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ELECTRONIC FILING

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

Re: *Ex Parte*, WT Docket No. 10-4

Dear Ms. Dortch:

This is to inform you that on July 16, 2012, Michael Rodgers, Lloyd Meese, Karen Reynolds, and Scott Terry, all of Wireless Extenders, Inc. ("Wi-Ex") and the undersigned spoke via telephone with Roger Noel, Joyce Jones, Moslem Sawez, Tom Derenge, and Becky Schwartz of the Wireless Telecommunications Bureau, and Ira Keltz, Bruce Romano, and Rashmi Doshi of the Office of Engineering & Technology. We discussed the following topics, reviewed in further detail below. The majority of the comments below pertain to the proposed consumer booster rules submitted in the record by Nextivity, T-Mobile, V-COMM, Verizon Wireless, and Wilson Electronics ("Joint Proposal").¹

Importance of a Consumer Market for Signal Boosters: Wi-Ex pioneered the sub-\$500 consumer signal booster market. Wi-Ex was also a pioneer in the development of quality boosters that automatically adjusted to prevent interference to

¹ *Ex Parte* filing by Nextivity, Inc. *et al.*, WT Docket No. 10-4 (submitted Jun. 8, 2012) ("Joint Proposal").

carrier networks, which other manufacturers have since followed. Wi-Ex has always taken necessary steps to ensure that its products do not interfere with wireless networks – its boosters have not been named by any wireless carrier in a case of harmful interference to wireless networks – while producing boosters that are viable consumer devices with respect to price and ease of set-up and use.

Wi-Ex urges the FCC to balance two main goals in this proceeding: (1) adopt necessary technical safeguards to ensure that all signal boosters include appropriate technology to prevent harmful interference to wireless networks, as Wi-Ex has always done; and (2) preserve a viable consumer market for signal boosters. Thus, Wi-Ex supports the general framework set forth in the Notice of Proposed Rulemaking in the above-captioned proceeding, in which consumer boosters are tested to technical safeguards designed to prevent harmful interference to wireless networks, and boosters that meet the established standards are allowed to be sold in a consumer market without any further approval or “veto” by wireless carriers. Consumer boosters that meet the safe harbor standards established in this proceeding should be able to operate across all commercial wireless bands, including any frequency bands that come into operation in the future.

Registration of Boosters: Wi-Ex disagrees with the registration requirement in the Joint Proposal that consumer boosters be registered prior to operation.² While details on how such a requirement would be imposed in practice are scarce, Wi-Ex opposes the proposed registration requirement. Instead, Wi-Ex strongly prefers a regulatory regime in which all consumer boosters that meet technical safeguards designed to prevent harmful interference are permitted, rather than trying to regulate devices once they are in the field – which appears to be the purpose of a registration system.

Carrier Approval of Boosters: Wi-Ex strongly opposes a scenario, advanced by AT&T for example,³ under which consumer signal boosters that meet the requirements set forth in any eventual technical safeguards established in this proceeding nevertheless have to be approved or certified on a carrier-by-carrier basis. As mentioned above, the purpose of establishing technical safeguards is to establish one set of technical rules that all signal booster manufacturers meet in order to prevent harmful

² Joint Proposal, Proposed Consumer Booster Part 20 Rules, at §20.16(e) (“Proposed Rules”). Though it was included in the Joint Proposal, note that in fact there was no agreement among the parties as to whether the registration requirement should be included. See Letter from Verizon Wireless *et al.* to Marlene H. Dortch (submitted Jun. 8, 2012) (“the signatories have not been able to agree as to whether the draft Part 20 rules should also include a provision stating that carrier consent is also required prior to a customer being authorized to operate a consumer booster”), at 2. See also, Letter from Wilson Electronics, Inc. to Marlene H. Dortch (submitted Jul. 13, 2012), at 4.

³ Ex Parte Filing by AT&T Inc. (submitted Jul. 2, 2012), at 1.

interference to wireless carrier networks. Requiring signal booster manufacturers to get their products approved or certified by each individual carrier is the antithesis of promoting a market for consumer boosters and would require an investment of resources that is far beyond the capabilities of most signal booster manufacturers – an investment that would likely raise the cost of signal boosters to a level beyond the reach of most consumers.

