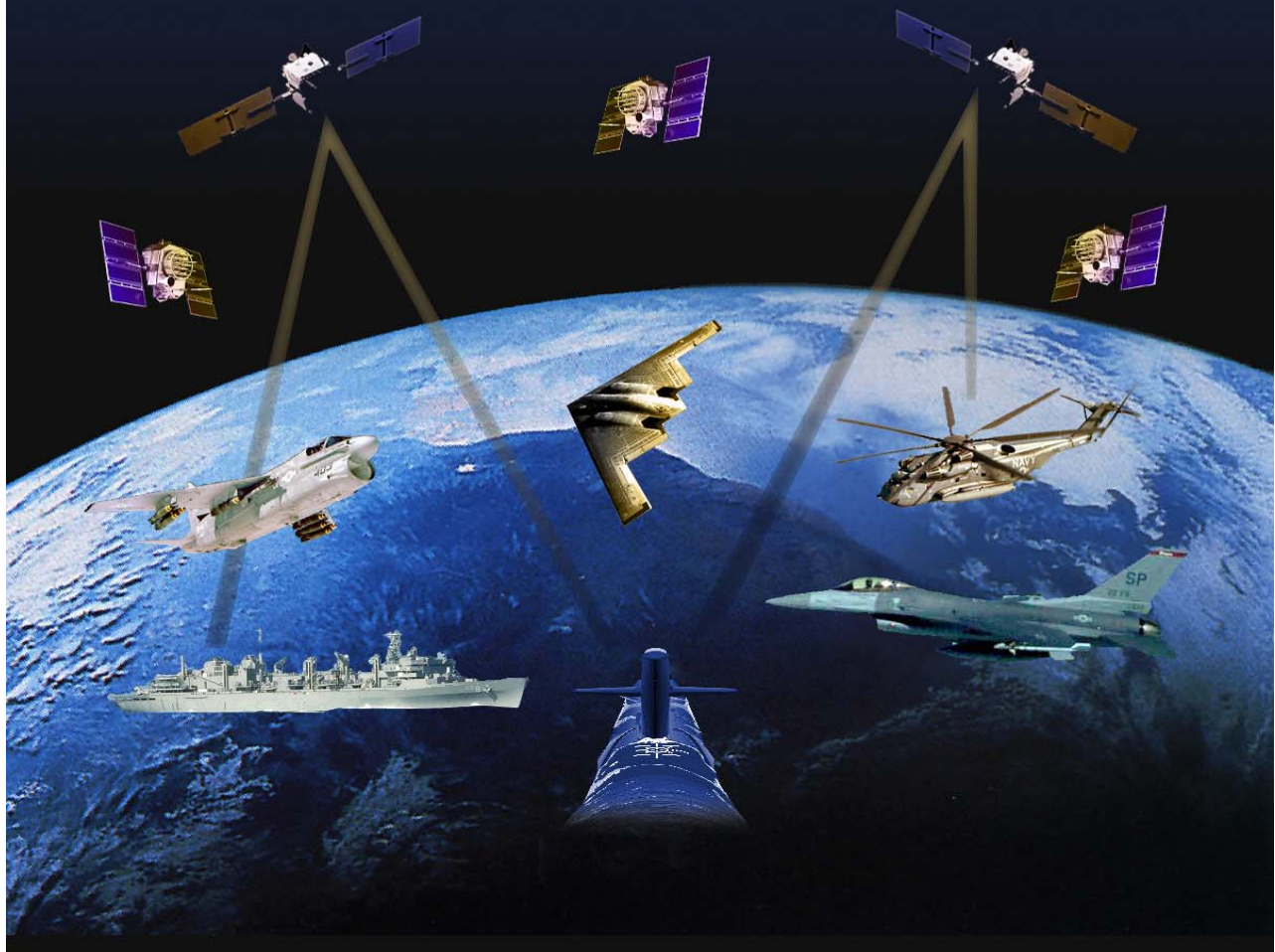




Department of Defense

Electromagnetic Spectrum Management Strategic Plan



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Office of Assistant Secretary of Defense
Command, Control, Communications and Intelligence
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Foreword

U.S. military forces have enjoyed superiority in many dimensions of armed conflict, but the tragic events of September 11th exposed threats directly aimed at U.S. territory, sovereignty, and freedom. Protecting against these threats requires a shift in the basis of defense planning, as outlined in the Quadrennial Defense Review, from a “threat-based” model in the past to a “capabilities-based” model in the future.

