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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas, Secretary
Federal Communications Commission
The Portals, 445 12th Street, S.W.
Room TW-B204
Washington, D.C. 20554

Re: ***Written Ex Parte Notification***
Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153
UWB Interference to CDMA PCS Networks

Dear Ms. Salas:

Sprint Spectrum L.P., d/b/a Sprint PCS, pursuant to Section 1.1206 of the Commission's rules, hereby submits an original and two copies of a notification of a written *ex parte* contact. Please associate this letter with the file in the above-captioned proceeding.

Please contact me should you have any questions concerning the foregoing.

Sincerely yours,

Charles W. McKee by [illegible]

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FEDERAL COMMUNICATIONS COMMISSION
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February 21, 2001

By Hand Delivery

Mr. Bruce A. Franca, Acting Chief
Office of Engineering and Technology
Federal Communications Commission
The Portals, 445 12th Street, S.W.
Washington, D.C. 20554

Re: ***Written Ex Parte Presentation***
Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153
UWB Interference to CDMA PCS Networks

Dear Mr. Franca:

Sprint Spectrum L.P., d/b/a Sprint PCS ("Sprint PCS"), below responds to certain criticism that two parties have made regarding the conclusions it has drawn from the Sprint PCS/Time Domain/Telcordia study of the impact of UWB devices on CDMA PCS networks. While Sprint PCS recognizes the importance of the NTIA testing that has recently been released, the Commission must be careful not to overlook the equally significant impact UWB devices would have on mobile networks. Specifically, the Commission should recognize the substantial impact UWB devices will have on CDMA networks, the base technology for *all* third generation ("3G") systems.

As demonstrated below, the factual issue in this proceeding is no longer whether UWB devices will cause harmful interference to CDMA PCS networks. The factual issue has rather become how often this interference will occur and how harmful this interference will be. Some UWB proponents recognize that the interference risk posed by UWB devices is significant and that as a result, UWB devices should not be permitted to operate in the PCS band or other bands below 3.1 GHz. Two UWB proponents, however, incorrectly claim that the probability of harmful interference will not be large.

In the end, the resolution of the factual issue of how much harmful interference UWB devices will generate is not legally significant. The federal government has re-

ceived sizable consideration for issuing "exclusive" PCS licenses to Sprint PCS. Having formed a contract with Sprint PCS, the government is not free to breach this contract by converting these licenses into "non-exclusive" licenses. The government certainly is not free to require Sprint PCS to share its spectrum for free so others can provide telecommunications services that could compete with Sprint PCS' own services.

Background

On September 12, 2000, Sprint PCS and Time Domain Corporation jointly submitted two documents in this ultra-wideband ("UWB") rulemaking proceeding.[1] The first document is a model that Telcordia Technologies developed, with substantial consultation with Sprint PCS and Time Domain, to analyze the impact of UWB transmitters on the forward link of a code-division multiple access ("CDMA") personal communications services ("PCS") network.[2] The second document summarized the tests that Sprint PCS, Time Domain and Telcordia conducted to better understand the effect of a UWB transmitter on a PCS handset under controlled conditions.[3] These tests included laboratory bench tests with conducted RF paths, over-the-air tests in an anechoic (RF absorber-lined) chamber, and field tests at Sprint PCS' laboratory.

Sprint PCS summarized the practical effects of this model and these tests in supplemental comments filed on October 6, 2000.[4] Specifically, the data confirmed that UWB devices will cause harmful interference to PCS CDMA networks even at the more stringent –53.2 dBm/MHz average power level discussed in the *NPRM*.[5] One effect of UWB interference was the loss of existing PCS network capacity. At the –53.2 dBm/MHz emissions level, a fair signal (-90 dBm RSSI) PCS handset will ask for 8% more power when exposed to a UWB device two meters away. A weaker signal (-100 dBm RSSI) handset will demand 50% more power. The network capacity loss at a base station could be considerable if several PCS customers are near active UWB devices. As

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1 *See* Letter from Charles W. McKee, Sprint PCS, to Magalie Roman Salas, FCC Secretary, ET Docket No. 98-153 (Sept. 12, 2000), and Letter from Jeffrey S. Ross, Time Domain, to Magalie Roman Salas, FCC Secretary, ET Docket No. 98-153 (Sept. 12, 2000).

2 *See* Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, "A Model for Calculating the Effect of UWB Interference on a CDMA PCS System" (Sept. 12, 2000), *appended as* Attachment 1 to the September 12, 2000 Sprint PCS and Time Domain letters.

3 *See* Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, "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" (Sept. 12, 2000), *appended as* Attachment 2 to the September 12, 2000 Sprint PCS and Time Domain letters.

4 *See* Sprint PCS Supplemental Comments, ET Docket No. 98-153 (Oct. 6, 2000).

