

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
Revision of Part 15 of the Commission's) ET Docket 98-153
Rules Regarding Ultra-Wideband)
Transmission Systems)

REPLY COMMENTS OF ZIRCON CORPORATION

Zircon Corporation ("Zircon"), by its attorneys, hereby files these reply comments in the above-captioned proceeding. Zircon is a leading U.S. manufacturer of specialized tools used in construction industries and will be directly affected by the outcome of this proceeding.

The Notice of Proposed Rulemaking (NPRM) in this proceeding is a significant undertaking, but it is really several notices in one. The Commission has proposed to permit various Ultra Wide Band (UWB) technologies with different requirements and technical characteristics to operate unlicensed under Part 15. Such far reaching and commendable proposals have had the predictable result of causing great concern to the many services that operate in the most heavily used spectrum and fear harmful interference from any technology that might share that spectrum. In addition to its usual chore of having to sort the wheat from the chaff, it is incumbent upon the Commission to bring coherence to these proceedings by reducing the scope of its deliberations to more manageable levels. The Commission must now be prepared to "slice and dice."

By its nature, UWB technology will share spectrum with most licensed services. These services have different characteristics and require varying levels of protection. Some services, for instance, GPS, are dependent on the reception of very low level signals. Such services may require different levels of protection than others. Some proposed UWB applications operate with very low level signals. These services may be

given more leeway than others. As a first cut, Zircon believes that the Commission is in a position now to make some basic determination with respect to Ground Penetrating Radar (“GPR”) and through-wall imaging systems using very low signal levels.

GPR and through-wall imaging systems should be treated similarly. First, it should be noted that while many commenters differed in their opinion of the degree of regulation that should be imposed on GPR and through-wall imaging systems, almost no one suggested that the two technologies should be treated differently from one another. There seems to be a fundamental understanding that low power non-communications devices are a separate breed of UWB device. Having said this, it must be noted that the comments on how these two technologies should be treated varied not only greatly but directly with the degree of concern for the victim receivers. For instance, The US GPS Industry Council (“the Council”) announces a seeming willingness to tolerate GPR and through-wall imaging devices, but only above 3 GHz. This position should be contrasted with that of Sirius Radio Inc., a DARS licensee that also is dependent on reception of low powered satellite signals. Sirius recommends that all UWB activity except certain ground and wall-penetrating radar applications be limited below 2.9 GHz. The commonality here is that the commenters treat GPR and through-wall imaging systems similarly.

Specific comments of US GPS Council. The restrictions and conditions that the Council would place on GPR and through-wall imaging systems would render most applications of these technologies useless. As we note above, in its efforts to protect GPS systems, the Council would not permit any UWB device to operate below 3 GHz. Zircon’s through-wall imaging radar emits pulsed energy between 200 MHz and 4 GHz. This range has not been chosen haphazardly but rather is absolutely necessary to successfully image the various materials and objects that might be buried within walls, floors or ceilings. By suggesting that Zircon not have access to bands below 3 GHz the Council evinces a complete lack of understanding of through-wall imaging systems.

The Council proposes other similarly disabling requirements such as a requirement for adaptive power control to assure only the power needed for the type of wall material penetrated and a demand for contact switches that would disable a device when not pressed against a target material. Of course, in a through-wall imaging system, the strength of the return, or echo, is very dependent on the type of material that caused the echo in the first place. It may even be necessary to use the information to classify the targeted material.

A contact switch requirement, a requirement that Zircon does not oppose in principle, must permit a device to be operated with an override mechanism to permit calibration (a matter of a few seconds), or to pass closely over uneven surfaces that might not always permit direct contact. The Commission understands that a GPR device operates in some instances “in close proximity” to the ground.¹ And because the ground itself is not always level, clearly GPR devices may at times not be pointing straight down. Still they will be pointing at an absorptive mass, whatever their specific orientation. The same is true of through-wall imaging devices. Depending on the texture of the surface, a through-wall imaging device may need to be used “in close proximity” to a wall or other surface. Nevertheless, its energy will be focused through an absorptive mass.

The Council also would restrict the use of through-wall imaging (and GPR systems as well) to situations involving protection of life or property. Even though use of the Zircon through-wall imaging radar does promote safety by making apparent hidden and otherwise hazardous objects, Zircon’s customers are contractors and remodelers who use the Zircon device in the course of construction and demolition. Restricting its use only to situations involving protection of life or property would effectively kill its market. One does not need to read between the lines to realize that the GPS interests, whatever their protestations, are not really willing to tolerate GPR and through-wall imaging devices in their spectrum at all.

