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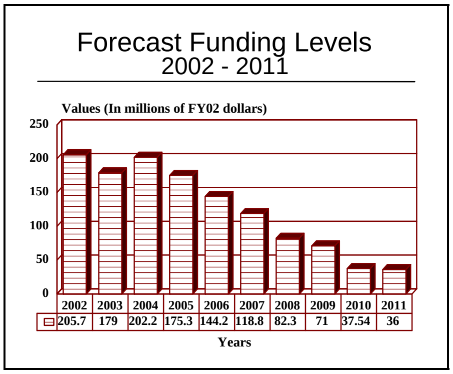
MILSTAR/Advanced EHF Terminals – Archived 02/2003

Outlook

- Rockwell Collins awarded contract to perform an Advanced EHF upgrade to the SCAMP terminals
- Raytheon awarded contract to develop Advanced EHF capabilities for the SMART-T terminal
- Raytheon and Harris Corporation to develop US Navy EHF SATCOM terminal prototype



Orientation

Description. The Military Strategic and Tactical Relay (MILSTAR) system is a US Department of Defense (DoD) joint service advanced, nuclear survivable, military satellite-based communications (EHF/SHF) system. The Advanced Extremely High Frequency (EHF) satellite is a follow-on intended to replace MILSTAR beginning around 2005. This report covers the airborne terminal portion of these programs.

Sponsor

US Air Force
Joint MILSTAR Program Office
Space & Missile Systems Center
Los Angeles, California (CA)
USA
(Lead agency for MILSTAR)

Electronic Systems Center
Hanscom AFB, Massachusetts (MA)
USA
(US Air Force/Navy airborne terminals development)

Prime Contractor

Raytheon Co
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USA
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Fax: +1 703 525 1968
Web site: www.raytheon.com
(Prime Contractor for Air Force airborne terminals)

Contractors

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(EHF airborne terminal)

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(Raytheon team member, alternate contractor)

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(Subcontractor to Raytheon airborne terminal design)

Harris Corporation
1025 West NASA Boulevard
Melbourne, Florida 32919
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Web site: www.harris.com
(EHF airborne terminal)

California Microwave
125 Kennedy Drive
Hauppauge, New York (NY) 11788
USA
Tel: +1 516 272 5600
(DAMA modems and Network Control Stations)

Status. Continuing development, upgrade, modification, and production programs.

Total Produced. The variety of MILSTAR/EHF systems available makes it difficult to give an accurate estimate of systems produced.

Application. MILSTAR/EHF terminals are designed to provide worldwide strategic communications coverage for airborne-, sea-, and land-based assets through high ECM or EMP areas.

Price Range. According to the US Air Force Program Executive Officer for Space Programs, terminal costs were to be in the US$2 million range. The average unit cost of all the terminal variants has decreased from US$2.1 to US$1.3 million. Since there are several different types of terminals to be procured for the airborne role, specific costs cannot be assigned. The Command Post Terminals are the most expensive, while the new Low Cost Terminals are considerably less expensive than the Low Volume Force Element Terminals that they will replace.

Technical Data

Design Specifications

	Metric	US
SCAMP		
Dimensions		
Volume of Case:		25 x 13.5 x 11 inches
Weights		
Weight of Self-Contained Terminal with Case:		Less than 37 pounds
Weight of Packed accessories Case:		Less than 34 pounds
Environment		
Winds:		20 mph with 30 mph gusts

	Metric	US
Rain:		Survive 2 inches/hour
Temperature:	-32° to +49° C	
Radio Frequency		
Uplink Frequency:	44.0 Ghz	44.0 Ghz
Uplink Bandwidth:	2.0 Ghz	2.0 Ghz
Downlink Frequency:	20.0 Ghz	20.0 Ghz
Downlink Frequency:	1.0 Ghz	1.0 Ghz
Data Rates	75-2,400 bps	75-2,400 bps
Power		
Internal Battery:	24 volts DC	24 volts DC
External DC:	20-33 volts DC	20-33 volts DC
External AC:	110-220 volts AC	110-220 volts AC

