring ubiquitous broadband deployment.[45] Indeed, such a program would uniquely benefit rural areas, which "have long been unserved or underserved by broadband technology …."[46]

D. <u>The Plan Should Extend Federal Universal Service To Broadband</u>

The concept of using federal universal service funds to subsidize broadband has been endorsed broadly.[47] Like adopting tax credits, extending the federal universal fund to broadband will facilitate broadband deployment in areas where it would otherwise be too risky or uneconomical to offer the service, whether that be in a hard to reach rural area or an economically depressed urban area.

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[43] Sarnoff, Nancy, "Texaco Building Leads CBD Hotel Surge," *Houston Business Journal*, Vol. 33, N. 4, p. 2, June 7, 2002 (discussing restoration projects in Houston neighborhoods).

[44] Thompson Jackson, Janet, Can Free Enterprise Cure Urban Ills?: Lost Opportunities for Business Development in Urban, Low-Income Communities Through The New Markets Tax Credit Program, 37 *U. Mem. L. Rev*. 659, 704 (2007) (citing Tax Policy: New Markets Tax Credit Appears to Increase Investment by Investors in Low-income Communities, but Opportunities Exist to Better Monitor Compliance, U.S. Gov't Accountability Office, GAO-07-296, (January 2007) (available at http://www.gao.gov/new.items/d07296.pdf).

[45] *See, e.g., Rural Broadband Report*, ¶ 118 (noting that "a number of states have enacted tax incentives designed to help offset deployment costs in order to encourage the provision of broadband services to consumers").

[46] *Id.*, ¶ 15.

[47] *See id.*, ¶ 138 (noting that many parties support the use of universal service "as a mechanism to ensure that broadband services are available in rural areas," pointing to comments by Embarq, CTIA- The Wireless Association®, USA Coalition, Benton Foundation, and the American Library Association).

E. **The Plan Should Ensure That All Broadband Initiatives Are Implemented In A Technologically Neutral Manner.**

Consistent, technology-neutral regulatory treatment "best facilitates" the "ubiquitous availability of broadband Internet access services to all Americans."[48] The Commission recently reiterated the importance of "technological neutrality" in its *Rural Broadband Report*.[49]

"Technological neutrality" requires that no direct or indirect preference be given to any particular technology choice. There are a wide range of wireline and wireless technologies that can provide broadband access, and the choice of the appropriate one for each particular implementation should be left to the service provider. Diversity of choice will allow operators to provide differentiated deployments and services. Thus, rather than mandating that all broadband services meet specified transmission speeds, the Plan should recognize that: (a) different platforms have different speed capabilities; (b) broadband speeds are impacted by a variety of network factors, including the use of shared facilities by service providers and the existence of network congestion; and (c) consumers have different needs with respect to broadband speeds. The most appropriate course is for the Plan to create technologically neutral incentives for providers to offer the most advanced speeds that can be economically supported.

For example, there are unique speed considerations for wireless broadband given the environment in which it is deployed, as compared to wired broadband solutions. The many unique benefits of wireless broadband also have associated characteristics that involve different overhead, spectrum bandwidth constraints, propagation uncertainties, and capacity and resource sharing requirements. Consequently, wireless broadband speeds generally are less than wired

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[48] *Wireline Broadband Internet Access Order*, 20 FCC Rcd 14853, ¶ 17.

[49] *Rural Broadband Report*, at 6 ("Decision makers therefore should proceed on a technology-neutral basis – by considering the attributes of all potential technologies – in selecting the technology or technologies to be deployed in a particular area").

broadband speeds, and the quality, capacity, variability and management characteristics are also different. However, is numerous situations, wireless is more practical and economical than wired broadband. In order to ensure technological neutrality, government policies must recognize these differences and support both wireless and wired solutions.

IV. PROMOTING INCREASED BROADBAND SPEEDS

The Plan should include policies that promote the deployment of increased broadband speeds by facilitating the digitization of cable networks. The cable industry currently is engaged in a multi-year, multi-billion dollar effort to digitize its networks and free up bandwidth for faster broadband service, high definition programming, and other innovative services that consumers want and the competitive video marketplace requires. Cable's DBS competitors -- DirecTV and Dish Network -- have always provided all-digital service. Some cable operators, such as Verizon, have already completed their transitions to all-digital networks,[50] while most others are migrating to digital on a more gradual basis.[51]

The cable industry's digitization efforts today are focused on reclaiming analog bandwidth. Traditional cable operators still have significant numbers of analog customers and typically dedicate 50 percent or more of their cable plant to analog channels.[52] This situation represents a highly inefficient use of cable bandwidth. Every analog channel uses 6 MHz of bandwidth on the cable plant – bandwidth that could be used to provide faster broadband speeds,

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[50] *See* Verizon Comments, filed in MB Dkt. No. 07-269, at 7 (May 20, 2009) (noting transition to all-digital service).

