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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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 No. 98-153

To: The Commission

COMMENTS OF THE U.S. GPS INDUSTRY COUNCIL

The U.S. GPS Industry Council ("the Council"), by counsel and pursuant to Sections 1.415, 1.419, and 1.430 of the Commission's rules, 47 C.F.R.§§ 1.415, 1.419, and 1.430, hereby submits Comments in the above-referenced docket proceeding which seeks to investigate the possibility of permitting the operation of ultra-wideband ("UWB") radio systems on an unlicensed basis under Part 15 of the Commission's rules.[1/] In particular, the Council is concerned that eventual changes, if any, to the Commission's rules to authorize the operation of UWB radio systems would result in an unacceptable adverse impact on millions of public, commercial, and consumer users worldwide that are dependent upon the Global Positioning System ("GPS") in the 1559-1610 MHz band.

The Council is a non-profit 501(c)(6) industry trade association whose mission is to be an information resource to the Government, the media, and the public on GPS. The Council's purpose is to promote sound policies for the development of commercial markets in civilian application, while preserving the military advantages of GPS. Current membership includes the principal U.S. manufacturers of GPS equipment — e.g., Boeing, Honeywell, Magellan/Ashtech, Rockwell International, and Trimble Navigation.

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1/ *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, FCC 98-208, slip op. at 1 (¶1) (released September 1, 1998) ("NOI").

GPS satellites transmit a very low power, data-only signal (on the order of 50 bps). The basic GPS system architecture has been unchanged since its conception in 1973, and there is no ability for the GPS user segment to accommodate any interference above the level at which the system was designed to operate. This is a fundamental constraint for any potential new users of the 1559-1610 MHz band.

Based on the latest data, there are over five million direct users of GPS around the world today. Between the many safety and commercial applications of GPS summarized below, the number of indirect beneficiaries of the continued reliable operation of GPS -- from airline passengers to stock market investors to users of resources that are produced more efficiently as a result of GPS technology -- lies well into the hundreds of millions.

Much of the use of GPS includes safety-of-life applications. In aviation, GPS is used for transoceanic and en route navigation, aids to landing, and for wind shear detection. In maritime environments, GPS is used for navigation on the high seas, search and rescue, positioning of buoys and marine navigation aids, docking of high-speed ferries, and precision coastal and harbor approach operations. In the differential beacon augmentation systems, GPS is used for increased accuracy in the coastal confluence zones of many nations around the world, and in surface transportation, they are used in such critical applications as monitoring of bridge status and train control, collision avoidance, and the transportation of hazardous materials. Also, GPS is an enabling technology for the nation's emerging Intelligent Transportation Systems ("ITS") infrastructure. Federal, state, and local governments are increasingly relying on GPS for use in ambulance, police and fire department dispatch, and to provide disaster management and relief for hurricanes, floods, earthquakes, and fires.

Moreover, GPS has become an integral part of the infrastructure of both the U.S. and world economies. GPS is used in many commercial applications where continued availability of uninterrupted timing signals and position information is critical to the underlying operation. For example, the world's financial, telecommunications, and internet industries have become highly reliant on GPS for network synchronization.

The frequency bands used by GPS are clearly "sensitive bands" under the vernacular employed in the NOI, [2] due to the inherent nature of the safety-related uses of the primary radionavigation satellite service allocation and constraints imposed by the GPS system specification,[3] and as such must be fully protected. The importance of GPS and the need to ensure its protection is reflected in legislation as well as in the policy initiatives of the Executive Branch.[4]

The Commission recognized in the NOI that the current design of identified potential UWB radio systems include the presence of high level, distinct spectral lines concentrated near the center of emission,[5] and that at least some proponents of UWB systems have admitted that their transmitters would generate signals in bands that would overlap the GPS bands.[6] The UWB systems would apparently result in significantly increased levels of distinct interfering signals across broad reaches of spectrum.[7]

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[2] NOI, FCC 98-208, slip op. at 2 (¶2) & n.5.

[3] The GPS System Specification has been in the public domain since at least 1984.

[4] *See, e.g.,* Presidential Decision Directive (1996); Defense Authorization Act (1997); Defense Appropriations Act (1998); Commercial Space Act (1998); Bilateral Agreement between the United States of America and Japan (1998).

[5] *Id.* at 2 (¶4).

[6] *Id.* at 3 n.14.

[7] *Id.* at 2 (¶4).