5 *See UWB NPRM,* ET Docket No. 98-153, FCC 00-163, 15 FCC Rcd 12086 (May 11, 2000).

an example, using the more stringent –53.2 dBm/MHz average power level, a medium sized city (200 cell sites), and a significant distribution of UWB devices, Sprint PCS would be able to serve from 250 to 1,000 fewer customers at times during the busy hour — solely as a result of UWB interference.

A second and separate effect of UWB interference is call blocking — namely, a PCS call will drop or a call attempt will be blocked if the handset is too close to an active UWB device. At the –53.2 dBm/MHz emission level suggested in the *NPRM* (and assuming that between one in twenty and one in five PCS customers are within three meters of an active UWB device), the model demonstrates that the resulting additional blocking percentages are from 1.2% to 4.8% respectively. At two meters, the additional blocking rates increase to 2.0% and 7.9% respectively. To put these figures into perspective, Sprint PCS spends tens of millions of dollars each year adding "capacity" cell sites to reduce its call blockage. Encountering new blockage rates of 4% to 8% would require significant additional millions to address.

Some UWB proponents readily acknowledge that UWB devices should not be permitted to operate at all in the 1.9 GHz PCS band.[6] For example, Multispectral Solutions ("MSSI"), which has over a decade of experience in developing UWB technologies, recognizes that UWB will cause "significant" interference to PCS networks, and it accordingly recommends that unlicensed UWB devices not be permitted to operate in the frequency range below 3.1 GHz.[7]

Notably, even those UWB proponents wanting to use the PCS band now concede that UWB devices will cause harmful interference to PCS networks. They assert that the Commission should nonetheless approve UWB use in the PCS band because of their belief that the probability of harmful interference is "not significant."[8]

Response to XtremeSpectrum and Time Domain

Of the over three dozen reply comments that were filed, only two parties — XtremeSpectrum and Time Domain — chose to question the conclusions Sprint PCS drew from the Sprint PCS/Time Domain/Telcordia model and data. Sprint PCS below responds to the points made by these two firms.

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6 *See, e.g.*, Multispectral Solutions Comments at 10-12; Fantasma Networks Comments at 3.

7 *See* Multispectral Solutions Reply Comments at 1-2. *See also id.* at 3 ("While higher frequency operation may require some additional engineering effort [for UWB devices] it is a far better alternative than interference to safety-of-life and other key commercial spectrum users.").

8 Time Domain Reply Comments at 38.

XtremeSpectrum: XtremeSpectrum, though not challenging any of Sprint PCS' data or conclusions, asserts that the probability of interference will be small because UWB devices "produce a very small area of interference."[9] This assertion conflicts with the claim that UWB technology will be used in local area networks ("LANs").[10] If, in fact, the path loss (the reduction in signal strength from a UWB transmitter as its transits a building) is as great as XtremeSpectrum claims, UWB could not be used as a wireless LAN technology because the expectation of these types of products is to transmit up to 100 feet or farther. XtremeSpectrum cannot have it both ways.

XtremeSpectrum further asserts that the probability of interference will be small because while PCS has "some indoor applications, everyday experience suggests that the large majority of use is outdoors."[11] This entirely unsupported claim, while it may have been true some years ago, is certainly not accurate today. A growing segment of mobile customers are people who use their wireless service as a replacement for landline service.[12] Another sizable percentage of customers use their mobile phone at home or at work to make long distance calls, as free long distance is included in many of the "bucket" plans that customers purchase. Indeed, some would say that the use of wireless phones in indoor environments has become so pervasive that cell phones have become a nuisance.[13] The extensive and growing use of PCS indoors is beneficial to consumers and competition. However, this trend would stop (if not retreat) if customers no longer had confidence that their PCS phone will work at home, in the office, or at other indoor locations.

XtremeSpectrum finally asserts that the probability of interference will be small because in many circumstances the same person will control both the UWB device and the PCS handset, "allowing the ultra-wideband device to be shut down as desired by the user."[14] Even ignoring the many situations where its "solution" has no applicability (*e.g.*, office setting, home visitors), XtremeSpectrum's solution is no solution at all. Faced with a UWB device that works and a PCS handset that does not, most consumers

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9 XtremeSpectrum Reply Comments at 8.

10 *See, e.g.*, Time Domain Reply Comments at 16 and 41 (describing UWB LANs as an "exciting" and likely prevalent application).

11 *Id.* at 11.

12 *See generally* Knight Ridder/Tribune Business News, "Consumers Replacing Landline Phones with Wireless" (Jan. 10, 2001).

