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OFFICE OF THE SECRETARY

July 13, 2001

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The Herbert Hoover Building
14th Street & Constitution Avenue, NW
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The Honorable Donald H. Rumsfeld
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The Honorable Norman Y. Mineta
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The Honorable Daniel S. Goldin
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Re: Pending FCC Rulemaking (ET Docket 98-153) on Ultra-Wideband Transmission Systems

Dear Secretary Evans, Secretary Rumsfeld, Secretary Mineta, and Administrator Goldin:

By this letter, XtremeSpectrum, Inc. (XSI) responds to the letter addressed to you on July 6, 2001 by Air Transport Association of America, Inc. and 38 other signatories (ATA *et al.*) Those parties oppose

the FCC's approval of ultra-wideband (UWB) technology, which uses extremely low-level signals across a wide range of spectrum. XSI conducts research in UWB communications applications, and expects to become a manufacturer upon FCC approval. XSI takes no position on UWB radar systems.

ATA *et al.* assert that UWB systems threaten radio interference in the frequency bands used by defense, safety-of-life services, and the Global Positioning System (GPS), as well as commercial licensees such as Personal Communications Service (PCS) and Digital Audio Radio Service (DARS). Such concerns would indeed be grave, were they well founded. But ATA *et al.* has exaggerated the threat UWB poses to other spectrum users. ATA *et al.* reached its alarming results in part by citing the results of tests on categories of UWB equipment that do cause interference -- and which XSI agrees should be prohibited.

Well-designed, properly regulated UWB will not cause interference to GPS, PCS, DARS, or any other federal or commercial system addressed in the FCC proceeding.

Equally important, UWB technology will make possible a communications technology that is fast, inexpensive, battery-efficient, safe, and reliable over short distances. One predecessor technology, spread spectrum wireless LAN, is now a $2 billion/year industry and still growing at 30-40 percent. We expect UWB to make at least a comparable contribution to the Nation's economy.

LOW UWB EMISSION LEVELS

ATA *et al.* fail to mention the remarkably low levels of UWB emissions. Over much of the spectrum, the FCC has proposed UWB levels equal to the permitted radio noise levels from an ordinary personal computer (in FCC terminology, the "Class B limits"). This is equivalent to 75 *billionths* of a watt, measured across a megahertz of spectrum. At frequencies below 2 GHz, where GPS and PCS operate, the FCC proposes to reduce those emissions even more, by 94 percent, to under 5 billionths of a watt.

XSI, however, proposed the lower levels shown below, to provide extra assurance of no harmful interference. These levels are fully supported in the test data cited by ATA *et al.*:

above 2.7 GHz:	**FCC Class B** (75 nanowatts)
2-2.7 GHz (*DARS, MMDS/ITFS*):	**1/4 of Class B levels** (19 nanowatts)
1.6-2 GHz (*PCS*):	**1/16 of Class B levels** (5 nanowatts)
below 1.6 GHz (*GPS*):	**1/64th of Class B levels** (1 nanowatt)

In engineering terms, the reductions below 2.7 GHz are 6 dB, 12 dB, and 18 dB, respectively. These are all unintentional emissions, outside the frequencies carrying 97% of the signal energy. These levels, particularly in the GPS band, are so low that they are difficult to measure, because the personal computers

needed to feed and receive the test data are allowed to radiate 75 times more power than the UWB devices under test.

EMISSION MASK

Our proposed reductions make up the "emission mask" that ATA *et al.* criticize. They say, first, the mask will not protect against interference resulting from harmful frequency shifts caused by "antenna distortion" on simple UWB consumer devices. This is a needless worry, as the FCC will not certify a device that the end user can easily take out of compliance. *Cf.* 47 C.F.R. Sec. 15.15(b). Second, ATA *et al.* argue the mask will not allow enough power for high data rate communications networks, and so will result in upward pressure on the mask. To the contrary, using the mask and other constraints presented here, XSI expects to achieve a throughput of 100 million bits per second -- almost ten times faster than any wireless local area network available today. Objections to speculative future requests for changes to the mask are premature, and should be raised if and when those changes are ever actually proposed.

OTHER PROTECTIONS

Spectral lines. XSI shares the special concern of ATA *et al.* concerning GPS. For that reason, XSI has proposed not only lower GPS-band emissions, explained above, but also a further rule to prevent any concentrations of radio energy (so-called spectral lines) in the GPS band. This rule would require any such concentration to be suppressed to harmless levels.