USC-38

	Metric	US
Dimensions		
High Power Amplifier (HPA):		54 x 18.75 x 24 inches
Communication Equipment Group (CEG):		67.5 x 24 x 24 inches
Radome: Ship:		60 x 56 inches hemisphere
Shore:		108 x 144 inches spherical inflatable, or 83 x 96 inches hemisphere
Submarine:		12.5 x 7.5 inches hemisphere
Weights		
High Power Amplifier (HPA):		615 pounds
Communication Equipment Group (CEG):		950 pounds
Radio Frequency		
Uplink Frequency:	44.5 Ghz	44.5 Ghz
Uplink Bandwidth:	2.0 Ghz	2.0 Ghz
Downlink Frequency:	20.7 Ghz	20.7 Ghz
Downlink Frequency:	1.0 Ghz	1.0 Ghz
Data Rates	75-2,400 bps	75-2,400 bps
Power		
High Power Amplifier (HPA):	440 volts, 60Hz	440 volts, 60Hz
Communication Equipment Group (CEG):	115 volts, 60Hz	115 volts, 60Hz

SMART-T

	Metric	US
Dimensions:		88 x 47 x 37 inches
Weights:		1,500 pounds
Environment		
Winds:		Up to 60 mph
Radio Frequency		
Uplink Frequency:	44.0 Ghz	44.0 Ghz
Uplink Bandwidth:	2.0 Ghz	2.0 Ghz
Downlink Frequency:	20.0 Ghz	20.0 Ghz
Downlink Frequency:	1.0 Ghz	1.0 Ghz
Data Rates		
Low Data Rate:	75-2,400 bps	75-2,400 bps
Medium Data Rate:	1.024 Mbps	1.024 Mbps

Power Source
1.5 kW Diesel Generator
200 Amp kit when installed on HMMWV

Variants/Upgrades

USC-38. The USC-38(V) terminals provide the Navy's basic warfighting communication system. As part of the Navy EHF SATCOM Program (NESP), the USC-38(V) provides voice, data and information exchange communications with anti-jam, low probability of intercept, low probability of detection, and anti-scintillation capabilities. The NESP terminal is interoperable with Air Force and Army terminals deployed with FLTSAT EHF packages on FLTSAT, UFO, and Milstar satellites.

The NESP USC-38(V) is an anti-jam, low- probability-of-intercept communications terminal designed to accommodate a wide variety of command and control communications (i.e., secure voice, teletype, data, and fleet broadcast systems). The NESP program provides for USC-38(V) terminal development, production, and installation which provides the fleet with core and hard core communications capabilities for worldwide command and control communications (C^3). USC-38(V) terminals currently provide physical and electromagnetic survivability, resistance to jamming and electromagnetic interference, and low probability of intercept detection capabilities against the current and projected threats at data rates of 75-2400 bits per second (bps).

EHF SATCOM This is the replacement terminal for the USC-38 terminal. It permits EHF data rates of up to 256kb/s and provides access to SHF and Gobal Broadcast Service communications.

SMART-T. The Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T) is a HMMWV mounted, EHF terminal that provides multichannel range extension for MSE at division and corps. The terminal operates at T-1 (1.544 Mb/s) over the MILSTAR satellite and at the low (75 Bps to 2,400 Bps) and medium (4.8 Kb/s) EHF data rates over MILSTAR and the EHF packages on FLTSAT and UFO. SMART-T will replace the multichannel GMF terminal for hard core and core users. It provides Low Probability of Intercept/Detection (LPI/D) and has built in Transmission Security (TRANSEC) with Over-The-Air-Re-keying (OTAR) capability. It has the capability to interface and control certain aspects of the satellite such as resource control and antenna pointing. The SMART-T must be initialized with TRANSEC fill data and mission specific data. SMART-T does not provide COMSEC but accepts data encrypted by the user. Selected SMART-Ts will have embedded FSEN switches. The SMART-T is interoperable with MILSTAR, FLTSAT EHF Packages (FEP), and EHF Packages on UHF Follow-On (UFO) Satellites.

