



National Telecommunications and Information Administration

Special Meeting of the IRAC Regarding GPS Re-Radiators

By: Robert Horton
CEO, GPS Source, Inc.

Oct. 28, 2005

Department of Commerce, Washington DC

Who are we:

- GPS Source, Inc. (“GPSS”) is a Pueblo, Colorado based company that manufactures and sells various GPS signal distribution products and services
- The health and vitality of the GPS industry is fundamental to GPSS achieving its commercial objectives
- As such, it is in GPSS’s best interest to ensure that the products marketed and sold are designed and installed in such a manner as to ensure safe, reliable and non-interfering operation for our customers and the other GPS equipment that may operate in the vicinity of our products





Safe & Reliable Operation

- GPS is a Government Owned Service and as such is intended for the public good
- GPS re-radiators already have demonstrated significant utility and proven invaluable for both government and commercial users alike
- Although GPSS is not aware of any reported cases of interference associated with GPS re-radiators, the potential for harmful interference from GPS re-radiators is a valid concern and must be addressed
- Safe, reliable use, without the potential for harmful interference, is possible if GPS re-radiators are properly designed, manufactured, installed and operated pursuant to a balanced regulatory regime

NTIA Questions

- In preparation for this meeting, NTIA posed a number of essential questions to GPSS and other interested parties
- GPSS has prepared detailed responses to these questions, which previously have been made available to the chairman of the IRAC for distribution to its members
- Hard copies of these responses will be available at the conclusion of today's meetings for any person who has not yet received them
- While in this presentation GPSS cannot address every response due to time allotments, GPSS will address the major issues raised by the NTIA questions

GPSS Re-Radiator Customers:

- Federal Government Agencies:
 - NOAA\NWS (122 units)
 - Department of Defense (111 units):
 - USAF\ANG (13 locations, 41 units)
 - US Army\Army Corps of Engineers (7 locations, 40 units)
 - USN (5 locations, 24 units)
 - USCG (4 locations, 6 units)
 - Federal Aviation Administration (4 units)
 - US Secret Service (4 units)
 - FBI (3 units)
 - NASA (3 units)

Scope of the Demand

GPSS Re-Radiator Customers:

- State & Local Governments (109 units)
- Private\Commercial Entities
 - DoD Contractors (15 entities, 102 units)
 - USGPS IC Members (4 known entities, 68 units)
 - Civil Aviation (20+ entities, 60+ units)
 - Cellular (15+ entities, 40+ units)
 - Broadcast Communications (20+ entities, 25+ units)
 - Survey (15+ entities, 30+ units)
 - Dealers\Distributors (8 entities, 300+ units)

Scope of the Demand

Totals:

- Some 355 different GPS Re-Radiator Customers
- Some 1806 Total GPS Re-Radiators Sold

- Quantities above are based solely upon GPSS's experience and do not reflect the customers or sales practices and experiences of other GPS re-radiator manufacturers

Examples of Applications:

- Vehicle & Aircraft Maintenance\Testing Facilities
- Research & Development Facilities
- Training & Customer Service Facilities
- Manufacturing facilities for GPS Capable Products (GPS receivers, Cell Phones, Automobiles, Aircraft, etc.)
- Maintaining “Hot” Status for:
 - Military Aircraft (installed in hangers for aircraft on alert status)
 - Infantry & Special Forces (interior of armored vehicles)
 - Emergency Response Vehicles (installed in fire houses to eliminate delay in vehicle traffic light preemption systems)



Benefits to Safety\Commerce\Convenience

- The nature and extent of the benefits of use are best addressed by those individual experts who expend significant capital and resources to procure, install, and operate GPS re-radiating devices
- To the best of our understanding, however, the following are some examples of the utility of GPS re-radiating products:

- Military Flight line Maintenance and Operations
 - Reduced maintenance time and costs by enabling trouble shooting, repair, and testing of aircraft systems within maintenance facilities when it is impractical to conduct such activities elsewhere (e.g., depot level maintenance facilities, Naval aircraft carrier hanger bays, hardened aircraft revetments, etc.)
 - More efficient maintenance practices result in increased aircraft ready rates
 - Reduced response times for aircraft on alert status

