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February 1, 2002

Robert L. Pettit
202.719.7019
rpettit@wrf.com

William Caton, Acting Secretary
Office of the Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: *Ex Parte* Notification in ET Docket No. 98-153.

Dear Mr. Caton:

On January 31, 2002, Jeff Ross and Paul Withington of Time Domain Corporation and Richard E. Wiley and I of this firm met with Commissioner Kathleen Abernathy and Bryan Tramont of her staff to discuss the above-referenced proceeding. The discussions focused on the need for expeditious Commission action to approve ultra wideband technology within operational parameters that would allow for commercial system development as well as the Commission's authority to do so. The substance of our discussions is reflected in the attached documents, which were left with Commissioner Abernathy and Mr. Tramont.

In accordance with the Commission's rules, an original and one copy of this notification are being filed. If you have any questions or would like anything further, please let me know.

Sincerely,

Robert L. Pettit

Enclosures

cc: The Honorable Kathleen Q. Abernathy
Bryan Tramont, Esquire

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Time Domain UWB Proposal

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- **Emissions Mask.**

Frequency (MHz)	# of db below Part 15
< 960	Current limits set forth in Part 15
960-2000	12
Above 2000	0

- **Additional Protection for GPS.** Limits of 21db below Part 15 in the GPS bands to protect against spectral lines or showing that the device in question produces effects in GPS receivers that are equal to or less detrimental than gaussian white noise at 12 db below the Part 15 limit.

- **Limits on Outdoor Operation.** No UWB devices may have a radiating antenna mounted on an outdoor surface unless: (1) it is an industrial entity under Part 90; and (2) the antenna is not more than 3 meters off the ground and the main lobe is at an elevation of -5 degrees or lower.

- **Public Safety.**

  ✓ Only marketed to eligible public safety entities under Part 90 of FCC rules.

  ✓ Part 15 power levels

  ✓ Protection of 10 db below Part 15 Class B in the GPS L1 band to protect against spectral lines or showing that the device in question produces effects in GPS receivers that are equal to or less detrimental than gaussian white noise at the part 15 general limit.

  ✓ Nominal center frequency of devices above 2 GHz

  ✓ Operation of device limited to preservation of life and/or property or training

  ✓ Registration requirement

15.____ Ultra-wideband Operation.

(a) Ultra-wideband devices as defined in Section 15.____ are authorized to operate under the following conditions:

(b)(1) Except as specifically provided in sub-paragraphs (c), (d), and (e) hereof, radiated emissions from ultra-wideband devices shall not exceed the following limits:

Frequency (MHz)	Field Strength (uV/meter@3meters)
<960 MHz	Limits set forth in §15.209(a)
960-2000	125
above 2000	500

(i) Measurements may be made at less than 3 meters with the limits adjusted inversely proportional to distance. Measurements shall be performed using an RMS detector with a 1 MHz resolution BW.

(ii) In addition to the limits set forth above, no ultra-wideband device shall radiate spectral lines in the band 1565.42 - 1585.42 MHz at a level exceeding 45 uV/m at 3 meters when measured with an RMS detector with a 10 KHz resolution bandwidth. In lieu of meeting this requirement, the applicant may provide measurement data showing its device produces effects in GPS receivers equivalent to or less detrimental than those produced by gaussian white noise at the power level that would produce field strength levels equivalent to those specified in subparagraph (b) (1)(i) above for the band 960 – 2000 MHz.

(iii) Manufacturers of UWB devices must ensure the frequency stability such that the emissions profile specified in this sub-paragraph is maintained under all conditions of normal operation.

(2) No ultra-wideband device authorized under this sub-paragraph (b) may

(i) have its radiating antenna mounted outdoors on any pole or surface unless such device is marketed exclusively for use by entities eligible for licensing in the industrial and land transportation pool of frequencies under Part 90 of this Chapter; and

(ii) provided further that any such device marketed to such an entity shall have any outdoor radiating antenna mounted not more than three meters above ground with instructions provided specifying that the antenna must be such that the main lobe of the pattern is at an elevation angle of -5 degrees or lower.

(c)(1) Ultra-wideband devices marketed exclusively to entities eligible for licensing in the public safety pool of frequencies set forth in Part 90 of this Chapter will be authorized, provided that

(i) The radiated emissions from such devices do not exceed the limits set forth in Section 15.209(a) of this Chapter;

(ii) In addition to the limits set forth above, no ultra-wideband device shall radiate spectral lines in the band 1565.42 - 1585.42 MHz at a level exceeding 165 uV/m at 3 meters when measured with an RMS detector with a 10 kHz resolution bandwidth. In lieu of meeting this requirement, the applicant may provide measurement data showing its device produces effects in GPS receivers equivalent to or less detrimental than those produced by gaussian white noise at the power level that would produce field strength levels equivalent to those specified in sub-paragraph (c)(1)(i) for frequencies above 960 MHz.

