United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Acquisition,
Committee on Armed Services, House
of Representatives

For Release on
Delivery Expected
at 10:00 a.m. EST
Thursday,
April 14, 1994

MILITARY SPACE PROGRAMS

Comprehensive Analysis Needed and Cost Savings Available

Statement of Louis J. Rodrigues, Director,
Systems Development and Production Issues,
National Security and International Affairs Division

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss two Department of Defense (DOD) satellite programs--the Defense Support Program (DSP) for early missile warning, including its planned replacement called Alert, Locate, and Report Missiles (ALARM), and the Milstar satellite communications system. These multibillion dollar space programs have demonstrated DOD's commitment to effectively deter the former Soviet Union strategic threat. However, U.S. military needs now emphasize tactical capabilities for future regional conflicts. As a result, DOD is striving to modify these programs to better serve tactical forces.

RESULTS IN BRIEF

DOD's action to terminate the most recent DSP follow-on program and begin a new effort provides an opportunity to fully assess the needs for early missile warning information. DOD's current plans to replace DSP with ALARM will require a comprehensive analysis that includes (1) reviewing and validating operational requirements, (2) selecting the most cost-effective alternative from plausible candidate systems, (3) ensuring that the system selected is affordable, (4) demonstrating that an adequate transition can be made from DSP to ALARM to avoid coverage gaps, and (5) evaluating the launch vehicle implications for DSP.

Concerning the Milstar program, DOD could save over $2 billion if it determines that not acquiring the last two satellites under the current plan would not create an undue operational risk in the short term. Such a decision would need to be accompanied by a plan to accelerate the development of an enhanced Milstar that is smaller in size, lighter in weight, lower in costs, and capable of being launched on a smaller vehicle than the Titan IV. Accelerating the enhanced Milstar effort may require some additional investment in the short run.

DSP REPLACEMENT DECISION REQUIRES A COMPREHENSIVE ANALYSIS

DSP satellites have been deployed for over 20 years, and DOD's efforts to replace DSP with more modern systems have encountered several setbacks. For example, in the early 1980s, the Advanced Warning System never fully materialized because of immature technology and high costs. In the late 1980s, DOD spent about $1 billion on the Boost Surveillance and Tracking System before discontinuing research and development in 1990. For fiscal years 1992 through 1994, the Congress appropriated $515 million for the Follow-on Early Warning System (FEWS) before DOD terminated the program in late 1993 based on affordability reasons.

In late February 1994, the Air Force selected ALARM to be DSP's replacement. Its plans are to release a draft request for proposal in June 1994, initiate research and development in

fiscal year 1995, have a flight-ready prototype satellite available by late 1997, and deliver the first operational satellite in 2004. ALARM is to be smaller than DSP with an emphasis on greater support to tactical forces.

Requirements Are Not Yet Established

Since program inception, DSP was designed toward detecting strategic missile launches from land and submarines, as opposed to shorter range tactical missile launches within a theater of operations. However, during the Persian Gulf War in 1991, DSP provided the primary tactical warning of Iraq's surface-to-surface Scud missile launches. DOD's assessment of DSP's performance was that sufficient warning was provided to the Army's Patriot missile defense system, but that an improved sensor capability would be needed for the future.[1]

During 1989 through 1991, the Joint Requirements Oversight Council[2] validated the requirements for an advanced space-based missile warning sensor to detect, process, and report ballistic missile launches. Air Force representatives informed us that the associated documents provided guidance for the FEWS research and development. However, they stated that specific FEWS requirements contained in a draft October 1992 FEWS operational requirements document were never validated.

According to an October 1993 study[3] performed for the Under Secretary of Defense for Acquisition to review and recommend options for a future space-based infrared surveillance capability, new needs could be met with a system that is simpler and less costly than FEWS. The study gave considerable weight to reducing the size of the FEWS satellite to allow it to be launched on a smaller vehicle than Titan IV, which DSP uses--an idea that would reduce costs.

The study stated that although there are strong reasons for DOD wanting a new, more able satellite in the future, (1) the current requirement, and associated FEWS specification, originated in a time of complex strategic needs, (2) times have changed--

---

[1]Conduct of the Persian Gulf War, Final Report to Congress, DOD, April 1992.

[2]A group of high level military officers, chaired by the Vice Chairman of the Joint Chiefs of Staff, having authority to determine the validity of mission needs and perform requirements analyses.

[3]Space-Based IR Sensors, October 1993, performed by a technical support group from several federally funded research and development centers and referred to as the Everett study.

strategic needs being less important and global awareness and theater support being more important, and (3) there is sufficient time to review the requirements and compete for a better, simpler, cheaper system within the existing budget constrained schedule. The study recommended that the requirements be redone in context of expected needs and capabilities that could be provided by other ground- and sea-based systems.

