PE NUMBER: 0303601F
PE TITLE: MILSATCOM Terminals

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2005

BUDGET ACTIVITY: 07 Operational System Development

PE NUMBER AND TITLE: 0303601F MILSATCOM Terminals

	Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	159.647	264.795	273.974	273.782	191.087	220.734	198.158	194.439	Continuing	TBD
2487	MILSATCOM Terminals	159.647	264.795	273.974	273.782	191.087	220.734	198.158	194.439	Continuing	TBD

(U) A. Mission Description and Budget Item Justification

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 Gapfiller System (WGS), Defense Satellite Communication System (DSCS), Transformational Communications Satellite (TSAT), and other military and 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-bands on WGS, X-band on DSCS, and commercial C- and Ku-band on commercial satellites to significantly increase throughput for inter- and intra-theater tactical force information such as air tasking orders, battle damage assessments, and reconnaissance data. The RDT&E effort for GMT completed in FY05.

3) FAB-T will develop robust, secure, survivable voice and data satellite communications terminals for nuclear and conventional forces. FAB-T provides an open architecture terminal to develop a "family of airborne/ground terminals" with hardware/software commonality for multiple waveforms supporting multiple satellites via an incremental approach. FAB-T Increment 1 program will provide Extremely High Frequency (EHF) voice and data communications for nuclear and conventional forces as well as ground and airborne command posts with connectivity to MILSTAR and Advanced EHF satellites. FAB-T Increment 2 will provide robust secure 2-way Ku/Ka band SATCOM capability on High Altitude Endurance (HAE) Intelligence, Surveillance and Reconnaissance (ISR) aircraft to operate with increased RF capacity on WGS, TSAT, and commercial satellites. FAB-T Increment 3 will provide XDR+ capabilities (45 Mbps) to platforms requiring communications in support of TSAT. Also included in the FAB-T program is the Advanced Multi-band Communications Antenna System (AMCAS) that provides a small multi-beam, multi-band phased array antenna that enables simultaneous connectivity to more than one satellite. This antenna 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 and future high data requirements while providing a common solution for each platform.

4) High Data Rate (HDR) Radio Frequency (RF) Ground Terminal Development. Develops terminals with transponded Ka-band HDR (274 Mbps) capabilities in support of the DCGS receipt of Airborne ISR (AISR) data. This bandwidth will be provided via the fourth and fifth WGS satellites. This terminal will also support the lower data rate (137 Mbps) provided by the first three WGS satellites.

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0303601F MILSATCOM Terminals

5) Lasercom Development. Develops an airborne laser communications terminal (ALT) to support optical communications for ISR and command and control aircraft; supports transformational communications initiatives which require laser transmission of sensor data at rates over TSAT.

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

7) Mobile User Objective System (MUOS) terminal upgrade development has been terminated. Existing narrowband terminals will be backwards compatible with MUOS and will ultimately be replaced by JTRS radios at their end of life.

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)

		FY 2004	FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	173.831	272.149	241.099	161.529
(U)	Current PBR/President's Budget	159.647	264.795	273.974	273.782
(U)	Total Adjustments	-14.184	-7.354		
(U)	Congressional Program Reductions	-0.494			
	Congressional Rescissions	-1.477	-7.354		
	Congressional Increases				
	Reprogrammings	-3.123			
	SBIR/STTR Transfer	-9.090			

(U) Significant Program Changes:

In FY 05, development efforts for Project Number 2, GMT, were completed.

In FY05, the Air Force terminated the Mobile User Objective System (MUOS) development as narrowband radios will operate in backwards compatibility and will ultimately be replaced by JTRS radios at end of life.

In FY 06, the Air Force is merging the HDR-RF Airborne development and the Advanced Multi-band Communications Antenna System (AMCAS) with the FAB-T development program in support of evolving the family of terminals concept to merge related programs. HDR-RF Airborne will become FAB-T Increment 2 as it reuses major components of Increment 1. The AMCAS antenna will be used on certain platforms in conjunction with FAB-T.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2005
BUDGET ACTIVITY: 07 Operational System Development	PE NUMBER AND TITLE: 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE: 2487 MILSATCOM Terminals	

	Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
2487	MILSATCOM Terminals	159.647	264.795	273.974	273.782	191.087	220.734	198.158	194.439	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

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 Gapfiller System (WGS), Defense Satellite Communication System (DSCS), Transformational Communications Satellite (TSAT), and other military and 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-bands on WGS, X-band on DSCS, and commercial C- and Ku-band on commercial satellites to significantly increase throughput for inter- and intra-theater tactical force information such as air tasking orders, battle damage assessments, and reconnaissance data. The RDT&E effort for GMT completed in FY05.