[51] *See* NCTA Comments, filed in MB Dkt. No. 07-269, at 18 (May 20, 2009) ("[C]able operators have embarked on a multi-year transition to gradually migrate analog customers to digital in order to take advantage of bandwidth efficiencies and innovations afforded by such technology and to meet increasing demand for digital services and higher speed broadband").

[52] *See* Broadband Technology, SNL Kagan, at 7 (May 20, 2009) (noting that 65 percent of U.S. cable subscribers take digital service).

or multiple channels of digital programming, such as two high-definition channels or 10 or more standard definition channels. To attract and retain customers in a highly competitive video marketplace, cable operators must move from analog to digital transmission and deliver more channels exclusively in digital format.

The availability of low-cost, limited-capability digital cable equipment has been critical to the cable industry's digitization strategy. Cable operators require low-cost devices that enable customers with analog televisions to view programming that is now delivered digitally. Motorola has been a leading provider of such equipment. It manufactures low-cost standard definition interactive set-top boxes, as well as a one-way standard definition device known as the Digital Transport Adapter ("DTA").[53] These devices are substantially cheaper than set-top boxes that provide multiple tuners, DVR, and other advanced features, and can thereby facilitate the rapid reclamation of analog bandwidth for faster broadband and other digital services.[54] For example, Comcast's digitization initiative, which is making extensive use of these low-cost devices, will result in the doubling of broadband speeds and the availability of 100 high definition channels, among other consumer benefits.[55]

Cable operators, including those that are already all-digital, also are looking to deploy technologies that improve the bandwidth efficiency of their digital services. Switched digital video ("SDV") is one such technology. In contrast to the traditional cable architecture, in which

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[53] *See, e.g.*, Motorola DTA-100, *at* http://www.motorola.com/Business/US-EN/Business+Product+and+Services/TV+Video+Distribution/Customer+Premises+Equipment+%28Set-tops%29/All-Digital+QAM+Set-tops/DTA100_US-EN.

[54] *See* Todd Spangler, *Cable's Analog Signal Zappers: Low-Cost Converters Promise To Pull Analog Subscribers Into The Digital Age Affordably*, Multichannel News (May 10, 2008).

[55] *See* Comcast Corporation, First Quarter 2009 Earnings Presentation, at 10 (Apr. 30, 2009).

all channels are typically delivered to all customers at all times regardless of whether anyone in a neighborhood is watching any given channel, SDV enables operators to allocate bandwidth based on usage levels. Channels that are heavily viewed continue to be delivered on a broadcast basis, while more lightly viewed channels can be delivered on an SDV basis, with no visible difference to the consumer.

These techniques allow the cable network to be even more responsive to the preferences of its customers through more effective bandwidth utilization. SDV can be used to expand channel offerings, including ethnic and niche programming channels. It also can be used to reduce bandwidth usage by current lightly-viewed channels. When a cable operator moves a linear channel to SDV, it can take the bandwidth that was formerly used by the linear channel and repurpose it for faster broadband speeds, more high definition channels, and other services. Motorola provides SDV solutions to the cable industry, including network, equipment, and other resources that allow operators to deploy SDV in their cable systems.[56]

Commission policies should facilitate, not impede, these digitization efforts, and there are two measures that the Commission should adopt in this regard. First, the Commission should encourage the deployment of low-cost cable equipment solutions that make the cable industry's transition from analog to digital as consumer-friendly, rapid, and seamless as possible. The Commission has taken a good first step in this area by approving the integration ban waiver

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[56] *See* Motorola Switched Digital Video Equipment, *at* http://www.motorola.com/Business/US-EN/Business+Product+and+Services/TV+Video+Distribution/Video+Distribution/Switched+Digital+Video+Equipment.

request filed by Evolution Broadband for certain one-way standard definition devices.[57] The Commission should provide similar relief to other one-way devices to ensure a level-playing field in the marketplace for cable equipment and assist the rapid deployment of low-cost equipment across the cable industry.

Second, the Commission should encourage the use of SDV and other bandwidth-conservation technologies. Motorola is concerned that the Enforcement Bureau's actions on SDV under the prior Chairman have had the effect of chilling the deployment of SDV and thereby denying consumers and operators the benefits of SDV.[58] Motorola has invested substantial resources in developing SDV solutions for the cable industry. Fewer SDV deployments may translate into the loss of jobs and stranded investment in the United States. This situation is unlikely to change unless and until the cloud of uncertainty created by these Enforcement Bureau actions is lifted.