(iii) The nominal center frequency, defined as the midpoint between the 3dB down frequencies on either side of the emission, of such devices is above 2000 MHz; and

(c)(2) The operation of devices authorized under this sub-paragraph is limited to uses directly related to the preservation of life and/or property or training directly related to such preservation.

(c)(3) Any public safety entity desiring to use an ultra-wideband device authorized under the provisions of this sub-paragraph (c) shall in advance of such operation register, with an entity designated by the Commission, the number of such devices, the FCC ID number associated with the device, the area of operation for such devices, and a representative who can be contacted in the event of reports of harmful interference that may be associated with the operation of such devices. The entity shall initially inform the operator of the device of the harmful interference report providing an opportunity to resolve the harmful interference and, when necessary to protect licensed services, exercise authority to order the termination of the operation of such devices until the interference complaint has been resolved.

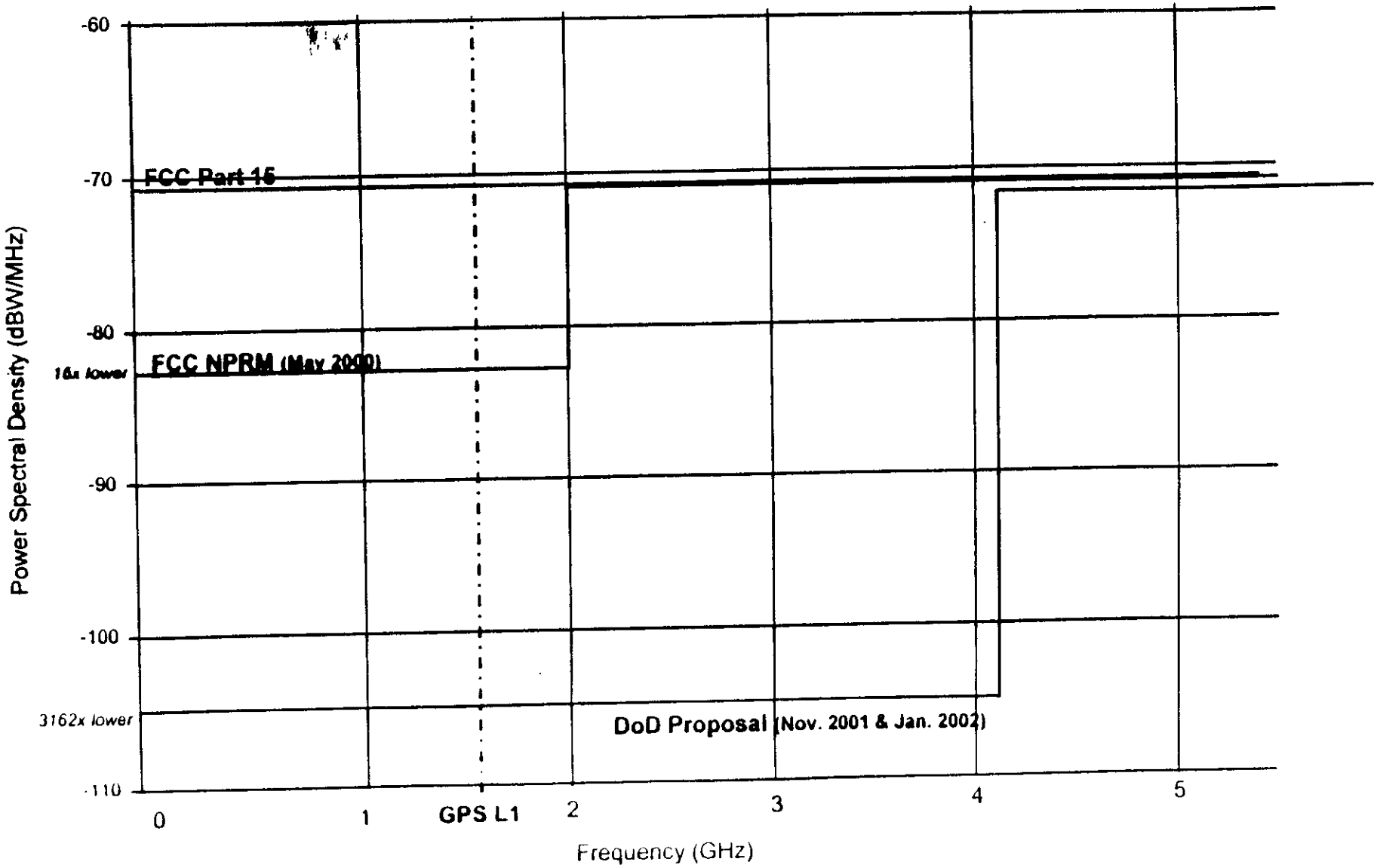
(d) [provisions pertaining to ground penetrating radar devices]

(e) [provisions pertaining to or referencing the rules for 24 GHz vehicle radar]

NOTE: The footnote to Section 15.209 should be amended to include a reference to this rule pertaining to the authorization of UWB devices.

