

SPECTRUM MANAGEMENT FOR THE 21ST CENTURY

THE PRESIDENT'S SPECTRUM POLICY INITIATIVE
PROGRESS REPORT FOR FISCAL YEAR 2007



U.S. DEPARTMENT OF COMMERCE

CARLOS M. GUTIERREZ, SECRETARY

**MEREDITH ATTWELL BAKER
ACTING ASSISTANT SECRETARY
FOR COMMUNICATIONS AND INFORMATION**

NOVEMBER 2008

This page intentionally blank

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
BACKGROUND	3
SUMMARY OF PROGRESS	4
<i>I. Capital Planning and Processes and Integration of Spectrum Planning in Agency Strategic and Capital Planning Processes</i>	4
<i>II. Formal Assessment of Spectrum Needs: The Technical Planning Process</i>	8
<i>III. Strategic Spectrum Planning</i>	9
<i>IV. Commerce Spectrum Management Advisory Committee (CSMAC)</i>	11
<i>V. Incentives for More Efficient Use of the Spectrum</i>	12
<i>VI. Public Safety</i>	13
<i>VII. Efficiency Measures</i>	15
<i>VIII. Advanced Information Technology</i>	20
<i>IX. Reducing International Barriers to United States Technology</i>	22
<i>XI. Unified Federal Response</i>	24
CONCLUSION	24
APPENDIX A: Status of Deliverables and Target Dates as of November 2008	23
APPENDIX B: President’s Initiative: Published Reports and Reference Documents	33

This page intentionally blank

EXECUTIVE SUMMARY

In Fiscal Year 2007 (FY07), Executive Branch agencies continued to improve spectrum management policies and practices in support of the goals of the Presidential Initiative. NTIA provided leadership to the Federal agencies in fulfilling these goals, as well as in carrying out a number of the Presidential Initiative tasks assigned to the U.S. Department of Commerce. Thus, with respect to the progress of the Federal agencies in FY07, this report is based on the agency inputs made in November, 2007. However, NTIA, in this report, summarizes NTIA-led Presidential Initiative activities up through the end of September 2008.

The Federal agencies in FY07 participated in the “Working Level Groups” chaired by the National Telecommunications and Information Administration (NTIA) which are working to accomplish the recommendations resulting from the Presidential Initiative. Agency spectrum managers provided leadership to improve internal agency processes for system planning, identification of spectrum requirements and use of new technologies to increase spectrum efficiency. The agencies instituted processes to better identify and track spectrum-using assets, link missions to functional requirements and to spectrum-dependent systems. The agencies are working to better identify future spectrum requirements. In FY07, the Federal agencies prepared updates to their agency-specific strategic spectrum plans.

Several Federal agencies have taken steps to increase collaboration on spectrum matters and use among the Federal agencies, with state, local, and tribal entities, and with the private sector. Federal agencies increasingly are sharing spectrum through inter-organizational arrangements. They are also exploring technologies which utilize dynamic spectrum access and laying the groundwork for their use. The following are examples of progress by the Federal agencies in improving spectrum management:

- Agencies increased integration of spectrum management into their overall information technology activities as well as agency strategic and capital planning processes.
- Agencies increased sharing of spectrum resources and infrastructure with each other and with state, local and tribal entities.
- DOD’s DARPA XG program continued to test the use of dynamic spectrum access technologies.
- The Federal agencies prepared updated agency-specific strategic spectrum plans identifying their use of spectrum, spectrum-dependent systems and spectrum requirements.

In addition to individual agency progress, NTIA achieved several milestones with respect to the President’s Initiative, both in FY07, and to the date of this report. These include:

- The Federal Strategic Spectrum Plan, published in March, 2008.
- The Commerce Spectrum Management Advisory Committee (CSMAC) activities with respect to providing advice to NTIA on improvements to Federal spectrum management and on the spectrum sharing test-bed.¹

¹ The CSMAC provided input to NTIA on a variety of subjects. These are outlined in Section IV, *infra*, at 11.

- A report on a shared broadband public safety network, the Wireless Accelerated Responder Network (WARN) which evaluated the operational and cost-effectiveness of infrastructure and spectrum sharing among Federal, state and/or local governments and other non-federal users.
- Achievement, at WRC-07, of the major U.S. goals for the conference, in support of non-Federal and Federal objectives. NTIA utilized recommended improvements in the preparatory process for World Radiocommunication Conferences (WRC) to support U.S. preparations for WRC-07. These improved processes enabled the U.S. to develop consensus proposals and positions at an early date and to gain support within the Western Hemisphere.
- Initiation of a Spectrum Sharing Innovation Test-Bed program to evaluate spectrum sharing between Federal and non-Federal spectrum users.

These actions by the Federal agencies and NTIA advanced the President's Initiative and accomplished a number of the goals in the Presidential Memorandums as well as the recommendations in the Task Force Reports. Additional milestones are expected to be completed in FY08 and FY09 to achieve a system of spectrum management that will be responsive to U.S. spectrum needs of the 21st Century.

In addition to the actions undertaken pursuant to the President's Initiative, NTIA also led the relocation of several thousand Federal frequency assignments from the 1710-1755 MHz band to other spectrum. Pursuant to the Commercial Spectrum Enhancement Act (CSEA)², the Federal government reallocated 45 MHz of spectrum from Federal-only use to non-Federal use for advanced wireless services (AWS). This spectrum, along with 45 MHz of non-Federal spectrum, was auctioned for \$13.7 billion, facilitating the provision of innovative new wireless services in the commercial market. Pursuant to the CSEA, which provided for a spectrum relocation fund, approximately \$1 billion of the auction proceeds was transferred by the Office of Management and Budget (OMB) to 12 Federal agencies to fund relocation of their wireless systems that operated in the 1710-1755 MHz band. Through this process, the CSEA benefitted the American public through spectrum auction receipts, made available spectrum for new or expanded wireless services, and enabled the Federal agencies to implement new state-of-the-art communications systems. The reallocation of spectrum and orderly relocation of Federal systems under the CSEA demonstrate how public/private cooperation can benefit the U.S. economy while ensuring that Federal communications requirements can continue to be met.³

² See, Commercial Spectrum Enhancement Act (CSEA), Pub.L. No. 108-494, 118 Stat. 3996-97 (2004).

³ See, *1710-1755 MHz Spectrum Band Relocation, First Annual Progress Report*, U.S. Department of Commerce, March, 2008, available at <http://www.ntia.doc.gov/reports/2008/SpectrumRelocation2008.pdf>.

BACKGROUND

This FY07 Progress Report describes activities of the major spectrum-using Federal agencies, as well as those of the National Telecommunications and Information Administration, undertaken in response to the President's call for a United States spectrum policy for the 21st century. In May 2003, the President launched an initiative to ensure that United States spectrum policy for the 21st century continues to mobilize the radio frequency resource in service of Federal missions and national prosperity.⁴ The goals of the Presidential Initiative are to: foster economic growth; defend and secure our Nation; maintain U.S. global leadership in communications technology and services; and satisfy other vital U.S. needs in public safety, scientific research, federal transportation infrastructure, and law enforcement.

The President directed the Department of Commerce to report each year on progress toward these objectives and provided that the Federal agencies assist the Department in this regard.⁵ Thus, at the request of the Assistant Secretary of Commerce for Communications and Information, the major spectrum-using Federal agencies submitted progress reports in the fall of 2005, 2006 and 2007. The progress made at the Federal agencies in FY07 is based on the November 2007 agency submissions.

In addition to the progress made by the individual spectrum-using agencies, NTIA has accomplished many of the goals outlined in the President's Initiative. The accomplishments of NTIA through the date of this report, along with tasks remaining and estimated completion dates, are summarized in Appendix A.

⁴ Presidential Memorandum on Spectrum Policy for the 21st Century, 69 Fed. Reg. 1568 (Jan. 9, 2004), 39 Weekly Comp. Pres. Doc. 726, 727 (May 29, 2003), available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2003_presidential_documents&docid=pd09jn03_txt-19.pdf. Pursuant to this directive, NTIA issued two reports. See, Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy Initiative: Report 1, Recommendations of the Federal Government Spectrum Task Force* (June 2004), available at http://www.ntia.doc.gov/reports/specpolini/pressspecpolini_report1_06242004.htm ("Task Force Report 1"); and Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy: Report 2, Recommendations from State and Local Governments and Private Sector Responders* (June 2004), available at http://www.ntia.doc.gov/reports/specpolini/pressspecpolini_report2_06242004.htm (Task Force Report 2").

