

Department of Defense

**Report to Congress on
Addressing Challenges for
Unmanned Aircraft Systems**



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REPORTING REQUIREMENT

On pages 426 and 427 of the Report of the Committee on Armed Services of the House of Representatives, House Report 110-652, accompanying H.R. 5658, the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, the committee requests an annual report containing at least the following information:

“...on the issues being addressed by the Task Force, progress made in coordinating UAS issues within UAS programs, between UAS and ISR-related manned and unmanned capabilities, and its recommendations to address existing issues. In addition, the report shall describe the actions that the Department has taken to implement the Task Force’s recommendations and milestones for completing any unresolved recommendations.”

INTRODUCTION

The Unmanned Aircraft Systems Task Force (UAS TF) continues pursuing current and future challenges that face Department of Defense (DoD) unmanned systems capabilities. This year, the UAS TF membership began formulating a new vision for maintaining the momentum gained in overcoming past challenges and providing for even more deliberate cross-service strategies in addressing future challenges. Therefore, the UAS TF intends to optimize the joint capabilities of its UAS systems through collaboration, advocacy, and education. It is the UAS TF intention to cross Departmental boundaries to achieve the following effects:

- Integration/Interoperation
- Consolidation/Synergy
- Standardization
- Efficiency
- Share Lessons Learned
- Affordability

To adequately address key issues facing UAS in both their development and operation, the UAS TF organized around four Integrated Product Teams (IPTs) to address the challenges of each area. These IPTs are: Interoperability, Airspace Integration, Frequency and Bandwidth, and Logistics and Sustainment. Each IPT is described in the coming pages, including their major tasks to address and solve specific challenges to DoD UAS. These sections describe the coordination progress and the specific actions taken to implement solutions as recommended by the UAS TF.

1. INTEROPERABILITY INTEGRATED PRODUCT TEAM (I-IPT)

The I-IPT continues to lead the DoD effort championing more efficient acquisition policies and practices, promoting Joint standards and architectures, and influencing common practices that enhance manned and unmanned interoperability across the Joint, Interagency, Intergovernmental, and Multinational (JIIM) domains. This leadership facilitates efficient and integrated acquisition practices as more and more unmanned systems are developed, fielded, and modernized. To further enable a broader and more capable network-centric environment that is interoperable, open, and scalable, programs are encouraged to develop open architectures and standard implementation profiles throughout a system's life cycle. In support of the Office of the Secretary of Defense (OSD) DoD Better Buying Power initiatives, the I-IPT continues to address the 29 prioritized Joint interoperability capability gaps identified in the approved Unmanned Interoperability Initiative (UI2) Capability Based Assessment (CBA).

A. UAS Control Segment Architecture Development:

The UAS Control Segment (UCS) Working Group (WG) is a combined DoD/industry collaboration tasked by the I-IPT to develop a common, open, and scalable architecture for command and control of UAS groups 2 through 5 (systems heavier than 20 pounds).

- The UCS WG released version 3.0 of the UCS architecture in July 2013 and version 3.1 in September 2013.
- The UCS WG is currently developing version 3.2 of the UCS architecture.
- The UCS WG is currently engaged in strategy and content meetings with the Military Departments to update its near-term sustainment plan.

Coordination Progress

- The UCS WG supported the completion of an Open Business Model (OBM) for UAS Ground Control Systems to increase competition, foster reuse across systems, and increase interoperability. The OBM was developed in alignment with the DoD Open Systems Architecture Guidebook for Program Managers and was successfully vetted through the Army, Navy, and Air Force General Counsel and Contracts Offices for tri-Service consensus. The OBM contains standardized Request for Proposal language intended to help Service programs procure, and industry and academia develop, consistent and coherent UAS services and applications.
- The UCS WG completed development of the UCS Repository, a web-enabled online application “App” store where vendors may advertise their UAS products for procurement by DoD Service Programs of Record (PoR)/Program Management Offices and the prime contractors who are looking for UCS solutions that are ready for integration and fielding. The UCS Repository also serves as a warehouse for procured services and applications for reuse by other Government PoRs. The concept for the repository is similar to the commercial personal smartphone industry wherein unique applications can be downloaded to suit individual user needs or productivity requirements.
- The UCS WG/OSD, in tandem with the Office of Naval Research, co-sponsored the conduct of the highly successful Force Integration Limited Technology Experiment (FI LTE) 2013. This FI LTE focused primarily on demonstrating increased interoperability between Joint Forces, specifically striving to reduce network operability uncertainty, enhance situational awareness, and increase dynamic force integration across an anti-access and area denial multi-Service environment. The UCS architecture played a prominent role in the LTE success.
- The UCS WG/OSD co-funded flight testing of a U.S. Army Shadow UAS that represented a major milestone for the UCS architecture development effort. The flight test demonstrated the use of a UCS-compliant Bi-Directional Remote Video Terminal (BDRVT) to control an aircraft and its payload. With the handheld BDRVT, a separate operator on the ground was able to take control of the Shadow aircraft from its initial operator, direct its movement, control its onboard sensors, and provide that information to the secondary operator before returning control back to the primary Shadow operator. Although the UCS compliant

