

January 30, 2002

VIA FEDEX AND FAX
The Honorable Michael Powell
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

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

Dear Chairman Powell:

GPS DOES NOT KNOW IF IT'S "INTENTIONAL" OR "UNINTENTIONAL"

Further to our letter of January 29, 2002, we have been informed that those seeking UWB authorization are interpreting Paul Wolfowitz's letter in such a manner as to negate the intent that UWB not be authorized below 4.2 GHz.

The Department of Defense issued a statement that no "intentional" UWB radiation should be transmitted below 4.2 GHz. XtremeSpectrum and others have said that they agree with the Department of Defense and that any of their emissions will of course be "unintentional" and therefore fall under Part 15.

Present masks or filters proposed by NTIA and the FCC at best knock down a UWB transmission to -72 dBm.

As noted in our prior letter, signals from the GPS satellites arrive at the surface of the Earth at -150 dBm. This means that even with masks, **there will be 78 dB of jamming**. Under these conditions, it is unlikely that a GPS receiver will lock up to the satellites.

A GPS receiver does not know whether this jamming radiation is intentional or unintentional.

There are those who say "you could drive a truck through 'unintentional'"; and that is what XtremeSpectrum is trying to do.

We at Tandler Cellular would like to suggest, as we have before, that the intent of the 4.2 GHz limitation on UWB be honored. We have stated in our submission of June 29, 2001 (copy

attached) that there is no way that UWB could be unintentional and that Part 15 is the wrong place for UWB to grab spectrum, even though it is free.

We therefore request the FCC to consider limiting any use of UWB to above 4.2 GHz so that there will be no UWB radiation in the GPS band, whether intentional or unintentional.

Respectfully Submitted,

Tendler Cellular, Inc.
Robert K. Tendler, Chairman

cc: Kathleen Q. Abernathy, Commissioner
Michael J. Copps, Commissioner
Kevin J. Martin, Commissioner

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

COMMENTS OF TENDLER CELLULAR, INC.

Robert K. Tendler
Chairman
Tendler Cellular, Inc.
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Boston, Massachusetts 02110
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June 27, 2001

SUMMARY

The authorization of Ultra Wide Band (UWB) constitutes *intentional jamming* of GPS, fails to fall under Part 15, and is a threat to public safety causing GPS receivers to *fail to lock onto GPS satellites* when employed in *E-911* situations to locate injured wireless phone users, thus preventing rescuers from reaching injured parties in time to save lives.

Importantly, UWB authorization would be *in direct conflict* with the Report and Order requiring wireless phones to be located by October 1, 2001 because the jamming would affect not only GPS but also the triangulation systems proposed.

Additionally, UWB authorization is *in contravention* of International treaties regulating the amount of Radio Frequency Interference acceptable for commercial flight.

Finally, UWB materially affects the operation of military GPS (*jamming*) and therefore its authorization is *a threat to national defense*.

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1. INTRODUCTION

The responder, Tandler Cellular, Inc., is a company which is heavily involved in providing E-911 GPS systems to alert Public Safety Answering Points (PSAPs) as to the location of a stricken individual. Tandler Cellular, Inc. was the first company to successfully integrate a GPS receiver inside a wireless handset, and has since 1995 struggled with the problems of interference with GPS signals from a variety of different sources. Tandler Cellular, Inc. was one of the first responders to the E-911 NPRM which required cellular carriers or manufacturers to locate individuals within 125 meters 67% of the time, and with a demonstration of the wireless phone with a GPS-equipped handset called Fonefinder[®] to the FCC succeeded in having the FCC issue its Report and Order requiring same (See Docket No. 94-102.)

In terms of public safety, it is paramount that the GPS receiver located in or on the handset be as free from interference as possible. The failure to be able to lock onto the relatively weak GPS satellite signals results in a failure to report position of an incident. This has a disastrous situation since it will be appreciated that the failure to locate an individual with a severed artery can cause the death of the individual due to bleeding. In general, a severed artery can result in the demise of the individual within eight minutes.

