

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

In the Matter of

Fostering Innovation and Investment in the
Wireless Communications Market

A National Broadband Plan For Our Future

GN Docket No. 09-157

GN Docket No. 09-51

**COMMENTS OF
THE BOEING COMPANY**

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SUMMARY

Boeing is a substantial provider and contributor of innovative wireless services and products that utilize radio frequency spectrum, and is a contributor to the “value chain” of the wireless market. Boeing commends the Commission for encouraging the growth of innovation and investment in the wireless industry. Boeing believes that the Commission can continue to manage spectrum in such a manner that fosters the efforts of wireless innovators such as Boeing while maintaining its mandate under the Communications Act to regulate the use of spectrum in the “public interest.”

The Commission, as a preliminary matter, should broaden its evaluation of “innovation” to include innovative products and services that require spectrum to operate, but do not directly generate revenue for consumer companies. Boeing has integrated numerous innovative wireless technologies into its aircraft and other products. Although the underlying economic value of these technologies may be difficult to quantify, they nonetheless generate substantial economic benefit and contributions to the economy.

The Commission can also encourage the use of wireless services to improve public safety communications by refraining from making quantitative comparisons of spectrum efficiency between dissimilar types of radio services and uses. The value of different spectrum uses should not be regulated via a single set of policies based upon commercial wireless efficiency criteria. Safety services require much more reliability than consumer applications. For example, Boeing uses numerous private radio systems to support public and private safety communications services, as well as for innovative manufacturing purposes. Boeing’s specialized wireless communications needs often cannot be satisfied by commercial providers. Therefore, the Commission should treat private licensees, such as Boeing, similarly to public safety users and

not subject them to the same market mechanisms for determining spectrum allocations, such as competitive bidding.

The Commission should instead consider employing a graduated regulatory fee on the unused portions of a license's total spectrum capacity as an additional incentive for private wireless licensees to use spectrum efficiently. Such fees can promote innovation and efficiency, while imposing a minimal burden on those licensees that use spectrum efficiently.

For purposes of increasing access to spectrum for experimental operations and innovative new services, the Commission should ensure regulations and policies impacting the granting of experimental licenses will not suppress the development of innovative technologies. The Commission should remove burdensome coordination and consent requirements on experimental license holders that effectively prevent parties like Boeing from performing the necessary testing required to develop innovative products. Boeing supports permitting licensees to operate experimental stations without obtaining consent from entities that have no incentive to coordinate such usage. Removing such barriers will increase wireless innovation and serve the public interest.

Finally, the Commission should tighten, rather than relax, its interpretation, application and regulation of "harmful interference." Encouraging new market entrants to provide proof that new wireless systems will not cause harmful interference to incumbent users will significantly reduce the regulatory timeline while ensuring existing investments in wireless systems will remain useful.

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The Boeing Company (“Boeing”), by its attorneys and pursuant to the Commission’s Notice of Inquiry (“NOI”), hereby files these comments responding to issues posed in the Commission’s wireless innovation and spectrum policies NOI.¹

I. INTRODUCTION

Boeing applauds the Commission’s support for and encouragement of further innovation and investment in wireless communications services. As the Commission correctly observes, wireless innovation encompasses not only the invention of “new things,” but also the discovery of “new ways of doing things.”² Boeing’s contributions to innovation and investment in wireless communications services are primarily in this latter focus.

¹ See Notice of Inquiry, *In the Matter of Fostering Innovation and Investment in the Wireless Communications Market, A National Broadband Plan For Our Future*, FCC 09-66 (Aug. 27, 2009) (“Notice of Inquiry”).

² *Id.* ¶ 2 (*emphasis in original*).

Boeing develops and employs wireless devices in countless manners, including implementing wireless technologies in the design, manufacture and testing of commercial and military aircraft and satellites, as well as avionics, ground, maritime and aerospace communications systems. Boeing's innovative use of wireless technologies is not limited to the factory floor, but encompasses the growing use of wireless systems within aircraft and defense systems to increase their reliability, efficiency and functionality.

Boeing's role as an innovator and consumer of wireless communications systems has helped Boeing maintain its status as the global leader in the design and manufacture of commercial and military aircraft and as a leader in the manufacture and launch of commercial and government satellites. Boeing employs more than 158,000 people across the United States and in seventy countries, and is one of the leading U.S. exporters with total revenue in 2008 of \$60.9 billion.

