



ASSISTANT SECRETARY OF DEFENSE
6000 DEFENSE PENTAGON
WASHINGTON, DC 20301-6000

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NETWORKS AND INFORMATION
INTEGRATION

Ms. Meredith Baker
Assistant Secretary for Communications and Information
U.S. Department of Commerce
Herbert C. Hoover Building
1401 Constitution Avenue, NW.
Washington, DC 20230

Dear Ms. Baker:

Pursuant to your undated letter regarding the President's Spectrum Policy Initiative activities, attached is the Department's annual progress report in fulfilling the initiative.

The OASD (NII) point of contact is Colonel Scot Heckman at (703)-607-0715.

Sincerely,


John G. Grimes

Enclosure:
As stated



**Department of Defense
Annual Progress Report
President's Spectrum Policy Initiative (PSPI)
Fiscal Year 2008**

The Department of Defense (DoD) continues to actively participate in all aspects of the President's Spectrum Policy Initiative (PSPI). Specifically, DoD remains committed to implementing the recommendations of the June 2004 Spectrum Reports. DoD strongly supports efforts to improve responsiveness of the Federal government's spectrum management processes, improve sharing between Federal government users, improve interoperability between Federal, state and local governments, and improve strategic spectrum planning to account for government and commercial demand.

DoD also recognizes the importance of spectrum efficiency. Consistent with the President's direction to "...promote more efficient and effective use of the spectrum while protecting national and homeland security...", DoD is engaged in studies to determine the best method to achieve these goals. Mission effectiveness remains a key tenet to be considered.

Lastly, DoD is pursuing a wide range of spectrum management reform initiatives and continues to actively participate in all PSPI Working Level Groups (WLGs). The DoD's contributions toward PSPI goals for FY2008 are outlined below.

I. Accomplishments Related to Implementing the June 2004 Spectrum Reports

Policy and Plans Steering Group (PPSG):

DoD participated in all PPSG meetings held during the fiscal year. DoD provided recommendations on key national spectrum issues to the Assistant Secretary of Commerce for Communications and Information. Major issues included expanding the role of the Federal Communications Commission's (FCC's) Defense Commissioner; revision of the Memorandum of Understanding between National Telecommunications and Information Administration (NTIA) and FCC; Federal Agency Participation in the Spectrum Sharing Innovation Test-bed; Lessons Learned from the 1710 – 1755 MHz relocation process; and the development of the Executive Branch position on the FCC's Notice of Proposed Rulemaking on Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz band.

Working Level Groups:

During FY08, significant actions occurred in WLGs C, E and G.

In WLG C (Information Technology) and its three sub-working groups (Policy; Frequency Assignments; and Spectrum Certification), the DoD worked closely with NTIA in the planning and development of the Federal Spectrum Management System (FSMS). A formal agreement

was drafted (still pending) between the NTIA and the DSO to collaborate on the development of the FSMS. DoD participated in all WLG C sub-working group meetings, providing comments on use-case specification documents, and addressing processes within the Interdepartment Radio Advisory Committee (IRAC), IRAC sub-committees, and NTIA Spectrum Management Divisions.

In WLG E (Engineering Analysis and Technical Assessments), DoD played a key role in the conception, definition and development of the Spectrum Sharing Test-Bed Initiative and supported NTIA development of the Phase 1 test plan. DoD assisted in assessing 11 industry candidates for the test-bed and selecting six.

DoD provided recommendations on all WLG E technical documents addressing spectrum efficiency, spectrum usage metrics, radar and fixed microwave methodologies, Antenna Polarization Mismatch Loss, radar spectrum efficiency metrics, L-Band usage, fixed point-to-point microwave frequency assignment methodologies, and building attenuation loss.

DoD assisted in the development of a catalog of spectrum management tools and models and continues work on a Best Practices Handbook, which is discussed further in Section IV below.

In WLG G (Spectrum Planning and Reform), DoD continued to work with the NTIA on the development of a long-range planning process for Federal government spectrum management, a Federal spectrum management architecture, and a Federal spectrum requirements process. DoD's Biennial Strategic Spectrum Plan (SSP), submitted on 30 November 2007, will be an integral part of NTIA's Federal Strategic Spectrum Plan update. DoD's Defense Spectrum Management Architecture (DSMA) continues to assist the development of NTIA's Federal Spectrum Management Architecture (FSMA). DoD is committed to sharing its DoD Spectrum Requirements Process Development Program and assisting NTIA in the development of its Federal Spectrum Requirements Process.

