

World View
Experimental License Application
File No.: 0158-EX-CN-2018

Explanation of Experiment

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. 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 number of radio systems that will carry telemetry data from its stratospheric balloon and deliver command and control signals to the balloon during its mission. To prepare properly for a safe launch and operation, this application also seeks authorization for ground-based testing prior to the launch.

Technical Synopsis:

- Spectrum requested: Command and Control only: 902-928 MHz; Telemetry 2.402-2.478 GHz and command uplink use also
- Power levels: C&C – 1 watt, with high gain yagi antenna, telemetry: 10 W downlink
- Limited time of use: testing will take place for approximately 3 hours per day
- Balloon will operate at 65,000 to 80,000 feet
- Radio operations are directional

Description of Operations:

World View is seeking authorization for operations across the western United States to accommodate a number of experiments. The company is working to develop a variety of communications tools that will allow it to stream video and data from its stratospheric balloons to its control stations.

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 much better information regarding how to configure its technology to deliver performance to its customers.

Downlink: After the launch, the 2.4 GHz downlink will be in use during the desired transmission periods. These are around Sunrise, mid-day, and Sunset for approximately 1 hour each. During those 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 2.4 GHz radio system to transmit at 10 watts, with an ERP of 20.2 watts. Given the altitude of the balloon, which will be 13 miles or more from earth, the signal at ground level will be very low

Command and control uplink: Command and control instructions will be transmitted to the off-site, remote test radios over both a 902-928 MHz link and over the 2.4 GHz link. Both of these radio systems are modified off the shelf systems. The 900 MHz link employs a Yagi antenna with 14 dBi of gain to communicate with the balloon to provide reliable communications for the safety of operations. The 2.4 GHz radio on the ground will use the higher gain tracking dish antenna to reach the balloon payload. This uplink will have an ERP of 3.7 kW, using a highly-directed antenna. While normally each radio system would operate under the provisions of Part 15 Section 15.247 of the Commission's Rules. With the addition of the higher gain antennas, the systems exceed the limited ERP and the radio links need to be licensed for this use. Because the systems use high gain antennas, pointed up to the stratospheric balloon, and the radios are listen-before-transmit, the chances of interference in this band are very low.



Figure 1. World View Stratospheric Balloon

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

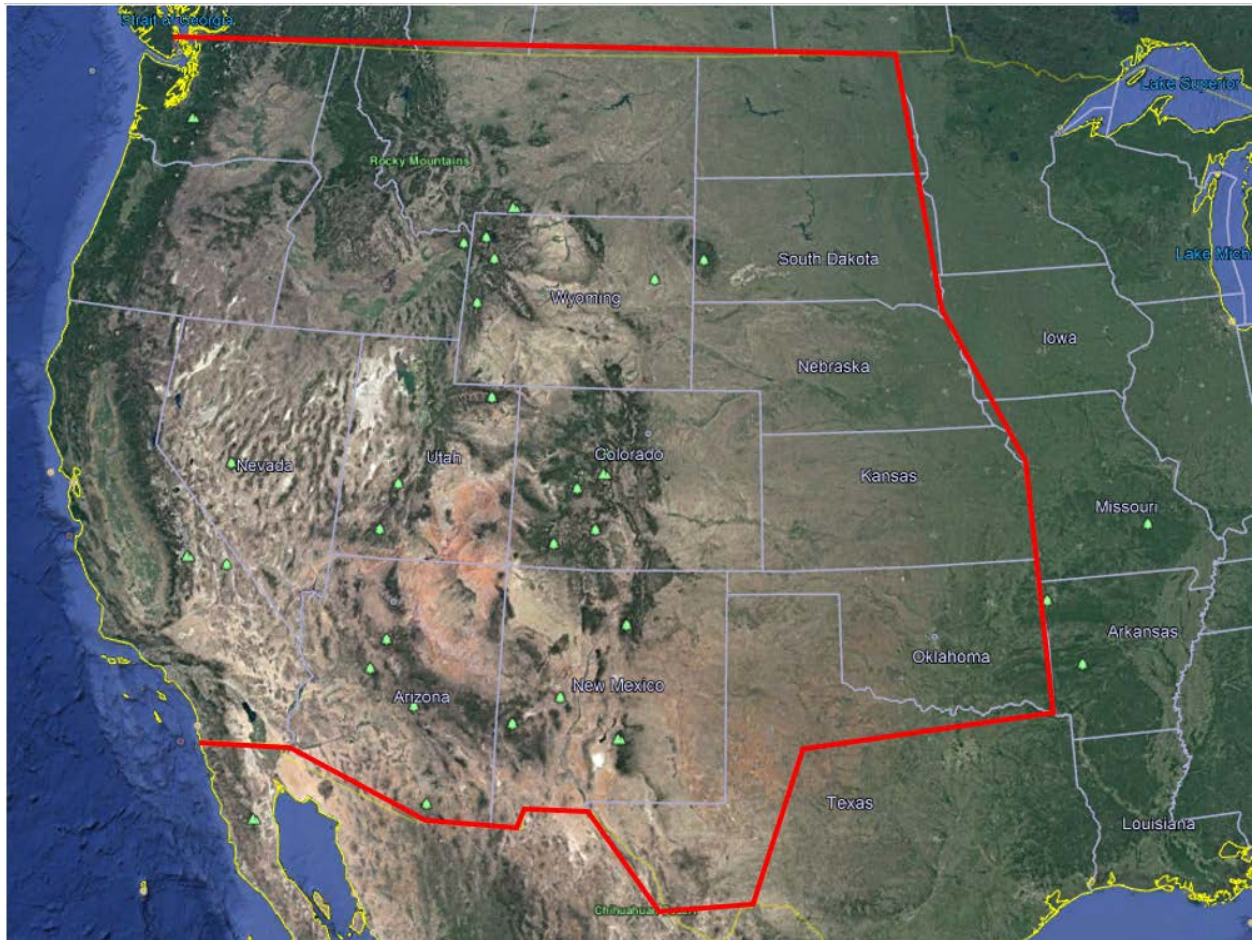


Figure 2. Proposed area of operations

(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. The testing will explore the distances that the radios can cover and the radius of coverage that the balloons can offer.

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. Additionally, these radios are all listen-before-transmit. They will find a clear channel before sending information, mitigating any potential interference to other users of the spectrum.

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, World View needs to test various radio configurations to determine what can be achieved over distances and varying altitudes. 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.

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