Boeing's reliance on wireless communications devices and services is substantial. Boeing operations utilize more than seven hundred FCC and federal government authorizations covering more than fourteen thousand licensed emitters operating in more than four thousand frequency segments. Boeing also operates thousands of unlicensed Part 15 wireless devices in its industrial operations and invests vast amounts of resources in commercial and unlicensed wireless technologies, such as cell phones, Blackberrys, satellite phones, pagers, unlicensed factory operations, and wireless laptops.

Boeing's spectrum interests and needs are extensive and well documented before the Commission.³ Boeing depends on numerous Business and Industrial/Land Transportation

³ See, e.g., *Comments of The Boeing Company to Spectrum Task Force*, ET Docket No. 02-135 (filed July 8, 2002) ("*Boeing Comments to Task Force I*"); *Comments of The Boeing Company to*
Footnote continued . . .

(“B/ILT”) licenses to fulfill a wide variety of specialized and critical internal communications needs, such as security, emergency services, aeronautical and industrial regulatory compliance activities, research and development, and manufacturing support. Boeing also uses numerous wireless technologies to support the manufacturing, testing and initial operations of commercial airplanes. For example, Boeing uses flight test spectrum to validate the safety and reliability of new and derivative aircraft as required by the Federal Aviation Administration (“FAA”) and international and foreign aeronautical regulatory agencies, as well as to comply with the requirements of U.S. Government customers.

Boeing also requires FCC authorization to conduct High Intensity Radiated Field (“HIRF”) testing on aircraft. HIRF testing ensures that aircraft flight systems are not disrupted by spurious emissions of electromagnetic energy in the 30 MHz to 18 GHz spectrum range. During the aircraft manufacturing and assembly process, Boeing also installs and tests numerous communication and navigation systems in each aircraft in order to ensure compliance with FCC and FAA regulations, as well as those of international and foreign aeronautical regulatory agencies. For example, an important part of aircraft design, manufacturing and certification is the testing and certification of the Traffic Collision Avoidance System (“TCAS”) and Automatic Dependent Surveillance-Broadcast (“ADS-B”) on each aircraft. TCAS and ADS-B are used to monitor the space around aircraft and to warn pilots of any collision threats. These systems employ aviation spectrum at 1030 MHz and 1090 MHz.

Footnote continued . . .

Spectrum Task Force, ET Docket No. 02-135 (filed Jan. 27, 2003) (“*Boeing Comments to Task Force II*”).

Boeing not only is a “consumer” of wireless communications services, it is a wireless communications service provider. In this role, Boeing provides to the U.S. Air Force in-flight broadband connectivity to critical U.S. Government aircraft transporting senior U.S. Government leadership, a service previously known as Connexion by Boeing and now called the Boeing Broadband SatCom Network.⁴

In each of these manners, Boeing is a substantial contributor to the “value chain” of the wireless market through investments in innovative manufacturing processes, innovative technologies, and innovative products and services.⁵

Boeing urges the Commission to continue to manage spectrum in a manner that facilitates the efforts of wireless innovators such as Boeing. Each of Boeing’s industrial and commercial communications service requirements necessitates the use of a specific spectrum band and service rules appropriate for that function. The Commission should not attempt to regulate or quantify the economic value of different spectrum uses through a single set of policies, rules, economic theories, or allocation philosophies. Instead, each spectrum allocation and use should be assessed according to its specific public interest benefits, and not indiscriminately lumped together using a common economic equation or metric. Such a detailed approach is mandated by

⁴ Boeing initially provided its aeronautical broadband service pursuant to a blanket earth station license issued by the Commission’s International Bureau in December, 2001. *The Boeing Company Application for Blanket Authority to Operate Up to Eight Hundred Technically Identical Transmit and Receive Mobile Earth Stations Aboard Aircraft in the 14.0-14.5 GHz and 11.7-12.2 GHz Frequency Bands*, Order and Authorization, 16 FCC Rcd 22645 (2001). Boeing now provides its aeronautical broadband service under contract to the federal government pursuant to an experimental license issued by the Office of Engineering and Technology (“OET”) (Call Sign WC2XVE).