BDRVT had been successfully demonstrated several times before with hardware in-the-loop simulations, this was the first time it had been demonstrated in a live flight test.

Actions Taken to Implement Solutions

- The UCS WG held the third in a series of informational and training tracks at the August 2013 Association for Unmanned Vehicle Systems International conference in Washington, DC.
- The UCS architecture effort has continued to grow and flourish to include well over 200 industry partners with nearly 600 participants. The public UCS WG web site is <https://www.ucsarchitecture.org>.
- The UCS architecture development effort was initially focused on solving various unmanned air vehicle to ground control station interoperability issues but has quickly gained recognition in the maritime Program Executive Office (PEO) domains including Unmanned Aviation and Strike Weapons (U&W); Command, Control, Communications, Computers and Intelligence; Integrated Warfare Systems; Submarines; and Littoral Combat Ships (LCS). In particular, LCS has received briefings and training about the architecture specifically tailored for them.
- The UCS WG successfully developed a comprehensive suite of training materials to include classroom briefs/presentations and related videos for post-training use and circulation. The training was developed to address design, development, and use of the architecture at a “101” level. A “201” level series of more technically detailed topics is being developed.

B. Joint Common Unmanned System Architecture (JCUA):

The Horizontal Integration Working Group (HIWG) continues to document and assess the DoD UAS Family of Systems and applicable System of Systems architectures to support UAS interoperability analysis as well as integration with the UCS architecture. The latest documentation, version 1.0, provides a basis for enhanced integration and operations with other DoD systems (including Air Force, Army, Navy and Marine Corps programs), and identifies potential efficiencies in the overall DoD UAS life-cycle process as well as the DoD Architecture Framework.

- The JCUA provides consistent architecture products to facilitate interoperability analysis and reuse across the UAS program inventories within DoD. Future versions of the architecture (version 2.0 ‘To Be’ Architecture) will incorporate additional programs and fully integrate with the DoD Chief Information Office (CIO) Joint Information Environment and Joint Staff J6 Warfighter Mission Area architecture federation projects.

Coordination Progress

- JCUA Version 1.0 was completed and is pending approval once all stakeholders have responded to the final draft document. It will be registered with the Joint Staff J6 Joint Architecture Federation and Integration Project (JAFIP) portal to replace the previous version (https://sadie.nmci.navy.mil/jafe/Project_Data/jcua/). In continued close partnership with the DoD CIO Enterprise Architecture strategy, the JAFIP portal ensures Joint Capabilities Integration and Development System architecture data/products need only be maintained in a single, dynamic, federated repository that is automatically discoverable via web services.

Actions Taken to Implement Solutions

- The JCUA continues to be matured and used as the analytical framework for integration with various related efforts and programs such as the Air Force's Surveillance Intelligence Reconnaissance Information System (SIRIS), UCS, Army's Federated Universal Synchronization Engine (FUSE), and Navy Unified Modeling Language architectures. Additional programs and projects are being assessed for future integration, depending on resource availability.
- The JCUA 2.0 'To Be' report will also include system-level analysis of the gaps previously reported as well as applicable Joint interoperability gaps identified in the UI2 CBA. Current estimate for completion is December 2013.
- The HIWG is coordinating with the USAF MQ-9 program to provide the JCUA as the reference architecture for the next increment of the Reaper program. This JCUA version will include the UCS architecture attributes. The goal of this collaboration is to help the MQ-9 program avoid redundant architecture development costs and to facilitate increased commonality of architecture data across the various UAS programs.

C. Universal System Interoperability Profile (USIP):

Industry standards enable end-to-end operational effectiveness. However, commercial and DoD standards bodies must address a wide range of industrial communities with diverse requirements. Commercial standards bodies address this need by allowing some degree of flexibility to tailor their standards for specific implementation communities, resulting in commercial entities or consortia frequently defining profiles of commercial standards. Due to this flexibility, compliance with a standard does not always guarantee interoperability. The DoD UAS community tackles this flexibility variance by defining implementation instructions or profiles of standards. These interoperability profiles seek to define proper subsets of standards or specific implementation instruction that serve as a basis for enhanced interoperability. In some cases, additional elements may be added to a standard to meet unique DoD requirements.

