

World View
Experimental STA Application
File No.: 0918-EX-ST-2020

Explanation of Experiment and Need for STA

Company Description/Overview:

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 a radio system that will carry telemetry data from its stratospheric balloon during its mission. World View recently was granted an experimental STA for operations in Arizona and New Mexico, WQ9XLF. Those operations are technically identical to those requested here; World View's customers are requesting that World View demonstrate the effectiveness of its Stratollite® platform over more complex terrain using this radio system. Therefore, this application requests authorization to operate across the western US.

This work is a combination of IRAD and federal contract work: Contract number: 80AFRC18D0005.

Need for an STA:

World View has recently purchased a new radio system for this testing. It has some customer missions scheduled in late 2020, and it needs to integrate the radio system into the Stratollite and test its operations as soon as possible to ensure proper operation before the customer missions. As noted above, the customers want to test results across varied terrain. Therefore, testing needs to start as soon as possible. For that reason, World View is seeking this STA.

Technical Synopsis:

- Spectrum requested: 2360-2483 MHz, with 20 MHz bandwidth
- Power levels:
 - Downlink: 8 W MIMO operations, with 5 dBi gain, ERP 15.4 W
 - Uplink: 8 W with 24dBi gain highly directional (7 deg beamwidth) dish antenna with a direct focus (autotrack) towards the elevated platform, ERP 1225.3 W
- Limited time of use: airborne use is only during flights, which are sporadic

- Balloon will operate at 50,000 to 75,000 feet

Description of Operations:

World View is seeking authorization for operation of a data link system to transmit information from its Stratollite to a mobile ground station that tracks the balloon while it is in flight. The proposed test flights will operate across the western US, as depicted in Figure 2, below. This is the identical geographic area for which World View holds a license to operate other radios, WJ2XNH.

The radios will be tested to see how far the radio links will reach while delivering reliable information, and the radios will be tested to determine the speed of the data transmissions that can be achieved across various distances. This testing will give World View better information about how to configure its technology to deliver performance to its customers.

Data link: After the launch, the data link will be in use during the desired transmission periods. The downlink will be used to transmit high-resolution imagery and other telemetry data from the balloon to the ground station. The downlink will use the 2360-2483 MHz radio to transmit at 8 watts, with an ERP of 15.4 watts. Given the altitude of the balloon, which will be 10 miles or more from earth, the signal at ground level will be very low. Data uplink will also use the 2360-2483 MHz radio to transmit at 8 watts, with an ERP of 1225.3 W confined to a 7 deg beamwidth cone centered in the direction of the aerial vehicle.



Figure 1. World View Stratospheric Balloon – Stratollite®

Area of Operation: Area of Operation: Sixteen states and the Texas panhandle, listed here, and see *Figure 2* below:

Washington
Oregon
California
Arizona
Nevada
Utah
Idaho
Montana
New Mexico
Colorado
Wyoming
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Part of Texas panhandle



Figure 2. Proposed area of operations

(The red outline above is illustrative only, the area requested is defined by the state boundaries, and the southern boundary should run along the US boundary with Mexico from New Mexico west across California.)

To optimize the functioning of the radio systems, World View has built a mobile command center that helps it to communicate with the balloon when it is in flight. The mobile command center carries both the command and control uplink and the telemetry link radio systems. World View is planning to send the command center out to track the balloon during the operational phase of this project. That aspect of the testing will explore the distances that the radios can cover and the radius of coverage that the balloons can offer.

The Stratollite movement is controlled by upper atmosphere wind patterns, so each flight will be somewhat different. The large area of proposed operations will allow World View to fly over varied and complex terrain, which will test the capabilities of the technology so that the company can work to optimize its operations.

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.

Limited Time of Use:

World View will only use this license, and the spectrum requested here, during its Stratollite flights. Those are intermittent, lasting from a few hours to a few days. Then, the company will prepare for a next launch. It is expected that the spectrum will be in use for only about 30% of the time, and then, the ground station will be operating only in the area right below the Stratollite. So, while the apparent area of operations is large, operations will be very localized at any time, and often there will be no spectrum use in a particular area.

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 in the Stratollite. The uplink design is highly directional. This is expected to minimize the prospect of any interference. Further, because the radios use a MIMO technology, they use spectrum very efficiently, which helps to minimize interference. The antenna gain incorporated at the Stratollite level is intended to minimize the footprint of the signal on the ground.

While the Stratollite will operate at a very high elevation, because it is below orbit, its footprint will be far more limited than satellites operating on the same spectrum.

Further, the signal level proposed should attenuate significantly due to free space pathloss before the signal reaches the ground. This will also minimize any potential for the signal to cause harmful interference to any licensed operators.

Stop Buzzer Point of Contact:

Greg York
World View
713-824-3836
gregory@worldview.space

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, World View needs to extent testing of a new radio system to determine what can be achieved over distances and varying altitudes and complex terrain. The proposed testing will allow World View to expand its experimentation to cover much greater

distances, allowing more adaptations for weather and allowing study of the effects of distance on radio throughput and transmit speeds. Federal Contract number for this experimentation is: 80AFRC18D0005.

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