

**UNCLASSIFIED**

PE NUMBER: 0303601F  
 PE TITLE: MILSATCOM Terminals

<b>Exhibit R-2, RDT&amp;E Budget Item Justification</b>	<b>DATE</b> <b>February 2008</b>
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<b>BUDGET ACTIVITY</b> <b>07 Operational System Development</b>	<b>PE NUMBER AND TITLE</b> <b>0303601F MILSATCOM Terminals</b>
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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	257.226	384.652	337.098	342.209	234.390	184.912	187.514	Continuing	TBD
2487 MILSATCOM Terminals	257.226	384.652	337.098	342.209	234.390	184.912	187.514	Continuing	TBD

FY08 funding totals do not include \$79.750M in FY08 GWOT Requirements still pending Congressional consideration.

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

FY2008 funding totals do not include \$79.750M FY2008 GWOT requirements still pending Congressional consideration.

The Military Satellite Communications (MILSATCOM) Terminals program develops equipment enabling users to communicate via Milstar, Advanced Extremely High Frequency (AEHF), Ultra High Frequency (UHF) Follow-On (UFO), Wideband Global SATCOM (WGS), Defense Satellite Communication System (DSCS), Enhanced Polar Systems (EPS), Transformational Communication Satellite (TSAT), and other military and commercial satellites, to support tactical Air and Space Expeditionary Force requirements and maintain essential connectivity for strategic forces. Program RDT&E currently includes the following program operations and support efforts:

- 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) The Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) Increment 1 program will provide Extremely High Frequency (EHF) voice and data military satellite communications (MILSATCOM) for nuclear and conventional forces as well as airborne and ground command posts with connectivity to Milstar and Advanced EHF satellites. FAB-T Increment 1 terminals will also support the command and control (C2) of Milstar and AEHF satellites. Increment 2 will provide robust secure 2-way Ku/Ka wideband SATCOM capability (274 Megabits per second - Mbps) on High Altitude Endurance (HAE) Intelligence, Surveillance, and Reconnaissance (ISR) aircraft (i.e., the Global Hawk Unmanned Aerial Vehicle). Increment 3 will provide Extended Data Rate-Plus (XDR+) capabilities to platforms requiring High Data Rate EHF (45 Mbps) and Processed Ka (311 Mbps) communications in support of the TSAT constellation. Increment 4 will provide optical (Lasercom) communication capability for Airborne ISR platforms requiring data rates in excess of 1 Gigabit per second. Also included in the FAB-T program is the Advanced Multi-band Communications Antenna System (AMCAS) which will deliver a family of multi-beam, multi-band, low-profile antenna to enable simultaneous connectivity to more than one satellite. This antenna addresses existing (limited) aircraft external surface area, historically high antenna integration costs, and aerodynamic/low-observability restrictions. AMCAS also enables airborne weapon systems to support the warfighter's need for multiple frequency bands (EHF and Ka). The AEHF Interim Command and Control (C2) terminal is a modified AEHF Universal System Test Terminal (AUST-T) that will perform C2 to work with the AEHF Satellite Mission Control Sub-System (ASMCS) and control AEHF satellites until FAB-T becomes available to perform these functions.
  
- 3) High Data Rate (HDR) Radio Frequency (RF) Ground Terminal development. Develops a transponded Ka-band HDR capability in support of the Distributed Common Ground System (DCGS) receipt of data from the Airborne ISR (AISR) platforms using FAB-T Inc 2 and Ka-band terminals. This bandwidth will be provided via the fourth and fifth WGS satellites. This terminal will also support the lower data rate provided by the first three WGS satellites.

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4) Joint Terminal Engineering Office (JTEO) provides tri-service coordination of terminal development, acquisition and fielding activities.

