Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Office of Secretary Of Defense	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
Total Program Element	59.463	49.292	25.120	-	25.120	27.388	21.365	18.292	22.924	Continuing	Continuing
P440: *UAS Airspace Integration*	30.663	32.082	24.704	-	24.704	26.957	20.918	17.831	22.447	Continuing	Continuing
P442: *Interoperability*	28.800	17.210	-	-	-	-	-	-	-	Continuing	Continuing
P443: *Unmanned Systems Road Maps*	-	-	0.416	-	0.416	0.431	0.447	0.461	0.477	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DOD) Unmanned Aircraft Systems (UAS) Common Development is a joint effort to develop and demonstrate common standards, architectures, and technologies that address UAS-specific issues across all Military Services. The intent is to increase interoperability and effectiveness by promoting cooperative development of solutions that are applicable across major classes of UAS. This effort will initially focus on addressing DOD UAS integration into the National Airspace System (NAS) and demonstration of a common, interoperable ground station architecture and associated interface standards.

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	55.289	49.292	28.391	-	28.391
Current President's Budget	59.463	49.292	25.120	-	25.120
Total Adjustments	4.174	-	-3.271	-	-3.271
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Defense Efficiency - Baseline Review	-	-	-0.255	-	-0.255
• Defense Efficiency - Report, Studies, Boards and Commission	-	-	-2.744	-	-2.744
• Defense Efficiency - Contract Staff Support	-	-	-0.234	-	-0.234
• Economic Assumptions	-	-	-0.038	-	-0.038
• Other Program Adjustments	4.174	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Project: P443: *Unmanned Systems Road Maps*		

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Office of Secretary Of Defense	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Congressional Add: *None*	-	-
Congressional Add Subtotals for Project: P443	-	-
Congressional Add Totals for all Projects	-	-

Change Summary Explanation

Defense Efficiency – Baseline Review. As part of the Department of Defense reform agenda, implements a zero-based review of the organization to align resources to the most critical priorities and eliminate lower priority functions.

Defense Efficiency – Report, Studies, Boards and Commissions. As part of the Department of Defense reform agenda, reflects a reduction in the number and cost of reports, studies, DoD Boards and DoD Commissions below the aggregate level reported in previous budget submission.

Defense Efficiency – Contractor Staff Support. As part of the Department of Defense reform agenda, reduces funds below the aggregate level reported in the previous budget submission for contracts that augment staff functions.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*	PROJECT P440: *UAS Airspace Integration*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
P440: *UAS Airspace Integration*	30.663	32.082	24.704	-	24.704	26.957	20.918	17.831	22.447	Continuing	Continuing
Quantity of RDT&E Articles											

Note

PE 0305220N: RQ-4 UAV (BAMS UAS) contains additional funding for the common GH/BAMS ABSAA development. The Navy BAMS UAS program office is managing the common GH/BAMS ABSAA development.

A. Mission Description and Budget Item Justification

In FY2012 the Department plans to transition from the U-2 to the Global Hawk (GH), but today's restrictions on airspace access preclude this. GH and the Broad Area Maritime Surveillance (BAMS) UAS, also an RQ-4 aircraft, need an autonomous, sense-and-avoid (SAA) as an alternate means of compliance to Title 14 Code of Federal Regulations, Part 91.113, requirement to see-and-avoid other aircraft. MQ-1 Predator, MQ-1C Gray Eagle, and MQ-9 Reaper have similar requirements for SAA capability; their SAA technology development will leverage the GH/BAMS technology. Development of a Ground Based Sense-and-Avoid (GBSAA) system using existing technology can provide a near-term solution for improved airspace access, both for terminal operations (e.g., Beale AFB, GH transit to/from controlled airspace) and for operations/training within the GBSAA system's coverage area (e.g., Gray Eagle at El Mirage, Shadow operations at Cherry Point).