DOD now plans to complete a review of space-based early warning requirements by October 1994. Considering the current emphasis on tactical needs, and presumably a continued need for a strategic capability, DOD must clearly establish a set of operational requirements that will address these needs before making a substantial investment in a new system.

Cost-Effectiveness Is Critical

Previous studies raised questions about the cost-effectiveness of FEWS and other advanced capabilities relative to DSP, and this will be a critical matter for ALARM. For example, in 1991, we reported[4] that an Air Force cost and operational effectiveness analysis showed life-cycle costs for an enhanced DSP were estimated at $2.4 billion to $3.5 billion less than two variations of FEWS and a fully capable Advanced Warning System. We also reported that a 1991 draft study by a Defense Science Board task force and a 1990 Air Force requirements trade study had similar conclusions.

Also, part of the October 1993 study's task was to identify cost-effective options for consideration by DOD executives. The study presented four options that ranged in cost from $5.2 billion to $11 billion for the period 2002 to 2015. The lowest cost option involved down-sizing the existing DSP design and using medium-sized launch vehicles instead of the Titan IV. The highest cost option involved using a lightweight version of FEWS, also designed for launch on a medium-sized vehicle.

Cost and operational effectiveness analyses are intended to be a management aid in decision-making by illuminating the relative advantages and disadvantages of candidate systems from among plausible alternatives. Despite DOD's prior experience relative to DSP, such an analysis will still be critical in justifying a new system.

Will ALARM Be Affordable?

Based on Air Force plans, the initial ALARM design will be less capable than FEWS. To reduce near term costs, the Air Force does

---

[4]Early Warning Satellites: Funding for Follow-on System Is Premature (GAO/NSIAD-92-39, Nov. 7, 1991).

not intend to install data processing capabilities and communication cross links on the ALARM satellites--both of which were key features in the FEWS design. The Air Force claims this helps address the affordability problem that plagued FEWS. Within the fiscal year 1995 Future Year Defense Program (FYDP) the Air Force estimated the costs for ALARM at $1.3 billion. FEWS was estimated at $4.6 billion--$3.3 billion higher than ALARM for fiscal years 1995 through 1999.

However, life-cycle cost estimates for both ALARM and FEWS, using medium-sized Atlas launch vehicles are roughly comparable. ALARM was estimated at $11.3 billion from fiscal year 1995 through 2019. Over the same period, FEWS was estimated at $11.7 billion, or $400 million higher than ALARM. In addition, the Air Force plans to upgrade ALARM starting with satellite number 5, but the costs for these upgrades are not yet available.

While the cost estimates show ALARM to be more affordable than FEWS in the short term, the total life-cycle costs lead us to question whether ALARM, with projected upgrades, will actually be a more expensive system.

Other Factors To Consider

Since program inception, the Air Force has launched 16 DSP satellites. It currently has multiyear contracts to procure a total of 22. To avoid a gap in coverage before making the transition from DSP to ALARM, the Air Force intends to procure one additional DSP satellite (number 23). It is important to ensure that this procurement will provide for an adequate transition and that any developmental risk associated with the ALARM program is compatible with such a transition.

In addition, the launch vehicle implications for DSP 23 should be considered. DSP satellites require the heavy lift capability of the Titan IV launch vehicle, which costs about $285 million per launch. However, there is no Titan IV available for DSP 23 under the current contract for 41 vehicles. The Air Force and the National Aeronautical and Space Administration are discussing the possibility of using the Space Shuttle for a future DSP launch.

MILSTAR: A COSTLY AND CONTROVERSIAL PROGRAM

During the past 12 years, DOD has invested about $8 billion in the Milstar program, which has experienced several changes, delays, and cost increases. On average, each Milstar satellite placed in orbit will cost about $1.3 billion--$1 billion for the satellite and about $285 million for the Titan IV. The first satellite, which was originally scheduled to be launched in 1987 was actually launched on February 7, 1994. DOD expects to launch the second Milstar in May 1995.

Milstar is designed to be a highly survivable satellite communications system, particularly resistant to electronic jamming, for commanding and controlling military forces. Originally, the emphasis was on strategic nuclear warfighting by including a low-data rate communications capability,[5] primarily for sending emergency action messages to U.S. strategic forces. Tactical forces were also planned users of this capability.

After the fall of the Berlin Wall, congressional leaders, in 1990, considered Milstar's cost to be too high, its support to tactical forces inadequate, and its nuclear war-fighting capabilities unnecessary for deterrence. As a result, the National Defense Authorization Act for Fiscal Year 1991 directed the Secretary of Defense to develop and carry out a plan for either a restructured Milstar or an alternative advanced communications satellite program.