Many of the current DoD initiatives address several actions and issues identified in the PSPI working level groups. A brief description of the major DoD activities is included in sections II through V, below.

Use of Commercial Services:

As part of the overall acquisition process, the DoD evaluates the viability of commercial solutions and routinely uses commercial services. For example, DoD uses commercial telecom services extensively for administrative services like cell phones. The DOD still remains one of the largest single consumers of commercial satellite services in the world. With missions around the globe, the US military leases commercial mobile and fixed satellite service in excess of several hundred million dollars annually.

In certain situations, commercial-off-the-shelf (COTS) equipment provides quick capability for the DoD. However, COTS devices may not always be the best alternative for the military. Some COTS devices may be authorized in the U.S., but restricted in another country, limiting its utility for worldwide military missions.

DoD Spectrum-Dependent Technology Initiatives:

The military operates in a dynamic environment that poses some unique spectrum challenges in supporting a highly mobile and widely dispersed force. Additionally, DoD's demand for data throughput is increasing as the DoD fields more complex and capable systems. At the same time, the worldwide competition for radio spectrum increases the pressure on US military spectrum usage. Future access to spectrum will only be achieved through the application of technologies that increase spectrum efficiency. Chapter 7 of the 2007 DoD SSP provides a sampling of ongoing research and development initiatives that are focused on improving spectrum efficiency. The 2007 DoD SSP is summarized in Section III below.

II. Improvements to Capital Planning and Investment Control Procedures

The Spectrum Scorecard:

DoD continues to develop the Spectrum Scorecard as a methodology to ensure spectrum efficiency of military communication systems. It provides a systems engineering approach for program managers to assess spectrum efficiency and mission effectiveness trade-offs. The Scorecard will be applied early in the acquisition process, in an effort to provide the necessary tools to complete the trade study.

To date, a manual process has been completed and documented. An automated prototype is under development and will be available by spring 2009. The DoD Spectrum Scorecard was briefed to the members of WLG – G in summer 2008.

System Acquisition Processes and Spectrum:

The DoD has integrated spectrum planning into the requirements and acquisition processes to minimize costs, avoid schedule overruns, and minimize threats to operational effectiveness stemming from spectrum issues in new systems.

Recent DoD and Chairman, Joint Chiefs of Staff (CJCS) issuances included consideration of spectrum early in the DoD acquisition processes. The recently released DoD 5000 series considers spectrum at the earliest program milestone. CJCS issuances detailing spectrum processes and the military services' revisions of their spectrum management policies all align with spectrum management guidance in Office of Management and Budget (OMB) Circular A-11.

The Defense Acquisition Guidebook was updated to address spectrum supportability, spectrum management systems engineering, test and evaluation master planning, and Electromagnetic Environmental Effects.

The DoD has also added spectrum management modules to the Defense Acquisition University's Program Manager Curriculum. These modules are being refined to reflect spectrum policy changes within the DoD.

III. DoD 2007 Strategic Spectrum Plan and Other Strategic Efforts

DoD Strategic Spectrum Plan (DoD SSP)

The November 2005 *DoD Strategic Spectrum Plan* was updated and submitted as the Biennial DoD SSP to NTIA in Nov 07. The report identified current DoD use of and dependence on spectrum, identified long-term spectrum needs, and provided a forecast of spectrum trends. Fundamental to this report was the goal to emphasize DoD's research into spectrum technologies that will assist in meeting spectrum requirements for future DoD systems. The approach used for this report provides a framework that will be enhanced and modified to support the President's intent.

The DoD recognizes the development of an effective biennial process will be a significant challenge. The size, complexity, and diversity of DoD's spectrum needs will not only require establishment of an extensive outreach structure, but will also require the development of a standardized data repository with codified procedures for updates, additions, and enhancements.

DoD Electromagnetic Spectrum Management Strategic Plan

The DoD has nearly completed the revision of the *Department of Defense Electromagnetic Spectrum Management Strategic Plan* to delineate DoD's goals, strategies, and objectives for assuring its access to electromagnetic spectrum to support the DoD's various worldwide missions. The purpose of this strategic plan is to establish a framework for DoD improvements in spectrum management business practices, spectrum planning, coordination with electromagnetic environmental effects (E3) programs, and the efficient and effective utilization of increasingly scarce spectrum.