⁵ See *Notice of Inquiry*, ¶ 4 (noting that the “value chain” includes not only wireless services provides, but also “providers of inputs and complements to wireless communications services”).

the Communications Act, which directs the Commission to regulate the use of spectrum in the “public interest” for each of its radiocommunications services.⁶

II. THE COMMISSION SHOULD FOCUS ON THE IMPORTANCE OF INNOVATIVE TECHNOLOGIES THAT REQUIRE SPECTRUM TO OPERATE, BUT DO NOT DIRECTLY GENERATE REVENUE

In assessing the state of innovation and investment in wireless communications, the NOI seeks comment on what metrics are most appropriate to evaluate innovation and investment in the wireless sector.⁷ In exploring this issue, the Commission should ensure that its emphasis on “innovation” is sufficiently broad to include innovative products and services that require spectrum to operate, but do not directly generate revenue for consumer companies.

A commercial airplane requires spectrum to operate safely and efficiently, and utilizes significant innovative wireless technology. It may be difficult, however, to quantify and itemize the economic value of the wireless systems deployed on an aircraft in a manner that is separate and apart from the total economic value of the aircraft itself. Further, the underlying economic value of an aircraft must be considered both in terms of its cost to construct and in terms of its anticipated long-term contribution to the economy as a vehicle of international trade and business productivity.

For example, Boeing is currently certifying the 787 “Dreamliner,” a highly innovative aircraft with unmatched fuel efficiency and the capacity to travel at speeds similar to today’s fastest wide-body aircraft.⁸ In an effort to ensure the aircraft operates safely, one of several new

⁶ See 47 U.S.C. § 157, 303, 307 & 309(a).

⁷ See *Notice of Inquiry*, ¶ 10.

⁸ See Boeing 787 Dreamliner Will Provide New Solutions for Airlines, Passengers, *available at* <http://www.boeing.com/commercial/787family/background.html> (last visited Sept. 23, 2009).

wireless technologies that Boeing has integrated in the 787 is a wireless health-monitoring system that will allow the airplane to self-monitor and report maintenance requirements to ground-based computer systems.⁹ This self-monitoring system is likely to provide immediate economic benefits to airlines by shortening or eliminating certain ground holds of aircraft to address maintenance issues. The long term benefits to the safety and reliability of the aircraft, its passengers and crew will also be substantial, but are difficult to quantify. The Commission should consider fully such products and services when evaluating innovation and its economic value in the wireless sector.

III. THE COMMISSION SHOULD CONTINUE TO ENCOURAGE COMPANIES SUCH AS BOEING TO UTILIZE WIRELESS SERVICES IN INNOVATIVE WAYS TO IMPROVE PUBLIC SAFETY COMMUNICATIONS AND INCREASE MANUFACTURING PRODUCTIVITY

The NOI requests 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, and what the Commission can do to encourage greater innovation.¹⁰ The NOI further seeks comment on how wireless services are being employed in innovative ways to address the challenges of production and management.¹¹

Boeing uses numerous private radio systems in its manufacturing and airport facilities to provide specialized and critical communication functions such as internal safety, security, fire suppression, emergency services, aeronautical and industrial regulatory compliance, research and development, and manufacturing support. Boeing also supplements local public safety entities

⁹ *See id.*

¹⁰ *See Notice of Inquiry*, ¶¶ 15, 19.

¹¹ *See id.* ¶ 17.

by serving as a “first responder” to public safety emergencies occurring near Boeing’s operations,¹² providing critical support during emergency situations in which public safety frequencies (along with CMRS networks) are heavily congested with traffic.

Boeing also relies heavily on its private internal radio systems to meet safety requirements of the Occupational Safety and Health Administration (“OSHA”). For example, as mandated by OSHA, Boeing operates a low power communications system at its Everett, Washington manufacturing plant to ensure the safety and health of up to one hundred Boeing employees per shift working inside confined spaces of airplane parts such as wings or fuel tanks. The work is hazardous and the radios are used by personnel to maintain contact during the manufacturing process and in cases of emergency. A similar system is deployed at Boeing’s satellite manufacturing plant in El Segundo, California.

In addition to its public and employee safety services, Boeing uses its private radio licenses and wireless networks for a number of other innovative manufacturing purposes, ranging from the control and monitoring of production, material handling, machine programming, inventory management, and licensed transportation. Boeing utilizes licensed and unlicensed wireless networks for the automatic input of data, thereby increasing productivity by eliminating the need for manually inputting information into a computer system. Wireless data collection and scanning keeps all parties in the business supply chain connected and reduces errors in the production process. Technicians are also able to wirelessly access assets for maintenance, increasing the amount of time that machines are up and running.