II. THE AUTHORIZATION OF ULTRA WIDEBAND (UWB) TRANSMISSION CONSTITUTES INTENTIONAL JAMMING OF GPS AND THEREFORE FAILS TO FALL UNDER PART 15

While it is the understanding of Tandler Cellular, Inc. that the NPRM requiring the revision of Part 15 of the Commission's rules regarding ultra wideband transmission systems has placed the utilization of ultra wideband transmissions within the "unintentional "category, it is the opinion of Tandler Cellular that the provision of ultra wideband signals constitutes intentional jamming of

GPS signals and therefore fails to fall under Part 15. The authorization of ultra wideband is not unintentional, but rather is intentional in every sense of the word. Other commenters have indicated in various testing scenarios that the original ability to lock onto GPS signals is compromised with even the smallest amount of ultra wideband radiation. This is confirmed in the RTCA Special Committee 159 report of March 27, 2001 which constitutes a second interim report to the Department of Transportation and outlines a number of independently developed RFI effects tests on GPS receivers, most notably from Stanford University, Applied Research Labs of the University of Texas, Johns Hopkins University Applied Physics Laboratory, and NTIA GPS RFI Susceptibility Tests and Analysis (See Appendix A).

It is undeniable from every study done so far that the deployment of ultra wideband transmissions will not only materially effect an already locked up GPS receiver to cause erroneous location reporting, it also can result in the failure of the GPS receiver to lock up at all.

No where else would such intentional emission of RF energy in a GPS band be considered anything other than intentional jamming. Thus, the FCC lacks authority under Part 15 to declare that the ultra wideband interference is "unintentional".

III. THE EFFECT OF UWB ON PUBLIC SAFETY

The seriousness of the intentional jamming of GPS signals through the authorization of ultra wideband transmission is nowhere more keenly felt as a threat to public safety. It will be noted that GPS receivers are presently used to locate individuals in distress and to report the position of the individual to a Public Safety Answering Point (PSAP) or like authority. GPS receivers come in essentially two varieties: Autonomous and Assisted. In both cases, the receivers operate on the transmissions from the 26 satellites in the GPS constellation. The signals emitted from the satellites are 40 watt spread spectrum signals, which when they reach the surface

of the Earth uncorrelated are at -150 dBm. There are some who consider that the absolute noise floor for the detectability of any electromagnetic signals is -160 dBm. Thus, it can be seen that it is only with extreme difficulty that uncorrelated GPS signals can be received at all.

While systems like ONSTAR and ATX have GPS receivers which are coupled to automotive or vehicle batteries, thus, eliminating the effect of power drain on such a system, for handheld wireless GPS equipped units, power consumption is indeed a factor. As is common practice, the GPS receiver is turned off until such time as a panic button is pressed. The reason is so that the GPS receiver does not drain the wireless phone battery under normal circumstances. Time to first fix for a turned off GPS receiver is critical and dramatically increases in the presence of interference.

It is therefore important that when the situation arises, the satellites be quickly acquired when the GPS receiver and the handset are turned on. It has been found that while the quickest acquisition of GPS signals for a so-called "hot start" is in the 1-3 second range, this quickly deteriorates into 90-120 seconds (or worse) in the presence of interfering radiation. The interfering radiation can be from any of a number of sources and while GPS receivers are designed to eliminate single frequency interference, ultra wideband interference being of a spread spectrum variety is exceedingly difficult to eliminate.

If one were to add even a modicum of additional interfering radiation, public safety would be thwarted in the inability of the GPS receiver to at least initially lock onto the GPS signals.

Further, as shown by the aforementioned report from the RTCA special committee 159, even when the GPS receiver is locked onto the signals and the correlators are functioning, the presence of ultra wideband radiation in fact causes the receivers either to lose lock or to incorrectly report position. Thus, even if there were unlimited battery power to permit the GPS receivers to be on all of the time, positional inaccuracy or loss of lock due to UWB affects public safety adversely.

