

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2008
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BUDGET ACTIVITY 04 Advanced Component Development and Prototypes (ACD&P)	PE NUMBER AND TITLE 0603845F Transformational SATCOM (TSAT)
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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	700.429	804.739	842.974	985.113	1,237.783	1,514.357	1,791.467	Continuing	TBD
4944 ADVANCED WIDEBAND SYSTEM	700.429	804.739	842.974	985.113	1,237.783	1,514.357	1,791.467	Continuing	TBD

(U) A. Mission Description and Budget Item Justification

The Department of Defense remains committed to producing the communications capabilities envisioned by Transformational Satellite Communications System (TSAT). However, current funding constraints have led the Department to reassess the optimal investment strategy for satisfying future satellite communications requirements. In parallel with this assessment, the TSAT program will continue with current programmatic activities, including space segment source selection actions. Preserving this key partnership with industry will enhance the DoD's responsiveness to deliver the right communications capabilities when they are needed by the user community.

The TSAT will provide DoD with high data rate Military Satellite Communications (MILSATCOM) and Internet-like services as defined in the Transformational Communications Architecture (TCA). As the spaceborne element of the Global Information Grid (GIG), it will extend the GIG to users without terrestrial connections providing increased connectivity and data transfer capability, vastly improving satellite communications for the warfighter. TSAT's Internet Protocol (IP) routing will connect thousands of users through networks rather than limited point-to-point connections. Additionally, TSAT will enable high data rate connections to Space and Airborne Intelligence, Surveillance, and Reconnaissance (SISR, AISR) platforms.

The TSAT program consists of a five satellite constellation (a sixth satellite will be procured to ensure mission availability), TSAT satellite operations centers (TSOC) for on-orbit control, TSAT Mission Operations System (TMOS) to provide network management, and ground gateways. TSAT will incorporate radio frequency (RF) and laser communications links to meet defense and intelligence community requirements for high data rate, protected communications. The space segment will make use of key technology advancements that have proven mature by independent testing of integrated subsystem brass boards to achieve a transformational leap in SATCOM capabilities. These technologies include but are not limited to: laser communications, Internet protocol based packet switching, bulk and packet encryption/decryption, concentrated theater coverage area antennas (in support of battle command-on-the-move), dynamic bandwidth and resource allocation techniques, and protected bandwidth efficient modulation. Technical risk reduction activities, leveraging successful partnerships with industry and Massachusetts Institute of Technology (MIT) Lincoln Laboratories, have significantly improved the maturity of key critical technology elements essential for the TSAT program. Technology maturation activities remain on schedule with the prime contractors and numerous directed technology development contractors.

In FY09, following the FY08 award of the space segment development and production contract, the contractor will develop/update design documents and Interface Control Documents. The contractor will also continue to mature the laser communications terminal brassboard and the next generation processor/router brassboard to support the next phase of risk reduction testing and the first round of Early Integration Activity testing. Additionally, continued work in ASIC maturation/design/build will occur along with technology needs forecasting and maturation of spacecraft and payload designs. The contractor will complete an Integrated Baseline Review and participate in the Program Synchronization Review.

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The TMOS single contract was awarded in January 2006. In FY09, the TMOS overall efforts will include the development/update of design documentation, Interface Control Documents, Network Prototyping, Integration and Test plans, and initial software development. The contractor will also continue to support TSAT interface and integration activities, related risk mitigation, TSAT system level requirements maturation, and requirements studies, and will continue design efforts and program/baseline synchronization efforts with the selected space segment contractor in preparation for the TSAT Program Synchronization Review.

Funds are in Budget Activity 4, Advanced Component Development and Prototypes, since it funds TSAT technology development and engineering design activities including risk reduction and system definition.