3) FAB-T will develop robust, secure, survivable voice and data satellite communications terminals for nuclear and conventional forces. FAB-T provides an open architecture terminal to develop a “family of airborne/ground terminals” with hardware/software commonality for multiple waveforms supporting multiple satellites via an incremental approach. FAB-T Increment 1 program will provide Extremely High Frequency (EHF) voice and data communications for nuclear and conventional forces as well as ground and airborne command posts with connectivity to MILSTAR and Advanced EHF satellites. FAB-T Increment 2 will provide robust secure 2-way Ku/Ka band SATCOM capability on High Altitude Endurance (HAE) Intelligence, Surveillance and Reconnaissance (ISR) aircraft to operate with increased RF capacity on WGS, TSAT, and commercial satellites. FAB-T Increment 3 will provide XDR+ capabilities (45 Mbps) to platforms requiring communications in support of TSAT. Also included in the FAB-T program is the Advanced Multi-band Communications Antenna System (AMCAS) that provides a small multi-beam, multi-band phased array antenna that enables simultaneous connectivity to more than one satellite. This antenna 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 and future high data requirements while providing a common solution for each platform.

4) High Data Rate (HDR) Radio Frequency (RF) Ground Terminal Development. Develops terminals with transponded Ka-band HDR (274 Mbps) capabilities in support of the DCGS receipt of Airborne ISR (AISR) data. This bandwidth will be provided via the fourth and fifth WGS satellites. This terminal will also support the lower data rate (137 Mbps) provided by the first three WGS satellites.

5) Lasercom Development. Develops an airborne laser communications terminal (ALT) to support optical communications for ISR and command and control aircraft; supports transformational communications initiatives which require laser transmission of sensor data at rates over TSAT.

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE 2487 MILSATCOM Terminals

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

7) Mobile User Objective System (MUOS) terminal upgrade development has been terminated. Existing narrowband terminals will be backwards compatible with MUOS and will ultimately be replaced by JTRS radios at their end of life.

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)**	FY 2004	FY 2005	FY 2006	FY 2007
(U)	Continue concept/prototype demo/MILSATCOM Terminals roadmap/SATCOM funding	1.812	3.983	3.902	3.957
(U)	Completed Ground Multi-band Terminal (GMT) development	10.276	22.393		
(U)	Continue Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) development (FAB-T Inc 1)	112.795	147.379	224.604	203.583
(U)	Continue High Data Rate (HDR) RF Air (merge with FAB-T in FY06 to become FAB-T Inc 2)	3.824	32.368		
(U)	Continue Advanced Multi-band Communications Antenna System (AMCAS) development (merge with FAB-T in FY06)	3.860	8.418		
(U)	Continue High Data Rate (HDR) RF Ground Terminals	3.865	14.369	12.200	0.000
(U)	Continue Lasercom Terminals development	16.406	28.736	25.217	58.083
(U)	Continue Joint Terminal Engineering Office (JTEO) Support	6.809	7.149	8.051	8.159
(U)	Total Cost	159.647	264.795	273.974	273.782

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

		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U)	Aircraft Procurement, Air Force,Project 119992 (Budget Activity 5, P-27 and P-61, PE 0303601F only) (1)	35.628	27.161	2.742	10.389	122.551	152.137	291.344	351.024	Continuing	TBD
(U)	Other Procurement, Air Force, 'MILSATCOM Space',Project 836780 (Budget Activity 3, P-66, PE 0303601F only) (1)	24.694	23.032	31.809	75.973	106.915	86.760	131.664	137.728	Continuing	TBD

(1) Spares Included

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)

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE 2487 MILSATCOM Terminals

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

PE 0603430F Advanced EHF MILSATCOM (Space)
PE 0603845F Transformational SATCOM (TSAT)
PE 0603432F Polar MILSATCOM (Space)
PE 0603854F Wideband Gapfiller System (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)
PE 0207581F Joint STARS (RDT&E)

(U) D. Acquisition Strategy

In FY04, the AF began the development for the FAB-T Increment 2 Ka SATCOM capability. Increment 2 will be developed in 2 phases. In FY05, Phase 1 was awarded and encompasses requirements definition to develop the Contractor Technical Requirements Document (CTRD). Phase 2 will be awarded in FY06 and will be the implementation of this CTRD.

In FY 04 the Air Force began the Advanced Multi-Band Communications Antenna System (AMCAS) concept development phase. This effort is known as the AMCAS Technology Development Plan, which involves multiple studies to define the system architecture to be completed in FY07. The results of the studies will be used as a basis for awarding a System Design and Development (SDD) contract based on full and open competition.

