PE NUMBER: 0603791F
PE TITLE: International Space Cooperative R&D

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2008

BUDGET ACTIVITY: 04 Advanced Component Development and Prototypes (ACD&P)

PE NUMBER AND TITLE: 0603791F International Space Cooperative R&D

Cost ($ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	0.574	0.610	0.627	0.643	0.652	0.664	0.678	Continuing	TBD
5035 Intl Space Coop R&D	0.574	0.610	0.627	0.643	0.652	0.664	0.678	Continuing	TBD

In FY 2003, from PE 0603790F, 64NATO, NATO Coop R&D, space-related efforts transferred to PE 0603791F, 645035, Intl Space Coop R&D, in order to clearly identify space-related projects and funding.

(U) A. Mission Description and Budget Item Justification

These funds will be used to help implement space-related international cooperative research, development, and acquisition (ICRD&A) agreements with North Atlantic Treaty Organization (NATO) member states and major non-NATO allies (Argentina, Australia, Egypt, Bahrain, Israel, Japan, Jordan, and Rep. of Korea (South Korea), Kuwait, Morocco, New Zealand, Pakistan, Taiwan, Thailand, and Phillipines) and friendly foreign countries (Austria, Brazil, Bulgaria, Finland, India, Singapore, South Africa, Sweden, Switzerland, and Ukraine). The program implements the provisions of Title 10 U.S. Code, Section 2350a on NATO Cooperative Research and Development (R&D). The program was established to improve cooperation among NATO nations, and later major non-NATO allies, in research, development, and acquisition. The legislation authorized funds to significantly improve United States (US) and allied conventional defense capabilities by leveraging the best defense technologies, eliminating costly duplication of R&D efforts, accelerating the availability of defense systems, and promoting US and allied interoperability or commonality. The program will be reported as required by Title 10 U.S. Code, Section 2350a(f). This program element funds the implementation of space-related Air Force ICRD&A agreements in (1) Basic Research (2) Applied Research (3) Advanced Technology Development (4) Advanced Component Development and Prototypes (5) System Development and Demonstration and (6) RDT&E Management Support. This PE is designated in Budget Activity 4 because most of the ICRD&A projects support specific systems, include all efforts necessary to evaluate integrated technologies in as realistic an operating environment as possible to assess the performance or cost reduction potential of advanced technology, and help expedite technology transition from the laboratory to operational use.

(U) B. Program Change Summary ($ in Millions)

		FY 2007	FY 2008	FY 2009
(U)	Previous President's Budget	0.591	0.619	0.633
(U)	Current PBR/President's Budget	0.574	0.610	0.627
(U)	Total Adjustments	-0.017		
(U)	Congressional Program Reductions			
	Congressional Rescissions			
	Congressional Increases			
	Reprogrammings			
	SBIR/STTR Transfer	-0.017		
(U)	Significant Program Changes:			

Exhibit R-2a, RDT&E Project Justification			DATE: February 2008
BUDGET ACTIVITY: 04 Advanced Component Development and Prototypes (ACD&P)	PE NUMBER AND TITLE: 0603791F International Space Cooperative R&D	PROJECT NUMBER AND TITLE: 5035 Intl Space Coop R&D	

Cost ($ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
5035 Intl Space Coop R&D	0.574	0.610	0.627	0.643	0.652	0.664	0.678	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

