
**The Joint Improvised-Threat Defeat Organization will enable Department of Defense actions to counter improvised threats with tactical responsiveness and through anticipatory, rapid acquisition of Combatant Commands' efforts to prepare for, and adapt to, battlefield surprise in support of counter-terrorism, counter-insurgency, and other related mission areas including counter-improvised explosives.**

# Joint Improvised-Threat Defeat Organization's

# Counter-Unmanned Aerial System (C-UAS) Hard Kill Challenge

## 1.0 Synopsis

The threat of Unmanned Aerial Systems (UASs) to American interests within the Continental United States and outside our borders is an ongoing concern. The continued and rapid improvements to UAS technologies are not only increasing their availability, but also lowering their overall costs. Technological advancements have increased UAS's payload (payload weight divided by vehicle weight) and increased the level of ease to operate, fly, navigate and transport. These advances in technologies have not only increased opportunities to utilize UASs in many beneficial ways, but have also have increased the potential for hostile actors to utilize UASs in nefarious ways. The C-UAS Hard Kill Challenge will provide the Joint Improvised-Threat Defeat Organization (JIDO), United States Central Command (USCENTCOM), Program Directorate Counter-Rocket Artillery Mortar Missiles (PD C-RAM), DoD agencies, U.S. Government agencies, and our FVEY coalition partners an opportunity to evaluate the current state of technology to defeat rotary and fixed wing UASs.

To assess current technology, the Joint Improvised Threat-Defeat Organization (JIDO), Defense Threat Reduction Agency (DTRA) is sponsoring a C-UAS Hard Kill Challenge at the White Sands Missile Range (WSMR), New Mexico starting 20 February for approximately five (5) weeks. The C-UAS Hard Kill Challenge is focused on evaluating "Hard Kill" technologies that can defeat UASs with a flyswatter approach. For the purpose of this event, "hard kill" shall be defined as the physical interruption of a UAS's ability to maintain lift and continue its mission via the direct capture of the UAS, the physical destruction of the airframe and/or the permanent ability to disrupt the power to the airframe.

The focus of this Challenge is on technologies that can defeat a UAS beyond 250 meters (m). Participation is at the teams' own expense. During the Challenge, teams will have the opportunity to defeat a combined 30 rotor and fixed wing UASs in scored events and 4 additional UASs in non-scored events. For those teams that cannot afford to engage 34 UASs, JIDO will hold a demonstration phase where select teams can demonstrate their systems to the government stakeholders. Challenge prizes are for those teams who compete in the Challenge, not the demonstration.

Only a limited number of registrants will be selected to participate in the Challenge and demonstration. A panel of Subject Matters Experts (SMEs) will review each team package to determine the most qualified candidates. The number of participants is limited due to logistical concerns at the range, cost of targets, and range time.

### 1.1 Key Dates

18 Nov 16: Initial intent to enter Challenge to JIDO Points of Contact (POCs). JIDO will also need system specifications so that preliminary range safety reviews can begin.

02 Dec 16: Submission of completed registration package.

05 Dec 16: JIDO selection panel convenes to review submissions.

12 Dec 16: Notification of selected teams.

09-10 Jan 17: Team Participation Meeting (TBD)

20 Feb 17: Start of Challenge (team schedules will vary)

### 1.2 Prizes

Teams will compete for up to $500,000 in prizes. Prizes will be given to the top performing team(s) subject to the availability and release ability of funds.

## 2.0 Registration Requirements

### 2.1 Disclaimer

This notice does not constitute a commitment by the U.S. Government. JIDO is not obligated to make prize as a result of any teams' submission. JIDO is in no way liable to pay for or reimburse any company or entity that responds to this Challenge announcement. Submitting information for this Challenge announcement is voluntary. It is desirable that data be received with unlimited rights to the U.S. Government. However, it is recognized that proprietary data may be included with the information provided. If so, clearly mark all proprietary information as such.

The information provided will be used to assist determination of sources capable of countering small Unmanned Aerial Systems (UAS) ahead of an upcoming Challenge. The Challenge is a fixed event; therefore, no late submissions will be accepted.

### 2.2 Registration Requirements

2.2.1 Interested parties should submit a white paper which should include the following information, if available. More information is better to allow more efficient range approvals and better inform the SMEs reviewing team submissions.