- **Civil Aviation Production and Maintenance**
 - Enables testing, trouble shooting and repair of aircraft systems when aircraft may not be moved due to other maintenance or other aircraft
- **Public Safety**
 - Elimination of delay in traffic light preemption systems results in significantly improved safety in route and in reduced response times (accidents at controlled intersections jeopardize the lives of emergency responders and citizens)

- **Commercial GPS Industry**

- Enabling of “full system” testing in manufacturing environment results in improved efficiencies and product quality
- Enabling of indoor operation at customer service call centers results in significantly improved customer service
- Enabling of indoor training improves customer experience and performance of customer support staff
- Enabling of product demonstration in GPS product retail centers improves customer product selection experience
- Enabling of R&D lab testing results in significantly reduced development costs and improved product quality

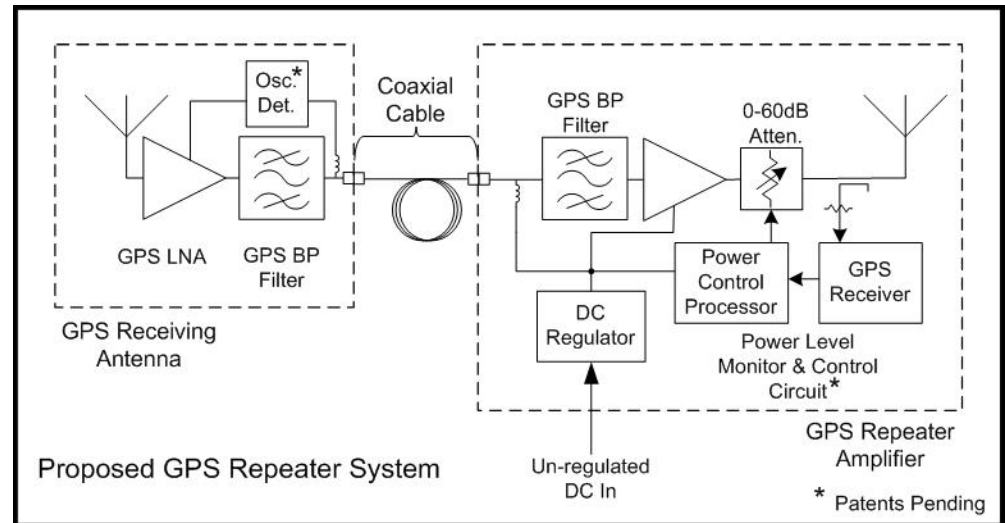
NTIA Technical Criteria

- “Recognizing that federal and non-federal users need to operate devices that re-radiate received signals from the GPS,” the NTIA has added section 8.3.28 to the NTIA manual authorizing use of these devices in certain circumstances
- GPSS believes the NTIA technical standards are a good foundation for authorizing use
 - Maximum ERP must be such that emissions are no greater than -140dBm/24MHz at a distance of 100ft from the building
 - Calculations showing compliance must be provided and should be based on free space propagation with no allowance for attenuation from the building

NTIA Technical Criteria

- GPSS believes the following additional product enhancements are necessary to further reduce the potential for harmful interference and should be required for authorized GPS re-radiation equipment:

- Power Monitor & Control *
- Fixed Transmit Antenna
- Oscillation Detection & Prevention *
- Adequate Frequency Selectivity



* GPSS has filed for patent rights for GPS Re-Radiating systems which include transmitter power monitor and control and oscillation detection functionality.

- Power Monitor & Control
 - GPS Re-radiator transmitter units that include power monitor & control would be calibrated prior to delivery and ERP levels would be set, either at the factory or by an approved installer, to levels that ensure compliance with the NTIA technical criteria
 - Once ERP levels have been set, the re-radiator system will not permit adjustment to ERP levels that would exceed the NTIA technical criteria, whether adjustments occur by the system control inputs or by unlawful tampering (e.g. inclusion of additional amplification stages or reduction of coaxial cable loss)

- Fixed Transmit Antenna
 - Fixed transmit antennas are necessary so as to prevent inclusion of additional amplification after the power control function

- Oscillation Detection & Prevention
 - To eliminate the potential for improper installation or antenna failures that may result in oscillation
- Re-radiator System Bandwidth
 - Re-radiating system bandwidths should be sufficient to pass both civilian C/A and military P codes
 - GPSS supports limitations on the re-radiated signal bandwidth and limitations on spurious out-of-band emissions

