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United States General Accounting Office
Washington, DC 20548

April 30, 2003

The Honorable John Warner
Chairman
The Honorable Carl Levin
Ranking Minority Member
Committee on Armed Services
United States Senate

The Honorable Duncan L. Hunter
Chairman
The Honorable Ike Skelton
Ranking Minority Member
Committee on Armed Services
House of Representatives

Subject: Spectrum Management in Defense Acquisitions

The electromagnetic radio frequency spectrum is critical to the development and operation of a variety of military systems such as radios, radars, and satellites. Due to the changing nature of warfighting, more and more military systems depend on the spectrum to guide precision weapons and obtain information superiority. In recent years, demand for the spectrum increased with advances in commercial technology. This demand has led to competition between government and nongovernment users, making spectrum management vital to prevent harmful interference and to promote spectrum efficiency.

With these goals in mind, DOD has long-standing policies and procedures that require system developers and acquirers to consider and deal with spectrum supportability knowledge early in the development and acquisition of systems. Early assessment of spectrum needs provides DOD the opportunity to identify, and therefore, better manage program and operational risks. DOD policy requires developers of spectrum dependent systems to obtain certification before assumption of contractual obligations for the full-scale development, production, or procurement of those systems.

Senate Report 107-151 and House Report 106-945 required us to assess the Department of Defense's (DOD) spectrum management process.¹ We focused our assessment on (1) the results of the DOD spectrum certification processes and (2) the reasons for those results. To determine the results of DOD's spectrum certification processes and the reasons for those results, we reviewed relevant program documents and interviewed key officials. We also sent out a data collection instrument to selected research and development and user commands to further identify and gather information on spectrum-dependent systems currently being developed or acquired. We conducted our work from April 2002 through March 2003 in accordance with generally accepted government auditing standards and relied upon agency-provided data. This report transmits the information provided in earlier briefings. (See enc. I)

We found that DOD's weapons programs have often failed to obtain, consider, or act upon adequate spectrum supportability knowledge during the early stages of acquisition. A majority of programs try to gain this knowledge at later stages, after key system development decisions may have been made. As a result, some programs experience significant delays, reduced operational capabilities, or the need for expensive redesign. More importantly, these programs missed opportunities to improve program results and avoid problems that are more costly to resolve late in development or fielding.

Also, in a review of selected programs still under development, we found that consideration of spectrum supportability continues to be a problem. DOD is still entering into contracts, starting full-scale development, and sometimes fielding systems before obtaining certification of spectrum supportability.

The reasons for this late attention include program managers' lack of awareness of spectrum certification requirements, dated and unclear spectrum management guidance that is not aligned with current acquisition models, the competing demands of program managers, and a lack of effective enforcement mechanisms for existing spectrum certification requirements. Additional challenges to DOD implementing the spectrum certification process include the lengthy spectrum certification process, increased reliance on commercial communications services and cutting-edge technologies that challenge the traditional allocation of spectrum frequencies.

Recommendations for Executive Action

To avoid delays, reduced operational capabilities, and costly redesign of weapon systems, we are making recommendations to ensure that spectrum supportability considerations are appropriately addressed in the development and acquisition of weapon systems. We recommend that the Secretary of Defense

- Direct the Under Secretary of Defense for Acquisition, Technology and Logistics; the Assistant Secretary of Defense for Command, Control,

¹ Senate Report 107-151, "National Defense Authorization Act for Fiscal Year 2003" [To accompany S. 2514]; and House Report 106-945 "Enactment of Provisions of H.R. 5408, The Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001," Conference Report to Accompany H.R. 4205; October 6, 2000.

Communications and Intelligence; and appropriate service officials to update the spectrum supportability guidance contained in their respective spectrum management and acquisition policy directives and instructions to

- Ensure program managers develop spectrum supportability knowledge, apply for spectrum certification, and consider spectrum operational risks at the earliest points possible,
 - Provide uniformity of spectrum management policies across the services, and
 - Provide a spectrum certification process with the flexibility to align with current acquisition models.
- Measure spectrum management compliance and process performance to determine how well spectrum supportability considerations are addressed in the acquisition process.
 - Establish and ensure appropriate funding for a program of record to develop a spectrum management automation architecture and to implement current and future spectrum management automation development efforts.

