

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

In the Matter of)	
)	
Petitions Regarding the Use of Signal Boosters and)	WT Docket No. 10-4
Other Signal Amplification Techniques Used with)	DA 10-14
Wireless Services)	
_____)	

COMMENTS OF SPRINT NEXTEL CORPORATION

Sprint Nextel Corporation (“Sprint Nextel”) submits these comments to discuss the measures the Commission should take to minimize the risk of harmful interference or network degradation from poorly designed or improperly installed signal boosters. Properly designed and installed, signal boosters can aid wireless subscribers by expanding the usability of wireless networks in areas of poor signal coverage; however, many signal boosters sold and deployed today cause harmful interference or degrade the performance of wireless networks as a result of flawed design, poor installation, or lack of coordination.¹ The Communications Act of 1934, as amended, requires the Commission and its licensees to maintain control over the marketing and use of signal boosters. Vigorously enforcing existing rules and policies regarding signal boosters – and closing loopholes in the current rules – will make wireless communications more dependable, less expensive, and more widely available to American consumers.

¹ In the context of these comments, we use the term “signal booster” as the Commission has used it in the Public Notice 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 licensees.” See *Public Notice*, DA 10-14, n.1.

I. The Communications Act and Commission Rules Permit Fixed Signal Boosters Only under the Authority of the Affected Wireless Network Licensee.

Section 301 of the Communications Act² states that “No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio ... except under and in accordance with this chapter and with a license in that behalf granted under the provisions of this chapter.” In addition, Section 1.903(a) of the Commission’s Rules, indicates that “Stations in the Wireless Radio Services must be used and operated only in accordance with the rules applicable to that particular service as set forth in this title and with a valid authorization granted by the Commission under the provisions of this part...”³ Furthermore, the Commission’s rules provide authority for the use of fixed signal boosters only by wireless licensees.⁴

Four of the petitions under consideration in this proceeding acknowledge, and Sprint Nextel concurs, that the Communications Act and Commission’s Rules dictate that the use of signal boosters is only permitted on a fixed basis and only with the permission of a wireless licensee. Wilson Electronics, Inc. (“Wilson”), however, takes a different view in its petition, arguing that the use of *mobile* signal boosters by wireless subscribers (with or without the authority of the wireless network licensee) is permitted under the authority that extends from the wireless network operator’s license to its subscribers.⁵ No rational basis exists for Wilson’s claim. First, the Communications Act’s prohibition against the use of radiofrequency spectrum without Commission authorization applies just as forcefully to signal boosters as every other radio transmission. Second, the Commission has never adopted rules permitting mobile signal

² 47 U.S.C. § 301.

³ 47 C.F.R. § 1.903(a).

⁴ See 47 C.F.R. §§ 22.527 and 90.219.

⁵ See, e.g., Wilson Electronics’ *Petition for Rulemaking* at 9. See also 47 C.F.R. §1.903(c).

boosters. Third, the Commission's rules require network licensees to exercise effective operational control over mobile stations receiving service through their cellular systems.⁶ Under Wilson's proposed approach, however, licensees would have no ability to exercise operational control over mobile signal boosters since they would not even be aware of their existence or location. Fourth, subscribers cannot have the authority to use mobile signal boosters since the Commission's rules do not authorize their use by the wireless network licensees themselves.

II. Rigorous Enforcement of Existing Standards and Reasonable Coordination Ensures that Signal Boosters Supplement, Rather than Disrupt, Wireless Communications.

Sprint Nextel field engineers have spent many hours tracking down and correcting interference problems caused by the poor design or installation of signal boosters. One typical problem involves the use of 800 MHz broadband signal boosters to improve the coverage of public safety signals inside buildings. Many communities require building owners to ensure that public safety communications can be received throughout the building. A common approach to addressing this problem is to install an in-building signal booster system. These systems tend to cover the entire 800 MHz band, so that multiple public safety channels will be available in the building. In many markets, those public safety channels still are interleaved with Specialized Mobile Radio channels that are used by Sprint Nextel and others.⁷ Therefore, 800 MHz signal boosters will amplify all signals in the band whether needed or not. It is important that installers

⁶ See, e.g., 47 C.F.R. § 22.927.

