

# MULTISPECTRAL SOLUTIONS, INC.

*A Tradition of Excellence in Innovation*

31 August 2001

Ms. Magalie Roman Salas  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
Washington, D.C. 20554

Re: *Ex Parte* Presentation, ET Docket 98-153

Dear Ms. Salas:

On 30 August 2001, the undersigned and Mr. Robert Mulloy, MSSSI Vice President, met with Commissioner Kathleen Q. Abernathy to discuss regulatory issues relating to ultra wideband (UWB) technology.

We highlighted that MSSSI has been developing and fielding UWB systems for the U.S. Government for over 12 years and, as a consequence, has considerable real-world experience in the use of such systems in close proximity to other RF systems. We noted that existing Part 15 limits for UWB were insufficient to protect GPS, PCS/PCN, 3G, VHF/UHF TV and numerous other systems operating below 3.1 GHz. This assessment has been supported by test results from the NTIA, Stanford University and the University of Texas - Austin which have demonstrated UWB interference to GPS and select Government radar systems. We also provided the Commissioner with copies of a video tape, previously submitted to the FCC under this docket, which demonstrated the deleterious effects of both dithered and non-dithered UWB emissions, at levels significantly below existing Part 15 limits, on UHF television.

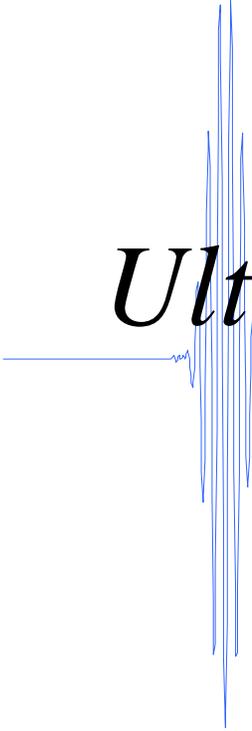
We recommended to the Commissioner that the FCC place a sharp, low frequency cut-off of 3.1 GHz on the initial deployment of UWB systems, and limit the operational pulse rate to 20 Mpps (million pulses per second) in the frequency range of 3.1 to 5.46 GHz. As all test results to date have demonstrated that high pulse rate UWB sources are far more interfering than lower pulse rate systems, the 20 Mpps limit (as noted by the NTIA) within this band will provide an additional reduction in UWB emission levels. We stated to the Commissioner that, without exception, *all* UWB proponents have demonstrated the ability to filter their transmissions and that, given the vast amount of data demonstrating UWB interference below 3.1 GHz, such a restriction would be a "win-win" for both the UWB industry and existing wireless users.

In accordance with the Commission's rules, an original and one copy of this letter, together with viewgraph presentation material, are being filed. An electronic copy has also been uploaded to the FCC Electronic Filing system.

Respectfully,

Robert J. Fontana, Ph.D.  
President

cc w/attachment & video tape: Mr. Julius Knapp, OET Deputy Chief

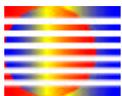


# *Ultra Wideband Technology & Regulatory Issues*

Presented to  
Commissioner Kathleen Q. Abernathy

by  
Multispectral Solutions, Inc.  
*[www.multispectral.com](http://www.multispectral.com)*

30 August 2001



**MULTISPECTRAL SOLUTIONS, INC.**

*A Tradition of Excellence in Innovation*

# Multispectral Solutions, Inc.

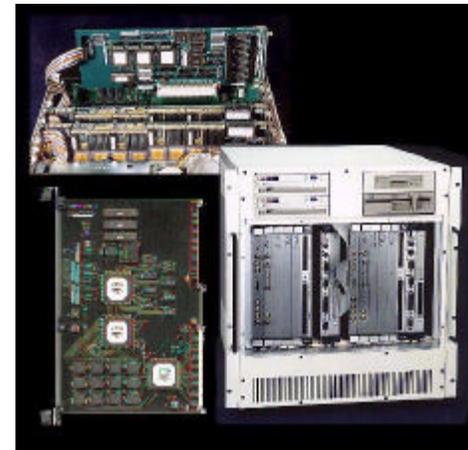
- Small Business Incorporated in 1989
  - Dr. Robert Fontana (Ph.D. Stanford, S.M. MIT) founder
- Industry Leader in UWB Technology
  - MSSSI principals involved in UWB since 1984
  - 53 new UWB program awards in 11 years
    - 47 UWB awards within last 6 years