2.2.1.1 Business Name
2.2.1.2 Business Address
2.2.1.3 Business Webpage
2.2.1.4 CAGE Code
2.2.1.5 Company POC and Contact Information
2.2.1.6 Detailed System/Subsystem Description
2.2.1.7 System TRL Level and Justification
2.2.1.8 Brief Concept of Operations (CONOPS)
2.2.1.9 Operational View (OV-1) (optional)
2.2.1.10 Narrative of what it would take to be deployable and ready to use in an austere environment within 12 months.
2.2.1.11 Program, Product or System Security Classification Guide or Guidance used to develop necessary security measures related to documentation, storage and operations and maintenance of the system and system data, in lieu of a classification guide, classification guidelines used to protect critical system parameters or critical information related to the program/product/system/technology must be provided.

2.2.1.12 Information Exchange Requirements (IERs/Interface Control Documents).

### 2.3 Document Submittal Instructions

All registration submittals must have arrived to JIDO close of business **2 December 2016**. Challenge invitee notifications will be made by **12 December 2016**. Submittals can be made either by mail, express mail or email via challenge.gov. The discussion board can be used for questions. The addresses are below:

**Challenge.gov registration (preferred)**

**United States Postal Service (Classified and Unclassified)**
ATTN: JIDO J8-AED/Hard Kill Challenge Team
Defense Threat Reduction Agency
8725 John J. Kingman Rd. Stop 6201
Ft Belvoir, VA 22060-6201

**Federal Express/United Parcel Service (Classified and Unclassified)**
ATNN: JIDO J8-AED/Hard Kill Challenge Team
Defense Threat Reduction Agency
6200 Meade Rd
Ft Belvoir, VA 22060-5204

## 3.0 Hard Kill Challenge Overview

The Hard Kill Challenge will provide JIDO and other DoD agencies an opportunity to evaluate where current technology is concerning hard killing rotor and fixed wing UASs. This Challenge will consist of three scored phases. The first phase is primarily set-up to verify the ability of each vendor's C-UAS system to hard kill a UAS. To advance to each subsequent phase, a vendor must hard kill a minimum of one UAS in each phase. This Challenge will only use Group I rotor and fixed wing UASs.

### 3.1 Phase I – Initial Assessment

Phase I is the initial C-UAS system assessment phase. During this phase there will be 12 scored test events and four unscored test events.

Six test events will consist of one rotors UAS hovering 50-100m Above Ground Level (AGL) at 250m, 500m and/or 1000m. Each test event will be no longer than 15 minutes. The test events will start at a distance of 250m. Teams must defeat two rotor UASs at each distance to move to the next further distance. It is possible that all six test events will take place at 250m if the team fails to defeat two rotor UASs.

Six test events will consist of one fixed winged UAS flying in an oval pattern 50-100m AGL at 250m. 500m, and 1000m. Each test event will be no longer than 15 minutes. The test events will start at a distance of 250m. Teams must defeat two fixed winged UASs at each distance to move to the next further distance. It is possible that all six test events will take place at 250m if the team fails to defeat two rotor UASs.

For those teams that have defeated a minimum of one UAS (rotor or fixed winged), they will participate in four unscored test events where the Red Team will provide Counter-Counter Measures (CCMs) to the UASs. These test events will start at the farthest distance that the team previously defeat the rotor/fixed winged UAS.

The maximum score for this event is 700 points. **Table 1** provides the scoring matrix and **Figure 1** provides an illustration of the event. Teams scoring 0 points during this Phase will not continue to Phases II and III. A no test will occur when a UAS malfunctions on its own.