Antennas for UWB devices would either be integral, permanently attached, or attached using a unique connectors. See Section 15.203.

UWB Proposed Emissions Limits



Time Domain UWB Proposal

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- **Public Safety.**

  - ✓ Only marketed to eligible public safety entities under Part 90 of FCC rules.
  - ✓ Part 15 power levels
  - ✓ Protection of 10 db below Part 15 Class B in the GPS L1 band to protect against spectral lines or showing that the device in question produces effects in GPS receivers that are equal to or less detrimental than gaussian white noise at the part 15 general limit.
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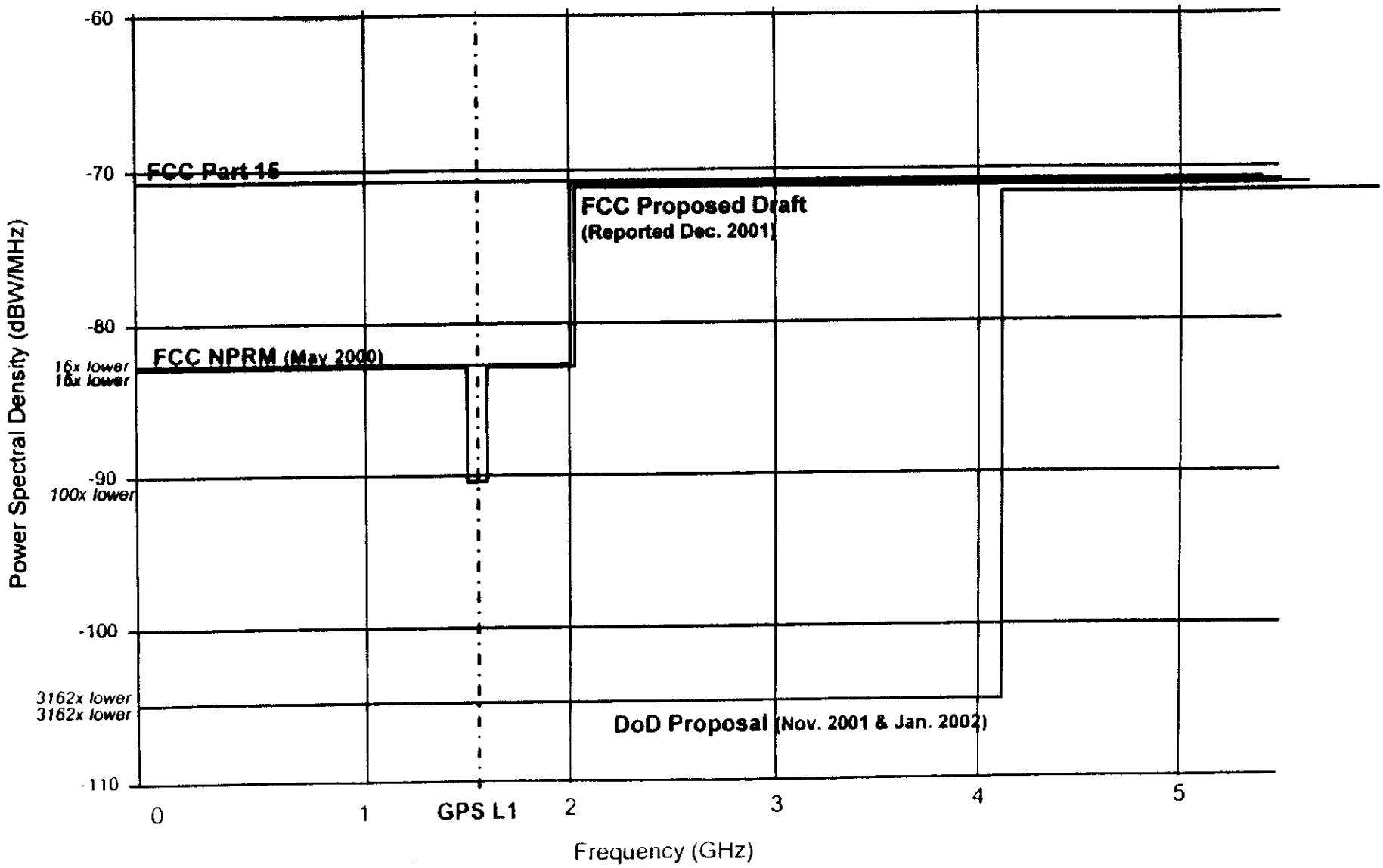
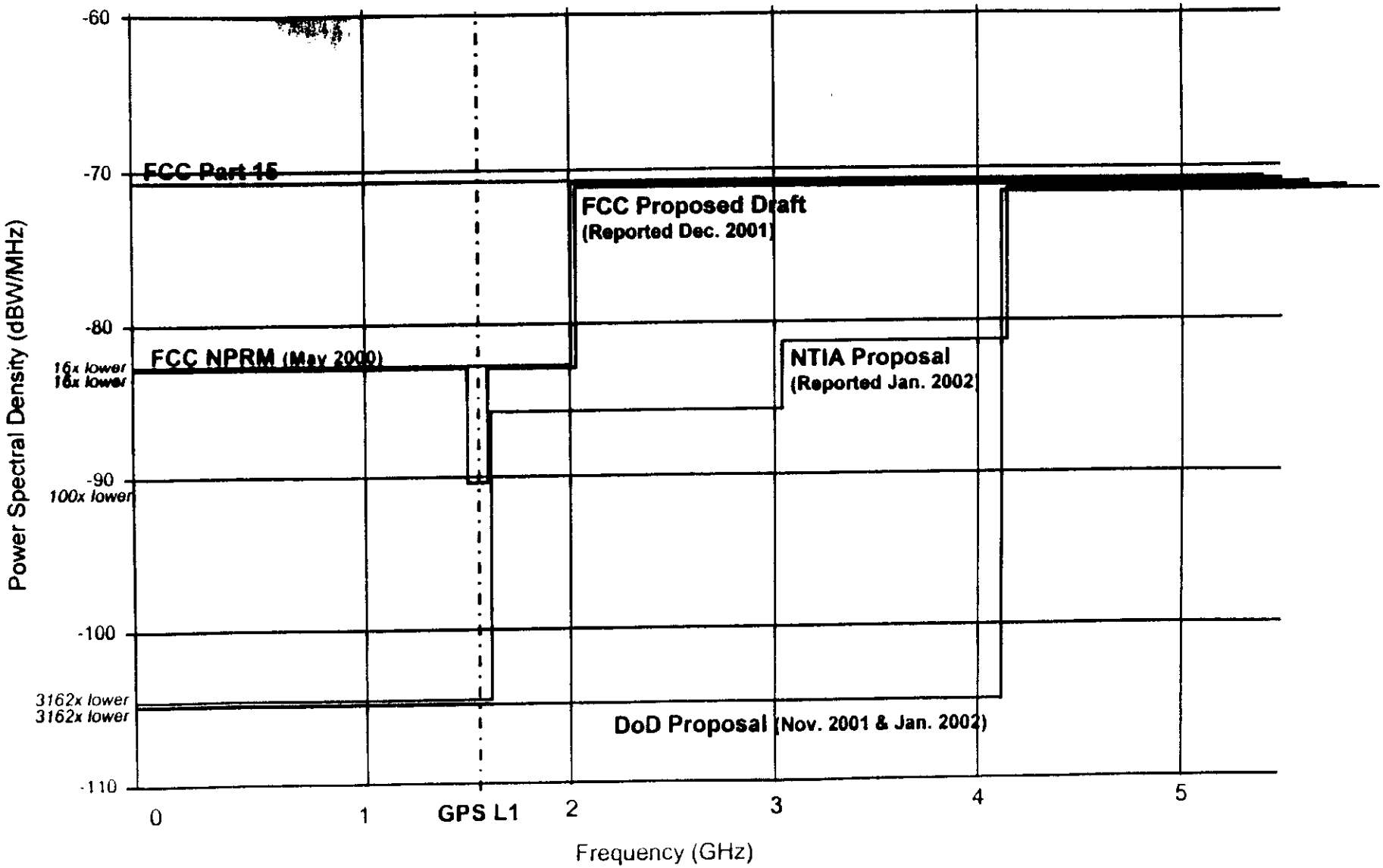
  - ✓ Operation of device limited to preseveration of life and/or property or training
  - ✓ Registration requirement