Provides joint funding for the BAMS and GH programs to accelerate the development of a common onboard, autonomous SAA (ABSAA) capability (one upon which a similar SAA system for Predator, Gray Eagle and Reaper can be based). BAMS program is the lead for the ABSAA development. Also, provideds a GBSAA capability to meet DoD training and operational objectives at locations where airspace restrictions currently limit training and operations, and establishes dedicated funding to develop standards, modeling and simulation tools, and technology to enable DoD UAS to routinely access the national and international airspace systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Unmanned Aircraft System Airspace Integration Initiatives	30.663	32.082	24.704
Description: Starting in FY2010 the Department's sense-and-avoid (SAA) developmental efforts are enhanced by this defense-wide program element. This program provides joint funding to accelerate the development of ABSAA systems and standards to enable UAS to routinely access the national and international airspace systems, and provides a GBSAA solution for improved airspace access in the near-term. This program also develops modeling and simulation tools needed to validate the systems and standards.			
FY 2010 Accomplishments: ABSAA - Completed Multiple Intruder Autonomous Avoidance Phase 3 development and flight demonstration activities using UAS surrogate aircraft and a surrogate radar sensor as risk reduction for new radar development. This included hardware sensor development, integration and test, sensor software development coding and test, and data development.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*	PROJECT P440: *UAS Airspace Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
ABSAA - Phase 0 Extension - Analyzed existing Global Hawk technical baseline and identify potential integration solutions and potential risks/issues. Conducted Co-Site EMI Assessment for Global Hawk of ABSAA hadware components. Developed "Use Cases" derived from continued requirements decomposition and use of USG provided ConEmp. Continued enhancement and refinement of DoDAF artifacts. Conducted initial integration planning toward testing in surrogate and RQ-4 aircraft. Developed Requirements Verification/Validation Plan. ABSAA Phase 1A - Initiated development of a Critical Design Review (CDR) for a common, autonomous ABSAA system that satisfies common requirements of the United States Air Force (USAF) Global Hawk (GH) and United States Navy (USN) Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft Systems (UAS) that is scalable to medium-altitude UAS. The ABSAA system will provide a common, and modular, hardware and software solution for integration onto GH and the BAMS UAS. The integration effort will be implemented during the next phase ("Phase 1B"). Standards Development - Initiated the development of airworthiness criteria, standards, and methods of compliance for both fixed and rotary wing UAS (GCS and links included) to enable UAS to more routinely access the NAS with less operational restrictions. These criteria, standards, and methods are being prepared for incorporation into MIL-HDBK-516. Conducted an Analysis of Alternatives (AoA) to determine the best safety approach for providing a comprehensive assessment of the risks associated with unmanned aircraft system (UAS) operations in the National Airspace System (NAS). Tailored the recommended safety approach for Terminal Area Operations so as to align with the DoD Airspace Integration Plan and assist the ongoing Ground Based Sense and Avoid (GBSAA) effort. In response to guidance provided by the National Aeronautics Research and Development Plan, published by the National Science and Technology Council, conducted several workshops, performed analysis and derived a Target Level of Safety (TLS) for UAS. Performed requirements analysis to identify, develop, and document the performance requirements for UAS operations in the Terminal Area Profile of the Airspace Integration Plan, which includes airspace Classes C, D, E, and G. Coordinated performance requirements development within appropriate standards development organizations. Conducted a UAS Standards Gaps analysis to identify UAS-specific industry standards required for successful integration of UAS into the NAS. Modeling & Simulation (M&S) - Provided Modeling, Simulation and Analysis (MS&A) for the requirements, standards, and safety efforts previously mentioned. Specifically developed an MS&A Evaluation Plan, MS&A Data Analysis Plan, MS&A Support Plan, and initiated the M&S Roadmap and Investment Plan. Developed implementation processes, measures and guidance for any DoD UAS basing location.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*	PROJECT P440: *UAS Airspace Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
GBSAA –Developed prototype GBSAA Self-Separation System consisting of sensors, data networks, communications, avoidance logic and a user interface which was successfully employed at El Mirage, CA. Following a deliberate process with US Army airworthiness authorities, issued an Airworthiness Certificate for ERMP Sky Warrior to conduct night flights using GBSAA to replace observers/chase planes, thus validating GBSAA as a mitigation, or an alternate means of compliance, to the "see and avoid" requirement levied in CFR Part 91.113. Conducted successful daytime demonstration of the GBSAA system to the FAA. Submitted a COA request and Safety Case to FAA for use of GBSAA for UAS night flights at El Mirage. Established baseline requirements for a GBSAA System to include: sensors, operator interface, tracker, algorithms, and system network and communications. Developed repeatable process for the installation, testing, qualification, and employment of a GBSAA system. Developed documents (CONEMP, Requirements, Operational Procedures, Airspace Characterization, Operational Safety Assessment) to serve as templates to standardize and expedite other SAA efforts. Established a standard safety case process for implementation and approval of GBSAA, and held a collaborative workshop with all Military Services, NASA, and academia. Enabled joint development and demonstration of common standards, architectures and technologies that address UAS-specific issues across all Military services. Also collaborated with the Department of Homeland Security (CBP and U.S Coast Guard) in order to share knowledge of GBSAA lessons-learned to facilitate adoption of standards being developed. Successfully developed and demonstrated a prototype SAA Test Bed (TB).			