We also recommend that the Secretary of Defense identify an official or officials within the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics to

- Be accountable for oversight and enforcement of spectrum management in the acquisition process,
- Establish a mechanism to identify to the spectrum management community new systems that may ultimately require spectrum certification,
- Establish a mechanism that provides the spectrum management community program schedule data for systems that may require spectrum certification both to facilitate its prioritization of work effort and enable measurement of process enforcement and responsiveness, and
- Establish a mechanism to ensure—in line with DOD Directive 4650.1—that programs requiring spectrum certification do not proceed beyond Milestone B of the acquisition process without approved spectrum certification. In order to allow acquisition flexibility when required, waivers may be allowed by the official or officials identified within the Office of the Under Secretary based on appropriate cause, risk mitigation strategy, and compliance deadline.

Agency Comments and Our Evaluation

In providing oral comments on a draft of our report, DOD agreed with our findings and concurred or partially concurred with our recommendations. Specifically, in our first set of recommendations, DOD concurred with our recommendation to update the spectrum supportability guidance in its spectrum management and acquisition

policy directives and instructions, but stated that it would like GAO to clarify whether our recommendation applies to the previous DOD 5000-series acquisition publications or the current versions. We believe that the current and future versions of those publications need to address the issues identified in our recommendation. DOD also concurred with our recommendation regarding the need to measure spectrum management compliance and process performance, but indicated that the resources to be expended implementing this recommendation could be better directed towards improving oversight and enforcement mechanisms in the acquisition process. While we believe that improved oversight and enforcement are important, it will be difficult for DOD to determine effective actions for improving oversight and enforcement without performance measures.

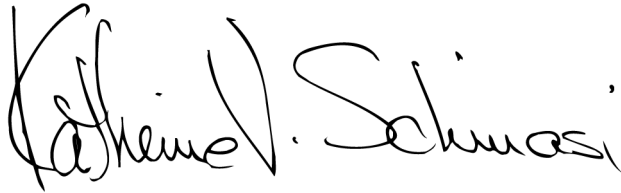
DOD partially concurred with our recommendation to establish and ensure appropriate funding for a program of record to develop a spectrum automation architecture and to implement future spectrum automation development efforts. DOD correctly understood the intent of the recommendation, but suggested that we clarify it by adding the word management to describe the covered activities. We agreed and have made that change. DOD also stated that implementation of this recommendation for other than current, on-going efforts, will be subject to the availability of funds. We believe that adequate funding needs to be ensured so that efforts to develop spectrum automation tools proceed in a coordinated, logical manner and provide managers with effective tools to address spectrum supportability considerations.

DOD also partially concurred with our second set of recommendations. DOD commented that it has a process in place for oversight and enforcement of spectrum management in the acquisition process that includes mechanisms to minimize programs proceeding beyond Milestone B without spectrum certification. DOD also indicated that the absence of certification should not preclude moving past that milestone. While we agree with DOD that a process does exist, our review confirms that the process is not being effectively followed and weapon programs do not address spectrum supportability issues until the later stages of development when addressing those issues can be much more costly. Without stronger enforcement and accountability, it is unlikely defense program managers will change their behaviors, which are motivated by the need to move through program milestones in order to achieve the next funding increment. Stronger enforcement and oversight would ensure the program obtains spectrum knowledge early in product development and increase the likelihood of success.

DOD also provided technical comments to a draft of this report that we incorporated where appropriate.

Unless you publicly announce the contents of this report earlier, we plan no further distribution of this letter until 30 days after the date of this letter. At that time, we will send copies of this letter to the Secretary of Defense; Secretary of the Air Force; Secretary of the Army; Secretary of the Navy; Commandant of the Marine Corps; Director, Office of Management and Budget; and interested congressional committees. We will also make copies available to other interested parties upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

Please contact me at (202) 512-4841 or John Oppenheim at (202) 512-3111 if you or your staff have any questions concerning this report. Other major contributors to this report were Julie Leetch, Gary Middleton, Jay Tallon, and Bruce Thomas.

