

FCC file number: 0478-EX-PL-2008
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Date: 17 December, 2008

Re: Request for information
Correspondence reference # 7829
From: Jose Trevino (Jose.Trevino@fcc.gov)

Dear Jose,

Thank you for your efforts to proceed speedily with our application for an experimental license. This note is in response to your request for additional information to address Section 8.3.28 of the NTIA Manual.

1. Our request is for an individual authorization on a fixed device that re-radiates GPS signals. The re-radiator will be used strictly indoors at the laboratory facility located in Manassas, Virginia.
2. na – application is not for frequency assignment
3. na – application is not for frequency assignment
4. na – application is not for frequency assignment
5. The repeater space is a single level laboratory and office facility under the strict and constant control of SAIC. Over the duration of the license, the repeater is expected to be turned on only during normal working hours though it may be in occasional use during off-hours, for example the early evening hours or occasional weekend use. It is further anticipated that the long term average on-time of the repeater would be in the vicinity of 10-20% of a normal working day.
6. The manufacturer of the repeater system is GPS Source, Inc. located in Pueblo, CO. SAIC has purchased one of their standard L1/L2 repeater kits incorporating 50' of premium grade, 50 ohm cable. All calculations supplied by the manufacturer are presented below and include the cable losses along with the repeater power at the specified range of 100'. As required, these calculations are for free space propagation and do not account for any attenuation by the building structure. For the repeater system to be used, Table I provides the ERP at 100' as 6.9×10^{-11} watts which translates to -143 dBm, in compliance with the NTIA requirement.
7. All GPS users within the facility and area of potential interference are being notified of the repeater installation. SAIC real estate and the facility landlord have been notified.
8. The equipment to be tested will be government furnished military SAASM receiver cards with some preliminary work with commercial GPS receiver cards. The specific details regarding manufacturer and model numbers can be supplied if desired.
9. The facility point of contact will be
Brian Hilko
Off: 571-921-3073
Res: 703-765-6512

Please let me know if there is any additional information that you require and I will respond as quickly as possible.

Best Regards
Brian

Dr Brian Hilko
SAIC
10110 Battlevue Parkway, Suite 100
Manassas, VA 20109

off: 571-921-3073
cell: 301-326-7259
fax: 703-676-1461
hilkob@saic.com

TABLE I – Repeater power budget calculations.

GPS Source, Inc. Repeater Budget Calculator

Change the values in the yellow boxes to calculate required readings

Receive Ant Gain	Ant Cable Insertion Loss	Repeater Amp Gain	Repeater Ant Gain Best Case	Range in Feet	Repeated Signal Power @ Range In dBm
33	-2.6	25	3	100	-137.69

GPS Carrier Frequency MHz	Total System Gain	Range in Miles	Total Signal Power @ Range in Watts
1575	58.4	0.02	1.7e-17
Avg Receive Power L1 dBm North America		Range in Meters	Radiated Power dBm
-130		31.17	-71.6
Free Space loss with Isotropic Antennas		Range in Kilometers	Transmitted Power (W)
-66.09		0.03	3.5e-11
			Effective Radiated Power (W)
			6.9e-11
			Effective Radiated Power (dBW)
			-101.6

TABLE II – Attenuation through purchased co-axial cable.

Attenuation & Power Handling Calculator - Microsoft Internet Explorer

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Address <http://www.timesmicrowave.com/cgi-bin/calculate.pl>

Coaxial Cable Attenuation & Power Handling Calculator

Product	Frequency (MHz)	Attenuation (db/100 feet)	Attenuation (db/100 mtrs)	Average Power (kW)
LMR-400	1575	5.262	17.267	0.43

Calculate

Run Length (feet)	Total Run Attenuation(dB)	Efficiency (%)
50	2.6	54.6

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(Instructions Below)

The calculator above can be used to estimate the attenuation (dB loss), power handling capability, and transmission efficiency for some of the more popular Wireless Communications and MIL Spec cables at the frequency of interest ([below Cutoff Frequency](#)). Actual measured values may vary somewhat from the calculated numbers based on manufacturing tolerances, cable length, connectors, operating frequency, and measurement accuracy. The attenuation of cables with Bare Copper and Tinned Copper outer conductors can vary substantially from the theoretical value due to oxidation and therefore we recommend they not be used above 1 GHz. Note: the outer conductor of LMR cables is the aluminum tape.

Using the Calculator

- 1) Select the product of interest using the Drop Down box.
- 2) Enter the frequency of interest in MHz.
- 3) Enter Run Length in feet.
- 4) Click Calculate button.
- 5) Repeat steps 2,3, & 4 for various frequencies and cable lengths.

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