Boeing is directly involved in the design and development of many wireless communications, data and monitoring systems that Boeing employs in its manufacturing

¹² See *Boeing Comments to Task Force I*, at 6-7.

processes, either through the use of Boeing research and development resources, or through consultation and partnership with manufacturers of niche wireless equipment and services. Boeing is also a major customer of and works closely with the major national commercial wireless service providers. These commercial wireless carriers provide cellular and wireless data services for over 60,000 devices used by Boeing.

All of Boeing's wireless communications needs cannot be satisfied by commercial providers alone, however, either because certain of Boeing's service needs are too specialized or require a level of reliability and availability that exceed the levels that can be provided economically or safely using major wireless consumer networks. For example, Boeing's factory floor operations require constant communications between employees and cannot be served efficiently, economically or safely without the use of private mobile radio spectrum.

Recognizing the important economic and safety benefits of private mobile radio spectrum, the Commission should treat B/ILT licensees, such as Boeing, as more analogous to public safety services than commercial radio services. Like public safety users that require dedicated, non-competitive and reliable spectrum for emergency communications, B/ILT licensees that do not provide communications services to the public cannot operate under the same market incentives and goals as commercial entities and should not be subject to the same market mechanisms for determining spectrum allocations, such as competitive bidding. The value of such spectrum use cannot be compared with spectrum used for third party commercial services on a 'megahertz per pop' basis without inappropriately disregarding the important public safety and public interest benefits achieved by the private users of such spectrum.

IV. THE COMMISSION SHOULD RENEW ITS EFFORTS TO INCREASE ACCESS TO SPECTRUM, INCREASE THE EFFICIENCY OF SPECTRUM AND FACILITATE EXPERIMENTATION

The Commission seeks comment on approaches that have been effective in allowing innovators to gain access to spectrum, and whether new models of spectrum access would further support and encourage innovation in wireless services.¹³ As the Commission acknowledges, experimentation is a key element of such innovation.¹⁴ The Commission therefore also seeks comment on ways to encourage more experimentation.¹⁵

In considering these issues, the Commission should recognize that many innovative efforts in the wireless communications sector begin with a visit to the Commission's Office of Engineering and Technology ("OET"). When spectrum is needed to support new services, OET resources and staff can be instrumental in helping to determine what spectrum bands may be available for new uses. Further, when experimental licenses are required to develop and test new products and services, it is OET's Experimental Licensing Branch that processes and issues such authorizations and takes the lead in establishing the conditions for their use.

The Commission should fully encourage and support OET's role as an objective resource for both the Commission as well as the public. In order to encourage and foster the development of new products and services that require wireless technology, the Commission should ensure that (1) OET's budget requirements are fully met; and (2) the regulations and policies impacting the granting of experimental licenses are such that they will help facilitate innovation and

¹³ See *Notice of Inquiry*, ¶¶ 26, 29.

¹⁴ See *id.* ¶ 65.

¹⁵ See *id.*

development of innovative technologies while ensuring appropriate interference protection to incumbent licensees.

A. The Commission Should Increase Access to Spectrum by Removing Barriers to Testing in the Experimental Licensing Process

Each day, the FCC's Experimental Licensing Branch grants experimental authorizations to companies and individuals permitting them to test new wireless devices and services, and to utilize wireless systems in the testing and verification of new products. The primary rule governing all such authorizations is that testing must be performed on a non-interference basis.¹⁶ This means that if experimental operations result in interference to any other authorized spectrum use, the experimental operation must shutdown immediately.

In order to facilitate the experimental process, experimental licensees often agree to provide contact information, such as a toll free telephone number, that is staffed throughout the testing process. Experimental licensees also often use emergency "cease buzzer" procedures to ensure that any complaints of suspected harmful interference are immediately addressed by stopping testing.

Despite these extensive precautions, the FCC's Experimental Licensing Branch has been increasingly mandating that holders of experimental licenses must secure the consent of all other licensees authorized to use the same spectrum in a given geographical region. Such requirements have been imposed even in cases where the nature of the proposed testing (*i.e.*, the planned power levels, shielding, and other means of attenuation) generally ensures that other licensees in the region will be unable to detect the presence of the experimental signals (much less suffer harmful interference).

¹⁶ See 47 C.F.R. § 5.85(c).