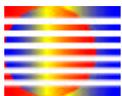
Ultra Wideband Systems



Satellite Systems



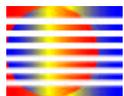
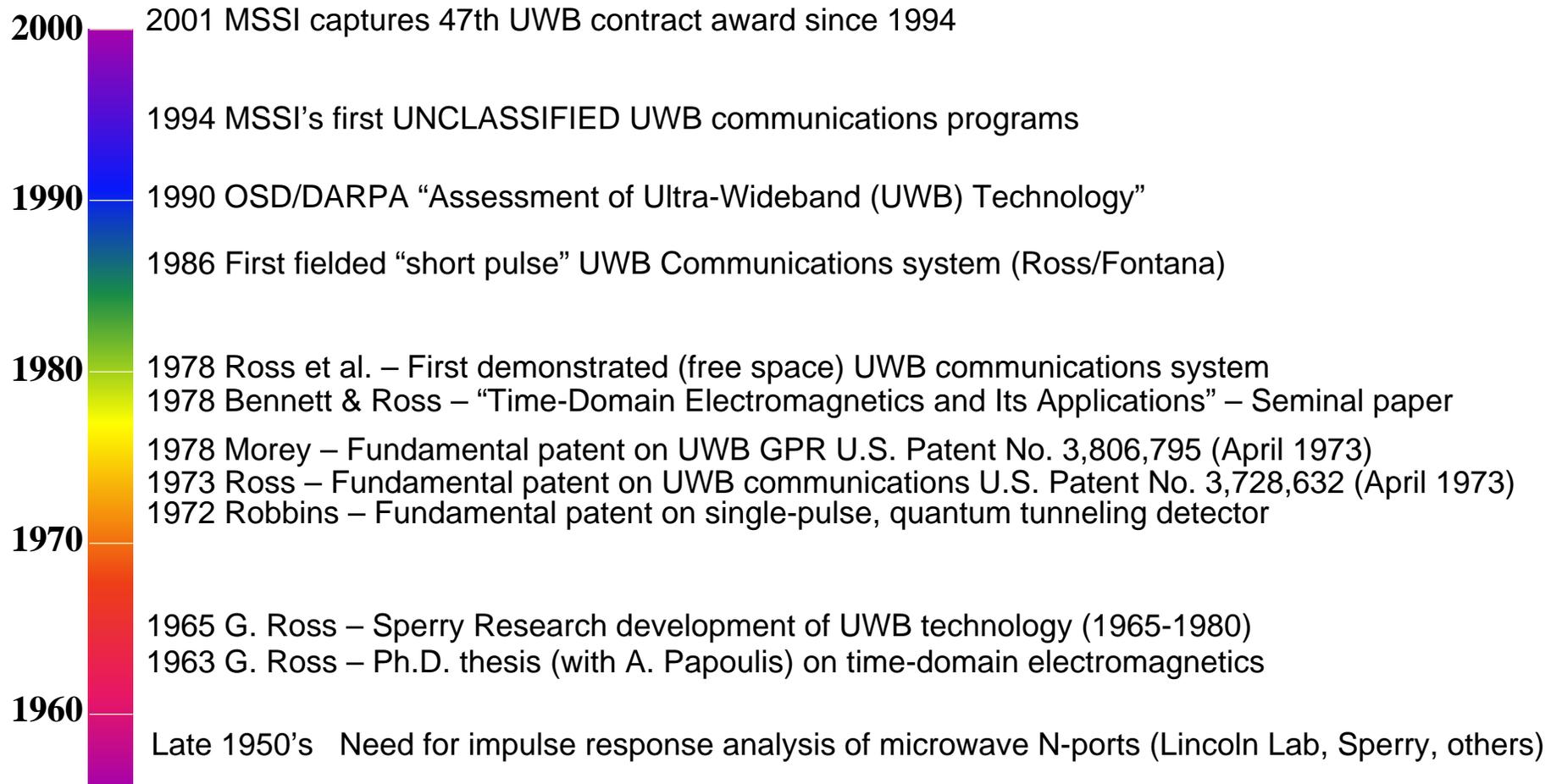
High-Speed Parallel Systems