SCAMP Block I. The SCAMP Block I terminal has embedded COMSEC/TRANSEC and provides EMP protection with a biological/chemical-protected carrying case. It provides range extension interfacing with the Area Common User System (ACUS) and Combat Net Radio (CNR). The SCAMP Block I will be a man-portable, single channel terminal offering half duplex communications. Block I provides an interim man-portable single channel, Low Data Rate satellite capability using today's technologies.

SCAMP - Block II. The SCAMP Block II is being developed to transmit and receive low rate data and voice in selectable point-to-point or broadcast modes. Capable to transmit in the EHF band and receive in the SHF band, the SCAMP Block II will be a manportable (12-15 lb) unit, designed to give the tactical warfighter secure anti-jam protected satellite communications that have a lower probability of intercept and detection. Block II will make use of advanced technologies and materials to provide for twelve hours of operation at a higher power density while utilizing lighter weight batteries and a lighter weight antenna. The Milestone II decision on the SCAMP II was made in the first quarter of 2001, and the EMD partnering contract was awarded shortly thereafter in the second quarter.

Program Review

Background. In 1981, US President Ronald Reagan announced the strategic modernization program, which included planning that eventually resulted in the Military Strategic and Tactical Relay (MILSTAR) mission and program. MILSTAR-related technology had earlier been demonstrated in development and evaluation programs. Most of the technology base was developed for the intelligence services.

The development of the EHF communications technology was carried out by the Naval Ocean Systems Center. The technology level studies for the STRATSAT system were the work of the Rome Air Development Center, with the Lincoln Laboratory responsible for the current system architecture. The US Navy was responsible for conceptual studies of the EHF communications test package for MILSTAR.

The MILSTAR program commenced in FY82 with US$16 million going to the Advanced Space Communications program and US$32 million being appropriated for the AFSCS program. Specific funding for MILSTAR was first requested in FY83 for both satellite and terminal development. Commencing in FY84, terminal development was funded under the AFSCS program; consequently, the MILSTAR program funded only the MILSTAR satellite and its mission control segment.

In May 1989, low-rate initial production was approved for US Air Force and US Navy MILSTAR terminals. In December 1989, contracts were awarded to Raytheon and Rockwell/Collins for airborne terminal low-rate initial production.

During 1990, significant concern was focused on terminal quantities and capabilities. Due to the overall drive for cost reductions of the very expensive MILSTAR program, the total number of all types of terminals for all services had been reduced from 1,721 to 1,467, and then to an estimated 1,281. The accompanying restructuring is estimated to have reduced overall program costs by 35 percent. The US Air Force's total terminal requirement dropped from 948 to 417.

Another important factor brought to light was the new emphasis on the provision of a medium-data-rate capability. While preceding Desert Shield/Desert Storm operations, this requirement was reinforced by the very heavy reliance placed on satellite communications during these operations. The existing low-data-rate capability was sufficient for the original nuclear war scenario; however, the tactical commander has assumed a higher priority in the MILSTAR scheme of things, and the medium data rate is considered critical for supporting tactical needs since more information can be processed in a quicker time frame. The medium data rate will allow straight communication into the US Army's Mobile Subscriber Equipment and the tri-service TRI-TAC switchboards.

In January 1991, Pentagon and US Air Force officials began a debate on whether or not to award new terminal contracts to a single contractor or to two contractors, as under the current program. A report issued by the General Accounting Office (GAO) at that time said it would be foolish to continue with the costly two-contractor approach as the cost per terminal rose from US$5.2 million to US$7.9 million. This recommendation was made in part because production funds were divided between two contractors which prevented either one from achieving efficient production rates.

Congress also expressed concern about MILSTAR's support to tactical forces being inadequate and its nuclear warfighting capabilities as being unnecessary in the new post-Cold War environment. The US Air Force, in turn, reduced its planned quantity of MILSTAR command post terminals to 138.

