

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 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 MOTOROLA, INC.**

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## SUMMARY

Motorola believes that the state of innovation in the wireless services is extremely strong. Consumer demand for mobile broadband services is driving competition, which leads to investments in innovative new products to entice new customers. The Commission can continue to promote broadband deployment by creating incentives for investment in broadband networks by: (1) continuing its “light touch” for broadband regulation; (2) recommending that the Congress adopt tax credits for broadband investments; (3) extending federal universal service to broadband; (4) ensuring technological neutrality in implementing broadband initiatives except where public safety interoperability is involved; (5) maximizing 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; and (6) promoting investments in research and development (“R&D”) by encouraging Congress to permanently extend the R&D tax credit. Continued application of these principles will drive further innovation through the 4th Generation (“4G”) of commercial mobile services and beyond, much as it has the first three.

In these comments, Motorola describes the current state of innovative use of wireless broadband services in the health care, energy, education and public safety sectors. To encourage further innovation in these areas, the Commission must ensure that carriers are able to prioritize traffic and maintain the security of sensitive data.

Motorola will provide more detailed comments on the amount of spectrum required to promote continued deployment of broadband networks in future comments. Here, Motorola provides its overarching spectrum management recommendations. First, the Commission should provide spectrum for a multiplicity of broadband applications and user requirements and should apply a suitable variety of regulatory approaches rather than adopt a one size fits all approach. While the term “broadband” is often thought of generically and any given broadband deployment assumed to be able to meet the video and data needs of all users, this is not the case. User groups such as public safety, critical infrastructure and enterprise users often have coverage, reliability and applications requirements that differ or exceed those provided by the median broadband deployment. Thus, it can not be assumed that a purely competition driven model with spectrum obtained via auction will result in broadband deployments that provide the features necessary for specialized users. The cost of meeting specialized requirements adds to the cost of deploying and operating the broadband network, making it less competitive in a highly price and cost sensitive market.

Second, the Commission must be clear and consistent about interference rights and responsibilities at the outset of the allocation process, and not undermine the incentives to invest by reducing interference protections after assignment. Defining interference rights when the spectrum is allocated and licensed will provide a stable environment for investment as well as facilitate the introduction of new services in the future. The lack of clearly defined interference protections presents a high hurdle to innovation by delaying deployment of new services while competing parties spend years debating protection rights after the fact at the Commission.

Finally, the Commission can facilitate innovation by improving its equipment authorization process and its experimental licensing process. Improving the speed of service for processing equipment authorization applications will allow manufacturers to recoup investments in R&D more quickly and will maximize the opportunity to provide consumers with innovations. Similarly, lowering barriers for receiving experimental licenses will allow researchers to focus more on creativity and less on the regulatory process.

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**COMMENTS OF MOTOROLA, INC.**

**I. Introduction and Summary.**

Motorola, Inc. (“Motorola”) respectfully submits these comments in response to the *Notice of Inquiry* issued by the Federal Communications Commission (“Commission”) concerning the factors that encourage innovation and investment in wireless.<sup>1</sup> Because innovation drives competition, and *vice versa*, this inquiry will provide relevant information for the Commission’s formulation of the National Broadband Plan mandated by the American Recovery and Reinvestment Act of 2009 (“ARRA”).<sup>2</sup>

These comments add to information filed previously by Motorola in response to the Broadband Plan NOI and Motorola urges the Commission to consider these further comments in conjunction with the previously filed comments.<sup>3</sup> Motorola appreciates the Commission’s emphasis on identifying policies that support investments in innovation.

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<sup>1</sup> Fostering Innovation and Investment in the Wireless Communications Market, Notice of Inquiry, FCC 09-66 (2009) (“NOI”).

<sup>2</sup> A National Broadband Plan for Our Future, Notice of Inquiry, GN Docket No. 09-51, FCC 09-31 (2009) (“Broadband Plan NOI”).

<sup>3</sup> Comments of Motorola, GN Docket No. 09-51, submitted June 8, 2009 (“Motorola’s Broadband Plan Comments”).

Motorola believes that the state of innovation in the wireless services is extremely strong. Consumer demand for mobile broadband services is driving competition, which leads to investments in innovative new products to entice new customers. The Commission can continue to promote broadband deployment by creating incentives for investment in broadband networks by (1) continuing its “light touch” for broadband regulation; (2) recommending that Congress adopt tax credits for broadband investments; (3) extending federal universal service to broadband; (4) ensuring technological neutrality in implementing broadband initiatives except where public safety interoperability is involved; (5) maximizing 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; and (6) promoting investments in research and development (“R&D”) by encouraging Congress to permanently extend the R&D tax credit. Continued application of these principles will drive further innovation through the 4th Generation (“4G”) of commercial mobile services and beyond, much as it has the first three.

In these comments, Motorola describes the current state of innovative use of wireless broadband services in the health care, energy, education and public safety sectors. To encourage further innovation in these areas, the Commission must ensure that carriers are able to prioritize traffic and maintain the security of sensitive data.