FY 2011 Plans: ABSAA - Complete Multiple Intruder Autonomous Avoidance Phase 4 development and flight demonstration activities using UAS surrogate aircraft and a new radar sensor, maturing the system to TRL 6. This includes hardware sensor development, integration and test, sensor software development coding and test, and data development. ABSAA - Phase 1A - This CDR effort will leverage the joint GH/BAMS operational, functional, and hazard analyses from the "Phase 0" effort to support the definition of the SAA technical requirements for the RQ-4 aircraft. ABSAA includes an integrated suite of sensors, decision logic algorithms, data recording, pilot displays, and prognostics & health management (P&HM) necessary to manage collision risk to an acceptable level of safety across the expected range of operational scenarios and mission environments for the RQ-4 UAS. An acceptable level of safety for the ABSAA system will be established through comprehensive system and operational safety analysis, modeling, simulation and test. These activities and associated analyses will result in design trades that will optimize system performance to achieve an acceptable level of safety, and to satisfy requirements for DoD compliance and operational approval. Standards Development - Develop airworthiness criteria, standards, and methods of compliance for both fixed and rotary wing UAS (GCS and links included) for incorporation into MIL-HDBK-516. Develop a consistent methodology across all Military Services for determining an appropriate Third Party Target Level of Safety (3PTLS) methodology for calculating accepted risk			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*	PROJECT P440: *UAS Airspace Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
to third parties on the ground due to a potential UA crash in a populated area. Tailor the safety assessment for additional UAS Profiles to include lateral and vertical transit operations. Perform requirements analysis to identify, develop, and document the performance requirements for UAS lateral and vertical transit operations within Classes A, C, D and E airspace as defined in the DoD Airspace Integration Plan. Coordinate performance requirements development within appropriate standards development organizations (SDOs). Develop a UAS Standards Development Plan that defines how the necessary UAS standards gaps will be closed. Generate and publish new UAS technical standards as identified and prioritized in the Standards Gaps Analysis with initial focus on Terminal Area Operations. Modeling & Simulation (M&S) - Provide MS&A to the proposed FY11 requirements and standards efforts as well as the safety analysis activities. Complete the FY11 M&S Roadmap and update the MS&A Evaluation Plan, MS&A Data Analysis Plan, and MS&A Support Plan. Develop new and update previous implementation processes, measures, and guidance for DoD UAS operators to use at all DoD UAS basing locations. GBSAA – Phase 1: Develop, verify, and validate incremental improvements for Phase 1 of Self-Separation such as data correlation/fusion capability and initial maneuvering in airspace with other aircraft. Phase 2 Self-Separation development: define, develop and test maneuver algorithm requirements, perform optical sensor trade studies, analysis of projection algorithm uncertainty, a data fusion requirements study, development of an improved user interface, and initial integration with the GCS. Test and validate additional radars (ASR-9/ASR-11) for wide-area GBSAA functionality and applicability. Perform analysis and determine key criteria for common SAA displays. Conduct testing, verification, validation for both ABSAA and GBSAA,to include optimization of SAA systems and their interfaces, including those to air vehicles and ground stations. Develop and publish GBSAA System Qualification Criteria. Support initial assessments of new site requests from across DoD. Facilitate the implementation of GBSAA at additional sites in accordance with the standard process developed previously. Conduct collaborative workshops to enable joint development and demonstration of common standards, architectures and technologies that address UAS-specific issues across all Military Services. ***FY 2012 Plans:*** ABSAA - Initiate planning to develop ABSAA through the CDR. Build, test, and fix Autonomous ABSAA software to support a sucesssful CDR. Standards Development - Complete the update of MIL-HDBK-516 for airworthiness criteria, standards, and methods of compliance for both fixed and rotary wing UAS. Tailor the safety assessment for additional UAS Profiles to include dynamic operations. Perform requirements analysis to identify, develop, and document the performance requirements for routine UAS operations in all classes of airspace to include dynamic operations. Coordinate the performance requirements developed within			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*	PROJECT P440: *UAS Airspace Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
appropriate standards development organizations. Generate and publish new UAS technical standards as identified and prioritized in the Standards Gaps Analysis. Provide an updated Standards Gaps List and Standards Development Plan based on progress from FY11. Modeling & Simulation (M&S) - Provide MS&A to the proposed FY12 safety, requirements and standards efforts as well as the safety analysis activities. Update the M&S Roadmap, MS&A Evaluation Plan, MS&A Data Analysis Plan, and MS&A Support Plan. Develop new and update previous implementation processes, measures, and guidance for DoD UAS operators to use at all DoD UAS basing locations. GBSAA – Design, test and implement Phase 1 technology upgrades as required. Demonstrate GBSAA Phase 2 prototype capability. Incrementally improve all component capabilities including: sensors, tracker, correlation/fusion, network and communications, maneuver algorithms, and user interfaces. Refine repeatable and validated process as necessary to incorporate test results, lessons learned, and trade study results. Collaborate with all Military Services to evaluate sensor, fusion, algorithm evaluation and operator Interfaces. Conduct collaborative workshops to enable joint development and demonstration of common standards, architectures and technologies that address UAS-specific issues across all Military Services. Begin deliberate planning for GBSAA Phase 3, which is the integration of GBSAA and ABSAA in order to realize unfettered access to the NAS by UAS. Coordinate and conduct initial Phase 3 assessments.			
Accomplishments/Planned Programs Subtotals	30.663	32.082	24.704