UWB Proposed Emissions Limits



UWB Proposed Emissions Limits



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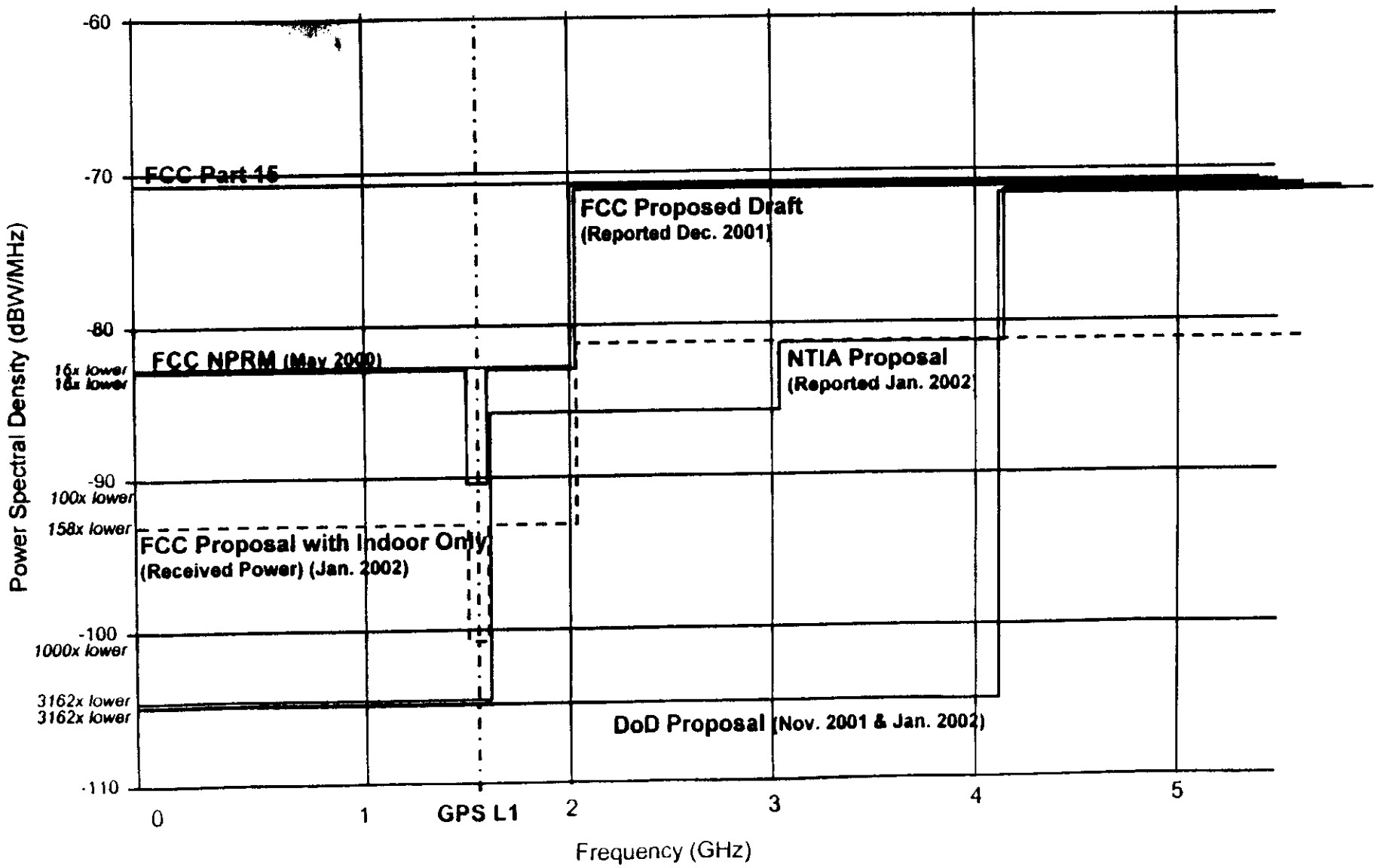
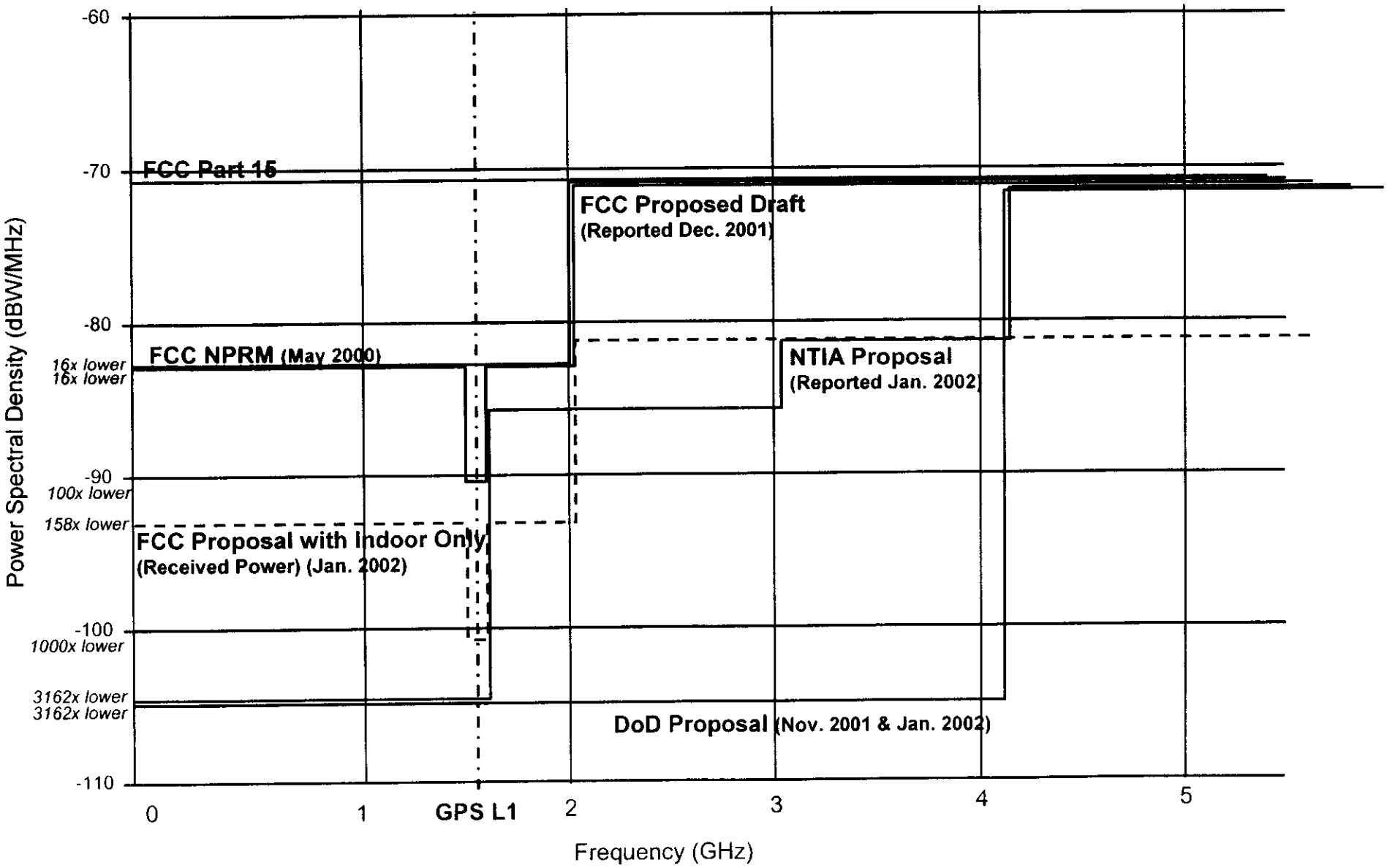
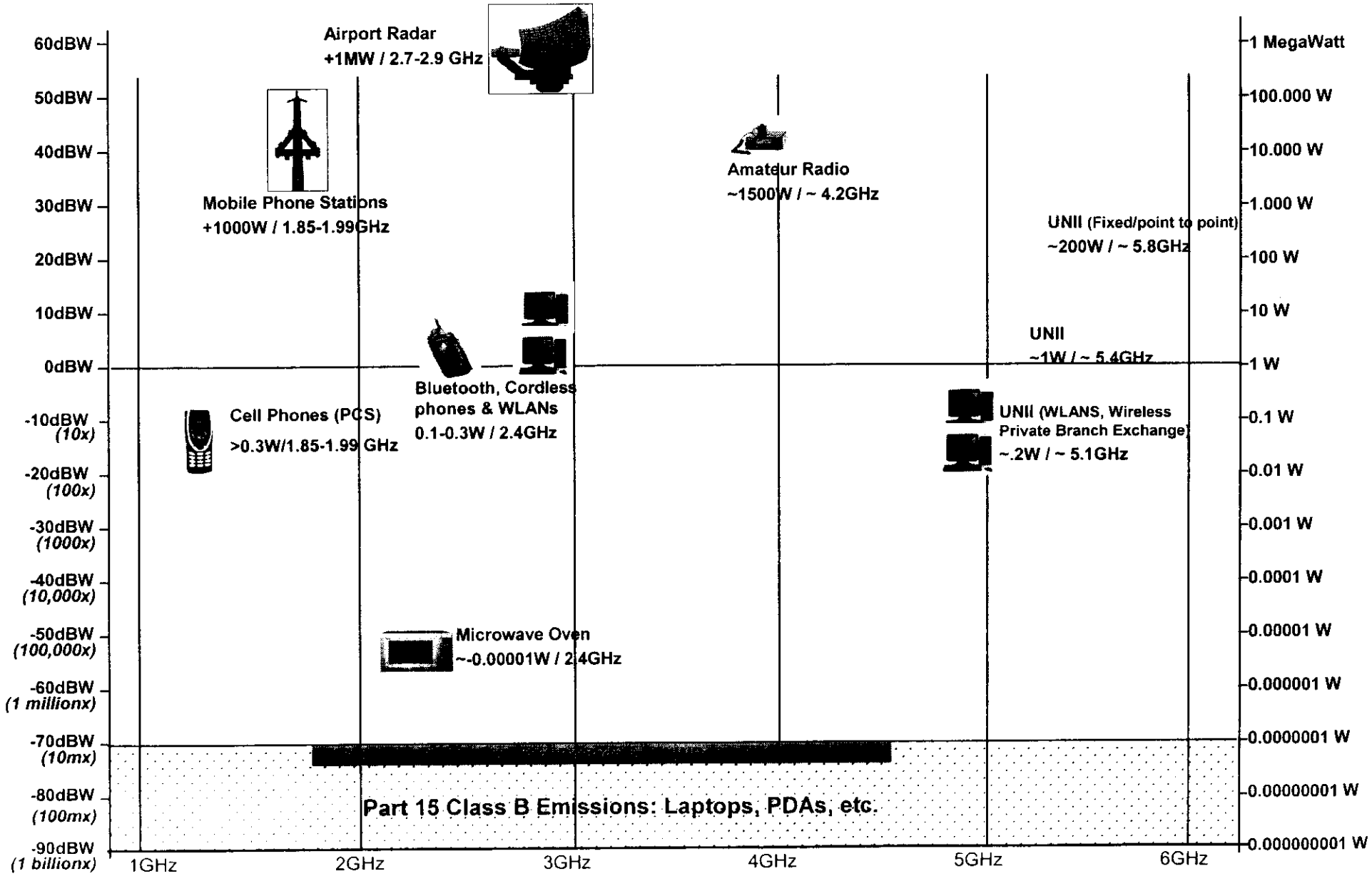