A handwritten signature in black ink that reads "Katherine V. Schinasi". The signature is written in a cursive style with a large initial "K" and a distinct "V" before the last name.

Katherine V. Schinasi
Director
Acquisition and Sourcing Management

Defense Spectrum Issues

**Briefing for House and Senate
Armed Services Committee Staff**

Defense Spectrum Issues Outline

- **Key Questions**
 - **Background**
 - **Findings**
 - **Recommendations**
-

Defense Spectrum Issues

Key Questions

How Effectively Are Spectrum Supportability Considerations Being Addressed in Weapon System Acquisitions?

1. What Are the Results of the DOD Spectrum Certification Processes and Procedures?
2. Why Were Those Results Experienced?
3. What Are the Barriers to Improving the Consideration of Spectrum Supportability?

Defense Spectrum Issues

Background: The Spectrum Basics

- **Radio Frequency Spectrum Is a Finite Resource**
 - Runs from 3 KHz to 300 GHz
 - Divided in the U.S. & Possessions into Segments for Government Exclusive, Nongovernment Exclusive, and Shared Use
 - Divided into Segments (Bands) for Specific Types of Services, e.g., Aeronautical Radionavigation. Some Segments Better Suited for Particular Uses Than Others.
 - Bands May be Designated for More Than One Type of Service with Some Services Being Designated Primary Use and Others Secondary (i.e., to Occur on a Noninterference Basis)
 - Spectrum Standards Set Technical Restrictions on Operation within a Given Frequency Band
- **Demand and Competition for Radio Frequency Spectrum Are Growing Due to New Technologies and Increased Uses of Spectrum**
- **Spectrum Is a Resource that Is Critical to the Development and Operation of Many Types of Military Systems**

Defense Spectrum Issues

Background: International and National Spectrum Management

- **Spectrum Is Managed through Different International and National Policies and Organizations**
 - **International Spectrum Management**
 - Regions and Countries Define Segments and Uses Differently
 - International Telecommunication Union Provides a Forum for International Coordination
 - World Radiocommunication Conferences Are Held Every 2 to 3 Years to Address International Spectrum Allocations
 - U.S. Must Receive Host Nation Approval to Operate Communication-Electronics Systems in Foreign Nations
 - **National Spectrum Management**
 - National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management
 - OMB Circular A-11
 - Systems Deemed to be “Major” Are Required to be Submitted to the NTIA for Coordination with Other Existing Government and Commercial Spectrum Users
 - Federal Communications Commission
 - An Independent Government Agency to Control and Manage Civilian Use of the Spectrum

Defense Spectrum Issues

Background: The DOD Spectrum Certification Process

- **Various DOD Directives, Instructions, and Requirements Further Define the Spectrum Certification Process for Weapon System Development and Acquisitions**
 - DOD’s Acquisition Guidance (DOD 5000 Series) Incorporates Consideration of Spectrum Supportability into the Acquisition Process
 - Recently Revised Guidance Maintains Spectrum Supportability Requirements, Though Much of the Language Regarding Spectrum Has Been Removed
 - Defense Spectrum Certification Guidance
 - DOD Directive 4650.1 – Developers Shall Obtain Military Communications and Electronics Board (MCEB) Guidance as Early as Possible during the Acquisition Process. . . Required Prior to Contract for Full-Scale Development
 - Service Spectrum Certification Guidance
 - To Address Their Individual and Specialized Missions, Each of the Services Has Its Own Spectrum Supportability Guidance Implementing DOD Directive 4650.1

