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GAO

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

National Security and
International Affairs Division

B-275382

November 13, 1996

The Honorable William J. Perry
The Secretary of Defense

Dear Mr. Secretary:

We are currently evaluating the Navy's Cooperative Engagement Capability (CEC) program. During this work Department of Defense (DOD) officials told us that CEC's capabilities could be adversely affected by the transfer of certain radio frequencies to the Federal Communications Commission (FCC) for allocation to public users. We are concerned that significant and very expensive military systems such as CEC are being developed with an acknowledged potential for impaired operation and that DOD's current official position regarding this problem is not clear. In 1993 DOD accepted the transfer of these frequencies to the FCC. However, DOD officials have recently expressed serious concerns to the Department of Commerce and Congress that loss of specific radio frequency bands from exclusive military use could seriously impair how well CEC and other DOD systems will eventually operate. The purpose of this letter is to state our concerns and to request that DOD provide us answers to the questions at the end of this letter by December 13, 1996. We also plan to separately ask the FCC and the Department of Commerce to respond to questions concerning the situation described in this letter.

SUMMARY

The government conducts about 90 percent of its operations below 3.1 gigahertz, but only has exclusive use of 17 percent of the spectrum and shares 16 percent of the spectrum, while the private sector has exclusive use of 67 percent of the spectrum below 3.1 gigahertz. Title VI of the Omnibus Budget Reconciliation Act of 1993 requires the federal government to provide a span of radio frequencies totaling not less than 200 megahertz (Mhz) of the federal radio frequency spectrum under 5 gigahertz to the FCC for allocation to public users, of which not less than 100 Mhz had to be below 3 gigahertz. The act was intended to benefit the public by promoting the development of new telecommunications technologies, products, and services that use the radio frequency spectrum. Further, additional legislation may be introduced that would convert as much as 25 percent of the current total federal radio frequency spectrum to public use. According to DOD officials, the transfer of

additional federal spectrum to public use could potentially impair future operation of CEC and other DOD military systems.

During our evaluation of the Navy's CEC program, we found that 50 of the above 200 Mhz which is to be offered to the FCC for reallocation to public users is within that portion of the radio frequency spectrum in which the CEC system operates. In 1994, the Department of Commerce transferred 25 Mhz to the FCC for reallocation to the public, and it plans to transfer another 25 Mhz to the FCC in January 1997–all of which are in the middle of that portion of the radio frequency spectrum used by CEC. Although CEC is a Navy program, your testimony on the fiscal year 1997 budget singled it out as a program of high priority and directed its accelerated development because of its great potential for increasing the warfighting capability of joint service operations. Expansion of CEC missions could require significant additional frequencies than originally identified.

DOD officials have expressed serious concerns to the Department of Commerce and Congress that loss of the 50 Mhz and associated guard bands could seriously impair how well CEC and other DOD systems will eventually operate, including their availability for training and practice missions. These officials also said foreign countries could follow the U.S. lead to allow commercial users to operate in frequency bands formerly reserved for military use and charge the United States for use of their frequencies.

We identified three studies of military spectrum requirements in progress by the Joint Chiefs of Staff, the Navy, and the Ballistic Missile Defense Office that, taken together, could provide information required to fully assess frequency requirements for CEC and other DOD systems. However, the Navy and Ballistic Missile Defense Office studies are not due until March 15, 1997 and April 1997 respectively, and have not been coordinated with the DOD-wide Joint Chiefs' study, which does not have an established reporting date. Therefore, none of the three studies will be finished before the transfer of the next 25 Mhz expected in January 1997. We understand the January 1997 transfer affects CEC almost immediately, and if there are further reallocations of the military portion of the radio frequency spectrum to public users, other military systems could be affected.

BACKGROUND

Title VI of the Omnibus Budget Reconciliation Act of 1993 requires the federal government to provide a span of radio frequencies aggregating not less than 200 Mhz for allocation to the public. The act intended to benefit the public by promoting the development of new telecommunications technologies, products, and services that use the radio frequency spectrum. To minimize negative impacts on the federal government, the act requires that the spectrum to be reallocated must

not be "required for the present or identifiable future needs of the Federal Government" and should not result in costs to the federal government that exceed the benefits gained.

The act required the government to prepare a plan identifying which parts of the radio frequency spectrum could be made available to the public within 15 years. This plan was prepared by the National Telecommunications and Information Administration of the Department of Commerce, with input from DOD and other federal agencies, and provided to the agencies, Congress, and the public for comment. DOD officials said they did not fully concur with the plan, but dropped their objections to the plan because it appeared inevitable that some military frequencies would eventually be forfeited.