A “capabilities-based” approach focuses on how an adversary might fight rather than who the adversary might be and where a war might occur. It establishes the need for the U.S. to identify the forces and capabilities required to deter and defeat radicals who will rely on surprise, deception, and unconventional warfare to achieve their objectives. These asymmetric threats require the DoD to enhance the capability and survivability of U.S. weapon systems and to leverage information technology and new concepts for more effective joint operations.

Key technological advances in space and cyber space can help the DoD maintain its superiority in conflict. Exploitation of space and the denial of the use of space to adversaries is a key objective for future military competition. Developments in these arenas are the backbone of highly sophisticated networked and wireless capabilities for both civilian and military applications. These advances and wireless technologies provide value to the DoD just as they provide economic viability to the private and commercial sector. Exploiting wireless capabilities to meet DoD needs creates a major challenge due to the contention for electromagnetic spectrum access.

DoD understands the criticality of electromagnetic spectrum access, and in order to face current and future challenges that affect the security of the Nation, developed a new DoD Electromagnetic Spectrum Management Strategic Plan. This plan maintains and builds upon DoD’s vision of “assured access” for electromagnetic (EM) spectrum, as originally articulated in the Joint Spectrum Vision (JSV2010) vision, and to operate in an increasingly more dynamic and competitive EM spectrum environment in the 21st century.

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Section 1

1.1 Strategic Plan Objective

The objective of this Department of Defense's (DoD) Strategic Plan is two-fold: First, to identify goals and associated strategies to “*assure the availability of, and access to, sufficient electromagnetic spectrum*” based on the conceptual framework outlined in the Joint Spectrum Vision 2010 (JSV2010)¹; second, to enhance collaboration within the electromagnetic (EM) spectrum management and the Electromagnetic Environmental Effects (E3) communities.

This strategic plan establishes goals and objectives along with specific initiatives to guide the DoD toward achieving its EM spectrum vision and is based on five core principles:

First, spectrum is a vital national resource. DoD understands that its needs must be balanced with other national needs and, therefore, supports a US spectrum policy that balances military and economic security.

Second, spectrum is a core enabler of what DoD does, and is indispensable to national security. Therefore, DoD should not allow a lack of sufficient spectrum to be a constraint on the US warfighter or on military capabilities.

Third, DoD recognizes that it must be a good spectrum user. DoD must strive to be as efficient a spectrum user as it can be.

Fourth, DoD commits to continue investing in new, spectrum-efficient technologies. It will seek to use technology to alleviate DoD's and the commercial sector's long-term needs for additional spectrum.

Fifth, DoD commits to actively supporting US policies and interests in international spectrum bodies and international and bilateral negotiations for spectrum allocation and use. To do this, however, DoD must ensure that the national process continues to yield positions that reflect the balance required between the public interest and commercial interests.

These five core principles are integral towards meeting the DoD's vision of “assured access” for EM spectrum and maintaining battlefield superiority in the 21st century.

1.2 The Department's Electromagnetic Spectrum Vision

¹ Joint Spectrum Vision 2010, September 27, 1999

The DoD's continued, "assured access" to sufficient EM spectrum is vital to ensure its ability to achieve the new levels of effectiveness envisioned in Joint Vision 2010 and reiterated in JV2020. JV2020 addresses the new operational concepts that US joint forces will need to achieve full spectrum dominance. Joint Spectrum Vision 2010 (JSV2010) provides the conceptual framework to assure access to EM spectrum necessary for effective joint warfighting and emphasizes the necessity of sufficient assured EM spectrum access required to meet the objectives of JV2020.

