

June 3, 2010

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Petitions Regarding the Use of Signal Boosters and Other Signal Amplification Techniques Used With Wireless Services, WT Docket No. 10-4

Dear Ms. Dortch:

CTIA – The Wireless Association® (“CTIA”) hereby submits this letter supplementing the record in the Federal Communications Commission’s (“FCC” or “Commission”) ongoing proceeding regarding the use of signal boosters¹ and other signal amplification techniques for wireless services. The record in this proceeding is replete with evidence of harm to commercial and Public Safety wireless networks caused by the unauthorized operation of signal boosters. CTIA once again urges the Commission to: (1) affirm and enforce the requirement that a FCC license (or express licensee consent) is necessary to operate a signal booster; (2) affirm that the sale and marketing of such devices to unauthorized parties is illegal and adopt labeling requirements consistent with this finding; (3) adopt an accelerated docket for the resolution of multiple instances of interference caused by the products of a single manufacturer; and (4) promote the adoption of standards governing the technical and operational features a booster must include.

I. The Widespread Interference Caused by Unauthorized Booster Operation Necessitates Prompt Affirmation and Enforcement of the Commission’s Existing Rules

In response to the recent Public Notice regarding the use of signal boosters,² many wireless service providers submitted detailed examples of the interference to their networks caused by the use of unauthorized signal boosters. The disruptions caused by signal boosters range from dropped calls to total loss of service, and have required carriers and Public Safety

¹ The Commission has defined the term “signal booster” as “intended to include all manner of amplifiers, repeaters, boosters, distributed antenna systems, and in-building radiation systems that serve to amplify CMRS device signals, Part 90 device signals, or extend the coverage area of CMRS providers or Part 90 service licensees.” Wireless Telecommunications Bureau Seeks Comment on Petitions Regarding the Use of Signal Boosters and Other Signal Amplification Techniques Used With Wireless Services, Public Notice, DA 10-14 at n. 1 (Jan. 6, 2010) (“Public Notice”). In this letter, CTIA utilizes the Commission’s definition of “signal booster.”

² See Public Notice.

officials to expend substantial resources in restoring service to their customers.³ As CTIA has previously observed, it is particularly concerning that these service disruptions could impact calls to 911 and Public Safety communications.⁴ Indeed, numerous Public Safety agencies reported incidents of interference to their operations,⁵ and expressed frustration regarding the difficulty of resolving such incidents.⁶

The harm caused by operation of unauthorized signal boosters is clear, and it is for this reason that CTIA urges the Commission to promptly enforce its existing rules, which dictate that such devices be operated only by FCC licensees or with the consent of Commission licensees. CTIA previously has highlighted the mandate of the Communications Act of 1934, as amended, that transmitting equipment operating on licensed spectrum be licensed by the Commission, along with the Commission's rules stating that subscribers lack the authority to use transmitters without the wireless provider having full operational control of the device.⁷

As CTIA also has noted, the Commission's rules require licensees to control devices operating on their network, yet CTIA is unaware of any third-party signal booster designed to allow for such licensee control.⁸ Recent Commission proceedings have demonstrated the degree to which end-user devices are integrated into wireless networks. This integration makes maintaining operational control over wireless devices essential, and is reflected in Commission rules, which mandate that "[c]ellular system licensees are responsible for exercising effective control over mobile stations receiving service through their cellular systems."⁹ The Commission's operational control requirements make it critically important

³ See, e.g., Comments of Verizon Wireless, WT Docket No. 10-4, at 5-6 (reporting 71 incidents of documented interference from radiofrequency devices between 2006 and 2009, the majority of which were caused by unauthorized signal boosters, and stating that investigating and resolving these incidents required more than 900 network engineer man hours).

⁴ Reply Comments of CTIA – The Wireless Association®, WT Docket No. 10-4, at 6 (Mar. 8, 2010) (“CTIA Reply Comments”).

