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

In the Matter of	)	
	)	
Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems	)	ET Docket 98-153
	)	
	)	

SPRINT PETITION FOR RECONSIDERATION

Luisa L. Lancetti
Vice President, PCS Regulatory Affairs
Sprint Corporation
401 9th Street, N.W., Suite 400
Washington, D.C. 20004
202-585-1923

Charles W. McKee, General Attorney
Scott Freiermuth, Attorney
Sprint Corporation
6450 Sprint Parkway
Mail Stop: KSOPHN0212-2A553
Overland Park, KS 66251
913-315-8521

June 17, 2002

Table of Contents

Summary of Petition iii

I. Introduction 1

II. The Commission Committed Legal Error in Ruling That PCS Licensees Do Not Hold Exclusive Licenses 4

III. The Commission Did Not Correctly Apply the Burden of Proof 8

IV. The Commission Erred in Failing to Address the Most Pernicious Harm UWB Devices Impose on PCS Systems – Loss of Network Capacity and Coverage..... 10

V. The Indoor UWB Emissions Level in the PCS Band Is Unexplained, Contrary to the Record Evidence, and Arbitrary and Capricious 14

VI. The UWB Order Conflicts with the Commission's E911 Policies and Requirements 20

A. The Commission Failed to Adequately Protect Use of GPS Indoors for E911 Applications 21

B. The Commission's Failure to Provide Any Protection in the PCS Band For Indoor E911 Applications Is Arbitrary and Capricious 24

VII. The Commission's Failure to Protect PCS Is Inexplicable Because UWB Emissions in the PCS Band Are Spurious Emissions..... 26

VIII. The Commission Erred By Not Adjusting UWB Emissions Levels in the PCS Band to Account for the Cumulative Effect of UWB Interference 27

IX. UWB Surveillance Systems Should Be Subject to the Same Rules Applicable to Indoor and Outdoor/Hand Held UWB Devices 30

X. The Commission Should Reconsider the Send/Acknowledge Requirements Imposed on UWB Devices 35

XI. The Commission Should Require UWB Developers to Make Their Devices Available for Testing..... 36

XII. Conclusion 39

Attachment 1: Operational Overview of the IS-95 CDMA Downlink

Attachment 2: Review and Analysis of the Sprint/Time Domain UWB-to-PCS Interference Tests

Summary

Sprint raises ten issues in its petition for reconsideration of the *UWB Order*:

1. The *Order's* conclusion that PCS licensees do not hold exclusive licenses is unexplained and inconsistent with Commission precedent. The Commission summarily rejected Sprint's argument that PCS licensees hold exclusive licenses, but in doing so, it failed to address any of the precedent Sprint had cited. This omission is itself reversible error. However, the rejection of Sprint's argument is also inconsistent with the position the Commission presented to the Supreme Court only two weeks later, when it told the Court that PCS licenses constitute "exclusive licensing arrangements" and "executory contracts":

> Under FCC licenses, performances are owed by both the licensee and the FCC. While [licensees] must obey FCC rules and make the required [auction] payments, *the FCC must protect [licensees'] exclusive right to the spectrum and refrain from authorizing others to use that spectrum.*

The Commission cannot justify its new intrusion on PCS bands based on the Part 15 rules, because those rules, as they were at the time of the PCS auctions, prohibited virtually all UWB devices.

2. The Commission did not correctly apply the burden of proof. In the NPRM, the Commission specifically asked parties to submit interference tests because "the information they yielded would be important for developing emissions limits for UWB devices." One would have expected UWB developers would have submitted such studies, since they have the burden of demonstrating their devices would not cause harmful interference and since only they have ready access to UWB devices. Yet, for the most part, UWB developers did not conduct such tests for the licensed services (or if they did, chose not to submit the results in the record). Sprint and others attempted to fill the void. Yet, the Commission ignored entirely one of the tests that Sprint submitted, mentioned the Telcordia Model without discussing its implications, and completely misinterpreted the other tests submitted. The Commission refused to consider certain E911 test data submitted by Qualcomm, stating that the data was "inconclusive," when UWB proponents submitted no test data of their own concerning UWB impacts to E911 service. As a practical matter, the Commission shifted the burden of proof to existing licensees to demonstrate that UWB devices would cause harmful interference. This constitutes legal error. Further, the Commission then ignored the evidence submitted by Sprint and others demonstrating harmful interference.

3. The *Order's* failure to address the most serious harmful interference to Sprint constitutes legal error. The Commission recognized its responsibility to protect existing licensees from harmful interference, and the *Order* states that the UWB emissions levels established will ensure that existing licensees are protected from harmful interference. Yet, the *Order* fails even to mention the most significant harm that Sprint will likely sustain as a result of UWB interference: a material loss of network coverage and capacity. Sprint demonstrates that certain UWB developers misled the Commission concerning the operating parameters of CDMA technology and that as a result, most of the Commission's conclusions concerning CDMA are factually erroneous. Supporting technical detail is provided in Attachments 1 and 2.

4. The indoor UWB emissions level in the PCS band is arbitrary and capricious. The Commission did not explain how it arrived at an indoor UWB emissions level of –53.3 dBm in the PCS band, and this omission constitutes reversible error. As an appellate court reminded the Commission only last November in reversing the Commission's interference analysis in a different proceeding:

> [T]he Commission provided no such clarity as to its choice of the appropriate interference threshold. . . . Conclusory explanations for matters involving a central factual dispute where there is considerable evidence in conflict do not suffice to meet the deferential standards of our review. Basic principles of administrative law require the agency to "examine the relevant data and articulate a satisfactory explanation of its action including a rational connection between the facts found and the choice made."

The irrationality of the indoor UWB mask is further confirmed by the fact that it is 10 dB *less stringent* than the outdoor/handheld UWB limit. It is more difficult for PCS carriers to serve their customers indoors because of the signal loss caused by building attenuation. Even assuming *arguendo* the validity of the –63.3 dBm mask for outdoor/hand held UWB devices, the indoor UWB emissions level should have at least been set at–68.3 dBm so as to maintain parity between indoor and outdoor coverage degradation due to UWB interference.

5. The *Order* conflicts with the Commission's E911 rules and policies. Mobile carriers are investing millions of dollars to provide public safety agencies with the location of 911 callers, and the Commission has imposed rigorous location accuracy requirements on carriers. The *Order* recognized the importance of E911 location accuracy by adding extra protection in the GPS band to "protect the newly emerging GPS-based indoor E-911 systems and their safety implications from UWB devices." Yet, the Commission decided not to extend similar protections in the PCS bands, although the two bands are in close proximity. Protecting the GPS portion of carrier E911 Phase II systems makes no sense if the Commission does not extend similar protections to the PCS portion of E911 Phase II systems, since the GPS information is transmitted over the PCS band. More fundamentally, the decision not to protect the PCS band may mean that carriers will be prevented from providing to public safety agencies the location accuracy they would otherwise be capable of supporting. And, the Commission certainly cannot legitimately impose on PCS carriers certain location accuracy requirements, but then take steps that inhibit them from meeting the requirements.

6. The Commission's failure to adequately protect PCS is inexplicable because UWB emissions in the PCS band are spurious emissions. The Commission has acknowledged that UWB emissions in the PCS band are spurious, which means that they are not required for UWB devices to operate. Thus, the Commission could have provided adequate protection in the PCS band without impacting the ability of UWB devices to achieve their intended function. This is irrational and is arbitrary and capricious.

7. The Commission erred in not adjusting UWB emissions levels in the PCS band to account for the cumulative effect of UWB interference. The *Order* acknowledges that the cumulative interference effects of multiple UWB devices pose additional problems to PCS networks and other radio systems. Although the Commission adopted more rigorous UWB emissions in the GPS band to protect against the effects of cumulative interference, it did not do the same for the

PCS band, although the two bands are in close proximity. This unexplained disparity in treatment is arbitrary and capricious.

8. UWB surveillance systems should be subject to the same rules applicable to indoor and outdoor/hand held UWB devices. The decision to regulate UWB surveillance systems "in the same way as through-wall imaging systems" is arbitrary and capricious given the Commission's concession that "technically these [surveillance] devices are not imaging systems." The less stringent rules the Commission adopted for surveillance systems are unexplained.

9. The Commission should reconsider the send/acknowledgement requirements imposed on UWB devices. The Commission required some, but not all, UWB devices to stop transmissions under certain circumstances. The decision to exclude some UWB devices from this requirement is unexplained and arbitrary and capricious as a result. The decision to use a 10-second time period is also unexplained, and arbitrary and capricious.

10. The Commission should require UWB developers to make their devices available for testing. For the most part, UWB developers chose not to conduct any interference tests even though they have the burden of demonstrating non-interference and even though the Commission specifically requested such tests. Sprint and others are prepared to do the tests that UWB developers are unwilling to perform, but with a few exceptions, UWB developers have been unwilling to make their devices available for testing. It is time for the Commission to order all UWB developers to make their devices available for testing so it can make its decisions based on concrete facts. The Commission should be concerned by the refusal of certain UWB developers to make their devices available for testing.

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

In the Matter of	)	
	)	
Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems	)))	ET Docket 98-153

SPRINT PETITION FOR RECONSIDERATION

Sprint Corporation, on behalf of its wireless division, Sprint Spectrum L.P., d/b/a Sprint PCS ("Sprint"), and pursuant to Section 405 of the Communications Act,[1] petitions the Federal Communications Commission ("Commission") to reconsider those portions of the First Report and Order in this proceeding ("*UWB Order*") discussed below.[2]

I. INTRODUCTION

Sprint supports innovative new technologies, including ultra-wideband ("UWB"). Indeed, Sprint will be activating later this summer this country's first nationwide third-generation CDMA network. Sprint also evaluated UWB technology early on with Time Domain Corporation ("TDC") to better understand this new technology and its potential.

Sprint's problem is not with UWB technology, but with the *UWB Order*. The *Order* states that the Commission is proceeding "cautiously" in authorizing UWB technology and that

---

[1] 47 U.S.C. § 405(a).

[2] *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, *First Report and Order*, FCC 02-48 (April 22, 2002), *summarized in* 67 Fed. Reg. 34852 (May 16, 2002)("*UWB Order*"). All citations in this petition to party comments or ex partes are to ET Docket No. 98-153 unless otherwise noted.