Indoor operation. Additionally, XSI has urged the FCC to restrict UWB communications systems to indoors. This will protect most GPS and DARS users, and all of the federal systems tested for UWB interference. On average, indoor operation will cut down any signal impinging on an outdoor receiver by a factor of 10 to 100 (10-20 dB). XSI has further demonstrated that UWB will not disrupt even an indoor wireless phone that incorporates a GPS unit used to locate 911 callers.

AGGREGATE EFFECTS

Finally, ATA *et al.* misapprehend the effects of large-scale UWB deployment. Even if hundreds of UWB devices operate in close proximity (as in an office network), a GPS or other receiver will "see" only the handful of units closest to it. All of the other UWB emitters, taken together, have no appreciable effect. There are two reasons for this. First, if all UWB units are indoors (as XSI recommends), their signals will penetrate poorly through walls and furniture, and so cannot add up in large numbers to cause interference. Second, because all of the UWB units in a network share the same radio channel, they cannot operate at the same time, or they will interfere with each other. Units in the same part of a building must take turns transmitting, or operate at reduced power, or both. In fact, the industry standard now under development to cover UWB devices will require sharing the channel in discrete time slots, making it

impossible for more than one unit to transmit at a time.[1] Surprising as it may seem, even under conservative assumptions, the total emissions from a building-wide UWB network will impinge on a receiver with less than 2.5 times the signal strength of a single UWB unit.

NO INTERFERENCE

Using the above considerations, XSI has re-analyzed all of the interference tests cited by ATA *et al.* In doing so, we corrected some patently false assumptions in the original analyses. For example, some analyses treated an indoor signal as though it were moving through open space, ignoring standard measures of attenuation through walls. Other analyses assumed UWB is the *only* source of interference in the radio spectrum, and overlooked far stronger interference sources -- including transmitters in the same service being studied. **A conservative analysis under realistic assumptions shows no significant likelihood of harmful interference from to GPS, PCS, DARS, or any other federal or commercial system mentioned in the FCC proceeding.** All specifics are on file at the FCC.

ADMINISTRATIVE LAW ISSUES

ATA *et al.* have asked the FCC to issue a second Notice of Proposed Rulemaking (NPRM). This step is legally and practically unnecessary, and would serve only to delay the introduction of a needed technology.

All of the proposed departures from the original NPRM are aimed at limiting UWB operation, solely to protect the services represented by ATA *et al.* These parties had their say, and indeed they were effective. But the parties cannot now use their own success in restricting UWB as the sole excuse to require another NPRM. Moreover, all of the proposed departures were raised for discussion in the NPRM, so the Administrative Procedure Act is fully satisfied.

CONCLUSION

Contrary to the views expressed by ATA *et al.*, properly regulated UWB communications devices do not threaten interference to safety-of-life or any other services. Proposed UWB emission limits are the same as noise levels for a personal computer -- except at sensitive frequencies, where they are greatly reduced. These limitations, together with the other controls discussed above, eliminate any realistic possibility of harmful interference.

Because UWB devices cause no significant risk, there is no need for a "unified Administration position" against them, as ATA *et al.* request. The FCC is charged with statutory responsibility for

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[1] *See* IEEE 802.15.3 protocol (targeting wireless personal area network devices such as UWB).

protecting the radio spectrum against harmful interference from non-Government devices and services. If ATA *et al.* believe the FCC's rules, when issued, do not accomplish their purpose of protecting other users, they should seek a stay and judicial review. Congress created an effective mechanism for achieving maximum use of the spectrum, while ensuring compatibility, and that mechanism should be allowed to function without interference.

Finally, we note this provision in the Communications Act of 1934, as amended:

> It shall be the policy of the United States to encourage the provision of new technologies and services to the public. Any person or party (other than the Commission) who opposes a new technology or service proposed to be permitted under this Act shall have the burden to demonstrate that such proposal is inconsistent with the public interest.

47 U.S.C. Sec. 157(a). UWB communications technology, under the modified proposals above, is fully consistent with the public interest.

Respectfully submitted,

Mitchell Lazarus
Counsel for XtremeSprectum, Inc.

ML:deb

cc: Chairman Michael K. Powell
Commissioner Gloria Tristani
Commissioner Kathleen Q. Abernathy
Commissioner Michael J. Copps
Commissioner Kevin J. Martin
Ms. Magalie Roman Salas, Secretary, FCC (2 Copies)
The Honorable Mitchell E. Daniels
Dr. Condoleezza Rice
Dr. Lawrence B. Lindsey
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