In FY04, the Airborne Lasercom Terminal (ALT) program initiated first phase, the Concept and Architecture Development Study Phase, of the program. Four technology demonstration contracts were awarded in June 04 and two architecture development contracts were awarded in August 04. The results of these efforts, in conjunction with the results of a FAB-T sponsored effort conducted by the FAB-T prime contractor, will be used to plan the Risk Reduction and Design Development Phase of the ALT program. The second phase of the program will feature the design and development of Engineering Development Models of terminals and is planned for award in FY06 and will run through FY09.

Exhibit R-3, RDT&E Project Cost Analysis

DATE: **February 2005**

BUDGET ACTIVITY: **07 Operational System Development**

PE NUMBER AND TITLE: **0303601F MILSATCOM Terminals**

PROJECT NUMBER AND TITLE: **2487 MILSATCOM Terminals**

(U) Cost Categories (Tailor to WBS, or System/Item Requirements) ($ in Millions)	Contract Method & Type	Performing Activity & Location	Total Prior to FY 2004 Cost	FY 2004 Cost	FY 2004 Award Date	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost to Complete	Total Cost	Target Value of Contract
(U) Product Development														
GMT Development	CPAF	Harris Corp., Melbourne, FL	30.696	6.571	Oct-03	19.500	Oct-04					0.000	56.767	55.939
FAB-T Development	CPAF	Boeing Corp., Anaheim, CA	45.904	97.232	Oct-03	119.569	Oct-04	208.683	Oct-05	195.161	Oct-06	Continuing	TBD	236.349
Joint STARS A-kit Development	AF-616	ESC/JS, Hanscom AFB	0.401									0.000	0.401	0.400
High Data Rate (HDR) RF Ground terminal study (Associated Contract Agreement)	TRN	Harris, Raytheon, Boeing	0.500	0.800	Feb-04							0.000	1.300	1.380
High Data Rate (HDR) RF Airborne terminal study (Associated Contract Agreement)	TRN	Boeing Corp., Anaheim, CA	0.500	1.946	Oct-03							0.000	2.446	0.500
High Data Rate (HDR) RF Ground Terminal Development	TBD	TBD				23.384	Oct-04	7.294	Oct-05	0.000	Oct-06	Continuing	TBD	
High Data Rate (HDR) RF Air Terminal Development (merged with FAB-T beginning in FY06)	CPAF	Boeing Corp., Anaheim, CA				25.689	Oct-04						25.689	
Lasercom Terminal Development	TBD	TBD		8.801	Oct-03	24.606	Oct-04	16.981	Oct-05	46.737	Oct-06	Continuing	TBD	
AMCAS Development (merged with FAB-T beginning in FY06)	TBD	TBD		5.136	Oct-03	6.654	Oct-04					Continuing	TBD	
												0.000	0.000	
Subtotal Product Development			78.001	120.486		219.402		232.958		241.898		Continuing	TBD	294.568
Remarks:														
(U) Support														
Systems Engineering Support	CPAF	MITRE, Bedford MA	134.568	19.699	Oct-03	21.425	Oct-04	23.009	Nov-05	16.650	Nov-06	Continuing	TBD	
Systems Engineering/Functional/Financial Support	Various	Various	165.836	12.156	Oct-03	14.258	Oct-04	12.850	Oct-05	11.542	Oct-06	Continuing	TBD	
Financial Support (Beginning in FY04 totals included in Systems Engineering/Functional/Financial Support)	Various	Tecolote, Bedford MA		0.000		0.000						Continuing	TBD	
Miscellaneous	Various	Various	20.763	3.207	Oct-03	4.059	Oct-04	4.374	Oct-05	3.085	Oct-06	Continuing	TBD	
													0.000	
Subtotal Support			321.167	35.062		39.742		40.233		31.277		Continuing	TBD	0.000
Remarks:														
(U) Test & Evaluation														
Various Programs	Various	AF Research	24.603			4.388	Oct-04					Continuing	TBD	

