

**UNCLASSIFIED**

PE NUMBER: 0603845F

PE TITLE: Transformational SATCOM (TSAT)

<b>Exhibit R-2, RDT&amp;E Budget Item Justification</b>	DATE <b>February 2004</b>
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<b>BUDGET ACTIVITY</b> <b>04 Advanced Component Development and Prototypes (ACD&amp;P)</b>	<b>PE NUMBER AND TITLE</b> <b>0603845F Transformational SATCOM (TSAT)</b>
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Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	111.485	335.430	774.836	1,192.437	1,346.687	1,830.137	1,038.550	Continuing	TBD
4944 ADVANCED WIDEBAND SYSTEM	111.485	335.430	774.836	1,192.437	1,346.687	1,830.137	1,038.550	Continuing	TBD

Note: In FY2003, this PE was renamed Transformational Satellite Communications (TSAT) (formerly Advanced Wideband System).

**(U) A. Mission Description and Budget Item Justification**

The Transformational SATCOM (TSAT) System will provide DoD with high data rate Military Satellite Communications (MILSATCOM) and Internet-like services as defined in the Transformational Communications Architecture (TCA). TSAT is part of the overarching Transformational Communications MILSATCOM (TCM) program that consists of TSAT satellites, Advanced Polar System (APS) satellites, TCM satellite operation centers (TSOC), TCM Mission Operations Systems (TMOS) , and ground gateways. TCM will extend the Global Information Grid (GIG) to users without fiber connections providing improved connectivity and data transfer capability resulting in a revolutionary change in satellite communications for the warfighter. Additionally, TCM will enable high data rate connections to Space and Airborne Intelligence, Surveillance, and Reconnaissance (SISR, AISR) platforms.

The TSAT portion of the TCA will incorporate radio frequency (RF) and laser communication links to meet defense and intelligence community requirements for high data rate protected communications. The space segment will make use of key technology advancements where feasible to achieve a transformational leap in SATCOM capabilities. These technologies include but are not limited to: laser communications, packet switching, bulk and packet encryption/decryption, communication-on-the-move antennas, dynamic bandwidth and resource allocation techniques, and protected bandwidth efficient modulation. Additionally, the Air Force is seeking Congressional approval for an FY04 subproject new start. The Department plans to fund the development of an enhanced (wide field of view) multi-access laser communications technology in FY04-07 called Optical Phased Array (OPA). This technology effort requires funding now to be available for fielding on TSAT satellite 3. TSAT acquisition includes the associated TSOCs, TMOS, and required gateways. The TCA calls for launch of the first satellite with these transformational capabilities in FY12.

In order to ensure TCM interoperability with the GIG Integrated Architecture, this program will participate in GIG end-to-end test bed and systems engineering activities. Elements of the net-centric GIG that TCM will be interoperable with include, but are not limited to, Information Assurance (IA), Network Operations (NetOps), and Information Dissemination Management (IDM). In addition, TSAT will be interoperable with other TCA space platforms.

Funds are in Budget Activity 4, Advanced Component Development and Prototypes, because they support the TCA technology definition, development, demonstration and validation.

## Exhibit R-2, RDT&amp;E Budget Item Justification

DATE

February 2004

BUDGET ACTIVITY

04 Advanced Component Development and Prototypes (ACD&amp;P)

PE NUMBER AND TITLE

0603845F Transformational SATCOM (TSAT)

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Previous President's Budget	117.953	439.277	877.504
(U) Current PBR/President's Budget	111.485	335.430	774.836
(U) Total Adjustments	-6.468	-103.847	
(U) Congressional Program Reductions		-103.847	
Congressional Rescissions			
Congressional Increases			
Reprogrammings			
SBIR/STTR Transfer	-6.468		

(U) **Significant Program Changes:**

A Congressional mark of \$100M in FY04 resulted in a restructure of TSAT and the TCM strategy. The TCM acquisition strategy was approved in Jun 03. The TSAT first launch was moved from FY10 to FY11 in order to reduce technology and schedule risk.