Raytheon was awarded a US$13.2 million contract in January 1992 for the demonstration of a small, low-cost EHF satellite terminal in support of MILSTAR. The low-cost, second-generation terminal is being developed to satisfy essential communication needs for various US Air Force applications, including bombers and Minutemen missile sites. The contract covers the development and verification of a minimum-cost terminal processing MILSTAR capability. Acceptance tests were completed in October 1992. Similar contracts were also awarded to Stanford Telecommunications and E-Systems. By establishing the satellite link, the Rockwell terminal test team demonstrated its ability to build, integrate, and operate an EHF MILSTAR terminal, giving Rockwell a potential advantage for becoming the sole terminal producer.

By May 1993, The US Air Force Electronic Systems Center had awarded a US$111 million contract to Rockwell and a US$73.9 million contract to Raytheon to provide Command Post Terminals and spares for use with the MILSTAR system. Rockwell was contracted to supply 24 terminals, and Raytheon was contracted to supply 20 terminals. Additionally, Raytheon was expected to supply an additional 60 USC-38(V) terminals to equip surface ships, submarines, and shore sites under a US$75.7 million contract modification. These terminals were expected to operate with both MILSTAR and EHF communications packages on Fleet Satellite System (FLTSAT) satellites.

A US DoD Inspector General's report, completed in mid-1993, heavily criticized the US Air Force for commencing MILSTAR terminal production. The Inspector General charged that the US Air Force prematurely awarded a contract to complete production of the MILSTAR Command Post Terminals while significant questions on design and operational suitability remained unanswered.

The Inspector General concluded that the terminal acquisition strategy should be restructured to allow production and deployment only after successful completion of the following criteria: 1) Phase 1 operational test and evaluation, 2) electromagnetic pulse testing to prove the terminals' operational suitability, and 3) resolution of the design issues raised by outstanding reports on terminal quality deficiencies. Other recommendations were listed as classified.

Scheduled program activity covering terminal development in FY94 focused on continuing much of the development work from FY93 and developing the

Mobile Ground Systems Baseboard Interface Units. FY95 efforts continued the development work in progress from previous years.

A large portion of the funding structure for the ground segment of MILSTAR was reworked, creating several new program elements for other portions of the system. This was done to provide better allocation of funds rather than lumping all the work into one large MILSTAR superfund.

FY97 was a bad year for MILSTAR financing as the US DoD attempted to secure funding for its Bosnia peacekeeping mission. More than US$2 billion in cuts to the budget were handed out, including to the MILSTAR program. MILSTAR funding was cut an average of 31 percent for FY97-FY99, but this funding was made up in FY00-FY01. From FY02 onward, funding will drop rapidly as the MILSTAR system nears completion and the US Air Force starts to gear up for the follow-on EHF system.

FY97 work included upgrades and modifications for the CPTs, as well as participation in both MILSTAR testing activities and the worldwide system test on the Network Control System (NCS). The NCS was also expected to be upgraded to full operational use during this period. UHF and AFSATCOM terminal modifications to MILSTAR terminals continued.

Scheduled activities for PE#0303601F – MILSATCOM Terminals, between fiscal years 1998 and 2001, included the continuation of basic activities to support MILSATCOM terminals and the continuation of CPT upgrades and processor modifications. Other FY98 work included the continuation of Milstar Wright Lab testing activities, the upgrade of the Network Control System, and Concept/Prototype Demonstrations of MILSATCOM Terminals roadmap. The initiation of Advanced Wideband Architecture and Roadmap development is planned as well.

USC-38(V). Procurement of the USC-38(V) began in 1990 when Raytheon won a competitive development and initial production contract. Full production approval came in the spring of 1993. In 1997, the known total of units made was 237. This was 120 terminals short of the estimated requirements of the US Navy.

In April 2000 it was reported in *Defense Daily* that the US Navy exercised first year production options for the delivery of a replacement SATCOM system for the USC-38(V). The first contract for the USC-38(V) replacement was awarded in 1998. It is not clear whether this is an upgraded version of the USC-38(V) or a whole new system. Approximately 89 of these LDR/MDR EHF SATCOM terminals were ordered: 63 for aboard ships, 10 for shore stations, and 16 aboard submarines. Deliveries were to begin in April 2001 and end in May 2002.