Such coordination and consent requirements are extremely burdensome to holders of experimental licenses given the fact that other licensees have no incentive to furnish their consent to such testing. For example, Boeing has had extreme difficulty in coordinating consent with wireless service licensees to enable High Intensity Radiated Field (“HIRF”) testing of new aircraft. HIRF testing is required by the FAA and, for military aircraft, by the U.S. Government to enable an aircraft to fly safely in the National Airspace. Some wireless service providers have not even built out their wireless networks where the HIRF testing takes place, yet they continue to refuse to work with Boeing.

In a recent experimental license grant, coordination conditions were placed on Boeing’s HIRF testing authorization in Glasgow, Montana. Operation in the 824-849 and 869-894 MHz bands required “consent of local cellular licensee(s)” and operation in the 1850-1910 MHz and 1930-1990 MHz bands required the “consent of PCS licensees.”¹⁷ Boeing was also required to obtain consent from Advanced Wireless Service and Broadband Radio Services/Educational Broadband Services licensees.¹⁸ Boeing continues to experience difficulty in obtaining consent from these licensees, even though some of them have not constructed their networks, and those networks that have been constructed would not suffer harmful interference from Boeing’s HIRF tests.

Boeing has seen these types of conditions applied to experimental licenses issued for nearly every band used by the commercial wireless industry. Since commercial licensees have not been receptive to Boeing’s requests, Boeing has been effectively prevented from performing the necessary testing for aircraft certification, despite the fact that there is no anticipated effect

¹⁷ See FCC File No. 0089-EX-ST-2009 (Call Sign WD9XHD) (April 2, 2009).

¹⁸ See *id.* at 2.

on any commercial wireless receivers. Such conditions impose significant unintended consequences on the aerospace industry, causing certification and delivery delays that result in significant costs to Boeing and, in the long term, to the flying public.

Boeing is apparently not alone in experiencing such roadblocks to innovation. The Commission's NOI specifically addresses the issue, seeking comment on whether "research organizations (*e.g.*, universities) be permitted to operate experimental stations without individual coordination of frequencies, conditioned on their not causing harmful interference to authorized stations."¹⁹

Boeing fully supports this proposal. Further, such experimental authority should be granted not only to research organizations such as universities, but to any proven testing entity that can demonstrate to OET that it is sophisticated in the design and operation of wireless systems, and in the use of various forms of attenuation to minimize the possibility of harmful interference. Authorizing such testing enables wireless innovation and serves the public interest.

The NOI further requests comment on whether such authorizations should be coupled with a requirement that experimental licensees be required to provide "real-time (*i.e.*, web-based) disclosure of frequencies being used and semi-annual reports to measure the success of the various research programs."²⁰ Boeing would not object to such requirements. Boeing observes, however, that this proposal seems duplicative of Section 5.73 of the Commissions' rules, which gives OET authority to impose regular reporting obligations on experimental licensees when

¹⁹ *Notice of Inquiry*, ¶ 66.

²⁰ *Id.*

appropriate. OET has imposed such requirements on experimental licenses held by Boeing in the past and complying with the requirements has not been burdensome.²¹

B. In Pursuit of Encouraging Efficient Use of Spectrum, the Commission Should Continue to Utilize the Private License Structure and Adopt Incentive-Based License Fees

In addition to increasing access to spectrum, the Commission seeks comment on ways in which it can promote more efficient spectrum use.²² The Commission suggests, however, that it may first be necessary to define and quantify spectrum efficiency.²³ Boeing previously indicated to the Commission that an appropriate, non-technical definition of efficiency is an ability to produce a desired effect or result with a minimum of effort, expense or waste.²⁴ The Commission has considered more technical definitions of spectrum efficiency, such as the rate of data transmission within a given bandwidth (*i.e.*, bits per second per Hertz (BPS/Hz)), or with respect to channel or utilization efficiency, which refers to the amount of a block of spectrum that is in use.²⁵ Such utilization measures cannot, however, be used to provide a meaningful comparison of efficiency between different services.

Whatever definition of spectral efficiency (if any) is used, the Commission should remain focused on the fact that promoting spectral efficiency is only one of the factors weighing on

²¹ See, e.g., FCC File Nos. 0254-EX-RR-2006 and 0153-EX-RR-2005 (Call Sign WC2XVE) (requiring the submission of progress reports to OET every six months).

²² See *Notice of Inquiry*, ¶¶ 38-47.

²³ See *id.* ¶ 40.

²⁴ See *Boeing Comments to Task Force I* at 4 (citing *Webster's Third International Dictionary*, Merriam-Webster, Inc. (1993)).

