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

In the Matter of:	)	
Wireless Bureau Seeks Comment on Petitions Regarding the Use of Signal Boosters and Other Signal Amplification Techniques Used with Wireless Services	)	WT Docket No. 10-4

REPLY COMMENTS OF MOTOROLA, INC.

Motorola, Inc. ("Motorola") hereby submits these reply comments on the record developed in the Federal Communications Commission's ("FCC" or "Commission") proceeding regarding several petitions on the proper usage of signal boosters.[1]

I. INTRODUCTION

Comments submitted by many Commercial Mobile Radio Service ("CMRS") and Part 90 Private Mobile Radio Service ("PMRS") licensees and users, as well as some manufacturers and retailers of signal boosters, provide substantial support for the positions taken by Motorola in its initial comments. Specifically, the record in this proceeding demonstrates that harmful interference caused by unauthorized signal boosters is a widespread difficulty experienced by CMRS and PMRS licensees, and has at times led to disruptions of mission-critical public safety communications. Consequently, the Commission should take action to curtail the unauthorized use of signal boosters through (1) affirming that the sale and use of CMRS signal boosters without licensee consent is unlawful, as requested in the Petition for Declaratory Ruling

[1] *See* Wireless Bureau Seeks Comment on Petitions Regarding the Use of Signal Boosters and Other Signal Amplification Techniques Used with Wireless Services, *Public Notice*, WT Docket No. 10-4, 25 FCC Rcd 68 (rel. Jan. 6, 2010).

of CTIA,[2] and (2) initiating a rulemaking proceeding to develop rules for the operation of boosters under Part 90 of the Commission's rules.

II. THE RECORD DEMONSTRATES THAT HARMFUL INTERFERENCE FROM SIGNAL BOOSTERS IS A WIDESPREAD PROBLEM

Numerous commenters, including several CMRS providers and public safety commenters, have provided evidence that unauthorized signal boosters often cause significant harmful interference to licensed CMRS and PMRS communications networks.[3] Although in some cases even authorized signal boosters have caused interference, the commenters report that the most common and troubling source of booster interference comes from unauthorized boosters that are often improperly installed by persons who are not fully qualified to evaluate the challenges and potential negative results of a given situation, which creates interference that is very difficult to pinpoint.

---

[2] *See* Petition for Declaratory Ruling of CTIA—The Wireless Association, WT Docket No. 10-4 (filed Nov. 2, 2007) ("*CTIA Petition*").

[3] *See, e.g.*, Comments of AT&T, WT Docket No. 10-4 at 29-32, Attachment A (filed Feb. 5, 2010) ("AT&T Comments"); Comments of Cobb County, Georgia E-911 Communications Bureau, WT Docket No. 10-4 at 1 (filed Jan. 19, 2010) ("Cobb County, Georgia E-911 Comments"); Comments of Raymond Grimes, Sheriff-Coroner Department, County of Orange, California, WT Docket No. 10-4 at 2 (filed Feb. 4, 2010) ("Orange County Comments"); Comments of United States Cellular, WT Docket No. 10-4 at 5-7 (filed Feb. 4, 2010) ("US Cellular Comments"); Comments of Gregory T. Bunting, Public Safety Department, St. Lucie County, FL, WT Docket No. 10-4 at 1 (filed Jan. 20, 2010) ("Public Safety Department Comments"); Comments of Sprint Nextel Corporation, WT Docket No. 10-4 at 3-5 (filed Feb. 5, 2010) ("Sprint Nextel Comments"); Comments of APCO, WT Docket No. 10-4 at 2 (filed Feb. 5, 2010) ("APCO Comments"); Comments of Phoenix Fire Department, WT Docket No. 10-4 at 1 (filed Feb. 4, 2010) ("Phoenix Fire Dept. Comments"); Comments of the King County, Washington Regional Communications Board, WT Docket No. 10-4 at 1-2 (filed Feb. 5, 2010) ("King County Comments"); Comments of Massachusetts State Police, WT Docket No. 10-4 at 1-2 (filed Feb. 4, 2010) ("State Police Comments"); Comments of County of San Bernardino, California, WT Docket No. 10-4 at 1 (filed Feb. 5, 2010) ("San Bernardino Comments"); Comments of Verizon Wireless, WT Docket No. 10-4 at 6-8 (filed Feb. 5, 2010) ("Verizon Wireless Comments"); Comments of the National Emergency Number Association, WT Docket No. 10-4 at 3-4 (filed Feb. 5, 2010) ("NENA Comments").

