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

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In the Matter of	)	
	)	
Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems	)))	**Docket No. 98-153**

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To: The Chief, Office of Engineering and Technology

REPLY COMMENTS OF THE
AMERICAN RADIO RELAY LEAGUE, INCORPORATED

The American Radio Relay League, Incorporated (the League), the national association of Amateur Radio operators in the United States, by counsel and pursuant to the *Notice of Inquiry*, FCC 98-208, released September 1, 1998 (the Notice), hereby respectfully submits its reply comments in the captioned proceeding. These reply comments are timely filed[1]. The comments to which the League replies address the possibility of permitting operation of ultra-wideband radio systems on an unlicensed basis under Part 15 of the Commission's Rules. Such systems could provide radar applications where precise distance resolution is required and for covert voice or data communications which are not subject to multipath degradation.

1. The League notes that several commenters in this proceeding independently arrived at the same general concern with the concept of ultra- wideband (UWB) devices as did the League: that interference to licensed services, and in the restricted bands listed at Section 15.205

[1] The Reply Comment date was extended to and including February 3, 1999 by *Order Granting Extension of Time*, DA 98-2650, released December 30, 1998, by the Chief, Office of Engineering and Technology.

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of the Commission's rules, may result from operation of UWB devices in bands allocated to licensed services. However, it may be that such devices can be operated on a filtered basis, which would allow bands in which sensitive amateur receivers are located, and the restricted bands, to be excluded from those in which the UWB devices operate.

2. The League is in agreement with the joint comments of the Consumer Electronics Manufacturer's Association and the National Association of Broadcasters (CEMA/NAB), which express concern about interference from UWB devices to television receivers and in the restricted bands. CEMA/NAB state, in part:

> CEMA and NAB are concerned that the operation of UWB radio systems on an unlicensed basis under Part 15 will cause interference within restricted bands and the TV broadcast bands. While CEMA and NAB appreciate the beneficial effects imagined by UWB technology, the Commission must ensure that it strikes an equitable balance between the needs of the public for services provided by non-licensed devices and the need to ensure that these devices do not cause harmful interference to licensed radio services. Part 15 of the Commission's rules permits the operation of low power radio frequency devices without a license from the Commission or the need for frequency coordination. The technical standards for Part 15 are designed to insure that there is a low probability that these devices will cause harmful interference to other users of the spectrum. The primary operating conditions under Part 15 are that the operator must accept whatever interference is received and must correct whatever interference is caused. Therefore, should harmful interference occur, the operator is required to immediately correct the interference problem, even if correction of the problem requires ceasing operation of the system causing the interference (footnote omitted).
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> Clearly, it would be inconsistent with the fundamental tenets of the Commission's foregoing policies regarding part 15 devices if the Commission were to amend its rules to accommodate the provision of unlicensed UWB radio systems, knowing that such systems can cause harmful interference within restricted bands and the TV broadcast bands...Further, the Commission must also consider that this problem would appear to be exacerbated by the cumulative impact of emissions if there is a large proliferation of UWB devices.

CEMA/NAB Comments, at 2.

The CEMA/NAB comments go on to note that the Commission cannot allow UWB operation until it is "absolutely certain" that the wide bandwidth of UWB system emissions do not result in fundamental emissions being transmitted into the TV broadcast and other restricted bands. To this category, the League would add any other licensed service allocations in which sensitive receivers or wideband receivers regularly operate. At this time, the Amateur Radio Service represents a good example of both. Amateurs use extremely sensitive receivers. Recent changes in Commission rules regarding use of spread spectrum techniques in the Amateur Service are starting to produce significant use of those emissions. It would be premature to allow new, Part 15 UWB signals in the amateur bands just as this technology is starting to take hold in the Amateur Service.

3. The comments of the U.S. GPS Industry Council (Council) are similar, relative to potential interference from UWB devices to Global Positioning System (GPS) receivers. The increasing use of GPS technology for ever-increasing applications, including safety-of-life applications necessitates protection against interference from Part 15 devices. UWB manufacturers have conceded that their UWB transmitters would generate signals in bands that would overlap the GPS bands. This would result in significantly increased levels of distinct interfering signals across broad reaches of spectrum. As stated by the Council:

> 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. 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. 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 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.
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> *Council comments, at 4.*

The Federal Aviation Administration (FAA) raised similar concerns relative to aeronautical safety bands in its comments in this proceeding. Ultimately, the Council urges that, should the Commission authorize UWB devices, it should do so only after a factual finding that there will be no interference to GPS user operations. This may, it states, entail authorizing UWB devices only on frequencies well above 1610 MHz. It is noteworthy that in the Amateur Service, extensive use of GPS technology is made in APRS communications, which is currently extremely popular.