- USIP 5.1 (Weaponization) was accepted into the Defense Information Systems Agency (DISA) Global Information Grid Technical Profile (GTP) technical body and is being staffed for final approval as a mandated DoD GTP.
- The DoD CIO C4 and Information Infrastructure Directorate is leading the development of a new USIP (1.2) for Beyond Line of Site (BLOS) Battlespace Awareness and will also pursue acceptance as a mandated GTP with DISA. This BLOS USIP will complement the existing approved USIP (1.1) for Line of Sight (LOS) situational awareness currently maintained as a mandated standard on the DoD IT Standards Registry (DISR). Estimated completion is 3rd Quarter 2014.

Coordination Progress

- The USIP working group has successfully integrated with other unmanned domains to include Unmanned Ground Vehicles and Unattended Ground Sensors. The I-IPT government lead is coordinating with the Robotics System Joint Program Office and Defense Intelligence Agency to identify and prioritize specific harmonization opportunities across all three unmanned domains (air, ground vehicles and unattended sensors). Outreach to other unmanned domains such as Unmanned Underwater Vehicles has been initiated with the Navy.
- Current and proposed USIPs are fully aligned with the UI2 CBA Joint interoperability gaps but require additional resources to continue development of profiles necessary to address those gaps.
- A number of potential USIP efforts remain shelved pending resource prioritization consideration; however, the USIP steering committee continues to reach out to DoD and JIIM stakeholders in search of government sponsors and opportunities to leverage ongoing work.

Actions Taken to Implement Solutions

- In coordination with the Motion Imagery Standards Board, USIP 1.1 (Line of Sight Transmission of Motion Imagery for Battlespace Awareness using Standard Common Data Link) was updated to include video interlace, time stamp requirements, and security country coding. The changes were staffed with the USIP stakeholder community and are currently pending final approval and update to the DISR.
- The USIP repository migrated to forge.mil to ensure controlled access to limited or sensitive information found in some interoperability profiles.
- In June 2013, PEO(U&W) conducted a live command and control demonstration with the U.S. Coast Guard. This experiment demonstrated that multiple standardized interfaces can be implemented across a variety of systems using an open architecture approach resulting in increased operational capability in support

of Information Dominance while achieving acquisition efficiencies. Specific objectives were:

- Demonstrate that an open government defined Command and Control (C2) interface can be used to control an airborne sensor.
- Transfer sensor C2 between a networked control system and an afloat remote video terminal.
- Enable the U.S. Coast Guard to assess the value of direct receipt of sensor data and of sensor control during boarding operations.

D. Unmanned Interoperability Initiative (UI2) Strategic Plan:

In March 2011, the Deputy Assistant Secretary of Defense for Strategic and Tactical Systems within the Office of the Under Secretary of Defense Acquisition, Technology, and Logistics and the Director J8, Joint Chiefs of Staff, jointly directed the initiation of UI2. This study was undertaken to conduct a portfolio assessment of the DoD UAS enterprise looking for opportunities to increase JIIM interoperability that would enhance Warfighter capability and improve acquisition efficiency. The UI2 included the development of a CBA to identify interoperability capability gaps and a Strategic Plan to propose an integrated, synchronized action plan to mitigate those identified capability gaps. The UI2 Strategic Plan is the end product of the UI2 effort and is the result of the collaborative staff effort of the OSD, Joint Staff, United States Special Operations Command, and the Military Departments.

- The UI2 Strategic Plan incorporates the DoD strategic vision for UAS interoperability and is synchronized with the DoD Unmanned Systems Integrated Roadmap and future biannual updates. The 2013 Roadmap supports the Unmanned Aircraft Systems Interoperability vision of:

“...seamless integration of diverse unmanned capabilities that provide flexible options for Joint Warfighters while exploiting the inherent advantages of unmanned technologies, including persistence, size, speed, maneuverability, and reduced risk to human life. DoD envisions unmanned systems seamlessly operating with manned systems while gradually reducing the degree of human control and decision making required for the unmanned portion of the force structure.”

Coordination Progress

- Each Military Department and Agency is finding aspects of the CBA and Strategic Plan relevant to their mission responsibilities and is working with the I-IPT and UAS TF to develop priorities and scope of effort.