**Table 1. Phase I Scoring Matrix**

| Assessed | Time to Kill | Assessed Points | | |
|---|---|---|---|---|
| | | 250m | 500m | 1000m |
| **Kill** | 0 secs < >59 secs | 25 | 50 | 100 |
| **Kill** | 1 min < > 1 min, 59 secs | 24 | 49 | 99 |
| **Kill** | 2 min < > 2 min, 59 secs | 23 | 48 | 98 |
| **Kill** | 3 min < > 3 min, 59 secs | 22 | 47 | 97 |
| **Kill** | 4 min < > 4 min, 59 secs | 21 | 46 | 96 |
| **Kill** | 5 min < > 5 min, 59 secs | 20 | 45 | 95 |
| **Kill** | 6 min < > 6 min, 59 secs | 19 | 44 | 94 |
| **Kill** | 7 min < > 7 min, 59 secs | 18 | 43 | 93 |
| **Kill** | 8 min < > 8 min, 59 secs | 17 | 42 | 92 |
| **Kill** | 9 min < > 9 min, 59 secs | 16 | 41 | 91 |
| **Kill** | 10 min < > 10 min, 59 secs | 15 | 40 | 90 |
| **Kill** | 11 min < > 11 min, 59 secs | 14 | 39 | 89 |
| **Kill** | 12 min < > 12 min, 59 secs | 13 | 38 | 88 |
| **Kill** | 13 min < > 13 min, 59 secs | 12 | 37 | 87 |
| **Kill** | 14 min < > 15 min | 11 | 36 | 86 |
| **Hit, No Kill** | | 0 | 0 | 0 |
| **Miss** | | 0 | 0 | 0 |

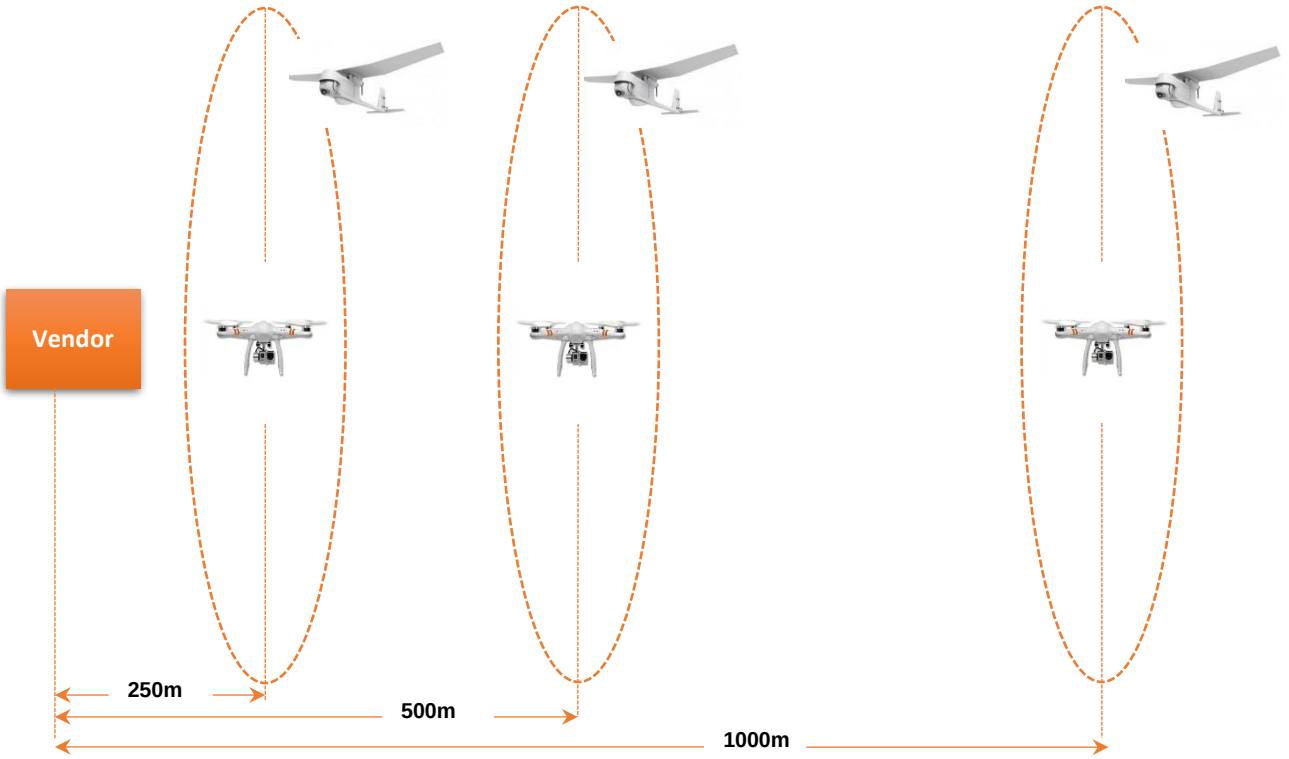


**Figure 1. Phase I Diagram**

At the completion of the scored portion of this event, there will be a non-scored special test event where countermeasures will be applied to the rotor and fixed wing UASs. Teams who have scored at least 11 points will have the opportunity to kill two (2) modified rotor and two (2) modified fixed wing UASs from the system's maximum Phase I kill range (250m, 500m or 1000m).