Booster-originated interference has ranged from moderate increases in the noise floor and dropped call rates to major disruptions of entire systems over large areas. In its comments, Verizon Wireless offered several examples of situations in which a single malfunctioning booster caused interference and service disruption over several cell sectors across multiple cells.[4] In one example, a single signal booster installed in a Manhattan office building interfered with nearly 200 different cell sites, including some as far as New Jersey.[5] In Wisconsin, US Cellular reports that five boosters that were installed a block away from a cell site caused a 1,100% increase in the dropped call rate in the affected sector.[6] AT&T and Sprint Nextel also filed comments citing similar examples of booster-related interference.[7]

Although dropped calls and other network problems are serious occurrences in commercial mobile networks, the widespread interference caused to public safety communications networks by signal boosters can literally be a matter of life and death. The Massachusetts State Police, which operates a statewide 800 MHz public safety radio system, stated in its comments that over the last five and a half years, the overwhelming majority of interference situations that it has identified were caused by signal boosters.[8] Similarly, the King County Communications Board cited an example of one malfunctioning signal booster that caused a false "Officer Needs Help" call to be sent out

---

4 Verizon Wireless Comments at 7-8.

5 *Id.* at 7.

6 *Id.*

7 *See* AT&T Comments at 30-32; Sprint Nextel Comments at 3-5.

8 State Police Comments at 1.

over the King County 800 MHz public safety network.[9] In another situation, an improperly configured signal booster being installed at a local correctional facility blocked all 800 MHz public safety communications in a 10-20 square block area for several hours.[10]

In addition to the disruptions in use of these mobile systems, network operators have wasted tremendous sums of money and numbers of man hours in efforts to identify and resolve these interference troubles. Orange County, California reports that on average it spends around 300 hours per year or more, at a cost of $25,000 to the County, investigating and resolving complaints of harmful interference caused by signal boosters.[11] On the commercial side, Verizon Wireless indicated that in recent years it has spent well over 2000 staff hours diagnosing and curing booster-related interference problems in just three regions of its nationwide cellular network.[12]

The record of this proceeding offers compelling evidence of the harmful interference to commercial and public safety communications systems that is being caused by signal boosters. These problems are likely to increase in frequency and seriousness. For example, as the King County Regional Communications Board noted in its comments, the use of signal boosters is now required under the National Fire Protection Association (NFPA) Uniform Fire Code.[13] Absent Commission action in this area to control booster operations in a way that resolves the potential for harmful

---

[9] King County Comments at 2.

[10] *Id.*

[11] Orange County Comments at 2.

[12] Verizon Wireless Comments at 7.

[13] King County Comments at 2.

interference, widespread adoption of the NFPA Uniform Fire Code could result in the expansion of these problems in areas across the country.

III. THE COMMISSION SHOULD TAKE ACTION TO CURTAIL THE UNAUTHORIZED OPERATION OF SIGNAL BOOSTERS

The large number of individuals who filed in support of the use of boosters demonstrates that there is a real need for signal boosters in both commercial and public safety wireless networks.[14] Although Motorola does not manufacture signal boosters, it does deploy them as elements of system solution designs when appropriate, and thus has an interest in promoting their responsible and effective use for its customers. In light of the proven harm of unauthorized and improperly installed boosters, the Commission must take actions to ensure that these devices are being deployed appropriately. A wide variety of commenters, including some manufacturers and retailers of signal boosters, have called for increased controls over booster operations.[15] To that end, the

---

[14] *See, e.g.*, Comments of William T. Morris, WT Docket 10-4 at 1 (filed Feb. 5, 2010); Comments of Tim Beyer, WT Docket 10-4 at 1 (filed Feb. 5, 2010); Comments of T. Kent Hill, WT Docket 10-4 at 1 (filed Feb. 5, 2010); Comments of Sue Dillard, WT Docket 10-4 at 1 (filed Feb. 5, 2010); Comments of Simon Richards, WT Docket 10-4 at 1 (filed Feb. 5, 2010); Comments of Scott Gilbert, WT Docket 10-4 at 1 (filed Feb. 5, 2010); Comments of Sam Logan, WT Docket 10-4 at 1 (filed Feb. 5, 2010).