By motion dated June 14, 2002, Sprint sought the Commission's leave to submit a reconsideration petition longer than 25 pages. The additional pages are needed due to the number of issues raised and the technical complexity of this proceeding.

the UWB emissions levels adopted are "extremely conservative."[3] These beliefs, however, are contradicted by the record evidence, at least as applied to the 1.9 GHz PCS band. The UWB emission levels established in the *UWB Order* will likely have the following effects on Sprint PCS:

- Service quality will decrease, especially indoors, as customers will find it more difficult to access Sprint PCS' network (to originate or receive calls) or will encounter increased instances where calls in progress suddenly drop;
- Customers will encounter coverage "gaps" that did not exist before, because the coverage of Sprint's existing network will be reduced from UWB interference;
- The capacity of Sprint's existing CDMA network will be reduced as Sprint uses more power to compensate for UWB inference, meaning that Sprint will be able to serve fewer customers with its existing network; and
- The location accuracy that Sprint will to provide to public safety agencies with E911 calls (assuming the calls can even be made) will be less precise than the accuracy Sprint would otherwise make available.

What makes the *Order* so troubling – and inexplicable – is that the UWB emissions levels that Sprint needs to protect its network from harmful interference would *not in any way adversely affect the ability of UWB devices to perform their designed functions*. The Commission has correctly required that most UWB applications must operate in frequency bands above 3.1 GHz. UWB emissions in the 1.9 GHz PCS band are thus spurious emissions, which means they can be reduced "without affecting the corresponding [UWB] transmission of information."[4] The *Order* thus needlessly harms Sprint's PCS network even though these harms are completely unnecessary for PCS and UWB to coexist.

---

[3] *UWB Order* at ¶¶ 1 and 2. According to TDC's Chief Executive Officer, in this *Order* the word "'conservative' appears 30 times, the work 'cautious' appears 11 times, and the word 'limited' appears 36 times. *See* Ralph Gregory Petroff, Prepared Testimony before the House Committee on Energy and Commerce, FCC's UWB Proceeding: an Examination of the Government's Spectrum Management Process (June 5, 2002).

The fundamental problem is that the Commission ignored most of the extensive data that Sprint submitted – including the Telcordia Model that UWB developers have acknowledged is an "excellent theoretical analysis of the interaction between a 1.9 GHz CDMA PCS system and TM-UWB emissions,"[5] and the Part 15 interference study demonstrating that the interference impacts of traditional narrowband Part 15 devices are radically different than UWB wideband devices.[6] Largely due to certain unsupported "red herrings" made by a few UWB developers, the Commission also misinterpreted the Sprint test data that it did consider. The supplemental PCS/UWB analysis the FCC Staff subsequently released *after* issuance of the *UWB Order* further demonstrates a fundamental misunderstanding of CDMA technology – a misunderstanding that invariably led the Commission to reach faulty conclusions concerning the impacts of UWB devices on CDMA networks.[7] The UWB emissions levels that the Commission established for the PCS bands are unexplained – and, in fact, are contrary to the record evidence.

The Supreme Court has held that an agency decision may be affirmed on appeal only if the agency "examines the relevant data and articulates a satisfactory explanation for its action including a rational connection between the facts found and the choice made."[8] The Court has further ruled that an agency decision "would be arbitrary and capricious if the agency . . . entirely

---

[4] *See* 47 C.F.R. § 2.1 (Spurious emissions defined as "[e]mission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information.").

[5] Time Domain Reply Comments at 39 (Oct. 27, 2000). *See also* XtremeSpectrum Ex Parte at 4 (Jan. 3, 2002)(Telcordia Model is "well designed and carried out.").

[6] *See* Sprint Ex Parte (Jan. 30, 2002), Appendix A, *Ambient Office Noise/Personal Communications and the Relative Impact of UWB Devices* (Jan. 18, 2002).

[7] *Compare* FCC Staff, *Potential Interference to PCS from UWB Transmitters Based on Analyses from Qualcomm,* ET Docket No. 98-153, at 4 (May 3, 2002)("FCC PCS/UWB Staff Report") *with* Attachment 1. The release of a Staff analysis *after* release of the *Order* (although the analysis is post dated back to the date of the *Order's* adoption date) also raises a host of issues under the Administrative Procedures Act.

failed to consider an important aspect of the problem [or] offered an explanation for its decision that runs counter to the evidence before the Commission."[9] The *UWB Order* does not meet these basic requirements of the Administrative Procedures Act. And, as an appellate court reminded the Commission recently, interference standards will not be affirmed simply because the Commission says they are "conservative" when it does not explain the factual basis for requirements.[10] The *Order* is fraught with so many errors, legal and factual, that the Commission should voluntarily stay the effective date of the *Order*.

II. THE COMMISSION COMMITTED LEGAL ERROR IN RULING THAT PCS LICENSEES DO NOT HOLD EXCLUSIVE LICENSES

Sprint paid the U.S. Treasury over $3 billion to acquire its PCS spectrum, and it has invested billions more to clear the spectrum and construct a nationwide, state-of-the-art PCS network. Sprint made this massive investment because the Commission declared that PCS licenses were exclusive:

> The Commission's grant of a PCS license confers on the licensee *an exclusive right* to use the designated portion of the electromagnetic spectrum for the term of the license.[11]

In the *UWB Order*, however, the Commission rejected Sprint's argument regarding exclusivity in the following two sentences, unsupported by any citation to precedent:

---

[8] *Motor Vehicle Manufacturers Ass'n* v. *State Farm,* 463 U.S. 29, 43 (1983).

[9] *Id.*

[10] *See AT&T Wireless* v. *FCC,* 270 F.3d 959, 968 (D.C. Cir., Nov. 9, 2001).

[11] *Public Utility Commission of Texas,* 13 FCC Rcd 3460, 3503 ¶ 89 (1997)(emphasis added). *See also PCS Reconsideration Order,* 9 FCC Rcd 7805, 7807 ¶ 10 (1994)("[W]e did not adopt an open architecture spectrum plan [for PCS] but instead adopted a plan with only one license per spectrum block per service area."); *Implementation of Section 309(j),* 10 FCC Rcd 7970, 7995 ¶ 42 (1994)("[A] licensee has exclusive use of a block of contiguous channels, such as in cellular and PCS."); *BellSouth* v. *FCC,* 162 F.3d 1215, 1223 (D.C. Cir. 1999)("CMRS spectrum is a finite resource and is also exclusive in that whatever one entity holds cannot be held by another.").

> [N]o such contractual exclusivity exists. This spectrum is not, and has never been, exclusive to Sprint or to any other licensee or user.[12]

This rationale is factually incorrect and legally unsound, as evidenced by prior Commission orders that Sprint had cited to the Commission.[13]

This Commission ruling is not simply incompatible with the position the Commission had taken before the *UWB Order*, it is also inconsistent with the position the Commission has taken since release of the *Order*. The Commission told the Supreme Court only one month ago that PCS licensees possess "exclusive right to the spectrum" and that these "exclusive licensing arrangements" at minimum constitute executory contracts:

> Under FCC licenses, performances are owed by both the licensee and the FCC. While [licensees] must obey FCC rules and make the required [auction] payments, *the FCC must protect [licensees'] exclusive right to the spectrum and refrain from authorizing others to use that spectrum.* Courts generally conclude that analogous exclusive licensing arrangements made by private parties for commercial reasons are "executory."[14]

The Commission also attempts to support its argument that PCS licenses are not exclusive on the grounds that "Part 15 transmitters currently are permitted to operate within the PCS" band.[15] The Part 15 rules cannot be used to justify an entirely new use of the PCS band because the Part 15 rules had prohibited virtually all UWB devices.[16]

---

[12] *UWB Order* at ¶ 271.

[13] *See, e.g.*, Sprint Reply Comments at 13-15 (Oct. 27, 2000); Sprint Ex Parte at 7-8 (Feb. 21, 2001); Sprint Ex Parte at 7-8 (Jan. 30, 2002). Sprint will not repeat here citation to Supreme Court cases holding the federal government liable in damages for breach of license contracts. However, if Sprint is correct concerning the harmful effects of UWB interference to PCS networks and if UWB developers are correct that they will manufacture more than a billion devices annually, the government's damage liability could be enormous.

[14] *FCC* v. *NextWave Personal Communications*, Nos. 01-653 and 01-657, Brief for the Federal Communications Commission, at 46 n.10 (May 6, 2002)(emphasis added).

[15] *UWB Order* at ¶ 271. Of course, PCS licensees acquired their spectrum subject to preexisting use by Part 15 devices – although importantly, Part 15 devices must accept whatever interference PCS causes to them and such devices cannot cause any interference to PCS. *See UWB NPRM,* 15 FCC Rcd 12086,

The Commission further suggests that UWB devices cannot harm PCS licensees because Part 15 transmitters are permitted to operate "at considerably higher emission levels than those to be adopted in this Report and Order."[17] This assertion, however, ignores that the type of interference Part 15 devices generate is fundamentally different from the type of interference UWB devices generate, as Sprint had repeatedly explained to the Commission.[18] In this regard, the Commission itself has already recognized that UWB emissions are "considerably different from those of unintentional radiators and conventional Part 15 transmitters," and as a result, could "cause a greater amount of harmful interference to other radio operations than digital [Part 15] devices."[19] Indeed, the Commission commenced this docket *because* UWB devices could *not* be approved under the Part 15 rules as a result of their fundamental differences from Part 15 devices.[20]

12087 n.3 (2000). However, approval of certain secondary use of the PCS band *before* the PCS auction does not authorize the Commission to approve additional and fundamentally different use of the PCS band *after* the PCS auction – especially when UWB developers state their technology will be integrated "into hundreds of applications of existing products" and that they expect to manufacture "over a billion chips per year." *See* Sprint Reply Comments at 10 and n.36 (Oct. 27, 2000).

[16] Under its rationale, the FCC could authorize anyone to use the PCS band simply by re-designating the applicable service rules into Part 15.

