



Department of Energy

Washington, DC 20585

Ms. Meredith Attwell Baker
Assistant Secretary of Commerce
For Communications and Information
1401 Constitution Avenue, N.W.
Washington, DC 20230

Dear Ms. Baker:

In response to your letter regarding the FY2008 Progress Report on the *President's Spectrum Policy Initiative*, I am pleased to provide an overview of the Department of Energy's efforts during the past year that support the Initiative's recommendations. Our response is structured according to the template and checklist provided in your letter.

The Department of Energy (DOE) remains committed to improving the efficiency and effectiveness with which we employ the critical resource of radio frequency spectrum. DOE is also continuously working to improve our spectrum management processes both within the Office of the Chief Information Officer and with our operational field organizations.

The Department of Energy appreciates the opportunity to respond to this important initiative. If you or your staff requires any further information, please contact TheAnne Gordon, Associate CIO for IT Planning, Architecture, and E-Government at (202) 586-3705.

Sincerely,

A handwritten signature in blue ink, appearing to read "T. Pyke".

Thomas N. Pyke
Chief Information Officer

Enclosure



Enclosure



Department of Energy
Fourth Annual Progress Report

In Support of the President's Spectrum Policy Initiative

December 1, 2008

Department of Energy – Fourth Annual Progress Report President’s Spectrum Policy Initiative

The Department of Energy (DOE) has an extremely diverse set of responsibilities and associated capabilities that support our strategic themes of Energy Security, Nuclear Security, Scientific Discovery and Innovation, Environmental Responsibility, and Management Excellence. These responsibilities range from the transmission and marketing of electricity over large areas of the country, to conducting some of the most advanced technological research going on in the world today, to the management and security of the nation’s nuclear weapons. DOE’s use of the radio frequency spectrum in accomplishing these responsibilities is significant as we employ over 8,000 radio frequency authorizations throughout the country. DOE takes seriously the stewardship of these critical national and natural resources and remains fully committed to improving the efficiency and effectiveness with which we use them. DOE’s efforts and accomplishments over the past year in support of the President’s Spectrum Policy Initiative are described below.

I. Accomplishments Related to Implementing the June 2004 Spectrum Reports

The Department of Energy (DOE) has continued to actively work towards implementing the recommendations of the June 2004 Spectrum Reports. DOE participated in the National Telecommunications and Information Administration (NTIA) Working Level Groups (WLGs) “A” through “G” that are addressing the individual recommendations from the reports. DOE fully supported all NTIA meetings and working groups that occurred during the past year, including providing comments on numerous documents and proposals. The WLG’s having significant activity this year were WLG-C, WLG-E, and WLG-G.

- A. Working Level Group C – Information Technology (WLG-C): DOE participated in all Working Level Group C, Information Technology meetings. These meetings were conducted primarily under the auspices of the Frequency Assignment Subcommittee (FAS) Working Group 22 (WG-22). The focus of the meetings was on addressing the requirements and implementation considerations for the Federal Spectrum Management System (FSMS). DOE accomplished reviews of all FAS WG-22 documents and provided comments and recommendations on many of them. Of DOE’s seven major recommendations on the FSMS Transition Plan, five were incorporated into the document. In addition, Bonneville Power Administration (BPA) has volunteered to test the beta version of the FSMS software once it is available. DOE also hosted the NTIA FSMS Program Manager as a key speaker at the DOE Information Management Conference held in Atlanta, GA in April 2008. DOE will be inviting the NTIA FSMS Program Office to provide a detailed program briefing to the DOE Radio and Spectrum Technology Workshop at the Information Management Conference scheduled for March 2009.