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 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Previous President's Budget	269.926	388.491	372.443
(U) Current PBR/President's Budget	257.226	384.652	337.098
(U) Total Adjustments	-12.700	-3.839	
(U) Congressional Program Reductions	0.000		
Congressional Rescissions	0.000	-3.839	
Congressional Increases			
Reprogrammings	-5.191		
SBIR/STTR Transfer	-7.509		

(U) **Significant Program Changes:**

Decrease in FY09 budget due to: 1) transfer of Predator unique funds from FAB-T Inc 2 to the Predator program for Ka terminal development, 2) delay of AMCAS SDD until 1QFY10 to allow technology maturation and 3) reflect Air Force inflation and fact-of-life takes.

## Exhibit R-2a, RDT&amp;E Project Justification

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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 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total	
2487 MILSATCOM Terminals	257.226	384.652	337.098	342.209	234.390	184.912	187.514	Continuing	TBD	
Quantity of RDT&E Articles	0	0	0	0	0	0	0			

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

FY2008 funding totals do not include \$79.750M FY2008 GWOT requirements still pending Congressional consideration.

The Military Satellite Communications (MILSATCOM) Terminals program develops equipment enabling users to communicate via Milstar, Advanced Extremely High Frequency (AEHF), Ultra High Frequency (UHF) Follow-On (UFO), Wideband Global SATCOM (WGS), Defense Satellite Communication System (DSCS), Enhanced Polar Systems (EPS), Transformational Communication Satellite (TSAT), and other military and commercial satellites, to support tactical Air and Space Expeditionary Force requirements and maintain essential connectivity for strategic forces. Program RDT&E currently includes the following program operations and support efforts:

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) The Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) Increment 1 program will provide Extremely High Frequency (EHF) voice and data military satellite communications (MILSATCOM) for nuclear and conventional forces as well as airborne and ground command posts with connectivity to Milstar and Advanced EHF satellites. FAB-T Increment 1 terminals will also support the command and control (C2) of Milstar and AEHF satellites. Increment 2 will provide robust secure 2-way Ku/Ka wideband SATCOM capability (274 Megabits per second - Mbps) on High Altitude Endurance (HAE) Intelligence, Surveillance, and Reconnaissance (ISR) aircraft (i.e., the Global Hawk Unmanned Aerial Vehicle). Increment 3 will provide Extended Data Rate-Plus (XDR+) capabilities to platforms requiring High Data Rate EHF (45 Mbps) and Processed Ka (311 Mbps) communications in support of the TSAT constellation. Increment 4 will provide optical (Lasercom) communication capability for Airborne ISR platforms requiring data rates in excess of 1 Gigabit per second. Also included in the FAB-T program is the Advanced Multi-band Communications Antenna System (AMCAS) which will deliver a family of multi-beam, multi-band, low-profile antenna to enable simultaneous connectivity to more than one satellite. This antenna addresses existing (limited) aircraft external surface area, historically high antenna integration costs, and aerodynamic/low-observability restrictions. AMCAS also enables airborne weapon systems to support the warfighter's need for multiple frequency bands (EHF and Ka). The AEHF Interim Command and Control (C2) terminal is a modified AEHF Universal System Test Terminal (AUST-T) that will perform C2 to work with the AEHF Satellite Mission Control Sub-System (ASMCS) and control AEHF satellites until FAB-T becomes available to perform these functions.

3) High Data Rate (HDR) Radio Frequency (RF) Ground Terminal development. Develops a transponded Ka-band HDR capability in support of the Distributed Common Ground System (DCGS) receipt of data from the Airborne ISR (AISR) platforms using FAB-T Inc 2 and Ka-band terminals. This bandwidth will be provided via the fourth and fifth WGS satellites. This terminal will also support the lower data rate provided by the first three WGS satellites.

4) Joint Terminal Engineering Office (JTEO) provides tri-service coordination of terminal development, acquisition and fielding activities.

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.