[17] *UWB Order* at ¶ 271. The FCC further noted that UWB emissions are spurious only. *See id.* However, the harm of interference is the same whether or not the interferor is operating intentionally or not. To the contrary, the fact that the UWB emissions are spurious makes the *Order* more indefensible, because as Sprint explains in Part VII below, *adoption of more stringent UWB emissions levels in the PCS band would not inhibit UWB devices from accomplishing their intended purposes.*

Sprint cannot respond to the final point made – there are "countless other devices that emit radio emissions within [the PCS] band" (*id.*) – because the FCC has not identified these other devices, and Sprint does not know what devices the FCC might be referring to. The FCC appears to be saying that because there is some pollution, it is acceptable to permit additional pollution.

[18] *See, e.g.,* Sprint Reply Comments at 4-6 (Oct. 27, 2000); Sprint Ex Parte at 3-4 (Sept. 10, 2001); Sprint Ex Parte at 2-4 and Attachment (Jan. 30, 2002).

[19] *UWB NPRM,* 15 FCC Rcd 12086, 12104 ¶ 40 (2000). Part 15 devices involve "relatively narrowband systems," while UWB devices entail "very wideband systems." *UWB Order* at ¶ 8.

[20] *See UWB NPRM,* 15 FCC Rcd at 12088 at ¶ 4; *UWB NOI,* 13 FCC Rcd 16376, 16377 ¶ 5 (1998).

All available record evidence confirms that the interference impacts of UWB devices are fundamentally different than Part 15 devices, especially to carriers like Sprint that use a wide-band air interface like CDMA.[21] Sprint submitted in the record the results of a series of tests it conducted to compare the impact in the PCS band of Part 15 devices and UWB devices.[22] The ambient noise measurements were made inside an office environment under "real world" conditions. The study found that "current Part 15 unintentional radiators, as well as some intentional radiators (*e.g.*, wireless LANs), operate well below those levels that cause interference with PCS networks and well below the power levels permitted by Part 15."[23] In stark contrast, the data for UWB devices showed a negative impact to the measured PCS noise floor by increasing the noise floor by 13 dB at –53 dBm – the emissions level the *UWB Order* authorized for indoor devices. Sprint advised the Commission:

> An increase in the noise floor at these levels would result in a decrease in PCS air interface capacity and increase the probability of dropped calls. In short, UWB interference would deteriorate the quality of existing PCS services.[24]

In sum, the Commission's decision that PCS licensees do not hold exclusive licenses is inconsistent with Commission precedent – both before and after the *UWB Order*. The Commis-

---

[21] CDMA uses spectrum so efficiently in part because of its use of widebands of spectrum to act as a single carrier of information. Current CDMA (IS-95) uses 1.25 MHz channels for transmission. This broad range of spectrum allows CDMA to overcome temporary and narrowband spikes of power within its frequency range, the types of spikes from typical Part 15 unintentional radiators. When averaged across the full 1.25 MHz, the resulting average power density is very low. UWB devices, in contrast, will generate power across the entire license of spectrum used by the CDMA carrier, and thus have the effect of generating far more harmful interference than a narrowband Part 15 device.

[22] *See* Sprint Ex Parte (Jan. 30, 2002), Appendix A, *Ambient Office Noise/Personal Computers and the Relative Impact of UWB Devices* (Jan. 18, 2002)("Sprint Ambient Noise Study"). Others confirmed Sprint's test results. *See, e.g.*, Qualcomm Ex Parte, Study Results at 1 (Feb. 6, 2002)("The tests did not show that the gpsOne receiver experienced any interference problems [with Part 15 devices] equivalent to the type of harmful interference that Qualcomm experienced when it tested the type of performed of a gpsOne receiver with a nearby UWB device.").

[23] Sprint Ambient Noise Study at 1.

[24] *Id.*

sion's treatment of UWB devices as simply another category of Part 15 devices is also inconsistent with the record evidence and the Commission's own prior observations. Sprint urges the Commission to reconsider these decisions.

III. THE COMMISSION DID NOT CORRECTLY APPLY THE BURDEN OF PROOF

Sprint repeatedly advised the Commission that UWB proponents have the burden of demonstrating convincingly that their proposed use of the PCS band will entail "no potential for interference."[25] As the Commission has recognized:

> The burden of proof is on the applicants and unless it has been shown affirmatively that either or both of the proposed antenna systems will function without the hazard of interference, the burden has not been sustained.[26]

Remarkably, in an *Order* over 90 pages in length involving the authorization of a radically new technology that will use spectrum licensed to hundreds of different persons, the Commission does not once mention the legal obligation of UWB proponents to "demonstrate conclusively that [their proposed] technology could not cause harmful interference to" authorized services.[27]

The Commission has recognized that the adoption of emissions limits for a new radio technology "requires a firm understanding of the characteristics of UWB signals, their impact on victim receivers, and the minimum separation distance between UWB devices and victim receivers."[28] The Commission thus specifically "encouraged" in the *NPRM* the conduct of interference tests because "the information they yielded would be important for developing emission limits

---

[25] *New Channels Communications,* 57 R.R.2d 1600 ¶ 6 (1985).

[26] *Cosmopolitan Enterprises,* 15 F.C.C.2d 659, 674 No. 4 (1967). *See also* AirCell, 15 FCC Rcd 9622, 9629 ¶ 18 (2000)("AirCell was required to make an affirmative showing that its system is not likely to cause harmful interference to terrestrial cellular operations.").

[27] *Non-Geostationary Satellite Orbit Fixed-Satellite Service,* 14 FCC Rcd 1131, 1180 ¶ 98 (1998).

[28] *UWB Order* at ¶ 222.

for UWB devices."[29] In other proceedings, persons proposing to begin using spectrum already utilized by others have conducted tests to meet their burden of demonstrating the absence of interference.[30] In stark contrast, UWB developers largely conducted no interference tests – even though as a practical matter only they could conduct such tests (because only they had access to their UWB devices). Thus, unlike the situation with the sharing of the 12 GHz DBS band, where the Commission enjoyed "the benefit of the extensive analytic record derived from the MITRE Report as well as the experimental MVDDS test operations,"[31] the Commission here in its own view had "limited information in the record."[32]

Sprint and other parties such as Qualcomm attempted to fill the void that UWB proponents had created. Sprint prepared an Ambient Noise Study, which the *UWB Order* ignored.[33] With Time Domain, Sprint commissioned the Telcordia Model, which the *UWB Order* mentioned in passing only, without any discussion of its implications and meaning.[34] The Commission did consider the results of limited Sprint/Time Domain tests, but as Sprint demonstrates in Part IV below and in Attachment 2, the Commission has misinterpreted the data. The numerous conclusions the Commission made with respect to the CDMA air interface are factually incorrect – inexplicably, the Commission chose to accept the representations of a UWB developer rather than the statements of a telecommunications carrier that has built and operates a nationwide CDMA network.

---

[29] *Id.* at ¶ 70.

[30] *See, e.g., 12 GHz Sharing Reconsideration Order,* ET Docket No. 98-206, FCC 02-116, at ¶¶ 8, 9 and 36 (April 11, 2002).

[31] *12 GHz Sharing Reconsideration Order,* ET Docket No. 98-206, FCC 02-116, at ¶ 36 (April 11, 2002).

[32] *See UWB Order* at ¶ 183.

[33] *See* Sprint Ex Parte (Jan. 30, 2002), Appendix A, *Ambient Office Noise/Personal Computers and the Relative Impact of UWB Devices* (Jan. 18, 2002)("Sprint Ambient Noise Study").

Qualcomm also submitted analyses of the impact of UWB interference on E911 Phase II location systems when it became apparent UWB developers intended to ignore this important subject. One would have expected that in response, the Commission would have asked UWB developers to submit their own UWB/E-911 tests if they believed Qualcomm's tests were inadequate. Instead, the Commission dismissed certain Qualcomm test data as "inconclusive."[35]

Several conclusions can be drawn from the foregoing. First, the UWB developers did not make an affirmative showing that their proposed devises would not cause harmful interference to existing licensees. Second, the Commission unlawfully imposed on existing licensees the obligation to prove that UWB devices would cause interference. And finally, the Commission failed to consider most of the evidence that PCS interests submitted, evidence that showed harmful interference from UWB devices. These Commission decisions constitute legal error.

IV. THE COMMISSION ERRED IN FAILING TO ADDRESS THE MOST PERNICIOUS HARM UWB DEVICES IMPOSE ON PCS SYSTEMS – LOSS OF NETWORK CAPACITY AND COVERAGE

The Commission acknowledged its obligation to protect licensed services from harmful interference and further stated that it is "concerned about harmful interference" to authorized services.[36] Yet, the *Order* suggests the Commission believes that harmful interference from UWB devices is not a major problem. Such a view is erroneous and counter to the record evidence.

The Commission first suggests that UWB interference will not be a problem because it is "likely that the UWB emissions would be somewhat below the maximum level permitted under

---

[34] *See UWB Order* at ¶ 155.

[35] *UWB Order* at ¶ 110.

[36] *See, e.g., UWB Order* at ¶ 62.

the rules."[37] *There is no record evidence supporting this view*, nor is there any basis in fact to assume that UWB device designers will not take full advantage of the rules.[38] This is especially the case given that several major UWB developers took the position that the existing (and less stringent) Part 15 emissions levels should apply to their UWB devices.[39] If the Commission truly believes that UWB developers will likely design their products to have lower emissions levels than those specified in the *Order*, then the "conservative" approach would be to reduce the authorized emissions levels so UWB devices pose less risk of harmful interference.

The Commission further suggests that any interference can be fixed easily: "Any interference at close distances can be easily remedied by moving the devices a short distance apart."[40] The Commission's "solution" – move away from the UWB interference – is not a solution at all. As Sprint discusses more fully below, there are serious legal and practical problems with this proposed "solution," and the Commission must reconsider its "solution."

Sprint is troubled because the *UWB Order* fails even to address the most pernicious harm that UWB presents to CDMA PCS systems: loss of network capacity and coverage. Sprint repeatedly explained to the Commission that UWB interference would reduce the capacity of its network:

> At the –53.2 dBm/MHz emissions level discussed in the *Notice*, a fair signal (-90 dBm RSSI) PCS handset will ask for 8% more power when exposed to a UWB

---

[37] *UWB Order* at ¶ 169.