Such policies will help accelerate the reclamation of cable bandwidth, which will enable the offering of faster broadband speeds and other digital services.

V. ENSURING PUBLIC SAFETY AND HOMELAND SECURITY

A. The Plan Should Address The Unique Broadband Needs Of Public Safety And Homeland Security.

Much work remains with respect to the deployment of networks capable of advancing public safety and homeland security.[59] The migration to next generation networks represents an

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[57] *Evolution Broadband, LLC's Request for Waiver of Section 76.1204(a)(1) of the Commission's Rules*, Memorandum Opinion and Order, FCC 09-46, Docket CSR-7902-Z (rel. June 1, 2009).

[58] *See, e.g.*, *Cox Communications, Inc., Fairfax County, Virginia Cable System*, Forfeiture Order, DA 09-122 (EB 2009); *Oceanic Time Warner Cable, a division of Time Warner Cable, Inc., Oceanic Kauai Cable System*, Forfeiture Order, DA 09-123 (EB 2009).

[59] *Notice of Inquiry*, ¶¶ 73-79.

opportunity to consider public safety holistically as an enterprise. The public safety enterprise spans geographic jurisdictions, encompasses multiple local, state and Federal agencies, and includes a mix of both common requirements and requirements that vary across regions and jurisdictions. At the same time, agencies increasingly face requirements to share information for the prevention of and response to incidents, disasters and homeland security situations. Therefore, public safety broadband solutions need to be designed to meet both day-to-day operability needs for data and video as well as interoperability capabilities to enable sharing and roaming when needed.

It is critical that any shared solution be attentive to the specialized needs of the public safety community by providing multi-level priority access, local agency operational control, preemption and end-to-end encryption for privacy and security. To provide economies of scale, the Plan should facilitate the use of standardized commercial technology. However, that technology must be deployed in a manner that meets public safety requirements which are more stringent and must accommodate different applications than those of systems designed to serve only the general public.

Two critical components necessary for providing state of the art broadband capabilities designed to meet the needs of public safety agencies are spectrum and funding. Congress and the Commission have taken steps to provide at least a portion of the spectrum required to meet public safety needs. For localized broadband coverage, the Commission allocated 50 MHz of spectrum in the 4.9 GHz band. For wider area coverage, the Commission has worked diligently over the past three years to forge a Public/Private Partnership between commercial interests and public safety that would lead to the creation of a purpose built network that would meet public safety's requirements for enhanced reliability and coverage on 20 MHz of spectrum in the 700

MHz band. Half of the spectrum is allocated for public safety uses and is licensed to a non-profit entity, the Public Safety Spectrum Trust ("PSST"). The other half, the Upper 700 MHz D block, is allocated for commercial services and obligated under the existing law to be auctioned via competitive bidding procedures. Despite intensive work by the Commission, public safety and the commercial industries, the proper formula to develop the shared network has proved elusive and is likely to remain so.

Recently, eight major public safety associations reached consensus on a revised plan that includes petitioning Congress to reallocate the commercial D block to create a single 20 MHz block of spectrum for use by public safety.[60] This proposal appears to be generating consensus and should be pursued. Therefore, additional work will to reallocate the spectrum and put in place appropriate rules for use and governance of the spectrum will be needed before the entire 20 MHz of 700 MHz spectrum will be available for deployment of broadband networks to benefit the nation's public safety agencies and the public they serve.[61] As noted previously, the requirements for public safety agencies and resources available to those agencies vary across the country. Therefore, Motorola recommends adoption of a regulatory structure that is adaptable to

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[60] Press Release, The Association of Public-Safety Communications Officials (APCO) International, "Public Safety Associations Meet to Form Consensus on the Development of a Nationwide Broadband Network" (May 28, 2009).

[61] A number of waivers have been filed for deploying systems in the 700 MHz spectrum prior to the adoption of a final licensing structure for the full 20 MHz of spectrum. *See, e.g., Amended Request by the City of Boston for Waiver of the Commission's Rules to Deploy a 700 MHz Public Safety Interoperable Broadband Network That Can be Integrated Into the Shared Wireless Broadband Network Developed by Public-Private Partnership*, PS Docket No. 06-229 (filed May 28, 2009); *Amended Request by the City and County of San Francisco, City of Oakland, and City of San Jose for Waiver of the Commission's Rules to Allow Establishment of a 700 MHz Interoperable Mobile Public Safety Broadband Network*, PS Docket No. 06-229 (filed May 27, 2009). Motorola supports facilitating early deployment of public safety networks, contingent on the need to ensure compatibility and interoperability with an umbrella of rules applicable to nationwide operations.

pubic safety's varying needs by allowing deployment by both agencies that want to deploy their own regional system and by third parties to serve those agencies that do not have the resources to own, operate or maintain their own system. Such a structure will provide the most cost-effective deployment meeting the varying needs and resources of public safety.