FY05: The first TSAT launch is now scheduled for FY12 after a program re-phasing. Additionally, the Department plans to develop an enhanced (wide field of view) multi access laser communications technology (+\$20M) for inclusion on TSAT #3 in order to reduce technology risk.

**Exhibit R-2a, RDT&E Project Justification**

DATE  
**February 2004**

<b>BUDGET ACTIVITY</b> <b>04 Advanced Component Development and Prototypes (ACD&amp;P)</b>				<b>PE NUMBER AND TITLE</b> <b>0603845F Transformational SATCOM (TSAT)</b>			<b>PROJECT NUMBER AND TITLE</b> <b>4944 ADVANCED WIDEBAND SYSTEM</b>			
Cost (\$ in Millions)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
4944	ADVANCED WIDEBAND SYSTEM	111.485	335.430	774.836	1,192.437	1,346.687	1,830.137	1,038.550	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0		

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**(U) A. Mission Description and Budget Item Justification**

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In order to ensure TCM interoperability with the GIG Integrated Architecture, this program will participate in GIG end-to-end test bed and systems engineering activities. Elements of the net-centric GIG that TCM will be interoperable with include, but are not limited to, Information Assurance (IA), Network Operations (NetOps), and Information Dissemination Management (IDM). In addition, TSAT will be interoperable with other TCA space platforms.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Continue System Definition -technology development for key advanced technologies to include laser communications (including enhanced (wide field of view) multi access laser comm in FY05), antenna design, encryption technologies, dynamic bandwidth and resource allocation, bandwidth efficient modulation, network operations, and networking	81.169	170.584	190.872

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	DATE <b>February 2004</b>
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<b>BUDGET ACTIVITY</b> <b>04 Advanced Component Development and Prototypes (ACD&amp;P)</b>	<b>PE NUMBER AND TITLE</b> <b>0603845F Transformational SATCOM (TSAT)</b>	<b>PROJECT NUMBER AND TITLE</b> <b>4944 ADVANCED WIDEBAND SYSTEM</b>
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protocols.			
(U) Completed architecture study and program (s) definition efforts		16.600	
(U) Technical Support		9.316	23.704 34.923
(U) Program Support		4.400	7.341 10.369
(U) Continued System Definition - initiated engineering design activities including risk reduction and system definition for the first transformational comm satellite system.			133.801
(U) Continue engineering design activities including risk reduction, and system definition and begin design for the first transformational communication satellite system.			432.472
(U) Continue to refine and prepare to acquire the TCM Mission Operations System ground segment and network management/operations management software.			66.600
(U) Continue systems engineering and integration support			39.600
(U) Total Cost		111.485	335.430 774.836

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to Complete</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) RDT&E, AF									
(U) PE 0603854, Project 644870, CCS-C, R-51	13.801	36.271	20.297	8.269	6.999	5.701	6.357	Continuing	TBD
(U) PE 0603854, Project 644811, WGS			53.202	7.681	2.291				226.614
(U) PE0604435F, Advanced Polar MILSATCOM, R-74		13.584			32.937	180.936	260.415	Continuing	TBD
(U) Other APPN									
(U) MPAF, PE 0303600F, WGS, P-29	186.694	21.848	40.307	61.983	270.676	175.338	47.747	117.943	1,307.990
(U) MPAF, PE 0303602F, TSAT					187.627	899.442	920.963	Continuing	TBD
(U) OPAF, PE 0303600F, CCS-C	5.320	8.049	2.124	0.288					15.781
(U) OPAF, PE 0303600F, WGS	15.142	11.776							26.918

(U) **D. Acquisition Strategy**

The Jun 03 approved Acquisition Strategy presented TSAT and APS as the two DoD Transformational Communications space systems being acquired as TCM. The TCM space segment contract for system definition and risk reduction (Phase B) will be awarded to two contractors in FY04. In FY05 the results of a full and open competition to select the final TMOS segment development contractor will be announced. In FY06 the results of a full and open competition to select the final space segment development contractor will be announced.