Motorola will provide more detailed comments on the amount of spectrum required to promote continued deployment of broadband networks in future comments. Here, Motorola provides its overarching spectrum management recommendations. First, the Commission should provide spectrum for a multiplicity of broadband applications

and user requirements and should apply a suitable variety of regulatory approaches rather than adopt a one size fits all approach. While the term “broadband” is often thought of generically, and any given broadband deployment assumed to be able to meet the video and data needs of all users, this is not the case. User groups such as public safety, critical infrastructure and enterprise users often have coverage, reliability and applications requirements that differ or exceed those provided by the median broadband deployment. Thus it can not be assumed that a purely competition-driven model with spectrum obtained via auction will result in broadband deployments that provide the features necessary for specialized users. The cost of meeting specialized requirements adds to the cost of deploying and operating the broadband network, making it less competitive in a highly price and cost sensitive market.

Second, the Commission must be clear and consistent about interference rights and responsibilities at the outset of the allocation process and not undermine the incentives to invest by reducing interference protections after assignment. Defining interference rights when the spectrum is allocated and licensed will provide a stable environment for investment as well as facilitate the introduction of new services in the future. The lack of clearly defined interference protections presents a high hurdle to innovation by delaying deployment of new services while competing parties spend years debating protection rights after the fact at the Commission.

Finally, the Commission can facilitate innovation by improving its equipment authorization process and its experimental licensing process. Improving the speed of service for processing equipment authorization applications will allow manufacturers to recoup investments in R&D more quickly and will maximize the opportunity to provide

consumers with innovations. Similarly, lowering barriers for receiving experimental licenses will allow researchers to focus more on creativity and less on the regulatory process.

## **II. Understanding Wireless Innovation and Investment.**

The NOI seeks first to understand the state of both innovation and investment in wireless communication and the Commission's role in promoting them more generally.<sup>4</sup> The Commission expresses particular interest in how its rules or policies may have lagged behind important industry developments or examples of where its policies have been successful in stimulating and promoting innovation and investments.<sup>5</sup> Finally, the Commission seeks comment on the most important high-level trends driving innovation throughout the wireless ecosystem and the relationship of research and development funding as a generator of investment.<sup>6</sup>

Motorola firmly believes that the state of innovation in the wireless services is extremely strong. Despite difficult economic times, the wireless industry is experiencing tremendous growth due to a culture of innovation that is providing consumers with new features and improved performance. Consumer demand for mobile applications, particularly in the entertainment space, and competition in the wireless industry drives wireless providers to constantly upgrade their networks, providing higher data rates and greater bandwidth. The movement toward advanced broadband networks has resulted in multiple competing operating systems and is providing third party applications

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<sup>4</sup> NOI at ¶ 10.

<sup>5</sup> *Id.* at ¶ 11.

<sup>6</sup> *Id.* at ¶ 12, 14.

developers, network providers, and device manufacturers the ability to develop new and innovative products.<sup>7</sup> This competitive landscape forces companies to innovate or suffer the consequences.

Consumers' growing appetite for a variety of mobile broadband services is driving competition and the need for greater capacity on broadband networks. This leads to investments in innovative new products to entice customers and investments to upgrade and expand broadband networks. In Motorola's Broadband Plan Comments, we urged the Commission to promote broadband deployment by creating incentives for investment in broadband networks by: (1) continuing the "light touch" for broadband regulation; (2) recommending that Congress adopt tax credits for broadband investments; (3) extending federal universal service to broadband; and (4) ensuring technological neutrality in implementing broadband initiatives.<sup>8</sup> In particular, hardware providers like Motorola recognize that innovation flourishes in a minimally regulatory environment. Regulations that are well-meaning and intended to promote competition during a given snapshot in time may well have unintended consequences that stifle competition by undermining the case for investment or block an as yet unknown innovation. The commercial mobile industry has thrived and evolved in a competitive environment with minimal regulation and we should not rush to impose broad regulation to resolve problems that either have not materialized or are so limited as to be inconsequential.

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<sup>7</sup> See, e.g., Comments of CTIA – The Wireless Association, WT Docket No. 09-66, June 15, 2009.

<sup>8</sup> Motorola's Broadband Plan Comments at 12.

The availability of spectrum provides the foundation for expanding network capacity which, in turn, provides the foundation for industry to develop new and innovative products and services for consumers. It is, therefore, imperative that the Commission maximize the availability of spectrum for a variety of broadband applications. In order to maximize the potential of wireless broadband technology and accommodate a diversity of services, the Commission should provide for 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 are driving innovation in the development and deployment of wider bandwidth technologies. 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 the continued growth of 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, as further discussed in this pleading.

Motorola believes that promoting investments in R&D should be a policy priority for the Commission and the Federal Government, generally.<sup>9</sup> Motorola spends approximately \$4.1 billion in R&D per year and has long supported the permanent extension of the R&D tax credit. However, Motorola does not believe that targeted R&D is always the most effective method for distributing research credits. The requirements to

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<sup>9</sup> NOI at ¶ 14.

qualify for the credit and to verify the work is specifically targeted at an individual program would be so cumbersome that it is likely the burdens will outweigh the benefits. Further, such a model could stifle unexpected innovation by demanding innovators be singularly focused on a specific outcome that may or may not be driven by market demands. Rather, Motorola supports targeted project grants for specific R&D projects, and a general tax credits for all other R&D.

Fundamentally, Motorola believes that the state of innovation and competition in the delivery and availability of wireless services is extremely high and one of the great success stories of the American economy. Continued application of the Commission's formula of minimal regulation and adequate spectrum access will drive further innovation through the deployment of 4G commercial mobile services and beyond.