Based on discussions with DOD and Commerce officials, we understand that the initial impact and costs of the frequency loss on military operations was underestimated when DOD approved the plan. Apparently this problem occurred because (1) program operations have subsequently changed and expanded, (2) DOD cannot design equipment to minimize interference with the commercial users until it knows the identity and technical characteristics of the equipment that will operate in the reallocated frequencies, and (3) assessing the cost and operational impacts of future frequency losses is difficult. For example, the final National Telecommunications and Information Administration report noted some costs to implement the act are unknown. An official from the Office of the Secretary of Defense also said costs associated with the loss of radio frequency spectrum cannot always be easily identified. According to this official, unanticipated costs may be necessary to (1) acquire new equipment to accommodate changes required by loss of frequencies, (2) modify other equipment or systems due to compatibility or interference problems, and (3) restructure logistical support arrangements and develop new technical and training materials. This official also said the same reasons affect current efforts to assess impact of the required frequency loss.

Legislation has been proposed to release additional portions of the radio frequency spectrum to the public. The Joint Chiefs of Staff identified seven significant requests for reallocation of portions of the federal radio frequency spectrum for public use made since 1993. In addition, on May 9, 1996, the Chairman of the Senate Committee on Commerce, Science, and Transportation released draft legislation for discussion on the subject of reforms to the telecommunications regulatory process and to relinquish a minimum of 25 percent of the federal radio frequency spectrum below 5 gigahertz to the public as soon as possible. Under this proposal, a presidentially appointed commission would oversee the process to make the federal radio frequency spectrum available to the public and could decide to make additional portions available to the commercial sector over a 10-year period. A DOD official expects this legislation will be introduced early in the next Congress.

POTENTIAL IMPACT OF FREQUENCY LOSS ON CEC OPERATIONS

DOD officials have said the Navy's CEC system could be seriously affected by the frequency reallocation to the public sector. However, DOD has not indicated precisely how much the frequency reallocation will affect CEC because (1) potential technical solutions have not been accepted by the FCC, (2) CEC missions have not been fully determined, and (3) training requirements have not been finalized.

In January 1996, the Deputy Under Secretary of Defense for Acquisition and Technology wrote a letter to the Department of Commerce that noted that CEC could operate satisfactorily with the loss of the 50 Mhz. However, the letter noted that a 75-Mhz guard band might be required on both sides of the reallocated frequencies to prevent interference with new commercial users. Thus, the total loss of frequencies could be 200 Mhz, or about one-third of the entire band where CEC operates. The letter stated that most of this guard band could be recaptured to meet the CEC needs by instituting technologically feasible requirements for improved selectivity and spectral control for commercial receivers. The letter further said the ideal time to initiate imposing more conservative spectral control requirements is before or simultaneously with the allocation of a frequency band for new commercial uses. Accordingly, DOD presented two alternative technical solutions to the FCC to mitigate effects of the frequency loss on CEC operations. One proposal was to move the 50 Mhz reallocated from the middle of the CEC frequency band to a range closer to the upper boundary of the band. An FCC official said this change could interfere with other users and rejected the proposal. The second alternative was for the FCC to impose receiver standards on commercial transmitters and receivers. A DOD official said that these standards are key to future sharing opportunities required to meet the growing spectrum needs of both government and industry. An FCC official said his agency does not have the authority to impose these standards and rejected the proposal.

CEC frequency requirements may also be expanding because of potential new missions. DOD and service officials said planned and potential operations of the CEC program have expanded since 1993 from a purely Navy program for battlegroup operations to a congressionally supported joint service and possibly international program. The conference report on the National Defense Authorization Act for 1997 urged the continued acceleration and expansion of joint service integration efforts with several Air Force, Army, and Marine Corps theater defense programs. The Chief of Naval Operations noted potential international interest in the CEC program in a 1995 memorandum to the Secretary of the Navy.

A CEC program official said options for realistic training operations in the continental United States and joint operations worldwide may be greatly reduced by the frequency loss. The official said the loss of the 50 Mhz required by the 1993

Omnibus Act must be accompanied by guard bands to reduce mutual interference of up to 150 Mhz (for a maximum of 200 Mhz), which could severely limit the number of users who can simultaneously participate in the CEC net. However, no formal training program stipulating numbers of participants and training scenarios has been approved. The Director of the Joint Spectrum Center told us an approved training plan is required to fully analyze potential interference problems.

POTENTIAL IMPACT OF FREQUENCY LOSS ON ALL DOD OPERATIONS WORLDWIDE

DOD officials have stated that a worldwide loss of operational readiness and effectiveness is possible because of existing and potential loss of the radio frequency spectrum and have called for a national review of all spectrum use. The Principal Deputy Assistant Secretary of Defense for Command, Control, Communications, and Intelligence testified before the Senate Committee on Commerce, Science, and Transportation on June 25, 1996, that recent and potential loss of portions of the radio frequency spectrum will reduce the effectiveness and overall capability of DOD to carry out its missions. He testified that peacetime and conflict operations of several major weapon systems have been directly affected by existing and planned reallocations of the government radio frequency spectrum by requiring fielded systems to develop alternative capabilities or "work arounds" to avoid conflicts with domestic frequency users. He also testified that adoption of receiver standards would reduce mutual interference between users of the same frequencies. However, he said that the FCC had not responded to a DOD proposal to adopt receiver standards.

