



# MULTISPECTRAL SOLUTIONS, INC.

*A Tradition of Excellence in Innovation*

29 July 2002

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Marlene H. Dortch, Secretary  
Federal Communications Commission  
Office of the Secretary  
445 12th Street, SW  
Washington, DC 20554

Reference: ET Docket 98-153

Dear Ms. Dortch:

On 18 July 2002, Dr. Robert J. Fontana, President, and Mr. Robert W.T. Mulloy, Vice President, Multispectral Solutions, Inc. (MSSI) met with Messrs. Ed Thomas, Julius Knapp, Alan Scime and John Reed from the FCC's Office of Engineering and Technology. We discussed MSSI's recent Petition for Reconsideration and current inconsistencies between the new Ultra Wideband rules and previously existing Part 15 regulations.

Respectfully submitted,

Robert J. Fontana, Ph.D.  
President

Enclosure: Non-proprietary portions of viewgraph presentation

# Discussions on UWB Technology

Presented to the  
FCC Office of Engineering & Technology  
18 July 2002

by  
Multispectral Solutions, Inc.  
Germantown, MD



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# Introduction

- MSSSI desires the opportunity to sell low power UWB devices in non-restricted bands
- FCC's current interpretation of pulse desensitization correction prevents Part 15 certification
- MSSSI filed Petition for Reconsideration highlighting these concerns
- Recent OET waiver for GPR devices indicates FCC support for low PRF UWB approval



# History

- MSSSI developed a UWB sensor (*Hummingbird*) for the U.S. Navy
  - Collision and obstacle avoidance
    - Only sensor tested which could detect suspended power lines beyond 300 feet
  - Precision landing (short range altimeter)
  - Extremely low probability of detection
- *Hummingbird* sensor was given to NTIA ITS/Boulder for testing (Device “A”)
  - Average power 35 dB below Part 15 limit of 500  $\mu\text{V}/\text{m}$  at 3 meters
  - Peak power 8.5 dB below Part 15 limit of 5000  $\mu\text{V}/\text{m}$
  - Pulse repetition frequency (PRF) of 10 kHz
  - Operational frequency range 5.4 to 5.9 GHz (hit restricted band at 5.46 GHz)
- *Spider* sensor (*Hummingbird* redesigned for DARPA UAVs and commercial applications)
  - Average power 13.4 dB below Part 15 limit of 500  $\mu\text{V}/\text{m}$
  - Peak power 4.6 dB below Part 15 limit of 5000  $\mu\text{V}/\text{m}$
  - Pulse repetition frequency of 30 Hz (test mode of 100 kHz)
  - Operational frequency range 6.1 to 6.6 GHz
  - Full certification tests performed by FCC-certified laboratory (Washington Laboratories)
  - Device “passed” Part 15 according to certification laboratory



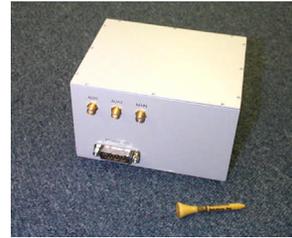
# Spider Applications



**Backup Sensor for Mining Machinery**  
DOT/National Highway Transportation Safety Admin.



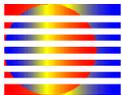
**Obstacle/Collision Avoidance**  
U.S. Navy, DARPA (Unmanned Aerial Vehicles)



**Helicopter Wire Detection**  
**Precision Altimetry (General Aviation)**  
U.S. Navy



**Automobile Collision Avoidance**  
National Academy of Sciences/  
Transportation Research Board



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# Pulse Desensitization & UWB

§15.35 of the Commission's Rules states that

*(a) “ On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified ... As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.*

*(b) “ On any frequency of [sic] frequencies above 1000 MHz, the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function.*

*“ When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules, e.g. see Section 15.255.*

*“ Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. Measurement of AC power line conducted emissions are performed using a CISPR quasi-peak detector, even for devices for which average radiated emission measurements are specified.”*



# Pulse Desensitization & UWB (cont.)

In its grant of waivers (15 June 1999) to Time Domain Corporation, U.S. Radar Inc. and Zircon Corporation, the Commission stated that

*“The specific rules waived are:*

*Section 15.205(a), which specifies that only spurious emissions may be placed in certain designated restricted frequency bands of operation; and,*

*Sections 15.31 and 15.35 which require the application of a pulse desensitization correction factor when performing certain measurements below 1000 MHz.”* [\[1\]](#)

[\[1\]](#) FCC Public Notice, “The Office of Engineering and Technology Grants Waivers for Ultra-Wide Band Technologies,” FCC 99-1340, 8 July 1999.

However, in its First Report and Order (FCC 02-48) for Ultra Wideband technology, the FCC clearly states:

*“...we believe that our proposal to permit a peak emission within a 50 MHz RBW of only -21.25 dBm EIRP is too conservative. We believe that the peak emission level of 0 dBm/50 MHz, equivalent to 58 mV/m at 3 meters, requested by TDC would not result in harmful interference problems to communications systems.*

*“This level translates to a peak EIRP of -24.44 dBm/3 MHz or 3.6  $\mu$ W/3 MHz, or to a peak field strength of 3.46 mV/m at [sic] measured at 3 meters with a 3 MHz RBW. This peak level is 16.8 dB higher than the average level determined with a 1 MHz RBW and is 3.2 dB lower than the peak limit permitted under the current Part 15 rules.”* [\[1\]](#)

[\[2\]](#) FCC 02-48, First Report and Order – Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems,” adopted February 14, 2002; released April 22, 2002.