However, two contracts were awarded in June 2001: one to Raytheon and one to Harris Corporation for the development of a Navy EHF SATCOM terminal prototype. It can be assumed either that the latter contracts are for a more advanced variation of the EHF SATCOM terminal or that there were delays and changes in the development and production associated with the initial order.

SCAMP. In 1992 the US Army Communications and Electronics Command issued two contracts to two separate manufacturers, Lockheed Corp and General Electric, to produce 15 engineering and manufacturing development (EDM) models of the SCAMP.

Having lost US$27 million in fiscal year 1995 development funds, the US Army had to cancel a contract for the production of the SCAMP terminal with Martin Marietta in late October 1994. In addition to losing the development funds for fiscal year 1995, the US Army had also discovered through a market survey that contractors were investing their own resources into the development of ground terminals, which were to be available in the mid-1995 time frame. With this information, the US Army realized that it could save money through competitive acquisition. By the end of this process, Rockwell defeated Martin Marietta and became the producer of the SCAMP satellite terminal.

Rockwell was awarded a US$25.7 million contract in February 1996 for full-scale production of 120 SCAMP Block I terminals. Provisions for as many as 512 SCAMP terminals were provided in the contract. The completion date is sometime in 2002.

It was reported two prototype development contracts, worth approximately US$7.25 million each, were awarded in fiscal year 1997 for Block II SCAMP Terminals. If successful, the contracts could lead to further awards for competitive engineering and manufacturing development and low-rate initial production. According to the US Army RDT&E budget estimates, 2,333 SCAMP Block II terminals will be produced between 2002 and 2005.

SMART-T. The initial production contract for the SMART-T terminal was awarded to Raytheon in February 1996. This US$31.6 million contact called for an initial low-rate production of 387 SMART-T terminals which would provide the US armed services with worldwide, high-data-rate digital communications.

In March 2000 Raytheon won an upgrade contract worth US$26 million for the US Army's SMART-T terminals. Through 2004 the capabilities of 69 terminals will be modified to meet new standards.

Funding

US FUNDING

	FY00		FY01		FY02		FY03(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E US Air Force								
PE#0303601F								
MILSATCOM Terminals								
Project 2487								
MILSTAR								
AF Terminals	-	7.6	-	17.6	-	41.8	-	57.6

	FY04(Req)		FY05(Req)		FY06(Req)		FY07(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E US Air Force								
PE#0303601F								
MILSATCOM Terminals								
Project 2487								
MILSTAR								
AF Terminals	-	98.3	-	81.8	-	68.4	-	30.7

	FY99		FY00		FY01(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E US Army						
SMART-T -	-	23.4	-	13.4	-	17.2
Project D384						
PE#0303142A						
SCAMP Block II	-	7.5	-	10.3	-	20.1
Project D389						
PE#0603856A						

	FY02(Req)		FY03(Req)		FY04(Req)		FY05(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
SMART-T	-	19.0	-	14.3	-	7.1	-	6.8
Project D384								
PE#0303142A								
SCAMP Block II	-	9.9	-	31.1	-	6.8	-	7.8
Project D389								
PE#0603856A								

All US$ are in millions.

	FY00		FY01		FY02	
	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E US Navy						
PE#0303109N						
Satellite Comm.						
Project X0728						
EHF SATCOM						
Terminals	-	6.3	-	9.2	-	12.3

Sources: Figures are derived from US Army, Air Force and Navy Fiscal Year 2002 RDT&E Budget Estimates submitted to Congress in 2001