The second critical component – sufficient funding – also remains elusive. The Commission attempted to take on the funding challenge of providing a nationwide broadband interoperable network for public safety by adopting the Public/Private Partnership structure.[62] However, the commercial realities of trying to provide these public safety enhancements solely through a commercially viable network have been unsuccessful to date, and modifications to the approach, including deployment by public safety agencies directly, are under discussion, as noted above

Public safety agencies should be supported in supplementing successfully their mission critical voice networks with broadband enabled applications. Broadband enables public safety users to have access to full motion video, multimedia, remote camera viewing, software downloads, video archiving, internet/intranet access, high resolution images, full office applications in the mobile environment and many other uses to be defined by and designed for public safety users. Broadband technology offers a whole new level of mobile and portable data and video communications capabilities for the first responder community.

The Los Angeles Police Department, for example, installed a localized broadband mesh network in Jordan Downs, a high crime housing complex. This broadband solution includes applications that: allow officers in moving vehicles or at the central station to:

- monitor video from any camera on the network;

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[62] *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Second Report and Order, 22 FCC Rcd 15289, ¶¶ 391-559 (2007).

- remotely pan and zoom cameras;
- share video taken from their own vehicle surveillance equipment with officers in backup vehicles or at the station;
- provide access to video feeds for fire units responding to calls in Jordan Downs;
- scan license plates from cars and get immediate information without station involvement; and
- provide parallel equipment capability on unlicensed spectrum that can be used to offer broadband connections to the public, once management provisions are in place to do so.

To cover larger jurisdictional areas such as counties, regions and states, public safety agencies will need wide area, rather than localized, broadband networks, *e.g.*, utilizing the 700 MHz broadband spectrum. The challenge for public safety agencies is obtaining the necessary funding to build such broadband networks that meet their higher level of requirements in terms of coverage, priority access, robustness, reliability, availability, survivability and performance. The Commission currently has under consideration a rulemaking to ensure that public safety broadband deployments in the 700 MHz band are made as part of a nationwide interoperable framework. Accordingly, funding for 700 MHz broadband deployments for public safety should be consistent with such a framework.

Another critical consideration regarding public safety is the Commission's recognition that public safety networks are fundamentally different than other broadband networks. Thus, while Motorola believes that the Commission's *Broadband Policy Statement* is working and should not be expanded,[63] the imposition of any new obligations on broadband providers generally, such as a nondiscrimination obligation, should not apply to public safety agencies or

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

emergency communications. Indeed, a public safety agency (or any broadband provider) should be encouraged to prioritize communications as required for first responders, and not be prohibited from doing so.[64]

B. The Plan Should Ensure Access To Spectrum In A Manner That Supports Both Operability And Interoperability.

The broadband needs of public safety are very different than the broadband needs for commercial systems and general public users. Public-safety communications in the U.S. dictate that public-safety agencies must be able to communicate in major metropolitan areas as well as vast areas that have little permanent population and would be uneconomical for an operator to serve . Public safety has an obligation to protect life and property, and their systems must work, without interference, when other systems may fail. Emergency communications systems need to be designed and constructed to withstand worst-case scenarios expected in a given region. The approaches needed to do so vary across differing regions. First responders have called this the need for system "operability," meaning that systems must first survive and function on a day-to-day basis as well as when a disaster strikes. A good example is the public safety radio system used during the bridge collapse in the Minneapolis area. The system had been designed with the capacity and redundancy to operate under conditions not typically faced every day. In short, public safety systems need to be designed to accommodate the unexpected, to the maximum extent possible.

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[64] For example, cities such as Plano, Texas have implemented mesh network systems that enable broadband services shared with other city services beyond public safety, including wireless meter reading for utilities, traffic control, mobile office for city service workers, and ad hoc networking. The key for public safety is to have control over the prioritization of access to the shared network; yet their doing so may constitute "discrimination."