⁷ Sprint Nextel is in the process of relocating public safety and other 800 MHz users to eliminate interference problems that result from this interleaving. See generally, Improving Public Safety Communications in the 800 MHz Band, *Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order*, 19 FCC Rcd 14969, 15021-45, 15069 ¶¶ 88-141, 189 (2004) as amended by Erratum, 19 FCC Rcd 19651 (2004), and Erratum, 19 FCC Rcd 21818 (2004) (*800 MHz Report and Order*); Improving Public Safety Communications in the 800 MHz Band, *Supplemental Order and Order on Reconsideration*, 19 FCC Rcd 25120 (2004) (*800 MHz Supplemental Order*); and Improving Public Safety Communications in the 800 MHz Band, *Memorandum Opinion and Order*, 20 FCC Rcd 16015 (2005) as amended by Erratum, DA 05-3061 rel. Nov. 25, 2005.

of 800 MHz signal booster systems coordinate their installation with all the public safety and commercial networks in the band. Not only will coordination ensure that signal booster users obtain the necessary legal authority to transmit in the band, it will also enable the system installers to become aware of important information about licensees' operations that can avoid interference problems. For example, the amplified signals from signal boosters on Sprint Nextel's 800 MHz frequencies can overload nearby Sprint Nextel base stations, resulting in dropped calls, reduced network capacity, and in many cases actually degrade the service of Sprint Nextel users in the building. If the installers coordinate the installation of the signal booster, Sprint Nextel can work with the installer to ensure that the installation is completed and adjusted in a balanced manner so that the public safety coverage in the building is improved without disrupting service at nearby Sprint Nextel base stations.

Sprint Nextel has identified other problems that can occur when broadband 800 MHz signal boosters are installed in areas without coordination. For example, in many markets Sprint Nextel utilizes both 800 MHz and 900 MHz channels as part of its integrated iDEN network. Although a customer's radio might see a stronger control channel signal on 800 MHz, when the customer makes a call and is assigned a 900 MHz voice channel (which is not amplified by the signal booster), the call may be dropped due to the relatively lower signal strength of the non-booster 900 MHz voice channel. Coordination of the signal booster installation with the network licensee is essential to ensure that these inadvertently unreliable handoffs do not occur.

Another common problem involves feedback oscillation that can occur when a signal booster is poorly installed. Generally, in-building signal booster systems have two antennas – one that is outside the building to communicate with the wireless network's base station and one inside the building to communicate with subscriber units. Often, installers that are not familiar

with signal boosters and do not have appropriate test equipment, will place these two antennas in close proximity. The result is that the inside antenna picks up the signal from the outside antenna and attempts to amplify the signal again, causing oscillation. The oscillation increases the noise level at base stations on the same frequency, thereby causing interference to subscribers or lowering network capacity. Again proper coordination and notice enables Sprint Nextel to provide guidance and assistance to installers to ensure that the signal booster system performs well for the users and doesn't cause interference.

Moreover, network operators routinely modify the channels that are used on base stations to accommodate customer demands. Operators also add new cell sites and expand network coverage. Wireless licensees must know the locations of signal boosters to ensure that adjustments are made to the signal boosters in parallel with macro network adjustments.

As can be seen from these examples, and others submitted in the record, the proper functioning of signal boosters can only be ensured when: 1) the use of those signal boosters has been coordinated with all wireless licensees whose signals will be impacted by the signal booster; and 2) the installation is done carefully to reflect the actual radio environment surrounding the site. For these reasons, the Commission should affirm and strengthen its rules requiring that signal booster installers notify all affected licensees and obtain their coordination and approval of such installations.

III. The Commission Should Vigorously Enforce Its Existing Proscription of Mobile Signal Boosters.

Mobile signal boosters are flatly prohibited by the Communications Act and the Commission's rules, as discussed previously. Unfortunately, mobile signal boosters have been marketed in the U.S. and are a common source of radio interference. Mobile signal boosters by their very nature can cause a wide variety of problems. First, the Commission's rules permit

fixed signal boosters only in areas where signal levels are low.⁸ Mobile signal boosters, however, are often installed in cars and boats that move from weak signal areas to strong signal areas. These mobile signal boosters may not be capable of adjusting their power or operation to reflect the strength of the network's signal or may not do it properly, thereby causing interference. Second, wireless network licensees adjust their base stations to provide coverage only in areas that they are licensed to serve. Signal boosters can be used inadvertently, without the knowledge of the licensee, to extend a network's normal signal coverage area beyond its licensed area, potentially causing interference to wireless networks in neighboring geographic areas. This encroachment can be avoided for fixed signal boosters by requiring coordination with the network licensee. However, the network licensee cannot control where a mobile signal booster operates, particularly if a licensee is unaware of its existence or location. For these reasons, among others, the Commission should not legalize the use of *mobile* signal boosters on spectrum licensed to commercial wireless communications operators.

IV. The Commission's Current Policy of Issuing Equipment Authorizations to Generic Signal Boosters and Then Permitting the Sale of This Disruptive Equipment to Anyone is Not Working and Should Change.

CTIA has proposed that the FCC affirmatively declare that signal boosters can only be lawfully marketed to parties after they have received permission from a wireless licensee to use the signal booster.⁹ Sprint Nextel supports this common-sense approach and the legal rationale underlying it.

Currently, the FCC is issuing equipment authorization for signal boosters based upon a demonstration of compliance with the Commission's technical requirements for wireless

⁸ See 47 C.F.R. §90.218(a).

