

Exhibit R-2, RDT&E Budget Item Justification

DATE

February 2004

BUDGET ACTIVITY

07 Operational System Development

PE NUMBER AND TITLE

0303601F MILSATCOM Terminals

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	65.090	171.860	272.149	241.099	161.529	186.802	173.957	Continuing	TBD
2487 MILSATCOM Terminals	65.090	171.860	272.149	241.099	161.529	186.802	173.957	Continuing	TBD

(U) A. Mission Description and Budget Item Justification

The MILSATCOM Terminals program develops equipment enabling users to communicate via Milstar, Advanced Extremely High Frequency (AEHF), Ultra High Frequency (UHF), Wideband Gapfiller System (WGS), Defense Satellite Communication System (DSCS), and other military satellites, as well as commercial satellites, to support tactical Air and Space Expeditionary Force (AEF) requirements and maintain essential connectivity for strategic forces. Program RDT&E currently supports the following efforts to include program operations and support:

- 1) Concept development work to identify commercial/military technology solutions to improve MILSATCOM terminal capabilities for the warfighters. Focus includes increasing throughput, facilitating sustainability, reducing footprint on user platform and supporting network.
- 2) Ground Multi-band Terminal (GMT) development. In addition to supporting the Air and Space Expeditionary Force requirement for increased information, GMT will replace Air Force Ground Mobile Forces (GMF) terminals with higher-capacity military communications to provide tactical ground forces with connectivity via the X- and Ka-band WGS, X-band DSCS, and commercial C- and Ku-band satellites to significantly increase throughput for inter- and intra-theater tactical force information such as air tasking orders, battle damage assessments, and reconnaissance data.
- 3) Family of Advanced Beyond-Line-of-Sight Terminals (FAB-T) development. FAB-T will develop robust, secure, survivable EHF voice and data satellite communications terminals for nuclear and conventional forces. FAB-T variants will provide ground and airborne command posts and other aircraft with connectivity to Milstar and AEHF satellites, while providing an open architecture terminal to support future increments for WGS, EHF payloads on polar and UHF Follow-on (UFO) satellites, Global Broadcast Service payloads and Transformational Communications satellites.
- 4) High Data Rate (HDR) Radio Frequency (RF) Terminals. Develops High Data Rate (HDR) RF terminals to operate with increased RF capacity on Wideband Gapfiller System and Transformational Communications Satellite System (TSAT) satellite providing 2-way Ka-band satellite communications for High Altitude Endurance (HAE) aircraft and to support the Distributed Common Ground System (DCGS) receipt of data rates up to 274 Mbps to satisfy Intelligence, Surveillance and Reconnaissance (ISR) requirements.
- 5) Lasercom Development. Develops a laser communications terminal to support optical communications for High Altitude Endurance Intelligence, Surveillance and Reconnaissance (ISR) aircraft (Global Hawk and U-2) and command and control aircraft (MC2A); supports transformational communications initiatives which require laser transmission of sensor data at rates above 1 Gbps over Transformational Communications satellites.
- 6) Joint Terminal Engineering Office (JTEO) provides tri-service coordination of terminal development, acquisition and fielding activities.
- 7) Advanced Multi-band Communications Antenna System (AMCAS) development. NOTE: The name of this program has been changed from Wideband Antenna program. AMCAS will provide a multi-beam, multi-band phased array antenna enabling simultaneous connectivity to more than one satellite aircraft. Addresses limited aircraft external surface area, historically high antenna integration costs, and aerodynamic and low observability restrictions. Enables airborne weapon systems to support the higher data needed for today's combat while eliminating the need to develop separate solutions for each platform to meet unique power and data rate requirements.
- 8) Mobile User Objective System (MUOS) terminal upgrade development is the next generation advanced narrowband satellite communications. MUOS-capable UHF

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SATCOM users will be able to utilize increases in bandwidth, gain and link availability.

This effort is funded in Budget Activity 7, Operational System Development because some of its programs have completed Milestone C reviews and are in production.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Previous President's Budget	71.293	173.831	241.906
(U) Current PBR/President's Budget	65.090	171.860	272.149
(U) Total Adjustments	-6.203	-1.971	
(U) Congressional Program Reductions			
Congressional Rescissions		-1.971	
Congressional Increases			
Reprogrammings	-0.004		
SBIR/STTR Transfer	-6.199		
(U) <u>Significant Program Changes:</u>			
None.			