Recent Contracts

Contractor	Award ($ millions)	Date/Description
Raytheon Electronic Systems	11.8	Mar 1999 – Definite quantity order under an indefinite delivery/indefinite quantity contract for 135 spare parts for the USC-38. The spares include traveling wave tubes, logic controller circuit card assemblies, and submarine antenna positioning groups. Completion date is December 2002. The Naval Inventory Control Point, Mechanicsburg, PA, is the contracting activity. (N00039-97-D-0013)
Raytheon Electronic Systems	26.1	July 1999 – A modification to previously awarded FFP/Time & Materials CPAF contract (DAAB07-96-C-A757). The contract is for the incorporation of DAMA capability into SMART-Ts. FY99 quantity is for 69 terminals, with an option for a FY00 full scale production of 80 terminals and a DAMA retrofit of low-rate initial production (LRIP) of 42 terminals. Work will be performed in Marlboro, MA, and is expected to be completed by June 2006. The US Army Communications & Electronics Command is the contracting authority.
Raytheon Electronic Systems	33.1	1999 – A modification to previously awarded FFP contract for inclusion of 89 SMART-T's for fielding to the US Army, USAF, and USMC. Work will be performed in Norfolk, VA, and is expected to be completed by June 30, 2006. The US Army Communications & Electronics Command is the contracting authority. (DAAB07-96-C-A757)
Raytheon Electronic Systems	5.5	1999 – A modification to a previously awarded CPAF contract to research and develop SMART-T efforts and to develop Demand Assigned Multiple Access (DAMA) capability to an asynchronous transfer mode (ATM) switch. Work was performed in Marlborough, MA, and was expected to be completed by November 2000. The US Army Communications & Electronics Command is the contracting authority. (DAAB07-96-C-A757)
Rockwell Collins Inc.	5.3	Dec 1999 – Modification to firm-fixed-price, time and material contract DAAB07-96-C-A760, to exercise the option for SCAMP efforts. Completion date is February 2007, and the contracting activity is the US Army Communications & Electronics Command, Fort Monmouth, NJ.
Raytheon Electronic Systems	11.1	Dec 1999 – A definite-quantity order under an indefinite delivery/indefinite quantity contract for spare parts for the USC-38. Completion date is December 2004, and the Naval Inventory Control Point, Mechanicsburg, PA, is the contracting authority. (N00039-97-D-0013) (Order EP54)

Contractor	Award ($ millions)	Date/Description
Raytheon Electronic Systems	11.2	Feb 2000 – Modification contract to F19628-99-C-0078 for system test support, depot and depot field support for engineering developmental terminals, and maintenance and distribution of databases for terminals through August 2002 in support of the MILSTAR communication satellite program.
Raytheon Electronic Systems	56.0	Apr 2000 – US Navy has exercised first year production options for the delivery of approximately 89 LDR/MDR EHF SATCOM terminals. 63 are to be installed aboard ships, 10 at shore stations, and 16 aboard submarines. This system will be replacing the USC-38(V). Deliveries began in April 2001 and will end in May 2002.
Rockwell Collins	9.4	Feb 2001 – US$9.392 increment of a US$34.67 modification to a cost-plus-incentive-award, firm-fixed-price, time and materials contract DAAB07-96-C-A760, for services and materials to design, develop, fabricate, integrate and test Advanced EHF SCAMP system enhance program (SEP). Work is expected to be completed by February 28, 2006. The US Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting authority.
Raytheon	9.45	Mar 2001 – Increment of a US$49,200,000 modification to cost-plus-fixed-fee contract DAAB07-96-C-A757, for a four-year research and development effort to develop Advanced EHF capability for the SMART-T terminal. Work is expected to be completed by March 31, 2005. This is a sole-source contract initiated on December 21, 2000. The US Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting authority.
Raytheon	5.2	Jul 2001 – Modification to firm-fixed-price contract DAAB07-96-C-A757 for acquisition of spare parts consisting of seven authorized stockage list for the Secure, Mobile, Anti-Jam Reliable, Tactical Terminal. Work is expected to be completed by March 31, 2005. This is a sole source contract initiated on March 21, 2001. The US Army Communications Electronics Command, Fort Monmouth, NJ, is the contracting authority.