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

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<b>BUDGET ACTIVITY</b> <b>07 Operational System Development</b>	<b>PE NUMBER AND TITLE</b> <b>0303601F MILSATCOM Terminals</b>	<b>PROJECT NUMBER AND TITLE</b> <b>2487 MILSATCOM Terminals</b>
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<b>(U) B. Accomplishments/Planned Program (\$ in Millions)</b>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Continue concept/prototype demo/MILSATCOM Terminals roadmap/SATCOM funding	2.772	4.313	4.403
(U) Continue Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) development	238.183	361.576	317.232
(U) Continue High Data Rate (HDR) RF Ground Terminal development	8.850	10.799	7.491
(U) Continue Joint Terminal Engineering Office (JTEO) Support	7.421	7.964	7.972
(U) Total Cost	257.226	384.652	337.098

<b>(U) C. Other Program Funding Summary (\$ in Millions)</b>	<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) Aircraft Procurement, Air Force, Project 119992 (Budget Activity 5, P-27 and P-61, PE 0303601F only) (1)	9.052	0.000	0.000	105.844	284.412	431.149	399.951	Continuing	TBD
(U) Other Procurement, Air Force, 'MILSATCOM Space', Project 836780 (Budget Activity 3, P-66, PE 0303601F only) (1) Spares Included	75.209	109.694	106.067	172.349	211.170	167.591	157.316	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 (Space)
- PE 0603430F Advanced EHF MILSATCOM (Space)
- PE 0603845F Transformational SATCOM (TSAT)
- PE 0603432F Polar MILSATCOM (Space)
- PE 0603854F Wideband SATCOM (RDT&E) Space
- PE 0604479F Milstar LDR/MDR SATCOM (Space)
- PE 0604240F B-2 (RDT&E)
- PE 0101113F B-52 (RDT&E)
- PE 0305207F RC-135 (RDT&E)

**(U) D. Acquisition Strategy**  
FAB-T provides a family of Beyond Line-of-Sight (BLOS) satellite communications (SATCOM) and Line-of-Sight (LOS) terminals with an open architecture to

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satisfy the requirements identified in the Advanced Wideband Terminal (AWT) and Command Post Terminal (CPT) Operational Requirements Documents (ORDs).

Increment 1 provides the layered architecture which enables support for evolving and new communication capabilities and technologies. Capabilities include transmission and reception of voice, data, imagery, and video as well as broadcast reception over protected and wideband SATCOM and LOS systems. Increment 1 also provides the capability for air and ground communications using the Milstar Extremely High Frequency (EHF) and Advanced Extremely High Frequency (AEHF) waveforms. Increment 1 terminals are planned for the B-2, B-52, and RC-135 aircraft and to upgrade the existing Command Post Terminals (CPTs) located on the ground (fixed and transportable) and airborne on the E-4 and E-6B aircraft.

Increment 2 will provide transponded Ka band communications over Wideband Global SATCOM (WGS), transponded Ku band communications over commercial satellites and LOS capabilities using Multi-Platform Common Data Link (MP-CDL) capabilities. These capabilities include communication over the WGS and provide LOS air-to-air, air-to-ground and ground-to-air for the Standard Common Data Link (STD-CDL). Increment 2 risk reduction contract was awarded sole source to Boeing Corporation due to ongoing Increment 1 development activities which lay the groundwork for all increments.

Advanced Multi-band Communications Antenna System (AMCAS) is a technology advancement program that will provide a multi-beam, multi-band antenna to enable connectivity to more than one satellite. This antenna program addresses limited aircraft external surface areas, historically high antenna integration costs, and aerodynamic and low observability restrictions. It enables airborne weapon systems to support the warfighter's need for higher data rates while providing a common solution for multiple platforms.

Increment 3 will add 2-way processed Ka band and EHF Extended Data Rate Plus (XDR+) that increases the EHF data rate from 8 Mbps to 45 Mbps and provides connectivity with the Transformational Communications Satellite (TSAT).

