

Federal Communications Commission

Washington, DC 20554

In the Matter of

Revision of Part 15 of the FCC's
Rules Regarding Ultra-wideband
Transmission Systems

ET Docket No. 98-153

**Reply to Oppositions to
Time Domain Corporation's Petition for Reconsideration**

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**Before the
Federal Communications Commission
Washington, DC 20554**

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Time Domain Corporation ("Time Domain") hereby replies to the oppositions noted below filed in response to Time Domain's petition for Reconsideration. Time Domain asked the Commission to modify its rules for ultra-wideband ("UWB") to make it feasible for public safety entities to operate through-the-wall radar units for use by public safety officers and tracking systems for use by firefighters. To achieve this result, Time Domain urged that the rules be modified to allow such uses at the Part 15 general limits, but with a 10 dB reduction for narrowband emissions falling into the GPS band. In its petition, Time Domain did not seek a change in the limits to be applied to UWB consumer devices even though Time Domain believes that those limits are overly conservative.

U.S. GPS INDUSTRY COUNCIL

Building on a series of distortions, the U.S. GPS Industry Council ("USGPSIC") argues against making available a small number of life saving applications of UWB (through-wall radar

and precision tracking systems for public safety personnel). The USGPSIC mischaracterizes the findings of all tests submitted during the FCC's rulemaking process. Most egregiously USGPSIC states that testing showed harmful interference, when no test showed harmful interference at the levels proposed by the FCC. Rather, all tests merely quantified the impacts of UWB emissions on GPS receiver performance. What these tests showed was that if given sets of assumptions were to be satisfied, lower limits than those proposed by the FCC in the NPRM were required. The confusion and distortion, however, arise in the assumptions, which often posited unrealistic scenarios.

The NTIA's tests are often cited by the opponents of UWB. These tests included such assumptions as:

- Flat earth (*i.e.*, no consideration of terrain features);
- No buildings;
- No foliage;
- Perfect alignment of antennas;
- No multipath;
- GPS satellites operating with worst-case multiple access noise (code alignment);
- All GPS satellites operating at end-of-life power; and
- Perfect availability and performance of GPS signals regardless of receiver location; and
- Use of a CW signal phase locked to a sensitive GPS signal spectral line in order to continually track the spectral line (a condition that would never arise in the real world).¹

¹ Or in the case of the Stanford GPS study, selection of a UWB pulse repetition frequency that would intentionally produce a spectral feature at the same frequency as a GPS spectral line. [M.](#)

The NTIA was then able to show that a 34 dB reduction from Part 15 Class B levels was required if the world were, in fact, like the assumptions. As Time Domain has noted in its filings², these are not supportable assumptions and had the NTIA selected realistic assumptions the results would have been drastically different. Indeed, the results would have shown that the general Class B limit was sufficient to protect existing services.

In opposing Time Domain's reconsideration request the USGPSIC shows that it has lost its perspective. They argue that "[b]ecause firefighters use and rely upon GPS equipment in the performance of their duties, and the emissions from through-the-wall devices are already at interfering levels, it is essential that such devices be licensed and operationally restricted in the manner decided by the Commission in the *UWB Order*."³ Thus, they argue that it is more important to protect GPS where it is irrelevant to public safety personnel – indoors – than it is to allow them to have a potentially life-saving tool.⁴

Luo et al, "Potential Interference to GPS from UWB Transmitters, Phase II Test Results," Stanford University, 16 March, 2001, submitted to the record by the NTIA on March 20, 2001.

² Section IV, Comments of Time Domain (In Response to the Request for Comments on Test Data Submitted by NTIA Regarding Potential Interference to Selected Federal Systems from Ultra-Wideband Transmission Systems), February 23, 2001. Appendix A, Reply Comments of Time Domain Corporation (In Response to the Request for Comments on Test Data Submitted by NTIA Regarding Potential Interference to Selected Federal Systems from Ultra-Wideband Transmission Systems), March 12, 2001. Sections VI and VIII, Comments of Time Domain Corporation (In Response to the Request for Comments on Five Reports Addressing Potential Interference from Ultra-Wideband Transmission Systems in Public Notice DA 01-753, March 26, 2001), April 25, 2001.

³ Consolidated Opposition to, and Comments in Support of, Petitions for Reconsideration, U.S. GPS Industry Council, July 31, 2002, p. 8.

⁴ Published reports suggest that augmented GPS is at best accurate to 50 meters within large structures; thus, the best GPS technology is at best only capable of telling firefighters something that they already know – that they are within a building. See, e.g. M. Meoglein and N. Krasner, "An Introduction to SnapTrack Server-Aided GPS Technology". Nor will it be useful to police

The USGPSIC filing also mischaracterizes the FCC’s Part 15 rules by stating “Part 15 rules apply only to narrowband operations for unintentional emitters that are not permitted to cause interference – and therefore not to UWB operations, which are both wideband and interfering at Part 15 levels.”⁵ Part 15 rules for intentional radiators⁶ do not differentiate between narrowband and wideband emissions, but speak only of “emissions.” Many Part 15 intentional radiators have bandwidths much wider than the GPS band and in fact, under the general provisions of Sections 15.209 and 15.109 many devices are permitted to radiate energy over very wide bandwidths. However, narrowband versus wideband is not the issue as it relates to the potential for causing harmful interference. The power in the emission is the primary consideration and no one has shown that power levels permitted under the existing provisions of 15.209 or 15.109 have ever caused harmful interference.