### **III. Innovative Uses of Wireless Services.**

The NOI seeks comment on how wireless services are being used in innovative ways to solve problems and provide consumer benefit in both the private and public sectors.<sup>10</sup> The Commission seeks specific input on how wireless services are being used to improve the effectiveness, cost and availability of health care, energy conservation, education and public safety.<sup>11</sup>

Motorola is continuously looking at ways to bring innovative wireless solutions to new markets and has an unparalleled depth of experience in each of the markets identified in the NOI. In previous comments responding to the Broadband Plan NOI, Motorola provided specific examples of innovative uses of wireless broadband

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<sup>10</sup> NOI at ¶ 15.

<sup>11</sup> *Id.* at ¶¶ 16-19.

technologies in each of these sectors and provided specific recommendations for policies that should be embedded in the National Broadband Plan to promote further innovations in these areas. Rather than repeat that discussion here, Motorola provides these brief summary points and urges the Commission to refer to its previously filed comments.

***Wireless Innovations in Health Care Services.*** Motorola is a leading provider of Health IT solutions, including mobile computing devices capable of bedside bar coding as well as displaying electronic health records. Further acceptance and use of these technologies, which help reduce medical errors and speed diagnosis and treatment through positive patient identification (PPID), will be hampered if patients and health care professionals are unwilling to transmit sensitive health-related information over broadband networks because of security concerns. In establishing net neutrality rules for broadband networks, the Commission must ensure that broadband providers can prioritize certain types of traffic such as medical-related data.

***Wireless Innovations in Energy Conservation.*** As they plan to implement their first Smart Grid services, most utilities are beginning with the implementation of an AMI (Advanced Metering Infrastructure) system. 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. By installing private wireless broadband networks to complete their AMI solution, 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. Many of the data applications can be accommodated using lower bandwidth technologies and, therefore, could be deployed in smaller bandwidth frequency 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 2 GHz) to take advantage of more favorable propagation characteristics.

***Wireless Innovations in Education.*** 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.

***Wireless Innovations in Public Safety.*** Working with public safety users, Motorola is deploying innovative localized broadband mesh networks in the 4.9 GHz band that allow officers in moving vehicles or at the central station to: monitor video from any camera on the network; remotely pan and zoom cameras at high crime locations; 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; and scan license plates from cars. Further innovations will be deployed once the Commission and Congress finalize the process for developing the public/private partnerships necessary to build a 700 MHz broadband network capable of providing public safety grade broadband applications and devices.

#### **IV. Spectrum Use and Availability.**

Recognizing that wireless innovation is most directly linked to the availability of spectrum, the NOI asks, in short, what are the most innovative ideas related to spectrum that the Commission should consider.<sup>12</sup> The NOI builds on this question with detailed discussions relating to current spectrum management practices, repurposing spectrum bands for new uses and access models. The NOI also asks whether there are innovative means of allowing spectrum access while affording other services adequate interference protection.

Motorola previously addressed these and similar issues when it participated in the Commission's Spectrum Policy Task Force to develop recommendations to update and modernize the Commission's spectrum management policies. What Motorola said then is equally applicable today – real world spectrum management is a blend of technical, economic, and public interest objectives in a way that provides the greatest benefit to the public, but there is no single blanket approach to managing the spectrum.<sup>13</sup> Instead, it is necessary for the Commission to apply a variety of different approaches and rules that best meet the needs of all users. In general, this means providing spectrum for both licensed and unlicensed devices, as well as accommodating the needs of commercial, enterprise and government users that cannot successfully participate in the general

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<sup>12</sup> NOI at ¶ 20.

<sup>13</sup> Comments of Motorola, ET Docket No. 02-135, July 8, 2002 at i.

auction process. Motorola will address the spectrum requirements for these various services in comments to the Commission's broadband spectrum NOI.<sup>14</sup>

Proper spectrum management will provide a structure that accommodates services meeting the requirements of users, provide the regulatory certainty necessary to drive investment in deployment of services and systems, but with sufficient flexibility to allow an evolution of technologies, promote efficient operations, and provide opportunities for the introduction of new technologies. It is indeed a daunting task to balance these numerous, and sometimes competing, requirements, but finding the proper balance is key to promoting a competitive industry that leads in technology and provides the means for a more efficient and safer society.

In developing a technical framework, the Commission should avoid creating the uncertainty caused by rules that allow services with very different technical characteristics to operate in co-channels or adjacent channels. For example, the Commission should:

- Avoid mixing Time Division Duplex ("TDD") and Frequency Division Duplex ("FDD") technologies within the same bands. In order for compatible operation between these technologies, severe restrictions on devices and deployments are required.
- Segregate high power and low power architecture systems including avoiding mixing interference limited systems with noise limited systems. Many examples of where problems exist can be found by examining the current issues surrounding interference into public safety.
- Segregate very different services, such as satellite downlink and terrestrial uplink services unless the services are under the control of the same network operator or clear sharing rules are developed beforehand.

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<sup>14</sup> *Comment Sought On Spectrum for Broadband*, Public Notice, DA 09-2100, Sept. 23, 2009.

While flexible spectrum use has been an innovation driver, it is imperative that the rules for use are clearly set in advance of any new spectrum allocation. The Commission should be very clear about the appropriate uses for new allocations, the responsibilities of primary and secondary users, as well as acceptable levels of interference - which will influence system design, deployment and equipment performance. It is a disruptive and expensive practice to clarify or reverse course after solutions are already deployed.

