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December 4, 2002

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

Re: ET Docket No. 98-153, Ultra-Wideband Transmission Systems
Ex parte Communication

On behalf of the Ground Penetrating Radar Industry Coalition and pursuant to Section 1.1206(b)(2) of the Commission's Rules, I am electronically filing this notice of an oral *ex parte* communication.

Yesterday, Dennis Johnson of Geophysical Survey Systems, Inc., David Redman of Sensors & Software Inc., Matthew Wolf of Mala Geoscience, Inc., and I, also representing Underground Imaging Technologies, met with Julius P. Knapp, Alan J. Scrime, Karen Rackley, John A. Reed, and Ron Chase of the Office of Engineering and Technology.

We reiterated and explained the points raised in the Petition for Partial Reconsideration of the Ground Penetrating Radar Industry Coalition (filed June 17, 2002). A copy of our presentation outline is attached.

If there are any questions about this filing, please call me at the number above.

Respectfully submitted,

Mitchell Lazarus
Counsel for the GPR Industry Coalition

cc: Meeting Participants
Edmond J. Thomas, Chief, OET
Chairman Michael K. Powell
Commissioner Kathleen Q. Abernathy
Commissioner Michael J. Copps
Commissioner Kevin J. Martin
Commissioner Jonathan S. Adelstein

Ground Penetrating Radar Industry Coalition

at the

Office of Engineering and Technology

December 3, 2002

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Agenda

- GPRIC Petition for Partial Reconsideration (filed June 17, 2002)

Overview

- About GPRIC
- Examples of GPR applications
- GPRs are non-interfering
- OET has interpreted the GPR Rules flexibly
- GPRIC seeks reconsideration of four rules:
  - Section 15.509(a): "UWB bandwidth" below 960 MHz
  - Section 15.509(d): emissions limits below Class B
  - Section 15.509(b)(1): limiting GPR operation to certain users
  - Section 15.525: requiring prior NTIA coordination
- Conclusion

About GPRIC

- Member companies:
  - Geophysical Survey Systems, Inc.
  - Mala Geoscience, Inc.
  - Sensors & Software, Inc.
  - Underground Imaging Technologies

- These companies account for 98% of commercial GPRs sold in the United States.

Examples of Routine GPR Applications
(Nearly All Support Public Safety)

- highway inspection to identify defects, pipes, and pavement thickness
- bridge deck inspection for quality assurance, condition assessment, and maintenance decisions
- airport runway inspection to find voids and evaluate pavement thickness (used by NASA and all major airports)
- railroad bed inspection to find leaking pipes and voids
- testing the soundness of subsurface environment before excavation
- detection and 3-D mapping of pipes and utilities before excavation
- geophysical surveys (locate bedrock, water table, and other geological properties); detect voids and anomalies
- forensics (locating criminal evidence, including buried murder victims)

Routine Applications (cont'd)

- environmental contamination surveys to determine location and extent of contamination, pipe leaks, waste pits, etc.
- archaeology -- mapping of underground sites prior to digging
- mining -- location of mineral deposits, seams, and water levels; detection of conditions dangerous to miners
- measurement of ice thickness in rivers and lakes
- under-ice Arctic and Antarctic research.
- inspecting foundations of nuclear power plants
- locating avalanche victims

Examples of One-Time Applications

- discovery of the wooly mammoth in Siberia (Discovery Channel)
- survey of unopened royal tomb in Xian, China
- discovery of unknown village near Macchu Pichu (National Geographic expedition)
- surveys at Washington's Mount Vernon, Jefferson's Monticello, and FDR's home
- discovery of the emerald deposit in North Carolina, North America's largest
- location of the "Lost Squadron" in Greenland in 1992 (leading to the upcoming flight of the recovered P-38 aircraft, "Glacier Girl")
- GPR system for Mars exploration, to define creek beds where remnants of life might be found.

