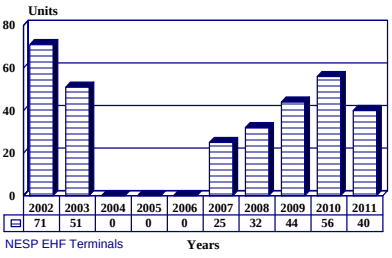
Navy EHF SATCOM Program (NESP) - Archived 09/2003

Outlook

- Forecast International projects the US Navy EHF SATCOM Program to purchase 319 EHF SATCOM terminals over the next decade
- In 2002, look for Project X0728 to continue conducting AEHF system engineering studies
- In 2003, expect Project X0731 to continue to perform developmental testing of SCI Networks

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. The United States Navy Extremely High Frequency (EHF) Satellite Communications (SATCOM) Program (NESP) provides for the development and production of terminals to provide communications capability for command and control of the US Navy fleet.

Sponsor

Milstar Joint Terminal Program Office
Washington, DC USA
(Program manager)

US Navy
Naval Ocean Systems Center
San Diego, California (CA) USA
(Lead Navy laboratory)

Naval Electronic Systems Engineering Center
Charleston, South Carolina (SC) USA
Portsmouth, Virginia (VA) USA
Vallejo, California (CA) USA

Naval Underwater Systems Center
New London, Connecticut (CT) USA

Prime Contractors

Raytheon Co - C3I Systems
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Marlborough, Massachusetts (MA) 01752
USA
Tel: +1 703 284 4422
Fax: +1 703 525 1968
Web site: http://www.raytheon.com
(Prime contractor for USC-38)

Contractors

Datron Systems Inc
3030 Enterprise Court
Vista, California (CA) 92083
USA
Tel: +1 760 734 5454
Fax: +1 760 734 5450
Web site: http://www.dtsi.com
(Antenna subcontractor)

E-Systems Inc
St. Petersburg, Florida (FL) USA
(EHF terminals)

General Electric Co
Camden, New Jersey (NJ)
USA
Web site: http://www.ge.com
(Trident IRR)

Harris Corporation

Government Communications Systems
2400 Palm Bay Road, NE
Palm Bay, Florida 32905
Tel: 1 321 727 4860
Fax: 1 321 727 4500
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6640 Lusk Boulevard, Suite A205
San Diego, California (CA) 92121
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Fax: +1 858 587 8123
Web site: http://www.macom.com
(Electronic circuit card subcontractor)

MIT - Lincoln Laboratory
244 Wood Street
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Fax: +1 781 981 7086
Web site: http://llex.ll.mit.edu
(Developer of FLTSATCOM EHF package)

Siemens Microelectronics & Components
4900 Old Ironsides Drive
PO Box 58075
MS 106
Santa Clara, California (CA) 95052-8075
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Web site: http://usa.siemens.com
(Traveling wave tube subcontractor)

Stanford Telecom
1221 Crossman Avenue
Sunnyvale, California (CA) 94089-1117
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Fax: +1 408 745 7756
Web site: http://www.stelhq.com
(EHF terminals)

Tech-Sym Corp
TRAK Microwave Corp
4726 Eisenhower Boulevard
Tampa, Florida (FL) 33634
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Fax: +1 813 901 7491
Web site: http://www.trak.com
(RF subsystem subcontractor)

Textron Inc
40 Westminster Street
Providence, Rhode Island (RI) 02903-2596
USA
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Fax: +1 401 421 2878
Web site: http://www.textron.com
(Antenna subcontractor, USC-38 submarine antenna and pedestal)

Status. Ongoing development and production.

Total Produced. Through 2001, 571 EHF SATCOM terminals have been produced.

Application. To provide communications in the face of electronic jamming, electro-magnetic pulses (generated by high-altitude nuclear bursts), and physical attack.

Price Range. The average unit cost of a NESP system is approximately US$1.4 million (FY97 dollars). This price is based on information obtained from contract averaging of a FY97 NESP terminal and peripheral equipment contract.

Technical Data

Design Specifications. The USC-38(V) is the communications terminal for NESP. It encompasses three major equipment groups: a communications equipment group (CEG), a high-power amplifier (HPA), and an antenna pedestal group (APG). There are three different APGs, configured for ship, shore, and submarine applications. The HPAs and CEGs are common to every installation.

