

Overview: Aerostar is filing this application for use of a GPS re-radiation system at its facility at 5900 Wireless St. Sioux Falls, 57107 Minnehaha County, South Dakota to re-radiate GPS within the building in order to verify signal acquisition of GPS products being developed. Many of these products rely on antennas integrated into the unit requiring the re-radiated signal to verify operation.

General compliance with NTIA section 8.3.28 set forth below are Aerostar's responses to the requirements of 8.3.28 as those answers apply for this location.

For any questions about this application, please contact Martin Harms,

Compliance with the Requirements of NTIA Manual Section 8.3.28

1. Individual authorization is for indoor use only and is required for each device at a specific site.
 - a. Aerostar confirms that there is only one device specified in this application and is only for indoor use inside the facility.
2. 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.
 - a. Yes, Aerostar. confirms that this application for frequency assignment is applied for as an XT station class and will be used as Experimental RNSS Test Equipment for the purpose of testing GPS receivers. Specifically, this device is used to re-radiate GPS within the building in order to verify signal acquisition of GPS products being developed and tested. Many of these products rely on antennas integrated into the unit requiring the re-radiated signal to verify operation.
3. Approved applications for frequency assignment will be entered in the GMF.
 - a. Aerostar affirms that we accept the fact that the requested frequency of 1575.42 Mhz will be published in the Government Master File (GMF) database.
4. The maximum length of the assignment will be two years, with possible renewal.
 - a. Aerostar confirms understanding that the authorization will be for two (2) years, and it will seek renewals when required.
5. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user.
 - a. Aerostar is in sole control of the GPS re-radiator units inside the building 5900 Wireless St Sioux Falls South Dakota 57107
6. 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.)
 - a. Answer: The re-radiator will be running at -144 dBm at 100 feet from the building, this does not include attenuation from the building itself. Free space loss includes the 100 feet outside of the nearest point of the building. The calculations showing compliance with this requirement are attached along with a diagram of the configuration.

7. GPS users in the area of potential interference to GPS reception must be notified that GPS information may be impacted for periods of time.
 - a. Aerostar will post notices that re-radiated GPS is in use and may cause disruption of GPS service.
8. The use is limited to activity for the purpose of testing RNSS equipment/systems.
 - a. Aerostar confirms that these units are for testing of its GPS related products only.
9. A "Stop Buzzer" point of contact for the authorized device must be identified and available at all times during GPS re-radiation operation of the device under any condition.
 - a. To "Stop Buzzer" contact: Brad Jensen at Brad.Jensen@aerostar.com or 605-957-5869



GPS Networking Link Budget Calculator

The following spreadsheet calculates the effective radiated power for a GPS Networking radiating system as well as the effective signal power at given range in dBm. Enter the components for the strongest repeating path in your system into the section with the red border. NTIA regulations require that the repeated signal be weaker than -140 dBm when measured 100 FT outside of the reradiated structure. Please feel free to reach out to GPS Networking if you need assistance.

Receive Ant Gain	Ant Cable Insertion Loss	Repeater Amp Gain	Repeater Ant Gain Best Case	Nearest External Wall (Feet)	Signal Power @ End of Building	Signal Power @ 100' Outside of Building In dBm
38	-5.4	18	4	35	-132.37	-144.0996081
GPS Carrier Frequency MHz			Total System Gain	Range in Miles	Total Signal Power @ Range in Watts	
1575			54.6	0.01	57.9E-18	
Avg Receive Power L1 dBm North America				Range in Meters	Radiated Power dBm	
-130				10.67	-75.4	
Free Space loss with Isotropic Antennas				Range in Kilometers	Transmitted Power (W)	
-56.97				0.01	14.5E-12	

Helpful Links:

Get an FCC Registration Number:	https://apps.fcc.gov/coresWeb/publicHome.do	Effective Radiated Power (W)
FCC Experimental Broadcast Form 44	https://apps.fcc.gov/oetcf/els/forms/442Entry.cfm	28.8E-12
Cable Loss Calculator	https://www.timesmicrowave.com/Calculator	
GPS Networking Store	https://www.gpsnetworking.com/store	Effective Radiated Power (dBW)
Tim's Email Address (if you need help)	mailto:tim@gpsnetworking.com	-105.4



System Receive Antenna		Cable Runs			
Part Number	Gain/Loss (dB)	Cable Type	Loss Per 100 Feet (LMR400) = -6	Feet of Cable	Cable Losses
L1GPASA-N	38	LMR-400	-6	50	-3
		RG316	-40	6	-2.4
					0
					0
Passive Components (Cause Loss)					0
Part Number	Gain/Loss (dB)				0
N-> SMA Adapter	0.1				0
					0
					0
Amplified Components (Cause Gain)					0
Part Number	Gain/Loss (dB)				0
					0
Repeating Antennas					0
Part Number	Gain/Loss (dB)				0
L1RRKPA	4				0

REV3



System Diagram