⁵ *President's Memorandum on Improving Spectrum Management for the 21st Century*, 49 Weekly Comp. Pres. Doc. 2875, § 3(c) (Nov. 29, 2004) (2004 Executive Memorandum) available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2004_presidential_documents&docid=pd06de04_txt-11.pdf.

SUMMARY OF PROGRESS

1. Capital Planning Processes and Integration of Spectrum Planning in Agency Strategic and Capital Planning Processes

One of the recommendations in the Commerce reports submitted to the President in response to the 2003 Presidential Memorandum called for use of capital planning and investment control procedures “to better identify associated spectrum requirements and costs of major investments.”⁶ The 2004 Presidential Memorandum tasked the Office of Management and Budget (OMB) and the Federal agencies with taking specific actions towards these ends. Pursuant to the President’s directive, OMB instructed Federal agencies to consider the economic value of radio spectrum when developing justifications for new major systems, beginning with FY07 budget requests.⁷ In their progress reports concerning the Presidential Initiative, the agencies reported on their efforts in this regard.

A. Integration of Planning for Spectrum-Dependent Systems into Agency Strategic and Capital Planning Processes and Compliance with OMB Guidelines

The Federal agencies continued to make progress to include planning for spectrum-dependent systems in the agencies’ strategic and capital planning processes. Budget requests for capital investments are submitted, including IT investments and investments in spectrum-dependent systems in accordance with OMB Circular A-11. Section 33.4 of Circular A-11 states that agencies should consider the economic value of spectrum when making decisions concerning investment in major new spectrum-dependent systems.⁸ Working Level Group G, chaired by NTIA, is developing guidelines for the agencies to use in considering the economic value of spectrum. These guidelines will assist the agencies in taking into account various factors in assessing value, and outline a common methodology to calculate spectrum value. However, in order for these guidelines to be finalized, empirical valuation methodologies must be developed. NTIA is awaiting the results of a contractor study to develop algorithms which can be used in calculating spectrum value.

The Department of Defense (DOD) further refined its “Spectrum Scorecard” that would provide detailed guidance on how systems should be selected to promote spectrum efficiency, effectiveness, and supportability. The Scorecard provides a trade-off analysis of alternatives, using a scoring methodology for determining spectrum efficiency and effectiveness of a candidate system. System performance specifications are assessed in relation to a fixed set of defined system and link level rating criteria. Also, as a part of integrating spectrum management with agency strategic planning, the DOD is examining its requirements and acquisitions processes to ensure that technical, financial, and spectrum supportability issues are taken into account at the earliest stages of system planning and equipment procurement.

The Department of Energy (Energy) is modifying agency capital planning procedures to ensure greater consideration of more efficient and cost-effective spectrum use. Energy conducted information exchanges between its spectrum management staff and agency capital planning and enterprise architecture staff to promote integration of spectrum management into agency capital and strategic

⁶ See *supra* note 1, Task Force Report 1 at 23.

⁷ The Office of Management and Budget Circular A-11, § 33.4 (2006), *available at* http://www.whitehouse.gov/omb/circulars/a11/current_year/s33.pdf.

⁸ *Id.*

planning. Energy's Chief Information Officer (CIO) incorporated spectrum management into the DOE Enterprise Architecture. The agency is updating its Information Technology Management Policy to incorporate Federal spectrum management within the responsibilities of the CIO. These responsibilities include compliance with OMB Circular A-11 guidance for Federal agencies with respect to major investments, which can include spectrum-dependent systems.

The Department of Commerce is working to ensure that spectrum economic analyses are conducted, and where required, described in the agency's Exhibit 300 submissions to OMB Circular A-11. The Department of Agriculture (Agriculture) has integrated spectrum management strategic planning into its overall agency IT architecture, strategic planning, business case development and budget processes. The agency has been particularly active in Working Level Group G (WLG-G), which addresses capital planning and investment control processes and briefed the group on capital and strategic planning within Agriculture. OMB's Circular A-11 requires agencies to combine proposed capital investments for IT infrastructure into a single business case called the Infrastructure Office Automation and Telecommunication Exhibit 300 submissions. Through this process, Agriculture performs the analyses required by OMB regulations but consolidates budget requests for major spectrum-dependent systems into high-level summary inputs to OMB in combination with IT investments.

The Department of Homeland Security (DHS) made further strides to incorporate spectrum planning into its capital planning and enterprise architecture processes and also participates in WLG-G. DHS is reviewing approaches to complying with Section 33.4 of OMB Circular A-11. The agency currently uses its Office of Chief Information Officer Acquisitions Review to evaluate major spectrum-dependent systems before funding is sought.

The Board of Broadcasting Governors (BBG) utilizes a Capital and Information Technology Planning Process to comply with all relevant guidelines, including those in OMB Circular A-11. In accordance with OMB guidance and internal BBG processes, spending for spectrum-dependent systems is a component of the annual budget process.

The Department of Interior (Interior) utilizes the OMB A-11 Exhibit 300s to identify expenditures for modernization of its radio systems, for narrowband conversion, and for the relocation of systems in the 1710-1755 MHz band. In FY10, Interior plans to incorporate consideration of spectrum value in its business case for new and upgraded systems and is developing a spectrum valuation methodology.

The National Aeronautics and Space Administration's (NASA) internal processes to comply with the requirements of OMB Circular A-11 include review of requests for spectrum-dependent systems on the basis of need for the spectrum, the technical parameters of the system, and the economic impact on NASA missions and budgets.

The Department of Justice (Justice) addresses spectrum use and investment in spectrum-dependent systems, such as the Integrated Wireless Network (IWN) program, as part of its capital planning and investment control process. Increasingly, Justice wireless initiatives are consolidated under IWN. The IWN program is reviewed every three to six months by the Department Investment Review Board which is chaired by the Deputy Attorney General. The Board addresses spectrum management in conjunction with review of the program.

In addition, Justice's Wireless Management Office (WMO), under the agency's CIO, has an integrated program management office for IWN. The WMO is developing a cost model system to provide an earned value management report for IWN system implementation.

The Treasury Department (Treasury) made strides to integrate its spectrum planning with the agency capital planning and investment control processes. Its participation in IWN has, in particular, driven this integration. In addition, Treasury is developing a spending plan template to identify financial requirements necessary to support current and future wireless needs.

B. Improved Management Approaches for Spectrum-Dependent Systems

Many agencies have reformed their organizational structures and processes to improve spectrum management. Agencies are coordinating spectrum management with capital planning and other programs, particularly IT. The DOD, Energy, and the Department of Veterans Affairs (VA) are integrating spectrum management, enterprise architecture, and capital planning.

DOD has established policies and procedures that will direct the use of integrated architectures to support Capital Planning and Investment, the Joint Capabilities Integration and Development Systems (JCIDS), the Acquisition System, and interoperability among IT systems. The Defense Spectrum Management Architecture (DSMA) is the DOD's enterprise architecture for spectrum management. It includes a common set of architecture products to provide decision makers with comprehensive descriptions of the operational, system, and technical elements of spectrum management for net-centric operations.

The DSMA provides for transition from an "As-Is" Baseline Architecture in 2006 to a Target Architecture in 2020-2025. The DSMA also provides a transition strategy and roadmap, including data points with descriptions of operational capabilities, environment characteristics, and architecture imperatives. These are laid out for specified time periods so they can be used to identify required actions with respect to establishing policy and procedures to achieve the Target Architecture. DSMA Version 2.0 was published in May 2007 and work is in progress on Version 3.0 to further capture capabilities needed to support net-centricity and real-time system relocation.

DOD also is developing a Global Electromagnetic Spectrum Information System (GEMSIS), a "system of systems" approach to provide an overarching framework for future capabilities. While the long-term vision (2020) is still general, in the near and mid-term GEMSIS will link to emerging service, architecture and joint operational concepts to build an integrated set of capabilities that will operate across service and functional lines. The goal of GEMSIS is to enable wireless devices to integrate spectrum and network-centric operations, increasing spectrum efficiency, agility, and ensuring spectrum availability on demand.

