

World View  
Experimental License Modification Application  
Call Sign: WJ2XNH  
File No: 0052-EX-CM-2020

## **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 sought and obtained a license, WJ2XNH to deliver telemetry information from its Stratollites ®. This application seeks authorization to add a command and control radio link that will allow commands to be sent and received to and from a control station on the ground when the Stratollite is in use. The license is also used to prepare properly for a safe launch and operation using ground-based testing prior to the launch.

### **Technical Synopsis for Modification:**

- Spectrum requested: Command and Control 902-928 MHz;
- Power levels: C&C – 1 watt, with high gain yagi antenna;
- Limited time of use: testing of the airborne system will be only 3 hours per day when in flight. Flights will be scheduled sporadically, and weather permitting

### **Description of Project:**

World View has been developing a platform that may be able to deliver advanced aerial surveillance and earth imaging from the stratosphere. The Stratollite platform also offers opportunities for scientific testing, sensing, and aerial monitoring of wind patterns and climatic conditions. The technological development of a system operating from the stratosphere requires extensive testing to ensure that the performance of the technology meets requirements, including imagery performance, safety standards, and a range of other criteria.

This application seeks to add a command and control link to the testing operations conducted under WJ2XNH. This command and control link will give World View a better opportunity to direct operations of devices on the Stratollite while the balloon is in flight, and it will provide redundancy that will enhance the safety of flight.

See Figure 1 below for an image of World View's stratospheric balloons.



*Figure 1. World View Stratospheric Balloon*

Once the stratollite is successfully launched, it will ascend to and operate between 65,000 and 80,000 feet. For most operations, the balloon will float over the surrounding Tucson region. The license being modified allows a greater geographic area for operations. When the balloon is in flight, the ground stations will drive to stay as nearly below the balloon as possible to ensure the success of the operation. That mobile ground station will operate the 902-928 MHz command and control link. Experimentation with the balloon and communication systems technology, is subject to stratospheric wind conditions. The typical flight duration can be up to 10 days, although it is often only 4-5 days.

The command and control link will be used for testing regularly at World View's headquarters in Tucson. It will only be used across the rest of the licensed area occasionally when the Stratollite flights are taking place.

#### Ground testing:

In preparation for future flights, World View will continue system integration testing at and near its facilities in Tucson, Arizona. These tests will start indoors in the World View

building. After the first testing in the laboratory to test the radios on the bench, World View is planning a local test to mimic the operation of the communications systems when the balloon is in flight.

900 MHz 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 already-licensed 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 used for ground testing to the remote system will use the higher gain tracking dish antenna to reach the balloon payload.

Normally the radio system that is the subject of this modification application would operate under the provisions of Part 15 Section 15.247 of the Commission's Rules. However, with the addition of the higher gain antenna, the system exceeds the ERP limits, and so the radio link needs to be licensed for this use. The radio uses a listen-before-transmit technology, which minimizes the chances of interference to other users of radios in this band.

#### Operational Mission - balloon flights:

World View is planning to use this license for numerous test flights over the next 24 months to move its business forward to develop expertise in the integrated radio and telemetry communications needed for its future commercial flights.

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. Because the system uses a high gain antenna, pointed upward to the stratospheric balloon, and the radios are listen-before-transmit, the chances of interference to other users of radios in this band are very low.

#### Area of operations:

Site 1: Ground-based testing at the World View headquarters in Tucson. Here, testing will be conducted indoors as part of the systems integration effort. The radios will be turned on and tested to ensure that they are operating properly. The time of use is expected to be only a few minutes per day for the first week of work. Figure 2 below shows Spaceport Tucson adjacent to the World View facility.



*Figure 2. Spaceport Tucson & World View's Facility*

Site 2 – Mobile Operations: This is the operational phase of the project. All operations will be mobile. World View has some control over the trajectory of the balloon in flight, and it can assure operations within a limited radius. All operations will be conducted in US airspace.

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. While the mobile command center will stay on major US roadways, it will aim to be as close as possible to operating directly below the balloon as possible. This helps to ensure that the communications links using directional antennas perform at their best. The antennas on the balloon are not steerable, making it important for the mobile command center to be as close to below the balloon as possible.

Because of the nature of this project, the area of operations describes where the operations could be. It is important to note that within that area, the radios will be in use in a very localized spot and move as the balloon moves. The radios will never be in use across the whole area at the same time. The spectrum use is only local.

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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Summary and Conclusion:

World View is seeking to modify its experimental license to add a 902-928 MHz command and control link. This link will offer improved command and control to the experimental operations of the Stratollite balloon, and it will enhance the safety of operations.

For additional information or if there are any questions regarding this application, please contact Anne Cortez at [alc@conspecinternational.com](mailto:alc@conspecinternational.com) or 520-360-0925.