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MILITARY SPACE PROGRAMS

Opportunities to Reduce Missile Warning and Communication Satellites' Costs

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Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss two Department of Defense (DOD) space programs. They are the Defense Support Program (DSP) for detection of ballistic missile launches and the Milstar satellite communications system for command and control of military forces.

At your request, we reviewed the status of these programs, including DOD's plans for such systems in the post cold war environment.

DSP and Milstar are two of DOD's major multi-billion dollar space programs that were designed to operate in a global nuclear ballistic missile confrontation with the former Soviet Union. The histories of these programs have demonstrated DOD's commitment to develop advanced and sophisticated space-based technology to effectively deter the Soviet threat. However, military requirements now emphasize tactical warfighting capabilities for future regional conflicts.

RESULTS IN BRIEF

In summary, DOD's action to terminate the current DSP follow-on program and begin a new effort provides an opportunity to fully consider the new tactical requirements. Plans to initiate a new DSP replacement effort in fiscal year 1995 will involve major management considerations, including requirements, cost effectiveness, and affordability.

On Milstar, however, we believe DOD may not have gone far enough and further actions could be taken to reduce costs. Milstar's original design emphasized support to strategic nuclear forces. As the strategic threat declined, DOD began placing greater emphasis on reducing Milstar's high cost and increasing support to tactical forces. Despite several program changes during the last few years, Milstar is still a costly system. We believe that by canceling some of its planned large-sized satellites and initiating early development of a lower cost system of smaller satellites, DOD has an opportunity to reduce program costs by billions of dollars.

Considering the changed threat and a reduced defense budget, opportunities to make program changes aimed at achieving cost savings deserve increased attention. However, changes in the national security space community's culture will have to occur in order to achieve more substantive changes in DOD's acquisition, operation, and use of space assets.

DSP: REPLACEMENT DECISION OFFERS COST SAVINGS OPPORTUNITY

DSP is a strategic surveillance and warning satellite system with an infrared capability to detect ballistic missile launches

(intercontinental and from submarines). Its primary users are (1) the North American Aerospace Defense Command, which is responsible for assessing potential attacks on North America, (2) the National Command Authorities, who are responsible for making retaliatory decisions, and (3) other major military commands that are responsible for strategic offensive forces.

DSP has been operational for more than 20 years, and efforts to replace it with more modern technology have encountered several setbacks. Since 1984, DOD has spent over $1 billion in research and development on such efforts--the most recent being the Follow-on Early Warning System (FEWS). DOD then decided to terminate FEWS because it was too expensive.

DOD plans to initiate a new effort in fiscal year 1995 to replace DSP. There are indications that smaller and less costly system capabilities than FEWS are being considered, with an emphasis on greater support to tactical forces. Actions that will be needed include (1) reviewing and validating requirements, (2) selecting the most cost effective alternative from among a group of plausible candidate systems, and (3) ensuring that the system selected is affordable within DOD's budget constrained environment.

Program Background and DOD Plans

DSP began in 1967, and the first operational satellite was deployed in 1971. Over the years, DOD has launched 16 DSPs, and the Air Force has multiyear contracts to procure up to 25 DSPs. As of December 1992, the Air Force estimated the total program acquisition costs for these 25 satellites at $9.3 billion over a 32-year period (1967 to 1999).[1]

DOD has wanted to improve or replace DSP with modern technology since 1979. It claimed that the current system could not satisfy all of the validated military requirements. The Air Force's planned replacement in the early 1980s, called the Advanced Warning System (AWS), never fully materialized because of immature technology and high costs. In 1984, DOD transferred AWS to the Strategic Defense Initiative Organization, and the system became known as the Boost Surveillance and Tracking System (BSTS). In 1990, after spending about $1 billion on BSTS research and development, the Organization discontinued its efforts, and responsibility for BSTS was returned to the Air Force, which renamed the system AWS.

In 1991, the Secretary of Defense approved a strategy for a scaled-down version of AWS, calling it FEWS. In 1992, the Air

[1]This excludes launch and operating costs.

Force awarded two FEWS demonstration and validation contracts that were scheduled to be completed in mid-1994. For fiscal years 1992 through 1994, the Congress appropriated $515 million for FEWS research and development. The system's purpose was to improve coverage and detection information associated with tactical and strategic ballistic missile launches.