Interior has utilized the President's Initiative as an impetus to implement internal changes to its spectrum management planning and activities. It has established an Executive Radio Advisory Council to oversee program management and improvements as well as focus groups so that field personnel can exchange information on end-user needs, radio technology development, and for reporting up to senior program and spectrum managers. Interior has a land mobile strategic plan and radio architecture and has instituted processes to review radio operations based on efficiency, facilities management and other metrics. Interior is also participating in inter-agency meetings with Agriculture (particularly the Forest Service) and DHS to explore opportunities for collaboration and sharing. Interior, along with Agriculture, has implemented a common procurement vehicle for radio purchases.

The U.S. Postal Service (USPS) has formalized its approach to wireless communications and implemented a Spectrum Management Office with a Wireless Governance Committee comprised of representatives of operational units within USPS and its technology partners. It is developing a comprehensive plan for USPS spectrum policy, standards, and governance with a goal of centralizing wireless management to maximize operational effectiveness and obtain spectrum efficiencies. USPS also will award a radio device contract to provide engineering and development support for all radio systems and wireless devices within the organization.

C. Ongoing Collaboration between the Federal Agencies and NTIA to Address OMB Guidelines

NTIA continues, through its Working Level Groups, to identify model agency practices with respect to capital planning for spectrum-dependent systems. Working Level Group G has developed draft guidelines for Federal agencies to use in complying with Section 33.4 of OMB Circular A-11, requiring that spectrum value be taken into account when seeking funding for major new spectrum-dependent systems. Working Level Group F, which is charged with improving NTIA procedures for processing spectrum certification and frequency assignment requests, is evaluating possible revision of its certification rules so that agencies can attest to taking into consideration OMB requirements.

II. Formal Assessment of Spectrum Needs: The Technical Planning Process

The President directed that agency heads implement a formal process to evaluate proposed needs for spectrum.⁹ The 2004 Executive Memorandum requires Federal agencies to make this evaluation before seeking certification from NTIA for new or upgraded radio systems.¹⁰

In FY07 a number of Federal agencies utilized the President's Initiative as a spur to improve the technical planning process for spectrum-dependent systems. The Department of Commerce (Commerce) has instituted a formal process to evaluate proposed needs for spectrum, which includes an analysis and assessment of the most spectrum-efficient options and alternatives to meet requirements. Commerce bureaus and offices perform spectrum efficiency analyses as part of the spectrum certification process. Commerce is working within Working Level Group E to develop: (1) a standard format for summarizing the analyses and assessments of proposed new spectrum-dependent systems; and (2) a process for reviewing these analyses.

The DOD is improving its technical planning processes through, among other approaches, updating the Defense Acquisition Guidebook which addresses spectrum supportability, spectrum management systems engineering, test and evaluation master planning, and electromagnetic environmental effects.

DOD also is developing a methodology to assess how much spectrum DOD utilizes at any given time and how much it will need in the future. Key elements of this activity are: (1) identifying new data elements to provide information on the functional and temporal aspects of spectrum use; (2) developing a process for determining spectrum requirements; (3) establishing ongoing data collection; (4) accounting for duration, mission, or seasonal patterns of spectrum usage; (5) studying waveform and network technology improvements to determine how spectrum might be more efficiently allocated, assigned, and monitored; and (6) providing flexibility in data metrics to respond to oversight inquiries.

Apart from DOD and agencies with specialized missions or international and scientific commitments, many agencies' spectrum-dependent systems are relatively straight-forward, e.g., land mobile radio and fixed microwave. However, even these systems require upgrades or expansions on a regular basis. Planning for land mobile and fixed-microwave systems also can benefit from improved internal processes, assessment of new technologies, and consideration of commercial options.

Energy undertakes a thorough review of its spectrum-dependent systems that require new procurement, major upgrades or expansions of existing systems, including an evaluation of spectrum efficiency attributes. Interior has instituted internal processes to evaluate proposed needs for spectrum, including analysis and assessment of the most spectrum-efficient options and effective alternatives. These processes are utilized prior to submission of system certification requests to NTIA for new systems.

The Treasury Wireless Programs Office (WPO) continues to provide technical oversight for land mobile radio systems deployed by the Department. The WPO provides technical services to the Department's wireless consumers, to include technical planning and spectrum management, to efficiently and effectively meet their short-term and long-term wireless needs.

⁹ 2004 Executive Memorandum, 49 Weekly Comp. Pres. Doc. 2875, § 2(a).

¹⁰ *Id.*

NASA engages in extensive planning for its missions and systems, including new spectrum-dependent systems, years in advance of implementation. This enables NASA to provide input to NTIA through its system certification requests as soon as spectrum requirements are identified for support of new systems.

III. Strategic Spectrum Planning

NTIA in FY07 completed a draft of a comprehensive Federal Strategic Spectrum Plan (FSSP), based on the 15 agency plans submitted in November 2005.¹¹ The document contains a future vision of the need for regulatory structures which will support dynamic spectrum technologies to ensure spectrum access. Following completion of the FSSP, NTIA will work with the FCC to create a National Strategic Spectrum Plan.¹²

In November 2007, the Federal agencies submitted to NTIA updated agency-specific strategic spectrum plans. The agencies utilized spectrum managers, program managers, equipment and service users, as well as budget and planning personnel to develop their updated strategic spectrum plans. Several agencies noted, in their Annual Report submissions, that the President's Initiative provided the impetus for greater collaboration on spectrum-dependent systems within their organizations, promoted development of improved data collection mechanisms, and increased focus on the importance of spectrum management in meeting agency missions.

Energy, beginning in March 2007, convened a Spectrum Coordination Group to facilitate the exchange of spectrum-related information on a regular basis among Energy stakeholders and the agency's spectrum management program. The Spectrum Coordination Group is chartered under the Department's Information Technology Council. Energy also is working to integrate spectrum management into the Department's Enterprise Architecture.

Agriculture utilized the President's Initiative as an opportunity to better organize its internal spectrum management strategic planning. Each of its eight bureaus using Federal frequencies now has a spectrum management liaison officer. These officers identified key personnel for describing spectrum requirements and use. Spectrum and operational program representatives met as a group to develop goals and objectives for Agriculture's ongoing wireless program.

The DOD has drafted an internal electromagnetic spectrum management strategic plan which establishes the goals and associated objectives to assure the availability of, and access to, sufficient electromagnetic spectrum to guide the DOD toward realizing its Net-Centric Spectrum management vision. The scope of this plan is influenced by: (1) the President's direction to improve spectrum management policies; (2) alignment of spectrum management goals and objectives with the DOD's 2006 Quadrennial Defense Review (QDR) Report which includes objectives supporting joint warfighter

¹¹ *Supra*, note 6. The 2004 Executive Memorandum directed Federal agencies to formulate agency-specific strategic spectrum plans providing (1) future spectrum requirements, (2) planned uses of new technologies, and (3) suggested spectrum efficient approaches to meeting identified requirements. The 2004 Executive Memorandum also required that DHS, through consultation with other Federal, state, and local agencies, develop a Spectrum Needs Plan to address public safety spectrum needs, as well as continuity of Government operations. The Federal Strategic Spectrum Plan, including the public safety spectrum needs plan, was released by NTIA on March 20, 2008. See, National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy Initiative: The Federal Strategic Spectrum Plan* (March 2008), available at <http://www.ntia.doc.gov/reports/2007/SpectrumPolicySecondReport2007.pdf>.

¹² *Id.* at 2876.