These funds will be used to help implement space-related international cooperative research, development, and acquisition (ICRD&A) agreements with North Atlantic Treaty Organization (NATO) member states and major non-NATO allies (Argentina, Australia, Egypt, Bahrain, Israel, Japan, Jordan, and Rep. of Korea (South Korea), Kuwait, Morocco, New Zealand, Pakistan, Taiwan, Thailand, and Phillipines) and friendly foreign countries (Austria, Brazil, Bulgaria, Finland, India, Singapore, South Africa, Sweden, Switzerland, and Ukraine). The program implements the provisions of Title 10 U.S. Code, Section 2350a on NATO Cooperative Research and Development (R&D). The program was established to improve cooperation among NATO nations, and later major non-NATO allies, in research, development, and acquisition. The legislation authorized funds to significantly improve United States (US) and allied conventional defense capabilities by leveraging the best defense technologies, eliminating costly duplication of R&D efforts, accelerating the availability of defense systems, and promoting US and allied interoperability or commonality. The program will be reported as required by Title 10 U.S. Code, Section 2350a(f). This program element funds the implementation of space-related Air Force ICRD&A agreements in (1) Basic Research (2) Applied Research (3) Advanced Technology Development (4) Advanced Component Development and Prototypes (5) System Development and Demonstration and (6) RDT&E Management Support. This PE is designated in Budget Activity 4 because most of the ICRD&A projects support specific systems, include all efforts necessary to evaluate integrated technologies in as realistic an operating environment as possible to assess the performance or cost reduction potential of advanced technology, and help expedite technology transition from the laboratory to operational use.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2007	FY 2008	FY 2009
(U) Measurement of High-Latitude Ionospheric Structures and System Effects from Northeast Greenland (AFRL/Denmark) - Planned cooperative project to accurately model, simulate, recognize, and forecast polar ionospheric conditions impacting DoD systems. The project will collect multi-instrument measurements of ionospheric conditions at Station Nord in Greenland for the purpose of furthering basic research into mechanisms creating ionospheric disturbances, improving high-latitude ionosphere models, simulations, and providing space weather situational awareness and forecast tools.	0.025	0.000	0.000
(U) Cooperation In Navigation Warfare Technology Demonstrator and System Prototype Projects (PA) SMC/GP (GPS Joint Program Office) and ASD/NII/UK - Cooperative project to conduct collaborative studies and cooperatively develop advance counterSATNAV capabilities that can be employed from current and projected EA platforms. Developed technologies will be jointly tested to assure desired effects are achieved and that there is minimal fraticide impact on friendly forces. Additionaly, an initial concept of employment or operations will be collectively developed and tested by the participants in order to assess optimal capabilities in varying threat situations.	0.175	0.000	0.000
(U) Forecasting Communication and Navigation Disruptions due to Inonspheric Disturbance During Solar Minumum (AFRL/VSBX) and Australia - Planned cooperative project to collaborate with Australia to study ionospheric	0.274	0.266	

Exhibit R-2a, RDT&E Project Justification		DATE February 2008
BUDGET ACTIVITY 04 Advanced Component Development and Prototypes (ACD&P)	PE NUMBER AND TITLE 0603791F International Space Cooperative R&D	PROJECT NUMBER AND TITLE 5035 Intl Space Coop R&D