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## Pulse Desensitization & UWB (cont.)

On 15 May 2002, MSSSI was notified by Washington Laboratories (Gaithersburg, MD) that the FCC had held a teleconference on 14 May 2002 with all of its TCBs (Telecommunications Certification Bodies), notifying them that it was now necessary to take into account pulse desensitization when considering pulsed emissions, regardless of the operational frequency of the device.

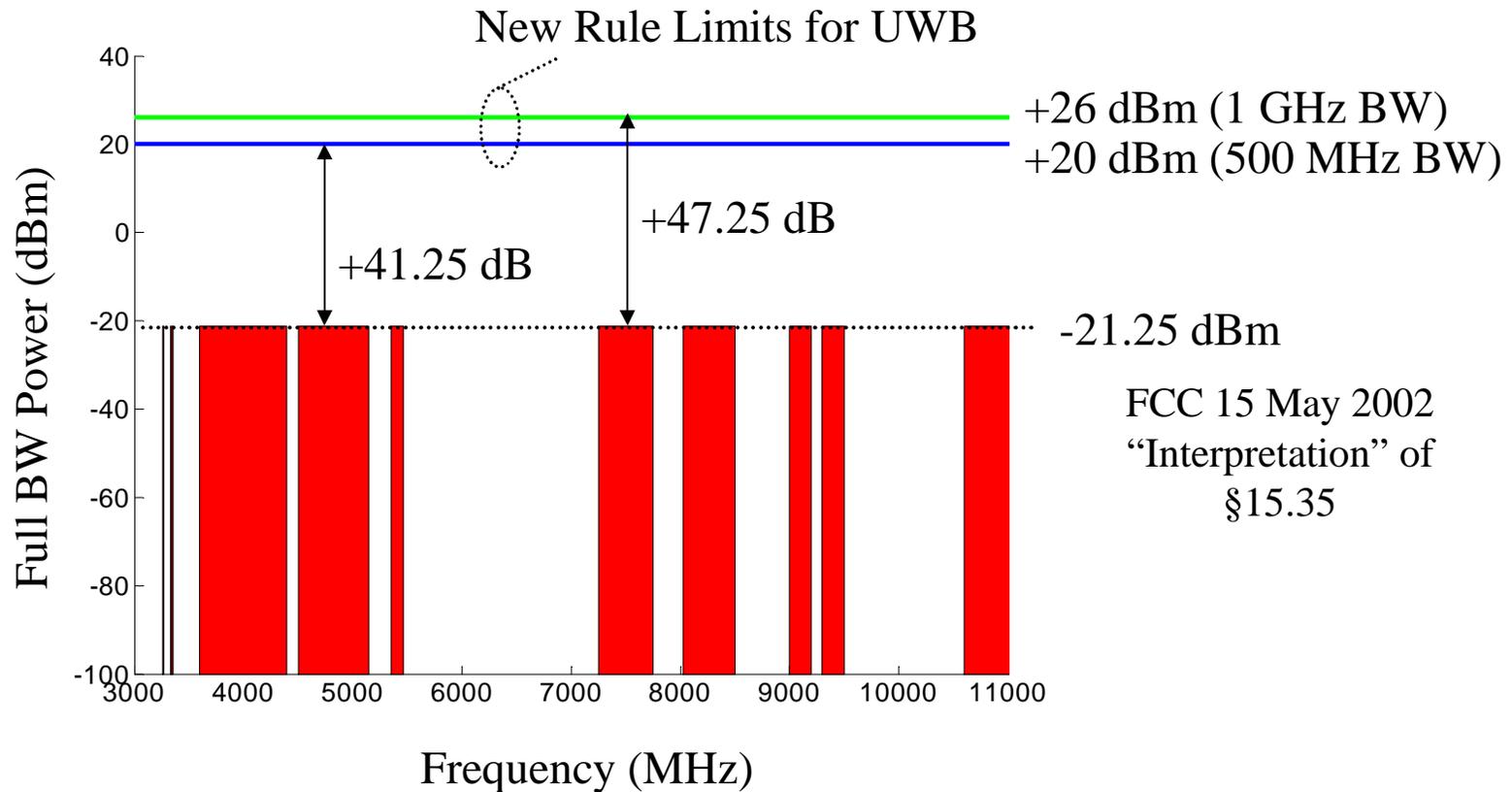
MSSSI contacted Mr. John Reed from the FCC's Office of Engineering and Technology (OET) for clarification.

*Mr. Reed indicated that §15.35 was to be interpreted as limiting the total peak power for a Part 15 device to -21.25 dBm (numerically 20 dB above the -41.25 dBm/MHz average limit), and that this limit was a "full bandwidth" limit.*

*That is, -21.25 dBm represented the total peak power as measured in the full bandwidth of the pulse, not in the "greater than 1 MHz" bandwidth as specified in §15.35(b). Pulse desensitization correction was now necessary for all frequencies, irrespective of whether the emission fell above or below 1 GHz.*



# Impact of FCC (May 14, 2002) Reinterpretation of §15.35 Full Bandwidth Power Limitations



 §15.209(a) Restricted Bands



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