Sprint

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Mr. Julius P. Knapp, Deputy Chief, OET
Ms. Lisa Gaisford, Deputy Chief, Policy and Rules Division
Mr. Michael J. Marcus, Associate Chief for Technology
Ms. Karen Rackley, Chief, Technical Rules Branch
Mr. John A. Reed, Technical Rules Branch
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
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 Mr. Knapp, Ms. Gaisford, Mr. Marcus, Ms. Rackley, and Mr. Reed:

This letter responds to certain questions posed to Sprint PCS during our meeting on June 5, 2001. Pursuant to Section 1.1206 of the Commission's rules, an original and four copies of this written presentation are being submitted for the record.

1. UWB Emissions Levels. The notice of proposed rulemaking ("NPRM") in this proceeding sought comment on an emissions level of –53dBm for UWB devices, a 12 dB reduction below current Part 15 levels. Sprint PCS and Time Domain responded by jointly submitting a Telcordia model and the results of preliminary joint testing. This data confirmed that a –53 dBm emissions level would *not* protect Sprint PCS' network from harmful interference. Specifically, the data showed that UWB devices operating at a –53 dBm emissions level would both increase call blockage and reduce the capacity of Sprint PCS' networks. Accordingly, Sprint PCS, other CMRS carriers and CMRS vendors have filed materials confirming that harmful interference will result if UWB devices are permitted to use the 1.9 GHz PCS band licensed to PCS service

During our meeting, you asked about the impact of an alternative –59 dBm emissions level. Based on the Telcordia model that Sprint PCS and Time Domain have submitted, UWB devices would still cause harmful interference to Sprint PCS' CDMA network at such an emissions level. As the attached matrix demonstrates, the Telcordia model suggests that the Commission would have to establish a *–70 dBm emissions level* before UWB devices would no longer cause harmful interference to Sprint PCS.

Time Domain has acknowledged that the Telcordia model is "an excellent theoretical analysis of the interaction between a 1.9 GHz CDMA PCS system and TM-UWB emissions."[1] Sprint PCS therefore finds it remarkable that Time Domain continues to assert that the 12 dB reduction proposed in the NPRM is "not warranted because no filing in this proceeding has demonstrated that noise-like UWB emissions at Part 15 Class B levels cause harmful interference."[2] Indeed, the Telcordia model that Time Domain has itself endorsed contradicts these unsupported assertions.

2. Multipath Fading. Certain UWB proponents have begun to criticize the Telcordia model and joint Sprint PCS/Time Domain tests as being incomplete. However, the model and tests were never designed to exhaustively study the CDMA/UWB interference issue. Sprint PCS rather commissioned this activity to obtain a preliminary assessment whether UWB devices would pose a problem to its network. The model and tests confirm that UWB devices will cause harmful interference at the emission levels discussed in the NPRM.

The Telcordia model admittedly did not take into account multipath fading, but we do *not* consider this is an issue that undermines our conclusions. CDMA, unlike other radio technologies, uses multipath signals to boost performance. The impact of multipath fading on Sprint PCS' network is limited because CDMA uses RAKE receivers that collect up to three different signal sources with differing arrival times and then combine them in order to improve reception.[3] In addition, Sprint PCS plans to deploy new technologies over the next few years to further utilize multipath signals as a source of improving reception, thereby further limiting the impact of multipath fading. Because of this, Sprint PCS does not understand where fading or the signal strength argument that some UWB proponents advance has validity.

Time Domain also criticizes the tests it conducted jointly with Sprint PCS and Telcordia by asserting that they did not reflect "real world" conditions because they were performed in a chamber. (Notably, it made no such complaints while the tests were being conducted.) It has suggested that in an ordinary cluttered environment, UWB signals would be blocked or mixed with other radio noise.

In fact, Sprint PCS, Telcordia and Time Domain did conduct tests outside of a chamber, although these outside tests certainly were not exhaustive. What is important is that an independent third party, Dr. Jay Padgett, Senior Research Scientist at Telcordia, has concluded that this field test provided "enough information to analyze the behavior of

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[1] Time Domain Reply Comments, ET Docket No. 98-153, at 39 (Oct. 27, 2000).

[2] Time Domain Ex Parte Comments, ET Docket No. 97-213, at 1 (Aug. 16, 2001).