[38] In contrast, FCC Staff makes just the opposite assumption, when it states that it is "reasonable" for PCS systems to operate at or near the maximum signal level permitted by FCC rules. FCC Staff, *Potential Interference to PCS from UWB Transmitters Based on Analyses from Qualcomm*, ET Docket No. 98-153, at 4 (May 3, 2002)("FCC PCS/UWB Staff Report").

[39] *See, e.g.*, Time Domain Comments at 8 (Sept. 12, 2000)("UWB devices will cause the same amount or less interference than unintentional emitters operating under Part 15."); XtremeSpectrum Comments at 9-10 (Sept. 12, 2000)(supports existing Part 15 rules for UWB).

[40] *UWB Order* at ¶ 159.

> device two meters away. A weaker signal (-100 dBm RSSI) PCS handset will demand 50% or power.[41]

The total downlink power in a CDMA network is fixed. Thus, to the extent that PCS handsets require more power in an attempt to compensate for UWB interference, less power will be available to serve other handsets, including customers that obtain service today.

The *UWB Order* and the accompanying FCC PCS/UWB Staff Report indicate that the Commission holds fundamental misunderstandings regarding CDMA technology. For example, the Staff Report repeatedly states that "the staff does not agree with Sprint that its PCS system is designed to work at a thermal noise floor level of –105 dBm":

> Simply, it is not reasonable to design a communications system to operate at or near the thermal noise floor of the receiver. . . . The statement from Sprint PCS that PCS systems operate at the –105 dBm thermal noise floor is unreasonable.[42]

Yet, in the very next sentence, the Staff concedes that it based its "unreasonableness" conclusion without any supporting facts:

> However, we do not have any data regarding the actual signal levels employed in PCS systems.[43]

Sprint specifically advised the Commission that in its link budget analyses, it uses "a receive sensitivity of –105 dBm with the intent of having handsets operate at this level of sensitivity."[44] Sprint further advised the Commission that it would incur "enormous costs if, as Time Domain suggests, Sprint PCS must redesign its networks to –95 dBm to allow for UWB interference."[45] Sprint does not have the burden to prove that UWB will cause interference; as demon-

---

[41] Sprint Supplemental Comments at 4 (Oct. 2, 2000).

[42] FCC PCS/UWB Staff Report at 4, 5 and 6.

[43] *Id.* at 6.

[44] Sprint Ex Parte at 6 (Feb. 21, 2001).

[45] *Id.*

strated above, it is UWB developers that have the "affirmative burden" to demonstrate the absence of interference. However, Sprint finds it troubling that the Commission would believe the undocumented representations of a UWB developer, which has no operational experience with CDMA technology, over the statements of a telecommunications carrier that has constructed and operates a nationwide CDMA network.[46]

The *UWB Order* and the accompanying Staff Report contain numerous misconceptions about CDMA technology. Sprint identifies these errors in Attachment 1, *Operational Overview of the IS-95 CDMA Downlink*, and demonstrates (mathematically where necessary) why the Commission's conclusions are without factual basis.

Similarly, the Commission accepted Time Domain's assertion that the Sprint/Time Domain field tests were inconsistent with the Telcordia Model and the anechoic chamber tests.[47] The Commission accepted Time Domain's assertion even though the Telcordia scientist that prepared the Model and the test procedures concluded that the field-test data *confirmed* the Model's prediction.[48] Even more remarkable is that the Commission considered the field tests to the exclusion of the anechoic chamber tests, given its holding elsewhere in the *UWB Order*:

> One commenter criticized the NTIA and DOT measurements programs for not including outdoor radiated measurements in assessing the impact of UWB devices

[46] In the end, it is legally irrelevant whether the FCC believes that Sprint's design of its PCS network is reasonable or not, given that Sprint paid the U.S. Treasury over $3 billion for the exclusive right to use the PCS bands it acquired. Sprint is entitled to design its network in the manner it sees fit, and in the Commission's own words, "the FCC must protect [licensees'] exclusive right to the spectrum and refrain from authorizing others to use that spectrum." *FCC* v. *NextWave Personal Communications,* Nos. 01-653 and 01-657, Brief for the Federal Communications Commission, at 46 n.10 (May 6, 2002).

[47] *See UWB Order* at ¶ 159. Time Domain has stated that the Telcordia Model is "an excellent theoretical analysis" and that the anechoic chamber tests "confirm the model's predictions." It then claimed that the "results from real-world tests differed dramatically from the model's predictions." *See* Time Domain Reply Comments at 40 (Oct. 27, 2000).

[48] *See* Sprint Ex Parte at 5-6 (Feb. 21, 2001), *quoting from* 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),

> on GPS receivers. We believe that conducted measurements [using an anechoic chamber] that are repeatable in a controlled environment are more appropriate at this stage where we are trying to set conservative limits for a new technology.[49]

In Attachment 2, *Review and Analysis of the Sprint/Time Domain UWB-to-PCS Interference Tests*, Sprint demonstrates in more detail that the field tests were, in fact, consistent with the Telcordia Model and the anechoic chamber tests, and such tests confirm harmful interference.

The Commission has recognized that the adoption of emissions masks for UWB "requires a firm understanding of the characteristics of UWB signals, their impact on victim receivers, and the minimum separation distance between UWB devices and victim receivers." Adoption of UWB emissions levels also requires a "firm understanding" of the radio technology used by victim receivers. Attachments 1 and 2 document that the Commission's factual assumptions and beliefs concerning CDMA technology are factually – and materially – erroneous.

V. THE INDOOR UWB EMISSIONS LEVEL IN THE PCS BAND IS UNEXPLAINED AND ARBITRARY AND CAPRICIOUS

The Commission adopted an emissions level of –53.3 dBm for UWB devices operating indoors in the PCS band, or 12 dB below that specified for conventional Part 15 devices.[50] In establishing this UWB emissions level, the Commission did not engage in the extensive link budget analysis that it utilized in establishing the UWB emissions level for the GPS band.[51] Instead, the Commission's discussion of the UWB emissions level in the PCS band was limited to the following two sentences:

> The 12 dB of attenuation below the Part 15 general emission limits appears more than sufficient to provide this protection [to PCS], as described in our discussion of the Qualcomm analyses . . . . Based on the above, we are applying a 12 dB re-

[49] *UWB Order* at ¶ 75.

[50] *See* 47 C.F.R. § 15.517(c). *See also UWB Order* at ¶¶ 53 and 183.

[51] *See UWB Order* at ¶¶ 86-108.

> duction below the general emission limits over the frequency range 1610 MHz to 1990 MHz.[52]

In the Qualcomm Analysis section, the Commission stated:

> [G]iven that we are applying a reduction of at least 12 dB in emissions in the GPS frequency band, which is in close proximity to the PCS band, in an abundance of caution we require this reduction to extend through the PCS band to 1990 MHz.[53]

Based on this "analysis," the Commission stated it was "convinced" that the UWB emissions level in the PCS band is "very conservative."[54] The Commission extended a total of 34 dB additional attenuation to protect GPS,[55] and the *UWB Order* did not explain why the Commission chose to extend only 12 dB of protection to PCS systems, even though the two bands admittedly are "in close proximity."

The Commission's failure to explain how it derived the –53.3 dBm indoor UWB emissions level in the PCS band constitutes reversible error. Indeed, the Court of Appeals addressed a very similar issue only last November. In its *AirCell Order,* the Commission decided to use the –117 dBm interference threshold proposed by AirCell rather than the –124 dBm threshold advocated by cellular carriers. The extent of the Commission's discussion of the subject was limited to the following sentence, where the Commission used language eerily similar to the *UWB Order* :

> We believe that this [-124 dBm threshold] is too conservative and that an interference threshold of minus 117 dBm is more realistic for typical analog systems.[56]

---

[52] *UWB Order* at ¶¶ 192-93.

[53] *Id.* at ¶ 163. The FCC sought comment on an additional attenuation of 12 dB in the NPRM, but that number was never explained. *See UWB NPRM,* 15 FCC Rcd 12086, 12103 ¶ 39 (2000).

[54] *UWB Order* at ¶¶ 65-66.

[55] *See id.* at ¶ 111.

[56] *AirCell,* 15 FCC Rcd 9622, 9631 n.67 (2000).

In holding that the Commission committed reversible error (and in remanding the case for re-evaluation), the Court stated that the Commission's "succinct statement fails to provide a reasoned justification for rejecting the minus 124 dBm threshold, much less a defense of the minus 117 dBm threshold that the Commission viewed as being 'more realistic'":

> Conclusory explanations for matters involving a central factual dispute where there is considerable evidence in conflict do not suffice to meet the deferential standards of our review. Basic principles of administrative law require the agency to "examine the relevant data and articulate a satisfactory explanation for its action, including a rational connection between the facts found and the choice made."[57]

That there is no rational basis for the indoor UWB threshold of –53.3 dBm is further confirmed by the fact that indoor level is 10 dB *less stringent* than the UWB emissions level established for outdoor (hand held) UWB devices. It is more difficult for PCS carriers to serve their customers indoors (*e.g.*, homes, offices, shopping malls) because of the signal loss caused by building walls and windows.[58] Sprint explains in Attachment 1 the technical reasons why UWB emissions levels must be more stringent indoors than outdoors so as to maintain parity in indoor and outdoor coverage degradation due to UWB interference.[59]

The Commission has established –63.3 dBm as the emissions level for UWB hand held devices that operate outdoors.[60] Assuming this emissions level is reasonable,[61] the appropriate

---

[57] *AT&T Wireless* v. *FCC,* 270 F.3d 959, 968 (D.C. Cir., Nov. 9, 2001)(internal citations omitted).

[58] For purposes of its *UWB Order*, the FCC allotted an additional 9 dB to account for the loss of GPS signal strength due to building attenuation. *See UWB Order* at ¶ 97. The NTIA Study upon which the FCC based its building loss attenuation suggests that a higher attenuation factor is needed for the PCS band. Moreover, PCS carriers often use even higher attenuation factors in practice in order to provide the quality of service that customers have come to expect. However, regardless of the specific factor used, UWB emissions levels must be more stringent indoors than outdoors.