In late 1993, based on a review of options for a future space-based infrared surveillance capability, DOD decided that FEWS was too expensive and therefore terminated the program. The Air Force issued a stop-work order to the contractors, and the work was halted in December 1993. Now, DOD plans to initiate a new research and development effort in fiscal year 1995. However, the form that this effort will take is not yet clear. This is because discussions are still ongoing within DOD as to whether the development of an improved design of the existing DSP system or a new space-based early warning system should be pursued.

Requirements and Cost Effectiveness Are Critical Management Considerations

Since program inception, DSP has been oriented toward detecting strategic nuclear missile launches. However, during the Persian Gulf War, it provided the primary tactical warning of Iraqi's surface-to-surface Scud missile launches. DOD's assessment of DSP's performance during the war 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.[2]

During 1989 through 1991, the Joint Requirements Oversight Council[3] validated the needed capability and performance requirements for an advanced space-based missile warning sensor to detect, process, and report ballistic missile launches. Air Force representatives informed us that the documents associated with the need and the requirements provided guidance for the FEWS research and development contractors. However, specific FEWS requirements, contained in a draft October 1992 FEWS operational requirements document, were never validated.

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

[3]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.

According to an October 1993 study[4] performed for the Under Secretary of Defense for Acquisition to review and recommend options for a future U.S. space-based infrared surveillance capability, new needs can be met with a system that is simpler and less costly than FEWS. The study gave considerable weight to reducing the size of the satellite to allow it to be launched on a smaller vehicle than Titan IV which is currently used for DSP--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--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 other systems, and it supported DOD's decision to terminate the current FEWS effort.

In addition to the requirements matter, various studies have raised questions about the cost effectiveness of FEWS and other advanced capabilities. For example, in 1991, we reported[5] 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 AWS. 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. These options were in addition to a recommendation that called for acquiring more existing DSPs to ensure coverage until the transition was made to a new capability.

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[4]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.

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

MILSTAR: A COSTLY AND CONTROVERSIAL PROGRAM

Milstar is designed to be a highly survivable satellite communications system, particularly resistant to electronic jamming, for use by military forces during wartime. Its users include the National Command Authorities,[6] chief military commanders, and strategic and tactical forces where critical communications are needed for command and control purposes.

DOD has been developing Milstar for the past 12 years. Thus far, it has invested about $8 billion in the program, which has experienced several changes, delays, and cost increases. Although the first satellite was originally scheduled to be launched in 1987, program delays pushed the first launch to February 5, 1994--about 72 hours from now. DOD expects to launch the second Milstar in May 1995.

On average, each Milstar satellite placed in orbit will cost about $1.3 billion--$1 billion for the satellite and at least $285 million for the Titan IV launch vehicle. In addition, when the first Milstar is launched, the estimated annual operating costs for satellite control purposes will be about $110 million.

DOD has an opportunity to reduce Milstar program costs by over $2 billion, including launch costs, if it does not acquire the last two satellites under the current plan. 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 this effort may require some additional investment in the short run and an assessment of any operational risk by not acquiring these last two satellites. As part of an ongoing review of space programs, we are evaluating the tradeoffs between cost savings and operational risk for consideration during the fiscal year 1995 defense authorization and appropriations deliberations.

Program Background and DOD Plans

DOD established Milstar in 1981. In 1983, President Reagan designated it as a program of highest national priority. Milstar's original design emphasized strategic nuclear warfighting by including a low-data rate communications

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[6]The National Command Authorities consist of the President and the Secretary of Defense or their successors.

capability,[7] primarily for sending emergency action messages to U.S. strategic forces during an enemy attack. Tactical forces were also planned users of this capability.

Milstar is the most complex satellite communication system DOD has built. Over the years, it encountered many program changes and difficulties. 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 warfighting 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 8 to 6 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.

The October 1992 conference committee report on the fiscal year 1993 defense authorization bill expressed additional concern about DOD's space investment strategy. The conferees directed the Secretary of Defense to develop a comprehensive acquisition strategy aimed at reducing costs and increasing efficiencies for developing, fielding, and operating DOD space programs. In October 1992, the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence approved a further reduction in Milstar's planned constellation size to 4 satellites. What this meant, however, was that DOD would still launch the first two satellites based on the original design, with the low-data rate capability. Then, the medium-data rate capability for increased support to tactical forces 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 4 satellites, but limit the total acquisition to 6 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

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

an advanced capability based on a smaller satellite design that will use a smaller, less expensive launch vehicle.

