United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Defense, Committee on Appropriations, House of Representatives

May 22, 1992

MILITARY SATELLITE COMMUNICATIONS

Potential for Greater Use of Commercial Satellite Capabilities

Statement for the Record of Louis J. Rodrigues, Director, Command, Control, Communications, and Intelligence Issues, National Security and International Affairs Division

Mr. Chairman and Members of the Subcommittee:

I am pleased to provide this statement discussing the potential for greater use of commercial communication satellite capabilities to satisfy Department of Defense (DOD) general purpose communication requirements. In contrast to critical communications for commanding and controlling forces, which must be provided by unique military satellites, general purpose satellite communications can be provided by commercial systems.

At the request of this Subcommittee, we are reviewing various aspects of using commercial communication satellites as replacements or supplements for military communication satellites, with the objective of reducing costs. Although our review is not yet completed, my statement briefly discusses our work to date on DOD's expectations regarding satellite communication requirements and increased use of commercial communication satellites, and some potential problems associated with alternative approaches to satisfying the requirements. We plan to provide you with a detailed assessment of alternatives early next year for the fiscal year 1994 budget cycle.

RESULTS IN BRIEF

DOD expects its requirements for general purpose satellite communications to increase substantially during the next several years and to exceed the existing and planned capacity of military communication satellite systems. In the past, DOD has leased individual circuits on commercial communication satellites, but this is a costly approach. There are less costly alternatives that involve consolidating requirements and acquiring greater communications capacity. A specific alternative DOD is considering involves creating private networks by acquiring and managing commercial communication satellite assets. However, this alternative may be flawed because of restrictions associated with the government operating in nongovernment radio frequency bands. An alternative we explored involves a commercially equivalent military satellite system that would operate in a government radio frequency band. However, additional study of a potential impediment is needed.

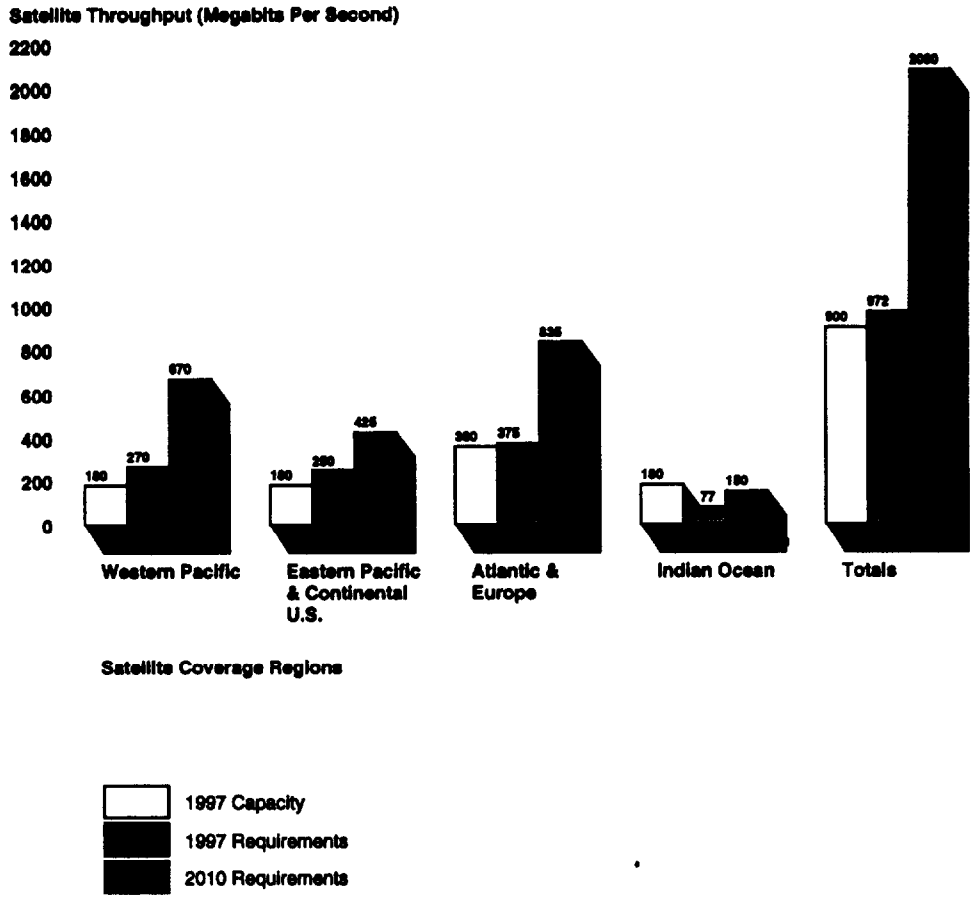
There are also other alternatives that need to be analyzed, and DOD intends to hire several contractors to assist in the analyses during the next several months. Until this is done, and our review is completed, we would caution against DOD making any long-term commitments toward satisfying the expected increased requirements in general purpose satellite communications.