[15] *See, e.g.*, Comments of Michael C. Condell, WT Docket 10-4 at 5-6 (filed Jan. 31, 2010) (RF Engineer and Booster Installer); Comments of GPD Telecom Inc, WT Docket 10-4 at 1-2 (filed Feb. 3, 2010) (booster system designer and installer); Comments of Bird Technology Group, WT Docket 10-4 at 3-5 (filed Feb. 5, 2010) (Booster manufacturer) ("Bird Comments"); Comments of Scott Alford, RF Industries Pty. Ltd, WT Docket 10-4 at 7 (filed Feb. 5, 2010) (Booster manufacturer and distributer); Comments of Nextivity, WT Docket 10-4 at 5 (filed Feb. 5, 2010) (Booster manufacturer); *see also* AT&T Comments at 14-24; Comments of CTIA—The Wireless Association, WT Docket No. 10-4 at 4-9, 12-22 (filed Feb. 5, 2010); Verizon Wireless Comments at 19-22; Comments of the Wireless Communications Association International, WT Docket 10-4 at 4-8, 12-14 (filed Feb. 5, 2010) ("WCAI Comments"); US Cellular Comments at 4-5; Comments of the Joint Council on Transit Wireless, WT Docket 10-4 at 4-5 (filed Feb, 5, 2010); NENA Comments at 4-5; Comments of the California Public-Safety Radio Association, WT Docket No. 10-4 at 1-4 (filed Feb. 5, 2010); APCO Comments at 2-3; King County Comments at 3; State Police Comments at 2; Cobb County Comments at 2; Comments of the City of Phoenix, WT Docket 10-4 at 1 (filed Feb. 4, 2010); Comments of Dave Clemons, City of Worcester, WT Docket 10-4 at

Commission should attempt to curtail the unauthorized use of signal boosters in both CMRS and PMRS bands.

With respect to boosters operating in the CMRS frequencies, the Commission should clarify that it is illegal to operate a booster in exclusively licensed frequencies without a license or the authorization of the licensee, as requested in the CTIA petition.[16] As various commenters indicated, the law provides that only a licensee is authorized to transmit over exclusively licensed spectrum.[17] Thus, the use of boosters without the consent of the licensees of the frequencies being amplified is already illegal, and the Commission should remove any doubt by making this prohibition explicit.

Additionally, as indicated by Motorola and others, absent coordination with the operators of the mobile networks whose signals are being amplified, booster operations are much more likely to result in harmful interference. Only the licensee network operator has important technical information that is needed for successful and interference-free installation of signal boosters. Requiring licensee consent will enable these devices to be used in areas where cellular service is lacking, while ensuring that the underlying networks are unharmed.

In addition to taking the above-mentioned actions with respect to CMRS boosters, as suggested in Motorola's initial comments, the Commission should initiate a rulemaking proceeding aimed at crafting operational and technical rules to ensure

---

1 (filed Jan. 30, 2010); Public Safety Dept. Comments at 1; Sprint Nextel Comments at 5-9; Phoenix Fired Dept. Comments at 1.

[16] CTIA Petition at 10-14.

[17] *See* AT&T Comments at 3-13; CTIA Comments at 12-17, Sprint Nextel Comments at 2-3; US Cellular Comments at 4-5; Verizon Wireless Comments at 9-13; WCAI Comments at 4-6; *see also* 47 U.S.C. § 301 (prohibiting the operation of an radio transmitter "except under and in accordance with . . . a license").

interference-free operation of signal boosters for the benefit of Part 90 licensees. The fact that there is a very real need for the use of signal boosters by public safety users in order to extend the range of their PMRS networks is evidenced by the comments of many individual public safety users in the record in this proceeding.[18] However, as discussed above, unauthorized and improperly installed CMRS and PMRS signal boosters often cause harmful interference to public safety mobile radio systems. The Commission must balance these two dynamics in its Part 90 signal booster rulemaking.

As an initial matter, Motorola reiterates its support for that part of the Bird Technology Group proposal that would require written licensee authorization for all booster deployments.[19] CMRS and PMRS signal boosters alike can cause harmful interference to public safety communications networks if not properly installed, and thus licensee consent should be required in all cases.

Additionally, Motorola notes the request of Pyramid Communications, Inc. that additional frequencies be made available for Vehicular Repeater Systems (VRS).[20] As Pyramid and other commenters explain, VRS mobile units help public safety users to stay in touch with the PMRS network even when they go inside structures where the network

---

[18] *See, e.g.*, Comments of the West Side Volunteer Fire Department, WT Docket No. 10-4 at 1 (filed Feb. 12, 2010); Comments of William T. Morris, WT Docket No. 10-4 at 1 (filed Feb. 5, 2010); Comments of Robert Bertram, WT Docket No. 10-4 at 1 (filed Feb. 4, 2010); Comments of Cranford Jordan, WT Docket No. 10-4 at 1 (filed Feb. 3, 2010); Comments of Brenton W. MacAloney, WT Docket No. 10-4 at 1, (filed Jan. 26, 2010).

