

Application for Modification of Experimental Authorization
Exhibit 1

1. Introduction

By the instant application (“Application”), General Dynamics OTS (Aerospace), Inc. (“Applicant”)¹ seeks to modify its existing authorization under call sign WQ2XNO to conduct operations at a second location. The additional location is an indoor facility located in Moses Lake, Washington, at 47° 13’ 23.74” N, 119° 18’ 13.33” W.² A directional antenna will be used with the width of the beam at the half power point at 140°, the orientation in horizontal plane at 240° True North, and the orientation in vertical plane at 30° below horizontal.

2. Purpose of the Operation – Description of Research Project

The requested modification will support the development and verification of GPS-enabled navigation systems for various precision guided munitions (PGMs) and related hardware in a controlled laboratory environment. The projects focus on simulating real-world GPS satellite signals indoors to test receiver functionality, signal acquisition, and navigation accuracy without exposure to external variables. Radio communication (GPS signal re-radiation) is not the primary objective but serves as a supporting tool for broader system validation efforts across multiple programs.

The operations will support both internal research and development (IR&D) and government contract activities. These operations include hardware-in-the-loop (HWIL) testing and IR&D efforts to ensure reliable performance of GPS receivers integrated into end products. Radio communication (GPS signal re-radiation) is not the primary objective but serves as a supporting tool for broader system validation efforts across multiple programs.

The requested authorization for the fixed, indoor GPS Source GPSRKL12-P110/3.3 re-radiator (operating on L1 at 1575.42 MHz and L2 at 1227.60 MHz with 30 dB amplification, 3.3V DC output, pass DC input/block DC output, and L1 P passive antenna) is essential to provide stable, simulated GPS signals indoors. In our lab setting, direct satellite signals are blocked by building structures, making outdoor testing impractical for iterative development. The re-radiator captures live outdoor signals via the external antenna and re-transmits them at low-power indoors, enabling precise verification of receiver performance under controlled conditions. Without this, we cannot accurately simulate GPS environments for testing, which is critical for project milestones in PGM navigation system integration.

¹ Applicant’s FCC registration number is 0037967908.

² Due to formatting limitations in the Experimental Licensing System, the application form accepts coordinates only to whole seconds. The coordinates in this narrative reflect a more precise site location; any discrepancy is solely the result of rounding in the form.

Existing facilities, such as standard GPS simulators or outdoor test ranges, are inadequate for our needs. GPS simulators generate synthetic signals but do not replicate live satellite constellations with real-time variations (e.g. multipath or atmospheric effects), leading to incomplete validation. Outdoor testing is logistically challenging, weather-dependent, and exposes sensitive hardware to uncontrolled environments, increasing the risks and costs. Our lab lacks RF-shielded enclosures (Anechoic Chamber) that would exempt licensing, and no alternative low-power indoor solutions provide necessary live-signal fidelity without re-radiation. Thus, the requested facilities are required to advance programs efficiently and safely.

3. Waiver of Station ID Requirements

A waiver of the Station ID requirements of 47 CFR §5.115(a) is respectfully requested.

4. Government Contract

As explained above, the operations will support both IR&D and government contract activities.

Accordingly, it is requested that:

- The Commission grant the license with an “XT” Station Class
- The Commission not include a Special Condition limiting operations to contract support

With respect to the contracts being supported, the following information is provided:

Customer/Agency: US Army
Contract No: W15QKN-18-9-1008 DOTC-19-04-INIT4268
USG POC: Greg Rodebaugh, 973-396-6181

5. Stop Buzzers

The following will be available by wireless telephone and will act as the “stop buzzer” if any issues arise during testing:

Bothell location: **Eric Thome**
(206) 455-4238

Moses Lake location: David Gindhart
(509) 771-7946

6. Responses to Items Listed at 8.3.28 of the Manual of Regulations and Procedures for Federal Radio Frequency Management

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).

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

Applicant: Yes, understood

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.

Applicant: Yes, understood – the Station Class will be assigned by the FCC based on the information provided by Applicant.

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

Applicant: Yes, understood – This is not an action item for Applicant – Applicant assumes this will be addressed by the relevant agencies.

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

Applicant: Yes, understood – The license is being requested for a 2 year term

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.

Applicant: Yes, understood

f. The 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.

$$P_{Tmax} = P_R + 20 \log_{10} f + 20 \log_{10} (30 + d) - 27.55$$

Where: P_{Tmax} is the maximum permissible EIRP in dBm
 P_R is the power received at 30 meters 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.