As the US Armed Forces transition to meet new operational concepts, they face an increased reliance on EM spectrum to accomplish their mission in the 21st century. The EM spectrum is the only transmission medium adequate to support the mobility, dispersion, and higher tempo of operations envisioned in JV2020.

Challenges confronting the DoD in realizing its vision of assured EM spectrum access are a direct result of domestic and international EM spectrum management regulatory changes and new requirements driven by developments. Congressionally mandated EM spectrum reallocation, and EM spectrum auctions, increased frequency of international regulatory actions at the International Telecommunication Union (ITU) World Radiocommunication Conference (WRC), and world-wide market growth in commercial wireless usage emphasize the necessity for EM spectrum efficiency, increased coordination, and strategic planning where DoD can take a proactive posture in protecting its interest both domestically and internationally.

In addition, the effects of the electromagnetic environment on DoD's EM spectrum dependent systems must be carefully analyzed to ensure continued mission effectiveness. As the EM spectrum becomes more congested the need for an effective DoD E3 program grows. The adverse effects of the electromagnetic environment (EME) have been experienced numerous times during Joint and Allied operations, and have endangered lives, platforms, systems, and equipment. Controlling and minimizing these effects is crucial for successful accomplishment of the Department's missions. It is our objective to work the EM spectrum issues in concert with technological approaches to ensure that any EME effects are transparent to the Warfighters.

1.3 Challenges Affecting DoD's EM Spectrum Management

Although the military force structure has downsized considerably since the end of the Gulf War, operational tempo has increased. A sampling of military operations include: Operations Provide Comfort, Northern/Southern Watch (Iraq), Operation Provide Promise and Operation Joint Endeavor in Bosnia and Herzegovina, humanitarian relief operations in Operation Support Hope in Rwanda, Operation Restore Hope in Somalia, Operation Allied Force in Kosovo, counter-drug Operations, and humanitarian aid for disaster, flood, and other natural disasters, and most recently Operation Nobel Eagle and Enduring Freedom. The DoD projects an increase in worldwide operations in support of homeland security. To meet these obligations with the present force structure, the DoD must increase its reliance on force multipliers such as increased automation, smarter weapons, and near real-time situational awareness. These approaches require a far greater reliance on rapid, sustained information transfer than in the past.

Growth in commercial wireless applications (i.e. cellular, Personal Communications System, paging, mobile telephony, broadcast and others) worldwide has also placed increasing pressures on DoD. Future military information superiority requirements introduce technical developments in areas such as passive and active sensing, high-speed data links, high-resolution radars, wideband mobile links, and antenna technology. Some examples of such technical developments are the unmanned aerial vehicle (UAV) and network centric operations. UAVs can find, identify, and even direct precision munitions to a target of interest. They can also collect and relay tactical and strategic intelligence. Network centric operations enhance the common operating picture of the Warfighter with tremendous improvements in information sharing made possible by networking. Because of these desired capabilities, military systems find themselves sometimes in direct competition for use of certain portions of the EM spectrum with commercial wireless applications.

Congressionally mandated EM spectrum reallocations of some critical DoD's EM spectrum have challenged DoD and become a concern in terms of future EM spectrum availability for operational training and testing. Title VI of the Omnibus Budget Reconciliation Act (OBRA-93) required the Secretary of Commerce to provide at least 200 MHz of Government allocated EM spectrum for reallocation. Title III of the Balanced Budget Act of 1997 (BBA 97) required that the Federal Communications Commission (FCC) and National Telecommunications and Information Administration (NTIA) identify for auction at least 120 MHz of additional EM spectrum (20 MHz of which had to be "Government" EM spectrum). The loss of government EM spectrum has reduced the flexibility critical to operations and training for the DoD. The prospect of future reallocations only serves to exacerbate these problems. This has challenged DoD to pursue proactive approaches that would prevent future erosion of critical government EM spectrum and technologies that preserve the operational flexibility needed by Warfighters to complete their mission.