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BUDGET ACTIVITY 07 Operational System Development				PE NUMBER AND TITLE 0303601F MILSATCOM Terminals			PROJECT NUMBER AND TITLE 2487 MILSATCOM Terminals			
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	
2487 MILSATCOM Terminals	65.090	171.860	272.149	241.099	161.529	186.802	173.957	Continuing	TBD	
Quantity of RDT&E Articles	0	0	0	0	0	0	0			

(U) A. Mission Description and Budget Item Justification

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- 8) Mobile User Objective System (MUOS) terminal upgrade development is the next generation advanced narrowband satellite communications. MUOS-capable UHF SATCOM users will be able to utilize increases in bandwidth, gain and link availability.

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BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE 2487 MILSATCOM Terminals
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This effort is funded in Budget Activity 7, Operational System Development because some of its programs have completed Milestone C reviews and are in production.

(U) B. Accomplishments/Planned Program (\$ in Millions)	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Continue concept/prototype demo/MILSATCOM Terminals roadmap/SATCOM funding	1.002	3.307	3.785
(U) Continue Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) development	51.756	96.596	112.685
(U) Continue Ground Multi-band Terminal (GMT) development	3.628	9.677	23.043
(U) JSTARS development to assume Airborne Battlefield Command and Control (ABCCC) role	0.400	0.000	0.000
(U) Continue High Data Rate (HDR) RF Terminals	4.806	29.340	81.669
(U) Continue Lasercom Terminals development	3.498	14.401	28.736
(U) Continue Joint Terminal Engineering Office (JTEO) Support		7.322	7.687
(U) Continue Advanced Multi-band Communications Antenna System (AMCAS) development		11.217	9.052
(U) Initiate Mobile User Objective System terminal upgrades development			5.492
(U) Total Cost	65.090	171.860	272.149

(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</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) Aircraft Procurement, Air Force, Project 119992 (Budget Activity 5, P-27 and P-61, PE 0303601F only) (1)	31.824	35.628	27.665	8.861	121.757	152.994	223.574	Continuing	TBD
(U) Other Procurement, Air Force, 'MILSATCOM Space', Project 836780 (Budget Activity 3, P-74, PE 0303601F only) (1) (1) Spares Included	4.267	22.452	26.555	100.180	106.717	116.391	131.062	Continuing	TBD

NOTE: Related RDT&E costs for MILSATCOM satellite systems to which terminal development is linked can be found in RDT&E Budget Item Justification Sheets for the following Program Elements (PEs):

- PE 0303110F Defense Satellite Communication System
- PE 0603430F Advanced EHF
- PE 0603845F Transformational Communications Satellite (TSat)
- PE 0603432F Polar MILSATCOM (Space)

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

PE 0603854F Wideband Gapfiller System (Space)
 PE 0604479F Milstar LDR/MDR Satellite Communications
 PE 0604240F B-2 RDT&E
 PE 0101113F B-52 RDT&E
 PE 0305207F RC-135 RDT&E
 PE 0207581F Joint STARS RDT&E

(U) **D. Acquisition Strategy**

In FY03, the Air Force (AF) initiated development of the High Data Rate (HDR) RF terminals and Lasercom Terminals to operate with Wideband Gapfiller System (WGS) and Transformational Communications Satellites. Contract awards for HDR RF terminals will be split into HDR RF airborne and HDR RF ground. For both HDR RF pieces, the contracts will be awarded to provide capabilities incrementally and will be a combination of sole source and full and open competition acquisitions. In FY03, the AF also began development of the Lasercom terminal and plans to award multiple technology demonstration contracts to mature the optical aperture technologies and will also award an architecture definition effort contract. In FY04, the AF initiated the development of the Advanced Multi-band Communications Antenna System (AMCAS) Program and will award multiple technology demonstration contracts to mature the antenna technology with a follow on contract based on full and open competition to build the antenna. In FY05, AF will begin development of Mobile User Objective System (MUOS) terminal modifications to incorporate Software Communications Architecture (SCA) functionality so that the SCA compliant MUOS waveform can be used on the AIT radio. Modifications will be accomplished via sole source development contract to Raytheon due to the proprietary AIT radio software.

