

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

Spectrum Policy Task Force Seeks  
Public Comment on Issues Related  
to Commission's Spectrum Policies

ET Docket No. 02-135

**COMMENTS OF  
THE BOEING COMPANY**

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July 8, 2002

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The Boeing Company (“Boeing”), by its attorneys and pursuant to the Task Force’s Public Notice, hereby files these comments on issues related to the Commission’s spectrum policies.<sup>1</sup>

**I. INTRODUCTION**

Boeing is participating in this proceeding in its role as the world’s largest manufacturer of commercial satellites and provider of launch services, and also as the global leader in the design and manufacture of commercial and military aircraft. Boeing relies on spectrum resources for a variety of industrial functions and commercial purposes. Boeing holds more than six hundred FCC 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.

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<sup>1</sup> See Public Notice, *Spectrum Policy Task Force Seeks Public Comment on Issues Related to Commission’s Spectrum Policies*, DA 02-1311 (June 6, 2002) (“*Task Force Public Notice*”).

For example, Boeing depends on its industrial private land mobile radio (PLMR) licenses to fulfill a wide variety of specialized and critical internal communications needs, such as security, emergency services, aeronautical and industrial regulatory compliance, research and development, and manufacturing support. Boeing also uses a number of spectrum allocations for the testing and initial operation of commercial airplanes. For example, flight test spectrum is utilized to ensure the safety and reliability of new aircraft. Boeing also requires FCC authorization to conduct High Intensity Radiated Field (“HIRF”) testing, which ensures that aircraft systems are not disrupted by powerful emissions of electromagnetic energy across entire spectrum bands. During the assembly process, Boeing also installs and tests numerous communication and navigation systems in each aircraft in order to make them compliant with the regulations of the FAA and other domestic and international aeronautical regulatory agencies.

Although generally outside of the Commission’s regulatory jurisdiction, Boeing also holds numerous Department of Defense spectrum assignments for the development and testing of manned and unmanned military programs which includes; Fighters (F15, F/A-18E/F, F22), Transports (C-40, C-32A, Air Force One), Electronic Systems (Airborne Warning and Control System or AWACs), ABL (Airborne Laser), DREEM (Drone RF Electronic Enhancement Program), Cargo (C17), Helicopters (AH64D, RAH-66), Trainers (T-45TS), Missiles (JDAM (Joint Direct Attack Munition), CALCM (Conventional Air-Launched Cruise Missile)), UCAV (Unmanned Combat Air Vehicle), and various military systems such as JTRS (Joint Tactical Radio System), FCS (Future Combat Systems) and NMD (National Missile Defense).

Boeing is also participating in this proceeding as the world’s largest provider of satellite manufacturing and launch services, and also as a satellite network licensee. Boeing is authorized by the Commission to launch and operate a mobile-satellite service (“MSS”) network in the

2 GHz MSS band, which Boeing developed to provide aeronautical communication, navigation and surveillance services to the aviation industry. Boeing holds blanket FCC licenses to provide aeronautical mobile-satellite services (“AMSS”) in the United States on a non-conforming basis in the Ku-band. Boeing also holds authorizations from other administrations to provide its AMSS on aircraft in other regions of the world. In addition, Boeing has pending before the Commission applications to operate non-geostationary satellite networks (“NGSO”) in order to provide fixed satellite service (“FSS”) in the Ku-band and augmentation services for the global positioning system (“GPS”) in the GPS L1 and L5 bands. Finally, Boeing utilizes numerous experimental licenses in its satellite and aircraft manufacturing operations and research programs.

None of Boeing’s industrial and commercial communications services and spectrum uses is fungible. Instead, each spectrum use requires a specific spectrum band and service rules appropriate for that function. Therefore, it would not be helpful or appropriate for Boeing to attempt to adopt a “one size fits all” approach for the management of the spectrum resources that it employs.