[59] *See* Attachment 1, Operational Overview of the IS-95 CDMA Downlink, at 12-18.

[60] *See UWB Order* at ¶ 183 and 47 C.F.R. § 15.519(c).

emissions level for indoor UWB applications should be –68.3 dBm, or 5 dB below the outdoor UWB emission level.[62] Instead, the Commission inexplicably provided *less* protection to PCS networks indoors, by adopting less stringent emissions levels for indoor UWB devices (-53.3 dBm) – precisely the opposite of what the Commission should have done using the very logic used by the Commission in its *Order*.

Sprint repeatedly advised the Commission of the obvious – namely, people use their PCS handsets in their homes and in other indoor locations.[63] Chairman Powell has recognized that wireless has become "a real substitute to the wire line service,"[64] citing a recent USA Today/CNN poll finding that "18 percent of Americans call their cellphone their primary phone."[65]

Although the *UWB Order* acknowledges the impact of building attenuation in protecting other services such as GPS,[66] the same *Order* fails to adjust UWB emissions levels to account for the negative impact building attenuation has on PCS signals indoors. This unexplained and internally inconsistent approach is arbitrary and capricious, contrary to record evidence, and constitutes clear legal error.

---

[61] Sprint demonstrates below that this outdoor emissions level needs to be tightened to account, among other things, for safety-of-life applications and the cumulative effects of interference from multiple nearby UWB devices.

[62] *See* Attachment 1 at 15. The 5 dB addition to the indoor UWB emissions level assumes a PCS handset receiver level of –104 dBm. If the FCC continues to believe that a more rigorous PCS handset receiver level is "reasonable," then it must correspondingly adopt an even more stringent indoor UWB emissions level to account for the additional increase in other-cell interference. *See id.* at 16-18.

[63] *See, e.g.,* Sprint Ex Parte, at 4 (Feb. 21, 2001); Sprint Supplemental Comments at 7-8 (Feb. 23, 2001); Sprint Ex Parte, at 4-5 (Sept. 10, 2001).

[64] Remarks of Michael K. Powell, Dialogue with Thomas Wheeler at the CTIA Conference (March 19, 2002).

[65] BOSTON GLOBE, "FCC Chairman Sees Battle for More Wireless Channels Looming Ahead" (March 20, 2002).

[66] *See, e.g., UWB Order* at ¶¶ 66 and 99.

The *UWB Order* suggests that indoor UWB interference to PCS service is not particularly important because such interference can be "easily remedied by moving the [PCS and UWB] devices a short distance apart."[67] Moving PCS handsets and UWB devices further away from each other is not a solution to harmful interference, and moreover, is unlawful. The Commission's "solution" to harmful interference is unlawful, because it shifts to the PCS licensee and customer the burden of avoiding interference, in direct contradiction to the Part 15 rules. The Commission's "solution," moreover, assumes that the PCS customer will be able to discern that the reason her PCS handset no longer works is due to UWB interference.[68] The Commission's "solution" further assumes that a PCS customer is able to move a greater distance from interfering UWB devices (*e.g.*, has not just suffered a heart attack and cannot originate a 911 call). Indeed, if UWB proponents are correct that offices and homes will be flooded with UWB devices, then a PCS customer's ability to get sufficiently far away from a UWB device may be difficult if not impossible.

Most fundamentally, even assuming a PCS customer could pinpoint that UWB interference was the reason the PCS handset no longer worked (and further realized that added separation may help), moving the handset a greater distance from the UWB device does not eliminate the harmful interference. Adding additional distance separation between the PCS handset and the interfering UWB device may enable the PCS customer to originate the desired call, but this distance separation does nothing to prevent the greatest harm caused by UWB interference: loss of PCS network capacity, because the CDMA base stations will allocate more power to compen-

---

[67] *UWB Order* at ¶ 159.

[68] The most likely reaction of a PCS customer unable to originate a call is to complain to the PCS provider that the handset does not work – thereby blaming the PCS operator for the effects of harmful UWB interference.

sate for the UWB interference. Since the total downlink power is fixed, this will leave less power for other handsets.

Again, Sprint paid the U.S. Treasury over $3 billion for the right to provide its PCS services – both indoor and outdoor. The Commission has required that Sprint deliver 911 caller location information on 95 percent of all calls.[69] The Commission has both a contractual and legal obligation to ensure that Sprint's authorized PCS system can operate without harmful interference.

The Commission established the PCS service as an "anytime, anywhere communications tool,"[70] so as to provide the American consumer with alternatives to, and "replacements for, ordinary residential and office telephones."[71] This LEC-CMRS competition is beginning to develop, and CMRS carriers have begun to make inroads to this market.[72] Commission steps that make it more difficult for PCS licensees to provide their authorized services indoors, besides being unlawful, undermines the very policy objective that the Commission has established for PCS.

---

[69] *See* 47 C.F.R. § 20.18(h).

[70] *Second Annual CMRS Competition Report,* 12 FCC Rcd 11266, 11281 (1997).

[71] *Tentative PCS Decision*, 7 FCC Rcd 5676, 5689 (1992).

[72] The FCC has noted that "for some, wireless service is no longer a complement to wireline service but has become the preferred method of communication," further observing that "mobile phone use has begun to erode wireline revenue due to 'technology substitution.'" *2002 Biennial Review Spectrum Cap Order,* 16 FCC Rcd 22668 at ¶ 34 (Dec. 18, 2001). A report last year found that "33 percent of households surveyed said they had replaced their second phone line with wireless service since the start of the year." NEWSBYTES, "Households Canning Second Phone Lines for Broadband" (Sept. 19, 2001). *See also* RCR WIRELESS NEWS, "Wireless Eating Into Local Phone Business, Verizon Exec. Says," at 42 (March 18, 2002); RCR WIRELESS NEWS, "Report: High-Speed Wireline Firms May Find Wireless Threat, at 21 (May 27, 2002)(A report predicts that mobile connections will surpass fixed connections by 2005).

VI. THE UWB ORDER CONFLICTS WITH THE COMMISSION'S E911 POLICIES AND REQUIREMENTS

E911 service, the Commission has observed, "saves lives and property by helping emergency services personnel do their jobs more quickly and efficiently."[73]

> It is difficult to identify a nationwide wire or radio communication service more immediately associated with promoting safety of life and property than 911.[74]

The Commission has noted that "the life-saving advantage of being able to know accurately and quickly the location of an emergency is obvious":

> Emergency police, fire, and medical teams cannot assist a person they cannot find. Less obviously, automatic location identification (ALI) also allows PSAPs and emergency response teams to operate more efficiently.[75]

In this regard, Commission has emphasized the importance of carriers providing to public safety agencies the highest degree of accuracy possible:

> More accurate ALI will reduce the area that must be searched to locate the emergency situation while also making the selective routing of calls to PSAPs more accurate and reliable.[76]

The Commission has imposed rigorous location accuracy on CMRS providers. Carriers such as Sprint that use a GPS-based, handset solution are required to provide accuracy of 50 meters for 67 percent of all E911 calls and 150 meters for 95 percent of all E911 calls.[77] The

---

[73] *First E911 Order,* 11 FCC Rcd 18676, 18679 ¶ 5 (1996).

[74] *E911 NPRM,* 9 FCC Rcd 6170, 6171 ¶ 7 (1994).

[75] *Third E911 Order,* 14 FCC Rcd 17388, 17398 ¶ 2 (1999).

[76] *Third E911 Order,* 14 FCC Rcd 17388, 17422 ¶ 74 (1999). Indeed, the FCC has encouraged carriers "to upgrade and improve 911 service to increase its accuracy" so as to achieve a level of location accuracy beyond that specified in its E911 rules, because such efforts "will ensure that the public benefits from technological innovations, through the application of those innovations to public safety needs. *First E911 Order,* 11 FCC Rcd 18676, 18685, 18728 ¶ 101 (1996).

[77] *See* 47 C.F.R. § 20.18(h). Sprint interprets this accuracy rule to apply only to E911 calls that a PCS customer can originate. Thus, Sprint's compliance with the rule is not affected because a customer cannot originate a E911 call because of UWB interference. However, as discussed herein, UWB interference

Commission has further advised carriers that if their Phase II E911 solution "fails to comply with the Phase II accuracy requirements," they must "propose a solution that does comply with those requirements."[78]

The *UWB Order* is at complete odds with the Commission's E911 requirements and policies. Simply put, the emission levels that the Commission established for UWB inhibits CMRS carriers' ability to meet the Commission's E911 accuracy requirements. The *UWB Order* is internally inconsistent, by protecting an additional measure of protection from UWB interference in the GPS band, but not in the PCS band. And what make the *UWB Order* wholly inexplicable is that the Commission chose not to protect E911 services from UWB interference when the UWB emissions are spurious emissions – meaning that the adoption of more rigorous UWB emissions would not affect the ability of UWB devices to accomplish their designed function. The *UWB Order* as applied to E911 services also requires reconsideration.

A. The Commission Failed to Adequately Protect Use of GPS Indoors for E911 Applications

The Commission has recognized that "GPS does not work well if a caller is inside a building or amid obstructions that attenuate or block the satellite radio signals."[79] The Commission therefore recognized the need to adopt more stringent UWB emissions in the GPS band to "protect the newly emerging GPS-based indoor E-911 systems and their safety implications."[80]

---

will also likely impact adversely the degree of accuracy that carriers can provide to PSAPs, which would appear to implicate a carrier's ability to comply with the E911 accuracy rule.

[78] *See, e.g., Sprint Phase II Waiver Order,* 16 FCC Rcd 18330 at ¶ 35 (Oct. 12, 2001). The $2.2 million fine proposed recently for AT&T Wireless' alleged violations of the Phase II rules demonstrates graphically the seriousness with which the FCC expects carriers to take its E911 requirements. *See AT&T Wireless Notice of Apparent Liability,* File No. EB-02-TS-018, FCC 02-142 (May 9, 2002).

[79] *E911 NPRM,* 9 FCC Rcd 6170, 6178 ¶ 46 (1994).

[80] *UWB Order* at ¶ 108.

