Fletcher, Heald & Hildreth, P.L.C.
1300 North 17th Street 11th floor
Arlington VA 22209
703-812-0400 (voice)
703-812-0486 (fax)

MITCHELL LAZARUS
703-812-0440
LAZARUS@FHHLAW.COM

September 26, 2001

Ms. Magalie Salas, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: ET Docket No. 98-153, Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems
Ex parte Communication[1]

Dear Ms. Salas:

XtremeSpectrum, Inc.[2] responds to an *ex parte* submission addressed to OET personnel by Sprint PCS on September 10, 2001.[3]

In summary, XtremeSpectrum has shown that its ultra-wideband (UWB) implementation does not cause interference to PCS. UWB proponents have met their burden in this proceeding, and now seek prompt Commission action to bring the benefits of this technology to the public.

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[1] Pursuant to Section 1.1206(b)(1) of the Commission's Rules, I am electronically filing this written *ex parte* communication for inclusion in the above-referenced docket.

[2] XtremeSpectrum, with 67 employees, conducts research in ultra-wideband communications systems as its sole business. XtremeSpectrum intends to become a UWB communications manufacturer once the Commission authorizes certification of such systems. XtremeSpectrum takes no position on UWB radar applications.

[3] Letter from Luisa L. Lancetti, Esq., to Julius P. Knapp, Lisa Gaisford, Michael J. Marcus, Karen Rackley, and John A. Reed (dated Sept. 10, 2001) ("Sprint PCS Letter").

A. UWB DOES NOT INTERFERE WITH PCS.

Sprint PCS continues to allege that ultra-wideband (UWB) will cause interference to PCS at any level above -70 dBm.[4] Yet, at the same time, Sprint PCS has all but conceded that it has no practical basis for this assertion.

Sprint PCS originally based its requests for extremely low UWB emissions levels on results of mathematical modeling and laboratory testing filed in this docket on September 12, 2000.[5] XtremeSpectrum has since pointed out several respects in which those studies make unrealistic predictions.[6]

Most of Sprint PCS's studies were conducted under highly artificial conditions designed to maximize the likelihood of detecting even the faintest interfering signal. The typical set-up used an anechoic chamber containing a PCS base station simulator, a PCS handset, and a UWB emitter one meter away.[7] The anechoic chamber not only eliminates all ambient noise from outside, but also suppresses the multipath effects due to reflected signals that otherwise impede PCS reception. Under these conditions, it is not surprising to find the handset is exquisitely sensitive to UWB.

Such experiments can be a valuable starting point for interference studies. But Sprint PCS made it the ending point as well. It insists that PCS phones in actual service need the same level of protection as a phone in an anechoic chamber. This defies both engineering experience and common sense. Outside the chamber, where PCS handsets are exposed to the myriad of RF sources and attenuating conditions that characterize the real world, much higher UWB levels will have no effect on PCS service.

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[4] Sprint PCS Letter at 1.

[5] Jay Padgett, *A Model for Calculating the Effect of UWB Interference on a CDMA PCS System* and Jay Padgett, *Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System*, filed as attachments to Letter from Charles W. McKee, Sprint PCS, to Magalie Roman Salas, FCC (Sept. 12, 2000). *See also* Sprint PCS Supplemental Comments (filed Oct. 6, 2000).

[6] *XtremeSpectrum, Inc., Technical Reply to Comments on Potential GPS and PCS Interference from UWB Transmitters,* filed with *Reply Comments of XtremeSpectrum, Inc. on Issues of Interference Into GPS and PCS*, ET Docket No. 98-153 (filed May 10, 2001) ("XtremeSpectrum Technical Reply").

[7] *Notes on Sprint PCS/Time Domain Anechoic Room Testing* at 9, Annex to Jay Padgett, *Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System*, *supra*.

Although Sprint PCS did attempt six test runs outside the chamber, data from three were lost, and there were "significant gaps" in data from the other three.[8] The only reported result showed the handset functioning correctly unless the UWB emitter was within one foot! This does not appear consistent with the demand for -70 dBm maximum emissions.[9]

But even the one-foot result does not ring true. XtremeSpectrum generates its signal in exactly the same way that conventional consumer digital devices generate noise. This gives XtremeSpectrum's signal the same interference characteristics as that noise -- except the Commission proposes to hold PCS-band UWB emissions to levels 12 dB lower than consumer digital devices. If PCS phones work well close to ubiquitous consumer digital products, as they certainly seem to, they will work just as well near UWB devices.

XtremeSpectrum has raised these issues before.[10] The Sprint PCS Letter of September 10 *concedes* several of XtremeSpectrum's points, and ignores the rest. Although Sprint PCS attempts to defend each of the concessions below, its demands for emission limits lower than those proposed by the Commission no longer have any sound technical support.