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Exhibit R-3, RDT&E Project Cost Analysis										DATE February 2004		
BUDGET ACTIVITY 07 Operational System Development				PE NUMBER AND TITLE 0303601F MILSATCOM Terminals				PROJECT NUMBER AND TITLE 2487 MILSATCOM Terminals				
(U) <u>Cost Categories</u> (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	<u>Contract Method & Type</u>	<u>Performing Activity & Location</u>	<u>Total</u> Prior to FY 2003 <u>Cost</u>	<u>FY</u> 2003 <u>Cost</u>	<u>FY</u> 2003 <u>Award</u> <u>Date</u>	<u>FY</u> 2004 <u>Cost</u>	<u>FY</u> 2004 <u>Award</u> <u>Date</u>	<u>FY</u> 2005 <u>Cost</u>	<u>FY</u> 2005 <u>Award</u> <u>Date</u>	<u>Cost to Complete</u>	<u>Total</u> <u>Cost</u>	<u>Target</u> <u>Value of</u> <u>Contract</u>
GMT Development	CPAF	Harris Corp., Melbourne, FL	28.046	2.650	Nov-03	5.500	Oct-03	19.500	Oct-04	Continuing	TBD	55.939
FAB-T Development	CPAF	Boeing Corp., Anaheim, CA	3.670	42.234	Oct-03	89.233	Oct-03	95.700	Oct-04	Continuing	TBD	236.349
Joint STARS A-kit Development	AF-616	ESC/JS, Hanscom AFB	0.000	0.400	Oct-03	0.000		0.000		0.000	0.400	0.400
High Data Rate (HDR) RF Ground terminal study (Associated Contract Agreement)	TRN	Harris Corp., Melbourne, FL	0.000	0.500	Mar-03	0.880	Feb-04	0.000		0.000	1.380	1.380
High Data Rate (HDR) RF Airborne terminal study (Associated Contract Agreement)	TRN	Boeing Corp., Anaheim, CA	0.000	0.500	Mar-03	0.000		0.000		0.000	0.500	0.500
High Data Rate (HDR) RF Terminal Development	TBD	TBD	0.000	0.000		22.248	Oct-03	75.255	Oct-04	Continuing	TBD	
Lasercom Terminal Development	TBD	TBD	0.000	0.000		8.714	Oct-03	24.606	Oct-04	Continuing	TBD	
AMCAS Development	TBD	TBD	0.000	0.000		7.843	Oct-03	7.288	Oct-04	Continuing	TBD	
MUOS Terminal Modification Development	TBD	TBD	0.000	0.000		0.000		3.869	Dec-04	Continuing	TBD	
Subtotal Product Development			31.716	46.284		134.418		226.218		Continuing	TBD	294.568
Remarks:												
(U) <u>Support</u>												
Systems Engineering Support	CPAF	MITRE, Bedford MA	120.977	13.591	Oct-03	17.231	Oct-03	21.425	Oct-04	Continuing	TBD	
Systems Engineering/Functional/Financial Support	Various	Various	162.734	3.102	Oct-03	12.915	Oct-03	14.796	Oct-04	Continuing	TBD	
Financial Support (Beginning in FY04 totals included in Systems Engineering/Functional/Financial Support)	Various	Tecolote, Bedford MA	3.013	1.125	Nov-03	0.000		0.000		Continuing	TBD	
Miscellaneous	Various	Various	20.075	0.688	Oct-03	6.996	Oct-03	4.059	Oct-04	Continuing	TBD	0.000

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BUDGET ACTIVITY				PE NUMBER AND TITLE				PROJECT NUMBER AND TITLE				
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Subtotal Support				306.799	18.506	37.142	40.280	Continuing	TBD	0.000		
Remarks:												
(U) <u>Test & Evaluation</u>												
Various Programs		Various	AF Research Lab	24.603	0.000	0.000	4.388	Oct-04	Continuing	TBD		
Miscellaneous T&E		Various	Various	5.907	0.300	Oct-03 0.300	Oct-03 1.263	Oct-04	Continuing	TBD		
Subtotal Test & Evaluation				30.510	0.300	0.300	5.651	Continuing	TBD	0.000		
Remarks:												
(U) <u>Management</u>												0.000
Subtotal Management				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Remarks:												
(U) Total Cost				369.025	65.090	171.860	272.149	Continuing	TBD	294.568		
NOTE: Prior Year dollar amounts do not agree with last years document due to removal of the Raytheon FPIF/FFP from June 1985, Rockwell CPIF from August 1993 and ViaSat C/FFP from October 1995 contract lines. Nothing has been budgeted for these products since FY01 and no future work is planned on these projects.												