Increment 4 is planned to develop Optical Communications (Lasercom). Lasercom will provide very high bandwidth communications so that sensor data may be transmitted to exploitation facilities at very high data rates (e.g., 1 > Gbps). Airborne Command & Control aircraft will also use Lasercom to exchange or update large databases.

The program strategy is to procure future increments using the open system architecture and adding functionality as funding becomes available and when requirements are identified. These increments may include providing SATCOM capability combinations of AEHF, Global Broadcast Service (GBS), and commercial wideband video and data services to over fifty-seven additional aircraft/platform types that are identified in the AWT Operational Requirements Document (ORD).

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**Exhibit R-3, RDT&E Project Cost Analysis**

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(U) <u>Cost Categories</u> (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	<u>Contract Method &amp; Type</u>	<u>Performing Activity &amp; Location</u>	<u>Total Prior to FY 2007 Cost</u>	<u>FY 2007 Cost</u>	<u>FY 2007 Award Date</u>	<u>FY 2008 Cost</u>	<u>FY 2008 Award Date</u>	<u>FY 2009 Cost</u>	<u>FY 2009 Award Date</u>	<u>Cost to Complete</u>	<u>Total Cost</u>	<u>Target Value of Contract</u>
(U) <u>Product Development</u> FAB-T Development	CPAF	Boeing Corp., Anaheim, CA	479.952	204.300	Jan-07	335.312	Jan-08	268.875	Jan-09	Continuing	TBD	
FAB-T	Various	Various	18.892	9.488	Jan-07	6.838	Jan-08	29.825	Jan-09	Continuing	TBD	
High Data Rate (HDR) RF Ground Terminal Development	FFP	Comtech, Tempe, AZ	0.000	1.614	Aug-07	3.547	Jan-08	2.771	Jan-09	Continuing	TBD	
High Data Rate (HDR) RF Ground Terminal Development	FFP	Raytheon, Maraboro, MA		2.985	Aug-07	3.548	Jan-08	2.772	Jan-09	Continuing	TBD	
High Data Rate (HDR) RF Air Terminal Development (merged with FAB-T beginning in FY06)	CPAF	Boeing Corp., Anaheim, CA	13.787								13.787	
Lasercom Terminal Development Studies	FFP	Various	30.395								30.395	
Subtotal Product Development			543.026	218.387		349.245		304.243		Continuing	TBD	0.000
Remarks:												
(U) <u>Support</u> Systems Engineering Support	CPAF	MITRE, Bedford MA	198.825	21.510	Jan-07	20.560	Jan-08	18.190	Jan-09	Continuing	TBD	
Systems Engineering/Functional/Financial Support	Various	Various	216.440	15.711	Jan-07	12.416	Jan-08	12.431	Jan-09	Continuing	TBD	
Miscellaneous	Various	Various	30.494	1.618	Jan-07	2.431	Jan-08	2.234	Jan-09	Continuing	TBD	0.000
Subtotal Support			445.759	38.839		35.407		32.855		Continuing	TBD	0.000
Remarks:												
(U) <u>Test &amp; Evaluation</u> Various Programs	Various	AF Research Lab	25.018							Continuing	TBD	
Miscellaneous T&E	Various	Various	26.187							Continuing	TBD	0.000
Subtotal Test & Evaluation			51.205	0.000		0.000		0.000		Continuing	TBD	0.000
Remarks:												
(U) <u>Management</u> Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	0.000
Remarks:												
(U) Total Cost			1,039.990	257.226		384.652		337.098		Continuing	TBD	0.000

