

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

In the Matter of

Revision of Part 15 the Commission's)	
Rules Regarding Ultra-Wideband)	ET Docket No. 98-153
Transmission Systems)	
)	
Comments Requested on Reports)	
Addressing Potential Interference)	DA 01-753
From Ultra-Wideband Transmission)	
Systems)	

COMMENTS

Lockheed Martin Corporation (“LMC”) herein files its Comments in response to the Federal Communications Commission (“Commission” or “FCC”) Public Notice issued on March 23, 2001 with respect to the above-captioned proceedings.¹

Introduction and Summary

In May 2000, the Commission released a Notice of Proposed Rule Making (“NPRM”) proposing to revise Part 15 of Title 47 of the Commission’s Rules to open the way for new types of products incorporating ultra-wideband (“UWB”) technology.² The thrust of the general proposal would allow certain very low-power UWB systems to operate as unlicensed devices within Part 15 of the FCC rules. The Commission

¹ See *Public Notice*, “Comments Requested on Reports Addressing Potential Interference from Ultra-Wideband Transmission Systems,” DA 01-753 (released March 23, 2001, revised March 26, 2001).

² See *Notice of Proposed Rule Making*, ET Docket No. 98-153 (May 11,2000).

previously placed on Public Notice two reports released by the National Telecommunications and Information Administration (“NTIA”) containing analyses of data it collected regarding the potential for UWB transmission systems to cause harmful interference to non-GPS Federal systems operating between 400 MHz and 6000 MHz. In response to this Notice, LMC stated its concern regarding possible interference to Fixed-Satellite Service (“FSS”) receivers operating in the 3700-4200 MHz band and observed that a necessary precondition to the deployment of UWB devices is the development and implementation of an appropriate and enforceable technical regulatory regime.³

The latest results of NTIA’s testing,⁴ and the test report from Stanford University for the Department of Transportation (“DoT”)⁵ show that, in the vast majority of cases studied, UWB will cause harmful interference to GPS operations unless UWB is restricted to avoid such impact. Testing by Johns Hopkins University (“JHU”) also indicates that interference to GPS occurs in some scenarios and that different coding schemes produce differing interference effects on GPS receivers. The JHU report also indicates the Commission has the information needed “...to establish criteria for regulating UWB emissions.”⁶

While we agree that the Commission has a significant amount of material on which to develop a technical and regulatory framework for regulating UWB emissions, LMC urges the Commission to issue a Further Notice of Proposed Rulemaking with the

³ See *LMC Comments to DA 01-171*, February 23, 2001

⁴ See *NTIA Special Publication 01-45*, “Assessment of Compatibility between Ultrawideband Systems and Global Positioning System Receivers” (March 9, 2001).

⁵ See “*Potential Interference to GPS from UWB Transmitters, Phase II Test Results*” (March 16, 2001).

⁶ See *Johns Hopkins Report on UWB – GPS Compatibility Analysis, March 8, 2001 at Executive Summary*.

specifics of a technical regulatory framework, in order to provide for focused public comment based on the testing completed thus far.

NTIA's Test Results Show Potential for UWB Interference to GPS Operations.

The NTIA Report shows that interference is caused in the vast majority of interference scenarios tested. NTIA's testing indicates that low pulse repetition frequency ("PRF") devices, which might be used for ground-penetrating radars, may not cause as significant an impact on GPS operations as higher rate PRF applications, which might be used for wideband communications applications; these latter applications would represent a significant threat to GPS operations.⁷ This would seem to indicate that restriction of the PRF for certain UWB applications may help alleviate some of the interference potential to GPS receivers. With limitations on maximum effective isotropic radiated power ("e.i.r.p") and limitations on the duty cycle and modulation characteristics, the Commission may have the beginnings of a sound technical regulatory framework pursuant to which some applications for UWB devices may be implemented in certain frequency bands. LMC notes that NTIA indicated in an earlier report that operation of UWB devices in bands up to 3.1 GHz would be "quite challenging" and operation in the bands from 3.1 to 5.65 GHz would require "operating constraints" on UWB devices and possible further restrictions on operating time, output power and aggregate units in a given area to protect FSS earth station receivers in the 4 GHz FSS band.⁸ NTIA's testing demonstrates that most, if not all, UWB devices will have to be subject to some

⁷ See *NTIA Special Publication 01-45*, "Assessment of Compatibility between Ultrawideband Systems and Global Positioning System Receivers" (March 9, 2001) at page 4-4.