- The UI2 Strategic Plan was formally staffed and is now pending approval. The plan documents an integrated series of recommendations and actions to mitigate the 29 identified capability gaps, pending resource availability.

Actions Taken to Implement Solutions

- The I-IPT continues to work with the Military Departments and Agencies to close the 29 Joint interoperability gaps identified within the CBA and ultimately improve capability to the Warfighter.
- The I-IPT will continue to coordinate with the UAS Task Force to ensure alignment with both the Unmanned Systems Integrated Roadmap, UI2 Strategic Plan, and Better Buying Power initiatives depending on availability of resources and funding.

E. GEOINT Standards Compliance:

In August 2011, the Office of Under Secretary of Defense for Intelligence (OUSD(I)) directed all initiatives supported by the Intelligence, Surveillance, and Reconnaissance Task Force (ISR TF) provide verification of National Geospatial-Intelligence Agency (NGA) Geospatial-Intelligence (GEOINT) data standards compliance. This initiative aimed to close an acquisition oversight gap on all PoR/Quick-Reaction Capabilities (QRC) in theater and was closely monitored by the ISR TF and the National System for Geospatial-Intelligence Interoperability Action Team. The final reports were released on July 15, 2012, and revealed that nearly all manned and unmanned aircraft ISR systems had compliance issues with GEOINT metadata standards. This significantly reduced interoperability while increasing integration and development time and costs per system.

- The UAS TF Interoperability IPT is leading an effort with OUSD(I), the NGA, and the Military Departments to develop action plans toward compliance. The conformance with and enforcement of standardized data/metadata formats (sensor and platform generated data) facilitates archiving, searching, retrieving and distributing sensor data to a wide range of appropriate users and enables automated tasking, processing, exploitation, and dissemination solutions throughout the Intelligence Community (IC). The Metadata Tiger Team continues to examine governance improvements, such as GEOINT standards in the Net-Ready key performance parameters and Joint Interoperability Test Command (JITC) interoperability certification process.

Coordination Progress

- The Metadata Tiger Team continues to coordinate efforts with the Military Departments and is in the process of establishing a mitigation plan for programs of record. Central to this effort is an enduring JITC/NGA retest strategy to confirm program standard compliance throughout a program's life cycle.

- The I-IPT coordinated with NGA and JITC on the GEOINT metadata standards compliance plan for DoD manned/un-manned programs and contributed to the development of a new GEOINT Functional Manager Seal of Approval prior to JITC interoperability certification.

Actions Taken to Implement UAS TF Recommendations

- The I-IPT continues to work with the Military Departments to resolve the compliance issues and further establish a mitigation strategy for non-PoR/QRC as these programs redeploy from overseas contingency operations.

F. UAS Mission Integration Working Group (UMI WG):

The UMI WG is tasked with addressing interoperability seams that challenge collaboration among UAS operations center; ground, air, intelligence users; disadvantaged users; and command centers. The group's mission and objectives are to understand the common tasks and common data needed to execute UAS missions; define a common, open, scalable UMI architecture approach for operations centers through disadvantaged users; and integrate interoperable UMI solutions into experimentation, joint tests, and programs of record.

- The UMI WG continues to provide an ideal forum to nominate and implement Joint user-defined Common Operational Picture (COP) concepts between the Service's UAS platforms, control stations, and video terminals. Additionally, the UMI WG has expanded its aperture and developed partnerships with other countries through NATO exercises such as UNIFIED VISION and programs such as the Air and Space Interoperability Council.

Coordination Progress

- The UMI WG is focused on outreach and synchronization with JIIM stakeholders to address the following Joint interoperability challenges:
 - Standards, Definitions, Compliance, and Enforcement
 - Communications
 - Common IC analytical and automation tools
 - Architectures to solve key interfaces, critical nodes, and core services

Actions Taken to Implement UAS TF Recommendations

- Successfully conducted a SIRIS-FUSE-Ground Based Sense and Avoid (GBSAA) integration demonstration for Air Force Special Operations Command, at Joint UAS Digital Information Exchange test site. Additional exercises and demonstrations are planned for NATO Unified Vision 2014.

- Identified previously unknown interoperability capability gaps between the individual Service's Distributed Common Ground Systems (DCGS) and UAS operation centers
- Standardized and demonstrated interoperable information threads between Air Force, Army, Navy, and IC's DCGS at Enterprise Challenge 2013.
- Published Air Force Joint Operations SIRIS Tactics, Techniques, and Procedures (TTPs) for joint employment of the UAS user-defined COP.
- Conducted Technical Exchange Meetings between Air Force, Army, and Marine Corps system integration labs enabling existing technologies to meet or exceed UI2 Strategic Plan interoperability gap-closure recommendations.