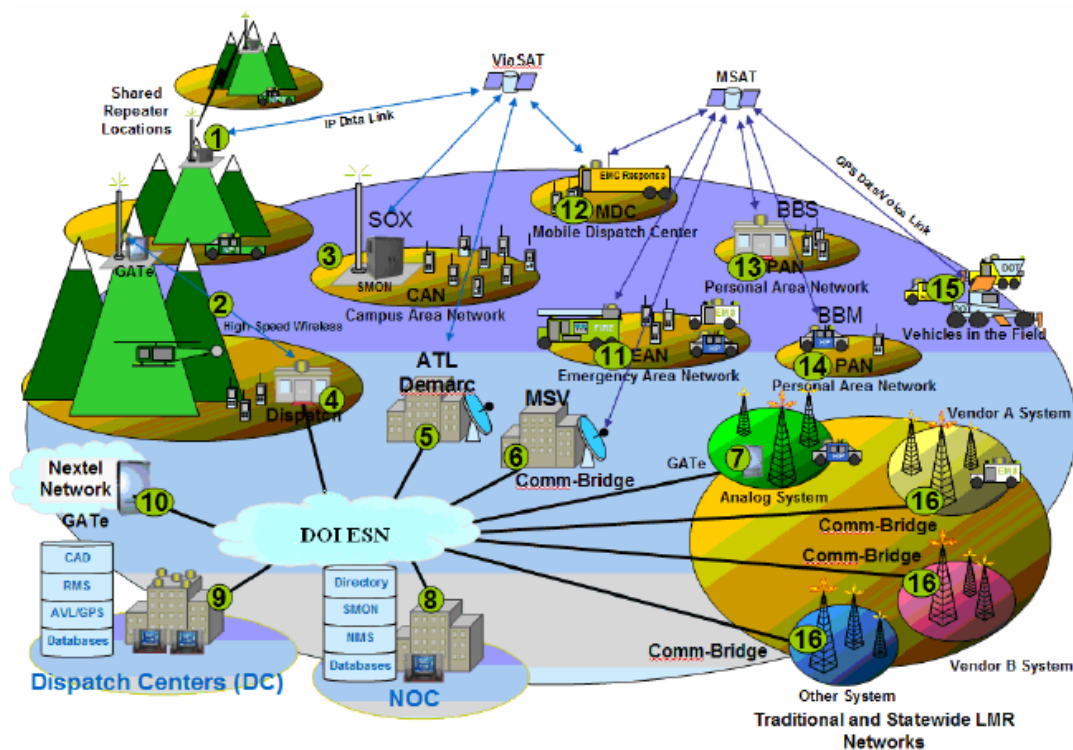
capability; and (3) alignment of spectrum management goals and objectives with the U.S. military transformation to a more agile expeditionary force and DOD-wide net-centricity.

DHS during FY07 began a modernization program of several of its wireless communications systems. The President's Initiative encouraged DHS to identify three major goals for spectrum management: (1) leverage DHS efforts to increase spectrum efficiency and effectiveness; (2) continue to integrate spectrum into the DHS enterprise architecture and planning process; and (3) increase interoperability and partnerships with other Federal and non-Federal entities.

Justice utilized its internal organizational structure to ensure that the agency's spectrum requirements were fully taken into account in the 2007 update to its strategic spectrum plan. Justice's Wireless Management Office developed an internal management plan for spectrum. As future requirements demand greater spectrum access to support multiple missions and functions, Justice is developing a hybrid, scalable, flexible, and secure wireless architecture, involving both Federal and commercial systems, to leverage the available technologies.

Interior developed an internal strategic spectrum plan and architecture for land mobile radio. Through this plan and architecture, Interior Land Mobile Radio seeks to: improve capabilities of its existing systems; comply with the NTIA narrowband mandate; upgrade Interior's land mobile radio infrastructure to support P25 technology; and provide for interconnection with satellite communications networks. Interior seeks to achieve full data networking as well as interoperability between voice, data and other systems and with other Federal, state, tribal, law enforcement, public safety and emergency management services. The land mobile radio architecture identifies a process to converge technologies such as P25, satellite and radio over Internet protocol. The following figure provides an overview of the concept of operations based on this architecture.¹³

¹³*Progress Report on Meeting the Requirements of the President's Spectrum Policy Initiative*, U.S. Department of Interior, July 2008, at 9.



NASA updates its Long-range Spectrum Plan on an on-going basis, including bandwidth and frequency location for future technologies and services, consistent with the U.S. National Space Policy issued August 31, 2006.¹⁴

Treasury is developing a process to identify its wireless system priorities and areas for improvement. It has conducted internal surveys to identify baseline wireless communications needs and to provide the foundation for business impact analyses. This information was also used to update its agency strategic spectrum plan submitted to NTIA.

IV. Commerce Spectrum Management Advisory Committee (CSMAC)

The Department of Commerce's Spectrum Management Advisory Committee (CSMAC) was established in November 2006 as part of the President's Initiative, to provide advice on a broad range of issues regarding spectrum policy.¹⁵ The CSMAC is composed of 19 experts from the telecommunications industry and academia and provides its advice to the Assistant Secretary of Commerce for Communications and Information. The committee provides an opportunity for NTIA to gain information on technology trends and to benefit from the insights and experiences of the commercial sector. The focus of the CSMAC's subcommittee work, thus far, has been on: (1) efficiency in spectrum use; (2) streamlining Federal/non-Federal sharing of spectrum and infrastructure; (3) improving the process of identifying potential spectrum for future reallocation from Federal to non-

¹⁴ U.S. National Space Policy (August 31, 2006), available at <http://www.ostp.gov/galleries/default-file/Unclassified%20National%20Space%20Policy%20--%20FINAL.pdf>.

¹⁵ The 2004 Executive Memorandum ordered the Department of Commerce to implement all of the recommendations contained in the June 2004 reports issued pursuant to the President's 2003 directives and not specifically addressed elsewhere in the 2004 Memorandum. 2004 Executive Memorandum, 49 Weekly Comp. Pres. Doc. 2875, § 3(c). Recommendation 1 of Report 2 called for the creation of a Federal advisory committee on spectrum matters. Report 2, *supra* note 1, at 4.

Federal use; (4) increasing spectrum efficiency in Federal land mobile radio systems; and (5) the possible application of user fees for Federal agency use of spectrum. The CSMAC subcommittee reports identify a number of possible changes to domestic spectrum policies and management. The CSMAC subcommittees will submit their finalized reports to the full committee which then must approve reports and recommendations to be forwarded to the Assistant Secretary of Commerce for Communications and Information.¹⁶

With respect to increasing efficiency, the CSMAC is considering proposals on: utilization of existing and improved efficiency metrics to assess proposed new systems; more sharing of systems and spectrum among Federal users and between Federal users and non-Federal users; and more research into cognitive systems to allow for opportunistic spectrum use. On streamlining Federal/non-Federal sharing, one subcommittee report recommends that NTIA establish a clear process for non-Federal entities to determine if Federal spectrum resources might be available, that NTIA and the FCC provide rules and procedures for non-Federal use of Federal spectrum on their websites, that NTIA and the FCC align application processes for use of shared Federal/non-Federal spectrum, and that NTIA establish a standard spectrum-sharing Memorandum of Understanding.

Concerning the process for identifying spectrum for future reallocation or sharing, one of the CSMAC subcommittees proposes that such reallocations occur only in response to identifiable needs, taking into account impact to both commercial and government operations. In addition, in the event of future relocations of Federal systems from reallocated spectrum, the subcommittee report recommends: (1) a clearly established relocation timeline; (2) improved information dissemination prior to auction; and (3) a web portal for exchanging information between Federal agencies and non-Federal entities and for system coordination. This subcommittee report also recommends that funds be made available so that Federal agencies can adequately plan for and conduct system relocation and incentives developed for agencies to promptly clear reallocated bands.

On improving spectrum efficiency in Federal land mobile radio systems, a CSMAC subcommittee report suggests that technology solutions such as narrowbanding, trunking and use of industry-standard radios, e.g., P25, be utilized. In the long term, the subcommittee report encourages Federal agencies to utilize technology solutions such as smart antennas, software defined and cognitive radios, and take advantage of the evolution in non-Federal wireless broadband communications technologies and standards. The use of commercial technologies wherever possible could result in substantial cost savings and improved efficiency and innovation, according to the subcommittee report.

V. Incentives for More Efficient Use of the Spectrum

Consistent with the “Plan to Identify and Implement Incentives That Promote More Efficient and Effective Use of Spectrum” (“Incentives Implementation Plan”) forwarded by NTIA to the White House in March, 2006, NTIA will complete a contract with an outside organization to develop a unit of consumption for and a methodology to estimate the value of spectrum used by the Federal government. While this activity had not been completed by the end of FY07, the study contract is underway as of the date of this report.

¹⁶ See, http://www.ntia.doc.gov/advisory/spectrum/csmac_reports.html. Some additional reports were adopted at the Committee’s September 19, 2008 public meeting and will be posted on the NTIA website.

Additionally, NTIA plans to: (1) propose a spectrum use fee based on spectrum use/value and prepare draft legislation to implement such a fee; (2) complete a case study on 5 GHz sharing; (3) prepare a study of the rights afforded to Federal spectrum users; and (4) identify how Federal agencies could be afforded broader authority in their use of the radio spectrum.