The NOI seeks comment on innovations that improve access to spectrum that is currently encumbered with uses.<sup>15</sup> As an example, cognitive radio technology combined with geolocation techniques are an innovation that allows for greater use of the television (“TV”) broadcast spectrum in a reliable non-interfering manner. The current rules for accessing the TV white space (“TVWS”) spectrum are very conservative and a number of changes are necessary to provide viable access to the TVWS spectrum under real-world conditions. For instance, the very restrictive minimum and maximum height limits for fixed devices do not allow for realistic deployment of services and present a serious obstacle meeting the broadband needs of rural areas.<sup>16</sup> Other requirements also can be removed. One such example is sensing requirements that approach the noise floors, even when access to databases protects the primary license owners (TV and licensed microphones).<sup>17</sup> In this case, the sensing requirements do not provide any additional protection to the incumbents, but seriously undermine the ability of a TV band device to

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<sup>15</sup> NOI at ¶ 29.

<sup>16</sup> *Petition for Reconsideration and Clarification of Motorola, Inc.*, ET Docket No. 04-186, March 19, 2009 at 3.

<sup>17</sup> *Id.* at 8-12.

operate. Such overly-restrictive requirements limit new commercial applications and rural broadband deployment. Current geolocation techniques provide reliable protection to incumbents and will continue to be refined and improved so that even more intensive use of idle TV broadcast spectrum can be accomplished by unlicensed devices. The challenge for the Commission is to create a regulatory environment that provides incentives for manufacturers and researchers to develop these improvements and innovate, without then being compelled to participate in a multi-year rulemaking proceeding to change the rules of spectrum access.

At the heart of the spectrum access matter is interference protection. The challenge for innovation is to properly balance the interference protection afforded to incumbent co-channel and adjacent channel operations with the need to allow new services into the spectrum. While it is easy for potential new entrants to claim that improvements in the receiver performance of incumbents is a reasonable and readily implemented modification that will allow new uses in adjacent spectrum, actual implementation of such changes can be far more difficult or costly than claimed and can shift the burden of protection from the new entrant to the incumbent. With the ever-increasing demand for new spectrum for a variety of worthwhile services, these actions are tempting to pursue. Motorola recommends, however, that the Commission be extremely careful in pursuing these approaches, or risk serious damage to investments in innovation.

When allocating spectrum, the Commission should clearly state the acceptable levels of interference with adjacent users before allowing new users to deploy. Harmful interference should be defined upfront and should relate to the type of users involved.

For example, public safety and other critical enterprise systems normally warrant more protection than those deployed for casual consumer use. Defining levels of acceptable interference upfront will help drive the design and deployment of systems, including both the network and receiver design to tolerate a given level of interference. This provides greater certainty regarding the type of systems that can be deployed in both co-channel and adjacent spectrum and potentially avoids multi-year rulemakings in which parties debate the definition of interference.

The Commission must continue to address interference mitigation from an overall system perspective, including characteristics of the systems receiving and causing interference. Further, the Commission should not view the introduction of receiver performance specifications as an opportunity to provide “underlay” users with access to licensed spectrum. Such an approach would create a more uncertain interference environment at the expense of users of licensed services and therefore undermine the impact of improved receiver performance.

To help the Commission resolve interference disputes, the NOI asks whether the Commission should designate a panel of technical experts to advise it on spectrum sharing issues and disagreements about harmful interference.<sup>18</sup> The NOI further asks if the Commission’s Technical Advisory Committee (“TAC”) should be used for this purpose.<sup>19</sup> The Commission must realize that many members of the TAC are employees of publicly held corporations have a fiduciary duty to their companies and their shareholders first and foremost. While it is appropriate for the Commission to solicit

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<sup>18</sup> NOI at ¶ 35.

<sup>19</sup> *Id.*

input from the TAC on objective issues of science and technology, interference disputes are most complicated when the solution requires a balancing of competing public interests. This is a role the Commission should continue to fulfill.

Motorola believes that noise floor measurements in incumbent frequency bands will be extremely difficult to acquire. The only reliable way to measure a true noise floor without considering the contributions of primary services is to command every primary transmitter to be silenced. The noise floor can be accurately measured when only natural and unintentional man-made emissions are present. Even if intentional radiators are demodulated and their relevant parameters (*e.g.*, amplitude, phase) are estimated, at weak signal levels there can be some, perhaps substantial, estimation error and some residue will remain after canceling the signals. This residue will give a false reading of the noise floor.

Finally, Motorola opposes the spectrum usage rights model as recently examined in the United Kingdom. Under this proposal, where licenses are subject to interference limits that describe signal strength as experienced by a receiver rather than technical rules on transmitted power, licensees can update or modify their technologies as long as they stay within their interference limit. While the concept is intriguing, Motorola believes that there are too many practical problems for this approach to succeed in congested spectrum.

## **V. Networks, Devices, and Applications.**

The NOI requests comment on innovation in the various areas of wireless technology, including both the hardware and software used to provide such services.<sup>20</sup> More specifically, the Commission asks for comment on developments and innovations that are promoting investment in and robust use of wireless network infrastructure, end-user devices, and applications and services, on any major barriers or deterrents to such innovation and investment.

