

NTIA CHAPTER 8 COMPLIANCE

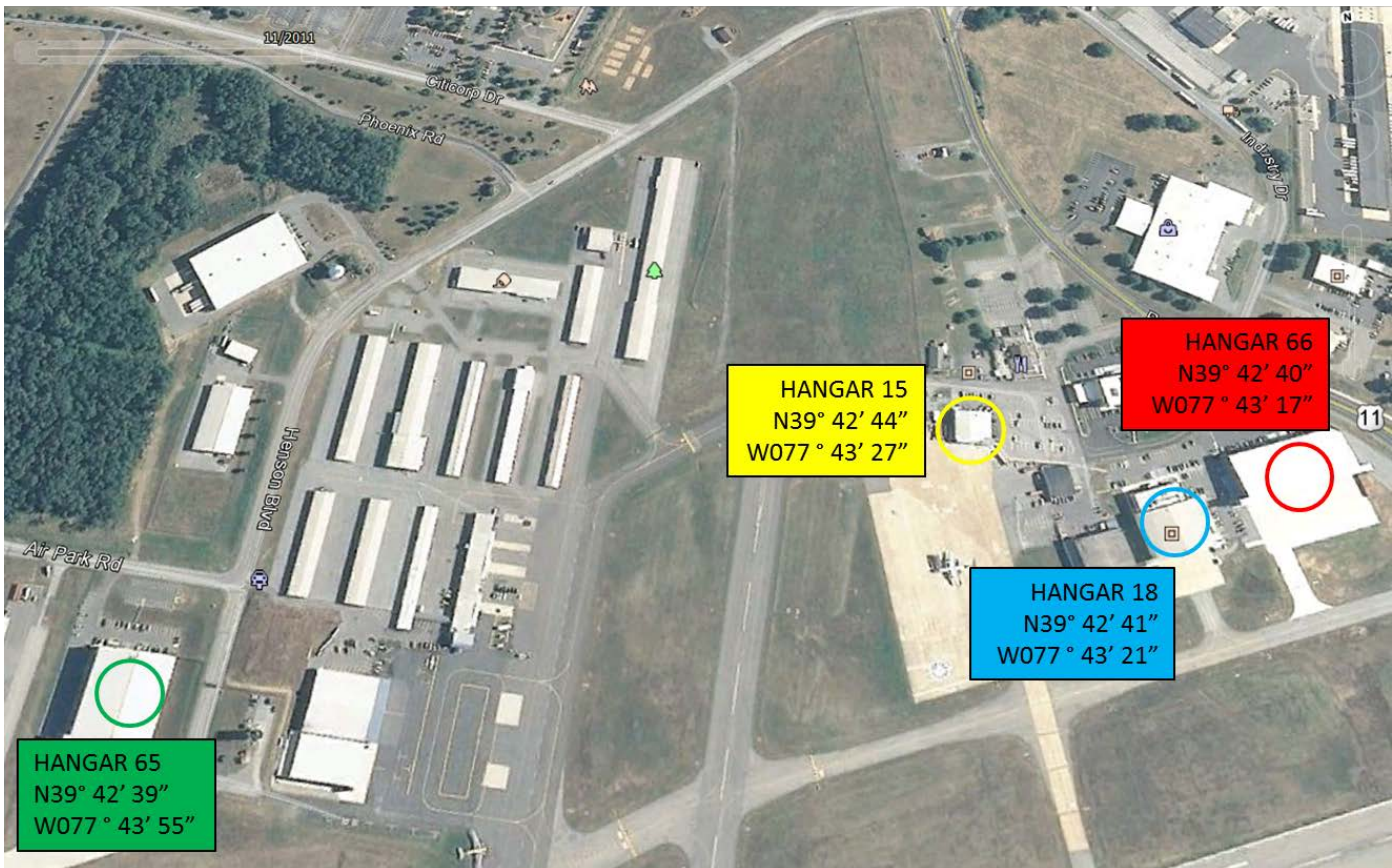
8.3.28 Use of Fixed Devices That Re-Radiate Signals Received From the Global Positioning System

Except as otherwise authorized under Part 7.14, federal agencies and departments may, under the following conditions, operate fixed devices that re-radiate signals received from the Global Positioning System (GPS).