- B. Working Level Group E – Engineering Analysis and Technical Assessments (WLG-E): DOE participated significantly in the activities of Working Level Group E (WLG-E), Engineering Analysis and Technical Assessments. WLG-E’s major focus this past year was on the Spectrum Sharing Test-Bed Initiative. WLG-E assessed 11 industry candidate participants for the Spectrum Sharing Test-Bed and selected 6 participants for actual evaluation under the Test-Bed effort. DOE participated in the review and evaluation of the candidate participant’s proposals, in meetings with the Test-Bed candidates, and supported NTIA’s development of the associated Phase I test plan. DOE also provided a presentation to the NTIA staff on the capabilities of the Idaho National Laboratory (INL) Wireless Test Bed (WTB) as a candidate location/facility for NTIA to conduct Phases II and III of the Spectrum Sharing Test-Bed effort. INL’s WTB is a national resource. The WTB has sophisticated test and monitoring equipment and is located in a large but isolated geographic region where the radio frequency spectrum is essentially “clean”. The WTB is capable of supporting the testing and evaluation of any wireless domain technology, and is also equipped with a state of the art, Tier 1 level, cellular network
- C. Working Level Group G – Spectrum Planning and Reform (WLG-G): DOE participated significantly in the activities of the WLG-G, Spectrum Planning Reform Working Group. DOE attended all meetings of WLG-G where the major topics of discussion included spectrum valuation, spectrum efficiency incentives, capital planning related to spectrum certification, and the Federal Strategic Spectrum Plan (FSSP).
- D. Dynamic Spectrum Access Coordination Group: DOE participated in the meetings of the Dynamic Spectrum Access (DSA) Coordination Group (CG) this year. In support of the DSA CG efforts, DOE arranged for a special presentation to the DSA CG by the Oak Ridge National Laboratory on their Cognitive Radio Technology work and related research.
- E. Policy and Plans Steering Group (PPSG): DOE participated in the meetings held this past year of the Policy and Plans Steering Group. DOE provided inputs related to the key issues addressed during these meetings. Major issues included the “Lessons Learned from the 1710 – 1755 MHz Band Relocation Effort” and the development of the Executive Branch position on the Federal Communications Commission (FCC) Notice of Proposed Rulemaking on the 700 MHz Nationwide Public Safety Broadband Network.
- F. Implementation of Information Technology (IT): DOE has invested in commercially available radio frequency interference analysis software to enhance DOE’s spectrum related IT capabilities. The specific software application is titled “HTZ Warfare” and it is produced by the ATDI Corporation. DOE’s primary use of the software at this stage is in support of the analysis of the potential for radio frequency interference to DOE systems in the 1710 – 1755 MHz Band from “early entrant” Advanced Wireless Services (AWS) licensees. DOE employs the software as a means of providing a validation of the analysis results provided by AWS licensees in their frequency coordination notices/requests.

- G. Career Development Program: DOE strongly supports the recommendation focused on the need for a Federal spectrum management career development program. DOE has for the past two summers provided the opportunity for a summer intern to work directly with DOE's Spectrum Management Program to expose young college juniors and seniors to the spectrum management career area.

II. Improvements to Capital Planning and Investment Control Procedures

- A. The November 30, 2004 Executive Memorandum provided direction to agencies to “implement a formal process to evaluate their proposed needs for spectrum.” As noted in DOE's 2007 Annual Progress Report, the majority of DOE spectrum dependent systems are common or standard off-the-shelf solutions. This means that the radio equipment solutions available to DOE are typically designed for standard bandwidths (e.g., narrowband VHF and narrowband UHF, 12.5 KHz) that support efficiency to a large degree and that enable interoperability; a critical need. DOE does not have the technical flexibility or “market influence” to procure radio equipment solutions with non-standard bandwidths, though such options could feasibly provide more “spectrum efficiency.” For those few DOE programs or systems that do require new procurement or major upgrades of existing systems during a given year, DOE thoroughly reviews and assesses the technical proposals with respect to the system's spectrum efficiency attributes. System configurations or approaches that are not consistent with efficient use of spectrum resources are addressed with the sponsoring DOE field organization and must be justified before the certification proposal is submitted to the NTIA IRAC Spectrum Planning Subcommittee.
- B. DOE is in the final stage of publishing the Department's new Information Technology Management policy, DOE Order 200.1, which will formally delineate Departmental requirements and responsibilities for Federal spectrum management. The publishing of this policy will be complemented by a DOE Spectrum Management guidance document addressing requirements with respect to federal spectrum management responsibilities for all DOE organizations employing spectrum. DOE intends to incorporate in the spectrum management guidance document the requirements related to OMB Circular A-11 direction for NTIA certification of spectrum dependent systems.