[3] Sprint PCS is not suggesting that CDMA eliminates multipath fading, but its negative impact is reduced through the techniques described above.

the system" and that the test results were "consistent with interference calculations based on the tests in the anechoic room and with the way in which the forward [CDMA] link is understood to manage its traffic channel power allocation."[4]

Admittedly, the joint tests did not evaluate the strength of the UWB signal in a cluttered environment. Nevertheless, the line of argument that certain UWB proponents advance in response to this fact appears to conflict with the claimed benefits of UWB. Some UWB proponents have stated that UWB devices can be used as a wireless LAN with ranges of hundreds of feet. But if this is the case, how can these same proponents assert that in a "real world" office environment, UWB signals will be attenuated to the point of having no impact on PCS or other licensed services?

It bears emphasis that it is UWB proponents, and not existing licensees, that have the burden of demonstrating that there is "no potential for interference."[5] UWB proponents have not met this burden with respect to the 1.9 GHz PCS band. The facts that the Telcordia model did not take into account multipath fading and that the PCS/ UWB testing did not evaluate the strength of UWB signals do not mean that the model and test results are invalid and can be ignored. To the contrary, if UWB proponents believe these considerations would mitigate the harmful interference caused by UWB, they have the burden of demonstrating their arguments with facts (*e.g.,* a refined model, additional testing). Unless UWB proponents present such facts — and they have not done so to date — the Commission can only conclude that UWB devices will cause harmful interference to PCS CDMA systems unless emissions levels are set at –70 dBm.

3. UWB devices are "like" any unintentional radiator. A popular argument among some UWB proponents is that UWB devices are no different than hair dryers or other unintentional radiators and that as a result, rules designed for such devices should be extended to the radically different UWB technology. This is a false analogy, as numerous commenters have demonstrated. Conventional Part 15 devices are designed to have *narrowband* emissions, and they will interfere with PCS service when operating in close proximity *and* within the bandwidth of the PCS handset. In contrast, because UWB devices are designed to operate on a *wideband* basis, a UWB device need *only* be operating in close proximity to cause harmful interference. As one commenter has

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[4] Jay Padgett, Ph.D., 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 (Sept. 12, 2000), *appended as* Attachment 2 to the joint Time Domain/Sprint PCS comments submitted in ET Docket No. 98-153 on September 12, 2000.

[5] *New Channels Communications,* 57 R.R.2d 1600 ¶ 6 (1985). *See also Industrial Communications,* 6 FCC Rcd 264, 265 ¶ 12 (1990)("It is the burden of the applicant to demonstrate interference-free operation."); *Waynesboro Broadcasting,* 1 F.C.C.2d 431, 432-33 ¶ 3 (1965) ("[T]he burden of proof is upon the applicants to show that interference will not be caused to [existing] installations by their proposals.").

correctly noted, "Allowing the maximum peak power to be 60 dB as proposed in the NPRM would effectively allow a single UWB device to look like 1,000 or more –41 dBm radios spread across the band."[6] UWB interference will be especially harmful on CDMA networks, which currently use 1.25 MHz channels and with "third generation" technologies will eventually use up to 5.0 MHz channels.

Sprint PCS takes no position on whether UWB devices should be regulated under Part 15 or a new rule part, so long as the rules protect existing licensed carriers and other interested parties from interference. However, the evidence is clear that UWB devices cannot be regulated under the current Part 15 rules governing unintentional radiators.

4. UWB in the home. The suggestion was made at our meeting that interference conflicts could be addressed by each consumer, with the consumer deciding to use either UWB devices or PCS service. Sprint PCS does not believe that the government should require consumers to make this choice, especially when most consumers will not realize that their PCS handset is not working because of a UWB device they purchased. Sprint PCS invariably will receive the brunt of customer complaints, because most consumers will erroneously assume that Sprint PCS is the cause of any problems they are encountering with their PCS service. In addition, this "each customer can pick" arrangement obviously will not work in other indoor environments such as offices and shopping malls. More fundamentally, this consumer choice issue does not address the fact that UWB can reduce the capacity of Sprint PCS' network. Thus, a choice made by one consumer could adversely affect the availability and reliability of PCS services to the consumer's neighbors.