13 In response, restaurants, theaters and concert halls have begun imposing restrictions on the use of cell phones.

14 XtremeSpectrum Reply Comments at 12.

will conclude that the reason the handset does not work is due to inferior PCS service; few (if any) consumers would realize that the handset problem is actually caused by UWB interference. Consumers would therefore need to be trained about UWB interference problems, but who — PCS carriers or UWB vendors — would shoulder the burden of this education effort? Will UWB vendors alert consumers only in their product manuals — such that consumers would not learn of the interference problem until after they purchased the UWB device?

More fundamentally, XtremeSpectrum's solution would impose a choice that consumers should not be compelled to make.[15] Many customers use their PCS phone as their second line so, for example, they can make and receive calls while accessing the Internet from their computer using their landline. According to XtremeSpectrum, consumers should be forced to make the following choice: turn off their PCS phone while using the Internet (undercutting the very reason they use PCS as a second line), or turn off the computer. The Commission should not force consumers to make such a Hobson's choice.

Time Domain: Time Domain acknowledges that the Telcordia model it and Sprint PCS commissioned is an "excellent theoretical analysis" and that the anechoic chamber tests "confirm the model's predictions."[16] It asserts, however, that the "results from real-world tests differed dramatically from the model's predictions."[17] Sprint PCS must respectfully disagree. While there were some data collection issues with the "live" tests, the Telcordia scientist that Time Domain retained holds the view that the data is adequate to confirm the model's predictions:

> Although the available data set from this live testbed experiment is limited, it does seem consistent with interference calculations based on the tests in the anechoic room and with the way in which the forward link is understood to manage its traffic channel power allocation.
>
> Overall, the tests described here have provided enough information to allow the effect of multiple UWB transmitters, with some specified

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15 It bears emphasis that while UWB does have some unique applications, most consumer applications would involve applications that can, and are, being addressed by other, non-UWB wireless applications. *See, e.g.,* Sprint Reply Comments at ii-iii.

16 Time Domain Reply Comments at 39.

17 *Id.*

> transmitted power and spatial density (average number of devices per square meter) to be modeled and simulated.[18]

Time Domain next asserts that Sprint PCS' analysis "unrealistically assumes that a –105 dBm level represents an adequate received power level for [PCS] service" and that Sprint PCS should instead be designing its network at a –95 dBm level:

> Rayleigh fades and other sources of noise are sufficiently common that the threshold for evaluation should be at a minimum of –95 dBm. At this level, a Part 15 TM-UWB device should not have a significant impact unless it is less than 1.5 meters away from the CDMA handset, and probably closer to 1 meter.[19]

At the outset, Sprint PCS must express its surprise that Time Domain thinks that it is more competent than Sprint PCS in designing CDMA PCS networks that operate in the real world.

Sprint PCS' CDMA network is designed using link budget analysis, a method for designing proper coverage and network capacity. These link budgets include margins for fading, intra- and inter-cell interference, and a receive sensitivity for the handset of –105 dBm with the intent of having handsets operate at this level of sensitivity. Sprint PCS would incur enormous costs if, as Time Domain suggests, Sprint PCS must redesign its networks to –95 dBm to allow for UWB interference. And it is important to note that even Time Domain concedes that this massive PCS network redesign would not eliminate UWB interference, but only reduce the level of interference (with Time Domain claiming that UWB devices "*should* not have a significant impact *unless* . . . .").

Time Domain also asserts that the probability of harmful interference is small because the most likely application of UWB technology is as a wireless LAN and it "would appear that the duty cycle of a WLAN is relatively low — perhaps less than 0.1% of the time."[20] This argument is disingenuous and highly misleading. The analogy would be for one to assert that rush hour traffic jams do not exist based on the fact that a freeway is designed to handle all traffic flows so long as the traffic flows are av-

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18 Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, "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 4-5 (Sept. 12, 2000), *appended as* Attachment 2 to the September 12, 2000 Sprint PCS and Time Domain letters.

19 Time Domain Reply Comments at 41 (emphasis omitted).

20 Time Domain Reply Comments at 42.

eraged over a 24-hour period. Time Domain's argument also ignores the clear trend in the LAN environment. As applications like video streaming, video conferencing, and voice over IP become commonplace, the duty cycle of wireless LANs will become much higher.