### **A. Network Infrastructure and Systems.**

The NOI discusses network infrastructure and systems asking, in general, about the implications of internet protocol (“IP”)-based wireless networks for innovation.<sup>21</sup> Noting that 4G wireless networks may represent “the most significant advance in wireless communications in a decade,” the NOI asks about policies the Commission should adopt to facilitate 4G deployment.<sup>22</sup> The Commission also seeks comments on innovations in network architectures noting, in particular, the synergies between licensed and unlicensed technologies.<sup>23</sup> The Commission seeks comment on the “backbone” of wireless infrastructure – towers – and asks if there are measures that the Commission may implement to increase the speed and efficiency of processing tower-related matters.<sup>24</sup> Finally, the NOI seeks comment on innovations in the use of renewable energy and other

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<sup>20</sup> NOI at ¶ 48.

<sup>21</sup> *Id.* at ¶ 49.

<sup>22</sup> *Id.* at ¶ 50.

<sup>23</sup> *Id.* at ¶ 51.

<sup>24</sup> *Id.* at ¶ 52.

green technology to makes wireless networks more energy efficient or address other environmental concerns.<sup>25</sup>

In response to these broad inquiries, Motorola notes that earlier generation commercial networks were based mainly on one or two applications, such as voice and SMS/messaging, and additional data capabilities were later added. IP-based networks will open the floodgates to many data-centric and multi-media applications, as well as carrying voice over IP (VoIP), possibly in several forms. In short, IP-based networks offer great potential for innovation because they are application agnostic.

Associated with a diversity of applications is a wide variety of different operating requirements in terms of speed, latency, and quality of service (“QoS”) by a diverse user community. Maximizing network performance using valuable and limited wireless resources and covering such a diversity of requirements suggests that network operators must have the flexibility to manage such scarce resources for the benefit of all users. It is difficult to predict the future, but experience has shown that, for commercial systems, licensee flexibility enabled through minimal, but effective, regulation and incentives will generally encourage investment and innovation and allows consumers and businesses to decide what mix of services they desire and how different providers creatively adjust in response.

While commercial IP-based networks will offer a wide range of capabilities, they may not be able to fully meet the specialized requirements of certain users, such as public safety, critical infrastructure and enterprise users. To the extent these unique

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<sup>25</sup> *Id.* at ¶ 54.

requirements are critical and not met by commercial deployments, separate spectrum and requirements may be required. Commercial networks will be designed to address a wide variety of needs that meet a large cross-section of consumer and business applications, while some unique enterprise or public safety needs may be better served by separate, independently operating networks. For instance, while there is widespread agreement that Long Term Evolution (“LTE”) will be the primary technology deployed for both commercial and public safety users in the 700 MHz band, public safety will require greater coverage and reliability requirements than traditional commercial systems provide. In addition, LTE, like other commercial cellular based technologies, does not provide direct-unit-to-unit communications without infrastructure as do mission critical public safety voice systems.

Flatter, IP-based networks are made possible by the lower cost per bit of 4G wireless technologies, compared to previous generations of technology. These higher bandwidth networks will deliver much greater speeds at lower overall costs, helping drive network innovation. While costs are being lowered, the deployment of such networks remains a significant capital investment that represents risk to shareholders. Too much regulation and taxation can increase risk and stifle innovation.

Fourth generation mobile networks place more control at the edge of the network, where decisions can be made more intelligently and quickly depending on the local conditions and needs of the user. Key network elements can now be aggregated or distributed, allowing the designer and operator greater flexibility in deciding how to best serve users. Fourth generation network evolution reduces the strictly hierarchical relationships among components and, in general, enables a “many-to-many” pooled

architecture that allows easy growth, eliminates dependencies on single network elements above the radio, and allows for geographic redundancy.

Network reliability can be enhanced by distributing critical resources and providing additional routing options, while lowering backhaul costs and improving latency performance. Different backhaul options are also enabled by the new architecture.<sup>26</sup> Lowered costs for these networks will allow greater performance and capacity at reduced prices per bit. QoS advancements will allow operators and innovators to tune the network for specific requirements and individual performance experiences, if this flexibility is allowed.

Network security is enhanced as it relies on standard IP security solutions. Security on previous generation mobile wireless systems varied and there was no common solution. These solutions could also vary in effectiveness. IP-based networks allow for both standardized solutions across multiple platforms but also provide for flexibility in deploying security solutions. For example, application or content providers can provide for their own end-to-end security.

High speed IP-based networks enable the rapid expansion of mobile video as previous solutions were generally slow due to bandwidth considerations, were network specific, or used customized solutions like DVB-H or MediaFLO. The use of IP networks, along with encryption and compression enhancements, more readily allows for distribution of both commercial and personal content over wired or wireless networks.

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<sup>26</sup> Sharing mixed backhaul with other services, handling different media formats, providing redundant links over different physical media and a “many-to-many” architecture provides a resiliency that hierarchical networks could not provide.

Orthogonal Frequency Division Multiplex (“OFDM”) will provide greater performance at the cell edge by reducing and better managing interference while reducing costs. Advancements in Radio Access Network architecture such as the use of tower-top amplifiers/antennas will reduce the site footprint, significantly reduce power requirements for both transmit power and air conditioning for a greener solution. Fourth generation networks will provide functionality and scalability to allow base stations of all sizes and different ownership models (*e.g.*, femtocells, picocells, etc.).