Military commanders have noted that foreign countries could limit overseas operations of CEC and other DOD systems by following the U.S. lead to allow commercial users in the frequency band where CEC and other DOD systems operate and/or charging for use of their frequencies. In 1995, the Military Communications Electronics Board asked theater commanders for the impact from loss of DOD radio frequency spectrum within their theaters. The European theater commander said reallocation of portions of the radio frequency spectrum in the United States from military/federal government use to civil sector use may accelerate the same actions that were already occurring in Europe. The Pacific Theater Joint Frequency Management Office said that Japan would not approve downlink frequencies for the MILSTAR program in 1994 because of possible interference with existing civil users and because the frequencies did not conform to Japan's allocation of frequencies.

Theater commanders also said some of their host countries were charging the United States for frequency use or denying use of the frequencies altogether. Joint Chiefs of Staff officials said the United Kingdom, as well as a number of other nations, is proposing to introduce a monetary charge for the use of radio spectrum.

According to one official, the money to be made from spectrum auctioning for our country may have to be used to pay billions of dollars in charges for spectrum use worldwide. This official said U.S. and North Atlantic Treaty Organization use of host nation frequencies was explicitly negotiated in Operation Joint Endeavor to prevent such charges.

In a July 1995 letter, the Pacific theater commander said he was concerned about continued efforts to reduce federal government (particularly DOD) assigned radio frequency spectrum without a systematic, logical review of requirements, impacts, resources, and plans for the spectrum's future management. He noted that while frequency sharing between government and industry is a foregone conclusion, it should occur after significant study in a partnership arrangement to minimize the impact on DOD operational readiness. The Atlantic Command theater commander also noted that adequate frequencies are critically important to development of technologically advanced new systems like CEC.

DOD INITIATES STUDIES TO MEET CONGRESSIONAL AND DOD CONCERNS

In 1996, congressional conferees and DOD officials noted their concerns about potential interference problems arising from the upcoming loss of frequencies. However, neither a Navy study in response to congressional concerns about the impact of current and potential loss of radio frequency spectrum nor a Ballistic Missile Defense Office study of potential CEC requirements as part of overall missile defense has been coordinated with a Joint Chiefs of Staff study of all DOD frequency requirements. The three studies also will be completed too late to affect the next transfer of frequencies to the FCC and may also lack data needed for the type of assessment suggested by military commanders.

Secretary of the Navy Study

The July 30, 1996, conference report on the National Defense Authorization Act for 1997 directed the Secretary of the Navy to prepare a detailed report for submission no later than March 15, 1997. The report should discuss (1) progress made in resolving the issue of radio frequency spectrum interference as a result of the reallocation of portions of the radio frequency spectrum in which the CEC system operates and (2) steps that the Secretary has taken to address and resolve harmful interference between CEC and other fleet weapons systems and data links. A Navy official said on October 23 that the CEC program manager will be tasked to conduct this study, but no tasking had been made as of that date. In addition, the March 15, 1997 date the study is due will be after the National Telecommunications and Information Administration transfer of an additional 25 Mhz of radio frequency spectrum to the FCC for release to the public.

At the time of our work on this issue, this study also had not been coordinated with the Military Communications Electronics Board or the Joint Spectrum Center. A Navy official expected technical support will come from the Johns Hopkins University Applied Physics Laboratory. A Board official believe the Center should be involved in the deliberations about mutual interference between CEC and other Navy systems because the Center is (1) DOD's technical agent for identifying and analyzing interference problems between multiple systems and (2) conducting a DOD-wide radio frequency spectrum review.

Addressing mutual interference problems between CEC and other DOD systems could be difficult because programs may not have followed DOD frequency certification procedures. The certification process is to ensure that (1) the operational frequency bands and type of service conform with national and international tables of radio frequency spectrum allocation; (2) the equipment conforms to applicable statutes, regulations, directives, standards, and specifications; and (3) the equipment can operate in its intended environment without causing harmful interference to other equipment operating in the same environment.

Frequency assignments generally require frequency certification. All radio frequency spectrum dependent equipment deployed or being fielded overseas requires Theater Commanders in Chief action to coordinate operations with host nations. An Army official said waivers are considered on a case-by-case basis but are not normally granted. A recent Office of the Secretary of Defense message noted that many of the radio frequency spectrum management problems DOD faces today stem from the lack of compliance with the radio frequency spectrum management and analysis requirements called for in the DOD acquisition directives. The message also states that the information required in the certification process is critical to the defense of DOD radio frequency needs by the Center and requested the Air Force and the Navy to duplicate an Army action to ensure frequency certification procedures are followed.