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0604400D8Z: *Unmanned Aircraft Systems Common Development*	PROJECT P442: *Interoperability*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
P442: *Interoperability*	28.800	17.210	-	-	-	-	-	-	-	Continuing	Continuing
Quantity of RDT&E Articles											

Note

FY2010 includes a $6 million congressional add.

A. Mission Description and Budget Item Justification

The UAS Common Ground Station Demonstration project will develop and demonstrate an interoperable, standards-based, open ground station architecture for MQ-1 (Predator/Gray Eagle), MQ-5 (Hunter), MQ-8 (Fire Scout), and MQ-9 (Reaper) UAS. The intent is to improve joint- and coalition-interoperability and to promote competition through the implementation of open standards and open architectures.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: UAS Common Ground Station Demonstration	28.800	17.210	-
Description: Develop and demonstrate an interoperable, standards-based, open ground station architecture for MQ-1 (Predator/Gray Eagle), MQ-5 (Hunter), MQ-8 (Fire Scout), and MQ-9 (Reaper) UAS. The intent is to improve joint- and coalition-interoperability and to promote competition through the implementation of open standards and open architectures.			
FY 2010 Accomplishments: Completed scheduled release of versions 0.5 and 1.0 of the architecture software focusing on data standards and data flow. Developed and completed a plan with an initial subset of services that will be demonstrated as a representative sample of GCS collaboration with industry. Developed an Open Business Model (OBM) that represents a different government approach to creating services for use by the Military Services, third parties, and vendors. Developed a USIP conformance certification process certified by the JROC that establishes a “custodial path” for documents to ensure validation and publication into the DISR.			
FY 2011 Plans: Develop an “Open” approach to the v2.0 software plan. Transition scheduled projects to Programs of Record and user communities. Develop “3rd Party” vendor Integration Plan to reach out to additional vendors to develop services for future use. Establish a path forward that allows Industry partners an opportunity to develop and share intellectual property through a body comprised of a federation of industry representatives within the OBM.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Develop Interoperability Roadmap based on top down capabilities assessment. Conduct a review of remote video terminals and develop a plan for prototyping a government-owned “best of breed” version that can be released to vendors for open competition.			
Accomplishments/Planned Programs Subtotals	28.800	17.210	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

n/a

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense			DATE: February 2011
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COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
P443: *Unmanned Systems Road Maps*	-	-	0.416	-	0.416	0.431	0.447	0.461	0.477	Continuing	Continuing
Quantity of RDT&E Articles											

A. Mission Description and Budget Item Justification

This effort supports the Department's Unmanned Systems Roadmap and updates. The Unmanned Systems Roadmap provides a DoD vision for the continuing development, fielding and employment of unmanned systems technologies. This roadmap defines a common vision, establishes the current state of unmanned systems in today's force, and outlines a strategy for the common challenges that must be addressed to achieve the shared vision. Funding for this effort was previously contained within P440 and P442 of this Program Element.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Unmanned Systems Roadmap ***Description:*** Develops the Department's Unmanned Systems Roadmap and updates. ***FY 2012 Plans:*** Update the Department's Unmanned Systems Roadmap and perform related studies supporting the Department's vision for unmanned systems.	-	-	0.416
Accomplishments/Planned Programs Subtotals	-	-	0.416

	FY 2010	FY 2011
Congressional Add: None ***FY 2010 Accomplishments:*** N/A	-	-
Congressional Adds Subtotals	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Provide up to date Unmanned Systems Roadmap providing a DoD vision for the continuing development, fielding and employment of unmanned systems technologies.