III. DOE 2007 Strategic Spectrum Plan and Other Strategic Efforts

- A. DOE 2007 Strategic Spectrum Plan (2007 SSP).

The development of DOE's 2007 SSP was described in detail in the DOE 2007 Annual Progress Report submission. DOE's three Spectrum Management goals provided below continued to guide overall efforts this past year.

DOE Spectrum Management Goals

1. Improve spectrum management at DOE by:
 - a. Publishing a DOE Spectrum Management manual,

- b. Improving planning for future spectrum requirements, and
 - c. Facilitating an integrated management approach with the possible implementation of a Spectrum Management Office (SMO) for spectrum management.
2. Integrate spectrum management into Departmental EA by:
- a. Ensuring spectrum investments are in line with the Department's strategic goals and target architecture and
 - b. Evaluating and improving the capital planning and investment control process for spectrum management.
3. Improve interoperability, spectrum resource sharing, and spectrum support for emergency planning by:
- a. Further developing interoperability capabilities and
 - b. Increasing sharing of spectrum and telecommunications assets within the Department, among other federal departments, and with state, local, and energy sector partners.

B. Other DOE Strategic Spectrum Management Efforts.

1. **DOE Spectrum Coordination Group (SCG).** The DOE SCG is comprised of three distinct entities: the Spectrum Coordination Committee, the Federal Leadership Group, and the Spectrum Working Group. The SCG is governed by the Spectrum Coordination Committee. The Spectrum Coordination Committee provides leadership to both the Federal Leadership Group and the Spectrum Working Group. The Federal Leadership Group serves as the official voice of the SCG by providing the formal DOE position on spectrum-related issues. DOE's Spectrum Working Group (SWG) continued to meet this past year on a monthly basis providing a vital forum for emphasizing spectrum management improvements and enabling collaboration among field elements on spectrum efficiency initiatives. DOE emphasized the October meeting of the SWG as a maximum participation event for all field organizations in order to ensure that all DOE spectrum management efforts in the coming year are synchronized and effectively accomplished.
2. **DOE 1710 – 1755 MHz Spectrum Relocation Project.** The DOE OCIO has continued to aggressively pursue the relocation of DOE systems from the 1710 – 1755 MHz spectrum band and to work with the Advanced Wireless Services (AWS) licensees to facilitate their early entry into the band. The OCIO Spectrum Relocation Project Management element supports the process for Advanced Wireless Services (AWS) licensees to request and receive data on DOE frequency assignments and for AWS licensees to submit and receive responses on frequency coordination requests. The Project Management element also develops the required DOE Quarterly and Annual Relocation progress reports. The DOE OCIO has responded to over 425 AWS frequency data requests and over 70 AWS frequency coordination requests. Up to this time, DOE has been able to concur with the early entry of all AWS licensees that have worked through the coordination process.