NTIA is also reviewing its current administrative cost-recovery fees applied to Federal spectrum assignments, to assess whether various factors related to spectrum use, such as geographical coverage of the system, can be taken into account, in calculating those fees.

VI. Public Safety

A. Federal/Non-Federal Public Safety Demonstration Program

Pursuant to the recommendations of the Presidential Initiative Task Force, NTIA evaluated the operational and cost effectiveness of sharing spectrum and communications infrastructure among Federal, state and local governments, and other non-Federal users.¹⁷ NTIA selected the Washington, D.C., Wireless Accelerated Responder Network (WARN) to meet this requirement. The WARN program operates on a dedicated public safety network in the 700 MHz band under an experimental FCC license. WARN provides real-time video for city-wide remote surveillance, chemical and biological detection, and other emergency-related services.

In June, 2007 NTIA published a report on the results and observations of the demonstration project and made recommendations based on its evaluation.¹⁸ NTIA's Report recommended that: (1) Federal as well as state and local public safety entities develop spectrum plans identifying their broadband requirements; (2) the FCC complete its revision of the 700 MHz band plan to provide capability for public safety entities to deploy broadband services; (3) broadband partnerships should be considered by the public safety community to include all levels of government; and (4) public safety agencies use commercial broadband services, where appropriate, to satisfy their broadband requirements.¹⁹

B. Interoperability

Justice, in conjunction with the IWN program, completed the High Risk Metropolitan Areas Interoperability Assistance Program to enhance inter-agency communications connectivity in targeted metropolitan areas in the United States. This interoperability allows Federal law enforcement agents to better communicate among themselves and to collaborate with public safety officials at the state and local level. The new interoperability channels use narrowband equipment with enhanced functionality. According to the Justice Annual Report, the inter-operability solutions enabled multi-agency response in support of the Major Gangs Task Force during 2006-2007; security for the Global Conference to Combat Nuclear Terrorism in June 2007; and security for major sporting events attended by thousands of members of the public.

Justice also utilizes channel sharing to enable interoperability with non-Federal public safety entities. This involves cooperative use of the bands 150.8-162 MHz and 420-870 MHz.

¹⁷ Report 2, Recommendation 9(b). *supra* note 1, at 4.

¹⁸ National Telecommunications and Information Administration, U.S. Dep't of Commerce, A Public Safety Sharing Demonstration, June, 2007, ("WARN Report") available at <http://www.ntia.doc.gov/reports/2007/NTIAWARNReport.htm>.

¹⁹ *Id.*, at p. xiv.

C. Partnerships among Federal agencies and with state, local, tribal and other entities

DHS is using its role as co-chair of the Security Communications Task Group (SCTG) of the U.S./Mexico High Level Consultative Committee on Telecommunications (HLCC) to build partnerships with state and local public safety agencies, particularly to develop and implement a long-term solution for cross-border security communications. At present the foundation of the solution is a set of microwave links between the U.S. Customs and Border Protection (CBP) and Mexico's C4 stations.

DHS also is utilizing the Federal Partnership for Interoperable Communications (FPIC) to develop a standards-based infrastructure and spectrum approach in conjunction with other Federal, state and local entities that can serve as a model for interoperability solutions and shared systems in other regions. DHS has formed partnerships with entities in Arizona, Wyoming and Virginia.

CBP, in conjunction with the city of Phoenix, is evaluating encryption software and other capabilities to ensure security when spectrum and facilities are shared across organizational and jurisdictional boundaries. The state of Arizona is utilizing the FPIC to coordinate shared spectrum and infrastructure between the state and Federal entities. Such sharing will enable further evaluation of the operational feasibility of a shared, dual-band trunked system to enhance communications and reduce costs.

FPIC proposed to coordinate a Federal partnership with the state of Wyoming to operate on the Wyoming statewide system to further demonstrate the capabilities of sharing spectrum and infrastructure. The state of Virginia uses the FPIC to assist in coordinating spectrum and infrastructure sharing between Virginia governmental units and Federal agencies that interoperate with those units. Virginia is implementing a statewide trunked radio system to improve public safety communications. Federal agencies will have access to the system but will purchase or use existing modified equipment to access the Virginia network. This system is slated for implementation in 2008.

These sharing arrangements, particularly those addressing large geographic areas, provide DHS and other Federal agencies expanded coverage, enhanced digital capabilities, and improved interoperability while minimizing investment by the Federal entities.

The DHS Interoperable Communications Technical Assistance Program (ICTAP) works with urban areas, states and territories to assess their current communications infrastructure and to determine solutions to enable interoperability. A total of 42 states have received ICTAP support to develop and implement statewide communications interoperability plans. ICTAP provides training and system inventory and planning tools.

Interior has sharing agreements with state and local agencies, including South Dakota, Montana and Wyoming, to utilize their state-wide trunked radio systems and is sharing spectrum and infrastructure with state, local and tribal public safety communications entities in these states. In particular, the Bureau of Indian Affairs (BIA) has an MOU with South Dakota that enables BIA to utilize South Dakota's communications infrastructure to reach remote tribal areas in a cost-effective manner.

VII. Efficiency Initiatives

A. Sharing

Initiatives to enable sharing of radio frequency spectrum and/or infrastructure among Federal agencies or between Federal agencies and state, local and other entities accelerated during FY07, according to the Annual Report inputs. Several of these initiatives are discussed in the preceding section on public safety.

In FY07, progress was made on the Integrated Wireless Network (IWN), a joint trunked radio system to enable interoperability among Justice, Homeland Security, and Treasury. The contract to construct and implement the system was awarded in FY07. IWN is currently deployed from Blaine, WA (U.S.-Canadian border) to the Portland, OR metropolitan area. In addition to working with DHS and Treasury, Justice entered into a partnership with the states of Washington and Oregon to utilize their microwave backbone systems. Plans are underway to expand this network to a total of 73 sites by July 2008. To ensure full coordination in the implementation of IWN, Justice held an IWN Wireless Summit in September 2007 with over 200 representatives from numerous Federal agencies and other entities.

Agriculture continues to share spectrum with other Federal, state, local, and tribal entities. The National Interagency Fire Center (NIFC) maximized sharing opportunities by establishing Memorandums of Understanding (MOU) at every level of the government throughout the country.

Agriculture is also working closely with Interior to improve radio support services and frequency management. The agencies share field offices, and some firefighters work for both organizations. The Chief Information Officers of both agencies met with radio managers and firefighters at the jointly run National Interagency Fire Center located in Boise, Idaho, in August 2007, to coordinate improved technology support for wildland firefighting operations. Agriculture participated in an Interior-sponsored spectrum managers' conference in FY07, which also afforded an opportunity to share information and strategies, develop cooperative relationships, and learn about new technology from private sector vendors.

Energy reports the following as examples of sharing with other Federal entities: sharing of the Lawrence Livermore National Laboratory (LLNL) land mobile radio trunked system with the Golden Gate National Recreation Area; and sharing of the LLNL LMR system with Energy's Lawrence Berkeley Laboratory, DOD operations in the San Joaquin Valley, the Joint Genome Institute, and National Parks Service sites in California. Energy in conjunction with other Federal agencies, are developing trunked radio systems in Southern Nevada to be used by Energy and the Air Force.

Treasury developed a high-level conceptual design for a department upgraded nationwide network to maximize sharing of systems where feasible and eliminate duplicative and redundant systems. Implementation of this conceptual design would reduce the number of each bureau's frequency requirements while increasing coverage and improving interoperability between Treasury bureaus. The agency also is a participant in IWN.

DHS is implementing a unified enterprise and network infrastructure, including wired and wireless communications, called OneNet. OneNet will enable DHS, to maximize sharing and minimize duplication of wireless systems. Other key wireless initiatives include: (1) the Secure Border Initiative Network (SBInet), (2) Custom and Border Protection Tactical Communications Modernization, (3) Rescue 21, an advanced command, control and communications system which will replace the existing

maritime search and rescue communications system; and (4) Project Deepwater, a multi-year program to modernize and replace aging ships and aircraft, and to improve command and control and logistics systems.²⁰

DHS continues to work with Justice and Treasury to ensure that IWN will fully leverage the capabilities of the joint network. In FY07, the MOU for IWN was revised to identify common requirements and opportunities for joint infrastructure while recognizing the unique missions of each department.