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Exhibit R-3, RDT&E Project Cost Analysis										DATE February 2004		
BUDGET ACTIVITY 04 Advanced Component Development and Prototypes (ACD&P)					PE NUMBER AND TITLE 0603845F Transformational SATCOM (TSAT)					PROJECT NUMBER AND TITLE 4944 ADVANCED WIDEBAND SYSTEM		
(U) Cost Categories (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	<u>Contract Method &amp; Type</u>	<u>Performing Activity &amp; Location</u>	<u>Total</u> <u>Prior to FY</u> <u>2003</u> <u>Cost</u>	<u>FY</u> <u>2003</u> <u>Cost</u>	<u>FY</u> <u>2003</u> <u>Award</u> <u>Date</u>	<u>FY</u> <u>2004</u> <u>Cost</u>	<u>FY</u> <u>2004</u> <u>Award</u> <u>Date</u>	<u>FY</u> <u>2005</u> <u>Cost</u>	<u>FY</u> <u>2005</u> <u>Award</u> <u>Date</u>	<u>Cost to</u> <u>Complete</u>	<u>Total</u> <u>Cost</u>	<u>Target</u> <u>Value of</u> <u>Contract</u>
(U) <u>Product Development</u>												
Architecture Studies	CPAF	Various		14.900	Oct-02						14.900	
Lockheed Martin: Technology Maturation/Risk Reduction & Program System Definition	CPFF	Sunnyvale, CA				47.326	Jan-04	216.236		Continuing	TBD	
Boeing: Technology Maturation/Risk Reduction & Program System Definition	CPFF	El Segundo, CA				47.325	Jan-04	216.236		Continuing	TBD	
Booz Allen Hamilton: System Engineering & Integration	Time & Materials w/ IF	El Segundo, CA		0.850	Oct-03	21.850	Oct-03	39.600	Nov-04	Continuing	TBD	
TMOS PRDAs	FFP	Various		0.850		17.300	Oct-03	2.900			21.050	
TMOS Contract								63.700	Dec-04	Continuing	TBD	
Risk Reduction: Technology Maturation	Various	Various		81.169		115.283		190.872		Continuing	TBD	
Risk Reduction: Technology Maturation (Space Segment) Lockheed Martin	CPFF	Sunnyvale, CA				27.650					27.650	
Risk Reduction: Technology Maturation (Space Segment) Boeing	CPFF	El Segundo, CA				27.651					27.651	
Subtotal Product Development			0.000	97.769		304.385		729.544		Continuing	TBD	0.000
Remarks:												
(U) <u>Support</u>												
Technical Support	Various		0.000	9.316		23.704		34.923		Continuing	TBD	
Program Support	Various		0.000	4.400		7.341		10.369		Continuing	TBD	
Subtotal Support			0.000	13.716		31.045		45.292		Continuing	TBD	0.000
Remarks:												
(U) <u>Test &amp; 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	

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Exhibit R-3, RDT&E Project Cost Analysis					DATE <b>February 2004</b>		
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Subtotal Management	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Remarks:							
(U) Total Cost	0.000	111.485	335.430	774.836	Continuing	TBD	0.000