Defense Spectrum Management Architecture (DSMA)

The DoD has established policy and procedures that direct the use of integrated architectures to support Capital Planning and Investment, the Joint Capabilities Integration Development System (JCIDS) process, the Defense Acquisition System, and interoperability among information technology (IT) systems.

The DSMA is the DoD's enterprise architecture for spectrum management. The DSMA includes a robust, common set of DoD Architecture Framework-compliant architecture products to provide decision makers and their supporting staffs with a comprehensive description of the operational, system and technical elements of spectrum management for net-centric operations.

The DSMA presents DoD spectrum management transformation at five representative points in time, referred to as epochs. Between the baseline "as-is" architecture (2006) and the Target

Architecture (2020 – 2025 timeframe), three transitional architectures are provided to describe the incremental changes needed over time to ultimately reach the target architecture.

The architecture also includes a Transition Strategy and Roadmap (TS&R) with data points and detailed descriptions of the operational capabilities, environmental characteristics and architecture imperatives for each epoch to identify required actions to establish policy and procedures for achieving the Target Architecture. DSMA Version 3.0 was published in September 2008.

Defense Spectrum Relocation Management Activity (DSRMA):

The Defense Spectrum Relocation Management Activity (DSRMA) was established to oversee the 1710 - 1755 MHz spectrum relocation process for all affected DoD systems. The DSRMA supports the Office of the Assistant Secretary of Defense for Networks & Information Integration (OASD NII). The Defense Information Systems Agency (DISA) Defense Spectrum Organization (DSO)/Joint Spectrum Center (JSC) is the trusted agent for analysis support to the DoD Military Departments for relocation of DoD communications systems, coordination with AWS Licensees, and interference mitigation. The DSO/JSC provides a process for Advanced Wireless Services (AWS) coordination through a secure Web-based portal built with a tracking database to record all data exchanged between parties. To date, the DoD has deleted 322 of the 428 frequencies, exceeding the planned amount for the 18-month point by 314 assignments. By being ahead of schedule, DoD allowed AWS network deployments prior to timelines established as conditions for the auctions. Although the DoD is ahead of schedule, replacement systems are still being designed and new assignments are forthcoming.

IV. Process to Evaluate Spectrum Requirements, including Spectrum Efficiency and Alternative Non-Spectrum Solutions

Spectrum Requirements Process / Methodology

The DSO is developing a comprehensive methodology to identify DoD's current and future spectrum requirements. This capability is required to answer strategic questions about DoD spectrum use and growth, justify or defend allocations, identify opportunities for sharing spectrum (internal and external to DoD), and identify where emerging bandwidth-efficient technologies and techniques may be most beneficial, and meeting specific objectives of the DoD Strategic Spectrum Plan. In FY08, DSO developed an ontology to ensure that the proper information on spectrum utilization can be captured and used to both describe current spectrum usage and form a basis for future spectrum usage forecasts.

Spectrum Efficiency Metrics and Studies

The DoD continues to support NTIA's development of metrics to evaluate achievable technical efficiency in spectrum use under specific operational conditions and to propose improvements, including the use of new technologies, spectrum management practices, standards, or policies. NTIA is currently focusing on the following services: Land Mobile Radio, Fixed, and

Radiolocation services. DoD has provided technical review and comments on NTIA's efforts in these areas. In addition, DoD has established spectrum efficiency metrics for networked communications systems and documented these within the spectrum scorecard, discussed previously.

The DSO developed a draft Dynamic Spectrum Access (DSA) Spectrum Management Roadmap to plan necessary actions to facilitate the introduction of DSA processes and technology into DoD systems. The Roadmap provided a depiction of the various components that comprise the DSA capability, established a baseline timeframe of DSA technology development and integration within the DoD, and identified activities that are required to prepare the DoD spectrum management community to support DSA. The DoD is also investigating the global impact of standardization efforts related to DSA and working to identify areas which may benefit from standardization.

Sharing Studies and Demonstrations

The DoD continues to work on assessing spectrum sharing alternatives and options. The US Army is conducting tests at Yuma Proving Grounds on handheld land mobile radio systems which have integrated XG¹ capabilities. The intent of these tests is to determine whether XG capability can increase spectrum utilization and availability without interfering with the primary users.