The Commission seeks comment on distributed antenna systems (“DAS”) and multi-carrier amplifiers and how their potential use could impact site deployments.<sup>27</sup> DAS is an option for wireless providers that should be supported when such solutions can enable and improve coverage where it would otherwise be challenging. The same flexibility to allow use of multi-carrier amplifiers would enable the build-out of some sites that would be challenged otherwise because of site issues or costs. The Commission should support such choices but maintain interference protections for other operations such as adjacent channel usage.

Finally, Motorola is working to reduce the environmental footprint of our products, operations and supply chain. Motorola approaches the “green” issue in several ways: improving the environmental profile of our products, running our operations in a safe and energy-efficient manner and helping our customers to be greener when they use our products.

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<sup>27</sup> NOI at ¶ 53.

In 2009, Motorola launched the MOTO™ W233 Renew, the world's first mobile phone made from recycled post-consumer water cooler bottles. Renew is also the first CarbonFree® certified mobile phone. Through an alliance with Carbonfund.org™, Motorola offsets the amount of carbon dioxide (“CO2”) generated to manufacture, distribute and use the phone through investments in renewable energy and reforestation.

Most of the energy used during the life cycle of a mobile phone is wasted when the charger is left on standby (plugged in but not in use). Since 2000, Motorola has reduced the average standby power of our mobile phone chargers by at least seventy percent. Newly designed chargers will use 0.10 watt or less of standby power. Software in our newly designed mobile phones reminds users to unplug their chargers after use, and phones are shipped with energy-saving settings enabled.

Motorola's cellular base stations are designed to operate at higher ambient temperatures, minimizing and even eliminating the need for air conditioning at some cell sites. Also, power efficient traffic management techniques allow base stations to switch off time-slots or, depending on the amount of traffic, allocate the traffic to fewer radios, thereby further reducing power consumption during quiet periods.

## **B. Devices.**

The Commission seeks comment on the ever-increasing sophistication and complexity of new wireless devices and seeks comments on ways in which the existing equipment authorization process could be modified or relaxed in order to simplify the process.<sup>28</sup>

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<sup>28</sup> *Id.* at ¶¶ 55, 56.

Motorola agrees that much can be done to reduce approval times for radio frequency (“RF”) devices. Over the past twelve years, the Commission has initiated two proceedings, “to provide a simpler, less burdensome path for products to be marketed in the United States,” by streamlining its equipment authorization rules and process.<sup>29</sup> The actions taken in these proceedings have indeed provided incremental improvements to the process. Most notably, the elimination of two of the five categories of equipment authorization, the relaxation of equipment authorization requirements for certain Parts 15 and 18 devices and elimination of notification requirements for Parts 74, 78 and 101 transmitters, the adoption of an electronic application filing system, and, most important, approval of the use of Telecommunications Certification Bodies (“TCBs”).<sup>30</sup>

Despite these actions, the reduction in the Speed of Service (“SOS”) for obtaining equipment approvals has not met either the Commission’s or applicants’ expectations. In 1998, the Commission had expected to reduce in half the forty-day processing time that existed at that time. Unfortunately, that expectation has not been realized.<sup>31</sup>

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<sup>29</sup> *Amendment of Parts 2, 15, 18 and Other Parts of the Commission's Rules to Simplify and Streamline the Equipment Authorization Process for Radio Frequency Equipment*, ET Docket No. 97-94, 13 FCC Rcd 11415 (1998) at 5 (“Streamline Order”). See also, *1998 Biennial Regulatory Review -- Amendment of Parts 2, 25 and 68 of the Commission's Rules to Further Streamline the Equipment Authorization Process for Radio Frequency Equipment, Modify the Equipment Authorization Process for Telephone Terminal Equipment, Implement Mutual Recognition Agreements and Begin Implementation of the Global Mobile Personal Communications by Satellite (GMPCS) Arrangements*, GEN Docket No. 98-68, 13 FCC Rcd 24687 (1998) (“TCB Order”).

<sup>30</sup> See, e.g., *id.*

<sup>31</sup> Based on the most recent data available on the OET Laboratory Division Electronic Filing Site, the SOS for the period May 1-May 31, 2009 was 50 percent processed within 5 calendar days; 90 percent processed within 33 calendar days. No data were available on the site for processing 100% of the applications during that period.

Motorola commends the Commission for acknowledging the continued importance of, “minimizing burdens on manufacturers and decreasing the time to market.”<sup>32</sup> The records of prior proceedings have shown unwavering support for reduced administrative burdens by those entities subject to the equipment authorization process. Nowhere is the need for process simplification greater than for innovative new or unique wireless devices. To that end, Motorola offers the following recommendations from the perspective of a user that has participated in the equipment authorization process for a broad range of wireless devices since the process began.

Motorola recommends that the Commission implement a fifteen day cycle time from date of application submittal to final action by the Commission Laboratory, minus the time during which additional information is requested by the applicant. In this era of accelerated innovation and competition, it is important for the Commission to commit itself to continuous improvements in the pace of its equipment authorization process. The reduction of application processing time from forty days to approximately thirty-three days is an improvement to be sure, but a more significant reduction is necessary.

If lack of engineering resources at the Commission Laboratory is the root cause of the inability to further reduce approval times, Motorola submits that the public interest will be served by the addition of qualified engineers working in the equipment authorization process.