1. Individual authorization is for indoor use only, and is required for each device at a specific site.

This request encompasses four (4) separate hangars shown with coordinates in the illustration below. Re-radiators for these hangars will be located entirely indoors.

GPS INDOOR RE-RADIATOR LOCATIONS – SIERRA NEVADA CORP. – IMS HAGERSTOWN, MD



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.

These re-radiator installations will be used for indoor testing of aircraft navigation systems and mission systems, including EO/IR (Electro-optical/Infrared) turrets and radar inertial reference installations requiring over-the-air GPS RF inputs.

3. Approved applications for frequency assignment will be entered in the GMF.

Understood.

4. The maximum length of the assignment will be two years, with possible renewal.

New license renewal application will be submitted before each two year limit expires.

5. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user.

The areas in which the re-radiators will be operating are entirely under the control of SNC personnel. 115 VAC power switches to the re-radiators will be clearly marked and power will be shut down when re-radiator operation is not required for testing activities.

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.)

Refer to the tabulations in Addendum A below for details. The following equation was used for free space path loss (100 ft from building) in the Excel spreadsheet:

*$Loss_{100} = (20 * \text{LOG}_{10}(\text{Freq.}) + 20 * \text{LOG}_{10}((B21 + 100) * 0.0003048) + 32.44) * (-1)$, where B21 is distance from antenna to wall in feet. Frequency is in MHz.*

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.

KHGR tower personnel will be contacted when systems are in use.

8. The use is limited to activity for the purpose of testing RNSS equipment/systems.

Understood.

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.

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ADDENDUM A: EIRP CALCULATIONS

HANGAR 15 EIRP CALCULATIONS @ 100 FT FROM BUILDING					
COMPONENT	SIGNAL LEVEL	UNITS	MFGR	PART NO.	NOTES
GPS Signal Input	-130.0	dBm	USAF		
Receive Antenna Gain	3.0	dBi	GPS Networking	L1/L2GPSSA-N	
Receive Antenna LNA Gain	40.0	dBm	GPS Networking	L1/L2GPSSA-N	
Coaxial Cable Loss	-1.5	dB	Times Microwave	LMR-400	Loss@1.5 GHz = 5 dB/100 ft.
Lightning Arrester	-0.1	dB	Poly-Phaser	DGXZ+06NFNF	
Stand-Alone LNA	20.0	dBm	GPS Networking	LA20	
Type N to SMA Adapter	-0.2				
In-Line Attenuator	-10.0	dB	Crystek	CATTEN-0100	
Indoor Re-Radiator Antenna	3.0	dBi		L1/L2RRKPA-N	
L1 Path Loss (@100 ft from bldg)	-68.3	dB			
L1 EIRP (external@100 ft from bldg)	-144.1	dBm/24 MHz			
L2 Path Loss (@100 ft from bldg)	-66.2	dB			
L2 EIRP (external@100 ft from bldg)	-141.9	dBm/24 MHz			
Antenna Distance from Outside Wall	30.0	ft			(minimum)
Coaxial Cable Length	30.0	ft			
Indoor Transmit EIRP	-75.8	dBm			