Emergency response providers also need solutions to account for and mitigate the potential impact of communications infrastructure damage, including the destruction of telephone lines, public safety networks, towers, and sustained loss of power. The Plan should enable the deployment of public safety broadband networks that meet the requisite "operability" requirements as defined by the public safety community. At the same time, a national framework is needed to specify minimal requirements for interoperability. These national framework requirements are more involved than merely specifying a radio access network technology such as LTE, WiMAX, etc. To provide interoperability and roaming from one jurisdiction to another, operational issues such as controlled access and authentication of users, as well as specification of some basic set of data and video applications needed for interoperability will be required. For operability, public safety agencies using these networks will also need the flexibility to deploy their additional applications beyond those basic ones specified for interoperability. To meet their operational needs, they must also have open access to choose and deploy any device that meets the interoperability requirements of the nationwide framework and does not harm the network.

C. <u>The Plan Should Recognize The Local Nature Of Public Safety.</u>

A key enabler and best practice for public safety communications interoperability is the existence or planned deployment of statewide or regional networks. Many States and regions have significant investments in these large-scale, shared, public safety networks, and much of the communications equipment used by emergency responders is being upgraded to standards-based digital equipment. These networks offer a high degree of interoperability within their geographic coverage areas and can be linked to other networks through gateways, which improves communication between State and local Governments and among neighboring local jurisdictions.

Motorola supports encouraging, developing, and promoting by incentives those large-scale State and regional shared public safety networks to enable cost-effective, interoperable, public safety, and emergency response capabilities. Beyond the technology implications, Federal grants that encourage increased levels of coordination and cooperation among Federal, State, local, and tribal public safety agencies by establishing multidisciplinary, cross-jurisdictional governance structures will improve regional collaboration and promote efficient use of funding devoted to public safety communications.

For broadband, the public safety community has expressed interest in leveraging commercial technologies. Whether broadband service is provided on a network commercially deployed or by deploying compatible technologies on dedicated public safety broadband regional networks is a decision the Commission and Congress should make as quickly as possible, while paying significant attention to the views of the public safety community.

VI. ADVANCING ENERGY INDEPENDENCE AND EFFICIENCY

A. The Plan Should Recognize That Broadband Applications Can Help To Improve Efficiencies In Energy Production, Distribution, And Consumption, Such As Smart Grid Technology.

There are a number of broadband applications that can help utilities improve energy efficiency, reliability and security, which the Plan should facilitate.[65] As they plan to take their first step towards their Smart Grid vision, most utilities are beginning their journey with the implementation of an AMI (Advanced Metering Infrastructure) system. More and more of these utilities are also realizing that to truly harness the power of the Smart Grid, they must also have a separate wireless broadband infrastructure capable of delivering 24/7 high-speed communication to enable a variety of additional Smart Grid benefits. These include more cost-effective backhaul

[65] *Notice of Inquiry*, ¶¶ 86-87.

of AMI data, delivery of sophisticated energy management/control programs and real-time connectivity within the utility to help improve service delivery, outage management and overall productivity.

In essence, the deployment of a wireless broadband communications network for Smart Grid applications enables the utility to become a truly "Connected Utility," features of which include the following:

- **Remote Monitoring and Control.** Most utilities have long wished for automation, real-time monitoring and remote control of system elements such as primary and secondary substations, power lines, capacitor banks, feeder switches, fault indicators and other physical facilities. So far, the major deterrent has been cost. Now, with affordable wireless broadband solutions, networks can be extended simply and cost-effectively, allowing remote facilities to be monitored around the clock with applications such as SCADA and video surveillance. The result is not only fewer and shorter disruptions, but also significantly improved management of power quality.

- **WiFi Hot Spots.** Wireless broadband networks can also significantly improve productivity through the creation of WiFi hot spots that allow real-time communications to and from employees in the field. Now, for example, a worker can transmit data from a substation directly into the utility's main system without having to drive back to the nearest office. Field engineers can also download or view blueprints and network diagrams on their computer screens precisely when and where they need them. This instant two-way connectivity improves customer service and eliminates wasted time, dollars and fuel.

- **Demand-Response Services.** Two-way customer communications empowered by system-wide wireless networks enable the automated demand response and management programs being mandated by many regulatory agencies. These networks, coupled with the utility's AMI system, provide connectivity and bandwidth to each installed smart meter, enabling support for demand side management programs that can help reduce energy consumption through voluntary and involuntary programs. These include programs that send pricing signals to customers and/or automatically control customer devices such as thermostats, pool pumps, water heaters, air conditioning and more.