GPRs Are Non-Interfering

- GPR energy is directed into the soil, where it dissipates as tiny amounts of heat.
    - manufacturers deliberately suppress air-borne emissions to improve range and resolution.
- Few GPRs are in use -- typically just a small number per county.
- Most GPRs operate only a small percentage of the time.
    - The few GPRs that operate continuously do so only for short periods and while in motion at high speed (*e.g.*, inspecting highways).
- Many GPR applications occur in lightly populated areas.
- The pulse repetition frequency (PRF) of systems made by GPRIC members is 500 kHz or less, which does not cause interference.(1)

(1) For citations, see following slide.

NTIA: GPRs Do Not Interfere With GPS

- NTIA found no GPS interference from UWB devices with PRFs typical of GPRs (below 100-500 kHz), *even at Class B levels.*(1)

- NTIA data confirm that current GPR emissions limits are unnecessarily high:
  - The current GPS-band limits derive from NTIA's estimate of GPS receiver susceptibility threshold at –117.5 dBm/MHz.(2)
  - NTIA calculated its –117.5 dBm/MHz figure from a high (20 MHz) PRF -- but at at low PRFs (typical of GPRs), the GPS receiver functioned properly at emissions levels tens of dB higher.(3)

(1) *Assessment of Compatibility Between Ultrawideband (UWB) Systems and Global Positioning System (GPS) Receivers (Report Addendum)* NTIA Special Publication 01-47 at xi (November 2001).

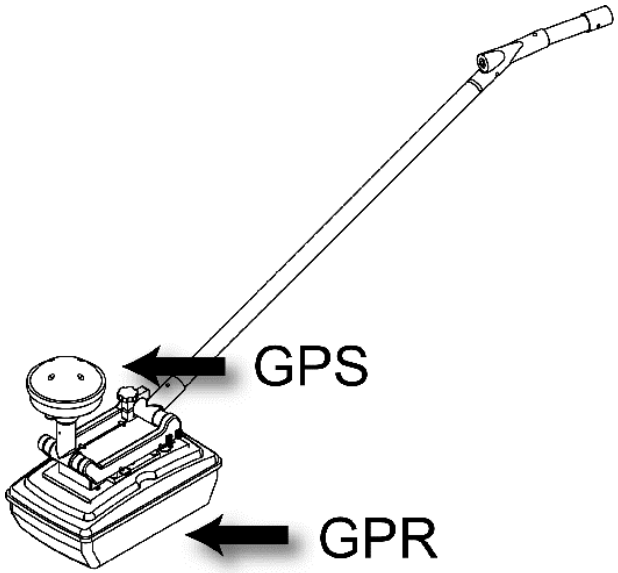
(2) *Measured Emissions Data for Use in Evaluating the Ultra-wideband (UWB) Emissions Limits in the Frequency Bands Used by the Global Positioning System (GPS)*, Project TRB 02-02 at 9 (October 22, 2002)

(3) Measurements to Determine Potential Interference to GPS Receivers from Ultrawideband Transmission Systems, NTIA Report No. 01-389, Addendum to NTIA Report 01-384 at pages 9-10, Figures 3.1, 3.3 (September 2001).

GPRs Do Not Interfere With GPS (Cont'd)

- We test this question in the field hundreds of times each working day.
- Nearly all GPRs are designed to work with a GPS receiver located only centimeters from the antenna.

  (GPS is needed to map locations of GPR readings).
- We do not know of a single instance in which the GPR has ever caused interference to GPS.



UWB Opponents: GPRs Do Not Interfere

- **Aeronautical**: "Precautions such as limiting UWB operations in the restricted bands to . . . [GPRs] may serve to minimize the impact of any harmful interference by UWB operations on GPS and other safety-of-life operations."(1)
- **PCS**: "Sprint does not necessarily oppose these [penetrating radar] applications."(2)
- **Amateur**: "ARRL does not object to permitting GPRs to be operated anywhere in the spectrum . . . subject to appropriate emission limits."(3)
- **DARS**: GPRs "are unlikely to pose a significant threat of interference to DARS reception."(4)

(1) Comments of Aeronautical Radio, Inc. and the Air Transport Association of America, Inc. at (filed Sept. 12, 2000).
(2) Sprint PCS Supplemental Comments at 2 n. 3 (filed Oct. 6, 2000).
(3) Comments of ARRL, the National Association for Amateur Radio at 16 (filed Sept. 12, 2000).
(4) Reply Comments of XM Radio Inc. at 6 n. 8 (filed Oct. 27, 2000).