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

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Previous President's Budget	732.661	963.585	1,227.784
(U) Current PBR/President's Budget	700.429	804.739	842.974
(U) Total Adjustments	-32.232	-158.846	
(U) Congressional Program Reductions		-153.708	
Congressional Rescissions		-5.138	
Congressional Increases			
Reprogrammings	-9.468		
SBIR/STTR Transfer	-22.764		

(U) **Significant Program Changes:**

Department is reassessing the optimal investment strategy for satisfying future capabilities envisioned by TSAT and in parallel continuing the Space Segment source selection. FY09 funding reduction enables program to respond to revised investment strategy and delays Preliminary Design Review from late FY09 to mid FY11.

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04 Advanced Component Development and Prototypes (ACD&P)		0603845F Transformational SATCOM (TSAT)					4944 ADVANCED WIDEBAND SYSTEM			
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4944 ADVANCED WIDEBAND SYSTEM	700.429	804.739	842.974	985.113	1,237.783	1,514.357	1,791.467	Continuing	TBD	
Quantity of RDT&E Articles	0	0	0	0	0	0	0			

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Control Documents, Network Prototyping, Integration and Test plans, and initial software development. The contractor will also continue to support TSAT interface and integration activities, related risk mitigation, TSAT system level requirements maturation, and requirements studies, and will continue design efforts and program/baseline synchronization efforts with the selected space segment contractor in preparation for the TSAT Program Synchronization Review.

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(U) <u>B. Accomplishments/Planned Program (\$ in Millions)</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Continue System Definition and technology development for key areas to include laser communications, antenna design, encryption technologies, dynamic bandwidth and resource allocation, bandwidth efficient modulation, network operations, and networking protocols; conduct Integration/Concept of Operations (CONOPS) demonstrations	81.149	80.801	64.155
(U) Provide Technical Support	53.065	72.544	75.541
(U) Provide Program Support	8.798	13.795	14.365
(U) Continue engineering design activities including risk reduction, and complete system design review for the first TSAT satellite	367.477	193.572	
(U) Award space segment contract and begin preliminary design development		221.845	473.559
(U) Continue TSAT Mission Operations System ground segment and network management/operations management software	129.379	132.947	123.656
(U) Continue systems engineering and integration support	60.561	68.069	69.892
(U) Continue qualification and production of radiation-hardened components for USAF/DOD space programs		21.166	21.806
(U) Total Cost	700.429	804.739	842.974

(U) <u>C. Other Program Funding Summary (\$ in Millions)</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) RDT&E, AF									
(U) PE 0603854F, Project 644870, CCS-C, R-52	15.532	19.091	12.422	13.201	12.096	11.255	6.532	Continuing	TBD
(U) PE 0603854F, Project 644811, WGS, R-52	28.466	0.000	0.000	0.000	0.000	0.000	0.000		302.276
(U) Other APPN									
(U) MPAF, PE 0303600F, WGS, P-19,20	412.498	322.334	22.492	40.419	43.705	29.601	23.898	Continuing	TBD

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

(U) OPAF, PE 0303600F, CCS-C	0.000	0.531	0.000	0.000	0.000	0.000	0.000	0.000	17.667
(U) OPAF, PE 0303600F, WGS	0.000	0.000	0.000	1.701	1.701	0.000	0.000	0.000	30.166
(U) MILCON, PE 0303602F, TSAT	0.000	0.000	0.000	5.178	49.208	7.649	4.822	Continuing	TBD
(U) MPAF, PE 0303602F, TSAT	0.000	0.000	0.000	0.000	0.000	0.000	181.000	Continuing	TBD
(U) OPAF, PE 0303602F, TSAT	0.000	0.000	0.000	0.000	0.000	37.816	0.000	Continuing	TBD

(U) D. Acquisition Strategy

On 20 January 2004, the TSAT program entered Phase B, Risk Reduction and Design Development. Phase B space segment contracts (Cost Plus Fixed Fee) were awarded to Lockheed Martin and Boeing in late January 2004. However, on 20 June 2006, the Milestone Decision Authority rescinded KDP-B approval in order to appropriately align TSAT program activity with the revised National Security Space Acquisition Policy (NSS 03-01). The update to NSS 03-01 revised the space acquisition framework to make it more consistent with critical systems engineering events that must inform acquisition decisions. One result of the revision was the realignment of Key Decision Point B (KDP-B) with completion of a space program's System Design Review (SDR). A successful SDR was completed in April 2007, and a Defense Space Acquisition Board will convene for a new KDP-B approval. In FY08, after a full and open competition, the final space segment development contractor will be selected.