- **Load Management.** By empowering applications such as Critical Peak Pricing (CPP), Time of Use (TOU) and Direct Load Control, private wireless broadband networks can help utilities reduce the strain on the grid during peak usage times. Even small reductions or shifts in peak load can reduce a utility's need for increased capacity, which in turn can help lessen the need for new power plants. In addition, because wholesale energy prices spike during critical peak periods, reduction in peak demand can lower the spot price for wholesale energy, providing cost savings that can be passed on to customers.

- **6 GHz Underbuild Network Expansion.** Many utilities continue to rely heavily on licensed microwave communication networks that are now in need of digital upgrades and incremental capacity to meet increasing demand for services and higher performance. As demand for these services continues to increase, the FCC needs to ensure sufficient spectrum is available for backhaul.

Even as they work at breakneck speed to implement their initial AMI systems, a great many utilities are planning for increased usage of the Smart Grid. By installing private wireless broadband networks to complete their AMI solution, these utilities are ensuring future growth in both service and profitability by preparing themselves for these and other energy-wise applications that are on the horizon.

B. <u>The Plan Must Provide Incentives For Smart Grid Investments.</u>

Broadband infrastructure is the backbone to the development of the Smart Grid. Communications providers will play a vital role, as the Smart Grid is composed of technology centered around providing communications to and between People to People, Things to Things and People to Things. Ultimately, the goal of the new Smart Grid is the empowerment of the entire utility enterprise through mobile and fixed intelligent devices and high-speed two-way connectivity with virtually every part of the organization. Motorola has been providing utilities around the world with communication systems and networks to support mission critical voice, utility monitoring and control applications which allow utilities to make critical decisions involving grid efficiency, reliability and security.

The federal funding provided for development and implementation of Smart Grid technologies will greatly enhance efforts to bring the smart grid to reality. The funding will allow utilities, technology providers, academia and regulators to test and demonstrate Smart Grid technologies and implement solutions that make the energy grid efficient, reliable and secure. Broadband infrastructure technologies enable utilities to tie in multiple Smart Grid applications

such as smart meters, distributed energy resources, and utility monitoring and control devices – ultimately creating a unified Smart Grid.

In addition to energy savings, investments in Smart Grid will create jobs. In January 2009, the GridWise Alliance released a Smart Grid Jobs Report (available at www.gridwise.org) which estimates that up to 280,000 new jobs can be created directly from the deployment of Smart Grid technologies. In addition to the 280,000 direct jobs, the report notes that a Smart Grid will drive a substantial number of indirect jobs as it enables the deployment of new technologies such as plug-in hybrid electric vehicles, distributed renewable energy resources such as solar, smart appliances, home automation software and hardware, and wind energy generation.

C. The Plan Should Ensure Adequate Coordination On Smart Grid Deployment And Sufficient Smart Grid Spectrum.

The Commission should coordinate with the Department of Energy which is leading the effort to develop the Smart Grid through federally funded demonstration programs and investment grants. The Commission also should coordinate with the Department of Commerce which is leading efforts to develop uniform standards for the Smart Grid. The Commission should also coordinate with the Federal Energy Regulatory Commission which has regulatory authority over the interstate transmission of electricity and will play a critical role in the development of the Smart Grid.

In addition, spectrum solutions will be required in order to enable the deployment of a secure and reliable Smart Grid, which requires machine-to-machine communications. Many of these devices will be connected by wired technology, but wireless broadband technologies can provide cost effective Smart Grid deployment with mission critical reliability using licensed spectrum. These data applications can be accommodated using lower bandwidth technologies

and, therefore, could be deployed in frequency bands smaller than that needed for wide area commercial mobile broadband networks. However, the large geographies that electric grids encompass make it desirable to use lower frequency spectrum (*i.e.*, below 2GHz) to take advantage of more favorable propagation characteristics.

VII. ADVANCING EDUCATION

As the Commission has recognized correctly, broadband plays a critical role in education.[66] Professors in universities and teachers in K-12 schools are leveraging the power of the Internet to enrich the learning experience for today's students. Online tests are common. Webinars and podcasts enable professors to disseminate additional information on virtually any subject. On-line posting of assignments, grades, study guides and more helps teachers and administrators ensure student success.