This strategic plan establishes goals and objectives along with specific initiatives to guide the DoD toward achieving its EM spectrum vision. The DoD EM spectrum and E3 communities must continue to support changing warfighting concepts and support the fielding of new commercial and military systems. DoD must pursue regulations and procedures to ensure EM spectrum supportability. DoD must expand its participation in international and national EM spectrum decision forums to identify and resolve potential issues at their onset before they become serious problems. DoD must prioritize planning, programming, and resources to meet technology changes.

Section 2

DoD EM Spectrum Management Strategic Goals

This section presents the DoD's EM spectrum management and E3 goals and associated objectives, which emphasize DoD's approach towards achievement of JSV2010. This plan is designed to provide a streamlined, focused, and coordinated DoD effort, to ensure access to sufficient EM spectrum needed for realization of JV2020.

1. Goal: - Improve EM spectrum management and E3 business processes

Access to EM spectrum is essential to the success of military operations and is the preeminent objective of DoD EM spectrum management. The DoD must develop improved business processes to successfully meet its present and future EM spectrum needs, and ensure that systems are free of unintentional adverse effects from the electromagnetic environment.

Objective 1: *Obtain user EM spectrum dependent system requirements.*

Strategy: Conduct a thorough end-to-end assessment of systems needs, including technology trend and evolution. Document baseline user EM spectrum dependent system requirements for current and future DoD systems. Develop a process and establish parameters to periodically update baseline requirements.

Target: Identify and document all validated DoD user EM spectrum dependent system requirements. Maximize the identification and documentation of demonstration program requirements, for the purpose of quantifying and qualifying EM spectrum supportability.

Objective 2: *Translate user needs to EM spectrum requirements.*

Strategy: Develop and implement a dynamic and repeatable process to translate user requirements to EM spectrum requirements.

Target: Review all Mission Needs Statements (MNSs), Capstone Requirements Documents (CRDs), Operational Requirements Documents (ORDs) and acquisition documents and participate in Request For Proposal (RFP) development and system acquisition process to determine EM spectrum required to support user requirements.

Objective 3: *Assess and pursue EM spectrum supportability for user requirements.*

Strategy: Participation in the Overarching Integrated Product Team (IPT) and Working-level IPT to ensure that EM spectrum supportability and E3 requirements are addressed in the acquisition process.

Target: Review all Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) supportability plans for EM spectrum requirements for all DoD systems.

Objective 4: *Identify and document E3 and EM Spectrum Certification (SC) requirements early on during the Requirements Generation, Planning Programming and Budgeting System (PPBS) and acquisition processes to determine their impact on the DoD mission.*

Strategy: Evaluate and assess programs during the life-cycle phases of the acquisition process based on existing E3 and SC policies and procedures, and provide resolution to program managers on potential issues. Provide the warfighter with an E3 and SC Limitations and Vulnerabilities Report for each program.

Target: DoD program managers address EM spectrum certification and E3 issues at each milestone.

Objective 5: *Ensure identification and timely submission of host nation EM spectrum support requests early in the acquisition cycle.*

Strategy: Update DoD Directive 4650.1 so that it is consistent with the revised DoD 5000 series. Partner with the requirements and acquisition communities to ensure EM spectrum supportability requirements and host nation approval are addressed and submitted in a timely manner.

Target: All EM spectrum dependent systems operating outside of the United States and its Possessions (OUS&P) have documented requests for host nation support; DoD program managers address host nation approval at each milestone for all EM spectrum dependent systems.

Objective 6: *Plan for long-term EM spectrum requirements based on required capabilities in an integrated and coordinated approach.*

Strategy: Coordinate and ensure joint EM spectrum management strategic planning, including analysis of long-term EM spectrum requirements and forecasts, and evaluate the means to satisfy these requirements.

Target: Develop a plan of action to satisfy and integrate all DoD long-term EM spectrum requirements.

