

## **APPENDIX 2 - Areas of Opportunity for Allied Organizations**

### **1.1 AOC COMPETITION FLIGHT RANGE**

The competition flight range for the UAS AOC will be required to have an active Certificate of Authorization (CoA) from the Federal Aviation Administration (FAA) or to be located in restricted airspace. The proposer should have experience facilitating routine UAS flights on their range and have operations and safety policies in place and publicly available.

#### **1.1.1 AOC COMPETITION FLIGHT RANGE REQUIREMENTS**

1. Provide a flight range that can support the simultaneous flight of five or more unmanned aircraft, operating in adjacent geo-fenced areas that may span several kilometers.
2. Appropriate facilities to house competitor aircraft and equipment, for protection from weather and to support pre-flight preparation and testing (for both electric and combustion powered aircraft).
3. Documented flight range restrictions and policies that competitors must follow.
4. Appropriate facilities to support public viewing of competition and to support press coverage during the competition.
5. Internet connectivity for competition personnel, competitors, and press (should include commercial cellular data availability).
6. Weather forecasting and monitoring to assure conditions are compliant with competition and flight range guidelines.
7. Infrastructure and personnel to respond appropriately to aircraft crashes, chemical releases, fires, and injuries.
8. Provide spectrum management services to verify that the competitors, Traffic Squadron, and Ghost Squadron do not experience issues with RF interference.

### **1.2 COMPETITOR QUALIFICATION**

Prior to participating in AOC competition flights, a competitor's aircraft, ground control station, and flight crew operational procedures must be verified as compliant with AOC final rules and compliant with restrictions that are conditional to use of the competition flight range.

#### **1.2.1 COMPETITOR QUALIFICATION REQUIREMENTS**

1. Inspect competitor aircraft and supporting documentation to verify or establish flightworthiness and compliance with competition restrictions.
2. Verify that the competitor has properly provisioned the aircraft for safe operations using the Competition Furnished Global Positioning System (CFGPS) and uses the CFGPS as its only source of GPS data for navigation.
3. Verify that competitors operate their vehicles in accordance with competition and flight range rules through the use of a Hardware-in-the-Loop simulation.
4. Develop and administer written tests to assure that competitors fully understand safety requirements of the competition and the flight range.
5. Monitor competitor performance during competition flight operations to detect violations of either safety guidelines or competition rules that may result in disqualification.
6. Verify that competitors have the proper liability insurance.

### **1.3 UAS TRAFFIC SQUADRON**

Simultaneously operating multiple unmanned aircraft that have multi-hour endurance and can be dynamically tasked and coordinated in flight is a critical component of the UAS AOC. The contractor should have documented experience operating multiple unmanned aircraft that incorporate custom control software and allow for precise coordination of 4 Dimensional Trajectories (4DT) between vehicles.

### **1.3.1 UAS TRAFFIC SQUADRON REQUIREMENTS**

1. The ability to routinely operate four or more unmanned aircraft, simultaneously.
2. Fly Traffic Squadron aircraft that have more than three hours endurance.
3. Fly Traffic Squadron aircraft for up to six hours per day, for multiple consecutive days
4. Safely operate Traffic Squadron aircraft at ranges of up to 5 km.
5. Fly Traffic Squadron aircraft that can accurately fly an assigned 4DT while consistently maintaining less than 1 sec errors in waypoint arrival times and less than 5 meter errors in waypoint miss distance.
6. Dynamically assign 4DTs to aircraft in flight.
7. Synchronize the Traffic Squadron 4DTs with each other, challenge competitors, and Ghost Squadron.
8. Fly Traffic Squadron aircraft that incorporate ADS-B out onboard.
9. Log flight trajectory data for each Traffic Squadron aircraft and report it to competition judges while vehicles are still in flight, to support competitor scoring
10. Operate aircraft that stay within a dynamically assigned geo-fence in all situations, including lost link and stray waypoint cases
11. Maintain communication links with other flight teams and ground services personnel and respond appropriately to contingency situations
12. Comply with all range safety and contest safety rules

### **1.4 GHOST TRAFFIC SQUADRON**

The UAS AOC Ghost Squadron will be a group of simulated aircraft, equal in number to the Traffic Squadron, that will be presented to competitors in the form of TIS-B messages, broadcast from a ground station. The contractor should have the capability to broadcast the messages at low power for indoor testing and at high power for use outdoors, during the competition.

#### **1.4.1 GHOST TRAFFIC SQUADRON REQUIREMENTS**

1. Generate realistic, simulated flight trajectory data for several aircraft that are synchronized with the 4DTs of the Traffic Squadron and Competitor Aircraft.
2. Generate valid TIS-B messages for the simulated aircraft of the Ghost Squadron.
3. Broadcast Ghost Squadron TIS-B messages at low power, suitable for indoor testing of an aircraft's Hardware-in-the-Loop simulation
4. Broadcast Ghost Squadron TIS-B messages at high power, adequate for outdoor use during competition flights
5. Incorporate 4DTs that have been generated after the multi-vehicle simulation and TIS-B broadcast have begun.