Defense Spectrum Issues

Background: The DOD Spectrum Certification Process

- **Program Developers and Acquirers Are to Submit Requests for Spectrum Approval (DD Form 1494) for Review/Certification by the Service Frequency Management Offices and the MCEB**
 - Review Is Intended to Determine Whether Adequate Spectrum Will Be Available to Support System Operation and Whether Systems Comply with the Spectrum Standards for their Chosen Bands
 - Certification Is Generally Required to Operate System in a Designated Portion of the Radio Frequency Spectrum
- **Applications for Spectrum Certification Can Be Made at Four Stages**
 - Stage 1: Conceptual
 - Stage 2: Experimentation
 - Stage 3: Developmental
 - Stage 4: Operational
- **A Goal of Early Stage Assessments Is to Provide Feedback That Can Be Factored into Development**

7

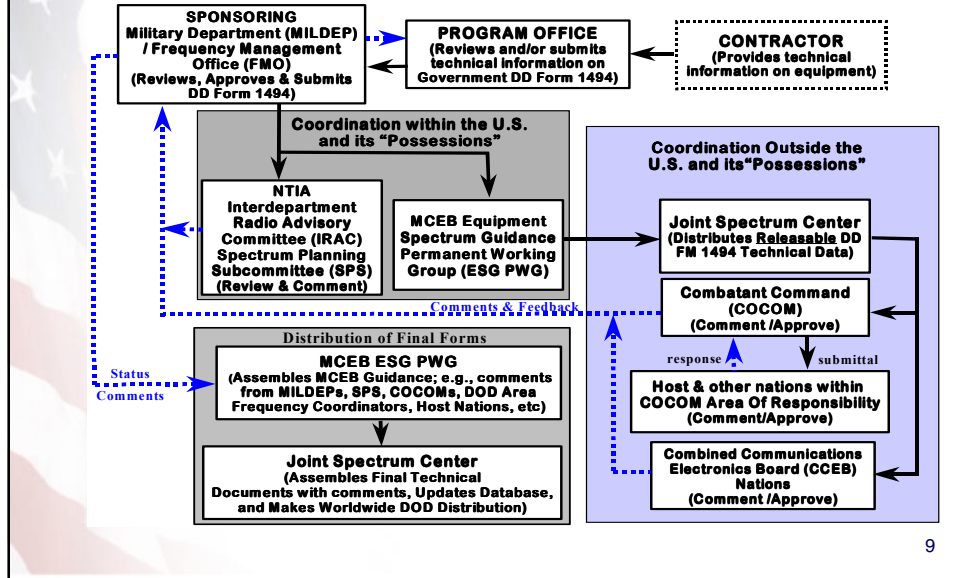
Defense Spectrum Issues

Background: The DOD Spectrum Certification Process

- **The Spectrum Certification Assessment Is Intended to Provide Knowledge of Spectrum Supportability and Enable:**
 - Feedback to Developers on Planned Spectrum Usage and Proposed Equipment's Technical Characteristics and Compliance with Spectrum Standards
 - Mitigation or Resolution of Electromagnetic Interference Problems
 - Siting of New DOD or Commercial Systems on Ships, Aircraft, in Space, and at Shore Sites
 - Integration of Commercial Items into the Intense Electromagnetic Environment Found on Military Platforms and Installations
 - Frequency Assignments for DOD Operations, Exercises, and Training
 - Coordination with Foreign (Host) Nations for Use of DOD Systems Overseas

8

DOD Spectrum Certification Process



9

Defense Spectrum Issues

Findings: DOD Spectrum Certification Process Results

- **The DOD Has a Long-Standing Spectrum Certification Process. Failures to Follow the Process Have Led to Problems in Weapon System Development and Operations. These Problems are Due to Factors Both Inherent and External to the Process.**
- In the Past, System Developers Have Failed to Acquire Knowledge of Spectrum Supportability or Act Upon It Early in the Process Resulting in:
 - Significant Delays and Limitations
 - Degraded System Performance
 - Increased Acquisition Risk
 - Higher Cost
- Consequences of Such Failures Have Been Documented in the Following Reports:
 - 1987 GAO Report (GAO/NSIAD-87-42, February 9, 1987)
 - 1993 DOD *CIM Modeling Study of DOD Management and Use of the Electromagnetic Spectrum* Interim Report (August 1993)
 - 1998 DOD Inspector General Report (Report No. 99-009, October 9, 1998)
 - DOD Comptroller's Fiscal Year 2000 Annual Statement of Assurance
 - Defense Science Board Task Force Report *Coping with Change: Managing RF Spectrum to Meet DOD Needs* (November 2000)