RESPONSE TO AT&T WIRELESS SERVICES, INC.

AT&T Wireless Services, Inc. submitted a document in opposition to TDC’s Petition to Reconsider.⁷ This section responds to several of their points.

Indoor vs. Outdoors

AT&T Wireless states that “[t]he [FCC’s] limits for emissions in the cellular and PCS bands are also irrational because they provide less protection from indoor devices than they do from

officers as they attempt a forced entry to rescue hostages whose positions could be more precisely determined by through-the-wall radar.

⁵ *op cit*, pps 18 – 19.

⁶ 47CFR §15.209.

⁷ Although styled as “comments,” the AT&T Wireless filing is really an untimely petition for reconsideration, which should be rejected as such.

outdoor devices.”⁸ AT&T states, “[a]s Sprint explains, PCS and cellular operations require additional protection indoors because customers already experience signal loss caused by building walls and windows.”⁹ This argument fails under closer scrutiny. In IS-95 systems, the system controls the transmitted power level so that each handset, regardless of location, receives the same average power level.¹⁰ Thus, an IS-95 cellphone that is indoors receives the same power as one that is outdoors (unless the system would have to transmit a power level that exceeds a predetermined limit). The PCS community has argued that in the presence of UWB emissions, the IS-95 system would have to increase the transmit power level to compensate for the UWB signal. If this were true, the capacity of the system might be significantly reduced. However, real-world experimentation has shown that when the IS-95 handset was in close proximity (from less than 1 up to 3 meters), the PCS system did not increase transmit power relative to when there was no UWB transmission. Thus, the core of the PCS industries argument against UWB is not supported by real-world measurements.¹¹

While AT&T Wireless does not operate an IS-95 network (*i.e.* CDMA), the situation is essentially the same for their network. Either the handset has sufficient power to communicate

⁸ [Comments of AT&T Wireless Services, Inc. on Petitions for Reconsideration, ET Docket 98-153, July 31, 2002](#), p. 10.

⁹ *Id.*, p 11.

¹⁰ The base station may transmit more power to a given handset, but the received power is effectively monitored by the effort to maintain the bit error rate to an acceptable level.

¹¹ Appendix A of [Reply Comments of Time Domain Corporation, October 27, 2000](#), FCC OET Docket 98-153

effectively or it does not. If there is sufficient power, a UWB signal at the levels established by the FCC is far too small to create any harmful interference issue.¹²

Part 15 Was Correctly Interpreted by the FCC

AT&T Wireless completely mischaracterizes the FCC's *First Report and Order* by stating that the FCC's decisions were based on a "misguided belief that Part 15 is meant to encourage the unlimited 'sharing' of spectrum, rather than the more limited use that the Part 15 actually permits."¹³ The *First Report and Order* places severe limits on UWB systems. As should be well known to the PCS industry and was most recently noted by XtremeSpectrum,¹⁴ other Part 15 systems may legally radiate intentional emissions into the PCS band at nearly sixteen times greater power than UWB is allowed. To these Part 15 emissions, one can add the harmonic and spurious emissions from a plethora of licensed transmitters.

Finally, AT&T's protestations as to testing ring hollow. The Commission invited testing in its NPRM. Time Domain stepped up to the plate and engaged in testing. This effort included the joint Time Domain-Sprint work as well as Time Domain's underwriting of the University of Texas testing and analysis by the Applied Physics Lab of Johns Hopkins University. In the case of the University of Texas testing, multiple opportunities were provided for interested parties to comment on the test design. Both the University of Texas and the Johns Hopkins efforts were

¹² AT&T Wireless operates a GSM-standard system. A document was submitted outlining the results of a test conducted by Siemens Roke Manor Research showing the robustness of GSM networks to UWB emissions. [Ex Parte Filing of Roke Manor Research, Ltd., A Siemens Company, filed May 31, 2001.](#)

¹³ AT&TWS, p. 12.

¹⁴ [Opposition to Petitions to Reconsider, XtremeSpectrum Inc., July 31, 2002](#), FCC OET Docket 98-153, p. 17.

under the control of the respective academic institutions. As for any further tests or measurements by the FCC, Time Domain expects that the Commission will invite public comment on these efforts once they are completed. The Commission, however, should not fall for the pleas for endless testing, which are beginning to sound a lot like the “inside the beltway” approach of “let’s study the problem until the proponents disappear.”

CONCLUSION

The Commission’s *First Report and Order* in this proceeding stands out as a conservative step. This effort can provide the basis for initial experience with non-federal UWB operations at extremely low power levels – 75 billionths of a watt per MHz and less. Neither the levels authorized in the Commission’s decision nor the very limited changes proposed by Time Domain for highly limited public safety uses pose any realistic threat of harmful interference. Accordingly, Time Domain urges the Commission to reject the oppositions noted in this Reply and to reaffirm its initial decision with the limited modifications necessary to make public safety uses of UWB a reality.

Respectfully,
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By submitted electronically
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August 15, 2002

CERTIFICATE OF SERVICE

I, Paul Withington, Vice President of Time Domain Corporation, hereby certify that on this 15th day of August, 2002, a true and correct copy of the foregoing Opposition for Time Domain was sent by first class mail to the following:

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