DOD chose to restructure the Milstar program. To lower costs, it decided to reduce the planned constellation size from eight to six satellites, reduce the quantity of other ground-based equipment, and eliminate several system survivability features. To provide greater utility to tactical forces, it decided to add a medium-data rate capability to satellite 4 and beyond.

In October 1992, based on guidance from the conference committee on the fiscal year 1993 Defense authorization bill, the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence approved a further reduction in Milstar's planned constellation size to four satellites. At this point, DOD's plan was to launch the first two satellites based on the original design with the low-data rate capability. Then, the medium-data rate capability would be added to satellite 3 and beyond.

In its October 1993 bottom-up review of major defense programs, DOD decided to keep Milstar's constellation size at four satellites, but to limit the total acquisition to six satellites --the first two, referred to as Milstar I, with the low-data rate capability only, and the next four, referred to as Milstar II, with both low- and medium-data rate capabilities. To reduce long-term costs, DOD plans to replace the Milstar II design in fiscal year 2006 with an advanced capability based on a smaller satellite design that will use a smaller, less expensive launch vehicle than the Titan IV.

---

[5]This low-data rate capability allows information to be transmitted at speeds ranging from 75 to 2,400 bits per second that would carry teletype and compressed voice communications. Medium-data rate includes speeds up to 1,544,000 bits per second that would carry regular voice communications and imagery.

Additional Cost Saving Alternative Should Be Assessed

In our 1993 report,[6] we discussed alternatives for inserting modern technology into DOD's military satellite communications programs that could reduce long term-costs by about $17.6 billion compared with DOD's baseline plan. We specifically discussed an opportunity for making a transition to a common bus--a standard satellite platform that supports the mission payload equipment.

Regarding Milstar, which was one of several DOD satellite communication systems within the plan, we suggested that such a transition could be made after satellite 6. This was at a time when DOD was planning to build eight Milstar satellites, thus the acquisition of satellites 7 and 8 could be avoided. We recommended that the Secretary of Defense reassess various alternatives to preclude the continuation of costly, customized satellites.

In its December 1993 response to our report, DOD (1) discussed plans to terminate Milstar after the sixth satellite, based on the bottom-up review decision, (2) agreed with the need to move away from customized, unique busses toward common busses, and (3) stated that the most cost-effective approach for inserting modern technology was to begin developing an advanced, lower cost, lower weight payload capability.

We now believe there is a basis for DOD to consider inserting modern technology after satellite 4. The first two medium-data rate Milstars (satellites 3 and 4) are under development and scheduled for launch in 1999 and 2000, respectively. However, a contract has not been awarded for the last two Milstars (satellites 5 and 6), which are planned to be launched in 2001 and 2002, respectively. This would provide a break point in the Milstar program offering an opportunity to reduce costs through technology insertion.

Regarding the insertion of modern technology, it was the consensus of an outside technical support group, established to review options and assess risk under DOD's bottom-up review, that an advanced design could be deployed as early as 2003 on a medium-sized Atlas launch vehicle. This is in contrast to DOD's planned deployment of an advanced design in 2006. In fact, some members of the group believed a first launch of an advanced satellite would be possible in 2000, using technology already developed or under development.

---

[6]Military Satellite Communications: Opportunity to Save Billions of Dollars, (GAO/NSIAD-93-216, July 9, 1993).

If DOD did not acquire satellites 5 and 6 and if it deployed a less-expensive, advanced capability in 2003, there would be a 2-year delay, from 2002 to 2004, in achieving a four-satellite constellation with medium-data rate capabilities. DOD would have to compare the benefits of the potential cost savings associated with this approach, which could be over $2 billion including launch costs, to the operational risk of not having a four-satellite constellation during the time period now planned. A decision would need to be made this year because the Air Force plans to acquire long lead items for these satellites in fiscal year 1995.

In addition, Milstar satellites require the heavy lift capability of the Titan IV launch vehicle. This type of vehicle costs about $285 million per launch. There are no Titan IVs available for Milstar satellites 5 and 6 under the current contract for 41 vehicles; therefore, eliminating these two satellites would reduce future Titan IV procurement.

- - - - -

Mr. Chairman, this concludes my statement. I will be happy to answer any questions you or members of the Subcommittee may have.

(707067)

Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are $2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

Orders by mail:

U.S. General Accounting Office
P.O. Box 6015
Gaithersburg, MD 20884-6015

or visit:

Room 1000
700 4th St. NW (corner of 4th and G Sts. NW)
U.S. General Accounting Office
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (301) 258-4066.

United States
General Accounting Office
Washington, D.C. 20548

Official Business
Penalty for Private Use $300

First-Class Mail
Postage & Fees Paid
GAO
Permit No. G100