10

Defense Spectrum Issues

Findings: DOD Spectrum Certification Process Results

- Some Examples of Systems That Failed to Adequately Develop, Consider, or Act on Spectrum Supportability Knowledge – Resulting in Recent Operational Delays and Limitations or the Need for System Redesign – Include:
 - B-2 Radar - The B-2 Radar Is Being Redesigned Due to High Probability of Interference with Primary Users in the Fielded Radar System's Frequency Band
 - Enhanced Position Location Reporting System (EPLRS) / Situational Awareness Data Link (SADL) - EPLRS/SADL Operates in a Band Not Authorized for Such Equipment Resulting in Significant Spectrum Supportability Issues Both in the U.S. and in Host Nations. Currently, Not Allowed to be Used in Germany or Korea
 - Global Hawk/Commercial SATCOM Data Links – Under Current U.S. Regulations, Global Hawk's Commercial SATCOM Data Links, Which Operate in Exclusive Nongovernment Fixed Satellite Service Bands, Cannot be Certified and Must Operate on a Noninterference Basis
 - Remote Ordinance Neutralization System (RONS) - Procurement Proceeded without Operational Certification Resulting in Systems Being Fielded with Significant Limitations Before System Reconfiguration

11

Defense Spectrum Issues

Findings: DOD Spectrum Certification Process Results

- **Based on Our Review of Recent Acquisitions, Timely Consideration of Spectrum Supportability Continues to Be a Problem**
 - Majority of Initial Filings Come in at Later Stages of System Development
 - Filings Made Significantly After Frequency Bands Identified by Developers
 - Filings Not Approved by Time of Research & Development (R&D) Contract Award
 - Navy's AN/APG-79 Active Electronically Scanned Array (AESA) Radar
 - Air Force's PICOSat Mission
 - Initial or Accurate Filings Made After R&D Contract Award
 - Airport Surveillance and Precision Approach Radar Control System (ASPARCS)
 - Naval Space Surveillance System (NSSS)
 - Filings Not Made by Time of Equipment Purchase or Fielding
 - Global Positioning System Re-Radiating Kits
 - U.S. Army Pacific Command Tri-Band SAT COM C4ISR Tri-Band Terminals

12

Defense Spectrum Issues

Findings: DOD Spectrum Certification Results

- **Even When Developers Seek Guidance – Feedback May Be Ignored**
 - Common Low Observable Verification System (CLOVerS)
 - Force Protection Airborne Surveillance System (FPASS) – Force Protection Unmanned Aerial Vehicle
 - AN/SRC-59 Shipwide Interior Wireless Communications System
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13

Defense Spectrum Issues

Findings: Why Spectrum Consideration Problems Happen

- **Reasons for Failing to Obtain Guidance Early Include:**
 - A Lack of Clarity in the Guidance for Early Stage Filings and Alignment with Current Acquisition Models
 - A Lack of an Enforcement Mechanism
 - A Lack of an Effective Means for the Spectrum Management Community to Identify Spectrum-Dependent Programs
 - A Lack of Spectrum Supportability Awareness by Program Managers
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14

Defense Spectrum Issues

Findings: Why Spectrum Consideration Problems Happen

- **Reasons for Failing to Obtain Guidance Early (cont.)**

- Due to Trade-offs in Program Decision-Making to Reach Program Objectives Such As:
 - A Function of Development Approach
 - The Acquisition of Commercial-Off-the-Shelf (COTS) Equipment
 - The Belief that Filings Should Be Made After Detailed System Technical Parameters Can Be Defined
 - A Function of Resource Constraints
- **Reasons Developers May Ignore Feedback**
 - Misguided Reliance on Prior History
 - Shipwide Interior Wireless Communications System
 - Force Protection Unmanned Aerial Vehicle

