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September 29, 2000

ORIGINAL

RECEIVED
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie R. Salas
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Ex Parte Presentation of the US GPS Industry Council
ET Docket 98-153

Dear Ms. Salas:

Pursuant to Section 1.1206 of the Commission's Rules, 47 CFR Sec. 1.1206, this letter serves as notice that on September 28, 2000, Dr. Charles Trimble and Ms. Ann Ciganer representing the US GPS Industry Council ("Council") and the undersigned met with Mr. Peter Tenhula of Commissioner Powell's office to discuss Comments filed and other issues concerning the referenced docket. Enclosed is a copy of the slide presentation used by Council representatives during their meeting with Mr. Tenhula.

An original and one copy of this letter and its enclosure are submitted for inclusion in the record of the referenced proceeding.

Respectfully submitted,

Raul R. Rodriguez
For the US GPS Industry Council

RRR/rjc

Enclosure

cc (w/o encl.): Mr. Peter A. Tenhula

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Presentation on

ET Docket 98-153

By Representatives of

The U.S. GPS Industry Council

September 28, 2000

Communications Act

Directs FCC to maximize access to, and efficient use of, spectrum

- To maximize access, the FCC is encouraged to speed the process of adopting new technologies and services
- To maximize efficient use, the FCC must ensure the preservation of equities of all licensed and allowed services both old and new

Balancing Competing Goals

- All other things being equal, priority should be given to services and technologies which are efficient in terms of spectrum, particularly those relating to the nation's IT engine.
- In the case of UWB, however, things are not equal
  - Technical issues
  - Regulatory issues
  - Risk to public safety, security, and IT infrastructure

UWB in Military

- Use
  - Clandestine communications
  - Radar
  - Intrusion detection
- Assumes
  - Low density of use
  - Spectrum efficiency not important
  - Closed system environment

Spectrum for IT Economic Engine

- Use
  - High density
  - Maximum frequency efficiency (data rate/bandwidth)
  - Majority of users and services below 3 GHz
  - Reliability and predictability
- Assumes
  - Open environment in license-free bands (no control over who operates)
  - Band assignment maximizes number of different services
  - Grandfathering of existing services

UWB History

- Original Marconi spark-gap radio was UWB
  - One of the last commercial marine uses of spark gap radio was on the Titanic
- 1927 Radio Act divided the spectrum into 80 channels to allow multiple users in the same geographic area free of interference
  - End of terrestrial use of UWB technology for decades
- Modern UWB technology developed for the military
  - Proposed as a technology for sharing spectrum below the noise floor
  - Claims to be no noisier than a hair dryer

That UWB Puts Out No More RFI Than a Hair Dryer Is A Red Herring

- Hair dryers are not on most of the time
- Hair dryers are rarely used outdoors
- Hair dryers are not connected to an antenna
- Hair dryers are not networked
- Hair dryers cannot be changed into GPS jammers

Issues Raised By The Proposed UWB Sharing

- What is the quantifiable level of known interference to existing services?
  - taxation of existing licensees?
- What proof exists of the ability to limit and control UWB interference to acceptable levels?
- What controls must be placed on UWB emitters so that they cannot easily become jammers?
- What is the ability to control composite interference in safety-of-life bands?

Status of Current Testing

- NTIA is collecting operational scenarios
- GPS sensitivity is being studied by DoT/Stanford, University of Texas and NTIA
  - using a limited number of UWB pulse trains
- Some time and frequency domain measurements of limited UWB pulse trains have been collected in an attempt to establish link budgets
  - but, this assumes the applicability of frequency domain analyses and "generic" UWB pulse trains

Current Test Approach Will Not Lead To An Understanding of How To Regulate UWB Pulse Trains

- Without a fundamental theoretical science understanding, an experimental approach must be used in the testing -- *there is no generic UWB pulse or pulse train*
- Each UWB pulse train must be tested independently--uniqueness of UWB pulse trains precludes generalization of test results
- This means that the number of tests needed, and therefore the amount of time and money involved to arrive at a reliable answer, is large and unknown.

Current Test Approach Will Not Lead To An Understanding of How To Regulate UWB Pulse Trains (Continued)

- Initial testing to date indicates that GPS receivers are highly sensitive to the fine spectral line structure caused by UWB pulse trains
- Unfortunately, initial testing to date indicates that the transmitted UWB pulse train is strongly affected by its antenna and external loading of the antenna
- Operationally, transmitted UWB pulse trains are unstable causing unpredictable movement in the fine spectral line structure

Current Test Approach Will Not Lead To An Understanding of How To Regulate UWB Pulse Trains (Continued)

- There is a recipe on how to convert a UWB device into a GPS jammer on the FCC website
- Mere proximity of the UWB antenna to human and inanimate objects alters the UWB pulse train
  - this invalidates any link budget analysis to protect existing services because the fine UWB spectral line structure changes depending on the proximity of objects

Current Test Approach Will Not Lead To An Understanding of How To Regulate UWB Pulse Trains (Continued)

- Limiting power, either peak or average, on a device basis does not limit the power of a network

- The precise aggregation effect (including multipath) of large networks of UWB communications devices is unknown, but it is clear that the total radiated power per unit area cannot be controlled for unlicensed devices

- It is hard to understand how a networked communication system could be designed without some form of synchronization and therefore the composite effect of network synchronization must be understood

Summary

- Radiated UWB pulse trains are unstable due to variation in antenna loading and near-field coupling, therefore their effect on current services cannot be predicted
- Networking of UWB devices, especially in multipath environments, means that the total interference cannot be easily measured, predicted or controlled
- The instability and aggregation issues pose major obstacles to the development of a rational regulatory environment

FCC Is In An Impossible Position

The FCC is under strong pressure to allow UWB technology to be introduced into the market

- Before the basic science of the interference with the Nation's IT engine is understood
- In the face of initial tests indicating unpredictable spectral characteristics of UWB pulse trains and the inability to limit the total noise power of a network of UWB devices
- Given a documented example of UWB interference with broadcast television
- Given a documented example of how to build a GPS jammer from a UWB emitter

Solution

- The U.S. GPS Industry Council is not opposed to UWB technology and believes that it should be allowed the test of the marketplace
- The solution is to perform a strategic experiment
  - Use conventional band-segmentation
  - Choose a 3 GHz-wide band above 3 GHz that does not contain a safety-of-life service and designate it as a band to use for UWB devices on a non-interfering basis
  - Use the experience gained to try to develop a regulatory environment for UWB devices

Managing Risk and Reward from New Technologies

- The demand for commercial spectrum is intense
- The attraction of technological "silver bullets" is obvious, but
- The nation's IT engine (and critical and other services in restricted bands) must not, and need not, be exposed to technical and regulatory "Russian roulette."