P_{Tmax} can then be converted to picowatts by using the formula: $P_{Tmax(pW)} = 10^{\left(\frac{P_{Tmax}}{10} + 9\right)}$

Applications requesting power greater than the P_{Tmax} calculated at $d = 0$ meters (i.e. 39.3 pW for L1, 23.8 pW for L2, and 21.9 pW for L5) must provide the distance from the transmit antenna to the nearest exterior wall so that reviewing agencies can determine if the requested power meets the maximum EIRP described above.

Applicant: See "Attachment 1" for demonstration of EIRP levels.

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.

Applicant: Yes, understood

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

Applicant: Yes, understood

i. A "Stop Buzzer" point of contact for the authorized device must be identified and available at all times during GPS re-radiator operations.

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(206) 455-4238

Moses Lake location: David Gindhart
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7. FAA Coordination

Applicant completed FAA coordination for the Bothell location and has initiated FAA coordination for the Moses Lake location. Applicant will supplement the file with the concurrence when it is received.

Attachment 1

GPS Re-Radiation Network Radiate Power Analysis

Below, please see Applicant's demonstration of compliance with GPS re-radiation requirements set forth in section 8.3.28 of the NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management.

The figure below is provided by the manufacturer GPS Source:

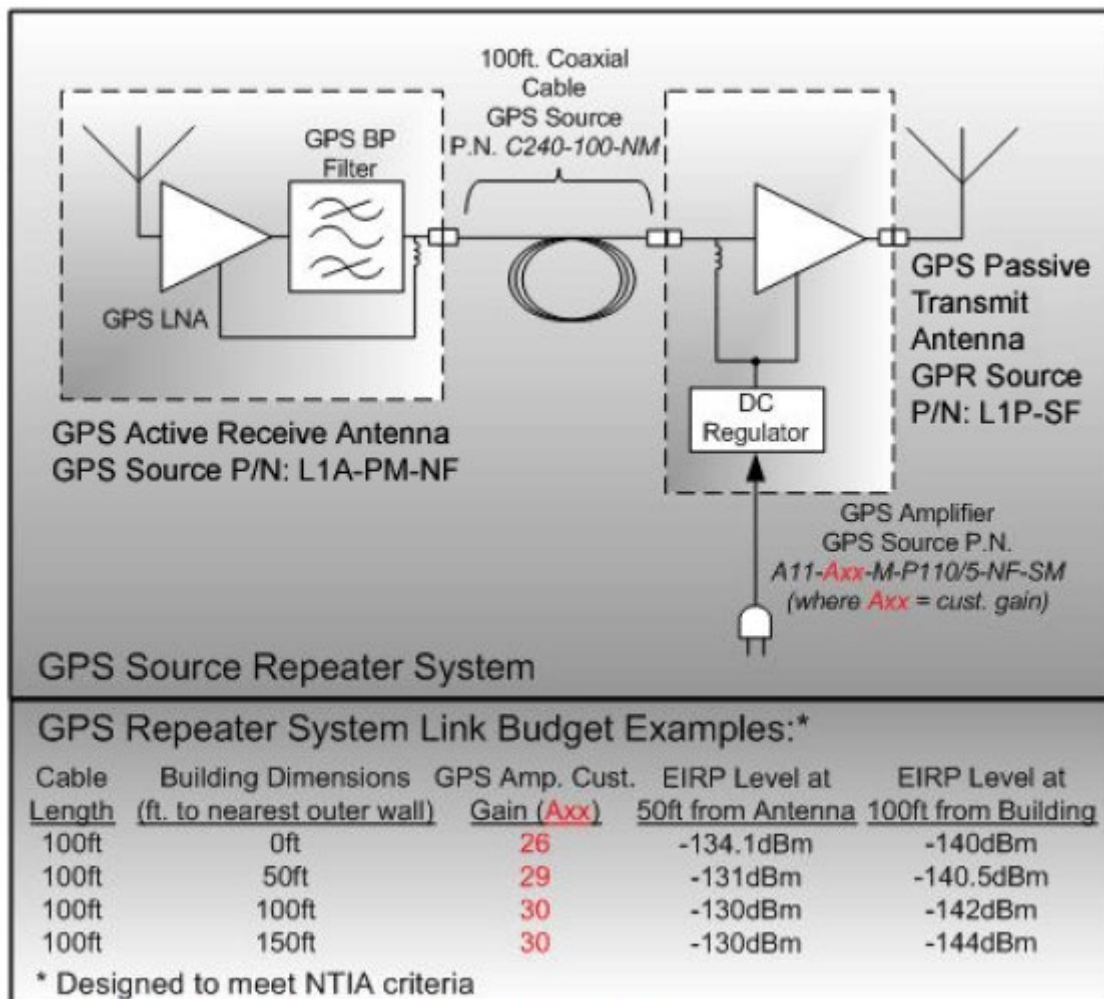
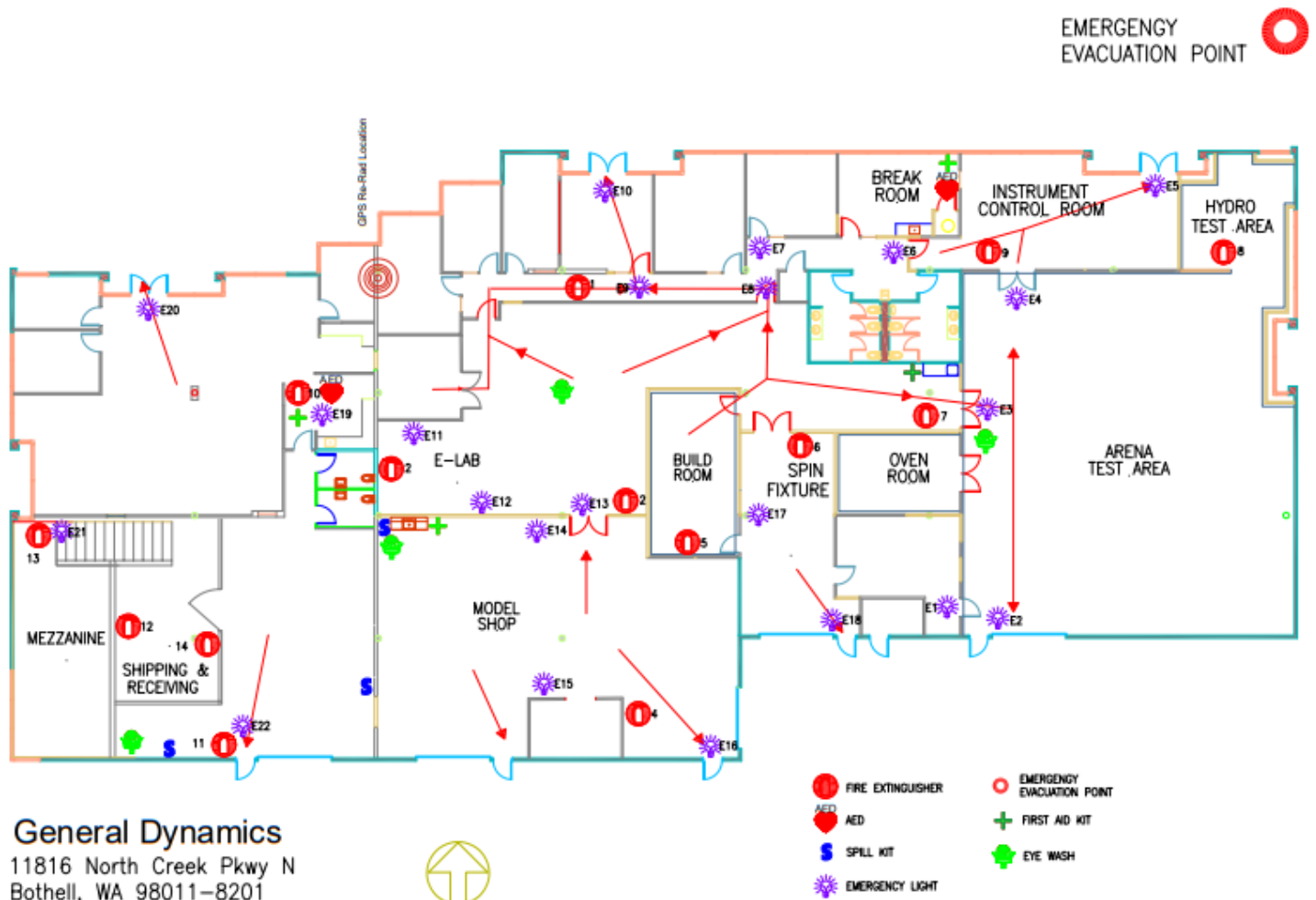


Figure 1. GPS Source typical Repeater System

Bothell Location Site Diagram



Moses Lake Location Site Diagram