In October 2003, after a full and open competition, a Systems Engineering and Integration (SE&I) contract for four 1-year options was awarded to Booz Allen Hamilton. After a full and open competition, the SE&I Follow-on contract will be awarded 4QFY08. The SE&I function spans end-to-end TSAT systems analysis and simulation, architecture refinement, requirements development, interface management and system integration.

TSAT Mission Operations System (TMOS) Program Research and Development Announcement (PRDA) contracts were awarded to Raytheon, Lockheed Martin, and Northrop Grumman in November 2003. In January 2006, after a full and open competition, a single TMOS development contract was awarded to Lockheed Martin.

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Exhibit R-3, RDT&E Project Cost Analysis

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(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) <u>Product Development</u>												
Architecture Studies	CPAF	Various	14.900								14.900	
Lockheed Martin: Technology Maturation/Risk Reduction & Program System Definition	CPFF	Sunnyvale, CA	278.160	183.628	Nov-06	96.786	Dec-07				558.574	
Boeing: Technology Maturation/Risk Reduction & Program System Definition	CPFF	El Segundo, CA	278.160	183.849	Nov-06	96.786	Dec-07				558.795	
Booz Allen Hamilton: System Engineering & Integration / SE&I Follow-on Contractor TBD	Time & Materials w/ IF	El Segundo, CA	92.734	60.561	Nov-06	68.069	Dec-07	69.892	Dec-08	Continuing	TBD	
TMOS PRDAs	FFP	Various	55.139								55.139	
TMOS: Lockheed Martin Integrated Systems and Solutions	CPAF	San Jose, CA	49.320	129.379	Nov-06	132.947	Dec-07	123.656	Dec-08	Continuing	TBD	
Risk Reduction: Technology Maturation	Various	Various	341.351	81.149	Nov-06	80.801	Dec-07	64.155	Dec-08	Continuing	TBD	
Risk Reduction: Technology Maturation (Space Segment) Lockheed Martin	CPFF	Sunnyvale, CA	27.651								27.651	
Risk Reduction: Technology Maturation (Space Segment) Boeing	CPFF	El Segundo, CA	27.651								27.651	
Space Segment Development	TBD	TBD				221.845	Jul-08	473.559	Dec-08	Continuing	TBD	
Radiation Hardened Parts Developers	Various	Various				21.166	Dec-07	21.806	Dec-08	Continuing	TBD	
Subtotal Product Development			1,165.066	638.566		718.400		753.068		Continuing	TBD	0.000
Remarks:												
(U) <u>Support</u>												
Technical Support	Various		103.775	53.065	Nov-06	72.544	Dec-07	75.541	Dec-08	Continuing	TBD	
Program Support	Various		26.240	8.798	Nov-06	13.795	Dec-07	14.365	Dec-08	Continuing	TBD	
Subtotal Support			130.015	61.863		86.339		89.906		Continuing	TBD	0.000
Remarks:												
(U) <u>Test & Evaluation</u>												
None											0.000	
Subtotal Test & Evaluation			0.000	0.000		0.000		0.000		0.000	0.000	0.000
Remarks:												
(U) <u>Management</u>												
None											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	0.000
Remarks:												
(U) Total Cost			1,295.081	700.429		804.739		842.974		Continuing	TBD	0.000