²⁵ See, e.g., *Authorization and Use of Software Defined Radios*, Notice of Proposed Rule Making, 15 FCC Rcd 24442, 24447 n.21 (Dec. 7, 2000).

spectrum decisions. The Commission's primary duty is to regulate the use of spectrum in the public interest "for the purpose of promoting safety of life and property."²⁶ The Commission has recognized that safety of life communications services require a higher level of availability and reliability than are typically provided by commercial radio services. In light of the different public interest benefits involved, quantitative comparisons of spectrum efficiency between dissimilar kinds of radio services and uses – such as between public safety (including the B/ILT services) and commercial wireless – are not appropriate.²⁷ Such comparisons inherently fail to take into account the important non-quantifiable public interest benefits that safety services provide.

The Commission should also refrain from depending on auctions to maximize spectrum efficiency and equating auctions with a guarantee of automatic spectral efficiency. Boeing has consistently argued that auctions should not be used for private radio spectrum.²⁸ Most auctioned spectrum is granted on a broad geographic basis, usually providing the rights to an entire metropolitan area to a single entity, the highest bidder, which often may not make the most efficient use of its spectrum resources.

In contrast, private licenses, such as B/ILT and Aeronautical Telemetry licenses, are granted on a coordinated basis, with no licensee holding exclusive rights to any spectrum band in a geographic region. With respect to B/ILT licenses, only specific tower sites and immediate operating areas are protected via coordination, and only in discrete spectrum bands. As a result,

²⁶ See 47 U.S.C.A. §§ 157, 303, 307, 309(a).

²⁷ See *Boeing Comments to Task Force I*, at 5-6.

²⁸ See *id.*, at 4; *Comments of The Boeing Company*, PR Docket No. 92-235 (filed Nov. 20, 1995); *Ex Parte* Presentation of The Boeing Company, PR Docket No. 92-235 (filed Sept. 28, 1995).

numerous unrelated licensees can use the same spectrum on an interleaved basis. Moreover, the types of private uses can vary from neighborhood to neighborhood, with dispatch services in urban centers, factory communications in adjacent manufacturing areas, and farming and rural manufacturing communications uses in rural areas. Surely, this approach is successful in not only encouraging efficiency, but in maximizing innovation.

Competitive bidding would invariably discourage such innovative and efficient spectrum use. Private users, the core competency of which is typically not tied to providing communications services to the public, would almost always bid less than entrepreneurs planning to use spectrum to provide service for profit because third-party resellers of spectrum expect to recoup their costs. Auctions would drive up the price of private radio spectrum and reduce the ability of traditional private licensees to compete. Without access to spectrum, B/ILT licensees such as Boeing would be foreclosed from investing in and developing new wireless services for its manufacturing and aircraft systems.

Similarly, the use of auctions would make it difficult for Boeing's workers to be mobile and productive. The Commission's Part 15 unlicensed spectrum bands have been tremendously successful in encouraging the development of innovative consumer and industrial communication and data services. The complex requirements of aeronautical engineering, design and manufacturing are also enhanced significantly through the use of unlicensed wireless devices. To this end, Boeing has deployed Part 15 devices, including using wireless LANs as extensions of its internal networks. Many of these communication and data services could not have been developed or implemented if the Commission imposed an auctions process or other "efficiency based" licensing schemes.

Furthermore, auctions are incapable of furthering public safety, social welfare, and other public interest goals. In pursuit of promoting spectrum efficiency, the Commission should continue to utilize the existing private license structure.

As an alternative to auctions, the Commission might consider employing regulatory fees as a means to ensure that private wireless licensees have additional incentive to use spectrum efficiently. Boeing has long endorsed the use of a graduated fee structure, with higher license fees for inefficient technologies.²⁹ If properly structured, license fees can promote the deployment of new and innovative radio services and technologies, promote the efficient and intensive use of radio spectrum, and create a minimal burden on licensees that use spectrum efficiently. Boeing, however, cautions that private license fees should not be so high as to discourage their use for purposes that do not directly generate revenue, such as ensuring the safety and security of employees and the public in a manufacturing environment.

In this regard, Boeing supports the Commission's suggestion of assessing license fees on the unused portions of a license's total spectrum capacity.³⁰ Such an approach would protect those users that are utilizing spectrum efficiently and provide an incentive to those who are not to return some or all of their spectrum licenses to the Commission. Boeing understands that the fee assessment could be different for each band and could depend on various factors such as the number of users in the band and the band's total capacity. Boeing would be happy to assist the Commission with such an assessment and will participate in further proceedings regarding any proposed fee criteria and structure.