Warning Labels: Wi-Ex has several concerns relating to the warning labels that would be required by the Joint Proposal.⁴ First, the proposed warning labels would be required in “any marketing materials.” Such a requirement would be highly overbroad – it is hard to see how such a rule would apply to banner ads and other Internet advertising, which are increasingly relied upon by smaller manufacturers that cannot afford the full-page or half-page newspaper ads that wireless carriers may be accustomed to. Second, Wi-Ex opposes the proposed requirement that operation of the device must be ceased immediately upon request of a wireless carrier.⁵ Once again, this requirement is overbroad and would seemingly apply even in cases in which there is no harmful interference to wireless carrier networks. Wi-Ex believes that the operator of a consumer signal booster should be required to cease operation if notified by the FCC in cases of harmful interference, similar to the requirement under Part 15 of the rules.⁶ A requirement wherein consumers are required to stop using devices they have purchased at the request of a wireless carrier without any showing that the device is actually causing harmful interference is not conducive to the development of a market for consumer signal boosters.

Wi-Ex also has serious reservations with the Joint Proposal’s proposed warning label with respect to E911 location information.⁷ As Wi-Ex has explained in the past, its wideband consumer signal boosters introduce negligible signal delay and therefore negligible location inaccuracy.⁸ Indeed, Wi-Ex’s boosters significantly improve E911 calling by consumers by enabling those with weak signals to place E911 calls. Given the reality that the use of Wi-Ex’s signal boosters increases the likelihood that consumers can reach emergency responders when they call 911 while introducing a negligible distortion of E911 location information, Wi-Ex opposes a warning label that could discourage consumers from buying a product that would greatly enhance their safety.

Specific Technical Requirements in the Joint Proposal: The attached technical appendix discusses Wi-Ex’s concerns and suggested changes to the safe harbor protection standard requirements in the Joint Proposal.⁹ Specifically, Wi-Ex believes

⁴ Proposed Rules, §20.16(g).

⁵ Proposed Rules, §20.16(g)(i).

⁶ 47 C.F.R. § 15.5(c).

⁷ Proposed Rules, §20.16(g)(ii).

⁸ *Ex Parte* filing of Wireless Extenders, Inc. (submitted May 1, 2012).

⁹ Joint Proposal, Consumer Booster Safe Harbor Protection Standards.

that the proposed booster gain limits and mobile station coupling loss ("MSCL") requirements would render consumer boosters unable to boost signals over a distance of more than a few feet and are not necessary as the concerns that the MSCL is intended to address are addressed in other proposed requirements. The attached technical appendix also discusses Wi-Ex's concerns with the proposed uplink inactivity requirement and the proposed uplink third order intermodulation requirements.

Wi-Ex also acknowledges that it is difficult to appreciate all the technical considerations that went into the various safe harbor protection standard requirements, and welcomes a discussion with parties that worked on the Joint Proposal on any of the issues raised in the attached appendix. Wi-Ex shares the goal of parties in this proceeding to ensure that any technical safeguards adopted in this proceeding prevent harmful interference to wireless networks, and commends the parties for producing detailed safe harbor protection standards that, with some suggested changes, would enable a viable market for consumer boosters. Wi-Ex stands ready to work with the parties to address their concerns in a manner that continues to enable a viable market for consumer signal boosters.

Please direct any questions regarding this matter to the undersigned.

Respectfully,

A handwritten signature in black ink that reads "T. Devendra Kumar". The signature is written in a cursive style with a horizontal line underlining the name.

Devendra T. Kumar
Attorneys for Wireless Extenders, Inc.

cc: Roger Noel
Joyce Jones
Becky Schwartz
Moslem Sawez
Tom Derenge
Ira Keltz
Bruce Romano
Rashmi Doshi

Technical Appendix — Detailed Responses to Specific Proposed Requirements in the Proposed Consumer Booster Safe Harbor Standard Proposed by Verizon Wireless, T-Mobile, Nextivity, V-COMM, and Wilson Electronics

Booster Gain Limits & Mobile Station Coupling Loss (MSCL) (section 3.iii.a)

The use of a worst-case Mobile Station Coupling Loss (MSCL) factor in the Booster gain effectively renders broadband boosters as **useless**. A gain reduction of 30-40dB from the maximum gain levels reduces the coverage radius of a booster to a mere few feet. A more thoughtful method is required. It is our understanding that this gain reduction factor was contrived as a method to address power control limitations due to excessive UL gain for a mobile which does not need the signal gain. The network has the need and the ability to lower a mobile device's output power in order to balance the signal it receives from all mobiles. An excessive UL gain boost for a mobile which is near its serving BTS could cause the Network to receive excessive power from that mobile, thereby forcing the BTS to control all other mobile devices in the sector to a higher power level to achieve balance. This problem is actually already addressed in the proposal in two ways:

- 1) A mobile which is near its serving BTS will necessarily have a strong DL signal level and a strong DL signal level will cause the booster to lower its gain in both the DL and the UL. This reduction in gain reduces the signal level received by the BTS, thus protecting the network's power control.
- 2) When the network reduces a mobile's UL power to its minimum level, about -48dBm, its signal will be undetectable by the booster or below the booster's UL signal threshold, even if only a few feet away, which therefore causes the booster to lower its UL gain due to UL Inactivity (section 3.ix).

The MSCL gain-reducing factor is, therefore, unnecessary and should be removed in order to enable boosters that benefit consumers by boosting signals over an area corresponding to a home or small business.

UL Inactivity (section 3.ix)

We agree with the concept of reducing a booster's gain during periods of inactivity to further reduce potential noise rise to the network in network sectors if the concentration of boosters were expected to be high, but we are concerned that the amount of UL gain reduction required to meet the -70dB/MHz limit will lead to an unacceptable number of failures in mobile call setup.

It is our understanding that for some network settings of many wireless protocols, the mobile device will use the DL pilot power level to compute its starting UL power output. A higher (boosted) DL will lead to a reduced UL power starting point. The booster UL power detector may be unable to detect this low UL power and would stay in its low-gain state (especially since the UL detector follows the UL gain stages in order to maximize its sensitivity). If the DL/UL gain gap is too great (>10dB for some networks), the mobile device may time-out before the UL power level reaches a sufficient level for the BTS to decode and acknowledge (and before the booster can detect and increase the UL gain), causing the call to fail during setup. The network setting which determines how long a mobile is to increase power and retry is set by the wireless network operator (carrier).

A booster with a 5dB Noise Figure could only operate with 39dB of gain to meet the -70dB/MHz requirement. A 72dB maximum gain PCS booster, then, would have a 33dB DL/UL gain gap. Furthermore, the consumer would most likely assume that the problem lies with the booster itself, since calls would be able to setup successfully when the phone was taken outside.

For some network settings, this problem may be solved with a more sensitive power detector, but this would result in an unnecessary additional consumer cost, and is not likely to work in all cases.

We propose that 10dB is an acceptable UL inactivity reduction to reduce potential noise aggregation without noticeably degrading call setups.

UL IMD3 (Uplink Intermodulation, 3rd order) (section 3.vi)

For the Uplink (only), we oppose raising the standard from the current -13dBm limit to -19dBm. The stated goal in the original Verizon/V-comm/Wilson technical proposal was to reduce the level of out-of-band emissions (OOBE) from a booster by 6dB (from -13dBm to -19dBm) in order to prevent a booster from adding over 1dB to any emission which may already be at the -13dBm level (i.e. a mobile unit's spur at f_s MHz of -13dBm into the input of a booster could add to a similar spur created by the booster also at f_s MHz and of -19dBm resulting in an effective output of -13+1 or -12dBm).

This requirement is guarding against a very unlikely scenario to achieve a potential 2dB reduction in some unspecified spurious output (compared to -13dBm + -13dBm = -10dBm). Although unlikely, we do not oppose this concession for OOBE because it is not burdensome. In addition, we do not oppose this concession in-band in the Downlink since multiple signals are very common.

We do oppose this spurious limitation for UL IMD3, however, because

- 1) The stated goal does not apply since UL IMD3 spurs are not out-of-band,
- 2) A mobile device is a single carrier device so it does not generate IMD3 spurs to be added to a booster's spurious IMD3, and
- 3) This limitation is quite burdensome

- A 6dB decrease in IMD3 requires a 3dB increase in linearity for UL Power Amplifiers,
- UL PA's are the most expensive amplifier component in boosters,
- The Class AB Mobile Handset PA's will require over 3dB of additional back-off and won't meet this increased linearity at the minimum output power of 0.05W (section 3.ii), requiring a much more costly Class A PA.
- A higher current power supply & added heat dissipation methods increase cost,
- Results in \$32-38 MSRP increase for a dual-band booster product and 3-4 bands are commonly needed.

We propose that the UL IMD3 requirement should remain at the -13dBm level.