UWB Proposed Emissions Limits



Decibels vs. Power



UWB Government Contracts

Time Domain Corporation

National Institute of Standards and Technology (NIST) Advanced Technology Program
Internal communications and tracking system for medical equipment

National Aeronautics and Space Administration (NASA)
Astronaut / Space Station Extra Vehicular Activity communications and position location and tracking for space walks: Phase II Small Business Innovation Research contract

National Science Foundation
Universal Home Networking: Phase I Small Business Innovation Research contract

Department of Commerce
Firefighter locator: Phase I Small Business Innovation Research contract

DOD Military Operations in Urban Terrain Advanced Concept Technology Demonstration
Introduction and evaluation of RadarVision in military operations in urban terrain to clear buildings by detecting human presence through walls

Office of Naval Research (ONR)
Location and status tracking system for environmental conditions history and shelf life of ammunition in storage depots to circumvent the need for destructive testing and lot sampling

Office of the Assistant Secretary of the Navy for Safety and Survivability
Personal Position Location and Tracking System to locate sailors aboard ships during life-threatening situations

Defense Advanced Research Projects Agency (DARPA) Advanced Technology Office
Self-Healing Minefield program that cause mines to autonomously fill in minefield breaches

Army Missile and Aviation Command (AMCOM) Advanced Concept Office
Over-the-horizon communications link using unmanned aerial vehicles: Phase II Small Business Innovation Research contract

Army Missile and Aviation Command (AMCOM)
Blue Laser research: Phase II Small Business Technical Transfer Research contract

Army Tank Automotive and Armaments Command (TACOM) Tank Automotive RDE Center (TARDEC)
Terrain mapping radar sensor to provide ground truthing for Grizzly mine-breaching program: Phase II Small Business Innovation Research contract.

Army Corps of Engineers
Cooperative Research and Development Agreement to mark locations of unexploded ordnance on training ranges, for subsequent munitions clearing

Army Simulation Training and Instrumentation Command (STRICOM)

Advanced Tactical Engagement Simulation Program for the Objective Infantry Combat Weapon to detect hits on non line-of-sight targets during military exercises: Phase II Small Business Innovation Research contract

Army Space and Missile Defense Command, Battle Lab (SMDCBL)

Wireless communications for Future Operations Center local area network, the next generation tactical operations center

Army Simulation Training and Instrumentation Command (STRICOM)/ Univ. of Central Florida

Cooperative Research and Development Agreement to introduce time modulated ultra-wideband technology into military training.

Army Simulation Training and Instrumentation Command (STRICOM)

Lightweight Personnel Detection Device to track soldiers during military exercises at the National Training Center (ultra lightweight gear with precision location and tracking)

National Security Agency (NSA)

Technology license for Army Research Laboratory to study how and where time modulated ultra wideband communications should be implemented for the Army

NASA Glenn Research Center

Phased Array and SAR Radar: Phase I Small Business Innovation Research contract

NASA Goddard Space Flight Center

Interspacecraft Communication: Phase I Small Business Innovative Research Innovative Research contract

NASA Marshal Space Flight Center

Terahertz waveform propagation R&D: Cooperative Research and Development Agreement (CRADA)

Marine Corps

Personnel Identification System: Phase I Small Business Innovative Research contract

Defense Threat Reduction Agency

Evaluation of UWB for airborne surveillance and ground penetrating radar

Army STRICOM

Development of mobile ad hoc networking BAA with military and commercial dual-use capability

DoD Office of Science and Technology

OST IDIQ Program

Navy Sea Systems Command
UWB engineering expertise for technology insertion into Naval Applications

Navy Research Lab
To provide precise timing via wireless

L3 Communications
Provision of 3 full duplex evaluation PulsON® radios with propagation software

Army Material Command
Proposal to support intelligent mines with PulsON® radar sensor and PLT

National Telecommunication & Information Agency
Utilization of the PulsON® pulsers to facilitate interference testing in support of the FCC NPRM

Æther Wire & Location, Inc.