⁸ See *NTIA Special Publication 01-43*, "Assessment of Compatibility between Ultrawideband Systems and Selected Federal Systems" (January, 2001) at Executive Summary.

licensing regime to prevent harmful interference to GPS and other co-frequency services and thus cannot be treated as typical Part 15 devices.⁹

The Johns Hopkins Report Also States the Need for Regulation of UWB Emissions.

The JHU analysis of testing performed on UWB-GPS compatibility by the University of Texas, funded by UWB proponent Time Domain, indicates that the type of GPS receiver used in the interference tests significantly affects the results of the test. While generally showing compatibility with GPS operations in the limited¹⁰ scenarios examined, the report states that the FCC now has sufficient information “to establish criteria for regulating UWB emissions.”¹¹

The Department of Transportation Report Calls for Regulation of UWB.

The Stanford University study, commissioned by the Department of Transportation, the first phase of which was submitted to the FCC last October,¹² determined that certain PRFs and e.i.r.p levels have differing impacts on GPS receiver performance. Unlike the NTIA report, the DoT report does not specify what PRF or e.i.r.p levels would be necessary to protect GPS operations, but nonetheless does conclude that some form of regulation of UWB is necessary.

⁹ The correlation between coding and modulation techniques used for UWB devices and their impact on GPS operations is clearly indicated in NTIA’s report. This fact, and the fact that UWB devices operating at current Part 15 levels still caused interference to GPS operations, would indicate that UWB devices cannot be treated as conventional Part 15 devices.

¹⁰ The UT tests included only six representative GPS receiver types and addressed only a small number of the possible permutations of UWB signal structures.

¹¹ See *Johns Hopkins Report on UWB – GPS Compatibility Analysis, March 8, 2001 at Executive Summary.*

The FCC Must Develop an Appropriate Technical Regulatory Framework for UWB.

LMC believes that the current test data provides the Commission with sufficient information to propose a technical regulatory framework for the deployment of at least some UWB devices. Furthermore, it is critical that any Commission regulatory framework contain the appropriate technical constraints, which could include deployment or application limitations, duty cycle restriction, and/or e.i.r.p limitations, to ensure that any deployment of UWB devices does not cause harmful interference to GPS and other existing services. It may be necessary to limit deployment of UWB devices to certain frequency ranges if other restrictions on UWB operations prove infeasible. The Commission should place the specifics of a technical regulatory framework before the public for comment in a Further NPRM.

Conclusion

LMC acknowledges that UWB devices represent an exciting new technology that promises a wide variety of applications. However, the unrestricted deployment of UWB devices poses a demonstrated threat to operational systems, including those with safety-of-life implications. Thus, it is clear that some form of regulatory mechanism for UWB devices is needed beyond current Part 15 limitations. The Commission appears to have the requisite information with which to begin crafting proposed rules pursuant to which UWB systems could operate without causing harmful interference to GPS or other co-frequency operations. LMC urges the Commission to specify the details of such a regulatory regime in a Further NPRM, including possible limitations on PRF and e.i.r.p characteristics of UWB devices, or limitations on deployment or applications for these

¹² See *Reply Comments of the U.S. DoT: Interim Test Results and Analysis*, October 30, 2000

devices. Such a proposed regulatory regime for UWB devices should take into consideration the testing performed to date on compatibility between UWB devices and other services and should be placed before the public for comment at an early date.

Respectfully submitted,

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