2. AIRSPACE INTEGRATION INTEGRATED PRODUCT TEAM

DoD UAS require safe and routine access to national, foreign, and international airspace to execute their operational, training, and test and evaluation missions. However, current DoD UAS lack the same ability as manned aircraft to safely and efficiently integrate into the National Airspace System (NAS). The Airspace Integration IPT (AI-IPT) seeks to improve airspace access for UAS operations and training requirements in support of homeland defense, homeland security, and defense support of civil authorities. The AI-IPT reviews and assesses operational requirements; identifies and develops acquisition solutions; assists in the development of UAS technical standards; and recommends training and policy changes necessary to integrate UAS into necessary classes of airspace.

A. UAS Executive Committee Support:

- The UAS TF and AI-IPT supports the UAS Executive Committee (ExCom) mission *“to enable increased and ultimately routine access of Federal UAS engaged in public aircraft operations into the NAS to support operational, training, development and research requirements of the Federal Aviation Administration (FAA), DoD, Department of Homeland Security (DHS) and National Aeronautics and Space Administration (NASA)”*.¹
- The UAS ExCom has focused on those efforts to providing near to mid-term access for UAS operated by Federal agencies.

Coordination Progress

- The UAS TF and the DoD Policy Board on Federal Aviation (PBFA) work closely with the UAS ExCom and member agencies.

¹ UAS Executive Committee Charter, October 20, 2010

Actions Taken to Implement UAS TF Recommendations

- Over the past year, DoD, through the UAS ExCom Senior Steering Group, actively pursued solutions in three major areas: developing processes and procedures to allow multiple unmanned and manned operations in Class D airspace; expanding NAS access opportunities for small UAS (SUAS) (55lbs or less); and allowing UAS flights in remote operating areas with limited restrictions.
- DoD and FAA completed an update to the 2007 DoD/FAA Memorandum of Agreement (MOA) for UAS operations that greatly increased DoD's access to the NAS. The document increases DoD access to Class G airspace and simplifies the COA process to significantly expedite access for DoD SUAS, permits night flight, and expands access beyond flights over government controlled land.
- The updated MOA also provides access to DoD managed Class D airspace through the same simplified process. The DoD/FAA MOA has become a model for the other ExCom agencies.
- Additional work is being done by DoD and the FAA to establish procedures to permit operations in DoD managed Class D airspace that will allow flights by multiple UAS in that airspace and shared operations with manned aircraft.
- In close cooperation with the FAA, NASA, and the Department of Homeland Security (DHS)/Customs and Border Protection, the ExCom resolved operational and policy issues surrounding flights in remote areas and successfully enabled beyond line of sight SUAS flights in support of operations off the Alaska coast monitoring of the ice flow and protecting personnel and property in the region.

B. Other DoD Airspace Integration Activity:

- The AI-IPT supports additional integration efforts beyond those of the ExCom, providing an effective venue for coordinating and leveraging UAS airspace issues across the Military Departments.

Coordination Progress

- The AI-IPT collaborates closely with other DoD offices, PBFA, Joint Staff, Military Departments, Combatant Commands, FAA, NASA, DHS and the Next Generation Air Transportation System Joint Planning and Development Office.
- DoD fully supports FAA-sponsored Aviation Rulemaking Committees and sub-committees associated with RTCA in an effort to establish new or updated rules and policies for UAS integration as well as development of civil standards for UAS aircrew and equipment.