The GPS Council proposed for the GPS band an additional attenuation of 39.2 dB above Part 15 limits to protect indoor use of E911 service, and it submitted a specific link budget analysis in support of its proposal.[81] Directly against the advice of an expert body, the Commission reduced the additional attenuation by 8.4 dB to 30.8 dB – meaning that it permitted UWB devices to operate at power levels over 8 dB higher than had been proposed.[82] The Commission should reconsider this decision.

1. A Safety Factor Margin Factor. The Commission rejected the GPS Council's proposal to add a 6 dB safety margin in the GPS band to account for uncertainties in the link budget analysis.[83] The Commission rejected this safety margin proposal because the international standard that the GPS Council relied upon involves aviation safety of life applications:

> Therefore, it is not appropriate to apply this margin to non-aviation safety of life applications using GPS receivers, and the public safety margin of 6 dB specified by the USGPSIC should not be used in the E-911 operational scenario analysis.[84]

Sprint submits that this decision merits reconsideration – saving lives through E911 calls are clearly as important as saving the lives of an airplane full of people.[85]

The purpose of the 6 dB safety margin, as the Commission notes, is to account for uncertainties in the link budget analysis that are "real but not quantifiable."[86] One example will make the point. The Commission based its analysis of UWB interference impacts using 9 dB to account for the results of building attention, a threshold the Commission based on a 1995 NTIA

---

[81] *See UWB Order* at 101, Table 2.

[82] *See UWB Order* at ¶ 107, Table 3.

[83] *See UWB Order* at ¶ 104.

[84] *Id.*

[85] It is also important to emphasize that the safety benefits of mobile wireless service are not limited to E911 calls.

[86] *UWB Order* at ¶ 104.

Study.[87] However, this 9 dB figure is an *average* penetration loss of *all* building types the NTIA evaluated; the NTIA found, for instance that the average building attenuation in high rise buildings in the PCS band was 11.9 dB – or 3.5 dB higher than the average building attenuation in residential homes.[88] The purpose of the 6 dB safety margin factor is to account for variables such as this, so that there is higher degree of confidence that the E911 capabilities that carriers have installed in their networks (at considerable cost) will work when needed and will provide the level of accuracy for which the systems have been designed. The Commission should reconsider its refusal to extend a 6 dB of additional protection for a safety of life margin.

2. Cumulative Effect of Multiple UWB Devices. The Commission accepted NTIA's proposal to add 6 dB to the UWB emissions level to protect use of GPS outdoors from the interference effects of multiple UWB devices.[89] It declined, however, to provide any additional protection from the cumulative effect of indoor use of GPS, even though there is a much greater likelihood of having multiple UWB devices indoors rather than outdoors.[90] Given its recognition of the cumulative effects of multiple UWB devices, the Commission should extend the same 6 dB margin to UWB devices indoors that it applied to outdoors.

3. Satellite Acquisition Factor. The Commission added 6 dB of protection for the use of GPS outdoors "to account for the greater sensitivity of satellite acquisition," because the acquisition threshold is "more sensitive than the tracking threshold."[91] The very same phenomenon oc-

---

[87] *See UWB Order* at ¶ 97 and n.186.

[88] *See* NTIA Report 95-325, *Building Attenuation Measurements From Low-Height Base Stations at 912, 1920, and 5990 MHz*, at 26, Table 4 (Sept. 1995).

[89] *See UWB Order* at ¶ 94.

[90] *See UWB Order* at ¶ 106.

[91] *UWB Order* at ¶ 98.

curs with the use of the GPS band indoors, and the Commission therefore erred in not adding this same 6 dB satellite acquisition factor to its indoor GPS link budget analysis.

4. The Appropriate Minimum PCS/UWB Separation Distance. It is unclear from the *UWB Order* whether, in developing its indoor GPS link budget analysis, the Commission considered a separation distance of two meters or three meters.[92] UWB developers have stated that their technology will be integrated "into hundreds of applications of existing products" and that they expect to manufacture "over a billion chips per year."[93] People should be able to make a E911 call indoors; indeed, there are emergency situations where the caller may be unable to move to provide the needed separation distance from UWB devices in order to originate the E911 call (even assuming the caller realizes that the reason the PCS handset does not work is because of UWB interference). Sprint therefore submits that the Commission should use a separation distance of one meter (about three feet) in calculating its indoor GPS link budget analysis, rather than the two or three meters utilized in the *UWB Order*.

B. The Commission's Failure to Provide Any Protection in the PCS Band for Indoor E911 Applications Is Arbitrary and Capricious

The Commission in the *UWB Order* reaffirmed its "commitment" to protecting authorized radio services from receiving harmful interference from UWB devices, adding that it is "especially concerned about protecting radio services used for safety-of-life applications."[94] The Commission provided some measure of protection for Phase II E911 systems in the GPS band (although not enough as demonstrated above). In stark contrast, the Commission provided no

---

[92] *See UWB Order* at ¶ 106.

[93] *See* Sprint Reply Comments at 10 and n.36 (Oct. 27, 2000).

[94] *UWB Order* at ¶ 178. *See also id.* at ¶ 191 (With regard to GPS, we are particularly concerned about protecting E-911 applications.").

protection from UWB interference for Phase II E911 systems in the PCS band. This decision is not only arbitrary and capricious, it is illogical, because the protections the Commission afforded in the GPS band will have little value unless similar protections are afforded in the PCS band.

Sprint and other carriers are using assisted GPS ("A-GPS") for its Phase II E911 location solution.[95] The A-GPS solution, of course, requires use of the GPS band. But the A-GPS solution that Sprint has deployed and is now using also requires extensive use of the PCS band, including:

- The PCS band is used to send Doppler and code shift data information to the handset so the handset can more quickly locate the GPS satellites, thereby accelerating the time that location information can be forwarded to public safety agencies;[96]
- The PCS band is also used to perform Advanced Forward Link Trilateration ("AFLT"), which enables the handset to utilize signals from cell sites to generate location information when information from GPS satellites are not available; and
- The PCS band is, of course, used so the caller can originate an E911 call (and so the location information can thereafter be forwarded to the public safety agency).

The ability of the PCS handset to receive GPS signals is of no value if a mobile customer cannot originate a 911 call because of UWB interference. The AFLT system that Sprint has deployed so location information can be calculated in the absence of strong GPS signals is also of no value if the requisite information cannot be transmitted over the PCS band because of UWB interference. And, the A-GPS capability that enables a handset to locate GPS satellites more quickly (so the caller's location information can be calculated more quickly) is of no value if the information cannot be received by the PCS handset because of UWB interference.

---

[95] *See Sprint Phase II Waiver Order,* 16 FCC Rcd 18330 (2001). Given that the FCC is well aware that Sprint and other wireless carriers have deployed and are now using A-GPS systems, its statements – "GPS . . . *may* be used by commercial mobile radio service" and that the PCS band has "*potential* use in E-911 applications" – are at best perplexing. *UWB Order* at ¶¶ 34 and 192 (emphasis added).

[96] *See UWB Order* at ¶ 99.

The Commission may not legitimately impose rigorous location accuracy requirements on PCS carriers – much less expose them to multi-million dollar fine liability for failing to meet those requirements – and then add new harmful interference that inhibits their ability to meet the accuracy requirements. But putting legalities aside, it is simply astonishing that the Commission would allow new interference in the PCS band when this interference will inhibit the ability of carriers to provide to public safety agencies the location accuracy their systems are capable of supporting. And, the Commission's decision is especially inexplicable because as Sprint demonstrates in Part VI below, the adoption of more rigorous UWB emissions levels in the PCS band would not interfere with the ability of UWB devices to perform their intended function.

* * *

In conclusion, the safety of lives in emergency situations should not hinge on whether there are operational UWB devices in the area where a person needs to make an E911 call. Sprint therefore requests that the Commission reconsider its *UWB Order* for the reasons stated above. The Commission's decisions certainly do not reflect the stated "conservative approach" to UWB technology, for it is clear that more protection is needed to ensure that UWB does not interfere with E911 calls.

VII. THE COMMISSION'S FAILURE TO PROTECT PCS IS INEXPLICABLE BECAUSE UWB EMISSIONS IN THE PCS BAND ARE SPURIOUS EMISSIONS

The Commission has given indoor and outdoor hand held UWB applications access (for free) to an enormous amount of spectrum – specifically, the 7.5 GHz of spectrum between 3.1 GHz and 10.6 GHz.[97] Consequently, UWB emissions in the 1.9 PCS GHz band are spurious

[97] *See UWB Order* at ¶¶ 65, 67 and 204.

emissions.[98] Spurious emissions are "not required in order for the [UWB] equipment to function," and they contribute "nothing to the transmission of information."[99] The level of UWB spurious emissions can thus be reduced "without affecting the corresponding transmission of information."[100] What spurious emissions do is "reduce the availability of spectrum for other users," by increasing the noise floor:[101] In the end, as the Commission has acknowledged, "spurious emissions serve only to pollute the spectrum, reducing its availability to other users."[102]

Sprint demonstrates above that the Commission failed to adequately protect PCS services from the effects of harmful UWB interference. What makes the Commission's action so puzzling – indeed, indefensible – is that the Commission could have provided the protection PCS services require without impacting the ability of UWB devices to achieve their intended function, whether it be for communications services or for other applications.

VIII. THE COMMISSION ERRED BY NOT ADJUSTING UWB EMISSIONS LEVELS IN THE PCS BAND TO ACCOUNT FOR THE CUMULATIVE EFFECT OF UWB INTERFERENCE

The Commission has recognized that the presence of multiple UWB devices can present a greater risk of harmful interference than a single UWB device.[103] Thus, the Commission added

---

[98] *See, e.g., UWB Order* at ¶ 271. Sprint paid the U.S. Treasury $3 billion for approximately 30 MHz of spectrum nationwide. In contrast, the *UWB Order* gives UWB developers the right to access *for free* 7,500 MHz of spectrum – *or 250 times more spectrum than Sprint PCS has acquired.* The value of this spectrum use is obviously enormous.

[99] *Part 15 NPRM,* 2 FCC Rcd 6135, 6137 ¶ 17 (1987). *See also* 47 C.F.R. § 2.1 (Spurious emissions defined as "[e]mission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information.").

[100] *Control and Security Alarm Devices,* 3 FCC Rcd 1702, 1704 ¶ 19 (1988).