²⁰ See generally, Integrated Coast Guard Systems- Deepwater, <http://www.icgsdeepwater.com/overview/>.

B. Use of New Technologies

DOD is taking the lead among the Federal agencies in exploring and developing new technologies, including dynamic spectrum access (DSA) techniques, to facilitate spectrum sharing and access.

DOD made significant progress in FY07 on its efforts with respect to dynamic spectrum access through its Defense Advanced Research Projects Agency NeXt Generation communication program (“DARPA XG”). The XG technology program is funded through FY08. The Army is taking initial steps to consider use of the technologies tested within the XG program. Another initiative, Wireless Network after Next (WNaN) program is expected to be the follow-on to XG.

With respect to the DARPA XG program, field tests were conducted in September and October, 2007 at Fort AP Hill, VA. The tests assessed group behavior, policy controls, and interference-to-noise ratios. Testing was completed with XG developmental radios in conjunction with legacy radios. The fall 2007 testing program successfully demonstrated XG technologies for DOD and other representatives from the Federal Government and industry regulatory community. The tests demonstrated that: (1) XG technology works (forms and maintains dynamic connectivity); (2) XG causes no harm (avoids harmful interference to protected signals in accordance with spectrum regulations); and (3) XG increases spectrum utilization. The purposes of this test-bed are to: evaluate the performance of XG versus selected legacy radios; provide the power spectral density of legacy radios to evaluate the required XG radio thresholds and interference-to-noise ratios; and bench-test XG field scenarios. These tests are expected to be completed in FY08.

DOD’s Joint Tactical Radio System (JTRS) program was restructured in March 2006 to address and reduce program risks. JTRS utilizes multiple frequency bands and waveforms. DOD has expressed concern that the existing system certification process may not have the flexibility to address technologies, such as, software-defined and cognitive radios, which may be used in JTRS or other systems.

To provide a forum for the Federal agencies to exchange information on developments in DSA, NTIA established a dynamic spectrum access coordination group. The group is examining technology developments in the non-Federal and Federal sectors, and the activities of standard-setting bodies in the United States and internationally.

Internationally, the United States, through NTIA and other Federal agencies, is actively involved in work on the WRC-11 agenda item 1.19 on cognitive radios, required by ITU Resolution 956.²¹ This work is being undertaken within ITU-R Working Party 1B. The issue under consideration is whether revisions to the international spectrum regulatory structure are needed to support introduction and operation of cognitive radios and other similar technologies.

Agriculture implemented technology into its systems that has the capability to support downloading software from a central site, interoperating with agency personnel on either 25 kHz or 12.5 kHz channels, and interoperating with personnel using either analog or digital modes. Where the installation of landline circuits is not an option, Agriculture replaces existing microwave backhaul links with systems using Radio Control over Internet Protocol (RCoIP). These replacement systems are primarily based on next-generation data radio technologies that will eventually allow radio controller

²¹ Resolution 956, Final Acts of World Radiocommunication Conference, (Geneva, 2007).

sites to integrate with Forest Service and other Agriculture infrastructure using standard Internet interfaces.

Energy's National Nuclear Security Administration is exploring mesh networking to provide connectivity among fixed and mobile users within a site or facility. The goal is for the mesh network to support mobile wireless broadband data, including real-time high-resolution video. The mesh network would employ intelligent routing to support connectivity at high vehicular speeds; allow ad-hoc networking through self-forming, self-healing and self-balancing capabilities; and incorporate position location. The planned mesh network would utilize a combination of commercial, off-the-shelf technologies, including unlicensed devices operating at 2.5 GHz and in the licensed 4.9 GHz band.

Use of new technologies is fully considered in the NASA long-range spectrum plan. The Space Communications Architecture for returning to the moon and going to Mars has been disseminated to the NASA centers and space partners in order to ensure spectrum compatibility and interoperability for all space-faring nations. However, because of the unique nature of NASA missions, its spectrum-dependent systems often require the use of specific spectrum to address physics limitations and propagation considerations.

C. Commercial Services and Unlicensed Devices

Use of commercial services can reduce the need for Federal spectrum and dedicated Federal systems, and often improve mission support. Most of the agencies submitted annual reports indicating that they continue to rely on and expand their use of commercial wireless services and devices.

Agriculture joined the intergovernmental Federal Strategic Sourcing Initiative (FSSI) Wireless Handheld Devices and Services Team, to improve its asset management process. FSSI is a government coalition for Federal procurement to improve the management of commodities purchased in large volumes by multiple agencies. Fifteen Federal departments participate on the FSSI wireless team.

Agriculture has replaced over 30% of its existing wireless links between dispatcher systems and remote radio system controller sites with commercial landlines. These conversions result in a lower total-cost-of-ownership and save the department \$4,000 per system annually.

Agriculture examined FY2006 and FY2007 commercial wireless expenditures for firefighting emergency suppression activities and, based on accounting budget object codes, found that the use of commercial wireless services more than doubled in 2007.

The DOD continues to be one of the largest consumers of commercial satellite services in the world. With missions around the globe, the U.S. military leases commercial mobile and fixed satellite service, spending in excess of several hundred million dollars annually.

Interior utilizes commercial satellite service, especially in support of its law enforcement personnel operating in remote areas. The Bureau of Indian Affairs, for example, has several hundred mobile satellite user terminals. The National Park Service, as well, utilizes satellite services for remote data connectivity.

Justice is increasingly utilizing spectrum-dependent commercial devices and services such as cellphones, pagers, Blackberrys, and satellite communications to augment its own systems and ensure the communications capability needed by the agency to meet its many missions.

The USPS, through its radio device contract, requires the use of spectrum-efficient devices which have the potential of significantly reducing the USPS need for Federal spectrum. The USPS also reduced the number of radio assignments through a review of existing assignments and assessment of where unlicensed devices can be used.

Almost all of Energy's sites and facilities employ commercial wireless telecommunications service, including cellular phones, pagers, BlackBerrys and commercial satellite communications.

Treasury continues to widely utilize spectrum-dependent commercial services such as cell phones, Blackberries and pagers. Treasury bureaus utilize satellite communications at emergency operating centers (EOCs) and headquarters to augment their Treasury-owned systems.

D. Spectrum Engineering and Analytical Tools

NTIA's staff, in cooperation with the federal agencies, is focused on finding answers and developing models and tools to improve federal spectrum management. NTIA completed a report on how spectrum efficiency in the LMR systems can be improved.²² Other studies will address spectrum efficiency for fixed service and radiolocation systems.

NTIA is developing a Best Practices Handbook with the support of the Federal agencies, particularly DOD. The topics addressed in the Handbook include: antenna models, building attenuation, propagation models, interference protection criteria, measurement techniques, encounter scenarios, radar receiver performance, bandwidth correction factors, and aggregate interference analysis. NTIA, in its role as chair of Working Level Group E, has drafted numerous technical documents which will form the basis for the Best Practices Handbook. The DOD has been actively engaged in supporting the development of these documents. DOD also is developing a Communications Receiver Performance Degradation Handbook, which was funded by NTIA as part of the development of the Best Practices Handbook.

NTIA and the FCC moved forward with plans for a Spectrum Sharing Innovation Test-Bed.²³ The test-bed will explore innovative ways to make more intensive use of the Nation's airwaves, analyze technologies using dynamic spectrum access, and explore the feasibility of sharing between Federal and non-Federal users.²⁴ NTIA and the FCC each solicited public comment on the implementation of the test-bed.²⁵ Based on the comments filed, the agencies identified spectrum to be used in the test bed and expected to issue solicitations for participation in February 2008. Selection of test-bed applicants was made in May 2008 and the test-bed experiments are to be conducted during the fall of 2008.

²² The first phase study created a database of frequency assignments from the Government Master File in the 162-174 MHz band, in the Washington, D.C., area. National Telecommunications and Information Administration, U.S. Department of Commerce, *Federal Land Mobile Operations in the 162-174 MHz Band in the Washington, D.C., Area, Phase 1: Study of Agency Operations*, NTIA Report 06-440 (August 2006). As part of this study, a metric referred to as average signal capacity was developed to assess the geographical coverage capabilities of base stations operating in the 162-174 MHz band. The second phase study uses field measurements to characterize the federal LMR channel usage in the 162-174 MHz band. The third phase study will use the results of the two previous studies to derive the geographical coverage and traffic level specifications needed to design more spectrally efficient LMR systems that would provide the same level of performance and coverage as the current conventional LMR systems. The second and third phase reports are expected to be released in 2008.