Actions Taken to Implement Solutions

- The AI IPT funded sense and avoid (SAA) Science and Research Panel (SARP) is a focused effort that seeks to promote partnerships between DoD and the broader academic, science, and research communities on UAS airspace integration science and research initiatives. The SARP addresses cross-cutting SAA initiatives to gain insight into how these efforts align with DoD's priorities and to make recommendations to the AI IPT for sound technical approaches to address research gaps.
- DoD is continuing to develop SAA solutions that focus on enabling UAS access to the NAS within the airport terminal area, for transits to and from special use or controlled airspace and beyond. The ground based SAA (GBSAA) and airborne SAA (ABSAA) developments are being closely coordinated. Working closely with the FAA, DoD and the Marine Corps now have an approved GBSAA system that supports UAS operations at Marine Corps Air Station Cherry Point, North Carolina. The Air Force is expected to field a GBSAA system in early 2014. The Army plans to certify and field a GBSAA system in FY 2014-2015 at five MQ-1C Gray Eagle UAS operating locations.
- The FAA and DoD, through the PBFA, are continuing to pursue appropriate methods and data metrics that will be useful for the FAA to use in furthering UAS integration efforts.
- DoD has been actively involved in RTCA Special Committee 228 (SC-228) with FAA, NASA, and industry in the development of Detection and Avoid Minimum Operational Performance Standards (MOPS), which will be a critical element for the development and certification of SAA systems. DoD is providing research and development data, lessons learned, and expertise to support the planning and development of the MOPS.
- In conjunction with and to support the work being done by SC-228, the SARP hosted a multi-agency workshop in an effort to develop a quantifiable standard for "Well Clear." The Federal Aviation Regulations require that pilots pass "Well Clear" of other aircraft when flying in the NAS. A quantitative definition of "Well Clear" is needed to design a self-separation system to perform the same function and provide a means to evaluate system performance.
- To support coordination and efficiency for meeting the UAS airspace integration challenges and goals, DoD and FAA signed a Memorandum of Understanding (MOU) that establishes an agreement and process to collaborate on UAS research and technology development initiatives. The MOU defines a framework by which FAA and DoD can work cooperatively to prioritize joint research efforts and leverage expertise and research products to meet organizational UAS research objectives.

- The AI-IPT funded effort to update MIL-HDBK-516 will be completed and published by mid-2014. This effort establishes the formal guidance on UAS airworthiness and is a compilation of manned aircraft standards updated to account for the unique requirements for UAS where there were gaps or discrepancies. The ongoing effort, sponsored by the AI-IPT will document standards for SAA systems.

3. FREQUENCY AND BANDWIDTH INTEGRATED PRODUCT TEAM

The Frequency and Bandwidth IPT (FB-IPT) is tasked to develop DoD spectrum and bandwidth guidance for improving UAS operational effectiveness and mission capability for large, medium, and small platforms via new technical capabilities; operational TTPs; and regulatory actions. The FB-IPT continues to analyze UAS mission requirements for ways to improve Warfighter capabilities in the fielding of more spectral efficient UAS communication systems. The FB-IPT represents DoD and upholds the U.S. frequency and bandwidth policies and guidance associated with UAS around the world.

These efforts are accomplished by three established goals on Beyond Line of Sight (BLOS) (to include use of satellites), line of sight (LOS), and small UAS (SUAS) operations.

A. UAS BLOS Regulatory and Bandwidth Assessments

- The goal is to develop appropriate DoD policy, joint requirement documentation, and acquisition and operational guidance for improved spectrum utilization to improve BLOS UAS operations.

Coordination Progress

- The FB-IPT collaborates with representatives from all the interested stakeholders within the DoD (to include other UAS TF IPTs, the Military Departments, and Defense Agencies), other Federal agencies, allied and foreign governments, and numerous industry groups to obtain best spectrum access for BLOS operations.

Actions Taken to Implement UAS TF Recommendations

- DoD is reassessing its satellite communications procurement strategy to meet the emerging needs of the military. The FB-IPT is actively participating in the DoD reassessment to ensure the UAS BLOS needs are properly considered. This includes assessing the UAS sensor requirements, radio frequency interference and international regulatory challenges expected to be faced in the coming years as countries attempt to put up new satellite systems for their own domestic and global requirements.
- In addition, the IPT continues to evaluate UAS BLOS satellite communication bandwidth performance in order to identify possible technology investment opportunities for improving spectrum efficiency and support a greater number of

missions. The IPT completed several technical and regulatory assessments to assist the Department in addressing challenges and identify options for resolving them over the last year.

- The FB-IPT is continuing to support U.S. and overall DoD preparations for the International Telecommunication Union (ITU) World Radio Communication Conference 2015 (WRC 15). The ITU has conducted studies, in conjunction with the International Civil Aviation Organization (ICAO), to determine the future bandwidth and spectrum regulatory needs for UAS command and control (C2), sense and avoid, and other air traffic control aspects for successfully integrating of their operations into civilian airspace around the world. WRC 12 deliberated on the matter, but consensus was not achieved for UAS BLOS C2 aspect. As such, the Conference agreed to continue its studies and defer a decision until WRC 15. The FB-IPT is continuing to lead the DoD efforts, actively participating in ICAO and ITU Working Groups' technical and regulatory studies. The IPT structure allows for easier coordination across the Department on the strategies and positions being promoted while also ensuring the Warfighter needs are properly addressed.