15

Defense Spectrum Issues

Findings: Why Spectrum Consideration Problems Happen

- **R&D Contracts Awarded without Approved Guidance**

Reasons Include:

- A Failure to File Early Enough to Meet Program Schedules
- A Function of the Inability of the Certification Process to Provide Timely Results
- A Failure of Enforcement
 - AF PICOSat
 - AN/APG-79 AESA Radar
- **R&D Contract Awarded without Accurate Filing**
 - Revised Certification Applications Not Filed Until After Contract Award
 - Naval Space Surveillance System

16

Defense Spectrum Issues

Findings: Barriers to Improvement

- **DOD Faces a Number of Current and Future Challenges to the Improvement of Spectrum Supportability Consideration**
- **Current Challenges Include:**
 - DOD Doesn't Keep Metrics Assessing Process Performance
 - Number of Certifications Completed v. Number of R&D Contracts Awarded
 - Timeliness of Filings
 - Cycle Time
 - No Clear Focus Who within DOD Acquisition Community Provides Oversight for the Execution of Spectrum Supportability in Acquisition Process
 - Spectrum Issues Viewed Solely As the Responsibility of the Command, Control, Communications and Intelligence (C3I) Community

Defense Spectrum Issues

Findings: Barriers to Improvement

- **Current Challenges (cont.)**
 - Push to Commercial Spectrum Challenges the Current Process
 - Commercial SATCOM
 - Tri-Band Terminals
 - Host Nation Approval Process
 - Decisions Regarding Use of Spectrum Are Sovereign and Subject to Change without Notice
 - Some Nations Do Not Want to See Early Filings
 - A Lack of a Common Tool for Program Decision-Making
 - Lack of a Spectrum Certification Automation Architecture and Funding

Defense Spectrum Issues

Findings: Barriers to Improvement

- **Future Challenges**

- Current Spectrum Certification Process Not Seen As Supporting Evolutionary Acquisition/Spiral Development Time Frames
 - Prior Studies – 1999 Air Force Scientific Advisory Board
 - Service Indicated Lead Times
 - Interviews
 - Examples
- Current Processes May Not Support Certification of Cutting Edge Technology
 - Software Defined Radios
 - Ultrawide Band Systems

Defense Spectrum Issues

DOD Actions Addressing These Issues

- **The DOD Spectrum Management Community Has Undertaken a Number of Efforts to Address Some of the Identified Issues, but More Is Needed by Spectrum and Acquisition Management Communities**
 - DOD Strategic Plan for Department of Defense Spectrum Management, December 3, 2002, which among other things established goal of improving spectrum management
 - Department of the Navy Chief Information Officer – Published Strategic Vision for Spectrum which among other things establishes need to consider spectrum requirements in system development
 - Defense Spectrum Office – Leading a spectrum supportability initiative to improve the spectrum certification process
 - Army Spectrum Management Office – Contracted with SI International to Make Recommendations on How to Improve the Army's Spectrum Certification and Frequency Assignment Request Processes
 - Air Force Air Combat Command – Created a Host Nation Spectrum Worldwide Database and a Risk Assessment Tool for Program Managers
 - Joint Spectrum Center – Along with the Defense Spectrum Office, cooperatively working with the Combatant Commands, Joint Staff, and Military Services to formally document requirements for a Spectrum Supportability System (funding for development of the system has not yet been identified)

Defense Spectrum Issues

Summary Observations

- Compliance With the Process Is No Assurance That Systems Can Be Used to Full Capabilities
 - May Be Due to Technical Constraints, Host Nation Restrictions, etc.
- Early Assessment Affords Opportunity to Better Manage Programmatic and Operational Risks
- Currently, Many Systems Do Not Consider Spectrum Supportability Until Late in Development/Fielding When Problems Are More Difficult to Deal with
- Opportunities Exist to Improve Spectrum Supportability