HANGAR 18 EIRP CALCULATIONS @ 100 FT FROM BUILDING					
COMPONENT	SIGNAL LEVEL	UNITS	MFGR	PART NO.	NOTES
GPS Signal Input	-130.0	dBm	USAF		
Receive Antenna Gain	3.0	dBi	GPS Networking	L1/L2GPSSA-N	
Receive Antenna LNA Gain	40.0	dBm	GPS Networking	L1/L2GPSSA-N	
Coaxial Cable Loss	-4.0	dB	Times Microwave	LMR-400	Loss@1.5 GHz = 5 dB/100 ft.
Lightning Arrester	-0.1	dB	Poly-Phaser	DGXZ+06NFNF	
Stand-Alone LNA	20.0	dBm	GPS Networking	LA20	
Type N to SMA Adapter	-0.2				
In-Line Attenuator	-3.0	dB	Crystek	CATTEN-03R0	
Indoor Re-Radiator Antenna	3.0	dBi		L1/L2RRKPA-N	
L1 Path Loss (@100 ft from bldg)	-70.9	dB			
L1 EIRP (external@100 ft from bldg)	-142.2	dBm/24 MHz			
L2 Path Loss (@100 ft from bldg)	-68.8	dB			
L2 EIRP (external@100 ft from bldg)	-140.0	dBm/24 MHz			
Antenna Distance from Outside Wall	75.0	ft			(minimum)
Coaxial Cable Length	80.0	ft			
Indoor Transmit EIRP	-71.3	dBm			

HANGAR 65 EIRP CALCULATIONS @ 100 FT FROM BUILDING					
COMPONENT	SIGNAL LEVEL	UNITS	MFGR	PART NO.	NOTES
GPS Signal Input	-130.0	dBm	USAF		
Receive Antenna Gain	3.0	dBi	GPS Networking	L1/L2GPSA-N	
Receive Antenna LNA Gain	40.0	dBm	GPS Networking	L1/L2GPSA-N	
Coaxial Cable Loss	-6.5	dB	Times Microwave	LMR-400	Loss@1.5 GHz = 5 dB/100 ft.
Lightning Arrestor	-0.1	dB	Poly-Phaser	DGXZ+06NFNF	
Stand-Alone LNA	20.0	dBm	GPS Source	A11	
Type N to SMA Adapter	-0.2				
In-Line Attenuator	0.0	dB	N/A	N/A	
Indoor Re-Radiator Antenna	3.0	dBi		L1/L2RRKPA-N	
L1 Path Loss (@100 ft from bldg)	-72.1	dB			
L1 EIRP (external@100 ft from bldg)	-142.8	dBm/24 MHz			
L2 Path Loss (@100 ft from bldg)	-69.9	dB			
L2 EIRP (external@100 ft from bldg)	-140.7	dBm/24 MHz			
Antenna Distance from Outside Wall	100.0	ft			(minimum)
Coaxial Cable Length	130.0	ft			
Indoor Transmit EIRP	-70.8	dBm			

HANGAR 66 EIRP CALCULATIONS @ 100 FT FROM BUILDING					
COMPONENT	SIGNAL LEVEL	UNITS	MFGR	PART NO.	NOTES
GPS Signal Input	-130.0	dBm	USAF		
Receive Antenna Gain	3.0	dBi	GPS Networking	L1/L2GPSA-N	
Receive Antenna LNA Gain	40.0	dBm	GPS Networking	L1/L2GPSA-N	
Coaxial Cable Loss	-1.0	dB	Times Microwave	LMR-400	Loss@1.5 GHz = 5 dB/100 ft.
Lightning Arrestor	-0.1	dB	Poly-Phaser	DGXZ+06NFNF	
Stand-Alone LNA	25.0	dBm	GPS Networking	LA25	
Type N to SMA Adapter	-0.2				
In-Line Attenuator	-15.0	dB	Crystek	CATTEN-0150	
Indoor Re-Radiator Antenna	3.0	dBi		L1/L2RRKPA-N	
L1 Path Loss (@100 ft from bldg)	-67.2	dB			
L1 EIRP (external@100 ft from bldg)	-142.5	dBm/24 MHz			
L2 Path Loss (@100 ft from bldg)	-65.0	dB			
L2 EIRP (external@100 ft from bldg)	-140.3	dBm/24 MHz			
Antenna Distance from Outside Wall	14.0	ft			(minimum)
Coaxial Cable Length	20.0	ft			
Indoor Transmit EIRP	-75.3	dBm			