4. The League agrees with the concerns expressed above, and notes with some grave concern that the Commission has taken an overly broad view in the past few years of its jurisdiction to authorize unlicensed, high power devices under Part 15. The League has participated in many of those proceedings, inasmuch as many of the bands in which Part 15 devices normally operate are allocations in which the Amateur Service has useful allocations. The current level of interference from unintentional and low-power intentional radiators results is not insubstantial, but it is usually resolved, at some expense to radio amateurs, involved manufacturers, and the Commission. However, the Commission should not add to the problem at present. The Commission has tended recently toward authorization of high-powered Part 15 devices in bands allocated to the Amateur Service, without adequate consideration for the

interference that will likely result, and in many cases does result, to amateur stations.[2] The Commission is obligated to determine, in accordance with the Communications Act, that Part 15 devices do not have the potential for interference to licensed services. If it cannot make this determination, it has no jurisdiction to authorize those devices, because they are by definition unlicensed. In this case, the League's comments, and those cited above, noted that there is a significant potential for interference from UWB devices to amateur SSB and television stations operating in various bands, at distances of more than a kilometer in free space, using typical receiver noise standards and signal-to-noise ratios.

4. Given the foregoing, and for the reasons stated in its comments, the League concluded that interference from UWB devices on amateur frequencies could substantially degrade certain amateur operations in allocated bands, especially between 222 and 450 MHz. Furthermore, these devices are difficult to identify by standard direction-finding techniques. The League assumed from the language of the Notice that UWB devices, of necessity, would operate even in the restricted bands, and as well in amateur bands in which sensitive wideband receivers operate. The Notice stated, at paragraph 11, that "it is difficult, if not impossible, for UWB systems to avoid placing fundamental emissions within the restricted bands or the TV broadcast bands." Thus, it was concluded that there would be a substantial potential for interference.

5. Since the comment date, however, the League has received correspondence from Multispectral Solutions, Inc. (MSSI), a commenter in this proceeding. MSSI, a small business in Maryland which develops advanced electronic systems for communications and radar applications, states that its view is that unfiltered UWB emissions could create potentially serious

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[2] See, e.g., ET Dockets 98-156, 96-102, and 96-8.

interference to other services, but that it has an approach to UWB signal generation that permits the filtering of the emissions to inhibit their falling within restricted bands. MSSI states that its approach does not affect UWB system performance, as its own experience has shown. MSSI also claims that the comments of TEM Innovations also indicate that band-limited UWB devices are practical to develop. MSSI stated to the League in correspondence dated December 22, 1998 that it is "confident that UWB systems can indeed be developed with proper filtering to protect aeronautical safety, GPS, (broadcast) television, amateur radio and other critical services." The League finds this option most appealing, and would welcome the exploration of filtered UWB devices as a means of arriving at a "win-win" situation. The problem, however, is that MSSI's view of the best location for its version of Part 15 UWB devices includes the bands 2200-2700 MHz, 5400-5900 MHz, and 9000-11000 MHz, which include large amateur allocations. MSSI also proposes relatively narrow bandwidth (200 MHz), and substantial power and antenna gain, on the order of one watt peak power output and +6dBi antenna gain. It is unclear that the devices which implement the level of filtering MSSI suggests would retain the UWB characteristics that are themselves interference-limiting. Furthermore, the comments of Zircon Corporation are directly at variance with those of MSSI. Zircon states:

> Signal filtering, or "notching", to avoid the restricted bands is not an option if it means the complete removal of all emissions as UWB device manufacturers would be forced to "prove the negative", a virtual impossibility. If on the other hand, notching means the reduction in emissions to some sub-Class B levels in certain bands, the cost and complexity to achieve this would quickly overwhelm UWB technology and drive all but the most expensive devices off the market. Even a few notched frequencies (e.g. FAA safety bands) represent difficult and costly tradeoffs. The practical result would be that the lowest notch will become the new Rule 15.205 baseline for all restricted band emissions, thereby severely limiting the usefulness of UWB technology.

Comments of Zircon Corporation, at 7-8.

It is not clear, therefore, whether any filtering or notching of UWB devices to exclude amateur, television broadcast, or restricted band operation is practically feasible.

6. The foregoing demonstrates that the use, operating parameters, and operating environment of each proposed UWB system are relevant to interference potential, and must be considered. Thus, the League again requests that the Commission ask the manufacturers of UWB devices to develop some proposed standards for UWB operation and circulate them in support of a unified, comprehensive plan for UWB technical devices. In the meantime, those devices which have public interest application should be considered on a case-by-case basis, and permitted operation by experimental license or waiver.

Therefore, the foregoing considered, the American Radio Relay League, Incorporated respectfully requests that the Commission proceed in accordance with the recommendations contained in its comments in this proceeding, and that it not authorize UWB devices at present on a blanket Part 15 unlicensed basis.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I, Judith L. Wing, Paralegal in the law firm of Booth, Freret, Imlay & Tepper, P.C. do hereby certify that a true copy of the foregoing "Reply Comments of the American Radio Relay League, Inc." was sent this 3rd day of February, 1999, by U.S. mail, postage prepaid to each of the following:

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