FCC: GPRs Do Not Interfere

- "We believe the risk of interference from GPRs is negligible because the overwhelming majority of their energy is directed into the ground where most of the energy is absorbed. . . . In addition, GPRs are expected to have a low proliferation and usually operate at infrequent intervals. Thus, the interference potential of these devices should be low. . . . [A]ccording to the comments, these devices have been used in limited numbers for quite some time . . . *without any known instances of harmful interference*."(1)
  - Nothing in the record says otherwise.
- The Commission later affirmed: "GPRs and wall imaging systems have been operating in the 1000-2000 MHz band for many years, and *we are unaware of a single report of harmful interference*."(2)

(1) *Ultra-Wideband Transmission Systems*, 15 FCC Rcd 12086 (2000) (Notice of Proposed Rule Making) (emphasis added).

(2) *Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, Order, DA 02-1658 at para. 9 (OET released July 12, 2002) (emphasis added).

OET Has Interpreted the GPR Rules Flexibly

- GPRIC (and the entire GPR industry) are grateful for OET's flexible approach to GPRs following the Report and Order, including:
  - grandfathering of equipment in use when rules took effect
  - expansion of eligible users to include contractors
  - broad approach to NTIA coordination
  - decision to forgo pre-grant certification testing
  - time extension for registration of grandfathered equipment
- These measures have greatly helped the industry, but do not eliminate the need for reconsideration (especially as to technical rules).

GPRIC Seeks Reconsideration of Four Rules

1. Section 15.509(a): requiring all of a GPR's "UWB bandwidth" to lie below 960 MHz;
2. Section 15.509(d): setting emissions limits for GPRs well below the Part 15 general limits;
3. Section 15.509(b)(1): limiting GPR operation to law enforcement, fire and emergency rescue organizations, scientific research institutes, commercial mining companies, and construction companies; and
4. Section 15.525: requiring prior coordination of GPR operation with NTIA.

1. Section 15.509(a): "UWB bandwidth" below 960 MHz

- Grounds for reconsideration:
  - no support in the record (violates the Administrative Procedure Act)
  - irrational consequences (and hence violates the APA as being arbitrary and capricious):
    - the rule *disqualifies* some devices having a lower interference potential than compliant devices.
    - the rule allows a non-compliant device to be made compliant by *increasing* its interference potential (see next slide).
  - no technical basis for the rule
    - not based on any test or other data.
- Reconsideration will promote the public interest (see second slide following).