Objective 7: *Associate EM spectrum requirements with C4ISR architectures.*

Strategy: Incorporate identified current and future EM spectrum requirements into C4ISR support plans.

Target: Incorporate EM spectrum requirements for C4ISR systems into the C4ISR architecture.

Objective 8: *Develop an integrated DoD EM spectrum Architecture to support the joint environment.*

Strategy: Document long-range EM spectrum requirements and balance identified EM spectrum requirements with EM spectrum availability.

Target: Map out DoD operational requirements with projected EM spectrum accessibility.

Objective 9: *Enhance coordination between the DoD EM spectrum management organizations.*

Strategy: Promote open dialogue sessions and improve existing problem resolution processes within the EM spectrum management community.

Target: Streamlined coordination processes, and improved dialogue amongst DoD frequency management organizations.

2. Goal: - Improve EM spectrum utilization through technological innovation

As the demand for access to limited EM spectrum continues to grow, means must be developed for efficient utilization of this resource. The DoD must leverage its research, development and test resources and promote technology as a key enabler to improve EM spectrum efficiency.

Objective 1: *Pursue technological innovations to improve EM spectrum utilization.*

Strategy: Require incorporation of EM spectrum efficient technology into all future DoD systems.

Target: Increased efficient utilization of EM spectrum as a result of improved technology.

Objective 2: *Encourage partnerships with industry and the civil community to develop new and efficient techniques for EM spectrum sharing.*

Strategy: Encourage cooperative research efforts between government, industry and academia through conferences and forums.

Target: Improved efficient EM spectrum sharing techniques to meet future DoD EM spectrum requirements.

Objective 3: *Encourage and support the development and adoption of equipment standards that afford mutually compatible EM spectrum access and sharing between government and non-government users.*



Communication Interoperability

Strategy: Develop and adopt common standards for EM spectrum dependent equipment.

Target: Improved standards to increase EM spectrum sharing and efficiency.

Objective 4: *Improve operational EM spectrum management decision support processes in dynamic environments.*

Strategy: Invest in new technologies to increase EM spectrum battlespace awareness, and enhance EM spectrum management systems performance and information exchange across various platforms.

Target: Increase efficiencies and capabilities of EM spectrum databases and automation capabilities.

3. Goal: - Promote EM spectrum and E3 awareness and education

To ensure spectrum managers, users, operators, military planners, policy makers, legislators and EM spectrum regulators are aware of EM spectrum and E3 policies and procedures, the DoD must actively pursue educational programs that focus and augment EM spectrum awareness in the areas of military planning, system acquisition, and integrated joint or coalition operations.

Objective 1: *Implement educational programs and appropriate training to increase awareness of EM spectrum and E3.*

Strategy: Target audiences that need EM spectrum management and E3 awareness, develop and implement training programs for frequency/EM spectrum managers, users/operators, military planners, and provide EM spectrum and E3 awareness to system acquisition program managers.

Target: Increased EM spectrum and E3 awareness in the acquisition and operational communities.

Objective 2: *Promote awareness of DoD's EM spectrum requirements and positions on EM spectrum issues to policy makers, legislators and EM spectrum regulators.*

Strategy: Develop and implement national and international programs to increase awareness of DoD's EM spectrum requirements.

Target: Policy makers, legislators and EM spectrum regulators are fully aware of DoD's EM spectrum requirements and position.

4. Goal: - Advocate and defend DoD's EM Spectrum needs in National and International EM Spectrum Forums

DoD's current and future EM spectrum needs are driven by the nation's interests to potentially include civil and commercial EM spectrum needs both nationally and internationally. Determining these needs and articulating them into a National Spectrum Strategy will promote coordination of EM spectrum requirements, increased compatibility, interoperability, and shared access.

Objective 1: *Develop a comprehensive EM spectrum use plan.*

Strategy: Document the need for DoD's current and future EM spectrum requirements. Identify mission impacts where EM spectrum is not available. Emphasize the importance of national security requirements and homeland security requirements, when balancing EM spectrum needs with public safety, and the nation's economic interests.