[101] *Part 15 NPRM,* 2 FCC Rcd 6135, 6137 ¶ 17 (1987). *See also First Part 15 Order,* 4 FCC Rcd 3493, 3498 ¶ 29 (1989)(FCC notes that spurious emissions "further increase the level of background RF noise.").

[102] *First Part 15 Order,* 4 FCC Rcd 3493, 3500 ¶ 46 (1989).

[103] *See UWB Order* at ¶¶ 195-96.

6 dB to the UWB emissions level in the GPS band specifically to protect use of the GPS band from the cumulative interference effects of multiple UWB devices.[104]

The Commission has acknowledged that PCS base stations are at risk to cumulative interference.[105] It further noted that authorized services indoors such as PCS are at considerable risk, because "indoor UWB devices, operating in an omnidirectional mode, could be sufficiently concentrated in a small area to cause a cumulative effect."[106] Yet, the Commission inexplicably did not provide for the PCS band the type of additional protection it afforded to the GPS band to account for cumulative interference, even though the two bands admittedly are "in close proximity."[107]

The Commission states that the emission limits it adopted are "designed to ensure that harmful interference to the authorized services is minimized, including interference from the cumulative effect of multiple UWB devices."[108] Yet, there is no indication in the *Order* that the UWB emissions levels adopted for the PCS band include anything (much less 6 dB) to account for cumulative effect. The Commission should reconsider this decision by adding 6 dB of additional protection to the indoor and outdoor/hand held UWB emissions levels in the PCS band to account for the cumulative interference harms these devices can cause.

The Commission alternatively states that it need not adjust UWB emissions levels for bands other than GPS because it has adopted "considerable restraints on the technical and opera-

---

[104] *See id.* at ¶ 87, Table 1, and ¶ 94.

[105] *See id.* at ¶ 233.

[106] *Id.* at ¶ 234.

[107] *UWB Order* at ¶ 163. Sprint repeatedly raised this subject with the FCC. *See, e.g.,* Sprint Supplemental Comments at 8-11 (Oct. 6, 2000); Sprint Supplemental Comments at 5-7 (Feb. 23, 2001); Sprint Ex Parte at 3 (June 6, 2001).

[108] *UWB Order* at ¶ 19.

tional standards for UWB equipment to ensure that cumulative interference will not occur."[109] Examination of the "restraints" the Commission identified reveals that none protect PCS services from cumulative interference caused by indoor and outdoor/hand held UWB devices.

The Commission first states that it has "limited outdoor applications to imaging, hand held and vehicle radar systems."[110] This "limit," however, does nothing to protect PCS systems from cumulative interference from hand held UWB devices, given the Commission's own recognition of the likely "uncontrolled proliferation of these devices."[111] The Commission also does not list UWB surveillance devices, over which it has also expressed "concern about the potential for the proliferation of these devices."[112] The Commission notes that imaging and vehicle radar systems will likely use directional antennas which will minimize the risk of cumulative interference, but it does not mention the converse – namely, the UWB applications that pose the greatest risk of interference (indoor, outdoor/hand held, and surveillance) will almost certainly use omnidirectional antennas. In summary, the restraints the Commission recites do little or nothing to protect PCS services and networks from the effects of cumulative interference.

As noted, the Commission has determined that the GPS band merits 6 dB of additional protection to account for cumulative interference. PCS systems, especially given their safety of life applications, also merit the same level of protection.[113]

---

[109] *UWB Order* at ¶ 234.

[110] *UWB Order* at ¶ 234.

[111] *Id.* at ¶ 67.

[112] *Id.* at ¶ 201.

[113] Certain statements that the FCC attributes to Sprint were not made by Sprint, but are rather assumptions made in the Telcordia Model. *Compare UWB Order* at ¶¶ 228 and 234 *with* Telcordia Model at 1-2. Just as TDC has disavowed the Model's use of a –105 dBm receiver sensitivity and Dr. Padgett's conclusion that the field-tests were consistent with the Model, so too the FCC should not conclude that Sprint agrees with every assumption made in the jointly negotiated Telcordia Model.

IX. UWB SURVEILLANCE SYSTEMS SHOULD BE SUBJECT TO THE SAME RULES APPLICABLE TO INDOOR AND OUTDOOR/HAND HELD UWB DEVICES

The Commission has permitted UWB developers to produce surveillance systems, defined as a "field disturbance sensor used to establish a stationary RF perimeter field that is used for security purposes to detect the intrusion of persons or objects."[114] The Commission states that although "technically these [surveillance] devices are not imaging systems, for regulatory purposes they will be treated in the same way as through-wall imaging systems."[115] The *UWB Order,* however, never explains this decision, rendering it arbitrary and capricious.[116]

The *UWB Order* states that the UWB emissions levels established for surveillance systems reflect "an abundance of caution to protect the GPS and PCS services."[117] The facts, however, do not support this conclusion as the following table demonstrates:

With respect to the statements the FCC attributes to Sprint, it is likely (if not probable) that multiple different UWB devices will be transmitting simultaneously in a networked office environment. In addition, as applications such as video streaming, video conferencing and voice over IP become commonplace, the duty cycle of wireless LANs will become much higher. *See* Sprint Ex Parte at 6-7 (Feb. 21, 2002). Indeed, it would appear that UWB surveillance systems must operate continuously to be effective. Finally, the FCC recognized the point made by Sprint and others that cumulative UWB interference is a problem. *See, e.g., UWB Order* at ¶ 94.

[114] 47 C.F.R. § 15.503(j). *See also UWB Order* at 3.

[115] *UWB Order* at ¶ 5 at 4.

[116] Moreover, even if surveillance systems could be properly treated for regulatory purposes as through-wall imaging systems, the *Order* never explains why surveillance systems should be classified as "Mid Frequency" imaging devices (Rule 15.511) as opposed to "Low Frequency" or "High Frequency" imaging devices (Rules 15.509 and 15.513).

[117] *UWB Order* at ¶ 56.

Comparison of Different "Imaging" Systems

	UWB Emissions Level (dBm)	Operate Adjacent to PCS Band
Surveillance Systems	-51.3	Yes
Low-Frequency Imaging Systems	-53.3	No
High Frequency Imaging Systems	-53.3	No

Thus, the Commission has provided *less* protection to the PCS band from surveillance systems than from low- and high-frequency imaging systems. The Commission's decisions to permit UWB surveillance systems to operate at –51.3 dBm in the PCS band and to operate down to 1990 MHz are completely unexplained.[118]

In fact, the rules developed for UWB surveillance systems are utterly arbitrary and capricious. The Commission acknowledged that surveillance systems pose "a greater risk for harmful interference" than low- and high-frequency imaging systems.[119] Yet, the Commission inexplicably extended to the PCS band *less* protection from interference caused by UWB surveillance systems.

The *UWB Order* suggests that a "less conservative" mask for surveillance systems is appropriate because, in the Commission's judgment, such systems will provide "substantial benefits to the public safety."[120] This belief, however, does not explain the decision to permit surveillance systems to be subject to less stringent emissions levels than low- and high-frequency imaging systems, which the Commission also states have "public safety" purposes.[121] More fun-

[118] *See UWB Order* at ¶ 54.

[119] *Id.* at ¶ 55. *See also id.* at ¶ 49 (Surveillance systems that do "not direct their energy into the ground . . . therefore present a somewhat greater risk of interference.").

[120] *Id.* at ¶ 55.

[121] *See id.*

damentally, permitting unlicensed commercial surveillance systems to interfere with licensed services, regardless of the perceived benefit of the UWB device, is unlawful and at complete odds with the Part 15 rules, which extends only secondary status to Part 15 devices.[122]

The *UWB Order* further suggests that any interference can be addressed through coordination:

> Surveillance systems will operate only at fixed locations, such that harmful interference can be avoided through coordination.[123]

The Commission, however, never explains how this "coordination process" is to work. Surveillance systems are effective only if they are hidden. Thus, even if a PCS customer suspects that UWB interference is the reason his PCS handset does not work, there will no ready means for the customer to locate the interfering UWB surveillance system, because it will be hidden.[124] But again, there is a more fundamental flaw with the Commission's "coordination" solution. Under Part 15, authorized licensees that have primary rights to use of their spectrum have no legal obligation to "coordinate" their use with unlicensed secondary users of the spectrum. There is, in short, nothing to coordinate, because the Part 15 rules are unequivocal in providing:

> The operator of a radio frequency device *shall be required to cease* operating the device upon notification of the Commission representative that the device is causing harmful interference. Operation *shall not resume* until the condition causing the harmful interference has been corrected.[125]

It is not appropriate to treat UWB surveillance systems like UWB imaging systems. As noted, the Commission readily acknowledges that surveillance devices "technically . . . are not

---

[122] *See* 47 C.F.R. §§ 15.5 and 14.15.

[123] *UWB Order* at ¶ 55.

[124] It is also unrealistic for the Commission to believe that an owner of a UWB surveillance system will scrap its investment once it is determined that the surveillance system causes harmful interference to PCS systems.

imaging systems." Surveillance devices will also have very different operational characteristics compared to imaging systems. Imaging systems, the Commission has stated, "will emit RF energy only for short periods of time, so any possible interference of operation at closer distance separations should be transient."[126] Surveillance systems, in contrast, will be "stationary," and they will be effective in achieving their stated purposes (*e.g.,* detecting intruders) only if they operate constantly.[127]

Surveillance systems, the Commission has observed, are "radar devices that establish a stationary RF perimeter field."[128] Accordingly, if surveillance systems should be treated like any other UWB device for regulatory purposes, they should be regulated not like imaging systems, but like vehicular radar systems, which will be permanently attached to vehicles and which will be designed "to detect the location and movement of objects near a vehicle."[129]

UWB vehicular radar systems will operate at a high frequency range (*e.g.,* 24-29 GHz) compared to UWB surveillance systems (*e.g.,* 3-10 GHz). Accordingly, with respect to the applicable emissions levels, UWB surveillance devices should be treated as indoor UWB devices (subject to new Rule 15.517) if they are located indoors, and treated as outdoor UWB devices (subject to new Rule 15.519) if they are located outdoors.[130] Specifically, UWB surveillance devices should be limited to use of the spectrum band above 3.1 GHz and subject to the same emission limits imposed on indoor and outdoor UWB devices applicable to the PCS and other bands.