⁵ See, e.g., Comments of the Cobb County E911 Communications Bureau, WT Docket No. 10-4, at 1 (Jan. 19, 2010) (“The unlicensed devices were not resolved as quickly and the response was not the same. Upon locating the device, employees had no prior knowledge the equipment existed, who maintained it, or what purpose it served. This problem was resolved by pulling the plug. Unfortunately someone plugged it back in a week later and we started all over again. The final resolution resulted in cutting the actual power cord and disabling the unit.”).

⁶ See Comments of Association of Public-Safety Communications Officials-International, WT Docket No. 10-4, at 2 (“Many public safety agencies have been frustrated by interference from unauthorized signal boosters, and the difficulty of locating the interfering devices.”); Comments of the County of San Bernardino Information Services Department Telecommunications Services Division, WT Docket No. 10-4, at 1 (Feb. 5, 2010) (“Fortunately, in this case, the owner was cooperative and turned the system off when confronted with the reality that they were disrupting radio communications for police and fire agencies. Approximately 80 hours of staff time was expended in first identifying the source, and then working with the homeowner to solve the problem.”).

⁷ See Comments of CTIA – The Wireless Association®, WT Docket No. 10-4, at 12-13 (Feb. 5, 2010) (“CTIA Comments”) (citing 47 U.S.C. § 301 and 47 C.F.R. §§ 1.903, 22.3, 22.165, and 24.11).

⁸ *Id.* at 14.

⁹ See 47 C.F.R. § 22.927.

that licensees be able to maintain control of devices that operate on their network, such as signal boosters.

CTIA, commercial wireless licensees, and the Public Safety community have requested an action that is compelled, in any event, under the Commission's rules – the prompt enforcement of control requirements designed to ensure the continued use of wireless spectrum in the public interest.

II. The Commission Must Affirm That the Marketing and Sale of Signal Boosters to Unauthorized Parties is Illegal and Adopt Consumer Disclosure Requirements.

For the Commission to stop the violation of its rules, it must address the source of the problem and affirmatively declare that the sale and marketing of signal boosters to unauthorized users is a violation of Federal rules and the Communications Act. CTIA has documented the Commission's ample authority under the Communications Act to make this declaration.¹⁰ Should the Commission fail to draw firm and clear lines, the illicit sale and operation of these devices will continue to proliferate. CTIA already has highlighted numerous examples of marketing and sales practices that fail to mention or misrepresent the Commission's rules.¹¹

CTIA supports the proposals advanced by several participants in this proceeding to develop a labeling requirement for the sale of signal boosters. A labeling requirement has widespread support, and would help avoid consumer confusion regarding signal boosters. Specifically, the Commission should require that all signal boosters have a warning label that states in plain language that users may only operate the booster with an FCC license or the written consent of the relevant Commission licensee, and that obtaining such authorization is the consumer's responsibility. This framework is consistent with the Commission's approach to wireless microphones,¹² and will help prevent the proliferation of signal booster use by unauthorized parties.

III. The Commission Should Adopt Accelerated Docket Procedures to Address Booster-Related Interference Complaints.

This proceeding has demonstrated that resolving the interference issues caused by unauthorized signal booster use is time-consuming and resource-intensive. And, most importantly, service often continues to be disrupted pending the resolution of such administrative interference claims. It is for this reason that CTIA supports the accelerated docket procedure proposed by AT&T. Under AT&T's proposed framework, a carrier would be permitted to bring a complaint under an accelerated docket procedure against a manufacturer that the carrier identifies as causing multiple interference events to its network.¹³ The accelerated docket would operate consistent with Section 208 of the

¹⁰ CTIA Comments at 18.

¹¹ *Id.* at 19-21.

¹² Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, Report and Order and Further Notice of Proposed Rulemaking, 25 FCC Rcd 643, ¶¶ 95-101 (2010).

¹³ Comments of AT&T Inc., WT Docket No. 10-4, at 35-36 (Feb. 5, 2010).