²³ See Report 1, Recommendation 11; Report 2, Recommendation 6(b), *supra* note 1, at 4.

²⁴ See <http://www.ntia.doc.gov/ntiahome/frnotices/2006/spectrumshare/comments.htm> for background concerning the test-bed.

²⁵ National Telecommunications and Information Administration, Docket No. 060602142-6142-01, *Notice of Inquiry*, 71 FR 33282 (June 8, 2006) and Federal Communications Commission, ET Docket No. 06-89, FCC 06-77, *Creation of a Spectrum Sharing Innovation Test-Bed*, 71 FR 35675 (June 21, 2006).

With respect to analyzing new spectrum technologies, DOD is developing simulation capabilities that will provide the ability to emulate and analyze the electromagnetic battlefield environment. The purposes of the simulation studies are to study the operational impact of new spectrum technologies, assess what spectrum management approaches are needed to implement such technologies, support acquisition efforts, and support the DOD's net-centric operations.²⁶

The DOD continues to be actively involved in the NTIA-chaired working level groups developing metrics for evaluating technical efficiency in spectrum use under specific operational conditions and to propose potential improvements, including new technologies and spectrum management practices.

In addition, the DOD is monitoring global standardization efforts related to Dynamic Spectrum Access in order to identify the potential impact of these efforts, identify areas which are not currently being addressed by national and international standards bodies, and ensure that the interests of the DOD are appropriately taken into account in developing United States positions within the standards bodies.²⁷

The Joint Spectrum Center (JSC) of the Defense Information Systems Agency's (DISA's) Defense Spectrum Organization (DSO) provided input to NTIA with respect to automated analytical tools being developed and used by the JSC. The JSC conducted an analytical tools demonstration, which included the tools of several organizations including the JSC. As a result of the relocation of Federal systems required by the Commercial Spectrum Enhancement Act (CSEA)²⁸, the JSC developed the Spectrum Management Transition Initiative (SMTI) to facilitate relocation of systems to new spectrum. SMTI improves automated spectrum management assessment and analysis by: (1) enhancing the current frequency assignment algorithms to increase spectral efficiency; (2) migrating to a web-based system with a simplified user interface; (3) developing a real-time frequency scheduling capability to enable more efficient assignment of frequencies at test and training facilities; and (4) developing an automated capability to support the services in the acquisition of replacement systems.

VIII. Advanced Information Technology

The Presidential Initiative underscores the role that information technology plays in improving the system certification and frequency assignment processes. NTIA is developing the Federal Spectrum Management System (FSMS) to improve and streamline these processes. This new system will provide for a web-based interface enabling Federal agencies to, among other things, prepare their system certification and frequency assignment requests, identify frequency availability, and perform interference analyses. The FSMS will capture much more information concerning proposed frequency assignments than is included in the existing NTIA process, including geographic location, time factors of use, and others. These additional data elements will assist the agencies in identifying where sharing spectrum and/or infrastructure with other Federal agencies might be feasible, and will provide more visibility for the Federal agencies into the spectrum use of their own and other agencies. It will also

²⁶ See, e.g., Zhang, Swain and Lina, "Dynamic Spectrum Access Enabled DOD Net-centric Spectrum Management," *IEEE Military Communications Conference* (2007).

²⁷ These standards-setting organizations include the Institute of Electrical and Electronic Engineers (IEEE) and the International Telecommunication Union (ITU). For example, within the ITU Radiocommunication Sector, the subject of dynamic spectrum access is being addressed. *Supra*, note 16.

²⁸ See, Commercial Spectrum Enhancement Act (CSEA), Pub.L. No. 108-494, 118 Stat. 3996-97 (2004).

provide for easier identification of spectrum users and the parameters of such use for resolving possible interference situations.

In the near and mid-term, IT improvements will support federal spectrum management evolution, reduce paperwork, duplication of effort, and the time for application processing. The FSMS also will evolve over time to support assured and dynamic spectrum access.

IX. Reducing International Barriers to United States Technology

A. Improved World Radiocommunication Conference Preparation

In 2005 NTIA issued a report with recommendations for improvement to the United States preparatory process for World Radiocommunication Conferences.²⁹ During FY07 NTIA worked with the Department of State and the FCC to consider and, where possible, implement the recommendations.

NTIA worked with the FCC, the Department of State and U.S. private sector interests to develop U.S. proposals and positions for WRC-07, held October 22-November 16, 2007. The requirements identified by the Federal agencies in their agency-specific strategic spectrum plans submitted in November 2005 were fully considered in developing the U.S. proposals to the conference. The U.S. was able to achieve its objectives at WRC-07 in part because of early cooperation within the U.S. preparatory process as well as early and on-going coordination with other Western Hemisphere nations, as recommended in NTIA's report. As described in the official delegation report on WRC-07, the U.S. substantially met every one of its major objectives for the Conference, which included the following:

- Identification of Spectrum for Wireless Broadband.** Identify spectrum and obtain favorable regulatory treatment for international deployment of international mobile telecommunications (IMT), to be used for advanced terrestrial wireless services (*e.g.*, wireless broadband), while protecting the satellite and radar systems that rely on the C-band (3400-4200 MHz) from IMT identification to the maximum extent possible;
- Protecting Wireless Broadband Rollout in the United States.** Secure stringent limits to protect emerging terrestrial systems from interference from satellite systems in the 2500-2690 MHz band and impose such limits as soon as possible;
- Preserving Access to HF.** Prevent allocation of new frequencies for broadcasting in the 4-10 MHz (high frequency or "HF") band, which is already fully-utilized;
- Resolving Conflicts between Scientific and Commercial Systems.** Balance the competing demands of protecting valuable scientific research conducted by passive sensing satellites without unnecessarily hampering deployment and operation of commercial and government services today and in the future;
- Increasing Spectrum for Aeronautical Telemetry.** Obtain international recognition of bands in the 4-6 GHz bands as harmonized spectrum for aeronautical telemetry to be used for air-to-ground flight tests in designated test areas;
- Providing Spectrum for Aviation.** Allocate new spectrum in the 112-117.975, 960-1164, and 5091-5150 MHz bands for aeronautical mobile satellite services to support modernization of civil aviation communication systems; and

²⁹ National Telecommunications and Information Administration, U.S. Department of Commerce, *World Radiocommunication Conferences, Recommendations for Improvement in the U.S. Preparatory Process*, NTIA Report No. 05-427, May, 2005, available at http://www.ntia.doc.gov/reports/wrc/wrc_05232005.htm.

•**Defining the Agenda for WRC-11.** Adopt an agenda for the next World Radiocommunication Conference that contains a manageable number of timely and significant agenda items.³⁰

B. Ensuring Access for U.S. Companies to International Markets

NTIA in FY07 prepared a report which addresses international barriers to implementation of United States telecommunications technologies and services and the impact of global and regional spectrum harmonization and standardization. The report is expected to be released in 2008.

X. Continuity of Government and Continuity of Operations Activities

The Federal agencies refined their Continuity of Government (COG) and Continuity of Operations (COOP) plans and stepped up their activities in FY07, including greater organizational and testing efforts with respect to wireless systems in support of COG and COOP.

Agriculture identified a secure mobile satellite solution compliant with National Communications System Security Directives (NCSD).³¹ The agency also upgraded the secure cellular phones used by continuity of operations senior leadership.

BBG upgraded its COOP Plan and physical facilities in support of COOP and COG. Its COOP site was relocated to provide for more efficient transfer of operations if and when the need arises. Redundant T1 communication lines and satellite equipment were installed in FY07. BBG has an on-going program to test its COOP plan.

Treasury has created an HF network to provide emergency communications between its bureaus' emergency operating centers (EOCs) and Treasury's EOC and headquarters. In FY07, Treasury continued to install HF radios at each site. Treasury is also evaluating various commercial satellite systems to comply with NCSD requirements for secure backup communications.

³⁰ *United States Delegation Report: World Radiocommunication Conference 2007*, U.S. Department of State, April 24, 2008 at 1-3.