Irrational Consequences of Bandwidth Rule

Less interfering device fails

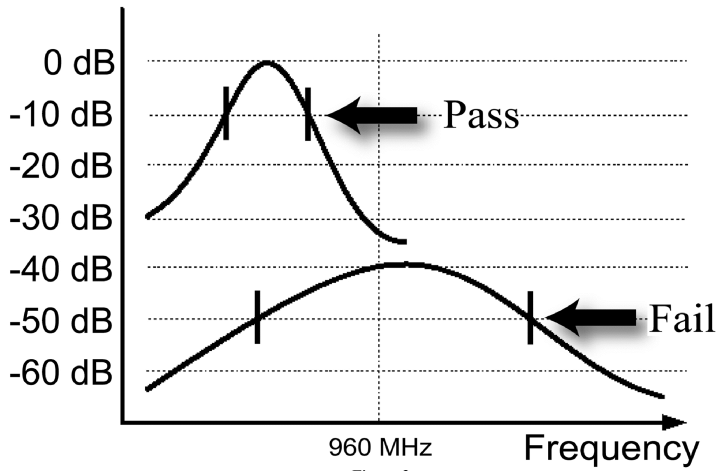


Figure 2

Increasing interference potential allows device to pass

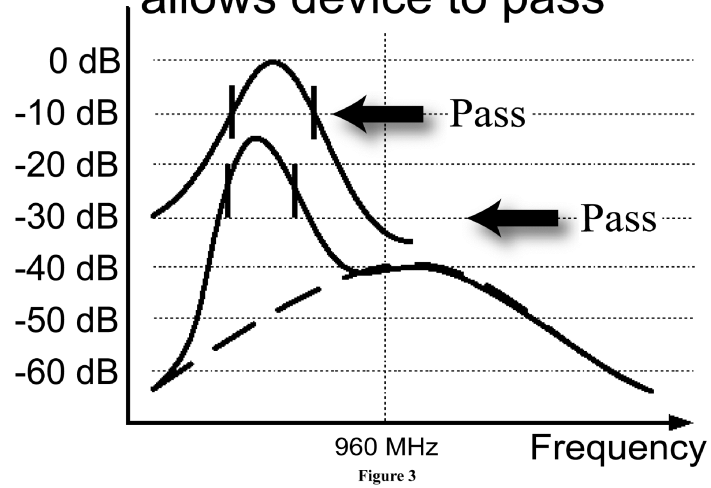


Figure 3

A device can fail even if its emission are *lower* than those of a compliant device *at all frequencies*.

Reconsideration of the Bandwidth Rule is in the Public Interest

- GPRs with bandwidths over 1000 MHz are needed for critical construction and engineering projects requiring centimeter-level resolution.
- Examples of these applications:
  - pavement, roadbed, and bridge deck evaluation
  - runway and concrete building investigation
  - determining ice thickness
  - detecting shallow utility facilities
  - locating avalanche victims.
- *No GPR that complies with the bandwidth rule can deliver the resolution necessary to accomplish these purposes*.

2. Section 15.509(d): emissions limits below Class B

- The Commission originally proposed GPRs operation at the "general limits" (numerically equal to Class B).
- There is no evidence in the record suggesting any threat of interference from GPRs at the general limits.
  - The courts consistently hold that agencies may not establish rules that run counter to the record. (1)
- And there is no showing that narrowband notches are needed to protect GPS.
  - GPR depends on smooth, broad spectral signals.
  - Narrowband notching precludes operation for many octaves on either side the notch.

(1) For citations, *see* Petition for Partial Reconsideration of the Ground Penetrating Radar Industry Coalition at 11-12 (filed June 17, 2002).

Class B Limits Are in the Public Interest

- NTIA data, confirmed by decades of experience, show that GPR PRFs cause no interference to GPS, even at the general emissions limits (see slides 9-10).

- General emissions limits are necessary for safe operation in public safety applications, e.g., roadway and bridge inspection:
  - the current limits restrict travel speed to 12 mph, creating traffic hazards
  - at Class B limits, 60 mph is feasible

3. Section 15.509(b)(1): limiting GPR operation to certain users

- We welcome OET's permissive interpretation of this rule.[1]
  - But the rule still causes confusion and unnecessarily limits the industry.
- This rule flatly violates the Administrative Procedure Act:
  - was never proposed for public comment;
  - was adopted counter to all of the evidence in the record.
- But we agree consumers should not have access to GPRs.
  - GPRIC will not contest a rule that limits GPR operation to Part 90 eligibles.

(1) *Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, Order, DA 02-1658 at para. 9 (OET released July 12, 2002).

4. Section 15.525: requiring prior NTIA coordination

- We welcome OET's broad approach to NTIA coordination.
  - But the rule still causes confusion and potential delay.
- This rule likewise violates the Administrative Procedure Act:
  - was never proposed for public comment;
  - was adopted counter to all of the evidence in the record.
- We acknowledge NTIA's interest in protecting certain sensitive installations.
  - GPRIC will not contest a rule that requires prior coordination within a reasonable radius of pre-identified installations.

Conclusion

1. All parties agree: GPRs are non-interfering.
2. None of the contested rules serves to reduce interference from GPRs.
3. All of the contested rules were adopted in violation of the Administrative Procedure Act.
4. Availability of GPRs serves the public interest and safety.
5. The contested rules hinder manufacture and deployment of some GPRs.
6. The Commission should repeal the contested rules.

Thank You!

The GPRIC appreciates this opportunity to meet with the Office of Engineering and Technology.