CEG. The CEG contains the following subassemblies: terminal control unit, terminal control processor, microwave processor, modem, power distribution unit, heat exchanger, and antenna position control unit (not required for submarines). The microwave processor unit incorporates the stable frequency reference. The modem supplies the following functions: multiplexing and demultiplexing, coding and decoding, timekeeping, signal acquisition, and transmission control.

HPA. The HPA includes all required circuitry for frequency conversion and amplification of the super high frequency (SHF) and local oscillator signals supplied by

the CEG's microwave processor section through the modem to a Q-band high-power signal. A liquid-cooled amplifier (high-power transistor invertor power supply, 250 W coupled-cavity TWT amplifier) supplies final output power at the 45.6 GHz uplink frequency.

APG. The APGs are system-specific, with the submarine configuration being the smallest. The ship APG may have to be deployed in pairs since a ship's superstructure may prevent complete coverage. The standard surface ship-based APG includes a 0.88-meter-diameter dish that has dual-band coaxial feeding along with a rotatable Cassegrain sub-reflector (provides conical scan tracking for the downlink frequencies). Also housed in the APG is a front-end receiver that includes a low-noise amplifier and a down-converter. Gyro-stabilization of the three-axis gimbaled pedestal overcomes wave motion. APGs for shore installations are similar, except that the dish is 1.83 meters in diameter and can be fielded with either a rigid or inflatable radome.

The submarine APG is somewhat different, especially with respect to size constraints since the APG is mounted on the periscope. The dual-band dish antenna is only 14 centimeters (5.5 in) in diameter, with the APG being protected by a thick-walled radome (external diameter of 17.8 cm). The weight of the complete APG is only 30 pounds. Antenna frequency bands are 43.5 to 45.5 GHz to transmit, and 20.2 to 21.1 GHz to receive. A hardware commonality level of greater than 90 percent has been achieved, which results in enhanced reliability and simplified logistic support.

Variants/Upgrades

Medium Data Rate Upgrade (MDRU). The MDRU is an appliqué system that increases the data-rate capability of the NESP terminals. The MDRU was reported to have begun initial deployment to older, Earth-based systems starting in 1998, and was scheduled for on-orbit operations beginning in 1999.

The MDRU capabilities will include protected jam-resistant and low probability of intercept/detection MDR communications at a rate of 4.8 kilobits per second to 2.0 megabits per second to all major fleet combatants. The MDRU will use Milstar satellites 3 through 6. Follow-on terminals and upgrade kits will be composed of the Full Milstar Low Data Rate (LDR) Operational Capabilities (FMLOC) combined with the MDRU.

Program Review

Background. The Navy EHF (extremely high frequency) SATCOM Program (NESP) is the USN's contribution to the Milstar program. Milstar is a satellite-based communications system designed to provide minimum essential communications under all military environmental conditions. All three US Services are involved with applications, including a wide variety of strategic and tactical aircraft, ships, and ground forces, with additional potential applications for NATO and US allies.

The NESP consists of two segments. The EHF SATCOM Terminals segment is made up of terminals and two Navy satellite communication packages. The Fleet Satellite Communications EHF segment supplies an orbital test and evaluation capability that supports tri-service terminal production decisions prior to Milstar deployment. It also includes an early, limited EHF capability for National Command Authority (NCA) needs.

PE#0303109N, Project X0728 (EHF SATCOM Terminals). The NESP provides for the development and production of terminals to provide anti-jam, low-probability-of-intercept communications capability for command and control of the Navy fleet. The terminals provide physical and electromagnetically survivable, worldwide communications in electromagnetic and nuclear-threat environments. Navy EHF terminals are interoperable with Army and Air Force terminals. Moreover, Navy EHF terminals operate with Milstar.

In 2001, Project X0728 finished upgrading the MDR Modem and MDR Satellite Simulator (SATSIM). The project also performed over-the-air (OTA) MDR communications testing and LDR regression testing in 2001.

In 2002, look for Project X0728 to continue conducting Advanced EHF (AEHF) system engineering studies. Forecast International also expects the project to perform terminal upgrade design and development activities in 2002.

In 2003, Project X0728 is expected to continue terminal development engineering analysis. The project should also conduct EHF POLAR software development and systems engineering in 2003.

PE#0303109N, Project X0731 (Fleet Satellite Communications). In 2001, Project X0731 established developmental Systems Integration Environment (SIE) laboratory connectivity across a range of wireless SATCOM technologies. Also in 2001, the project established a new end-to-end laboratory capability for development, integration, and evaluation across these systems and technologies.