In summary, some UWB developers have acknowledged that UWB devices will cause "significant" interference to PCS systems and other licensees holding spectrum below 3 GHz.[7] Those UWB proponents favoring use of the spectrum band below 3 GHz have not met their burden demonstrating that UWB devices will not cause harmful interference. These UWB proponents have failed to explain how the Commission can lawfully permit them to use spectrum that has been licensed exclusively to Sprint PCS (in return for a payment to the U.S. Treasury of over $3 billion) and others. Even assuming the Commission possesses the authority to convert PCS licenses from exclusive to non-exclusive licenses, these UWB proponents have not addressed how the federal

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[6] Metricom UWB Technical Appendix, ET Docket No. 98-153, at 1 (Sept. 12, 2000).

[7] *See* Multispectral Solutions Reply Comments, ET Docket No. 97-213, at 1-2 (Oct. 27, 2000). *See also* Multispectral Solutions Reply Comments at 4 (July 31, 2001)("[T]he interference effects of USB transmissions to existing spectrum users has been well documented."); Fantasma Network Comments at 3 (Sept. 12, 2000); Multispectral Solutions Comments at 12 (Sept. 12, 2000)("[W]hile some UWB advocates have claimed that UWB operates in the "garbage band" and can superimpose its emissions on existing services without interference thereby "creating spectrum," such statements are without basis in fact and, in fact, have shown to be false.").

government could avoid liability for the sizable costs that Sprint PCS and other CMRS carriers would incur in attempting to overcome UWB interference.

One UWB developer, Multispectral Solutions, has proposed permitting UWB devices in the band between 3.1 to 12.0 GHz (or, alternatively, 5.46 to 12.0 GHz) precisely because it recognizes that UWB devices will cause harmful interference to services licensed in bands below 3.1 GHz.[8] Operation of UWB devices below 3.1 GHz (or 5.46 GHz) would be permitted in the future – but only if real world data of authorized UWB devices becomes available demonstrating no harmful interference and only after additional public comment and Commission review.

Sprint PCS believes this is a reasonable approach.[9] This approach would permit UWB developers to introduce their technology in the market while protecting PCS systems and other existing licensees until UWB proponents can establish with *facts* that their devices will not cause harmful interference — if such facts can be shown. Sprint PCS encourages the Commission to adopt this Multispectral Solutions proposal. In all events, Sprint PCS urges the Commission to reject the proposal to permit UWB use of the 1.9 GHz band or any other band that might be reallocated to CMRS.

Please contact us should you have questions regarding the foregoing.

Sincerely,

Luisa L. Lancetti

Attachment

[8] *See* Multispectral Solutions Ex Parte, ET Docket No. 98-153 (July 25, 2001).

[9] Sprint has not examined the impacts of UWB devices in the spectrum band between 3.1 and 5.46 GHz. Accordingly, it is not in a position to recommend that the cut-off should be at 3.1 GHz, 5.46 GHz, or somewhere in between.

Attachment A with -59, -62, -67, -70
UWB Impacts on PCS Handset Noise Floor, Demand for Capacity, and Blocking

	Increase in Receiver Noise Floor Due to UWB		Add'l PCS Power Demand @ 2 Meter UWB Distance Given RSSI (dBm)		Chg. in Users Supportable @ 2 Meter UWB Distance Given RSSI (dBm)	
	@4 meters	@2 meters	@ -90	@-100	@ -90	@-100
Handset Loss=0(*)						
UWB PSD = -41	15dB	21dB	Blocked	Blocked	Blocked	Blocked
-53	4.7dB	9.5dB	47%	Blocked	-32%	Blocked
-59	1.8 dB	4.8 dB	12%	77%	-11%	-43%
-62	0.96dB	3.0 dB	6%	39%	-6%	-28%
-67	.33 dB	1.19 dB	2%	12%	-2%	-11%
-70	.17dB	.64dB	1%	6%	-1%	-6%

	Blocking Rates Due to UWB if 1/X Calls Are Exposed					
	@4 meters		@3 meters		@2 meters	
	1/20	1/5	1/20	1/5	1/20	1/5
Handset Loss=0(*)						
UWB PSD = -41	4.3%	17.2%	4.5%	18.0%	4.7%	18.7%
-53	2.3%	9.2%	2.9%	11.5%	3.5%	14.2%
-59	1.0%	4.1%	1.5%	6.1%	2.3%	9.3%
-62	0.6%	2.4%	0.9%	3.8%	1.6%	6.5%
-67	0.2%	0.9%	0.4%	1.4%	0.1%	2.9%
-70	0.1%	0.4%	0.2%	0.8%	0.4%	1.6%