⁹ CTIA Petition at 10-14.

transmitters. These technical requirements govern some operating parameters, such as power, out-of-band and spurious emissions, and frequency stability, but these requirements inadequately address many kinds of interference problems, such as those discussed previously and others discussed in CTIA’s petition and 2006 White Paper.¹⁰ Wilson has suggested that the Commission could adopt standards in an attempt to prevent signal boosters from causing harmful interference. No standard or set of standards, however, can address the myriad ways in which signal boosters can disrupt complex, wide-area wireless network operations. Installation, site selection, oscillation avoidance, frequency selection, power levels appropriate for each frequency, and other factors all must be calibrated to precisely match the wide-area wireless network. Identifying – and addressing – these factors both at installation and over time requires considerable technical expertise. A generic equipment authorization decision, even one ostensibly backed by normative standards, simply cannot ensure that an in-building system will be installed to ensure that signals from a remote base station are properly amplified, but signals from a nearby base station are not. Accurate, non-interfering equipment installation requires on-scene tuning of the system by adjusting in-building and outside power levels and amplification gain, as well as by installing directional antennas that direct signals towards the remote base stations and away from the nearby ones.

The Commission’s current approach of authorizing signal boosters that comply with its limited technical specifications and not limiting the marketing of these products has resulted in widespread availability of devices that routinely cause interference and a misplaced public perception that these devices are simply “plug and play.” Consumers purchase these devices on the Internet or elsewhere and install them, with no knowledge of the adverse effect on

¹⁰ See CTIA—The Wireless Association® *White Paper on Wireless Repeaters*, appended to CTIA’s Petition as Attachment 1.

commercial and public safety wireless networks. From a practical perspective, moreover, customers who install signal boosters without coordinating their use with wireless licensees may find that their service coverage and quality actually deteriorates rather than improves. Worse still, signal boosters that are not properly integrated into the network may generate radiofrequency noise and harmful interference to other licensees' networks, including those of public safety and critical infrastructure operators. Interference to commercial networks harms consumers by increasing costs, decreasing quality, and consuming limited human and financial capital resources. Interference into first responder and critical infrastructure networks threatens safety-of-life missions by law enforcement and first responders and can jeopardize the monitoring, performance, and repair of electric, gas, water, sewer and other critical utilities.

Further complicating the problem of non-coordinated signal boosters is the complete lack of information about precisely where the devices are installed. Thus, if Sprint Nextel becomes aware of interference from a non-coordinated signal booster, network teams must literally drive around and search for the source of the interference before they can begin to troubleshoot any issue with the non-coordinated device. Even when trained professionals use sophisticated and costly radiofrequency monitoring equipment, determining the location of a non-coordinated signal booster can prove an incredibly time-consuming "cat-and-mouse game." Triangulation is not an exact science: signals bounce off of some surfaces and are absorbed by others, creating an irregular signal footprint. Site access – not only to the suspected location, but also to optimal observation points – often proves difficult if not impossible to obtain and usually consumes carrier time and resources while the interference continues unabated.

To have any real effect on the explosion of mobile signal boosters damaging wireless networks, however, the Commission must stop issuing equipment authorization and cancel

existing equipment authorization grants for these devices. Continuing to issue equipment authorization for mobile signal devices improperly provides consumers with the false sense that the equipment they have purchased is legal to operate. Mobile signal booster manufacturers even encourage misplaced consumer reliance on the legality of the devices they purchase by the use of advertising that boasts that the equipment is “FCC approved” or even “licensed for sale by the FCC.”¹¹ These statements are false or, at best, highly misleading.

V. Sprint Nextel and Other Wireless Licensees Regularly Install Signal Booster Systems and Readily Permit Third-Party Devices To Operate On Their Networks.

Sprint Nextel sells, services, and installs products that consumers can use to enhance their coverage and has a well-established program to allow third-party systems to operate on the network. As an example, Sprint Nextel markets Sprint AIRAVE™ femtocells that permit the public to enhance coverage in homes and small offices at an affordable price. Sprint Nextel also has a program of providing in-building coverage to enterprise customers that can range from small offices to Fortune 500 companies. In 2009 alone, Sprint Nextel deployed thousands of small scale in-building solutions and nearly 1000 large-scale in-building system solutions. In addition, wireless operators continue to expand their coverage areas in response to consumers’ needs through the addition of new base stations and the deployment of new technologies.

VI. Conclusion

For all the reasons discussed above, Sprint Nextel encourages the Commission to act quickly to prevent poorly designed, improperly installed, and non-coordinated signal boosters from disrupting vital wireless voice, video and broadband data communications.

¹¹ See, e.g., Repeater Store, FAQs, FCC Licensing, available at <http://www.repeaterstore.com/support/faq/fcc-license.html> (Feb. 2, 2010) (“Are the repeaters you sell licensed by the FCC? Yes. *All the cellular repeaters we sell are licensed by the FCC.* The FCC license identification numbers are written on the product page for each cellular repeater individually, should these be required.”) (emphasis added).

Respectfully submitted,

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