**MULTISPECTRAL SOLUTIONS, INC.**

*A Tradition of Excellence in Innovation*

# UWB has emerged after nearly 40 years of development

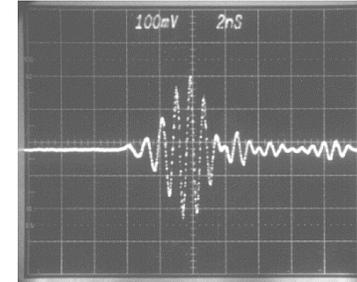


**MULTISPECTRAL SOLUTIONS, INC.**

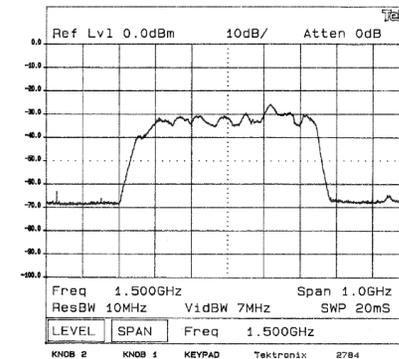
*A Tradition of Excellence in Innovation*

# What is Ultra Wideband?

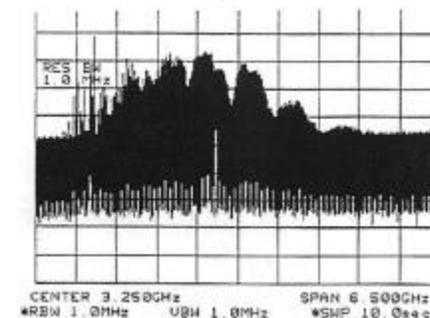
- *Short pulse waveforms*
  - “Carrier-free”, “baseband”, “impulse”
  - A few cycles of an RF carrier
- *Very large fractional bandwidths*
  - Bandwidth inversely proportional to pulse duration
  - Typically > 25%
  - Low duty cycles resulting in low average energy densities
- *Typically produced by “impulse- or step-excited” antennas, filters, etc.*
  - Not all UWB created equal
    - Spectrally filtered
    - Spectrally unfiltered



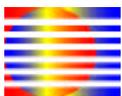
Time response



Spectrally filtered



Spectrally unfiltered



**MULTISPECTRAL SOLUTIONS, INC.**

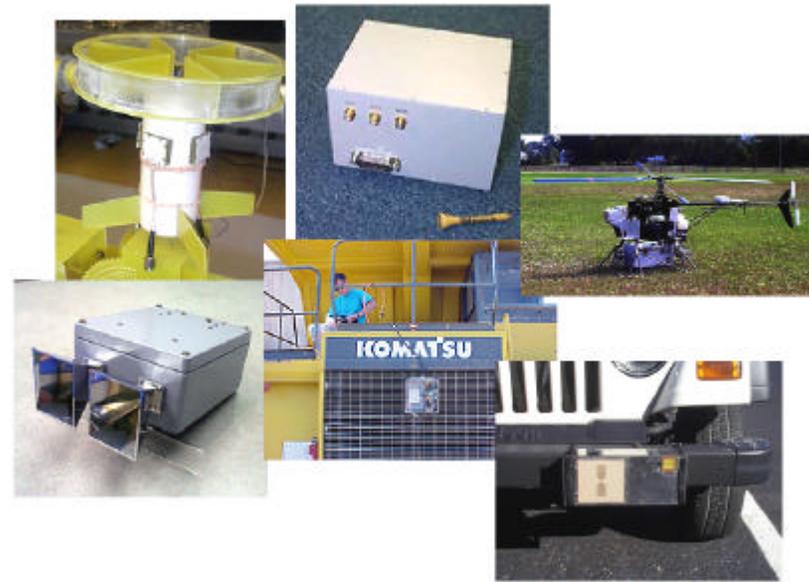
*A Tradition of Excellence in Innovation*