---

[125] 47 C.F.R. § 15.5(c)(emphasis added).

[126] *UWB Order* at ¶ 113.

[127] *See* 47 C.F.R. § 15.511(b)(2); *UWB Order* at 4 and ¶ 20.

[128] *UWB Order* at ¶ 201.

[129] *Id.* at 4.

The Commission further recognizes that UWB surveillance systems could "proliferate."[131] The Commission generally adopted the "most stringent" emissions levels for UWB devices that are expected to be produced in large numbers.[132] Yet, inexplicably, with respect to surveillance systems, the Commission adopted *less* stringent emissions levels than most imaging devices and other outdoor devices.[133] And, the Commission permitted surveillance systems to intentionally emit immediately adjacent to the PCS band, unlike most other UWB devices.[134] These unexplained decisions are arbitrary and capricious.

The likely proliferation of surveillance devices also led the Commission to "limit" the operation of surveillance systems to certain entities. Sprint agrees that limits on UWB surveillance devices are necessary, given the paucity of record evidence concerning such devices (as evidenced by how little the *UWB Order* discusses these devices). However, the use limits the Commission has imposed are far too broad in scope. Under the *Order*, UWB surveillance devices may be used by "law enforcement, fire or emergency rescue organizations or by manufacturers licensees, petroleum licensees or power licensees as defined in Section 90.7."[135] The Rule 90.7 definitions of manufacturer, petroleum and power licensees are so broad that the "limitation" the Commission imposed on use of UWB surveillance systems, as a practical matter, excludes only homes and retail establishments.

---

[130] The fact that outdoor surveillance systems will be fixed while hand held devices will be mobile is no basis to adopt different UWB emissions levels, since the harm caused by a UWB device will be the same, regardless of the mobility of the device.

[131] *See UWB Order* at ¶ 201.

[132] *See, e.g., UWB Order* at ¶ 67.

[133] *Compare* 47 C.F.R. § 15.511(d) *with* §§ 15.509(d), 15.513(d), 15.515(d), 15.517(c), and 15.519(c).

[134] *Compare* 47 C.F.R. § 15.511(a) *with* §§ 15.513(a), 15.515(b), 15.517(b), and 15.519(b).

[135] 47 C.F.R. § 15.511(b)(2), and *UWB Order* at ¶ 201.

Sprint is not particularly concerned by the use of UWB surveillance systems by law enforcement, fire or emergency rescue organizations – how it is not apparent how surveillance systems can be properly categorized as a public safety function or why public safety officials need to use UWB technology as opposed to other surveillance technologies. However, given the limited evidence in the record concerning these systems, due entirely to the failure of UWB proponents to submit data concerning their proposed surveillance systems, the Commission should not permit persons or firms other than law enforcement, fire or emergency rescue organizations to use UWB surveillance systems until UWB proponents can document that their surveillance systems will not pose a risk of harmful interference to authorized services, including PCS – in short, satisfy the legal burden they have yet to meet.

X. THE COMMISSION SHOULD RECONSIDER THE SEND/ACKNOWLEDGEMENT REQUIREMENTS IMPOSED ON UWB DEVICES

The *UWB Order* requires that certain UWB devices such as hand held devices must cease transmission within 10 seconds if they fail to obtain an acknowledgement from the intended destination UWB device.[136] The purpose of this requirement is to "ensure that the UWB device transmits only when it is sending information to an associated received," thereby minimizing the risk of harmful interference to authorized services.[137] The Commission, however, did not impose the same requirement on other UWB devices, such as indoor devices, although it did not explain why it thinks indoor UWB devices merit different treatment. The Commission should reconsider these exemptions. The reasons for imposing limits on outdoor UWB emissions apply equally

[136] *See UWB Order* at ¶¶ 68 and 199. *See also* 47 C.F.R. § 15.519(a)(1). The FCC similarly required imaging systems to cease operations 10 seconds after the operator releases the device. *See id.* at §§ 15.509(c), 15.511(c), and 15.513(c).

[137] *UWB Order* at ¶ 199.

well to indoor UWB emissions, and there is no reasoned basis to distinguish between these two classes of UWB devices.

Also unexplained in the *UWB Order* is how the Commission decided to use 10 seconds as the length of time before ending UWB transmissions. It would appear that a three or five-second length of time would be more appropriate.

XI. THE COMMISSION SHOULD REQUIRE UWB DEVELOPERS TO MAKE THEIR DEVICES AVAILABLE FOR TESTING

The Commission has observed that "real world" tests are "important for developing emission limits for UWB devices."[138] Indeed, Congress has recognized the importance of interference tests when a proposal is made to share the same spectrum among different technologies and applications.[139] In this proceeding, few UWB interference tests were conducted, and as the Commission has recognized, there exists "limited information in the record" in this UWB proceeding.[140]

As noted above, for the most part UWB developers have not conducted interference tests between their devices and licensed services such as PCS. Sprint and others attempted to fill the resulting void. Sprint conducted joint tests with Time Domain, but the tests were limited in time and scope and were early in the process, and Time Domain made only one if its devices available for testing. Qualcomm was unable to convince any UWB developers to loan it one of their UWB

---

[138] *UWB Order* at ¶ 70.

[139] For example, Congress required the FCC to conduct tests of terrestrial services proposing use of the 12 GHz band also used by DBS. *See, e.g., 12 GHz Sharing Reconsideration Order,* ET Docket No. 98-206, FCC 02-116, at ¶ 13 (April 11, 2002). It is noteworthy that Congress required the conduct of "independent testing" even after terrestrial proponents had conducted their own testing. *See id.* at ¶ 13 and ¶ 210.

[140] *See UWB Order* at ¶ 183.

devices for CDMA PCS tests.[141] The fundamental problem that the licensee community faces is their inability to obtain UWB devices so they can conduct the "real world" tests that for whatever reason, UWB developers have decided not to conduct themselves.

Sprint commissioned, with Time Domain, the Telcordia Model. This Model, Time Domain has observed, is "an excellent theoretical analysis of the interaction between a 1.9 GHz CDMA PCS system and TM-UWB emissions."[142] Although the limited tests that Sprint and Time Domain conducted confirmed the Model's predictions,[143] at least Sprint would like to conduct additional "real world" tests to better understand the impacts of UWB devices on PCS networks, especially with regard to indoor PCS operations.

PCS/UWB tests are important not simply to further confirm the predictions made by the Telcordia Model. Additional "real world" PCS/UWB tests are needed to begin addressing the following important areas:

- Understand the cumulative impact of multiple UWB devices in an area (*e.g.*, inside a home or office);
- Understand the impact of UWB interference to the A-GPS E911 system that Sprint has deployed, a system that uses both the PCS and GPS bands;
- Understand the impact UWB will have on wideband "third generation" CDMA systems – systems that may use 3.75 or 5.0 MHz-wide carriers, as opposed to the IS-95 1.25 MHz carriers in use today;
- Understand how different UWB devices, which use different wave forms or different center frequencies, impact PCS networks.
- Understand the relationship between average and peak UWB emissions to determine the best way to measure UWB interference.

---

[141] *See* Qualcomm Ex Parte at 6 (Jan. 11, 2002)("QUALCOMM contacted several UWB companies in order to buy or borrow an UWB pulse generator module. All the companies contacted declined the request.").

[142] Time Domain Reply Comments at 39 (Oct. 27, 2000). This reconsideration petition is based on the Telcordia Model. If further testing reveals that the Model should be adjusted, Sprint reserves the right to adjust its position accordingly.

[143] *See* Attachment 2.

- Understand how best to test UWB devices to differentiate between UWB emissions and unintentional emissions due to the associated digital circuitry.

Certain wireless parties have recently asked the UWB community to engage in coordinated tests and provide UWB devices for testing.[144] It is Sprint's understanding that, to date, one major UWB developer has agreed to participate in this important effort. Other major UWB developers have not yet responded to this proposal.

In a fact-heavy proceeding such as this where the interests of hundreds of licensees are at stake, the Commission has a duty to ensure that a complete record is formed. Indeed, making decisions without such rigor will leave the Commission open to reversal on appeal. So "real world" tests can be conducted, tests that the Commission has stated would be "important," the Commission should require each UWB developer participating as a party to this proceeding to make available their devices (devices that comply with the *UWB Order*) to industry for testing. UWB operators should further be required to provide multiple UWB devices, so tests of the cumulative effect can be undertaken.

The Commission expresses "concern" that the UWB emissions levels "may be overly protective and could unnecessarily constrain the development of UWB technology."[145] It therefore states that it intends to review the governing UWB emissions levels "within the next six to twelve months."[146] Sprint demonstrates above that the Commission has completely misunderstood CDMA technology, a misunderstanding that necessarily affected its judgments pertaining to UWB emissions levels in the PCS band. Sprint further demonstrates above that all of the UWB emissions levels that it adopted for the PCS band are unexplained – and, generally, incon-

---

[144] *See* AT&T Wireless, Cingular, Qualcomm, Sprint PCS and Verizon Wireless Letter to Motorola, Muli-Spectral Solutions, Time Domain and XtremeSpectrum (June 11, 2002).

[145] *UWB Order* at ¶ 1.

sistent with the record evidence. Sprint submits that the Commission is obligated to address the issues in this and other reconsideration petitions before it contemplates liberalizing the UWB emissions levels.

XII. CONCLUSION

For the foregoing reasons, Sprint respectfully requests the Commission reconsider its *UWB Order* consistent with the discussion above and in the two attachments.

Respectfully submitted,

SPRINT CORPORATION
(on behalf of its Wireless Division)

Luisa L. Lancetti (ccs)

Luisa L. Lancetti
Vice President, PCS Regulatory Affairs
Sprint Corporation
401 9th Street, N.W., Suite 400
Washington, D.C. 20004
202-585-1923

Charles W. McKee, General Attorney
Scott Freiermuth, Attorney
Sprint Corporation
6450 Sprint Parkway
Mail Stop: KSOPHN0212-2A553
Overland Park, KS 66251
913-315-8521

June 17, 2002

[146] *Id.*