The Commission should focus on spectrum management in this same way. Radiocommunications spectrum is beneficially used in a vast variety of ways, all of which have been deemed by the Commission to provide specific public interest benefits to consumers. The Commission should not attempt to regulate these different spectrum uses through a single set of policies, rules, economic theories, or allocation philosophies. Such an approach would undermine the Commission in its critical statutory obligation to use its technical expertise to

create new services, issue licenses and manage spectrum resources in ways that serve the public interest, convenience and necessity.<sup>2</sup>

## **II. IN PURSUIT OF EFFICIENT SPECTRUM USE, THE COMMISSION SHOULD NOT NEGLECT ITS STATUTORY OBLIGATION TO REGULATE SPECTRUM RESOURCES IN THE PUBLIC INTEREST**

The Task Force seeks comment on ways in which it can promote more efficient spectrum use. The Task Force acknowledges, however, that it may first be necessary to define and quantify spectrum efficiency.<sup>3</sup> The non-technical definition of efficiency is an ability to produce a desired effect or result with a minimum of effort, expense or waste.<sup>4</sup> 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.<sup>5</sup> Such utilization measures cannot, however, be used to provide a meaningful comparison of efficiency between different services.

At times, the Commission has considered that the use of auctions to reconcile mutually exclusive applications would ultimately favor the most spectrally efficient applicant. This assumption, however, has not been proven in practice because the highest bidder often has not made the most efficient use of spectrum resources. Furthermore, auctions are incapable of furthering public safety, social welfare, and other public interest goals.

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<sup>2</sup> See 47 U.S.C.A. §§ 157, 303, 307 & 309(a) (2001).

<sup>3</sup> See *Task Force Public Notice* at Question 20(a).

<sup>4</sup> See *Webster’s Third International Dictionary*, Merriam-Webster, Inc. (1993).

<sup>5</sup> 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).

Whatever definition of spectral efficiency (if any) is used, however, the Commission should remain focused on the fact that promoting spectral efficiency is only one of the factors weighing on spectrum decisions. The Commission’s primary duty is to regulate the use of spectrum in the public interest.<sup>6</sup> This requires a careful consideration of the specific public interest benefits of each of its radiocommunications services.

In light of the different public interest benefits involved, it would not be possible or desirable for the Commission to attempt to compare and quantify efficiencies across many different radio services, as the Task Force suggests in its public notice.<sup>7</sup> Instead, the Commission has historically carried out its statutory public interest obligations by individually examining all the potential benefits of a proposed radio communications service when considering the adoption a new spectrum allocation.<sup>8</sup>

**A. The Commission Should Not Attempt to Make Quantitative Comparisons of Spectral Efficiency Between Public Safety and Industrial Spectrum Uses as Compared to Commercial Radio Services**

The Commission’s obligation to use spectrum “for the purpose of promoting safety of life and property” is clear.<sup>9</sup> The Commission has consistently acknowledged this statutory obligation. Furthermore, 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.

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<sup>6</sup> See 47 U.S.C.A. §§ 157, 303, 307 & 309(a).

<sup>7</sup> See *Task Force Public Notice* at question 20b.

<sup>8</sup> See 47 U.S.C.A. § 157.

<sup>9</sup> 47 U.S.C. § 151.

Thus, while the Commission should encourage public safety services to use spectrum efficiently, the Commission should not attempt to make efficiency comparisons between public safety communication services and commercial radio services. Such comparisons inherently fail to take into account the important non-quantifiable public interest benefits that public safety services provide.

The Commission also appropriately considers the unique and beneficial aspects of other communication services, such as Business and Industrial/Land Transportation (“B/ILT”) radio services. As the Commission has acknowledged, “within the Industrial/Business Pool, some types of radio users employ radio not just for day-to-day business needs but also to respond to emergencies that could be extremely dangerous to the general public . . . [a]ny failure in their ability to communicate by radio could have severe consequences on the public welfare.”<sup>10</sup>

Boeing’s private radio network provides a good example of B/ILT licenses that are used in part for emergency functions. Boeing operates emergency service operations at each of its major manufacturing and aircraft facilities. Boeing has also entered into several mutual aid agreements with local public safety entities in areas such as 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 operations, and thereby providing critical support during emergency situations in which public safety frequencies (along with CMRS networks) are heavily congested with traffic.