Timetable

Month	Year	Major Development
Apr	1981	MILSTAR program start
Nov	1981	US Air Force began its portion of MILSTAR
Jan	1982	Joint MILSTAR program office established
Sep	1982	Full-scale engineering development RFP issued
Jun	1983	Full-scale engineering development begun
Sep	1983	US Air Force MILSTAR Terminal full-scale development
Jun	1984	EHF Preliminary Design Review
Feb	1985	EHF Critical Design Review
May	1985	Phase II FSD contract awarded to Raytheon
Apr	1986	Dual Modem Upgrade Quality Part 1. Dual Modem Physical Configuration Audit
Aug	1986	Start of EHF Terminal Qualification Model integration
Jun	1987	Navy transmitted first message via MILSTAR
Nov	1987	MILSTAR Terminal Prototype Test. EHF/UHF Systems Compatibility test
May	1989	LRIP approved for Air Force and Navy terminals
Dec	1989	Contracts awarded for airborne terminal low-rate initial production
	FY91	Completion of development of US Air Force EHF Core Terminal
Late	1991	Congress orders new direction for MILSTAR program

Month	Year	Major Development
Early	1992	Initial deliveries of low-rate initial production terminals
	FY92	Fabrication and delivery of EDM terminals completed
Jan	1993	First MILSTAR satellite delivered
	FY93	Full-scale development of LCT begun. Complete installation of EDM terminals in EC-135C aircraft
Feb	1994	First MILSTAR satellite launched
	1994	Installation of Airborne Modular Control Elements begun
	1994	Narrow-band Secure Voice Terminal compatibility implementation begun
Nov	1995	Second MILSTAR satellite launched
Sep	1996	MILSTAR I Initial Operational Capability
	FY97	Full-scale production of LCT
	1999	Medium data rate available upon the launch of MILSTAR satellite #3
Apr	2001	Initial Operational Capability for MILSTAR II
Jun	2006	Full Operational Capability for the MILSTAR system

Worldwide Distribution

This is a **US DoD** program only. However, in this era of multinational operations, it is likely that some of the technology, if not the actual terminals, will be shared with selected allies.

Forecast Rationale

Throughout the 1980s and 1990s, various satellite terminals were developed to provide secure, anti-jam, low probability of intercept and detection, worldwide strategic communications for the MILSTAR satellite program. The main three terminals purchased by the US military are the SMART-T, SCAMP Blocks I & II, and the USC-38. The latter is mainly employed by the US Navy, while the SMART-T and SCAMP are utilized by both the US Army and Air Force.

As technology evolved, new requirements were issued, thus leading to the development of the Advanced extremely high frequency (EHF) satellite program. This new system has transmission requirements that significantly exceed the current capabilities of the MILSTAR terminals. For example, the data rate of the Advanced EHF satellite is six times higher than that of the MILSTAR II satellite. These new transmission requirements called for either equipment upgrades or new terminals to support the Advanced EHF satellite constellation.

When the third MILSTAR satellite failed to reach its operational orbit, a gap in communications coverage was created. The Pentagon decided to accelerate the Advanced EHF satellite to fill the void. By eliminating the competitive bidding phase of the program and allowing the top competitors to work in collaboration, it was thought the launch of the first Advanced EHF satellite could be achieved by December 2004, 18 months ahead of schedule.

This past year, however, has been a difficult one for the Advanced EHF satellite program. The plans to move the launch of the first Advanced EHF satellite were short lived. In the Spring of 2001 the national Advanced EHF team made it known that the more concrete concept of the Advanced EHF satellite, which included added capabilities, would cost more than initial estimates. This led to a four month delay in the approval of the System Development and Demonstration (SSD) phase of the Advanced EHF satellite program.

As it stands now, the first Advanced EHF satellite will be launched in December 2005, followed by the launch of the second satellites in December 2006. The remaining satellites are scheduled to be launched in September 2007, March 2008 and September 2008. Initial Operational Capability is planned for 2008 and Full Operational Capability has been pushed back from 2010 to 2012.