Below, we recapitulate each of XtremeSpectrum's points, and quote Sprint PCS's recent response.

In General: *XtremeSpectrum*: The Sprint PCS reported tests did not give an accurate or reliable indication of likely UWB/PCS interference.[11] *Sprint PCS*: "The model and tests were never designed to exhaustively study the CDMA/UWB interference issue."[12]

Anechoic Chamber: *XtremeSpectrum*: Performing tests inside an anechoic chamber overlooks the effects of inevitable ambient RF noise and interference, including interference

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[8] *See* Jay Padgett, *Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System* at 4, *supra*.

[9] Moreover, although Sprint PCS gave several numbers relating to UWB output power, it did provide these on a per MHz basis, so we are unable to determine whether the UWB emitter was operating in accordance with the proposed rules.

[10] *See* XtremeSpectrum Technical Reply.

[11] XtremeSpectrum Technical Reply, *passim*.

[12] Sprint PCS Letter at 2.

from other PCS base stations.[13] *Sprint PCS*: The tests outside an anechoic chamber "certainly were not exhaustive."[14]

Free-Space Propagation: *XtremeSpectrum*: In assuming free space propagation, the studies overlooked at least 10 dB in attenuation due to inevitable reflection, scattering, and absorption in the environment.[15] *Sprint PCS*: "Admittedly, the [] tests did not evaluate the strength of the UWB signal in a cluttered environment."[16]

Multipath Interference: *XtremeSpectrum*: The studies ignore multi-path interference.[17] *Sprint PCS*: The model "admittedly did not take into account multipath fading."[18]

Noise Floor: *XtremeSpectrum*: Sprint PCS set the interference threshold 6 dB below the thermal noise floor. This assumes a complete absence of all other radio-frequency sources -- not only personal computers and other digital devices, but even other base stations operated by the same PCS provider.[19] *Sprint PCS*: (No response.)

Artificially High Device Densities: *XtremeSpectrum*: The Sprint PCS studies assumed impossibly high UWB device densities, ranging from 5,000 to 100,000 devices per km² (equivalent to 3 meters apart on a square grid!). This compares with NTIA's more realistic range of 1 to 10,000 per km². *Sprint PCS*: (No response.)

In addition, the Sprint PCS Letter made several statements that need a brief reply.

First, Sprint PCS said that UWB cannot be compared with unintentional radiators like hair dryers, which have narrowband emissions.[20] XtremeSpectrum agrees. We insist that UWB should be compared to wideband emitters, such as the noise from digital devices. On that basis, PCS will receive full protection from the Commission's proposal to hold UWB to levels 12 dB below Class B in the PCS band.

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13 XtremeSpectrum Technical Reply at 7.

14 Sprint PCS Letter at 2.

15 XtremeSpectrum Technical Reply at 5.

16 Sprint PCS Letter at 3.

17 XtremeSpectrum Technical Reply at 6.

18 Sprint PCS Letter at 2.

19 XtremeSpectrum Technical Reply at 5.

20 Sprint PCS Letter at 3.

Second, Sprint PCS objects that UWB signals cannot fall off quickly, as XtremeSpectrum claims, or proponents could not promise UWB wireless LAN systems with ranges in the hundreds of feet.[21] XtremeSpectrum reasserts that UWB signals do fall off quickly. For that reason we have cited an effective range for our product of only 10 meters. We do not think it is feasible, under the proposed rules, to build a useful system with a range of hundreds of feet.

Third, Sprint PCS argues that consumers should not have to choose between UWB and PCS.[22] We concur, and are committed to building UWB systems that are fully compatible with PCS. Wholly apart from regulatory constraints, XtremeSpectrum understands full well it cannot successfully sell a product that interferes with PCS.

Fourth, Sprint PCS objects that its industry will face sizeable costs in attempting to overcome UWB interference.[23] XtremeSpectrum vigorously disagrees. We do not expect the PCS industry to spend anything on our account. We acknowledge that we must avoid interfering with the PCS network as we find it, and we have done so.

B. THE UWB PROPONENTS HAVE MET THEIR BURDEN IN THIS PROCEEDING.

Finally, Sprint PCS assigns to UWB proponents the burden of demonstrating there is no potential for interference, and asserts they have failed to meet it.[24] But Sprint PCS misstates the burden. Nothing requires a Part 15 proponent to show, in advance, that its devices can never interfere with any licensed service. That would be impossible.[25] The proponents' burden, rather, is quite different: to show that UWB is in the public interest.[26] In the context of a Part 15

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[21] Sprint PCS Letter at 3.