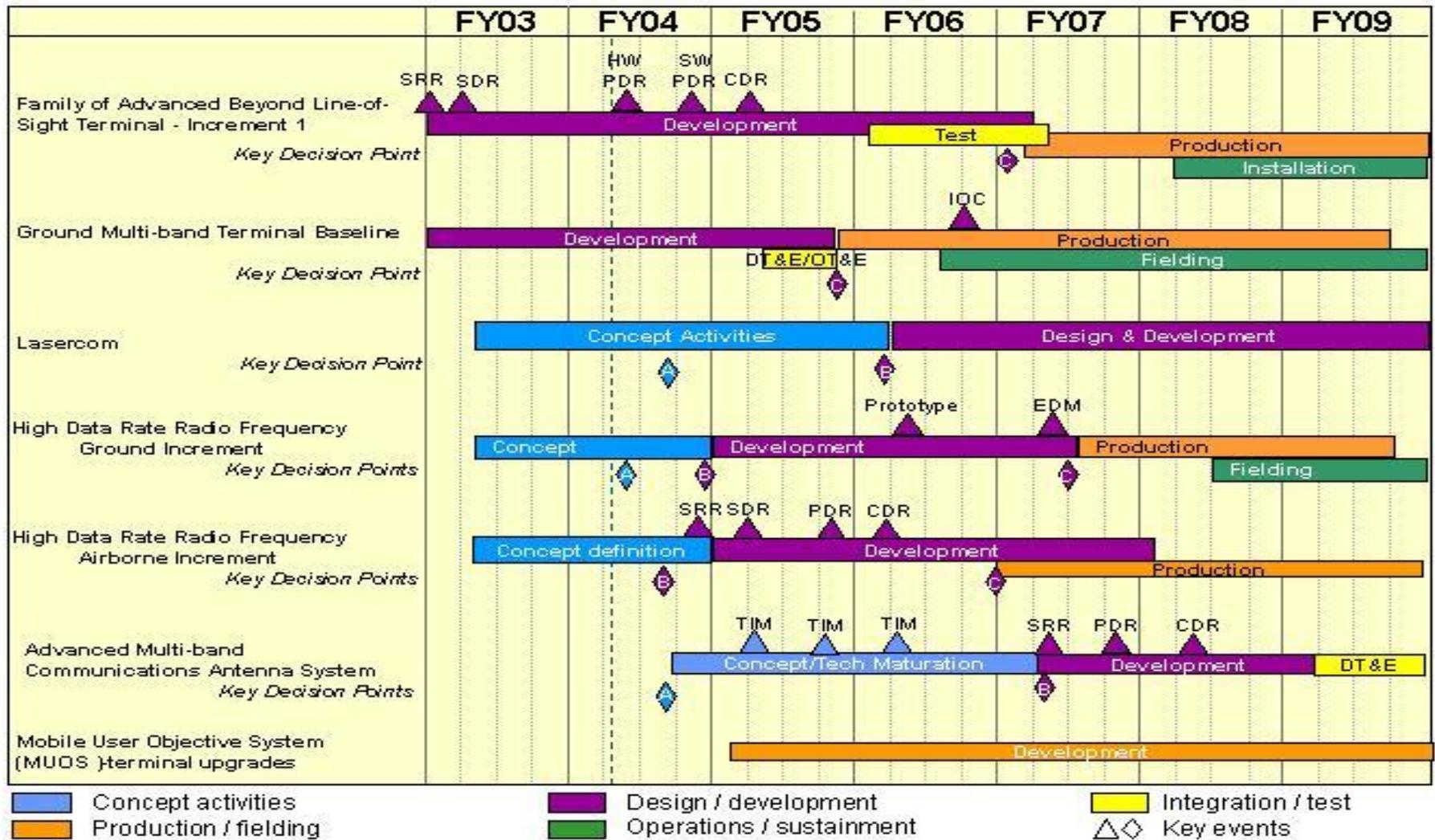
Exhibit R-4, RDT&E Schedule Profile

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AoA: Analysis of Alternatives CDR: Critical Design Review IOT&E: Initial Operational Test & Evaluation SRR: System Requirements Review
 PDR: Preliminary Design Review EDM: Engineering Design Model SDR: System Design Review TIM: Technical Interchange Meeting

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Exhibit R-4a, RDT&E Schedule Detail	DATE February 2004
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BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE 2487 MILSATCOM Terminals
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	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) <u>Schedule Profile</u>			
(U) JSTARS development of Airborne Battlefield Command and Control Center (ABCCC) communications capability	4Q		
(U) Begin Initial Development of High Data Rate (HDR) RF Terminals	2Q		
(U) Begin Initial Development of Lasercom Terminals	2Q		
(U) Award Technology Maturation contracts for Lasercom Optical Apertures		3Q	
(U) Award Technology Maturation contracts for Advanced Multi-band Communications Antenna System (AMCAS)		3Q	
(U) Begin Mobile User Objective System (MUOS) terminal upgrades development			1Q