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<sup>10</sup> *In the Matter of Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them and Examination of Exclusivity and Frequency Assignments Policies of the Private Land Mobile Services*, Second Report and Order, 12 FCC Rcd 14307 (1997)

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 affected communities surrounding its operations. Due to the potentially critical nature of communications for such services, interference free, priority access transmissions are vital.

Many of Boeing's information, communication and control systems requirements cannot be adequately satisfied by commercial telecommunications services. For example, Boeing's factory floor operations require constant communications between its employees, which cannot efficiently, economically, or safely be served without the use of private mobile radio spectrum. In "man down" situations, and in the remote control of overhead cranes, Boeing heavily relies on its private internal radio systems to meet OSHA safety requirements and to protect the safety of life, health and property.

Further, Boeing uses its private radio licenses for a number of other purposes ranging from compliance with aeronautical and industrial regulations; communications with personnel in confined and isolated areas; research and development; and, robotics to the control and monitoring of production; material handling; machine programming; inventory management; and, transportation. In all of these applications, Boeing uses its private radio systems to provide internal communications that protect the safety of life, health and property, and enhance the productivity of its manufacturing operations.

Therefore, to the extent that the Commission attempts to classify various spectrum uses, the Commission should treat B/ILT licenses such as Boeing's as far more analogous to public safety services than to commercial radio services. Commercial operators use spectrum to sell generic communication services to third parties. In contrast, Boeing and other B/ILT licensees,

use spectrum for critical internal operations and safety considerations. The continued availability of spectrum for business and industrial use is necessary in order to ensure economic growth and the health of the U.S. economy.

**B. The Commission Should Also Keep in Mind the Public Interest Benefits of Other Communications Services, Such as Satellite Services**

In making spectrum allocation decisions, the Commission is obligated to consider the specific public interest benefits of other types of services, such as satellite communications services. As the Commission has frequently acknowledged, satellite communications networks provide a competitive option for communications services, particularly in underserved areas, such as in rural and remote communities where terrestrial services are less feasible.

Satellite communication services promote the Commission's goal of providing services to all Americans because satellite services are, by their nature, generally available to all consumers throughout the United States. Furthermore, the costs for providing such services are essentially identical regardless of whether they are being provided to rural or urban areas. In addition, satellite based networks provide a critical means of emergency communications during natural and other disasters, which often render terrestrial communications systems unavailable for use.

In recent years, the justifications for these public interest benefits have only increased. Rural and remote communities, such as tribal lands and agricultural regions, are still critically in need of competitive communications services. Furthermore, the important focus on Homeland Security has given public safety services a renewed realization that they need access to communications networks that can survive and function reliably in emergency situations.

**C. The Commission Should Avoid Making Quantitative Efficiency Comparisons Between Licensed and Unlicensed Spectrum Uses**

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. Many of these services were unheard of just a few years ago and likely would not have been developed under a conventional or blanket licensing regime. They also could not have been developed through a process of auctions or other "efficiency based" licensing schemes.

The complex requirements of aeronautical engineering, design, and manufacturing are enhanced significantly through the use of wireless bandwidth and devices in order to enable Boeing's workers to be mobile and productive. To this end, Boeing has been deploying Part 15 devices, including the use of wireless LANs as extensions of its internal networks.

Recognizing the benefits of these technologies, Boeing supports efforts to make Unlicensed National Information Infrastructure (U-NII) frequencies exempt from licensing worldwide. The Commission should continue to encourage the widespread use of unlicensed frequencies and wireless LAN technologies both domestically and internationally, with appropriate consideration given to existing spectrum allocations and services.