(U)	B. Accomplishments/Planned Program ($ in Millions)	FY 2007	FY 2008	FY 2009
	phenomena which impact communication, navigation and radio frequency (RF) surveillance systems. The key research focus will be on forecasting ionospheric disturbances and their impact on systems such as Ultra High Frequency (UHF) Satellite Communication (SATCOM) and GLOBAL Positioning System (GPS) navigation. Ionospheric phenomena had an adverse impact on DoD satellite communication and navigation systems in recent operations in Afghanistan and during Operation Iraqi Freedom (OIF); future military operations will almost certainly be conducted in regions where ionospheric disturbances occur and C31 systems may be vulnerable. The Communication/Navigation Outage Forecast System System (C/NOFS) Advance Concept Technical Demonstration (ACTD) is dedicated to providing space-based forecasts of the disturbances that cause impacts on radio frequency (RF) systems.			
(U)	Multidemsional Diffusion of High Energy Radiation Belt Electrons (AFRL / UK) - High energy electrons constituting the radiation belts are a primary hazard for USAF and other satellites. They are often enhanced during geomagnetic storms, but not in a reliably predictable way. Thus, understanding and forecasting their behavior is a major research goal. The physics of the radiation belts is believed to be largely controolled by electromajnetic waves, which casue diffusion in the otherwise constant particle energy (E), equatorial pitch angle (a), and radial distance (L shell parameter). The wave amplitudes can become gratly enhanced during magnetic storms and substorms, leading to a rapid increase in particle energy and a rapid decrease in particle distance from the earth (through decrease in L, a0, or both), which increases the risk to satellites in medium or low earth orbit. Wave-particle interactions are also a dominant lost mechanism for energetic electrons, so the detailed evolution of the particle distribution depends on a complex balance of several diffusion rates.	0.100	0.125	0.119
(U)	Atmospheric Specification and Neutral Densisty Models (AFRL / Taiwan) - This effort is to improve specification of the ionosphere/thermosphere with the ultimate goal of improved atmospheric neutral density forecast.	0.000	0.219	0.150
(U)	Surveillance and Military Utility of Hyperspectral Imagery in the Reflective and Emissive Spectral Bands (AFRL / Australia) - The proposed effort will advance imaging spectroscopy for military remote sensing in two ways. The first and initial focus of the effort will be the quantification of the military utility of space-based hyperspectral imagery in the reflective spectrum (0.38 to 2.5 microns) utilizing extensive datasets taken with the TacSat-3/Advanced Responsive Tactically Effective Military Imaging Spectrometer over both U. S. and Australian sites.	0.000	0.000	0.125
(U)	Mission Study of Operational System for Coronal Mass Ejection Detection and Forecasting (AFRL / UK) - The objective of the proposed cooperative effort is a preliminary design study of an operational system for 24/7 monitoring of Coronal mass ejections (CMEs), primarily aimed at forecasting their terrestrial impacts and effects. CMEs cause the largest geomagnetic storms and pose hazards to DoD space assets. Advance warning is required to	0.000	0.000	0.125

Exhibit R-2a, RDT&E Project Justification		DATE: February 2008
BUDGET ACTIVITY: 04 Advanced Component Development and Prototypes (ACD&P)	PE NUMBER AND TITLE: 0603791F International Space Cooperative R&D	PROJECT NUMBER AND TITLE: 5035 Intl Space Coop R&D

(U) B. Accomplishments/Planned Program ($ in Millions)

		FY 2007	FY 2008	FY 2009
	mitigate or prevent impairment of space assets.			
(U)	Raven Class Telescopes for Space Situational Awareness Research and Development (AFRL / Australia) - The purpose of this effort is to perform research and development on the topic of Space Situational Awareness (SSA). The SSA research and development is predominantly high-accuracy satellite position determination and prediction, and characterization of satellites that too small or too distant to be imaged by optical telescopes.	0.000	0.000	0.108
(U)	Total Cost	0.574	0.610	0.627

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
(U) N/A									

(U) D. Acquisition Strategy

A principal goal of the International Space Cooperative R&D program is to effectively utilize the aggregate resources invested by the US and our allies in space-related R&D. This program element provides the critical funding incentive needed to pursue space-related ICRD&A agreements and helps to (a) leverage USAF and allied resources through cost sharing and economies of scale; (b) exploit the best US and allied technologies for equipping coalition forces; (c) demonstrate areas of commonality or interoperability with our allies; and (d) accelerate the availability of defense technology and systems. Candidate projects are reviewed and approved by the USD(AT&L). An international agreement defining project objectives, responsibilities and costs is required prior to release of funds. To obtain these funds and ensure service commitment, projects are selected from existing or new space-related RDT&E programs funded in the Future Years Defense Plan (FYDP). Project offices must show matching funds and contributions from associated program elements and equitable allied funding. As appropriate, funding responsibility for out-year requirements and follow-on efforts are transferred to the project office and associated program elements. Most contracts are awarded after full and open competition.