### 3.2 Phase II – Single UAS Missions (Rotor & Fixed Wing UASs)

Phase II will consist of eight test events. Four test events will consist of a single rotor UAS and four test events consisting of a single fixed wing UAS conducting either an ISR or attack mission. Each mission will start at approximately 3000m from the objective based on the performance specifications of each UAS. The team's objective is to defeat the UAS at the farthest possible distance.

Teams can earn up to 1,600 points for this Phase (200 pts./event). **Table 2** provides the scoring matrix and **Figure 2** provides an illustration of the event.

**Table 2. Phase II Scoring Matrix**

| Kill Distance | Points |
|---|---|
| >2750m | 200 |
| 2500m - 2750m | 175 |
| 2000m - 2499m | 150 |
| 1500m - 1999m | 125 |
| 1000m - 1499m | 100 |
| 750m - 999m | 75 |
| 500m - 749m | 50 |

| Kill Distance | Points |
|---|---|
| 250m - 499m | 30 |
| 100m-249m | 25 |
| Assessed Hit | 0 |
| Miss | 0 |

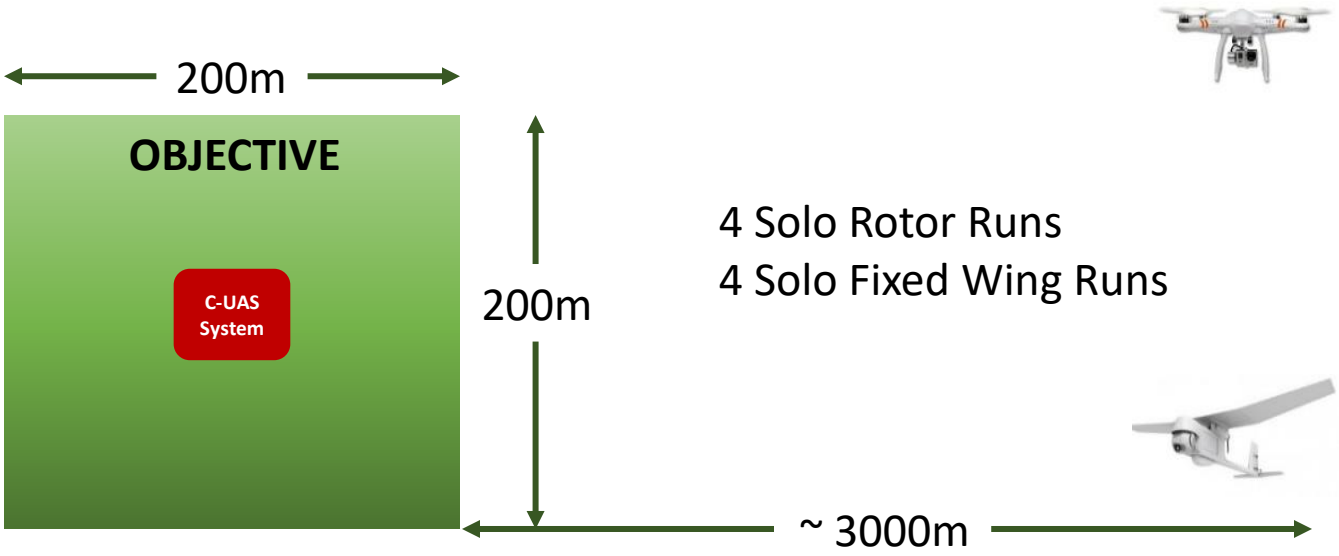


**Figure 2. Phase II Diagram**

### 3.3 Phase III – Swarm UAS Missions (Rotor & Fixed Wing UASs)

Phase III will consist of four UAS swarm test events. This test event will be similar to Phase II with the exception being that each mission will consist of multiple UASs. The first two missions will consist of two UASs (one rotor and one fixed wing), the 3rd mission will consist of three UASs (two rotors and one fixed wing) and the 4th mission will consist of three UASs (one rotor and two fixed wings).

