GPS Re-Radiation System Technical Description

Paul Farrell
Samaritan's Purse
Airlift Response Center
1 Samaritan Lane
Greensboro, NC 27409
828-719-9487

Purpose of this application

The purpose of this application is to obtain a 2-year experimental license to operate a GPS re-radiation system supporting the test and maintenance of GPS systems and equipment in operational aircraft.

Why we are applying for a license

Samaritan's Purse is a non-profit, faith-based, international humanitarian relief organization operating transport category cargo aircraft including a Boeing 767-300.

Figure 1 – Samaritan's Purse Aircraft

Samaritan's Purse conducts aircraft maintenance and system tests in our Hangar at the PTIA Airport (KGSO). These operations involve multiple aircraft and each aircraft has multiple GPS receivers and antennae.

The use of a GPS re-radiation system in this hangar is appropriate for these reasons:

- Samaritan's Purse is involved in the test of GPS receiving systems as part of maintenance, operations and test of aircraft systems.
- The GPS repeater provides an enhanced capability for the maintainers, increasing overall aircraft availability for rapid response to international disasters.
- Without a valid GPS signal, we are unable to test certain parameters of systems such as Flight Management, TCAS, Transponder and Terrain warning systems.

- The aircraft are frequently immobilized (on jacks) or are otherwise unable to be moved outside the hangar during ground test operations.

Compliance with NTIA requirements

This installation will comply with all requirements stated in section 8.3.28 of the NTIA "Manual of Regulations and Procedures for Federal Radio Frequency Management (Redbook)" May 2013 edition: *Use of Fixed Devices That Re-Radiate Signals Received From the Global Positioning System*.

a. Individual authorization is for indoor use only, and is required for each device at a specific site.
   Operation will only be conducted indoors at the location identified above and as the station location in the application form 422.
b. Applications for frequency assignment should be applied for as an XT station class with a note indicating the device is to be used as an "Experimental RNSS Test Equipment for the purpose of testing GPS receivers" and describing how the device will be used.
c. Approved applications for frequency assignment will be entered in the GMF.
   Samaritan's Purse concurs with this requirement.
d. The maximum length of the assignment will be two years, with possible renewal.
   Samaritan's Purse concurs with this requirement
e. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user.
   The Samaritan's Purse hangar is under Samaritan's Purse control.
f. The maximum equivalent isotropically radiated power (EIRP) must be such that the calculated emissions are no greater than -140 dBm/24 MHz as received by an isotropic antenna at a distance of 100 feet (30 meters) from the building where the test is being conducted. The calculations showing compliance with this requirement must be provided with the application for frequency assignment and should be based on free space propagation with no allowance for additional attenuation (e.g., building attenuation.) **See ERP Power Spreadsheet**
g. GPS users in the area of potential interference to GPS reception must be notified that GPS information may be impacted for periods of time.
   Samaritan's Purse will comply with this requirement. We will also notify the relevant PTIA/Greensboro airport personnel.
h. The use is limited to activity for the purpose of testing RNSS equipment/systems.
   The use of this system will be limited to testing RNSS equipment and systems.
i. A "Stop Buzzer" point of contact for the authorized device must be identified and available at all times during GPS re-radiator operations.
   Stop buzzer contacts are provided on Clarification Questions

System use

This system will be operated *only* when GPS equipment testing is being performed. The illuminated wall-mounted power switch will be activated by the aircraft technician or engineer conducting the test and will be deactivated when the testing is complete. The switch illumination helps remind the technicians/engineers that the system is in operation.

The GLI-METRO device monitors a number of parameters and mitigates equipment failures so as to greatly reduce the risk of harmful interference to other GPS users.