Exhibit R-3, RDT&E Project Cost Analysis

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
04 Advanced Component Development and Prototypes (ACD&P)	**0603791F International Space Cooperative R&D**	**5035 Intl Space Coop R&D**

(U) Cost Categories (Tailor to WBS, or System/Item Requirements) ($ in Millions)	Contract Method & Type	Performing Activity & Location	Total Prior to FY 2007 Cost	FY 2007 Cost	FY 2007 Award Date	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	Cost to Complete	Total Cost	Target Value of Contract
(U) Product Development												
AFRL Hanscom AFB, MA	TBD									Continuing	TBD	TBD
AFRL, WPAFB				0.236	Oct-07	0.254	Oct-08	0.258	Oct-09	Continuing	TBD	TBD
AEDC/DO										Continuing	TBD	TBD
SMC, LAAFB, CA				0.338	Oct-07	0.356	Oct-08	0.369	Oct-09	Continuing	TBD	TBD
Subtotal Product Development			0.000	0.574		0.610		0.627		Continuing	TBD	TBD
Remarks:												
(U) Support												
AFRL, WPAFB	TBD									Continuing	TBD	TBD
None											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		Continuing	TBD	TBD
Remarks:												
(U) Test & Evaluation												
TBD	TBD									Continuing	TBD	TBD
None											0.000	
Subtotal Test & Evaluation			0.000	0.000		0.000		0.000		Continuing	TBD	TBD
Remarks:												
(U) Management												
											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	0.000
Remarks:												
(U) Total Cost			0.000	0.574		0.610		0.627		Continuing	TBD	TBD

Exhibit R-4, RDT&E Schedule Profile

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
04 Advanced Component Development and Prototypes (ACD&P)	0603791F International Space Cooperative R&D	5035 Intl Space Coop R&D

ICR&D Project	Fiscal Year	Start Date	End IA	PE
Measurement of High-Latitude Ionospheric Structures and System Effects from Northeast Greenland	FY04	Sep-05	Sep-11	63791F
Cooperation In Navigation Warfare Technology Demonstrator and System Prototype Projects	FY05	Jun-07		63791F
Forecasting Communication and Navigation Disruptions due to Inonspheric Disturbance During Solar Minumum	FY06	Aug-07		63791F
Multidemsional Diffusion of High Energy Radiation Belt Electrons	FY07			63791F
Atmospheric Specification and Neutral Densisty Models	FY08			63791F
Surveillance and Military Utility of Hyperspectral Imagery in the Reflective and Emissive Spectral Bands	FY09			63791F
Mission Study of Operational System for Coronal Mass Ejection Detection and Forecasting	FY09			63791F
Raven Class Telescopes for Space Situational Awareness Research and Development	FY09			63791F

Exhibit R-4a, RDT&E Schedule Detail		DATE February 2008
BUDGET ACTIVITY **04 Advanced Component Development and Prototypes (ACD&P)**	PE NUMBER AND TITLE **0603791F International Space Cooperative R&D**	PROJECT NUMBER AND TITLE **5035 Intl Space Coop R&D**

(U)	**Schedule Profile**	FY 2007	FY 2008	FY 2009
(U)	Measurement of High-Latitude Ionospheric Structures and System Effects	1Q		
(U)	- Data collection begins	4Q		
(U)	Cooperation in Navigation Warfare Technology	1Q		
(U)	- Data collection begins	4Q		
(U)	Forecasting Comm. and Navigation Disruption due to Ionospheric Disturbances During Solar Minimum	3Q		
(U)	- Data collection begins		1Q	
(U)	Multidimensional Diffusion of High Energy Radiation Belt Electrons	3Q		
(U)	- Project Agreement Signed	4Q		
(U)	- Data collection begins		1Q	
(U)	Atmospheric Specification and Neutral Density Models		1Q	
(U)	- Project agreement signed		2-3Q	
(U)	- Data collection begins		3-4Q	
(U)	Surveillance and Military Utility of Hyperspectral Imagery in the Reflective and Emissive Spectral Bands			1Q
(U)	- Project agreement signed			2Q
(U)	- Data collection begins			3Q
(U)	Mission Study of Operational System for Coronal Mass Ejection Detection and Forecasting			1Q
(U)	- Project agreement signed			2Q
(U)	- Data collection begins			3Q
(U)	Raven Class Telescopes for Space Situational Awareness Research and Development			1Q
(U)	- Project agreement signed			2Q
(U)	- Data collection begins			3Q