Teams can earn up to 2,000 points for this Phase (maximum 400-600 pts./event). **Table 3** provides the scoring matrix and **Figure 3** provides an illustration of the event.

**Table 3. Phase III Scoring Matrix**

| Kill Distance | Each Kill |
|---|---|
| >2750m | 200 |
| 2500m - 2750m | 175 |
| 2000m - 2499m | 150 |
| 1500m - 1999m | 125 |
| 1000m - 1499m | 100 |
| 750m - 999m | 75 |
| 500m - 749m | 50 |

**JIDO HARD KILL CHALLENGE**

| Kill Distance | Each Kill |
|---|---|
| 250m - 499m | 30 |
| 100m-249m | 25 |
| Assessed Hit | 0 |
| Miss | 0 |

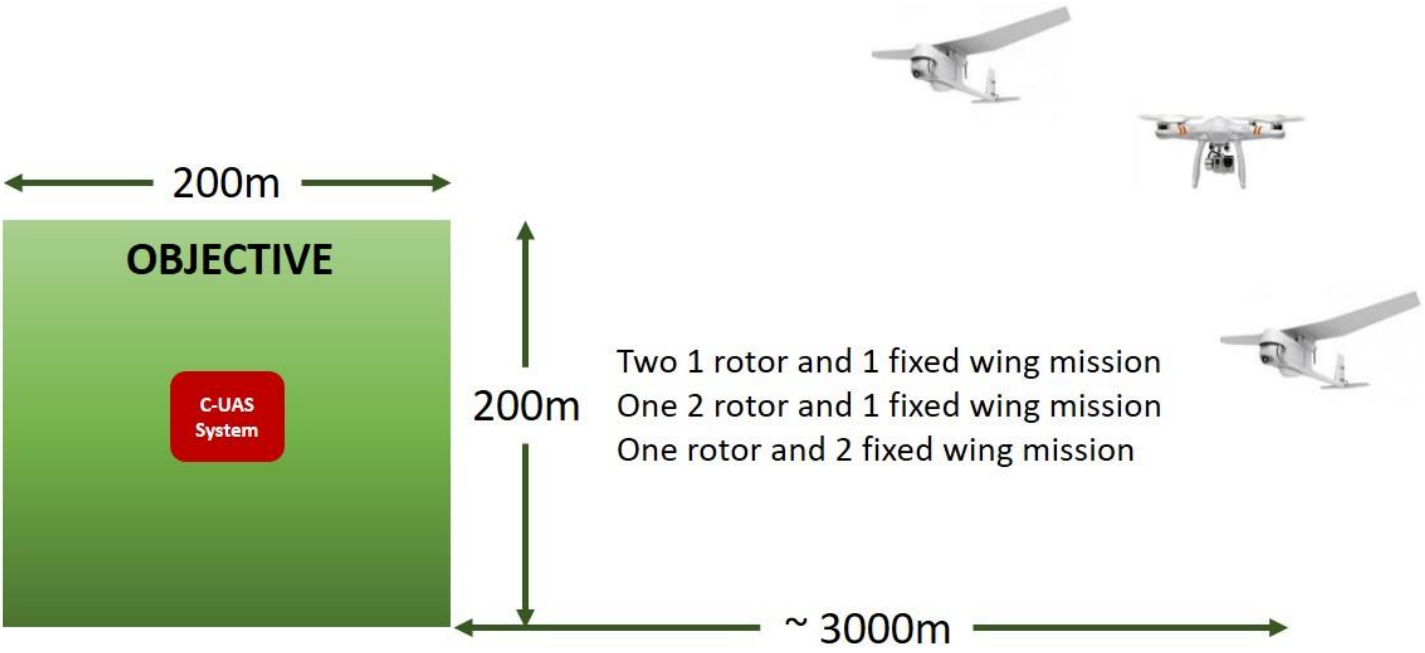


**Figure 3. Phase III Diagram**