DOD EXPECTS GENERAL PURPOSE SATELLITE COMMUNICATION REQUIREMENTS TO INCREASE

An October 1991 DOD military satellite communications architecture study identified two categories of satellite communication requirements--core and general purpose. Core requirements are associated with commanding and controlling combatant forces in environments where survivable communications are essential. General purpose requirements, which currently constitute over 80 percent of DOD's communication satellite requirements, involve less critical communications where urgency and survivability are not a concern.

According to the study, general purpose communication satellite requirements are estimated to far exceed the existing and planned capacity of military communication satellite systems. Figure 1.1 shows the planned capacity and requirements in four satellite coverage regions, measured in terms of satellite throughput--the number of bits of information that can be passed through the satellites each second. The shortfall in capacity is estimated to be about 175 million bits per second and 1.2 billion bits per second by 1997 and 2010, respectively, in three of the four regions. According to a DOD representative, this shortfall represents unsatisfied general purpose requirements. Excess capacity in the Indian Ocean region has the effect of making the total shortfall appear less; however, capacity in that region would not be available to offset shortfalls in the other regions.

Figure 1.1: DOD Communication Satellite Capacity and Requirements.



DOD EXPECTS TO INCREASE ITS USE OF COMMERCIAL SATELLITES

DOD believes that commercial communication satellites can satisfy general purpose communication requirements because they offer significant coverage, capacity, and flexibility at potentially lower costs. Historically, DOD's use of these satellites has been through leasing individual circuits; however, this approach can be costly. The Defense Information Service Agency recommended creating private networks as a cost-effective alternative, but this alternative may be flawed because of restrictions associated with the government operating in nongovernment radio frequency bands. A commercially equivalent military satellite using government radio frequencies may offer cost-savings, but a potential impediment needs further examination.

Total Current Usage Not Readily Identifiable and Leasing Costs Are Excessive

DOD currently leases numerous communication satellite circuits from commercial carriers, which are licensed by the Federal Communications Commission. This is done both centrally, through DOD's Defense Commercial Communication Office, and on an ad-hoc basis, by DOD activities requiring the services. The architecture study states that DOD currently spends about $160 million annually on central leasing--up to twice as much as it spent 5 to 7 years ago. The study also states that most commercial communication satellite services have been obtained on an ad-hoc basis, although the associated leasing costs were not readily available. Thus, DOD's total annual costs for leased communication satellite services are substantially higher than $160 million. The study recognizes that such ad hoc leasing reflects the lack of a coherent, consistent plan to obtain cost-efficient services.

Leasing communication satellite services on an individual circuit basis can be very costly. For example, the study states that it could cost as much as 25 times more to lease individual circuits equal to the nominal capacity of a single satellite transponder than to lease the transponder itself. According to DOD, alternatives to leasing individual circuits include (1) better consolidation of current commercial circuit leases, (2) acquiring bulk capacity by leasing entire transponders, (3) incorporating military transponders on host commercial satellites, and (4) leasing or procuring whole satellites.

Private Network Approach May Be Flawed

In describing the potential expanded role of commercial satellites for military communications, the Defense Information System Agency's primary recommendation was for DOD to acquire and manage commercial communication satellite assets as a permanent private system for fixed and mobile users. This means acquiring terminals and leasing transponder space from domestic and international communication satellite providers and creating private (dedicated) networks that would be operated and controlled by DOD personnel. However, this approach may be flawed because it would constitute the government using nongovernment radio frequencies without acquiring communication services through a commercially licensed carrier.