One of the uses for ultra wideband is in the so-called garage door opener scenario. In this case, it will be appreciated that a transmitter such as a garage door opener may be located no more than a foot, for instance, from a GPS-carrying wireless handset which may be mounted to the dash of the vehicle. Such proximity completely jams GPS receiver and is intolerable from the public safety perspective. Moreover, an even further intolerable situation is when there may be for instance as many as 10,000 radiators in a wireless LAN operation within a short distance. The effect of multiple radiators cannot do anything but deleteriously affect the ability of GPS receivers to lock onto satellites, a major public safety issue.

IV. E-911 REPORT AND ORDER

While the above provides comments with respect to the deleterious effect of a UWB jamming on the public safety sector and E-911 situations, it is very important to note that the UWB authorization would be in direct conflict with the Report and Order (Docket Number 94-102) requiring wireless phones to be located by October 1, 2001. This is because the jamming associated with UWB transmissions would effect not only GPS reception but also the triangulation systems proposed. It will be appreciated that the Report and Order was promulgated to be able to address the problems of the PSAP community. Robustness of solutions to the location problem are of paramount importance to being able to comply with the Report and Order. The Report and Order now permits the utilization of GPS receivers. The Report and Order also contemplates so called triangulation systems which triangulate on the radiation from cell phones. There is however a technological challenge of meeting the present FCC Report and Order as modified which requires triangulation systems to be able to locate a transmitter within 100 meters 67% of the time. The prior standard was 125 meters, and it was only with difficulty that this requirement could be met. The reason is that the apparatus on the cell towers needs to be tuned every 15 minutes for such

things as frequency, humidity, wind direction, wind velocity and other second order characteristics to enable these systems to operate appropriately. What will be appreciated is that while GPS is unusually sensitive to low level jamming, so are the triangulation systems and most importantly the tuning which can be affected in the presence of UWB jamming.

V. UWB IS IN CONTRAVENTION OF INTERNATIONAL TREATIES REGULATING THE AMOUNT OF RADIO FREQUENCY INTERFERENCE ACCEPTABLE FOR COMMERCIAL FLIGHT

Additionally, it is the understanding of Tandler Cellular that UWB authorization is in contravention of international treaties regulating the amount of radio frequency interference acceptable for commercial flight. The Department of Transportation is separately filing arguments in support of the notion that UWB should not be authorized due to international regulations as well as practical RF interference problems.

VI. UWB MATERIALLY AFFECTS THE OPERATION OF MILITARY GPS (JAMMING) AND THEREFORE ITS AUTHORIZATION IS A THREAT TO NATIONAL DEFENSE.

Finally, since a UWB authorization materially affects the operation of GPS receivers, ipso facto it affects military GPS receiver as well. The reason is that all present military GPS receivers operate on a so-called CA code which is utilized in order to acquire the signals. Since the publicly available GPS receivers and the military receivers operate on the same principal and are therefore subject to the same deleterious effects of jamming, Tandler Cellular, Inc. is of the opinion that not only will civilian GPS receivers be affected, it is absolutely the case that present military GPS receivers will be likewise affected. As a result, the UWB authorization is a threat to national security and should not be allowed.

CONCLUSION

Tendler Cellular appreciates the opportunity to comment on this obvious matter of importance and wishes to convey to the Federal Communication Commission that at least as far as GPS receivers are concerned, UWB transmissions amounts to intentional jamming of GPS which is so susceptible to low level jamming as noted above. As a result, UWB transmissions are a threat to public safety causing GPS receivers to fail to lock onto the GPS satellites when employed in E-911 situations. Importantly, UWB authorization is in direct conflict with the Report and Order requiring wireless phones to be located by October 1, 2001. UWB authorization is in contravention of international treaties regarding regulating the amount of radio frequency interference acceptable for commercial flight. Finally, UWB transmissions material affect all GPS receivers including military GPS receivers and therefore its authorization is a threat to national security.

Respectfully Submitted,

Robert K. Tendler
Tendler Cellular, Inc.