Regulatory Regime

- GPSS supports the establishment of a reasonable, practical and effective “authorization” regime, administered by the FCC for non-governmental entities and by the NTIA for governmental entities, covering the manufacturing, marketing and use of GPS re-radiation products
- The precise regulatory requirements of such a regime presumably will involve some form of site-licensing and equipment authorization, using the criteria developed by the NTIA as the technical standard with which all device deployments and operations must conform
- GPSS believes that a balanced regulatory regime will prevent harmful interference to other GPS equipment operators by:
 1. Restricting device operation to a limited class of eligible users
 2. Ensuring proper installation at authorized sites
 3. Ensuring compliance with technical standards (including total power control) through the FCC’s equipment authorization process

Eligible Users

1. Ensuring safe and non-interfering operation through restricting eligibility
 - GPSS supports limiting sales, installation and use to the following groups, many of which already are using these products without interfering with other GPS operations:
 - a) Government agencies, including Federal, State and local government agencies, including law enforcement, fire and rescue organizations under the auspices of state and local government
 - b) Contractors operating under contract with the various agencies of the Federal government, including the Department of Defense or the military Department, including subcontractors and system integrators
 - c) Companies in the military and civilian aviation industry, including aircraft and avionics manufacturers and maintenance facilities
- (continued)

Eligible Users (cont.)

- d) Manufacturers of GPS chipsets and integrators of such chipsets into other equipment
- e) Manufacturing, production and test facilities where GPS is an integral part of the finished product
- f) Commercial GPS equipment manufacturers and GPS product sales outlets or distribution points for the purpose of demonstrating commercial GPS products
- g) Owners of indoor public transportation (e.g., train, subway) or parking facilities where repeaters could enable E911 services via access to GPS or AGPS service where it is otherwise unavailable
- h) Members of the U.S. GPS Industry Council not included in the foregoing categories

Site Authorization

2. Ensuring safe and non-interfering operation at authorized sites
 - GPSS believes that operation should be restricted to indoor locations meeting some preset criteria for installation and operation, and should include such general recommendations as:
 - Transmit antennas should be located as close as possible to the application's receiving antenna and operate re-radiator at minimum ERP levels necessary to perform the intended function
 - Users should avoid directing the re-radiating antenna toward large apertures which would increase signal levels in places accessible by the general public
 - Where necessary, compliance with preset criteria could be ensured through professional installation, as certified to the agency by the site authorization applicant

Site Authorization (cont.)

2. Ensuring safe and non-interfering operation at authorized sites (Cont):

- GPSS proposes two models for sale and installation of GPS re-radiator systems:
 - A “standard” re-radiator system that is factory calibrated and permanently set for an ERP of -140 dBm at 100ft, with no allowance for attenuation of building materials or for dimensions of the building.
 - A “custom install” system that would allow for an approved, professional installer to adjust power levels for proper system operation and for compliance with NTIA criteria. However, once set by the installer, the system power level would be automatically monitored and controlled to maintain the power level for compliance with NTIA criteria.
- Professional installation would not be required for systems designed such that they would meet the agreed upon criteria in any location (i.e., systems designed such that it would be impossible to install the system in a way that would exceed the agreed upon criteria)

Equipment Authorization

3. Ensuring safe and non-interfering operations through the FCC's equipment authorization process.
 - Certification and/or self-certification against the agreed upon technical standard (e.g., emission limits, frequency bandwidth, fixed antenna, etc.)
 - Equipment authorization to cover the manufacturing and marketing of GPS re-radiation products to non-government users
 - Process should be reasonable and not overly burdensome

Conclusions

- GPS is a Government Owned Service and as such is intended for the public good
- GPS Re-radiators, if properly designed and regulated, enhance the utility of GPS
- Multiple government and non-government entities already are using these devices without causing interference to other GPS operations
- Limiting use of GPS re-radiators to federal Government applications and GPS Industry commercial applications, while excluding Public Safety use is inconsistent and significantly limits the benefit to the general public
- GPSS looks forward to working with the NTIA and the IRAC, as well as industry colleagues, toward the prompt establishment of a regulatory regime that will serve the public good

Thank you for your valuable time and consideration.

QUESTIONS?