B. UAS LOS Regulatory and Bandwidth Assessments

- The goal is to develop appropriate DoD policy, joint requirement documentation, and acquisition and operational guidance for improved spectrum utilization to improve LOS operations for larger UAS.

Coordination Progress

- The FB-IPT collaborates with representatives from all the interested stakeholders within DoD (to include other TF IPTs, the Military Departments, and Defense Agencies), other Federal agencies, allied and foreign governments, and numerous industry groups to obtain best spectrum access for LOS operations.
- The IPT works with AT&L, Military Departments, and Combatant Commands to expand UAS Common Data Link (CDL) LOS capabilities for improved bandwidth efficiency and spectrum flexibility to support a multitude of missions in different parts of the world.
- The UAS TF worked closely with Deputy Assistant Secretary of Defense for Command, Control and Communications, and Cyber to complete specifications for previously undocumented Remote Video Terminal waveforms, including 466ER and Tactical Predator. With these specifications in hand, DoD will be able to drive proprietary and undocumented waveforms out of the CDL market space while ensuring Warfighter interoperability with critical legacy systems.

Actions Taken to Implement UAS TF Recommendations

- The FB-IPT continued to support the development and introduction of an advanced and more efficient waveform for the CDL system. As the department ISR datalink standard, CDL is used by various UAS platforms for command, control, and mission data dissemination for the Warfighter. These efforts are expected to offer the military the ability to support higher fidelity sensors and improve overall spectrum flexibility.
- In support of the UAS operations, the IPT prepared several reports and papers. One report described the advances offered by the Bandwidth Efficient CDL waveform (the next generation of the CDL standard); another paper addressed the bandwidth needed by the various UAS payload sensors. The IPT supported the preparation of reports addressing opportunities in UAS use of higher frequency bands for datalink connections.
- In addition, the IPT continued to work closely with the National Telecommunication and Information Administration and Department of State to improve UAS CDL and overall LOS spectrum access in the United States and its Possessions and near the borders. The intent is to improve spectrum sharing, allowing for more missions to be flown without unnecessary restrictions, and to mitigate any potential interference to or from other authorized network operations.
- The FB-IPT, in support of the AI-IPT, is actively participating in the ICAO and FAA RTCA forums studying C2 LOS performance requirements and subsequent spectrum regulatory related matters. The end goal is to establish a set of Minimum Aircraft System Performance Specifications and Minimum Operations Performance Standards. The standards are expected to help codify the UAS C2 LOS performance requirements for aviation authorities around to allow for UAS flights to be flown in civilian airspace around the world.

C. Small UAS Regulatory and Bandwidth Assessments

- The goal is to develop appropriate DoD policy, joint requirement documentation, and acquisition and operational guidance for improved spectrum utilization to improve LOS operations for SUAS.

Coordination Progress

- The FB-IPT collaborates with representatives from all the interested stakeholders within the DoD (to include other TF IPTs, the Military Departments, and DoD agencies), other Federal agencies, allied and foreign governments, and numerous industry groups to obtain best spectrum access for SUAS operations.

- The FB-IPT continues to participate in the evaluation of potential SUAS mission impacts as a result of any domestic and international commercial mobile broadband reallocation initiatives.

Actions Taken to Implement UAS TF Recommendations

- The FB-IPT supported the Department's effort to assess the operational impact of possible reallocation policies as they sought to meet the Administration's and Congress desire to usher in a new round of wireless innovation to meet the emerging needs of the U.S. consumer. The SUAS operations were identified as a critical capability that could potentially be affected by reallocation of spectrum for broadband purposes. Given SUAS operations represent such a large number of the systems in the DoD inventory, the IPT was requested to help with the technical studies. This included completing spectrum sharing and interference studies to identify possible technical, regulatory, or operational solutions to allow for additional mobile broadband spectrum without impacting national security needs.
- In addition, the ITU WRC 15 will be seeking to identify spectrum to support commercial broadband from a global perspective. A specific WRC 15 agenda item was selected to address the matter and is expected to set the stage for the world to deliberate on frequencies best suited to support new wireless broadband services and applications. As part of the FB-IPT previous, and ongoing support for the U.S. WRC 15 preparations, the group is conducting spectrum sharing studies and developing reports based upon the study findings. This is expected to be folded into the U.S. preparations for WRC 15 and be part of the basis of the U.S. position and contribution to WRC 15.
- The IPT is also assisting the fielding of systems for training and other missions by providing expertise and lessons learned on spectrum sharing and deconfliction.

The FB-IPT continues to support DoD efforts to identify military capabilities and subsequent UAS mission equities regarding possible spectrum repurposing for broadband.