Within the United States, radio frequencies are divided into three categories--government, nongovernment, and shared. Government frequencies are assigned by the National Telecommunications and Information Agency, and nongovernment frequencies are assigned by the Federal Communications Commission. If a federal government agency wants to use nongovernment frequencies without going through

a commercial carrier, it could only be authorized to do so on an exception basis and (1) would have to be coordinated with the Federal Communications Commission and (2) could not cause harmful radio signal interference to nongovernment users. According to a National Telecommunications and Information Agency representative, such exceptions are usually granted only when there is no practical way to accomplish the mission in government frequencies. Also, the government would not have the same priority rights as it would when operating in government frequencies and would have to cease operations if signal transmissions resulted in interference to nongovernment communications.

As a matter of policy, the government relies heavily on commercial carriers for communication services. Such services are defined as all functions normally associated with providing communications, including design, engineering, system management and operation, maintenance, and logistical support. Under DOD's private network approach, it would be questionable whether operating and controlling the terminals and satellite payload networking with DOD personnel could be interpreted as acquiring communication services from commercial carriers. Instead, DOD would be operating independently in nongovernment frequencies that would be subject to the previously described restrictions.

The Congress provided DOD with $15 million for fiscal year 1992 to study ways of using commercial communication satellite capabilities. These funds resulted in a February 1992 request-for-proposals, and subsequent contractors' studies are expected to take 18 months. However, DOD specifically described the private network approach in its request. This may limit the contractors to proposals that are not feasible because of the radio frequency issue.

Commercially Equivalent Military Satellite System May Offer Cost-savings

An alternative that may offer cost-savings is a hypothetical, off-the-shelf, commercially equivalent, communication satellite system that would use government (military) radio frequencies and existing terminals. The emphasis would be on satellite throughput capacity, and the system would be very suitable for DOD's general purpose communication requirements.

Based on a contractor estimate, DOD could procure or lease commercially equivalent satellites at less cost and with greater throughput than satellites that are built to military specifications and contain special survivability features. The commercially equivalent satellites would not have special survivability features, but would offer other desirable features commonly found on military satellites such as steerable spot beam antennas and secure telemetry and payload control links.

Attachment I provides some additional information on such a satellite system and compares it to the Defense Satellite Communication System (DSCS) III--DOD's primary communications satellite system.

Notwithstanding the advantages of a commercially equivalent system, an impediment could be encountered. The Communications Satellite Act of 1962 provided for an international commercial communications satellite system that is, in effect, a monopoly. The act allows for the creation of additional systems only if required to meet unique governmental needs or if otherwise required in the national interest. This provision permits military satellite communication systems because of unique requirements. However, in the opinion of a National Telecommunications and Information Agency representative, a military satellite system for general purpose communications could raise a question because it would be providing the same services as the international system.

Despite this potential impediment, the monopolistic status of the international system has been changing. In 1984, Presidential Determination 85-2 stated that separate international communications satellite systems are required in the national interest. Although certain restrictions were imposed, the U.S. Secretaries of State and Commerce stated in 1991 that it is the goal of the executive branch to completely eliminate the restrictions by January 1997. When this happens, the question about using military satellite systems for general purpose communications may no longer exist.

SELECTED COMPARISON BETWEEN THE DEFENSE SATELLITE COMMUNICATIONS SYSTEM AND A COMMERCIALLY EQUIVALENT SYSTEM

Features	DSCS III	Commercially equivalent
Approximate unit production costs: Satellite Launch vehicle Totals	(millions in 1992) $ 122 54 $ 176	(millions in 1992) $ 70 60 $ 130
Launch vehicle	Atlas II	Atlas IIA
Orbital position	Geostationary	Geostationary
Design life	10 years	10 years
Payload: Effective bandwidth Throughput Power	6 Channels 500 Megahertz 125 Megabits/second 120 Watts	6 Channels 750 Megahertz 300 Megabits/second 240 Watts
Antenna configuration: Transmit Receive 	 1 Steerable spot 2 Multi beam 2 Earth coverage 2 Ultra high frequency 0 Steerable spot 1 Multi beam 2 Earth coverage 2 Ultra high frequency	 4 Steerable spot 2 Fixed area 1 Earth coverage 0 Ultra high frequency 4 Steerable spot 2 Fixed area 1 Earth coverage 0 Ultra high frequency
Radio band	Super high frequency (X-band)	Super high frequency (X-band)
Terminals	DSCS	DSCS
Coverage	Global over equator	Global over equator

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