Defense Spectrum Issues

Recommendations

To ensure that spectrum supportability considerations are appropriately addressed in the development and acquisition of weapon systems, we recommend that the Secretary of Defense

- Direct the Under Secretary of Defense for Acquisition, Technology and Logistics; the Assistant Secretary of Defense for Command, Control, Communications and Intelligence; and appropriate service officials to update the spectrum supportability guidance contained in their respective spectrum management and acquisition policy directives and instructions to
 - Ensure program managers develop spectrum supportability knowledge, apply for spectrum certification, and consider of spectrum operational risks at the earliest points possible,
 - Provide uniformity of spectrum management policies across the services, and
 - Provide a spectrum certification process with the flexibility to align with current acquisition models.
- Measure spectrum management compliance and process performance to determine how well spectrum supportability considerations are addressed in the acquisition process.
- Establish and ensure appropriate funding for a program of record to develop a spectrum management automation architecture and to implement current and future spectrum management automation development efforts.

Defense Spectrum Issues

Recommendations

We also recommend that the Secretary of Defense identify an official or officials within the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics to

- Be accountable for oversight and enforcement of spectrum management in the acquisition process,
- Establish a mechanism to identify to the spectrum management community new systems that may ultimately require spectrum certification,
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- Establish a mechanism to ensure—in line with DOD Directive 4650.1—that programs requiring spectrum certification do not proceed beyond Milestone B of the acquisition process without approved spectrum certification. In order to allow acquisition flexibility when required, waivers may be allowed by the official or officials identified within the Office of the Under Secretary based on appropriate cause, risk mitigation strategy, and compliance deadline.

Defense Spectrum Issues

Backup Slides

Defense Spectrum Issues

Recent Changes to DOD 5000 Series

➤ **Previous DOD Directive 5000.1**

“Program managers shall give full consideration to all aspects of system support, including ... spectrum management and the operational electromagnetic environment.”

➤ **Current Draft DOD Directive 5000.1**

“Acquisition managers shall provide U.S. Forces with systems and families of systems that are secure, reliable, interoperable, compatible with the electromagnetic spectrum environment, and able to communicate across a universal information technology infrastructure, including”

Defense Spectrum Issues

DOD 5000 Series (cont.)

➤ **Previous DOD Instruction 5000.2**

“All programs shall ...be designed to be mutually compatible with other electric or electronic equipment and the operational electromagnetic environment...be certified for spectrum supportability....”

“Prior to approving entry into System Development and Demonstration at Milestone B, the MDA shall consider ... whether an application for frequency allocation has been made (if the system will require utilization of the electromagnetic spectrum)....”

“Prior to making the milestone [C] decision, the MDA shall consider...whether an application for frequency allocation has been approved (for systems that require utilization of the electromagnetic spectrum)....”

“The PM shall ensure that a flexible, performance-oriented strategy to sustain systems is developed and executed. This strategy will include consideration of the full scope of operational support, such as... spectrum supportability....”

Table 1:	Application for Frequency Allocation (DD Form 1494) (applicable to all systems/equipment that require utilization of the electromagnetic spectrum)	47 U.S.C. §305 (reference (ar)) Pub. L. 102-538 §104 (reference (as)) 47 U.S.C. §901-904 (reference (at))	MS B MS C (if no MS B)
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➤ **Current Draft DOD Directive 5000.2 makes table reference only**

Spectrum Certification Compliance (DD Form 1494) (applicable to all systems/equipment that require utilization of the electromagnetic spectrum)	47 U.S.C. 305, reference (y) Pub. L. 102-538, 104, reference (z) 47 U.S.C. 901-904, reference (aa) DOD Directive 4650.1, reference (aa) OMB Circular A-11, Part 2, reference (b)	MS B MS C (if no MS B)
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Defense Spectrum Issues

DOD 5000 Series (cont.)

- Missile Defense and Space Communities Developing Their Own Acquisition Processes Outside the DOD 5000 Series

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