To prepare itself for the Advanced EHF requirements, the US Air Force is currently seeking a manufacturer to modify existing terminals and develop new ones for the Advanced EHF system. The development and procurement effort will run through 2006 and will cost approximately US$300 million. Advanced EHF terminals are to be installed on B-2s, B-52s and the E-4B Advanced Command Post plane. The US Air force will reportedly design the Advanced EHF terminal for the US Navy's E-6B aircraft.

With contracts issued in early 2001, the US Army has already begun upgrading its SCAMP and SMART-T terminals. While Rockwell Collins was awarded a contract with a potential value of US$34.7 million to perform an Advanced EHF upgrade to the SCAMP terminals, Raytheon was awarded US$49.2 million contract to develop Advanced EHF capabilities for the SMART-T terminal. After successful testing the SMART-T terminal with the first MILSTAR II satellite, it has been reported that the US Army wants to begin full-rate production of the SMART-T terminal. Approximately 310 SMART-T terminals are slated for production.

Prior to the US Army contract, Raytheon received an award in April 2000 from the US Navy for the production of approximately 89 LDR/MDR EHF SATCOM terminals to replace the USC-38(V). Deliveries were to begin in April 2001 and end in May 2002. However, two contracts were awarded in June 2001, one to Raytheon and one Harris Corporation, for the development of a Navy EHF SATCOM terminal prototype. It can be assumed that the latter contracts are for a more advanced variation of the EHF SATCOM terminal or that there were delays or changes in the development and production associated with the initial order.

In general terms, funding for the SMART-T and SCAMP terminals appear to be steady over the forecast period. Although the USC-38 is being replaced by the EHF SATCOM terminal, it is not yet clear how many of these new terminals and at what rate they will be produced. It has been reported that production awards for up to 300 terminals could be issued by 2007.

The need for secure global communications in today's highly mobile modern military is a fact that cannot be ignored. Until the Advanced EHF satellite system is in place and operational, the MILSTAR system will be the primary secure global communication system for the US military. For several years after the implementation of the Advanced EHF satellite system, MILSTAR will remain a major component in the US military's communication network. The ever-growing need for real-time information will make the MILSTAR and Advanced EHF terminals an integral part of the US military's C4I efforts for many years to come.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR FUNDING ($ in millions)

			High Confidence Level			Good Confidence Level			Speculative			
Designation	**Application**	**Thru 01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**Total 02-11**
MILSTAR (AF TERMINALS)	MILSTAR RDT&E (USAF)	108.352	24.400	34.300	79.400	90.600	65.700	45.400	23.000	23.000	0.540	0.500	386.840
MILSTAR SCAMP TERMINALS	MILSTAR RDT&E (US ARMY)	38.400	19.900	31.100	6.800	7.800	7.000	6.500	5.500	5.500	5.000	5.000	100.100
MILSTAR SMART-T TERMINALS	MILSTAR PROCUREMENT (US ARMY)	155.200	19.600	12.700	32.800	20.100	19.500	20.400	18.300	12.000	7.000	6.500	168.900
MILSTAR SMART-T TERMINALS	MILSTAR RDT&E (US ARMY)	54.500	15.000	14.300	7.100	6.800	7.000	6.500	5.500	5.500	5.000	5.000	77.700
MILSTAR SMART-T TERMINALS	Prior Prod'n:	18.700	0	0	0	0	0	0	0	0	0	0	0
MILSTAR TERMINAL	MILSTAR PROCUREMENT (USAF)	238.100	43.100	48.700	68.100	50.000	45.000	40.000	30.000	25.000	20.000	19.000	388.900
MILSTAR USC-38(V) TERM.	MILSTAR PROCUREMENT (US NAVY)	716.300	64.300	29.100	4.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	98.000
MILSTAR USC-38(V)2 TERM.	MILSTAR PROCUREMENT (US NAVY)	161.498	19.400	8.800	3.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	31.600
Total Funding		1491.05	205.70	179.00	202.20	175.30	144.20	118.80	82.30	71.00	37.54	36.00	1252.04