In addition, today's students — the earliest of technology adopters — are growing up in a wireless world, expecting 'anywhere anytime' access to whatever information they need, on whatever device is in their hands. The new generation of tech-savvy students might want to watch a Professor's webinar on a laptop or as a podcast on a mobile device virtually anywhere on campus — from a dormitory room to the library or an outdoor area. Students are increasingly equipped with laptops that include the latest generation of wireless broadband technology, and their wireless expectations are increased to match the increased capability of their equipment. Furthermore, the increasing emphasis on campus safety is forcing security personnel to rely on new wireless technologies, from video surveillance to crisis notification systems, to extend their reach and work more efficiently. As a result, universities, colleges and private K-12 institutions

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[66] *Rural Broadband Report*, ¶ 19 ("Broadband can significantly improve the quality of education by providing students in rural America with the ability to do online research, interact with their teachers and schools from home, and obtain college credit and college degrees, even though they are not physically on campus"); *see also Notice of Inquiry*, ¶¶ 88-91 .

must determine how to cost-effectively provide the high-speed wireless access and applications required to enable anywhere, anytime access to the latest tools to not only meet student expectations, but to also improve registration and student safety.

By leveraging today's best-in-class wireless networking technologies, colleges, universities and K-12 institutions can address today's challenges by enabling the all-wireless campus. Today's high-performance 802.11n wireless LAN and wireless broadband networks allow the delivery of reliable high-speed wireless voice, video and data inside buildings as well as throughout the campus grounds, providing support for applications that greatly improve the learning environment, campus security and the overall productivity of faculty and staff — while providing value added services that strengthen relationships with students and their parents.

As a wireless expert with a long history of proven, innovative technology, Motorola holds over 100 key wireless LAN patents that enable Motorola features that work together to provide 'wired' performance levels on the wireless LAN. The Motorola mesh product portfolio provides connectivity to users in large outdoor spaces. With its point-to-point and point-to-multipoint solutions, schools can connect to multiple buildings on a single campus as well as connect remote buildings and facilities that are long distances away — even across water or in environments that are dense with buildings or foliage.

Motorola has successfully provided schools across the country with the tools necessary to extend the reach of their voice and data network throughout their entire campuses, and supports a national broadband plan that integrates these proven solutions. For example, the sixth-largest Public School System in one western U.S. mountain state serves more than 33,000 students. The district is committed to providing its faculty and students with access to the latest developments in advanced learning technology, including distance learning, VoIP, streaming video and many

more. With 26 elementary and one K-8 school to connect, the district looked for a reliable, secure and cost effective network with enough bandwidth to meet both present and future needs. Deeming its legacy T1 lines too slow and expensive, the district chose a Motorola wi4 Fixed point-to-point wireless network that offers carrier-grade performance, the flexibility of wireless connectivity, ten times the network capacity and savings of $350 per month per T1 line. The school system estimates that its new wi4 wireless broadband network will pay for itself in less than four years.

Another example is Greene County, North Carolina, which is the second-most tobacco dependent county in the nation. As revenues from tobacco production continue to decline, the county's economy is suffering and in need of long-term economic change. To facilitate this change, officials decided to invest in countywide technology and high-speed connectivity solutions. To provide ubiquitous, affordable broadband connectivity throughout all of Greene County, officials chose a highly reliable Motorola wi4 Fixed point-to-multipoint high-speed wireless network. In the three years the network has been in operation, education results have been spectacular. Composite SAT scores have increased by more than 40 points, high school proficiency scores have grown from 53 to over 78 percent, and in 2006 more than 80 percent of the Senior Class applied to college.

Texas A&M University is another case study in the educational benefits of broadband on a large scale. Texas A&M is one of the largest systems of higher education in the nation; through a statewide network of nine universities, seven state agencies and a comprehensive health science center, the A&M System educates nearly 100,000 students and reaches another 11 million people through service each year. Texas A&M in Kingsville needed a cost-effective, high-quality, easy-to-operate videoconferencing and distance-learning infrastructure that would

connect the Kingsville campus to 24 school districts in Southeast Texas, spanning an area of 235 miles (378 km). Although all of the school districts had Internet service, none had videoconferencing capability because bandwidth was limited and connectivity in the region was slow.

The network solution was the Motorola PTP 400 Series broadband system. The carrier-class links average 25 miles (40 km) across near-line-of-sight paths, at a throughput of 15 Mbps both upstream and downstream to support two-way voice, video and data communications across the network. This high-bandwidth, asymmetric network enables new distance-learning functionality not supported in conventional broadcast-only networks, enabling interactive communication between students, faculty and administration via online courses and videoconferencing. The network is used for classes as well as for University support services such as admissions, financial aid programs and non-credit workforce training for the state of Texas. The overall project goal to provide a cost-effective, high-quality and easy-to-operate distance-learning infrastructure for communities in the South Texas region was easily accomplished, thanks to the powerful combination of Texas A&M's vision, DS3's networking solutions and Motorola's carrier-grade wireless technology.

