Per your earlier email> NTIA Manual sect 8.3.28 states :

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. ***UTSI answer : This device is to be used exclusively indoors***

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. ***UTSI answer: information has been provided in updated attachment as follows : "The system for which this license is being submitted is a GPS repeater which will be used to checkout GPS time and position processing in equipment being flown by UTSI for NASA and NOAA for performing earth observations associated with global climate change and other environmental monitoring applications. As such the application is Experimental RNSS Test Equipment for the purpose of testing GPS receivers. The experiment hardware being developed by NASA Marshall Space Flight Center (contact: Dr Charles Laymon 256-961-7885 charles.laymon@nasa.gov NASA contract # NNM09AB71P) and NOAA Oak Ridge (contact: Mr Ed Dumas 865-576-3500 ed.dumas@noaa.gov NOOA Contract # NA09OAR4600160) either relies on aircraft GPS receivers for time and position or utilizes hardware integral to the experiment for processing this information. It is vitally important to check these systems out before rolling out of the hangar. In many cases the equipment must be installed and tested while the aircraft is partially disassembled and cannot be rolled out of the hangar. The GPS repeater allows these experiments to acquire GPS signals so we can test acquisition of GPS time and position. In these experiments, observations will be made from UTSI aircraft and the location of the aircraft noted by GPS positioning. Time will also be marked by GPS. This will allow comparison of results to other ground based or satellite based observations. . On the aircraft we are testing software that is acquiring GPS time, position and velocity information from a Garmin 530 GPS Receiver and a National Instruments PXI-6682 GPS receiver."***

3. Approved applications for frequency assignment will be entered in the GMF. ***UTSI answer: provided in application,***

4. The maximum length of the assignment will be two years, with possible renewal. ***UTSI answer: provided in application.***

5. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user. ***UTSI answer: hangar is exclusively under UTSI control. Ramp area surrounding the hangar is dedicated to UTSI use.***

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.)
UTSI Answer: This was provided in an attachment. To repeat

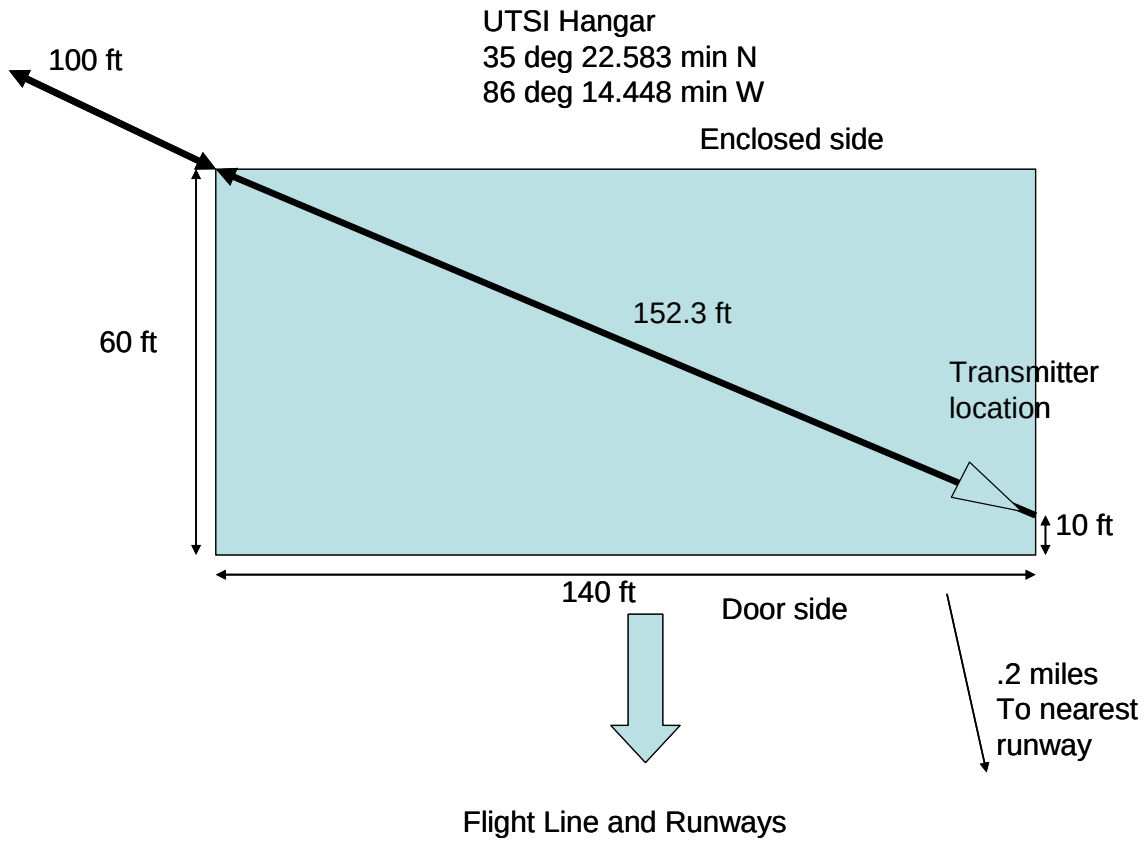
The GPS carrier frequency is 1575 Mhz and the average receive power for the GPS L1 signal in north America is 130 dbm

L1A Active Antenna 35 dB Gain
A11 Amplifier 30 dB Gain
L1P Passive Antenna 3 dB Gain (best case)
LMR 240 Cable Assembly, 50 Feet -5.1 dB loss

After leaving the re-radiating antenna the signal level is =-130dbm+35db (rcv antenna gain)+30 (amplifier gain)+3(passive transmit antenna gain) -5.1 (cable loss) = -67.1 dbm

Free space path loss is given by 20log((4*Pi*d*f)/c) where log is log base 10, d is the distance in feet, f is the frequency in hertz and c is the speed of light in feet per second (9.836*10^8 fps).

At 100 feet this would be a free space path loss of -66.1 db resulting in a signal strength of -133 dbm
At the 153 foot diagonal length of the hangar this would be a free space path loss of -69.8 db resulting in a signal of -137 dbm
At 100 feet beyond the 153 foot diagonal length of the hangar (253 ft) this would be a free space path loss of -74.1 db resulting in a signal of -141 dbm
This meets the NTIA criteria without relying on attenuation in the building.



Flight Line and Runways

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. ***UTSI answer: no users are within 100 ft of building.***
8. The use is limited to activity for the purpose of testing RNSS equipment/systems. ***UTSI answer: System will only be activated for periods of Navigation System testing. It will be powered down during all other times. It is anticipated that this will be less than 16 hours a month, primarily during dayshift hours.***
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. ***UTSI answer: we have provided Stop Buzzer points of contact in an attachment to the application and in an email.***
" In the event of suspected interference from the University of Tennessee Space Institute GPS re-radiator contact any of the following individuals to terminate transmissions:

Mr Greg Heatherly
Chief of Maintenance – UTSI Flight Research
Cell – 931-607-7637
Office – 931-393-7415

Mr Shane Porter – Airframe and Powerplant Mechanic

C615-347-0641

Mr John Muratore
Research Associate Professor
Cell – 832-387-0788

Dr Stephen Corda
Chair, Aviation Systems and Flight Research Department
Cell 661-331-266