

BEFORE THE
Federal Communications Commission

WASHINGTON, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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

ET Docket No. 98-153

To: The Commission

COMMENTS OF LOCKHEED MARTIN CORPORATION

Lockheed Martin Corporation ("Lockheed Martin"), pursuant to Section 1.415 of the Commission's rules (47 C.F.R. § 1.415), submits these comments regarding the Commission's Notice of Proposed Rule Making ("NPRM") in the above-captioned docket. The Commission seeks comment on its proposal to modify Part 15 of its Rules for the purpose of allowing operation of a variety of applications employing ultra-wideband ("UWB") technology, an approach to spectrum use that operates by transmitting short, high-energy pulses across broad swaths of the radiofrequency spectrum. Lockheed Martin supports the Commission's initiative to explore permitting deployment of this technology, but urges that it proceed cautiously in its capacity as national spectrum manager and require technical proof that any UWB applications it ultimately approves can operate without causing interference to existing spectrum users.

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List A B C D E

I. Statement of Interest

Lockheed Martin is a major aerospace, defense and telecommunications company specializing in the development of sophisticated spacecraft, launch systems, missiles and other high technology products and services. Among other endeavors, Lockheed Martin is an applicant to the Commission for authority to launch and operate a global satellite system that would augment the Global Positioning System ("GPS"). The "Regional Positioning System" ("RPS") will consist of twelve (12) geostationary satellites operating from six (6) orbital locations in the GPS frequencies – including GPS-L1 (1559-1610 MHz), GPS-L2 (1215-1240 MHz), and GPS-L5 (1164-1215 MHz). Lockheed Martin has also filed applications for fixed-satellite service networks that would use frequencies in the Extra High Frequency ("EHF") bands,¹ and is a shareholder through its Lockheed Martine Global Telecommunications ("LMGT") subsidiary in Astrolink™, a geostationary FSS system the will use primary service frequencies in the Ka-Band.² Most recently, LMGT merged with Comsat Corporation, the primary U.S. provider of C- and Ku-band space-segment employing INTELSAT capacity, as well as the primary provider of international mobile-satellite service ("MSS") using capacity on the Inmarsat, Ltd. L-band MSS system.

Furthermore, Lockheed Martin, since 1989, has been engaged in the development and production of twenty-one replenishment spacecraft for the GPS

¹ See Application of Lockheed Martin Corporation for a Global Q/V-Band Satellite Communications System, FCC File Nos. 129 through 137-SAT-P/LA-97 (filed September 25, 1997); Application of Lockheed Martin Corporation for the LM-MEO Satellite Communications System, FCC File No. 178-SAT-P/LA-97 (filed December 22, 1997).

² See *Lockheed Martin Corporation*, DA 97-973, slip op. (IB, released May 9, 1997).

constellation, which is supporting an ever-expanding user community. At present, Lockheed Martin is engaged in an effort to further enhance the operational performance of the GPS by modifying up to twelve of these spacecraft to incorporate additional military and civilian signals, as well as increased signal power. These modifications will accelerate the planned modernization of GPS by about eight years.³

Accordingly, as a company with interests across a broad range of the radiofrequency spectrum, Lockheed Martin has a strong interest in matters affecting potential changes in the Commission's approach to spectrum management, such as this proceeding. In particular, Lockheed Martin is concerned about the potential adverse impact of UWB transmissions within the L-band spectrum allocated to GPS and MSS and upon other space-based services in the restricted bands below about 3 GHz.

II. Discussion

Although the Commission has pledged generally in the *NPRM* to ensure the protection of existing spectrum users, Lockheed Martin is concerned that the Commission has made preliminary judgments favoring UWB implementation, and is not providing adequate time for evaluation of the varied impacts that different forms of UWB technology may have upon existing services. Near the outset of the *NPRM*, for example, the Commission notes it has decided that "UWB devices appear to be able to operate on spectrum already occupied by existing radio services without causing interference."⁴ This statement is puzzling in view of the fact that there is not yet any concrete technical basis

³ In addition, Lockheed Martin has submitted a proposal for participating in the development of the next generation of GPS.

⁴ See *NPRM*, FCC 00-163, at 1 (¶ 1).

for concluding whether UWB applications are actually compatible with existing licensed services. At the same time, the Commission is requiring test results to be presented in this proceeding no later than October 30, 2000 – less than six months after the issuance of the *NPRM* – and is making no provision for any follow-up testing.

