

From: Stanton Woodcock

To: Doug Young

Date: February 21, 2017

Subject: Request for Info - File #0020-EX-CN-2017

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Message:

Dear Mr. Doug Young,

This letter is in response to the subject request for information dated 2-14-2017, and is intended to document compliance with Section 8.3.28 of the NTIA Manual by submitting responses to items a, b and e-i of this manual subsection.

a. Individual authorization is for indoor use only, and is required for each device at a specific site. Sensus will install and operate its GPS Source transceiver from a fixed indoor location on the ceiling within its offices in order to re-radiate received GPS signals. The location is 31 feet from the nearest exterior wall. A floor plan with marked location is provided.

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. Sensus intends to utilize the GLI Metro smart GPS amplifier system manufactured by GPS Source in order to perform experimental testing on integrated GPS receivers within Sensus devices. Location and timing data from these GPS signals will be used to perform further experimental testing to validate system designs.

e. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user. Areas beyond the range for potential interference are protected by the maximum power calculation described in f. below, and thus no further record notes are required for frequency assignments. The placement of the GLI Metro smart GPS amplifier system is depicted in the provided floor plan detail. This detail shows the portion of the Sensus facility dedicated to experimental testing. The experimental testing facility is located within a full time Sensus office building and is occupied by Sensus employees and a test manager during system operation. The system will be powered off during evenings and weekends and/or any time the system is not in use.

f. The equivalent isotropically radiated power (EIRP) must be such that the 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 calculation for maximum EIRP shall be based on free space propagation with no allowance for additional attenuation (e.g., building attenuation) as shown below.

$$PT_{max} = PR + 20 \log_{10} f + 20 \log_{10} (30 + d) - 27.55$$

where:

PT<sub>max</sub> is the maximum permissible EIRP in dBm

PR is the power received at 30 meters (100') from the building (i.e. -140 dBm/24 MHz)

f is frequency in MHz (i.e. 1575.42 for L1, 1227.60 for L2, 1176.45 for L5)

d is the distance between the radiator and the closest exterior wall of the building in meters.

PT<sub>max</sub> can then be converted to picowatts by using the formula:  $PT_{max}(pW) = 10(PT_{max}/10 + 9)$

The GLI Metro will be configured via a front panel setting to output -72 dBm in a 24MHz bandwidth on L1.

As a result of this setting, L2 power is automatically configured to 5 dB less, or -77 dBm. Using the free space loss equation with this EIRP output setting, the criteria of -140 dBm/24 kHz is met at or within the 100 feet (30 meters) threshold from the building. Detailed calculations are shown in the file "NTIA EIRP Signal Level Computations.xlsx". Indoor antenna placement is provided in the two files "Sensus Antenna Mounting Location Detail.pdf" and "Sensus Floor Plan - 639 Davis Dr.pdf".

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. Sensus leases and utilizes as office space for its employees all buildings immediately surrounding this test facility location. Sensus will notify all potentially

impacted employees, that GPS information may be impacted for periods of time due to this GPS re-radiation system.

h. The use is limited to activity for the purpose of testing RNSS equipment/systems. The GLI Metro smart GPS amplifier system will be used for the sole purpose of testing Sensus integrated RNSS equipment/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. The Sensus "Stop Buzzer" point of contact for this device is: Frank A. Scaraglino / Sensus RF Engineer  
639 Davis Drive, Morrisville, NC 27560 USA

frank.scaraglino@xyleminc.com

919-317-6365 (o) / 919-379-3824 (m)

If Frank is not available for any reason, a secondary "Stop Buzzer" point of contact is:  
Oliver Bacasse / Sr. Director, International Infrastructure and Smart City  
8601 Six Forks Road, Suite 300, Raleigh, NC 27615

Oliver.Bacasse@xyleminc.com

919 376 2623 (o)

If Oliver is not available for any reason, a tertiary "Stop Buzzer" point of contact is:  
Antonde Branch / Environment/Safety/Security & Facility Coordinator

639 Davis Drive, Morrisville, NC 27560

Antonde.Branch@xyleminc.com

919-317-6393 (o) / 919-576-6185 (m)

As an additional emergency measure, Sensus has purchased and will deploy a Wi-Fi "smart" plug that will allow Frank, Oliver or Antonde to remotely turn off the GPS repeater from their smart phones.

We respectfully request an experimental license in order that we may continue development and testing of these units in our Morrisville, NC facility.

Please contact me if you have any questions regarding this matter.

Sincerely,

/ S /

Stanton B. Woodcock

Spectrum Manager