If major process improvements are to be made, however, future actions should be focused at improving and expanding the TCB system. Experience to date has shown that

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<sup>32</sup> NOI at ¶ 56.

the Commission has delivered on its promise to exert proper oversight of the rollout of the TCB system and at the same time enforce Commission's rules effectively. Given that favorable experience, the Commission should further enable the TCB system by expanding the types of devices—especially innovative devices – that can be approved by TCBs.

Some Commission policies hobble the effectiveness of TCBs. The Commission has previously concluded that some functions should not be performed by TCBs including: (1) granting waivers of Commission rules and regulations; (2) certifying new or unique equipment for which Commission rules or requirements do not exist or for which application of the rules or requirements are not clear; (3) enforcement actions; and (4) granting transfers or control or assignments of certifications.<sup>33</sup> Motorola agrees with most of these restrictions. It is noteworthy, however, that precluding TCBs from certifying new or unique equipment for which Commission rules or requirements do not exist or for which application of the rules and requirements are not clear, goes to the heart of this rulemaking.

New and unique devices will, by definition, be those that are likely to be most innovative. Motorola is concerned that elements of the current TCB preclusion policy, drafted twelve years ago, now present two unintended consequences: (1) the preclusion policy eliminates the applicant's option of having more than one approval body to choose from and selecting the one with the shorter processing time; and (2) the preclusion policy

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<sup>33</sup> TCB Order at ¶¶ 31-35.

selectively targets and redirects innovative devices to the Commission's equipment approval process which in its own words has been fraught with "uncertainty and delay."<sup>34</sup>

Motorola respectfully requests that the Commission revisit the conditions that apply to its policy on TCB scope of responsibility. It is hard to imagine a situation where equipment authorization applications are ready to be submitted to either the Commission or a designated TCB and rules or requirements simply do not exist. Such a situation may be theoretically possible, but this would likely be the rare exception rather than the rule. In those situations where application of the rules or requirements is not clear, it is incumbent on Commission technical and legal staffs to provide the necessary clarifications in a timely manner. This clearly serves the public interest because it results in, "...a reduction of applications filed with the Commission, thus enabling the Commission to redirect resources towards enforcement of the rules."<sup>35</sup>

Other Commission policies also limit the demonstrated effectiveness of TCBs. For example, the current TCB Exclusion List excludes TCBs from issuing certifications for ten equipment types.<sup>36</sup> The exclusion list thus stands in contrast to the Commission's pledge that it did not intend to preclude TCBs from certifying any class of equipment.<sup>37</sup> In sum, Motorola supports giving qualified TCBs the fullest authority possible in order to enhance the efficiency of the overall equipment authorization process.

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<sup>34</sup> *Id.* at ¶ 14.

<sup>35</sup> *Id.* at ¶ 10.

<sup>36</sup> The TCB Exclusion List is available at [http://fjallfoss.fcc.gov/oetcf/report\\_detail.cfm?report\\_url=/kdb/GetAttachment.html?id=27868](http://fjallfoss.fcc.gov/oetcf/report_detail.cfm?report_url=/kdb/GetAttachment.html?id=27868)

<sup>37</sup> TCB Order at ¶ 32.

Motorola also supports the comments submitted to this proceeding by the Telecommunications Industry Association regarding modifications to existing equipment authorization processes. Simplifying revisions are particularly appropriate for FCC policies governing antenna/device testing requirements. Manufacturers should be allowed to exercise their engineering judgment to focus testing on “worst case” configurations for RF exposure compliance and interference potential.<sup>38</sup> Additionally, testing exclusions should be available in those cases where transmitters have been tested repeatedly and RF exposure compliance consistently confirmed.

**C. Applications and Services.**

The NOI seeks comment on innovation occurring in wireless applications and services and asks whether the Commission should take any action to further facilitate development.<sup>39</sup> The Commission seeks specific comment about the market’s openness for applications and how the multiple technical standards and platforms that apply to wireless services may affect innovation.<sup>40</sup>

Mobile device application development is exploding. In July of 2009, Apple informed the Commission that there are 65,000 applications in its App Store that are capable of operating on the iPhone.<sup>41</sup> Earlier this week, Apple issued a press release

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<sup>38</sup> The Commission staff would, of course, retain the ability to review and challenge manufacturers with regard to whether the worst case scenarios are represented in the testing.

<sup>39</sup> NOI at ¶ 58.

<sup>40</sup> *Id.* at ¶ 60.

<sup>41</sup> Reply Comments of Apple, Inc., GN Docket No. 09-51, July 21, 2009, at 5.

stating that there are now 85,000 applications on-line, an increase of more than 30 percent in little more than two months.<sup>42</sup>

Similarly, devices running the Android operating system are already on the market and will continue to grow. Android is an open source mobile operating system developed in 2007 by the Open Handset Alliance, of which Motorola is a founding member. This operating system lends itself to third party application developers creating applications for consumers to directly download for a completely customizable mobile experience. The market for Android-based applications has accelerated tremendously in 2009 with new project starts increasing by more than 50 percent from June to July alone.<sup>43</sup> With multiple manufacturers, including Motorola, introducing many new Android-based products these numbers are sure to explode.

Motorola believes that these metrics reflect a thriving competitive market with incredible innovation, catering to the needs of consumers that does not need further government intervention. The multiple operating systems for mobile devices that now exist are promoting this competition and, at this time, removing barriers to product development.