[19] *See* Bird Comments at 3; Petition for Rulemaking of Bird Technology Group, WT Docket No. 10-4 at 9 (filed Aug. 18, 2005).

[20] *See* Comments of Pyramid Communications, Inc., WT Docket No. 10-4 at 3-6 (filed Feb. 5, 2010) ("Pyramid Comments").

would not normally provide coverage, similar to other signal boosters.[21] However, VRS differs from other signal boosters in that they are licensed devices that are controlled on a per channel basis with the assistance of frequency coordinators. While Motorola acknowledges the value of vehicular repeaters, the Commission should rely on the recommendations of the frequency coordinating committees in selecting frequencies for such use.

To improve the reliability of public safety wireless systems inside buildings, the Commission should, in its Part 90 signal booster rulemaking, consider the proposals of APCO and the Jack Daniel Company that the Commission promote the adoption of local zoning requirements and building codes that include signal booster requirements.[22] Although the Commission does not have direct jurisdiction over local zoning ordinances and building codes, it should nonetheless pursue opportunities that arise to express the importance of improving public safety communications inside buildings, and should urge the codification of guidelines and requirements that would serve this goal, provided these guidelines contemplate responsible installation and operation of boosters.

In its Part 90 signal booster rulemaking, the Commission should also seek comment on eliminating Class B type boosters and increasing the authorized power level for Class A type boosters.[23] Class A boosters, which are filtered to boost only a given licensee's signals, are preferable because they provide a cleaner spectral environment in

---

[21] Pyramid Comments at 2; Comments of the California State Firefighters' Association, Inc., WT Docket No. 10-4 at 1 (filed Feb. 17, 2010) ("CSFA Comments").

[22] *See* APCO Comments at 3; Petition for Declaratory Ruling of Jack Daniel DBA Jack Daniel Company, WT Docket No. 10-4 at 10-11.

[23] *See* Comments of Motorola, Inc., WT Docket No. 10-4 at 8-10 (filed Feb. 5, 2010) ("Motorola Comments").

the increasingly crowded Part 90 frequencies. In contrast, Class B type boosters do not provide such filtering. Motorola's experience is that the cost differential between Class A and B boosters is diminishing and thus the use of Class A boosters should be encouraged, because of their increased spectral efficiency.

Motorola also recommends increasing the maximum power allowed on Class A signal boosters for Part 90 systems in Section 9.219(b) of the Commission's rules to 35W ERP.[24] Doing so would provide licensees two key benefits. First, it could reduce the number of boosters needed to cover a building, allowing for more cost-effective buildout than if more lower powered boosters were used. Second, it would provide a better mechanism to deploy boosters to fill in specific holes in a Part 90 licensee's current coverage area. Using properly designed and installed systems with Class A boosters that are selective in the signals they boost should accommodate this power increase without a corresponding increase in interference.

Each of the above-mentioned issues should be addressed in the context of a full rulemaking proceeding in which the tradeoffs of such approaches would be debated prior to taking any action. In making these recommendations, Motorola's goal is to promote a cleaner spectrum environment with less potential interference and improved efficient and cost effective in-building systems for public safety and enterprise licensees.

IV. CONCLUSION

The record in this proceeding conclusively demonstrates that unauthorized signal boosters are an increasing source of harmful interference to commercial and public safety wireless networks. In order to protect the operations of these mobile services and to

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

ensure the successful transmission and reception of mission-critical public safety communications, the Commission must take action to halt the continued operation of unauthorized and improperly installed signal boosters. The Commission should grant the petition of CTIA and find that no signal boosters may be installed without the express consent of any affected exclusive licensees. Furthermore, the Commission should initiate a rulemaking proceeding regarding the use of signal boosters to facilitate Part 90 operations.

Respectfully submitted,

By: */S/ Steve B. Sharkey*
Steve B. Sharkey
Senior Director
Regulatory and Spectrum Policy

By: */S/ Robert D. Kubik*
Robert D. Kubik, Ph.D.
Director, Relations Telecom Global
Global Government Affairs

Motorola, Inc.
1455 Pennsylvania Avenue, NW
Washington, DC 20004
TEL: 202.371.6900

Dated: March 8, 2010