The Commission is also cognizant that UWB systems have the potential for causing harmful interference over wide bandwidths due to the increase in spectral density which produces noise-like signals in some cases and distinct spectra lines in other cases.[8] Further, the Commission has acknowledged that the combination of a UWB signal with a modulation technique that pseudorandomizes the time position of the pulses can make the signal appear to be broadband noise.[9] In this last regard, the Council notes that if two or more UWB signals use the same bandwidth, there would be a resulting increase in background noise and power spectral density.

Based on the scant descriptions provided in the NOI, the Council is concerned that the operation of UWB systems in bands that overlap with the GPS frequency bands would cause intolerable interference to the millions of current GPS users in terrestrial, maritime, commercial and general aviation, and space safety-of-life applications. Any increase in the basic noise floor will significantly reduce the ability of the receiver to acquire a GPS signal or even to maintain tracking of a GPS signal, or cause errors in position or time accuracy. **Any of these consequences is intolerable to the GPS user segment.**

In addition, of course, to in-band interference, GPS receiver systems are susceptible to both spurious and out-of-band interfering emissions. Again, these constraints are imposed by the GPS system design, not by the design of the user equipment. If UWB systems operate without sufficient frequency separation from the GPS frequency bands, interference from UWB emissions would manifest itself in either of two ways. First, the GPS receiver may not receive enough signals to develop a navigation solution (*i.e.*, service will be interrupted). Because GPS receivers

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[8] *Id.* at 4-5 (¶¶9-10).

[9] *Id.* at 5 (¶12).

are increasingly being integrated into complex systems, the operator of the system may never know that it is not receiving sufficient GPS information as a result of interference from UWB emissions. Second, the interference, short of totally blocking reception of the GPS signal, may cause erroneous information to be received. In either case, public safety could be compromised.

The Commission is obliged to ensure that safety services — such as the radionavigation satellite service in which GPS operates — are protected from harmful interference. Under International Telecommunication Union ("ITU") Radio Regulation ("RR") S4.10, administrations must take into account in the assignment and use of frequencies the fact that special measures are required to ensure that safety services are free from harmful interference.[10/] The Commission's own rules reflect this requirement.[11/] The Council notes that ongoing studies in the ITU, which is examining the feasibility of sharing a portion of the GPS spectrum from 1559-1567 MHz, have indicated that due to harmful interference, sharing with other telecommunications services that use digital signals (similar to what might be encountered with UWB systems) is not feasible.[12/]

The Council remains concerned about the impact of UWB interference into the GPS bands, and about the disruption such interference would cause both to the current installed GPS user base and to rapidly evolving and expanding GPS operations. Therefore, if the Commission ultimately proceeds to a proposal to revise its rules to authorize the operation of

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10/ *See* ITU RR No. S4.10.

11/ *See* 47 C.F.R. § 2.1(c)(1997) ("harmful interference," which is pervasively prohibited under the Commission's rules, is defined, in part, as "interference which endangers the functioning of a radionavigation service or of other safety services . . .").

12/ *See* ITU-R Working Party 8D Document No. 8D/TEMP/80 (Rev. 2) (draft elements for the Report of the Conference Preparatory Meeting for the 2000 World Radiocommunication Conference on Resolution 220 (WRC-97)).

UWB systems, it should only do so if it can ensure that no harmful interference will be caused to GPS user operations. This may entail limiting UWB to bands well above 1610 MHz, and even then only if it can be determined that UWB operations would not place harmful out-of-band or spurious emissions into the GPS bands.[13]

CONCLUSION

The users rely on the stability, continuous availability, and integrity of the GPS service that is provided by the U.S. Government and confirmed in the U.S. Presidential Decision Directive and various statutes. Indeed, since the first GPS receiver was developed in 1984, the continuous, market-driven evolution of passive receiver technology is premised upon the predictable integrity of the GPS spectrum.

For the foregoing reasons, the Council urges the Commission to consider the issues raised in these comments as it investigates the possibility of proposing a revision of its rules to authorize unlicensed UWB radio systems under Part 15. The Council is cognizant of the desires of UWB proponents, and acknowledges the potential benefits that UWB systems promise. It is only out of the need to preserve the integrity of the GPS system on which over five million users directly rely and many times that number rely indirectly -- an objective that is codified in statutes and reflected in a presidential decision directive, among other places -- that the Council

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[13] In this regard, the Council notes that the frequency bands below 3 GHz are very crowded and most services using these bands already operate under thin interference margins. The Commission may, therefore, be well advised to concentrate any proceeding it may initiate on UWB systems to bands above 3 GHz.

respectfully requests here that if the Commission initiates a rulemaking proceeding on the UWB concept it does so in a manner that ensures that there is no increase in the noise floor in the GPS bands.

Respectfully submitted,

U.S. GPS INDUSTRY COUNCIL

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