IV. Spectrum Sharing, Spectrum Efficiency, New Technologies, and Commercial Services

- A. **Spectrum Sharing**: Many of the DOE field sites and facilities have spectrum sharing arrangements with either other federal agencies or with state and local entities. A few specific examples were described in detail in the 2007 DOE Annual Progress Report. A couple of other examples are provided below with this report. In general, DOE sites and facilities consider the potential for sharing with other federal entities but in many cases they are not in close enough proximity to other federal entities for sharing to be feasible. There are instances where DOE is able to share frequencies, trunking resources, and physical space with the Department of the Interior, the Federal Bureau of Investigation, or with one of the military Departments. With regard to spectrum sharing with state and local entities, numerous DOE sites and facilities have mutual aid agreements with surrounding city, county, or state governments for support of law enforcement, fire and rescue, weather, and emergency medical services functions.
1. Several National Nuclear Security Administration (NNSA) field sites are exploring the use of the 4.9 GHz band for fixed and mobile wireless service. This band is primarily for non-Federal wireless Public Safety users, however Federal government entities are allowed to use the band once a sharing agreement with a Public Safety Agency having a current FCC license has been established.
 2. Idaho National Laboratory (INL) is in the initial stages of planning to procure and install a state-of-the-art, trunked Land Mobile Radio (LMR) System. This new LMR system will be P25 compliant and will support narrowband operations in the newly assigned 700 MHz band. The INL is working with the State of Idaho on an infrastructure and spectrum sharing Memorandum of Understanding (MOU), that will allow integration and sharing of the State of Idaho's 700 MHz system, providing critical interoperability. The system will support prioritized Talk Groups for INL's Emergency Service Providers (protective force, fire, medical, Emergency Response Organization - ERO) personnel. An Inter-RF Subsystem Interface (ISSI) will be used, which permits users in one system to communicate with users in another system (via web interfaces), enabling interoperability between the INL's current 406.1 – 420 MHz band LMR system, and all regional, state, and federal entities. INL has been invited by the Idaho State Interoperability Executive Committee (SIEC) to provide a presentation on the plan. Additionally, INL spectrum management personnel have been invited to be participants in the SIEC technical subcommittee.
 3. The Oak Ridge Operations office (ORO) is continuing to work with local law enforcement, emergency responders, and other agencies to improve mutual aid communications. ORO is working with the City of Oak Ridge on an MOU to allow the Y-12 facility to operate their MOTOMESH system in the non-Federal 4.9 GHz band.
- B. **Spectrum Efficiency, New Technologies, and Commercial Services**: With regard to spectrum efficiency efforts, the pursuit of new technologies, and assessing DOE's use of commercial services, the following information is provided.

1. **Spectrum Efficiency:** All DOE field organizations consider spectrum efficiency when applying for new radio frequency authorizations or when accomplishing the five year review of existing authorizations. DOE field organizations have been aggressively pursuing the conversion of all VHF and UHF Land Mobile Radio (LMR) systems to be compliant with the NTIA narrowband mandate. At the present time DOE has 1,567 assignments in the 162-174 MHz (VHF) band. Of these there are 1,448 that are narrowband compliant or 92.41 percent. DOE also has 1,391 assignments in the 406.1-420 MHz (UHF) band. Of these 1,150 are narrowband compliant or 82.67 percent.

2. **New Technologies:** DOE's operational field organizations assess the opportunity to implement new technologies whenever there are equipment upgrades accomplished. State-of-the-art capabilities are being implemented in Land Mobile Radio systems as well as in fixed point-to-point microwave systems that will operate in the 4/5 GHz and 7/8 GHz bands. DOE's strategic theme of Scientific Discovery and Innovation is the responsibility of DOE's Office of Science. The Office of Science oversees the efforts of 27 laboratories where world class research is conducted on a myriad of technical disciplines. Significant research efforts pertain to advanced wireless technologies. The Oak Ridge National Laboratory (ORNL) is heavily engaged in such research. ORNL is pursuing development of a Wideband Hybrid Spread Spectrum Waveform for demonstration use in the ISM unlicensed band. The goal of the demonstration is to confirm that wideband communication can be accomplished, below the noise floor, thus enabling secure communication. ORNL has filed and was awarded a patent associated with this research work. The patent is US 7,340,001 B2, Mar. 4, 2008, titled 'Multidimensional Signal Modulation and/or Demodulation for Data Communication' The focus of the investigation is to achieve the capability to transmit information at up to and beyond 20 bits/Hz. ORNL is also actively investigating cognitive radio technologies. ORNL established the Cognitive Radio Program Office whose mission is "to integrate software radio, sensors and computational intelligence capabilities to realize the art-of-the-possible in cognitive computing and communications to address both government and commercial problems, in a manner that enhances US National Security". The technologies being investigated by the program include: differential evolution (population based search algorithms); inferential sensing; mapping parameters to population vectors or "chromosomes"; bio-inspired secure computing, communications, and control.

3. **Commercial Services:** Almost all of DOE's sites, facilities, and capabilities continue to employ commercial telecommunications services. Most facilities employ commercial cellular telephones and Blackberries. These same facilities use commercial pagers and a significant subset use a combination of commercial pagers for national coverage and government owned pagers for local high-reliability coverage. DOE also employs commercial satellite communications systems for unique missions and applications.