In 2002, look for Project X0731 to initiate modification of the Digital Modular Radio (DMR), identified as the Joint Tactical Radio System (JTRS) candidate radio, to be compliant with the JTRS software architecture.

In 2003, expect Project X0731 to continue integration and implementation of SCI Networks and associated Special Intelligence Communication capabilities. Also in 2003, expect the project to continue to perform developmental testing of SCI Networks.

Funding

US FUNDING - RDT&E

	FY01		FY02(Req)		FY03(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (US Navy)						
PE 0303109N						
Project X0728	-	8.8	-	12.1	-	48.7
Project X0731	-	3.3	-	4.6	-	0.7

	FY04(Req)		FY05(Req)		FY06(Req)		FY07(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (US Navy)								
PE 0303109N								
Project X0728	-	51.6	-	35.4	-	17.6	-	10.5
Project X0731	-	0.8	-	1.84	-	11.8	-	1.8

All $ in US millions.

Source: US Department of the Navy FY 2003 RDT&E Descriptive Summary

US FUNDING - Procurement

	FY01		FY02(Req)		FY03(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT
PROCUREMENT (US Navy)						
EHF SATCOM Terminals	-	30.4	-	33.1	-	23.2

All $ are in US millions.

Source: US Department of the Navy FY 2003 Procurement Program Summary

Recent Contracts

Contractor	Award ($ millions)	Date/Description
Raytheon	11.8	1999 – An ID/IQ contract for 135 spare parts for the USC-38 weapons system which supports NESP. Work to be completed by December 2002. (N00039-97-D-0013)
Raytheon	11.1	1999 – An ID/IQ order for spare parts for the USC-38 weapons system. Work to be completed by December 2004. (N00039-97-D-0013)
Harris Corp	1.3	July 2001 – Harris Corporation awarded a seven-month, US$1.3 million study to help develop the next-generation AEHF SATCOM terminal.

Timetable

Year	Major Development
1982	Two EHF SATCOM Program FSD competitive contracts awarded
1984	Fabrication and assembly of test article completed
1985	Integration of an EHF SATCOM antenna and radome onto a Type 8 Mod 3 submarine periscope
1986	Raytheon awarded US$102 million to continue full-scale development and for initial production
1987	Deliveries of submarine antennas completed. EDM terminal installation and checkout on ship, shore, and submarine platforms completed
1988	Interservice Terminal Interoperability Testing completed; operational assessment completed; development of Milstar enhancements commenced
1989	Milstar Development Flight Satellite Compatibility testing completed
1990	Raytheon awarded LRIP contract; terminal OT&E completed
1991	Milstar and Tri-Service Interoperability Testing performed; testing with on-orbit EHF package
1992	Third-year increment awarded; deliveries of initial production units begun; Milstar Tri-Service testing with first Milstar satellite begun
1993	New microprocessor development completed; testing of new Milstar protocols begun; Build 2 integrated into NECC; IOT&E of Milstar satellite; first Milstar satellite launched
1994	Second Milstar satellite delivered
1995	Third Milstar satellite delivered
1996	NECC sub-development
1997	MDR EDMs delivered; fourth revised Milstar satellite delivered
1998	Procurement of MDRU kits begun; contract for 340 NESP terminals with MDRU signed
2001	Harris Corporation awarded a seven-month, US$1.3 million study to help develop the next-generation AEHF SATCOM terminal
2002	Project X0731 to initiate modification of the JTRS candidate radio to be compliant with the JTRS software architecture
2003	Project X0728 to continue terminal development engineering analysis

Worldwide Distribution

The NESP system is used solely by the **United States Navy**.

Forecast Rationale

The United States Navy Extremely High Frequency (EHF) Satellite Communications (SATCOM) Program (NESP) provides for the development and production of terminals to provide communications capability for command and control of the US Navy fleet.

As indicated by the outlook chart, Forecast International projects the NESP to purchase 319 EHF SATCOM terminals over the next decade. The need for advanced communications systems to achieve information superiority is driving NESP SATCOM terminal purchases.

NESP operates with Milstar I/II Satellite Packages. Milstar is comprised of satellites, control stations, aircraft, and terminals to provide worldwide, secure, anti-jam, survivable communications for the National Command Authority, CINCs, and operational commanders.

NESP is a critical US Navy program. Forecast International will analyze and report NESP developments as they occur.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level				Good Confidence Level			Speculative			
Designation	**Application**	**Thru 01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**Total 02-11**
NESP	NAVAL MILSTAR TERMINALS (USN)	571	71	51	0	0	0	25	32	44	56	40	319