**D. While Consideration of Technical Efficiency is Important, the Commission Should Continue to Focus Primarily on the Public Interest Benefits of each of its Communications Services**

It would be extremely difficult to list the specific public interest benefits of each of the Commission's communications services because there are so many different types with very different kinds of users and requirements. For example, in addition to the radio services discussed in the previous sections, GPS, aeronautical flight test, and aeronautical radionavigation

spectrum all provide critically needed services to the public. The benefits of such services could not be quantified on a “Hz per square mile per minute, or Hz per population coverage” basis, or using other quantitative measures of spectrum use.<sup>11</sup>

Therefore, it would disserve the public interest if the Commission placed its goal of spectrum efficiency above its other equally important and statutorily mandated goals and obligations. Certainly, the Commission can and should continue to promote the efficient use of spectrum. The Commission should also acknowledge that existing mechanisms already provide significant incentives for technically efficient spectrum use. For example, the use of more efficient radio communications equipment allows licensees to accommodate more users and provide more services in limited spectrum assignments. The use of better equipment usually also improves the quality and reliability of radiocommunications links.

In addition, the Commission’s regulatory fee structure provides licensees with a substantial incentive to limit their spectrum use to only what is necessary. In this regard, Boeing has long endorsed the use of efficiency-based regulatory fees (as opposed to auctions) as a means to ensure that private wireless licensees have adequate incentive to use spectrum efficiently.

A major reason for the tremendous success of the radio communications industries in the United States is the expert technical regulation and assistance of the Commission. The Commission has used its technical expertise to help create new radio communications services and to promote new spectrum sharing technologies in order to serve public policy objectives. The Commission cannot abandon its role of technical expert and attempt to replace it with an omnibus approach that is purely, or even primarily, based on economic theories of fungible commodities, in an open market, with many fully informed buyers and sellers.

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<sup>11</sup> See *Task Force Public Notice* at question 21.

Such an approach would reduce the diversity and the quality of the beneficial services that are provided using radio communications spectrum. Such an approach would also be in conflict with the Commission's statutory obligation to license and manage spectrum use in ways that serve the public interest, convenience and necessity.

**III. IN ATTEMPTING TO ADOPT MARKET-ORIENTED ALLOCATION AND ASSIGNMENT POLICIES, THE COMMISSION SHOULD CONTINUE TO REVIEW POTENTIAL IMPROVEMENTS ON A CASE-BY-CASE BASIS**

The Task Force seeks comment on specific policy and rule changes that might be needed to migrate from current spectrum allocations to more market-oriented allocations. Boeing believes that the answer to this question is different with respect to each of the Commission's radiocommunications services.

For example, the Commission is currently considering measures to permit CMRS providers to develop secondary markets for commercial wireless services by leasing spectrum segments to third parties. Such flexibility essentially already exists for satellite communications services. As the Commission has acknowledged, satellite network licensees are permitted to lease or even sell satellite transponders and capacity to non-licensed third parties.

In contrast, such flexibility would not be appropriate with respect to B/ILT services because it would interfere with the customized spectrum sharing arrangements that exist between multiple private licensees. For example, nearby factories or businesses are often able to share the same frequencies using site licenses and individual coordination agreements. Such cooperative arrangements would not be possible, however, if the Commission permitted the subleasing of B/ILT spectrum, or converted from a site licensing to a geographic area license system for B/ILT spectrum assignments.

Another example involves the terrestrial use of satellite communications spectrum. Historically, the Commission has determined that satellite and terrestrial services can share spectrum in only limited circumstances. In a number of proceedings, the Commission concluded that spectrum sharing between particular terrestrial and satellite services was not feasible. More recently, some MSS licensees have shown that ancillary terrestrial use of MSS spectrum may be possible, but only if the ancillary terrestrial use is managed and controlled by the same entity that is operating the MSS network.

Thus, the Commission cannot adopt a one-size-fits-all approach to spectrum flexibility and the use of market-oriented allocation policies. The Commission must instead continue to review the unique circumstances, goals and purposes of each radio communications service in order to determine whether additional flexibility and market-oriented structures can be adopted.