Exhibit R-4, RDT&E Schedule Profile

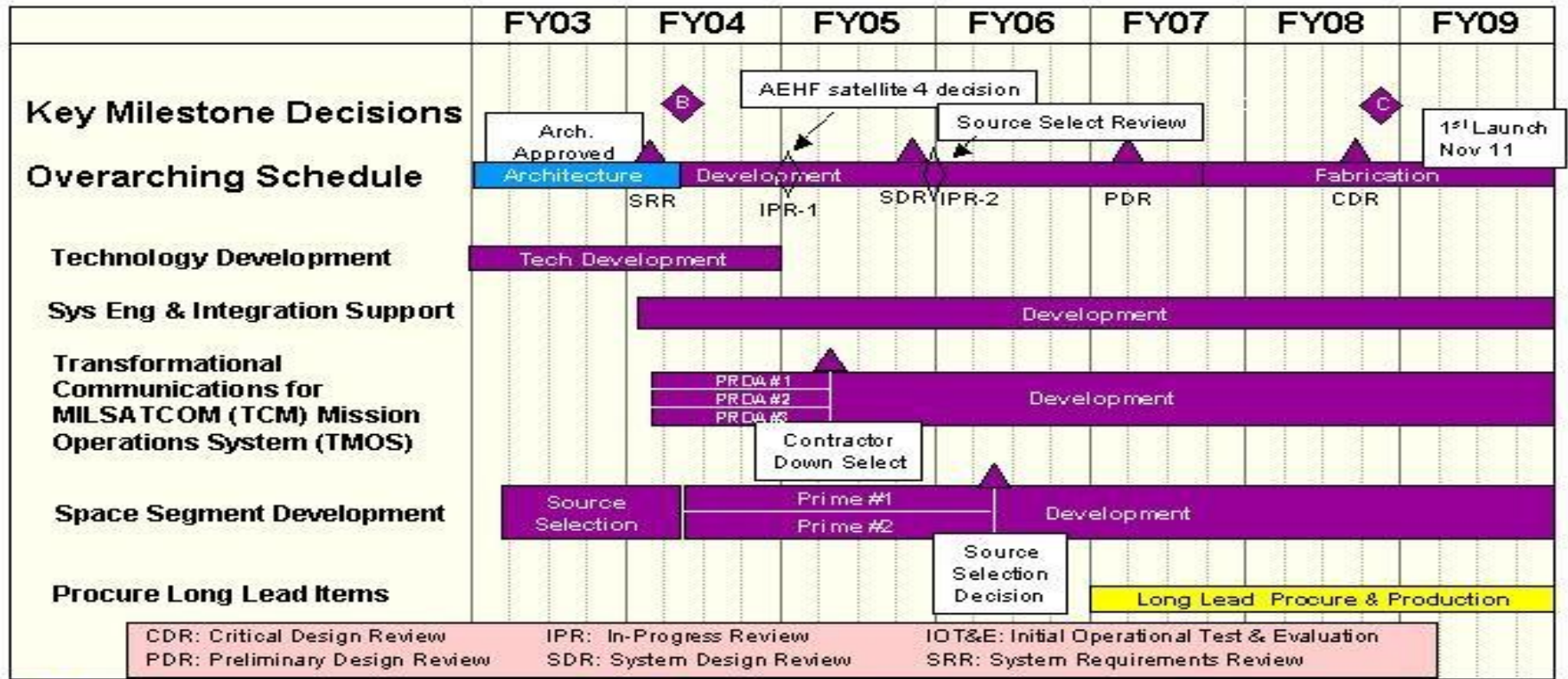
DATE

February 2004

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

PE NUMBER AND TITLE  
0603845F Transformational SATCOM (TSAT)

PROJECT NUMBER AND TITLE  
4944 ADVANCED WIDEBAND SYSTEM



CDR: Critical Design Review    IPR: In-Progress Review    IOT&E: Initial Operational Test & Evaluation  
 PDR: Preliminary Design Review    SDR: System Design Review    SRR: System Requirements Review

Concept activities     
  Design / development     
  Integration / test  
 Production / fielding     
  Operations / sustainment     
   Key events

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<b>Exhibit R-4a, RDT&amp;E Schedule Detail</b>	DATE <b>February 2004</b>
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<b>BUDGET ACTIVITY</b> <b>04 Advanced Component Development and Prototypes (ACD&amp;P)</b>	<b>PE NUMBER AND TITLE</b> <b>0603845F Transformational SATCOM (TSAT)</b>	<b>PROJECT NUMBER AND TITLE</b> <b>4944 ADVANCED WIDEBAND SYSTEM</b>
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	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) <b>Schedule Profile</b>			
(U) Architecture Approval	4Q		
(U) Key Decision Point B		2Q	
(U) Space Segment Risk Reduction & System Def Contract Award		2Q	
(U) Interim Progress Review			1Q
(U) System Design Review			4Q