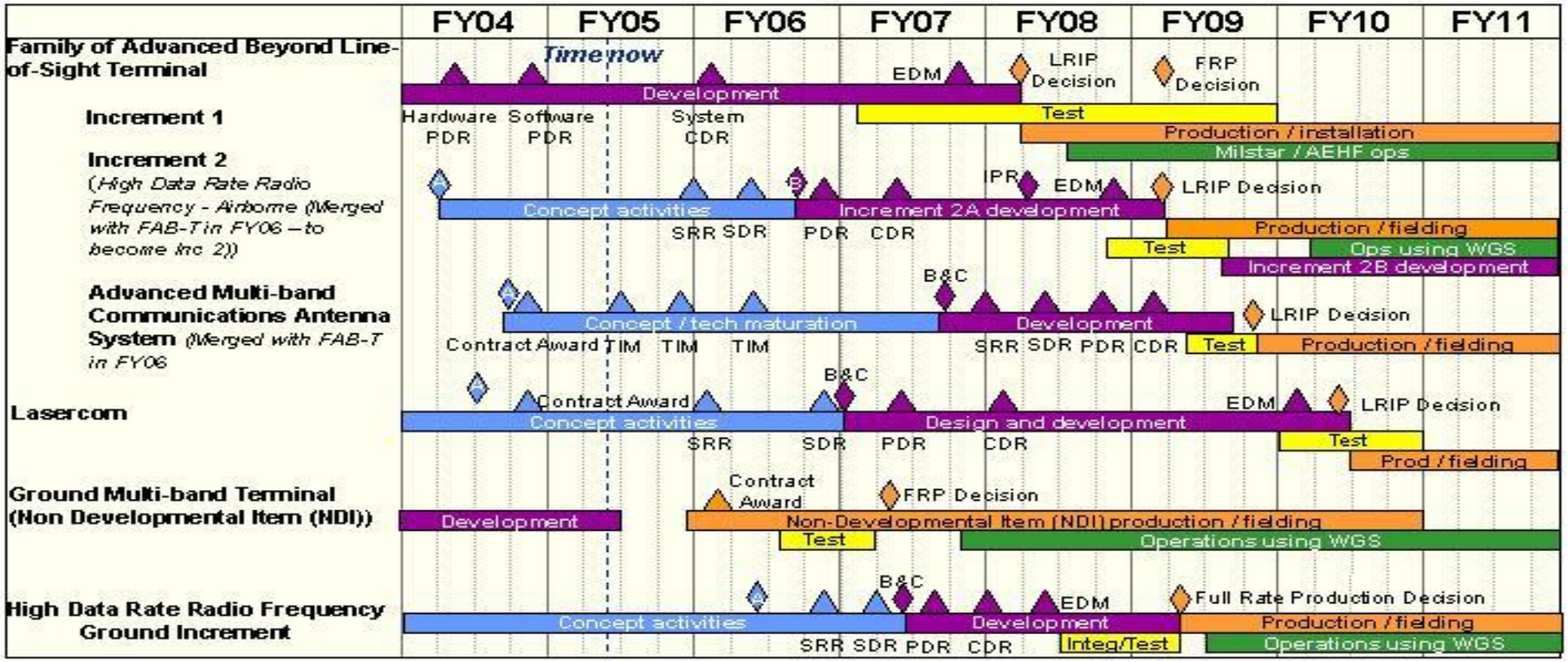
Exhibit R-3, RDT&E Project Cost Analysis

DATE: **February 2005**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
07 Operational System Development	**0303601F MILSATCOM Terminals**	**2487 MILSATCOM Terminals**

			Lab												
	Miscellaneous T&E	Various	Various	6.207	4.099	Oct-03	1.263	Oct-04	0.783	Oct-05	0.607	Oct-06	Continuing	TBD	
														0.000	
	Subtotal Test & Evaluation			30.810	4.099		5.651		0.783		0.607		Continuing	TBD	0.000
	Remarks:														
(U)	Management														
														0.000	
	Subtotal Management			0.000	0.000		0.000		0.000		0.000		0.000	0.000	0.000
	Remarks:														
(U)	Total Cost			429.978	159.647		264.795		273.974		273.782		Continuing	TBD	294.568

Exhibit R-4, RDT&E Schedule Profile		DATE: February 2005
BUDGET ACTIVITY: 07 Operational System Development	PE NUMBER AND TITLE: 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE: 2487 MILSATCOM Terminals



CDR: Critical Design Review
DT&E: Development Test & Evaluation
EDM: Engineering Design Model
FRP: Full Rate Production
IPR: Integrated Program Review
LRIP: Low Rate Initial Production
OT&E Operational Test & Evaluation
PDR: Preliminary Design Review
SDR: System Design Review
SRR: System Requirements Review
TIM: Technical Interchange Meeting

Exhibit R-4a, RDT&E Schedule Detail			DATE: February 2005
BUDGET ACTIVITY: 07 Operational System Development	PE NUMBER AND TITLE: 0303601F MILSATCOM Terminals	PROJECT NUMBER AND TITLE: 2487 MILSATCOM Terminals	

(U) Schedule Profile	FY 2004	FY 2005	FY 2006	FY 2007
(U) FAB-T (Inc 1) Critical Design Review (CDR)			1Q	
(U) Begin Initial development of FAB-T Increment 2		1Q		
(U) Award Technology Maturation contracts for Advanced Multi-band Communications Antenna System (AMCAS)	4Q			
(U) Begin Initial Development of AMCAS				3Q
(U) Award Technology Maturation contracts for Lasercom Optical Apertures	4Q			
(U) Begin Initial Development of Lasercom Terminals			2Q	
(U) Begin Initial Development of High Data Rate (HDR) RF Ground Terminals			2Q	