Target: Incorporation of DoD's long-range spectrum requirements into Federal and National Spectrum use plans.

***Objective 2:** Promote DoD's positions through the national and international EM spectrum processes.*

Strategy: Build and maintain a strong technical team and foster coalition. Partner with industry and allies and appropriate national and international EM spectrum representatives to articulate DoD EM spectrum requirements and positions.

Target: Enhance DoD's ability to secure required amount of EM spectrum.



Section 3

Summary

This Plan outlines the key Goals and Objectives to improving EM spectrum management business practices, EM spectrum planning, efficient EM spectrum utilization and coordination with E3 programs. To accomplish these Goals, the DoD will develop appropriate implementation plans for each of the objectives within this plan. Effective and timely implementation of these plans will assist the DoD towards realizing its vision of EM spectrum access in the 21st century.

Section 4

GLOSSARY

Assured spectrum access: Access to the spectrum required to afford the full capability of the battlefield electronic systems integral to the success of modern military operations.

Electromagnetic Environmental Effects (E3): The impact of the electromagnetic environment (EME) upon the operational capability of military forces, equipment, systems, and platforms. It encompasses all electromagnetic disciplines including Electromagnetic Compatibility (EMC); Electromagnetic Interference (EMI); Electromagnetic Vulnerability (EMV); Electromagnetic Pulse (EMP); Electronic Protection; Hazards of Electromagnetic Radiation to Personnel (HERP), Ordnance (HERO), and Volatile Materials; and natural phenomena effects of lightning and p-static.

E3 Business process: The programmatic efforts undertaken to ensure that E3 control is effectively integrated into National Security Systems and Information Technology Systems. These life-cycle efforts include budgeting for E3 design, test, and evaluation; defining E3 performance requirements; developing test and evaluation strategy; performing analysis and tests; and documenting system limitations and vulnerabilities.

Electromagnetic Environment (EME): The composite electromagnetic energy, including man-made and natural sources, to which a system or subsystem/equipment will be exposed in performing its mission. When defined, the environment will be for a particular time and place.

Electromagnetic (EM) spectrum: The range of radio frequencies of electromagnetic radiation from 3kHz to 300GHz.

Electromagnetic spectrum allocation: The designation of frequency bands for use in performing specific telecommunication functions and services. Also called frequency allocation.

Electromagnetic spectrum assignment: The authorization granted by an administration for a radio station to use a radio frequency channel under specified conditions. Also called frequency assignment.

Electromagnetic spectrum certification: The process by which the development or procurement of spectrum dependent systems will be reviewed and approved for compliance with spectrum management policies, allocations, regulations, and technical standards to ensure that radio-frequency spectrum is available. Also called spectrum certification (SC).

Full Spectrum Dominance: The synergy of new operational concepts of dominant maneuver, precision engagement, full dimensional protection, and focused logistics, to enable the US Armed Forces to dominate the full range of military operations from

humanitarian assistance, through peace operations, up to and into the highest intensity conflict.

Host Nation Authorization: The mechanism for initiating frequency supportability within DoD through submission of DD Form 1494, Application for Equipment Frequency Allocation, by the developing program office (PO) program manager (PM) to the frequency management office of the pertinent military service.

Spectrum Dependent Systems: Systems that require, operate in, or effect the radio frequency electromagnetic spectrum.

Spectrum Management Business Processes: The processes that DoD Spectrum management organizations perform in the day-to-day management of the DoD spectrum.

Spectrum Management: Planning, coordinating, and managing joint use of the electromagnetic spectrum through operational, engineering, and administrative procedures, with the objective of enabling electronic systems to perform their functions in the intended environment without causing or suffering unacceptable interference

Telecommunication: Any transmission, emission, or reception of signs, signals, writings, images, sounds, or information of any nature by wire, radio, visual, or other electromagnetic compatible systems.