[22] Sprint PCS Letter at 4.

[23] Sprint PCS Letter at 4-5.

[24] Sprint PCS Letter at 3.

[25] The cases Sprint PCS cites to support its reading of the burden are all inapposite. *New Channels Communications*, 57 R.R.2d 1600 (1985), and *Industrial Communications*, 6 FCC Rcd 264 (1990), each uphold the denial or dismissal of an application because the applicant failed to submit documentation required under the rules of the service -- Multipoint Distribution Service and Public Land Mobile Radio, respectively. *Waynesboro Broadcasting*, 1 F.C.C.2d 431 (1965), retained an issue for hearing on whether a broadcast applicant had afforded sufficient interference protection to the Naval Radio Research Observatory at Sugar Grove, WV. None of these cases offers any guidance as to the UWB proponents' burden in this proceeding.

[26] [T]he Commission from time to time, as public convenience, interest, or necessity

(continued...)

proceeding, that showing must include a lack of harmful interference to other services, to be sure, but the obligation is not absolute. The Commission is free to consider the benefits of UWB, as well its interference potential.

Sprint PCS also overlooks the mandate of Section 157(a) of the Communications Act, which provides,

> It shall be the policy of the United States to encourage the provision of new technologies and services to the public. Any person or party (other than the Commission) who opposes a new technology or service proposed to be permitted under this chapter shall have the burden to demonstrate that such proposal is inconsistent with the public interest.[27]

Even without the emphasis afforded by this provision, the UWB proponents have amply met their burden. They have shown that the risk of interference from UWB into any other service is extremely low, and that the extremely high benefits of UWB outweigh any such minimal risk.

C. PROMPT COMMISSION ACTION IS NEEDED.

UWB will bring needed products to the consumer, and will add value to the U.S. economy. UWB delivers high data rate, low cost, and low battery drain, at low range. This makes it ideal for such tasks as same-room wireless interconnection of images, data, or music among digital cameras, MP3 players, Palm-type devices, and personal computers. UWB is equally well suited to streaming audio and video among satellite-video and cable set-top boxes, VCRs and DVD players, TVs, and stereos in wirelessly networked homes. The technology will contribute to the projected $300 billion market for handheld devices by 2005. Although U.S. companies are developing UWB technology, start-ups in other countries have already received funding.

None of these benefits can be achieved without prompt Commission action. The UWB manufacturers in the United States are entrepreneurial start-ups in a notoriously tight funding market. They cannot survive extended regulatory delay. One UWB company has already folded, unable to wait out the delays associated with the regulatory process.[28]

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[26](...continued)
requires, shall . . . (c) Assign bands of frequencies to the various classes of stations . . ." 47 U.S.C. Sec. 303.

[27] 47 U.S.C. Sec. 157(a).

[28] Neil Orman, *Fantasma runs out of time -- Firm drains funds awaiting OK for wideband standard*, Silicon Valley /San Jose Business Journal (April 27, 2001),

(continued...)

After three years, having compiled a record of more than 700 submissions, the Commission has all the information it needs to make a sound decision. It should do so expeditiously. If, at the end of the day, Sprint PCS believes the Commission's rules do not adequately protect other users, it can seek judicial review.

If there are any questions about this filing, please call me at the number above.

Respectfully submitted,

Mitchell Lazarus
Counsel for XtremeSpectrum, Inc.

cc: Service List

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[28](...continued)
http://sanjose.bcentral.com/sanjose/stories/2001/04/30/story7.html

SERVICE LIST

Chairman Michael Powell
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Kathleen Q. Abernathy
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Michael J. Copps
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Kevin J. Martin
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Bruce Franca, Acting Chief
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W., Room 7C-155
Washington, D.C. 20554

Julius P. Knapp, Deputy Chief
Office of Engineering & Technology
Federal Communications Commission
445 12th Street, S.W., Room 7B-133
Washington, D.C. 20554

Rebecca Dorch, Deputy Chief
Office of Engineering & Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Dr. Michael Marcus
Associate Chief of Technology
Office of Engineering & Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Karen E. Rackley, Chief
Technical Rules Branch
Federal Communications Commission
445 12th Street, S.W., Room 7A-161
Washington, D.C. 20554

John A. Reed
Senior Engineer
Technical Rules Branch
Office of Engineering and Technology
Federal communications Commission
445 12th Street, S.W., Room 7A-140
Washington, DC 20554

Luisa L. Lancetti, Esq.
Vice President Regulatory Affairs
401 9th St. NW, Suite 400
Washington DC 20004
Counsel for Sprint PCS