# Recent MSSSI Ultra Wideband Systems

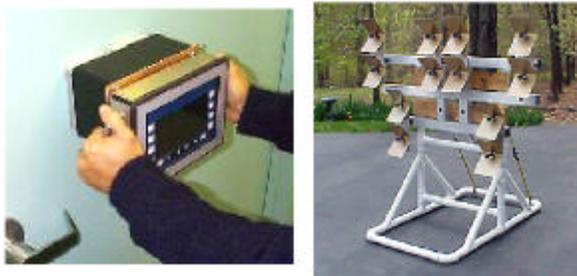
## High-Speed Communications Systems



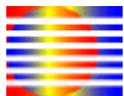
## Precision Altimetry & Collision Avoidance Sensors



## Intrusion Detection Systems



## Precision Geolocation & Tagging Systems



**MULTISPECTRAL SOLUTIONS, INC.**

*A Tradition of Excellence in Innovation*

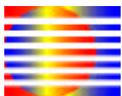
# UWB Products & Opportunities

## Military/Government

- Tactical Handheld & Network LPI/D Radios
- Precision Geolocation Systems
- Non-LOS LPI/D Groundwave Communications
- LPI/D Wireless Intercom Systems
- LPI/D Altimeter/Obstacle Avoidance Radar Tags
- Intrusion Detection Radars
- UAV/UGV Datalinks
- Proximity Fuzes

## Commercial

- High Speed LANs/WANs
- Precision Geolocation Systems
- Tags (Intelligent Transportation Systems, Electronic Signs, Smart Appliances)
- Collision Avoidance Sensors
- Intrusion Detection Radars
- Altimeter/Obstacle Avoidance Radars (commercial aviation)
- Industrial RF Monitoring Systems



**MULTISPECTRAL SOLUTIONS, INC.**

*A Tradition of Excellence in Innovation*

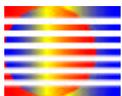
# UWB Commercialization

## ■ Regulatory Issues

- ET 98-153 Ultra-Wideband Transmission Systems
  - Notice of Inquiry (NOI) issued September 1998;
  - Notice for Proposed Rule Making (NPRM) issued May 2000
  - Rule making anticipated 4th Quarter 2001
- UWB proponents desire operation across §15.209 restricted bands
- FACT: Interference from UWB has been demonstrated below 3.1 GHz
  - NTIA, Stanford University, Sprint, Time Domain, University of Texas tests show potential interference to Government radars and GPS
  - Interference effects aggravated by high pulse repetition frequency (PRF) and use of multiple UWB transmitters

## ■ Recommendations

- NTIA – operation below 3.1 GHz is “problematic” except for lower (<20 Mpps) PRF applications
- ATA *et al.* (40+ companies) – stay above 5.46 GHz safety-of-life band
- MSSSI – Stay above 3.1 GHz
  - Part 15 emission levels (500  $\mu$ V/m @ 3 meters)
  - 3.1 - 5.46 GHz – limit PRF to 20 Mpps
  - > 5.46 GHz with no PRF limits
  - Enables benefits of UWB technology for all potential applications, including high speed wireless LANs, *without interference to existing services*



# Summary & Conclusions

- UWB is poised to enter commercial marketplace
  - 40 year history of technology development, with rapid growth in last 5 years
  - UWB technology has demonstrated great potential for high speed communications, radar, and geopositioning applications
- Modification to FCC Part 15 is necessary for widespread UWB commercialization
  - FCC approval will allow UWB to address multiple, high-growth, commercial markets
- Unprecedented access to §15.209 restricted bands must be permitted *only* after careful consideration for all affected parties, and with particular attention to safety-of-flight and safety-of-life allocations
  - As with existing spread spectrum regulations, UWB can be approved in steps
    - Step 1: Open up frequencies above 3.1 GHz for unlicensed UWB operations
    - Step 2: Evaluate commercial UWB products, and *only* consider operations below 3.1 GHz when significant, real-world data is made available for comment (future modifications to Part 15)