Communications Act: once a complaint has been lodged, the manufacturer would have ten days to demonstrate that it complies with the Commission's rules. CTIA also urges the Commission to establish procedures to allow for a short hearing, consistent with Section 208. While this accelerated docket would not replace or limit existing remedies in place to resolve interference disputes, it would enable the Commission to target those signal booster manufacturers that are the major source of interference to wireless networks.

IV. The Commission Should Promote the Adoption of Technical and Design Standards for Signal Boosters That Would Mitigate Harmful Interference.

Finally, even in an environment requiring carrier consent, signal boosters could nonetheless cause interference to commercial and Public Safety wireless networks. For this reason, CTIA proposes that signal booster manufacturers work with wireless licensees to develop technical and design features that would minimize the risk of interference to wireless networks. For example, signal boosters could be designed to include automatic gain control that would allow the booster to sense the power of the local base station and modify the booster's gain accordingly. If the received signal level from the base station is powerful enough, the booster could potentially even be turned off.

Fixed boosters should contain features including, at a minimum, a GPS chipset that provides the coordinates of the installation location, a remote shut-off control that would allow carriers to shut down a malfunctioning booster causing harm to their networks, and a mechanism for relaying accurate E911 location information. The fixed booster also should only operate on a channelized or narrowband basis, rather than on a broadband basis across multiple frequencies. In addition, comprehensive, verifiable standards governing the installation of fixed boosters would better ensure interference-free operation.

With regard to mobile boosters, minimum standards should include requirements that mobile boosters contain a remote shut-off function, that they operate on a channelized or narrowband basis, that they contain oscillation detection with automatic-shutdown, that they contain components that manage the device's power based on its proximity to a base station, and that they feature a mechanism for relaying accurate E911 location information. The use of a SIM card, if supported by the device, could allow a signal booster manufacturer to allow the wireless licensee to have operational control over the booster. Further, the Commission should establish an equipment certification for mobile boosters by a reliable third party, similar to the certification process for wireless handsets.

CTIA notes that next generation wireless systems provide an additional complexity for signal boosters to manage. LTE and WiMAX are both based on Orthogonal Frequency-Division Multiplexing ("OFDM") modulation. OFDM modulation schemes require very high peak to average power ratios to operate as efficiently and effectively as possible.¹⁴ As such, the behavior of the signal booster amplifier is critical to ensure that when it boosts an LTE or WiMAX signal, it maintains the linearity of the amplifier operation. The effect of non-linearity can be quantified in any amplifier as the ultimate limit to the signal-to-noise ("S/N") ratio of the output for a given modulation scheme. As an example, CDMA typically with an amplifier with a zero dB noise figure and a 60 dB S/N input signal will output a

¹⁴ See, e.g., http://www.vodafone-chair.com/publications/2010/Dohl_J_VTCfall_10.pdf.

signal of a little more than 10 dB S/N. However, a typical LTE amplifier may require an output S/N of approximately 25-26 dB.

The net effect is that the peak data rate of LTE, when passed through an amplifier with an insufficient S/N ratio, will be severely reduced. If a signal booster amplifier is only designed with CDMA specifications in mind, the net effect on an LTE input would be a loss of nearly 50% of the peak data rate/spectral efficiency. As such, signal booster amplifiers must be designed with next generation wireless networks in mind from the start, otherwise significant deleterious effects to the performance of consumer devices and wireless network capacity will be experienced.

This list of features and considerations proposed above by CTIA is not intended to be exhaustive, and CTIA may supplement this list with other proposed design features in the future. Further, the Commission should not mandate any particular technical solution. Rather, it should allow the industry to determine which features would best protect licensees from interference caused by signal boosters.

For the foregoing reasons, the Commission should take prompt action to prevent the harmful interference caused by unauthorized signal booster operation and adopt the proposals advanced by CTIA herein.

Respectfully Submitted,

Brian M. Josef

CTIA – The Wireless Association®

cc: Roger Noel