Although the Commission acknowledges elsewhere the need to protect GPS and other services in restricted bands,⁵ this result cannot be assured when only a single round of testing is to be accommodated. While the current schedule may be adequate to obtain initial test results, the Commission's evident intent to quickly establish rules based on limited public comment, itself based upon just one set of test results,⁶ would not allow sufficient opportunity for analyzing and critiquing the initial results, or for performing appropriate follow-up trials. The Commission has a unique obligation as the government entity entrusted with the task of spectrum management to require comprehensive testing of any commercial technology before it is deployed.

Thorough testing is particularly necessary with respect to restricted bands below 3 GHz, where at least some UWB applications claim a need to operate, given the presence of safety services and other operations requiring sensitive signal discrimination. These services include GPS, the Satellite Digital Audio Radio Service in the 2320-2345 MHz bands as well as the MSS Above 1 GHz ("Big LEO") Service in the 2483.5-2500 MHz bands. GPS satellites, for example, transmit at very low power, while at the same time, the navigation and position location functions of the service necessarily result in wide dispersal of units requiring access to GPS transmissions. Applications that use GPS

⁵ See *NPRM*, FCC 00-163, at 14 (¶ 30).

⁶ See *NPRM*, FCC 00-163, at 1 (¶ 1), 14 (¶ 31).

are numerous and varied, ranging from the delivery of precision weapons to the provision of aircraft en route navigation to transportation fleet monitoring to network timing and synchronization functions to a broad range of recreational uses. As a result, in addition to GPS being a critical tool of national security, a variety of civil and commercial users and industries have come to rely on the uninterrupted availability of GPS signals. Indeed, the Commission explicitly recognizes in the *NPRM* the substantial impact of GPS and its expanding commercial and public safety role, noting that “any harmful interference to GPS could have a serious detrimental impact on public safety, businesses and consumers,”⁷ and expressing its determination that “it is vitally important to ensure that critical safety systems, including GPS operations, are protected from harmful interference.”⁹ What began as a military application has fast become a global utility for an even larger civil and commercial user community; one which should not be put at risk by incursions into its assigned operating frequencies.

In view of these concerns, Lockheed Martin believes that it would be inappropriate for the Commission to make judgments regarding the substantial and far reaching issues that it faces premised solely on the preliminary data that it is expected to receive at the end of October. Given the broad range of UWB applications that are under consideration, and the necessarily complex tests, calculations and analysis that are entailed in any process to evaluate these applications, one submission of test data will not likely be adequate to address the large number of unknowns surrounding introduction of UWB transmissions into the current spectrum environment. Adoption of comprehensive

⁷ *NPRM*, FCC 00-163, at 13 (¶ 28).

⁹ *Id.* at 13 (¶ 29).

rules that impact a wide range of FCC licensees and government users demands a thorough testing program. Given this overriding need, Lockheed Martin believes that the Commission should allow more time for analysis of test results by all concerned parties – and based upon initial findings, for thorough follow-up testing – before it makes final decisions concerning UWB spectrum use.¹⁰

In particular, the Commission needs to devote more consideration to the very significant issue of cumulative interference from UWB emitters. In the *NPRM*, the Commission observes that its Technical Advisory Counsel (“TAC”) has found that multiple co-located UWB devices would cause “no significant rise in the RF noise floor.”¹¹ This conclusion, however, appears to be based solely upon consideration of papers authored by firms that are prominent advocates of UWB technology. The Commission’s very brief discussion does not explain how the TAC determined what level of increase in the RF noise floor should be deemed “significant” and provides no evidence that alternative views were examined. The issue of aggregate interference from UWB emitters, which could be widely deployed in certain applications, is a very significant matter that merits much more in depth consideration. The Commission should

¹⁰ Indeed, Lockheed Martin notes that the National Telecommunications and Information Administration has only recently received the necessary funding for one of the key studies cited in the *NPRM*. See *NPRM*, FCC 00-163, slip op. at 14 (¶ 31). It may therefore be impractical to expect final data from these important trials to be available by the October 30, 2000 FCC deadline for data submission. In the event that the NTIA study is not completed by that time, the Commission should grant an appropriate extension of the October 30 data submission deadline in order to allow full consideration of all of the data that is produced by the NTIA-sponsored testing program.