¹ NPRM at para. 25

Zircon appreciates the concern of the Council, NTIA, the Department of Transportation and the GPS interests. GPS services are extremely important for safety and other purposes and are becoming a more ubiquitous part of daily life. For the record, Zircon has no intention of offering a through-wall imaging device that is at all likely to impair the proper functioning of a GPS receiver, given reasonable operating scenarios. The marketing of any such device would be counterproductive. Zircon believes that the comments of the GPS interests in this regard are far wide of the mark. Indeed their arguments seem protectionist and reflexive rather than thoughtful and constructive.

Through-wall imaging systems do not pose a threat. There may be an UWB GPR or through-wall imaging system that is so powerful it poses a direct threat to GPS systems. However, it must be emphasized that the Commission has not contemplated permitting unlicensed operation of such a device under Part 15 in this proceeding (and Zircon does not make one). Rather the Commission has proposed regulation of low power devices that would operate at the Part 15 limits. For its part, as Zircon explained in its comments, its device emits energy at such a low level, it is barely measurable. After all, it is designed to operate at a range of 12- 15 inches! It is difficult to imagine that a Commission decision to permit the unlicensed operation of such devices would represent the beginning of a slippery slope toward disabling the effectiveness of licensed communications systems or GPS receivers.

In order to confirm what basic electrical theory and instinct suggest, Zircon has performed its own experiments with a GPS receiver. The result of the test is being submitted as Attachment A. Admittedly, the test involved only one receiver. Still, the results are instructive and compelling – and predictable. Pointing a Zircon-type transmitting device directly at a GPS receiver without intervening walls or absorptive materials of any kind, the pulse repetition frequency (PRF) was varied. At the PRF that will be used on Zircon's production models of its through-wall imaging system, it was noted that there was no measurable effect on the GPS receiver past approximately 5 feet. Even at five feet, even though the receiver suffered a ten percent reduction in signal strength, it lost no individual satellite signal. Given these results there seemed little

reason. to interpose any absorptive material to replicate actual operation. Zircon believes this test simply confirms the obvious. Its system is extremely low powered and not likely to interfere even with sensitive receivers in any rational scenario.

The Commission should “fast-track” non-communications UWB consideration. Zircon urges the Commission to bifurcate the UWB proceeding now. Even though the Commission is still awaiting test results from NTIA and others, it should separate its consideration of GPR, through-wall imaging systems and any other non-communications low power UWB technology, from the rest of the Docket and proceed on a fast track.

Bifurcation and fast-tracking will serve the public interest and simplify the Commission’s burden of sifting through the myriad and often contradictory filings in the general UWB proceeding. The technologies in question, GPR systems, and through-wall imaging devices are easily understood and do not require the years of study and debate that will surely accompany the Commission’s deliberations on UWB communications devices. The Commission should be prepared to consider separately, and act on requests to manufacture and sell devices that employ very low power, are not ubiquitous, either in time or location of operation, and pose no realistic interference threat to licensed services.

Zircon also recommends that the Commission grant the Chief, Office of Engineering and Technology, delegated authority to act on waivers of its rules to permit the earliest introduction of low powered UWB devices that are designed to operate by being directed into walls, floors, ceilings, the ground or which operate in any other confined environment. Although waivers have been possible in the past, the Commission has had to engage in lengthy coordination with the NTIA when UWB devices transmitted over restricted bands. A separated proceeding, concentrating on the low powered devices described above, should provide the Commission with sufficient information and confidence to act more expeditiously.

Conclusion. Zircon believes that the Commission has opened the door for a whole generation of new RF devices. It urges the Commission, however, not to hold hostage the most obvious candidates for simplified regulation, GPRs and through-wall imaging systems, pending resolution of a host of technical issues of relevance to other, more controversial UWB devices.

Respectfully submitted,
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ATTACHMENT A

SUMMARY REPORT IMPACT OF A ZIRCON UWB TEST TRANSMITTER ON A GPS RECEIVER

Zircon evaluated the impact of a test transmitter on a consumer GPS receiver, the Garmin emap. The test transmitter was very similar to that intended to be used in its commercial product. The main differences were in the ability to select both the Pulse Repetition Frequency (PRF) and the length of a pseudo random code intended to spread the spectrum.

Tests were conducted over distances from 2 to 50 feet to determine the degree of received signal degradation as a function of PRF and to evaluate the improvement obtained from spectrum spreading.

The tests indicated that interference would be displayed as a general reduction in signal strength of most of the satellites being received. The level of interference decreased with increasing distance and, at any given distance, increased with increasing PRF. The use of spectrum spreading produced about a 25% reduction in the level of interference.

The chart below shows the overall results in the form of a curve of distance versus PRF for a minimal impact on the GPS receiver. Minimal impact has been considered to be less than a 10% reduction in signal strength. This chart assumes the use of spectrum spreading.

