World View Enterprises Experimental License STA Application File No.: 0803-EX-ST-2022

# Explanation of Experiment and Need for STA

### <u>Company Description/Overview:</u>

World View, a Tucson, Arizona based company, was founded to build and launch stratospheric, lighter-than-air balloons carrying a range of payloads. See Figure 1 below for an image of a Stratollite. World View's customers range from the US Department of Defense to private citizens to commercial enterprises looking to take advantage of a platform that can bring them to the edge of space.

World View is seeking this authorization to operate radios that carry telemetry payload data from its stratospheric balloon during a demonstration mission being conducted for the US Army.

### Need for an STA:

The operations proposed in this application are for a short-term demonstration for a DoD customer. The planned demonstration will last 77 days, and so an STA is appropriate.

# Technical Synopsis:

- Spectrum requested: 2400-2483.5 MHz, center frequency between 2410-2473 MHz
- Power levels:
  - uplink: 20 W output power with 3.86 kW ERP
  - o downlink: 20 W output power with 193.3 W ERP
- Time of use: ground testing just a few hours, airborne only during flight
- Balloon will operate at 50,000 to 80,000 feet
- Emissions: 20M0F1D, 2M50F1D, 4M00F1D, and 8M00F1D

# **Description of Operations:**

World View is seeking authorization for operation of a data link system to transmit information between its Stratollite balloon and a mobile ground station that tracks the balloon while it is in flight. The proposed test flights will operate in and around the northwest coast of the US and over Puget Sound.

This demonstration flight is intended to give the DoD customers an opportunity to see how a stratospheric balloon can perform delivering persistent remote sensing information.



Figure 1. World View Stratospheric Balloon

Data link transmissions - downlink: The balloon will be launched from Camp Rilea on the Oregon coast near Astoria. It takes less than 30 minutes for the balloon to reach its operational altitude of 50,000 or above. After the launch, the data link will be in use through the flight. Given the altitude of the balloon, 10 miles or more from earth, the signal at ground level will be very low. The estimated receive signal strength if the balloon is flying at 50,000 – it's lowest operational altitude – will be 124 dB lower than the ERP on the stratollite, or -72.14 dBm (less than 100 pW.)

The data link transmitter is a Silvus radio that offers a high data rate for the transfer of imagery, in a radio format that is lightweight and does not have a high power requirement. These factors are essential to the proper functioning of a lighter-than-air aircraft. To ensure that the operations remain in the requested spectrum band, the center frequency used for any transmission will be in the range 2410-2473 MHz. As a result, if the radio uses a 20 MHz wide emission, all radio operations will remain in the band 2400-2483.5 MHz.

The ground station antenna is a high-gain, directional antenna. The manufacturer's antenna patterns are shown in Figure 2, below. The RF energy will be directed up to the balloon, and there will be little energy in the side lobes. This will minimize the chance of the transmitter having any effect on other operations. This radio link is expected to be a downlink primarily.

<u>Datalink transmissions – uplink:</u> The Silvus radio system will be used occasionally to send tasking orders up to the balloon. These transmissions are expected to be brief, small data files with instructions. As a result, the Silvus radio transmitter will be in use only for a few minutes for each transmission. World View expects to send these sorts of transmissions only a few times each day. Thus, the uplink radio use will be very limited. Because the uplink antenna is a high-gain, narrow beamwidth antenna, World View does not anticipate that the uplink transmissions will affect any other spectrum users.



Figure 2. Ground station antenna patterns for use with Silvus radio

The Silvus RF link is only be used once the balloon is at altitude, between 50,000 and 80,000 feet to send payload data to the ground station. World View continues to work with vendors to identify alternative radios that could be used to deliver the same performance with a mass and power requirement that the stratollite can support.

Areas of Operation: see Figure 3 below:

Areas over the eastern Pacific Ocean Portions of Washington State Portions of Oregon



Figure 3. Proposed area of airborne demonstration operations

The red circle above is a 200 nm radius around the launch site at Camp Rilea in Astoria, Oregon. The hand-drawn purple outline shows the anticipated area of operations, which will remain in the US, covering Puget Sound, the Pacific Ocean west of Washington and Oregon, and some portions of both of those states. The current demonstration plan is for most of the demonstration to take place when the stratollite is over water – either Puget Sound or the Pacific. Because of the variability of wind conditions, World View is requesting authorization to operate across the whole outlined area.

<u>Ground Station Operation Area:</u> To optimize the functioning of the radio systems, World View has built a mobile command center that uses a directional antenna to track and receive telemetry information from the transmitter on the Stratollite. *Figure 4* below shows the area in which the mobile ground station might operate. The current demonstration plan is to have the ground station operating at the launch site – Camp Rilea in Astoria, Oregon, on the coast. However, for better communications coverage when the balloon is over Puget Sound, the ground station may be moved to Port Angeles, Washington. World View is requesting that the ground station operations be mobile to allow for some flexibility to adjust to the circumstances, allowing it to conduct the best possible demonstration of the technology. In the event that the ground station is moved to operate some place other than Camp Rilea or Port Angeles, it would be some place on the coast. That is why World View is requesting authorization for the ground station to operate in the purple outlined area shown in *Figure 4*.



Figure 4. Ground station proposed area of operations

Proposed area of ground operations is bounded by:

Port Angeles: 48-08-46 N, 123-25-03 W Neah Bay (northwest point): 48-23-35 N, 124-44-27 W Oregon Coast (southern point): 44-45-22 N, 124-03-58 W

### Minimization of risk of interference:

To minimize any potential interference, World View has worked to design a system that puts the most gain into the receive antenna rather than adding power to the transmitter on the balloon.

### Limited Time of Use:

World View is seeking an authorization for approximately 2.5 months of operations: June 15, 2022 to August 31, 2022.

### Stop Buzzer Point of Contact:

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### Conclusion:

World View continues to develop its stratospheric balloon platform for a range of government and an emerging sector of commercial customers. As part of the development of the balloon and the business case, World View needs to demonstrate its capabilities to US government customers. The proposed demonstration will allow World View to show its potential customers the distances and throughputs it can achieve in imaging. This is essential to the growth of the industry and, in particular, to the growth of this company.

If there are any questions about this application, please contact Anne Cortez, WFS, 520-360-0925 or <u>alc@conspecinternational.com</u>.