#### **IV. THE COMMISSION SHOULD MAKE A RENEWED EFFORT TO ENFORCE ITS HARMFUL INTERFERENCE RESTRICTIONS**

Currently, the Commission has pending a rule making proceeding on resolving interference concerns for public safety services in the 800 MHz band (“800 MHz NPRM”). The proceeding was initiated because “[o]ver the past few years there has been an increasing number of reports of interference to public safety communications from CMRS systems.”<sup>12</sup> The increase in inference was not unexpected. Many parties, including Boeing, have warned the Commission

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<sup>12</sup> See *Improving Public Safety Communications in the 800 MHz Band; Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels*, Notice of Proposed Rulemaking, WT Docket No. 02-55, 17 FCC Rcd 4783, ¶ 14 (2002) (“800 MHz NPRM”)

repeatedly about the harmful impacts that could result from the increasing “cellularized” use of 800 MHz spectrum.<sup>13</sup>

Although the Commission acknowledges the scope of the problem in its *800 MHz NPRM*, the Commission does not attempt to assign any blame. In fact, the Commission speculated that the current interference experienced by public safety services in the 800 MHz band “can occur even though all parties involved may be operating in compliance with the Commission’s rules.”<sup>14</sup>

Boeing is skeptical about this assertion. 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.”<sup>15</sup> If this had actually occurred, then the same cellularized operators that caused the interference problems might have already alleviated the problem.

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.<sup>16</sup> Furthermore, the Commission may deny the grant of a license in a geographic area if the proposed operation would not be in the public interest.<sup>17</sup>

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<sup>13</sup> See, e.g., *Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended; Promotion of Spectrum Efficient Technologies On Certain Part 90 Frequencies; Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz*, Initial Comments of The Boeing Company, WT Docket No. 99-87 (filed Aug. 2, 1999); *Wireless Telecommunications Bureau Seeks Comment on Nextel Communications, Inc. Request for Waiver*, Initial Comments of The Boeing Company, DA 98-2206 (filed Nov. 25, 1998).

<sup>14</sup> *800 MHz NPRM*, ¶ 15.

<sup>15</sup> 47 C.F.R. § 90.173(b) (2001).

<sup>16</sup> See *id.*

<sup>17</sup> See *id.*

It does not appear that sufficient steps were taken to enforce such regulatory requirements. As a result, licensees in the 800 MHz band, including public safety services, are faced with a significant interference problem, one that will likely require great expense to resolve.

The Commission should take steps to avoid a reoccurrence of this problem. Specifically, the Commission should make a renewed effort to ensure that licensees that cause harmful interference to other parties through attempts to over pack their spectrum, or as a result of other means, are required to correct the interference concern in ways that are acceptable to all licensed users of the band.

**V. THE COMMISSION SHOULD MAKE A RENEWED EFFORT TO RELY ON ITS STATUTORY PUBLIC INTEREST OBLIGATIONS WHEN ADDRESSING INTERNATIONAL ISSUES, SUCH AS APPLICATIONS FOR MARKET ENTRY BY NON-U.S. SATELLITE NETWORKS**

When the Commission opened the U.S. market for non-U.S. licensed satellite networks, it created a presumption of entry for foreign systems licensed by WTO member administrations. The Commission acknowledged, however, that it would continue to fulfill its statutory obligation to consider other public interest factors, including spectrum availability, foreign ownership, legal, technical, and financial qualifications, operating requirements, and national security, foreign policy and law enforcement and trade policy concerns.<sup>18</sup>

While the Commission's market entry plan appeared equitable on paper, it has been less successful in practice. Specifically, situations have arisen in which non-U.S.-licensed systems have effectively argued that spectrum availability should not be considered as a factor when a

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<sup>18</sup> See *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Satellites Providing Domestic and International Service in the United States*, Report and Order, IB Docket No. 96-111, 12 FCC Rcd 24094, ¶ 146 (1997).

foreign system holds priority over a particular orbital position or frequency band as a result of ITU submissions made by non-U.S. administrations.

