

DHS Science and Technology Directorate

Enabling Unmanned Aircraft Systems

Eyes in the Sky

The Department of Homeland Security (DHS) requires dominant air domain capabilities to accomplish many core land and maritime missions. Fielding better airborne sensors on currently available and projected fleets is a cost effective way to cover regional and larger areas of the homeland.

The overall aim of the enabling the Program Executive Office for Unmanned Aircraft Systems (PEO UAS) is to (1) identify and quantify current capability gaps, sensor requirements, and the associated concept of operations (CONOPS) (2) conduct flight test and evaluation, (3) develop affordable end-to-end solutions, and (4) transition new capabilities to our operational users including: Customs and Border Protection (CBP), U.S. Coast Guard (USCG), U.S. Secret Service (USSS), Immigration and Customs Enforcement (ICE), the Science and Technology Directorate (S&T) First Responders Group, state and local first responders and the Federal Emergency Management Agency .



Developing a UAS Strategy

UAS have been used in military operations for years, becoming more prevalent as a tool for intelligence, surveillance, and reconnaissance for keeping the United States and allied soldiers safe on the battle field. Their application has been broadened to the homeland, where CBP currently operates a fleet of MQ-9 Predator B and Guardian UAS to surveil our land and maritime borders.

DHS anticipates the need for a tiered network of UAS that will include small, medium, and large-sized platforms operating cooperatively with one another and the operators on the ground, along with manned aircraft. In support of this strategy, the DHS S&T will serve as a knowledge resource center for these systems and their application to homeland security.

The goal of enabling UAS is to further inform and expand upon the airborne capabilities of DHS and first responders through rigorous testing and evaluation, as



well as research that will enable the use of UAS in the National Airspace System (NAS). Projects that will meet this objective include:

- **Knowledge collection and dissemination of UAS platforms, sensors, and requirements.** DHS S&T will continue to develop a UAS knowledge database for DHS customers CBP, USCG, USSS, ICE, and state and local first responders that will draw upon stated user needs and next-generation CONOPS requirements.
- **Small UAS (sUAS) Sensor Testing & Evaluation.** UAS are essential for rapid response and gaining invaluable situational awareness before engaging in potentially dangerous operations. DHS S&T will continue to evaluate current sUAS platforms and sensors for homeland security operational communities in order to be best informed of the systems and their capabilities.
- **NAS Access.** DHS S&T is partnering with National Aeronautics and Space Administration in the development of a UAS Traffic Management (UTM) system to enable the use of UAS in the NAS. When completed the technology, processes, and procedures will be in place to allow our customers the use of UAS beyond the line of visual sight in the NAS.
- **Sensor evaluation.** Maritime and land sensor packages, including wide-area surveillance, multi-spectral, light detection and ranging, short wave infrared and others will be evaluated for possible integration onto current and/or projected manned and UAS fleets.
- **Resilient GPS and Communication.** DHS S&T customers operate in regions where global positioning systems (GPS) are denied, and where WIFI and cellular communication are not available. DHS S&T will continue to identify and develop technology to provide continuous GPS and communications in all parts of the United States.

Good Things in Small Packages

Many operational challenges facing homeland security and first responders could be made safer and more cost efficient through the use of small UAS (sUAS) including:

- **Border Security**
- **Search and Rescue**
- **Real-Time Law Enforcement Operational Support**
- **Special Event Response**
- **Crime Scene Situational Awareness**
- **Fire/Wildfire Detection**
- **Disaster Evaluation and Initial Response**



Homeland Security

Science and Technology

To learn more about the Enabling UAS program and PEO UAS, contact UASProgramExecutiveOffice@hq.dhs.gov

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Accomplishments to date:

- **Knowledge collection and dissemination of UAS platforms, sensors, and requirements and sUAS Sensor Testing & Evaluation**
 - The Robotic Aircraft for Public Safety (RAPS) completed 15 sUAS demonstrations with nine different suppliers in 2016 at Fort Sill, Oklahoma. Demonstrations focused on USBP scenarios
 - The Robotic Aircraft for Maritime Public Safety (RAMPS) completed seven maritime sUAS demonstrations in 2016 at Webster Field, Naval Air Station Patuxent River (PAX) in St. Mary's County, Maryland. Demonstrations focused on USCG scenarios
 - Participated in the DHS First Responders Operation Exercise at White Sands, New Mexico; operated four sUAS in a denied GPS/denied communications environment
- **NAS Access**
 - Demonstrated concept for management of airspace in lower risk environments and multiple UAS operations at Crows Landing California in August 2015
 - Demonstrated management of geographically diverse operations; flew four vehicles from each site simultaneously under UTM. Conducted demonstrations at six Federal Aviation Administration (FAA) UAS Test sites in April 2016
 - Demonstrated beyond visual line of sight (BVLOS) operations including handling of off-nominal scenarios, altitude stratification, surveillance data and other services in Reno-Stead, Nevada in October 2016
- **Resilient GPS and Communication**
 - Successfully completed study and simulation of sUAS against a GPS threat environment. Results showed poor performance when GPS is threatened

Upcoming milestones:

- **Knowledge collection and dissemination of UAS platforms, sensors, and requirements and Small UAS (sUAS) Sensor Testing & Evaluation**
 - Robotic Aircraft Sensor Program – Border (RASP-B) (extension of RAPS) will conduct up to 20 demonstrations through 2018
 - Robotic Aircraft Sensor Program – Maritime (RASP-M) (extension of RAMPS) will conduct up to eight demonstrations through FY 2018
- **NAS access**
 - Demonstrate BVLOS over moderately populated land, with some interaction with manned aircraft. Testing will be conducted in 2018, and will include tracking, vehicle to vehicle, and vehicle to UTM and internet connected.
- **Sensor evaluation**
 - Request for Proposal (RFP) for the system integration of maritime surveillance sensor package to be issued in FY 2017, with a demonstration of the sensor package in FY 2019
- **Resilient GPS and Communication**
 - Development modular communication system for sUAS in a denied environment in FY 2017 with a demonstration in FY 2018

Performers/Partners

- **Knowledge collection and dissemination of UAS platforms, sensors, and requirements and Small UAS (sUAS) Sensor Testing & Evaluation**
 - CBP, USCG, U.S. Army
- **NAS access**
 - NASA Ames, FAA Center of Excellence Alliance for System Safety of UAS Through Research Excellence, Executive Committee (EXCOM), EXCOM Senior Steering Group (SSG), EXCOM SSG UAS Science and Research Panel
- **Sensor evaluation**
 - CBP, USCG
- **Resilient GPS and Communication**
 - NASA Ames, MITRE, U.S. Air Force Academy