Additional Cost Saving Alternative Could Be Assessed Against Current Plans

In a 1993 report[8] requested by this Subcommittee, we discussed alternatives for inserting modern technology into DOD's military satellite communications plans 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 8 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 6th 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 believe there is a basis for DOD to consider inserting modern technology after satellite 4, instead of after satellite 6. 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 yet been awarded for the last two Milstars (satellites 5 and 6) which would be launched in 2001 and 2002, respectively. This would be a break point in the Milstar program that would provide 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 launch vehicle. This is in contrast to DOD's planned deployment

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

of an advanced design in 2006.

If DOD did not acquire satellites 5 and 6 and deployed a less-expensive, advanced capability in 2003, there would be a 2-year delay, from 2002 to 2004, in achieving a 4-satellite constellation with medium-data rate capabilities. DOD would have to consider the benefits of the potential cost savings associated with this approach, which could be over $2 billion including launch costs, by not acquiring satellites 5 and 6, against any operational risk of not having a 4-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. As previously stated, we are assessing the tradeoffs between cost savings and operational risks as part of an on-going review of space programs.

COLD WAR CHANGES CALL FOR SPACE COMMUNITY CULTURE CHANGES

DOD's difficulties in finding a replacement for DSP and developing Milstar have primarily been associated with meeting the cold war threat, and subsequently, making changes in response to the reduction in this threat. In a report to Air Force Headquarters on DOD space investment strategy, the Air Force Space and Missile Systems Center and Air Force Space Command stated that the cold war made space systems expensive for the following reasons: (1) whole new technologies had to be invented, (2) system performance was the primary driver, and cost was not much of a consideration, (3) time was of the essence to ensure a deterrence capability, and (4) security needs forced program development into rigid security compartments. The result, according to the report, was a crises-driven acquisition process. This meant that (1) technology was developed concurrently with system procurement, resulting in delays and redesign, (2) system designs were seldom stable, considering an expanding threat, and (3) the security barriers discouraged efforts for commonality across systems or sharing of resources.

The report also stated that this cold war procurement rationale no longer applies, and now there is room to look at today's threat and space systems in context and proceed on a more ordered and efficient path. In addition, the report stated that maximizing system performance is no longer paramount--cost and technical risk being the principal factors--and there is greater potential for cross-program sharing in technologies, standards, and common resources.

Implementing these views, however, could be a major challenge because of changes that would be necessary within DOD's space

community culture. A December 1992 report[9] to the Vice President stated that policy decisions made in the early years of the space age resulted in the establishment of four separate space sectors within the United States--military, intelligence, civil, and commercial. Each of these sectors evolved under separate organizational structures and now has its own institutional culture. The report stated that the lack of strong coordination among these organizations encouraged different solutions to similar problems and overlap in capabilities, particularly in areas such as technology development, launch, and support services.

Within the military and intelligence sectors, the report cited six separate organizations that are active in the development and operations of space systems.[10] Each organization has a distinctly different culture with different technical requirements, acquisition procedures, and technical operations. Also, according to the report, institutional arrangements encourage overlap and discourage cooperation and synergism.

A subsequent Air Force report[11] discussed several, more specific, institutional obstacles to cultural change. For example, the report stated that (1) multiple space acquisition agencies have resulted in inefficiency and less effective forces, (2) there has been limited user input or influence on the requirements process, reducing the operational usefulness of military space systems and increasing their cost, and (3) the application of space in joint military operations needs more emphasis in all phases--planning, deployment, employment, and sustainment.

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

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[9]A Post Cold War Assessment of U.S. Space Policy, Vice President's Space Policy Advisory Board, Dec. 1992.

[10]They are the Air Force, Army, Navy, National Reconnaissance Office, Ballistic Missile Defense Organization, and Advanced Research Projects Agency.

[11]Blue Ribbon Panel of the Air Force In Space In the 21st Century, Executive Summary, Undated.

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