¹¹ See *NPRM*, FCC 00-163, at 21 (¶46).

ensure that this factor is fully considered in the course of analyzing the various test data that have yet to be submitted.

Accordingly, Lockheed Martin requests that the Commission limit the initial scope of this proceeding, and not seek to implement a broad technical framework for UWB, even on a provisional basis. Instead, the more appropriate course would be for the Commission to determine as a threshold matter whether permitting UWB technology under Part 15 is compatible with the well-established “frequency domain” approach to spectrum management. The Commission must first buttress its understanding of the technical issues surrounding “time domain” technology before adopting any rules to govern its deployment and operation. The Commission can then move forward to examine specific applications of UWB technology.

Some applications of UWB technology, such as certain types of ground-penetrating radars or through-the-wall imaging devices may be able to operate in some parts of the spectrum without causing any harm to other spectrum users. It may therefore ultimately prove appropriate to regulate such operations under Part 15 of the Commission’s Rules. New rules geared specifically to UWB operation would, of course, be required, as contemplated by the *NPRM*. Such regulations should specifically encompass the limitations previously placed on temporary authorizations granted to various entities that have been experimenting with UWB technology pursuant to FCC-granted waivers.¹²

¹² See Letter from Dale Hatfield, Chief, Office of Engineering and Technology (“OET”), to David Hilliard, Counsel to Time Domain Corporation, dated June 29, 1999; Letter from Dale Hatfield, Chief, OET, to Ronald LaBarca, President, U.S. Radar Inc., dated June 29, 1999; and Letter from Dale Hatfield, Chief, OET, to Terry Mahn, Counsel to Zircon Corporation, dated June 29, 1999. See also Letter from William Hatch, Acting

It may eventually be appropriate to allow use of UWB appliances for other purposes. At this time, however, the Commission does not have sufficient data describing the critical characteristics of such potential services, let alone their potential impact on current spectrum use. For this reason, the Commission must strive to gain the necessary knowledge in order to establish a firm foundation upon which to make fully informed judgments on interference issues surrounding these services. As the Commission has indicated, such applications would require independent Commission service rules, and are therefore matters beyond the scope of the anticipated Part 15 revisions addressed by the current *NPRM*.¹³

Finally, Lockheed Martin believes that the sensitive nature of many operations conducted in restricted frequency bands used for military and public safety applications (*e.g.*, GPS) and other sensitive uses warrants special measures to protect these services from harm.¹⁴ It would therefore appear to be appropriate to exclude UWB devices from operating in the frequency bands below about 2.9 GHz. Such an approach will meet the Commission's objective of protecting existing services without unduly constraining UWB development.

Administrator, Office of Spectrum Management, NTIA, to Dale Hatfield, Chief, OET, dated June 15, 1999 (attaching conditions for approval of Part 15 waivers).

¹³ See *NPRM*, FCC 00-163, at 8 (¶ 19). In addition to technical considerations, permitting operation of communications services on an unlicensed basis would produce regulatory inequities with respect to existing licensees, many of which have participated in spectrum auctions in order to gain access to spectrum necessary to provide similar types of services.

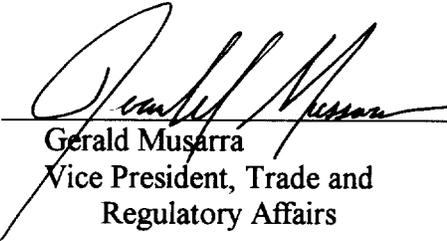
¹⁴ See 47 C.F.R. § 15.205(a).

III. Conclusion

The Commission should move cautiously in this proceeding, limiting its actions to providing a framework for introduction of UWB applications that have been proven to be compatible with existing radio uses. Pending test results that are forthcoming, the Commission may well be in a position in the near-term to allow introduction in certain frequency bands of some types of UWB technology, such as ground-penetrating radars and wall-imaging devices, subject to codification of specific technical rules necessary to ensure interference operation for other spectrum users. However, the Commission should likely preclude these devices from operation in bands below 2.9 GHz in order to protect GPS and other sensitive services operating in bands currently restricted under Part 15. The Commission should handle other types of applications on a case-by-case basis through subsequent rulemaking proceedings.

Respectfully submitted,

By:


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