Time Domain finally dismisses Sprint PCS' concern that the aggregation of nearby UWB devices will significantly increase the probability of harmful interference, although it recognizes that the Telcordia model it funded concluded that "it is the density of the active TM-UWB transmitters that is of interest in determining the effect of the TM-UWB emissions."[21] Suffice it to say that Time Domain's position is not shared by the NTIA, which has characterized Time Domains assertions as "misleading" and which has concluded that the presence of multiple UWB devices in the same area will likely have a "significant" impact on interference levels.[22]

In summary, neither XtremeSpectrum nor Time Domain has presented any reason to undermine the most reasonable conclusions that can be drawn from the Time Domain/Sprint PCS/Telcordia model and testing — namely, UWB devices will cause significant harmful interference to sophisticated CDMA PCS networks. The Commission certainly cannot approve UWB based on the unsupported assertion that it "seems unlikely" that UWB interference will not be harmful to PCS networks.[23]

The Legal Issue That Neither Time Domain and XtremeSpectrum Has Addressed

Time Domain wants the Commission to enter an order that would *require* PCS licensees to share their spectrum *for free* so it can provide (or license devices that provide) telecommunications services in competition with licensed PCS services.[24] In

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21 Time Domain Reply Comments at 40 and Appendix A at 15.

22 *See* NTIA, "Assessment of Compatibility Between Ultrawideband Devices and Selected Federal Systems," NTIA Special Publication 01-43, at x, 5-25, 6-4 (Jan. 2001)("Thus, for a ten-fold increase in emitter density, the received aggregate power will increase by ten dB, and for a hundred-fold increase by 20 dB."). Time Domain also complains that the Telcordia model it funded is incomplete because it did not include multipath fading and inter-cell interference from other handsets. But in making this complaint, Time Domain does not mention other factors that were not considered and that would have increased the negative impact of UWB on PCS networks (*e.g.*, impact of inter-cell interference of UWB devices and impact of multiple UWB devices in close proximity to a handset).

23 Time Domain Reply Comments, Appendix A at 18.

24 *See, e.g.*, Time Domain Reply Comments at 2 ("[D]eployment of UWB devices is in the public interest and can be achieved by regulations that allow for compatible spectrum sharing with existing services."); at Appendix A at 15 ("Many of the UWB manufacturers are targeting the wireless local area network marketplace.").

making this proposal, Time Domain acknowledges that UWB devices will pose a risk of harmful interference, but it claims that this risk is "not significant."[25] The Commission cannot grant the Time Domain request even if it was willing to accept Time Domain's unsubstantiated claims.

Sprint PCS has paid approximately $3.5 billion to acquire and clear its PCS spectrum, and it has invested another $12 billion in constructing its nationwide, state-of-the-art CDMA network. Sprint PCS made this massive investment with the express understanding that it would hold "an exclusive right to use the designated portion of the electromagnetic spectrum for the term of the license."[26] Having received valuable consideration for issuing exclusive licenses, the Commission does not now have the legal right to convert these licenses into non-exclusive licenses and to require Sprint PCS to share its spectrum with others, much less share its spectrum for free.[27]

Conclusion

Time Domain and XtremeSpectrum dismiss the concerns of licensees holding spectrum below 3.1 GHz as "ungrounded fears" because existing licensees, "lacking hard information, tend to assume the worst."[28] Sprint PCS' concerns are neither ungrounded nor unsupported with hard facts. To the contrary, the data it has submitted (with Time Domain) documents that the risk of harmful interference by UWB devices to PCS CDMA networks is both real and significant.

The threat to the wireless industry should not be understated. The conversion to 3G is a national priority, with the President noting that the technology will create "mobile-commerce (m-commerce) that people will use in ways that are unimaginable today."[29] Mobile carriers recently paid the government $17 billion to acquire additional PCS spectrum so they can begin deploying 3G technologies and begin providing 3G-

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25 Time Domain Reply Comments at 38.

26 *Public Utility Commission of Texas,* 13 FCC Rcd 3460, 35003 ¶ 89 (1997). *See also First Microwave Relocation Order,* 7 FCC Rcd 6886, 6889 ¶ 18 (1992); *BellSouth* v. *FCC,* 162 F.2d 1215, 1223 (D.C. Cir. 1999).

27 Given that the federal government has received valuable (and sizable) consideration for issuing PCS licenses, these licenses have effectively become a contract between the government and the licensee. The Supreme Court has repeatedly held in recent years that the government becomes liable if its breaches its contracts. *See, e.g., Mobile Oil* v. *United States,* No. 99-244 (June 26, 2000); *United States* v. *Winstar,* 518 U.S. 839 (1996).

28 Time Domain Reply Comments at 2; XtremeSpectrum Reply Comments at 16.

29 President Clinton, Memorandum for the Heads of Executive Departments and Agencies, "Advanced Mobile Communications/Third Generation Wireless Systems" (Oct. 13, 2000).

based services. Importantly, all carriers have announced their intention to use CDMA-based 3G technologies because of the efficiency in which CDMA uses spectrum. Now is not the time for the Commission to authorize unfettered UWB proliferation when the facts are undisputed that UWB devices will cause harmful interference to CDMA networks.

Respectfully submitted,

Sprint Spectrum L.P., d/b/a Sprint PCS

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