Exhibit R-4, RDT&E Schedule Profile

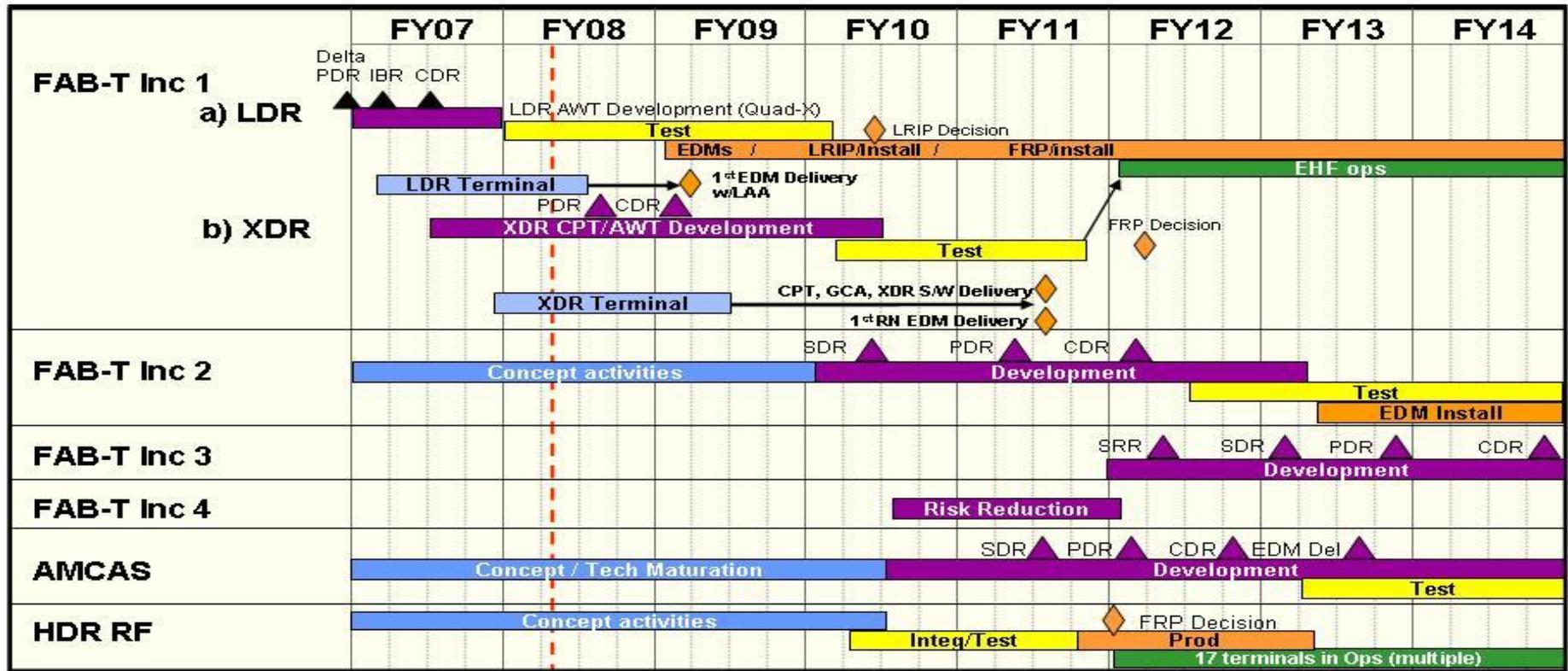
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# MILSATCOM Terminals Schedule (R-Doc)



CDR: Critical Design Review    EDM: Engineering Design Model    IPR: Interim Program Review    LRIP: Low Rate Initial Production  
 PDR: Preliminary Design Review    SDR: System Design Review    SRR: System Requirements Review    TIM: Technical Interchange Meeting

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

**Exhibit R-4a, RDT&E Schedule Detail**

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**(U) Schedule Profile**

- (U) FAB-T (Inc 1) Low Data Rate (LDR) Critical Design Review (CDR)
- (U) FAB-T (Inc 1) Extended Data Rate (XDR) Preliminary Design Review (PDR)
- (U) FAB-T (Inc 1) XDR CDR
- (U) FAB-T 1st Engineering Development Model (EDM) Delivery of LDR terminal

FY 2007

2Q

FY 2008

3Q

FY 2009

1Q

1Q