## **VI. Supporting Innovation and Experimentation.**

The NOI seeks comment on what the Commission can do to support experimentation in the wireless services.<sup>44</sup> The traditional experimental licensing process

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<sup>42</sup> *Apple's App Store Downloads Top Two Billion, More Than 85,000 Apps Now Available for iPhone & iPod Touch*, September 28, 2009, available at <http://www.apple.com/pr/library/2009/09/28appstore.html>.

<sup>43</sup> See, e.g., <http://blog.flurry.com/bid/24465/Smartphone-Industry-Pulse-July-2009>.

<sup>44</sup> NOI at ¶ 65.

governed by Part 5 of the Commission's Rules is critical to innovation.<sup>45</sup> Motorola supports expanding the availability of experimental licenses and lifting certain restrictions that inhibit their effectiveness for manufacturers and developers of new services and devices. For example, Motorola supported Commission changes to Section 2.803 of the FCC's Rules pertaining to the marketing of RF devices and now allows the experimental operation of devices for compliance and evaluation testing prior to equipment approval.<sup>46</sup> In many cases, the provisions of Section 2.803 have obviated the need to obtain Part 5 experimental licenses.

Although the existing procedures in Parts 2 and 5 have worked well to provide manufacturers and developers flexibility to test new services and devices, Motorola suggests three further improvements designed to remove impediments to the timely research and development of new and innovative products. First, Motorola recommends that the Commission remove the existing restriction in Section 2.803(e)(1)(iii) and Section 2.803(e)(1)(v) that prevent the operation of devices prior to equipment approval in residential areas.<sup>47</sup> The proper evaluation of a device's performance often requires that it be tested in the environments that it is expected to be used, and limiting the testing of consumer grade equipment to non-residential areas can frustrate that goal. The limited circumstances under which operations are permitted under these rule sections and the

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<sup>45</sup> 47 C.F.R. § 5.1 *et seq.*

<sup>46</sup> *Id* at § 2.803 (e).

<sup>47</sup> 47 C.F.R §§ 2.803 (e)(1)(iii), (e)(1)(v).

obligation to coordinate with the licensee of the spectrum used in the tests serves as a sufficient safeguard against interference.<sup>48</sup>

Second, Motorola supports removing any requirement for the experimenter to own the equipment. Under the Commission's Rules, a manufacturer generally cannot sell a product before it is approved.<sup>49</sup> In many cases, manufacturers prefer to wait for the results of trials before commencing the approval process so that they may ensure the equipment, as finally approved, incorporates any changes suggested by the trials, and to reduce costs associated with obtaining approvals for prototypes that manufacturers ultimately decide not to market. Any requirement for experimenters to own the equipment would significantly and unnecessarily hamper their ability to design and develop innovative applications or systems using equipment that has not yet been approved by the Commission.

At the same time, Motorola urges the Commission to provide manufacturers greater flexibility to obtain compensation for unapproved equipment that it supplies to experimenters for the trials. Section 2.803 (b) and (d) of the Rules allows manufacturers to enter into "conditional" contracts to sell unapproved equipment to certain entities, but they are prohibited from delivering such equipment until it is approved.<sup>50</sup> Motorola believes that the Commission should allow manufacturers the flexibility to deliver

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<sup>48</sup> *Id.* at § 2.803(e)(3)(ii). For operations in unlicensed, Part 15 bands, consumers in residential areas are protected by the requirement that operating authority is provided only for devices that are designed to comply with, and to the best of the responsible party's knowledge will, upon testing, comply with all applicable requirements. *Id.* at § 2.803(g).

<sup>49</sup> *See, generally, id.* at 2.803(a).

<sup>50</sup> *Id.* at 2.803(b) & (d).

unapproved equipment to experimenters under conditional contracts that limit the use of the unapproved equipment to experiments or demonstrations conducted under either Part 5 of the Rules or Section 2.803. So as not to undermine the Commission's goals to prevent the sale of unapproved devices to the general public or to end users that could cause interference, this additional flexibility could be appropriately limited to sales of a relatively small number of devices and only to developers or experimenters. Manufacturers would remain restricted from delivering unapproved devices in large quantities under conditional contracts to retailers.

Third, the NOI asks if research organizations should be permitted to operate experimental stations without individual coordination of frequencies, conditioned on their not causing harmful interference to authorized stations.<sup>51</sup> Motorola supports such an approach and urges the Commission to extend such flexibility specifically to manufacturers. Manufacturers conduct a significant amount of fundamental research to advance technology and this flexibility would eliminate burdens and costs that impede such efforts. Especially for operations performed on campuses or research facilities that are under the direct control of the manufacturer, such authority would encourage further design innovation.

As a final matter, Motorola urges the agency to continue its efforts to speed the processing of experimental license applications, which should directly benefit innovation. Experimental licenses are a key component of the Commission's arsenal, specifically aimed at assisting companies to innovate. While the average speed of processing routine applications has improved, it is still approximately six weeks based on Motorola's

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<sup>51</sup> NOI at ¶ 67.

experience. In the ever-shortening window of opportunity to market new and innovative wireless devices, further reducing the regulatory processing times will help manufacturers in their development and investment efforts.

**VII. Conclusion.**

Motorola hopes that the Commission finds these comments useful and informative as it strives to develop a plan for the expansion and proliferation of broadband services to the American public. Motorola strongly supports that goal and urges the Commission to take these recommendations under consideration as it considers policies and rules to promote the development of innovative wireless services.

Respectfully Submitted,

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