Joint Spectrum Center Study

The Military Communications Electronics Board directed the Joint Spectrum Center to identify frequencies that DOD (1) must absolutely defend against reallocation, (2) can share with the private sector, and (3) can forfeit. However, there is no current report on these frequencies. In addition, the Center's study does not appear to have an established reporting time frame requirement, and formal report review procedures do not appear to have been followed.

We understand an initial assessment of the study was finished at the end of fiscal year 1996 and that this assessment addressed what frequency bands DOD must keep for its essential or key systems. Center officials said their initial assessment

identified 15 frequency bands where DOD has exclusive use or is allocated priority use of the frequencies, and over 2,000 DOD systems operating in these bands now or in use by 2005. Of these systems, 154, including CEC, were designated as key or representative systems. However, Center officials said a more detailed technical analysis is required of each key system in the 15 bands to identify potential areas where government and private industry sharing can occur. They said a limiting factor in that analysis would be a lack of information on which industry users will be licensed and what technical data will be available on the commercial equipment.

DOD did not write a formal directive establishing the purpose of the study, who will implement any findings and recommendations, or when it will be completed. Thus, we are not aware of any decision point to resolve any service differences.

Joint Composite Tracking Net Study

The Joint Composite Tracking Net Study, sponsored by the Ballistic Missile Defense Office, could also affect decisions on radio frequency spectrum required for CEC operations. A Ballistic Missile Defense Office official said phase one of the study was completed in November 1995, and phase two, which began in May 1996, will be completed in April 1997. This study focuses on (1) connectivity requirements for theater, air, and cruise missile defense and (2) an assessment of the benefits CEC could contribute in detection, tracking, and engagement of these threats.

We asked Military Communications Electronic Board officials if this study had been coordinated with them. Board officials said they did not know of this study but, from information we gave them, the study should be coordinated with the Board because it is a joint study that could affect frequency requirements and raise potential mutual interference both in the U.S. and in foreign countries.

QUESTIONS

We are formally requesting that DOD provide us by December 13, 1996, responses to the following questions.

- DOD officials have stated that the Navy's CEC system could be seriously affected by the frequency reallocation to the commercial sector. However, CEC missions are not established and training requirements are not finalized. Given this uncertainty:

    - What is DOD's current position on the ability of the CEC system to operate in the reduced radio spectrum? If there is a significant potential that the operational capability of CEC will be reduced, should development of the system be modified?

- What DOD actions are planned or have been taken in response to the pending transfer and sale of frequencies under the Act? Because of the FCC's lack of agreement with DOD's proposals to date, will DOD seek a delay in the planned transfer of additional frequencies until Congress has assessed the study mandated by the conference report on the National Defense Authorization Act for 1997?[1]

– DOD officials and Theater Commanders in Chief believe a worldwide loss of operational readiness and effectiveness is possible because of (1) existing and potential losses of the radio frequency spectrum, and (2) foreign government charges for use of their radio spectrum; as a result, they have called for a national review of all spectrum use. Given these concerns:

  - What is DOD's position on the impact to CEC and all other DOD systems from further potential losses of radio spectrum within the United States?

  - What is DOD's evaluation of the potential threat of reduced U.S. access to foreign controlled radio spectrum? How do you evaluate the risks that DOD must buy or lease back frequencies sold under the 1993 act? What is your estimate of potential costs to the United States from such charges?

  - What DOD actions are planned or have been taken to address this issue?

– Ongoing DOD studies in response to both its own and congressional concerns about the impact of current and potential loss of radio frequency spectrum appear uncoordinated with each other.

  - What steps are being taken to coordinate and/or consolidate these studies within DOD and ensure they provide adequate information for informed decisions by the executive and legislative branches?

  - What action is being taken to coordinate DOD analyses with other federal agencies, particularly the Department of Commerce and the FCC?

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[1]Under the National Telecommunications and Information Administration Organization Act, as amended by the Omnibus Budget Reconciliation Act of 1993, the President has the authority, in appropriate circumstances, to recover for federal purposes frequencies that have been assigned for reallocation and substitute other frequencies, or delay the implementation of reallocation.

We are sending copies of this letter to the congressional committees of jurisdiction and other interested parties. Your response to our inquiry will also be provided the same congressional distribution. If you or your designee have any questions please contact me, Mr. Charles F. Rey, Assistant Director, or Mr. Robert R. Hadley, Evaluator-in-Charge, at (202) 512-4841.

Sincerely yours,

Thomas J. Schulz
Associate Director,
Defense Acquisitions Issues

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