Exhibit R-4, RDT&E Schedule Profile

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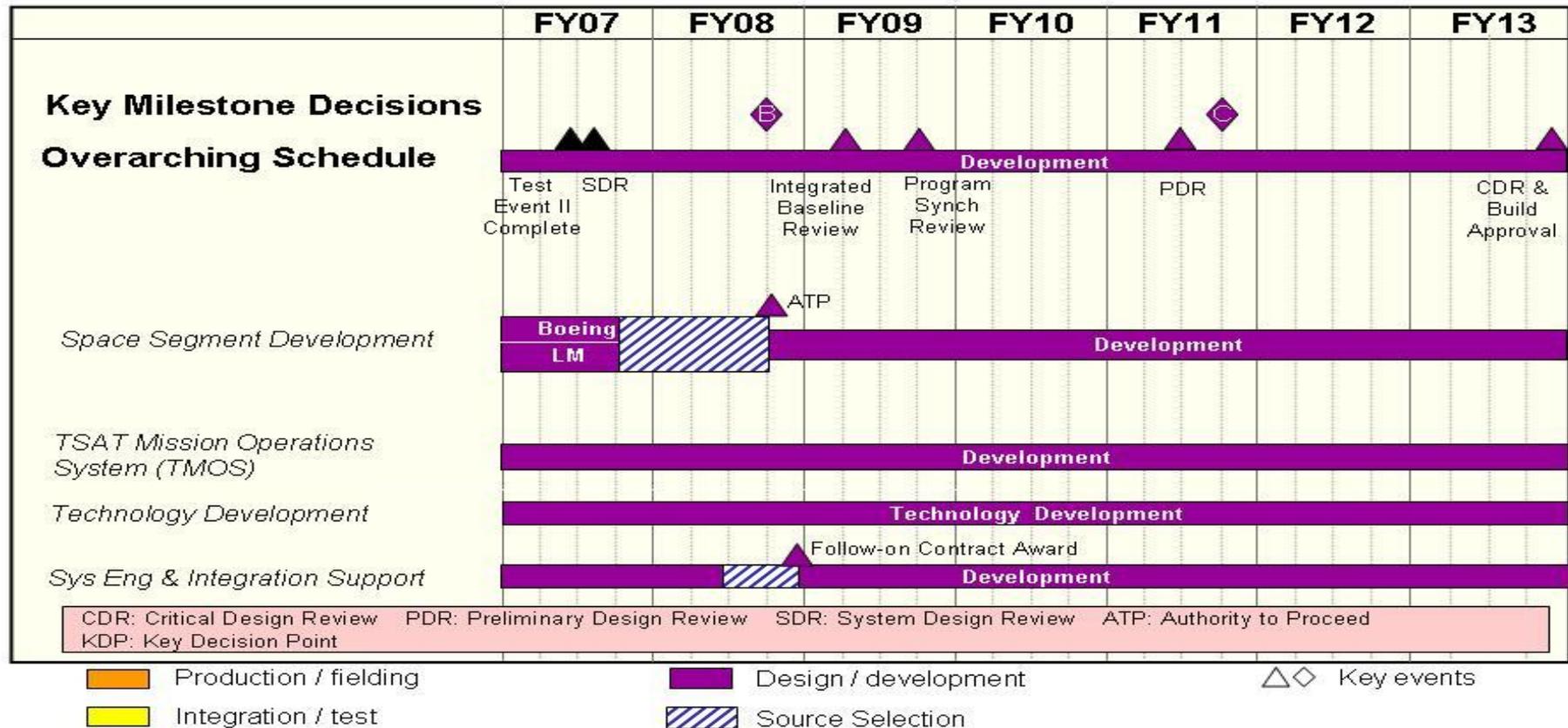


Exhibit R-4a, RDT&E Schedule Detail

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	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Schedule Profile			
(U) Technology Maturation -- Processor Router and Lasercom to Technology Readiness Level 6 (last of key critical technologies)	3Q		
(U) System Design Review	3Q		
(U) Key Decision Point B (KDP B)		4Q	
(U) Space Segment Contract Award		4Q	
(U) SE&I Follow-on Contract Award		4Q	
(U) Integrated Baseline Review			2Q
(U) Program Synchronization Review			4Q