²⁹ See *Ex Parte* Presentation of The Boeing Company, PR Docket No. 92-235 (filed Sept. 28, 1995).

³⁰ See *Notice of Inquiry*, ¶ 42.

C. The Commission Should Require Licensees that Cause Harmful Interference to Correct the Interference in Ways that are Acceptable to all Licensed Users of the Band

The Commission correctly notes that spectrum allocations and access often depend on controlling “harmful interference” between new entrants and incumbents.³¹ Under the Commission’s current rules, “harmful interference” is defined as interference “which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service.”³² Part 90 of the Commission’s rules requires that “[l]icensees of stations suffering or causing harmful interference are expected to cooperate and resolve this problem by mutually satisfactory arrangements.”³³ Boeing has previously argued before the Commission that the FCC’s current definition of and rules for harmful interference are inadequate to protect critical uses, identifying the 800 MHz proceeding as an example.³⁴ Boeing noted that if parties had actually cooperated to resolve the interference issues, then the interference problems might have been alleviated.

The Commission’s rules also indicate that if licensees are unable to resolve interference problems, the Commission may impose restrictions including specifying the transmitter power, antenna height, or area or hours of operation of the stations concern.³⁵ Furthermore, the Commission may deny the grant of a license in a geographic area if the proposed operation

³¹ *See id.* ¶ 34.

³² 47 C.F.R. § 2.1 (2008) at “*Harmful Interference.*”

³³ 47 C.F.R. § 90.173(b) (2001).

³⁴ *See Boeing Comments to Task Force I*, at 12-14.

³⁵ *See* 47 C.F.R. § 90.173(b) (2001).

would not be in the public interest.³⁶ With respect to the 800 MHz proceeding, sufficient steps were not taken to enforce such regulatory requirements. As a result, licensees in the 800 MHz band, including public safety services, faced significant interference problems.

For licensees such as Boeing, the uninterrupted integrity of communications networks is critical to the efficient and productive operation of its manufacturing facilities and processes, particularly when used for internal safety and emergency services. Due to the potentially critical nature of these communications, interference free transmissions are vital. As noted in the introduction to these comments, in addition to responding to emergencies at Boeing facilities, Boeing has several mutual aid agreements with local public safety entities in certain areas of Washington, Missouri, and Kansas. Under these cooperative agreements, Boeing supplements local public safety entities by serving as the “first responder” to public safety emergencies occurring near Boeing’s facilities. For example, Boeing’s mutual aid agreements were utilized during the Seattle, Washington earthquake of February 2001 and during the Wichita, Kansas tornado of May 1999, where Boeing provided first responder public safety services to the effected communities surrounding its operations.

In order to protect such important communications, the Commission should tighten, rather than relax, its existing definition for and regulation of “harmful interference.” Boeing urges the Commission to ensure that licensees that cause harmful interference to other parties quickly alleviate all interference issues in ways that are acceptable to the incumbent users of the band.

Boeing understands that resolution of disputes in rulemaking proceedings regarding potential or actual interference can pose a major impediment to the introduction of new services.

³⁶ *See id.*

At the same time, reliability and consistency with respect to the interference-free availability of wireless services is necessary to facilitate the adoption and long-term retention of wireless services by industry and users. Therefore, above all, a regulatory environment that adequately protects existing investments in wireless products and services – including investment by providers, enterprise users, and end user consumers – is necessary to promote further growth in wireless innovation and investment.

V. CONCLUSION

As a substantial provider and contributor of innovative wireless services and products that utilize radio frequency spectrum, Boeing commends the Commission for seeking to increase wireless innovation and investment and improve spectrum management. Boeing agrees that wireless innovation and investment should continue to be encouraged. In facilitating this growth, Boeing urges the Commission to consider the significant contributions of U.S. manufacturers to the long term strength of the U.S. economy, the wireless services sector, and to the general public welfare. As the Commission correctly observes, wireless innovation includes the innovative use of spectrum to create “new ways of doing things” that enhance the safety, productivity, and lifestyles of the American public. Such a focus additionally fulfills the Commission’s statutory mandate to manage spectrum resources in a manner that serves the public interest.

Boeing looks forward to continuing to be an active participant in these deliberations as the Commission moves forward.

Respectfully submitted,

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