4. LOGISTICS AND SUSTAINMENT INTEGRATED PRODUCT TEAM

The goal of Logistics and Sustainment IPT (LS-IPT) is development of affordable DoD-wide approaches for long-term sustainment of UAS capabilities that support systems' readiness objectives. The LS-IPT provides a forum to discuss common issues and opportunities for synergies between programs aimed at assisting UAS programs and the Military Departments in the development of UAS sustainment strategies by leveraging experience from existing programs, organizations, disciplines, and processes to identify best practices and lessons learned. IPT membership includes DoD stakeholders from the requirements, acquisition, and logistics communities.

The LS-IPT continued their efforts to coordinate UAS sustainment-related issues in two key areas, namely UAS System Support Synergies and UAS Software Sustainment, which will be covered below.

A. UAS Sub-System Support Synergies

The LS-IPT has identified potential opportunities to develop joint partnerships with industry and Services components to support like and similar UAS sub-systems across programs. Specifically, the IPT has developed a matrix of common/similar Multi-Spectral Targeting Systems sensors which are supported or planned to be supported by the Navy's Fleet Repair Center Jacksonville, Florida and used on a various UASs and manned aircraft. These programs could potentially benefit in terms of reduced cost and increased readiness from the consolidation of sustainment contracts related to Depot maintenance, supply, and sustaining engineering.

B. UAS Software Sustainment

The UAS Software (SW) Sustainment IPT was established at the direction of Joint Logistics Board as a continuation of the Secretary of Defense-directed review of UAS Depot Maintenance to develop cross-Military Department recommendations for the consolidation of UAS depot maintenance activities to minimize cost and eliminate unnecessary duplication. The group operates under the auspices of the Joint Logistics Board and the Maintenance Executive Steering Committee; however, as the effort moves forward, the results and recommendations of the UAS SW IPT will be vetted through the LS-IPT, UAS TF and UAS Senior Steering Group.

The scope of the SW IPT effort includes MQ-1/9 Class (Predator, Gray Eagle, Reaper) and RQ-4 Class (Global Hawk, Triton) UASs, the same five systems included in the original effort, systems which the Military Departments had determined as having core organic depot maintenance requirements.

The majority of the year was dedicated to the development of terms of reference, a comprehensive data call for UAS software sustainment requirements and organic software sustainment capabilities, and a tool to link operational requirements to system requirements to sustainment requirements.

- The data call will be released in early FY 2014. Based on data call responses, the IPT will analyze the requirements and capabilities to look for efficiency opportunities that leverage existing capabilities and reduce cost and maintain required level of support.
- The UAS SW IPT includes members from the Office of the Secretary of Defense and the Military Departments, and was augmented with software subject-matter experts as required.

Actions Taken to Implement or Monitor Implementation of Solutions

- The UAS LS-IPT is monitoring the Military Departments implementation of the UAS depot maintenance workload consolidation recommendations (FY 2012) in depot

activation plans and their respective Presidential Objective Memorandum budget requests.

- The U.S. Army (PM UAS) is currently partnering with the U.S. Air Force and optimizing Depot Maintenance repair of UAS airframe sub-assemblies at Hill Air Force Base (Ogden Air Logistics Center), Utah. Detailed Logistics Engineering reviews and analyses of functional similarities between the Army's Gray Eagle system and Air Force Predator and Reaper UAS have resulted in optimized depot maintenance agreements between the services. These efforts are ongoing and studies are currently underway to review Ground Control Stations, communications, and other UAS support equipment opportunities.
- While unforeseen events (Government furloughs and Sequestration cuts) have negatively impacted these Joint UAS IPT endeavors with delays, the joint UAS community remains actively engaged in seeking ways to reduce costs through Better Buying Power initiatives and surmounting unique challenges with innovative Depot Maintenance constructs.
- The IPT will continue to explore the potential for Joint Service partnerships with industry and organic Depots to provide effective and efficient support to programs, continuing to refine the potential consolidation of Sensor support and will initiate a review of commonality of communications subsystems.
- The LS-IPT will continue to formulate best practices for UAS sustainment metric development, and provide recommendations for use in the JCIDS process.

SUMMARY

The UAS TF continues to lead unmanned systems initiatives while striving to improve UAS commonality and efficiency in order to meet Warfighter capability requirements. As the DoD faces lean fiscal realities and rebalances its overseas efforts, many of the issues being addressed by the UAS TF will become increasingly relevant. The UAS TF will continue to provide a forum for influencing concepts, requirements, and design decisions to provide efficient and affordable combat capability.