

## **UAS Development**

Submitted by Joel Thorsheim on behalf of Insitu  
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### **Why an Experimental License is Necessary:**

An experimental license is required to support development and testing of the UAS communications data link architecture. This request is being submitted in lieu of an extension request for a Special Temporary Authority authorization issued under Call Sign WK9XYZ and will replace it.

### **Operation Description:**

The operation involves experimentation using a Common Data Link (CDL) systems that will be used as the communications data link for a UAS. The initial phase of the experimentation will require ground testing of the data link from the UAS terminal to a ground control station terminal. During this phase of the testing the aircraft terminal equipment will be operated on the ground at Bingen, WA. The UAS communications terminal will transmit in the CDL mobile band (14400 – 14830 MHz), and the fixed ground control terminal will transmit in the CDL fixed band (15150 – 15350 MHz). No mobile air operations are required for the initial phase, and all communications tests will be conducted within the requested areas of operation.

Follow-on testing will include actual mobile air to fixed ground station operations, and is anticipated to be conducted at Boardman Bombing Range, OR. Flight testing will demonstrate communications capability from ground to 10,000 feet.

Table (1) lists the aircraft terminal specifications, including frequency band of operation, transmitter output power, emissions, antenna types and gains, as well as maximum ERP. Figure (1) is a diagram of the aircraft terminal configuration.

| <b>Frequency Data</b>     |                                          |
|---------------------------|------------------------------------------|
| Transmit                  | 14400 – 14830 MHz                        |
| Receive                   | 15150 – 15350 MHz                        |
| <b>Transmitter Data</b>   |                                          |
| Transmitter Model         | Mini CDL 200                             |
| Transmitter Manufacturer  | L3 Communications                        |
| Transmitter Power Output  | 2.5 Watts                                |
| <b>Antenna Data</b>       |                                          |
| Bicone Antenna            | 5 dBi Gain Omni                          |
| Bicone Antenna ERP        | 5 Watts                                  |
|                           |                                          |
| Hemispherical Antenna     | 3.8 dBi Gain Omni                        |
| Hemispherical Antenna ERP | 4 Watts                                  |
| <b>Emission Data</b>      |                                          |
| Emissions                 | 800KG1D<br>8M00G1D<br>21M4G1D<br>42M8G1D |

**Table 1 – Aircraft Terminal Data**

Table (2) lists the ground terminal specifications, including frequency band of operation, transmitter output power, emissions, antenna types and gains, as well as maximum ERP. The ERP calculation takes into account various system losses between the transmitter output and antenna feed. Figure (2) is a diagram of the ground terminal.

| <b>Frequency Data</b>          |                                          |
|--------------------------------|------------------------------------------|
| Transmit                       | 15150 – 15350 MHz                        |
| Receive                        | 14400 – 14830 MHz                        |
| <b>Transmitter Data</b>        |                                          |
| Transmitter Model              | Mini CDL 200                             |
| Transmitter Manufacturer       | L3 Communications                        |
| Transmitter Power Output       | 2.5 Watts                                |
| <b>Antenna Data</b>            |                                          |
| Bicone Antenna                 | 5 dBi Gain Omni                          |
| Bicone Antenna ERP             | 5 Watts                                  |
|                                |                                          |
| Hemispherical Antenna          | 3.8 dBi Gain Omni                        |
| Hemispherical Antenna ERP      | 4 Watts                                  |
|                                |                                          |
| 1.2 Meter Directional Dish     | 8 Watts + 41.1 dBi                       |
| 1.2 Meter Directional Dish ERP | 83,000 Watts                             |
|                                |                                          |
| <b>Emission Data</b>           |                                          |
| Emissions                      | 800KG1D<br>8M00G1D<br>21M4G1D<br>42M8G1D |

**Table 2 – Ground Terminal Data**

Table (3) lists the locations/areas of operations, as well as the station class of the operation.

| City                   | State | Latitude  | Longitude  | Radius (KM) | Station Type |
|------------------------|-------|-----------|------------|-------------|--------------|
| Bingen                 | WA    | 45-42-23N | 121-27-29W | 5           | Fixed/Ground |
| Boardman Bombing Range | OR    | 45-44-54N | 119-47-38W | 2           | Fixed/Ground |
| Boardman Bombing Range | OR    | 45-44-54N | 119-47-38W | 50          | Mobile/Air   |

**Table 3 – Location Data**

**Operation Period:**

Start Date: October 1, 2017

Stop Date: September 30, 2019

**Stop Buzzer POC:**

Stop Buzzer for this operation is Insitu Operations Action Center at 509-493-4691.