Using such arguments, non-U.S.-licensed systems have managed to gain access to the U.S. market using frequency bands or orbital positions that have been previously denied to U.S. applications on the basis of a lack of spectrum availability. For example, a non-U.S. licensed system was granted authority to serve consumers in the U.S. using the L-band after the Commission concluded that there was insufficient spectrum available in this band to accommodate applications from U.S. licensed MSS operators.

The Commission's administration of its market entry procedures has created undesirable incentives for satellite operators. Some operators may approach other administrations to provide licenses and submit ITU filings for satellite networks that the Commission would likely not have considered acceptable if they had been submitted to the FCC directly in the form of an application. Thus, while the Commission should obviously honor the terms of the ITU Radio Regulations and the WTO agreement, the Commission should identify ways to do so in an even-handed way that does not give foreign licensed operators advantages over U.S. licensees, or encourages satellite operators to bypass the Commission's spectrum management rules and policies through the use of non-U.S. administrations.

**VI. IN ORDER TO PRESERVE ITS COOPERATIVE COORDINATION PROCESS WITH CANADA AND MEXICO, THE COMMISSION SHOULD WORK CLOSELY WITH THE TWO COUNTRIES IN ORDER TO PRODUCE A WORKABLE RESULT IN ITS 800 MHZ PROCEEDING**

As discussed in a previous section, the Commission has pending a rule making proceeding on resolving interference concerns for public safety services in the 800 MHz band. While a number of options are under consideration in the proceeding, none of them appear to

consider adequately the unique considerations of 800 MHz spectrum use in international border regions.

As a result of bi-lateral spectrum sharing agreements with Canada and Mexico, spectrum availability is extremely limited in the border regions. For example, the established agreements between the United States and Canada specific to the 800 MHz band in Region 5 (the region covering the Seattle/Puget Sound area, where Boeing has substantial facilities) divide the available channels almost equally.<sup>19</sup>

Proposals to shift spectrum or groups of channel assignments within the 800 MHz band, or to adjacent spectrum bands, have the very real potential of disrupting the detailed, individualized bilateral coordination agreements by shifting B/ILT users to channels currently assigned to Canada. Current proposals that call for rebanding or relocation to spectrum under the control of other countries are not viable solutions for incumbent licensees in the border regions. Any spectrum retuning or rebanding plan for the 800 MHz band that does not account for the unique border region channel assignments will result in tension in our bi-lateral relationships with Canada and Mexico and will cause major additional problems for border area licensees such as Boeing.

Because it will likely take significant time and resources to negotiate and implement new bilateral channel sharing and coordination agreements for the border regions, the Commission should implement any solution that is adopted in the 800 MHz proceeding on a channel-by-channel, site-by-site, or incremental basis. Instead of shifting 800 MHz incumbents to other bands where spectrum may not be available for U.S. use in the border regions, the Commission and Department of State (with industry cooperation) should work with Canada and Mexico to

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<sup>19</sup> See 47 C.F.R. § 90.619.

reach the specific and detailed agreements that will be necessary to enable displaced 800 MHz incumbents to successfully provide comparable service in their new channel assignments.

Only after these international agreements are completed should the Commission require 800 MHz PLMRS or Public Safety incumbents in the border regions to move to new spectrum. In the meantime, border region incumbents should be assured of grandfathered status, by permitting them to continue to use their current channel assignments in the 800 MHz band.

## VII. CONCLUSION

In seeking to find ways to improve the Commission's spectrum management policies, the Task Force should remain cognizant of the Commission's statutory obligation to license and manage spectrum in the public interest. The Task Force should also recognize that the Commission's long standing reliance on its expertise in technical and public policy issues have been a major factor in the success of the telecommunications industries and services in the United States. These successes could not have been achieved by a spectrum management approach that relied solely, or even primarily, on competitive market models and comparative definitions of efficiency.

Respectfully submitted,

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