DARPA
Grant for development of a position location system with a network of RF transceivers (ultra wideband localizers) (Æther Wire web site)

Intelligent Automation Incorporated (IAI)

Department of Commerce
Contract to develop a communication and tracking system for firefighters, police, and similar personnel (FCC Comment 9/6/00)

NASA
Contract to apply ultra-wideband technology to the next generation space suit so that the motions of an astronaut can be tracked (FCC Comment 9/6/00)

U.S. Army Simulation and Training Command
Contract to develop ultra-wideband for use in training exercises to track the motions of trainees and equipment (FCC Comment 9/6/00)

U.S. Army
Contract to apply ultra-wideband technology to the Grizzly Minefield Breaching Vehicle (FCC Comment 9/6/00)

U.S. Air Force
Contract that demonstrated the many advantages of ultra-wideband in phased array radar and in synthetic aperture radar (FCC Comment 9/6/00)

DOD's DARPA (Defense Advanced Research Projects Agency)
Working to evaluate distance learning in U.S. Dependent Schools on U.S. military bases abroad and the potential of wireless access to high bandwidth access (FCC Comment 9/6/00)

Multispectral Solutions, Inc. (MSSI)

Numerous Agencies
MSSI's Short Pulse Communications Systems (SPCS) has been evaluated by numerous government agencies for low detection voice and data communications (FCC comments)

U.S. Marine Corps Warfighting Laboratory
Contract for collision avoidance sensor (FCC comments)

Naval Air Systems Command
Contract for multifunction precision altimeter, collision avoidance sensor and low data rate communications system (FCC comments)

U.S. Navy
Contract for miniaturized high speed ultra-wideband video data link (FCC comments)

DOD's DARPA
Sub-contract for ultra-wideband precision geolocation system for urban warfighter applications (FCC comments)

Naval Air Warfare Center - Aircraft Division
Contract to develop ultra-wideband wireless intercom systems for Navy Aircraft (Press Release)

National Institute for Occupational Safety and Health (NIOSH)
Contract for development of ultra-wideband vehicle backup sensors for mobile mining equipment (Press Release)

Naval Facilities Engineering Command
Contract for development of Asset Location & ID System (Press Release)

U.S. Marine Corps
Contract for development of network-capable radios (Press Release)

U.S. Special Operations Command
Contract for development of ultra-wideband radar sensors for wide area surveillance, and intrusion detection (Press Release)

Department of Transportation
Contract for the development of an ultra-wideband tagging system for the detection of problem drivers (Press Release).

Navy Surface Warfare Center (Hummingbird Project)
Contract to develop precision altimetry and collision/obstacle avoidance applications (Press Release)

U.S. Army Research Laboratory
Contract for the development of an ultra wideband radar proximity fuze (Press Release)

U.S. Army Missile Command

Contract to develop high-speed ultra wideband (UWB) link for the transmission of command & control and live video data to/from an unmanned aerial vehicle (Press Release)

DOD's DARPA

Collision avoidance radar for use in DOD's Organic Aviation Vehicle (International Defense Review, 3/1/2001)

National Academy of Science

Contract to develop electronic license plates with dual function of collision avoider and RF tagging for vehicle to roadside communication (Press Release)

DoD's Office of Special Technology

Contract to develop an ultra-wideband voice/data packet radio using groundwave propagation for non-line-of-sight communications. (Jane's Int'l Defense Review 2/99)

DoD's DARPA

Contract for the design, development and delivery of UWB transceivers for DARPA's Exdrone UAV. (1998)

Army Aviation and Missile Command

Phase II SBIR contract for further development of UWB collision avoidance radar for MAV. (2000)

Naval Surface Warfare Center (NSWC)

Contract for development of UWB guided projectile navigation system. (2001)

SOCOM

Phase II SBIR contract for advanced development of UWB radar sensor for wide-area surveillance. (1999)

DoD

Contract for development of a short range UWB radar for helicopter terrain and obstacle avoidance. (2001)

US Navy

Navy Combat Information Center: Phase I SBIR contract to demonstrate a UWB surface wave communications system for improving CIC operations. (1999)

US Navy

Three-year, Indefinite Delivery/Indefinite Quantity (IDIQ) contract for development of UWB communications equipment. (2000)

ITT Industries

Air Force

Contract to research and develop ultra-wideband sources and antennas for communication systems (Sec. of Defense News Release)

Department of Energy - Lawrence Livermore National Laboratory

Defense Special Weapons Agency & U.S. Army's Humanitarian Demining Office

Working on development of a fieldable man-portable land mine detection system (Jane's Int'l Defense Review 2/99)

Lockheed Martin

DARPA

Contract for development of UWB foliage penetrating radar (1997)

US Navy

Contract to produce Advanced Wideband Mine Countermeasures (MCM) system (designated "Pathmaker") for nautical craft. (1999)

Mebatek Inc.

Office of Naval Research

Contract to research UWB synthetic aperture radar (SAR) for UAVs. (1996)

Essex Corporation

DoD

Contract to define new radar applications for its UWB Advanced Optical Processor (AOP). (2000)

Raytheon

Special Unit Operations/Situation Assessment System (SUO/SAS)

Contract for development of an impulse-based precision geolocation system. (1998)