The Defense Advanced Research Project Agency (DARPA) is funding continued work with XG technology in the Wireless Network after Next (WNaN) program. The DARPA WNaN program develops and demonstrates emerging technologies that will enable intelligent adaptive wireless networks consisting of densely deployed low cost wireless nodes. The WNaN networks will leverage XG dynamic spectrum and policy-based control technologies and will adapt to changing environments by adjusting the topology of the network and the operational mode of the nodes. DARPA is monitoring progress toward building prototypes that meet key functional requirements and support validation testing. DARPA has committed to deliver 500 units to the US Army. During the last In-Progress Review, a multi-node live demonstration involving the transmission on a single frequency of streaming video over a point-to-point link between two WNaN prototypes was conducted.

The Joint Tactical Radio System (JTRS) Joint Program Executive Office awarded a Small Business Innovation Research grant to Shared Spectrum Company to integrate XG with Wideband Networking Waveform (WNW) for testing at the JTRS facility in Charleston, SC. Shared Spectrum will test XG with WNW in fixed frequency mode. Shared Spectrum will demonstrate XG with WNW by end of calendar year 2009, at which point the JTRS program will decide whether or not to fund development and production.

¹ DARPA's program for Next Generation (XG) has a goal of developing, evaluating, and integrating technology to automatically select spectrum and operating modes to both minimize disruption of existing users and to ensure the most efficient operation of systems. The Next Generation (XG) program goals are to develop both the enabling technologies and system concepts to provide dramatic improvements in assured military communications in support of a full range of worldwide deployments through the dynamic redistribution of allocated spectrum along with novel waveforms.

The DoD addressed spectrum encroachment on the 3.5 GHz radiolocation band by commercial mobile applications (WiMAX). As a result, the DoD is conducting a detailed analysis of other radar bands that may be at risk of future encroachment by emerging wireless technologies. In addition, the study will analyze interference mitigation technologies as well as approaches for coexistence of radar and communications systems in order to present a wide range of options for addressing this problem.

Best Practice Handbook Support

DoD, in cooperation with NTIA, is updating the Communications Receiver Performance Degradation Handbook to include additional modulation, coding and interferer types, and emerging technologies and signal structures associated with WiFi, WiMax, Wireless Local Area Network (WLAN), and Ultra-Wideband (UWB) systems. The purpose of this degradation handbook, which will ultimately become part of NTIA's Best Practices Handbook (BPH), is to provide the radio frequency (RF) analyst with the capability to calculate the effects of noise and interference on RF communications receivers. The DoD also provided NTIA access to the DSO/JSC technical library to facilitate in the production of technical documents.

Spectrum Management Models and Automated Analytical Tools

The Spectrum Management Transition Initiative (SMTI - \$48M) and Spectrum Technology Testbed Initiative (STTI - \$28M) are facilitating the relocation of DoD systems from the 1710 – 1755 MHz spectrum band by:

- Enhancing frequency assignment algorithms to increase spectral efficiency
- Migrating to a web-based system that will include a simplified user interface to aid untrained and part-time frequency managers
- Developing a real-time frequency scheduling capability to support efficient assignment of frequencies at test and training facilities
- Developing an automated capability to support development of spectrally efficient replacement systems.
- Providing a simulation-based analysis capability that enables evaluation of the operational implications of relocating systems from the 1710 - 1755 MHz band to other bands.

Global Electromagnetic Spectrum Information Systems (GEMSIS)

In FY08, the GEMSIS Program Office was established. GEMSIS, Increment 1, planned to be fielded in 2010, will include the Coalition Joint Spectrum Management Planning Tool and the Host Nation Spectrum Worldwide Database Online functionality. Concurrently, an Analysis of Alternatives is being conducted to identify the GEMSIS functionality to be provided in Increment 2.

In its final form, GEMSIS will provide a secure and globally-connected suite of spectrum management services, hosted in the DoD's Enterprise Information Environment, and available to users as an enterprise service. GEMSIS will integrate spectrum management operations into net-

centric operations and provide a range of capabilities that will improve upon current spectrum management systems and access information from other related operational planning systems. GEMISIS is expected to provide the long-term solution for spectrum management capabilities.

V. Spectrum for COOP and COG Operations

DoD could not address COOP and COG Operations in this unclassified document.