Increased broadband deployment in unserved and underserved areas, and providing these areas with maximum network flexibility to implement proven technologies such as Motorola's, will drive access and opportunity for education. It is also important to note that other enabling factors are critical to the success of broadband for education. Among these factors are spectrum availability and network management flexibility. Addressing these factors will assist in the effort to spread the educational benefits of broadband access to all citizens, both urban and rural.

VIII. ADVANCING HEALTH CARE DELIVERY

As the Commission correctly recognizes, "[e]lectronic medical records are an important aspect of modernizing our healthcare system and stimulating our economy."[67] However, the benefits of electronic medical records and a truly modern healthcare system will not be recognized without broadband infrastructure and services. As broadband services are available to more Americans and the speeds and sophistication of such services increases, remote diagnostics will be available to millions of Americans, which will provide consumers in rural and other remote areas with access to advanced health care facilities and professionals that geographical limitations would otherwise preclude.

Broadband networks also enable the real-time sharing of electronic medical records between medical institutions, as well as between a hospital and emergency personnel at the scene of an accident. This information sharing will reduce medical errors and the amount of time required for diagnosis (and, thus, treatment).

While broadband represents an opportunity to transform dramatically health care in the United States, the Commission must create the proper incentives for the substantial investments in broadband networks, as discussed previously. Accordingly, the Commission must refrain from adopting regulatory policies that create disincentives to network investment or that could hamper realization of the very benefits of broadband, such as restrictive net neutrality rules. For example, imposing a nondiscrimination obligation on broadband providers could mean that that the benefits of telemedicine may "be forever around the corner" because, as the AEI-Brookings Center for Regulatory Studies noted, "who wants to risk remote surgery or emergency medical advice if the video stream is sluggish and jerky because of congestion caused by an online game

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[67] *Notice of Inquiry*, ¶ 82.

of Doom?"[68] Prohibiting broadband providers from prioritizing certain types of traffic such as medical-related data (as presumably would be the case if a nondiscrimination requirement were adopted) would undermine efforts to modernize health care in the United States.

Even with broadband infrastructure and services in place, broadband networks must be secure in addition to fast and intelligent in order to advance this country's health care system. Hackers attempt to access electronic medical records on a daily basis. The opportunity to reduce medical errors as well as speed diagnosis and treatment will not be realized if patients and health care professionals are unwilling to transmit sensitive health-related information over broadband networks because of the risk that such information will be accessed by unauthorized third parties. The Department of Health and Human Services ("HHS") is attempting to address this concern by issuing guidance regarding technologies and methodologies that can be utilized to "render [protected health information] unusable, unreadable, or indecipherable to unauthorized individuals."[69]

The HHS guidance offers a means of ensuring that broadband networks can be utilized to promote public health rather than to steal sensitive health information. Critically, security must be examined with respect to wireline and wireless broadband networks and connections. Wireless broadband security is sometimes overlooked, despite the increasing frequency with which medical records are transmitted in a mobile environment.

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[68] Robert Hahn and Scott Wallsten, "The Economics of Net Neutrality," AEI-Brookings Joint Center for Regulatory Studies, at 6 (April 2006).

[69] *Guidance Specifying the Technologies and Methodologies That Render Protected Health Information Unusable, Unreadable, or Indecipherable to Unauthorized Individuals*, 74 Fed. Reg. 19,006 (April 27, 2009) (to be codified at 45 C.F.R. pts. 160, 164).

The National Institute of Standards and Technology ("NIST") and the Department of Defense have promulgated encryption standards that provide effective security requirements that can protect electronic medical records from unauthorized access. In particular, data-in-motion can be secured with encryption technology that is compliant with Federal Information Processing Standard ("FIPS") 140-2. Further, networks that communicate data as well as those that could provide access to systems that store data-at-rest can utilize Full-Time 24x7 Wireless Intrusion Detection Systems ("WIDS"). Wireless firewalls and forensic programs to monitor and log wireless traffic also help protect networks. With respect to mobile devices, data-at-rest can be secured with FIPS 140-2 compliant encryption, and such devices should be capable of being quarantined or disabled.

These security features can help protect sensitive health information whether such information is being transmitted from hospital-to-hospital, hospital-to-ambulance, or mobile device-to-server. Enhanced security will encourage patients and health professionals to utilize broadband networks for diagnosis and treatment, and increased demand for the sharing of sensitive medical information between multiple locations will enhance demand for broadband services, which will increase network investment and stimulate the economy.

IX. CONCLUSION

In crafting the plan that will guide this Country's broadband initiatives for the foreseeable future, the Commission should adopt Motorola's proposals.

Respectfully submitted,

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