³¹ *See*, National Communications System Library of Directives, available at <http://www.ncs.gov/library.html>.

XI. Unified Federal Response

NTIA and the Federal agencies are working together through the NTIA-led working level groups to complete the actions identified in the Implementation Plan published in 2006.³² The Implementation Plan is expected to be updated in September 2008. The actions in fulfillment of the President's mandate and the Task Force Reports completed thus far, as well as projected dates for remaining actions, are contained in Appendix A of this FY07 report. The Policy and Plans Steering Committee (PPSG), in FY07, provided guidance to the Assistant Secretary of Communications and Information on the draft Memorandums of Understanding between the FCC and the NTIA on the amount of time to be permitted for resolving coordination issues between the FCC and the NTIA and with respect to the role of the FCC Defense Commissioner. The PPSG will continue to function in a high-level advisory capacity to NTIA's Associate Administrator as complex policy matters arise.

CONCLUSION

The *Presidential Spectrum Policy Initiative* accelerated its activities in FY07 and completed a number of the action items identified in the Implementation Plan for the President's Initiative. The Federal agencies improved internal processes, made more efficient use of spectrum, and considered alternatives for meeting future spectrum requirements. Accomplishments include: rollout of the Spectrum Sharing Innovation Test-Bed Pilot Program through defining the test parameters and selection of the Test-Bed Pilot Program participants; publication of the Federal Strategic Spectrum Plan; initiation of a study of methods for valuing Federal spectrum; completion of several technical studies on means for increasing efficiency in the use of spectrum; consideration by the CSMAC of possible spectrum management improvements; and publication of the WARN Report on Federal and state public safety interoperability. In FY07, the Federal agencies prepared updates to their agency-specific strategic spectrum plans which were submitted in November 2007. These will be used as a basis for an update to the Federal Strategic Spectrum Plan. Further progress with respect to the Incentives activities also is anticipated in FY08.

³² National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy Initiative – Implementation Plan*, March, 2006, available at <http://www.ntia.doc.gov/osmhome/reports/ImplementationPlan2006.htm>.

APPENDIX A

PRESIDENTIAL INITIATIVE ON SPECTRUM MANAGEMENT

Status of Deliverables and Target Dates as of November, 2008

Project A: Improve Stakeholder Participation and Maintain High Qualifications of Spectrum Managers		
<i>Task</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>
A.1. Establish a Commerce Spectrum Management Advisory Committee (CSMAC)	The NTIA established the Department's CSMAC to provide advice and recommendations to the Assistant Secretary for Communications and Information on a broad range of issues regarding spectrum policy, including the implementation of innovative technologies and services.	
	Advisory Committee Charter	May 2005
	Establishment of CSMAC	Jan. 2006
	Public meetings	Dec. 2006; May 2007; Dec. 2007; Feb. 2008; Apr. 2008; Jul. 2008
	Advice to NTIA on Spectrum Sharing Test-Bed	Advice provided in Nov. 2007
	Committee reports	To be completed Sept.-Dec. 2008
	Final Report to NTIA	Draft to be completed TBD

<p>A.2. Establish a High Level Interagency Advisory Group -- Policy and Plans Steering Group (PPSG)</p>	<p>The role of the PPSG, comprised of Assistant Secretaries or their equivalents in major spectrum-using Federal agencies is to advise the Assistant Secretary on complex and pressing spectrum issues that affect federal agencies.</p>	<p>Meetings – Jan. 2005; Mar. 2005; Oct. 2007; Mar. 2008; Jul. 2008</p>
<p>A.3. Resolve Inter-governmental Spectrum Disputes Through the Existing White House Policy Coordinating Committee (PCC) Process and Revise the NTIA/FCC MOU to Provide an Additional Minimum 15 Business Days to Accommodate the PCC Process</p>	<p>MOU between NTIA and the FCC to provide additional minimum 15 business days to accommodate PCC process of resolving coordination issues between FCC and executive branch agencies</p>	<p>PCC is on-going</p> <p>NTIA submitted revised proposed MOU language to the FCC in May. 2008</p> <p>Coordination with the FCC is on-going and the MOU is expected to be finalized year-end 2008</p>
<p>A.4. Expand the Role of the FCC Defense Commissioner.</p>	<p>MOU between NTIA and the FCC to expand the role of the FCC Defense Commissioner</p>	<p>NTIA submitted revised proposed language to the FCC in May 2008</p> <p>Coordination with the FCC is on-going and the MOU is expected to be finalized year-end 2008</p>
<p>A.5. Promote a Career Development Program and Spectrum Management Training</p>		<p>Program reactivated in Jan. 2008; Master plan expected to be completed in Dec. 2009</p>

Project B: Reduce International Barriers to U.S. Innovations in Technologies and Services		
<i>Tasks</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>
B.1. Improve U.S. Preparations for World Radiocommunication Conferences (WRCs)	Study and recommendations on improvements to U.S. preparations	Completed. Report issued in May 2005
B.2. Improve International Spectrum Management Policies and Regulatory Environment	Study and recommendations on Impact of International Spectrum Management Policies and Regulatory Environment on U.S. competitiveness	Completed. Expected to be published in 2008

Project C: Modernize Federal Spectrum Management Processes with Advanced Information Technology		
<i>Tasks</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>
C.1. Implement Advanced Information Management Systems	The Federal Spectrum Management System (FSMS) will utilize advanced information technology to develop a web-based process for preparing and processing applications for spectrum certification and frequency assignments. It will consolidate existing paper-based and multiple software systems, including Spectrum XXI and El-Cid.	On-going project. The system will be developed pursuant to a contract with a system integrator in conjunction with NTIA staff and with input from the Federal agency user community. Initial capabilities to be implemented in FY09.

Project D: Satisfy Public Safety Communication Needs and Ensure Interoperability		
<i>Tasks</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>
D.1. Spectrum Sharing between Federal and Non-Federal Public Safety Agencies	Assessment of feasibility of spectrum sharing between Federal and non-Federal Public Safety Entities	Completed. Report on Federal/non-Federal spectrum and infrastructure sharing published Jun. 2007
Project E: Enhance Spectrum Engineering and Analytical Tools		
<i>Tasks</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>

<p>E.1. Develop Analytic Approaches, Software Tools, and Engineering Techniques for Evaluating and Improving the Efficiency and Effectiveness of Federal Spectrum Use</p>	<p>The deliverables will be a series of reports that make recommendations for improving spectrum efficiency for the following radio services: land mobile radio, fixed, radiolocation, and satellite. These reports will be used to develop a spectrum efficiency recommendations report that includes an approach and timeframe for implementing the recommendations. The goal of these activities is to identify and utilize the recommended techniques to improve efficiency in Federal use of spectrum.</p>	<p>Report on Spectrum Efficiency Recommendations</p> <p>Expected completion in Sept. 2010</p>
	<p>(1) NTIA Report 08-451, Assessment of Alternative Future Federal Land Mobile Radio Systems</p>	<p>(1) Published in Dec. 2007</p>
	<p>(2) NTIA Report 07-448, Measurements of Land Mobile Channel Occupancy for Federal bands 162-174 MHz and 406-420 MHz in the Washington, D.C. Area</p>	<p>(2) Published in Jul. 2007</p>
	<p>(3) NTIA Report 07-447, Assessment of Federal and Non-Federal Land Mobile Radio Frequency Assignment Methodologies</p>	<p>(3) Published in May 2007</p>
	<p>(4) NTIA Report 06-440, Federal Land Mobile Operations in the 162-174 MHz Band in the Washington, D.C., area; Phase 1: Study of Agency Operations</p>	<p>(4) Published in Aug. 2006</p>
	<p>(5) Recommendations to Improve Spectrum Efficiency in the Federal Land Mobile Radio Frequency Bands</p>	<p>(5) To be sent to Federal agencies for review in 3rd Quarter 2009</p>
	<p>(6) Assessment of Federal and Non-Federal Fixed Point-to-Point Microwave Radio Frequency Assignment Methodologies</p>	<p>(6) Under review by the Federal agencies Expected in 3rd Quarter 2009</p>
	<p>(7) Channel plans for the 4 GHz and 7/8 GHz fixed service bands</p>	<p>(7) Completed in Jul. 2007</p>
	<p>(8) Implement channel plans for the 4 GHz and 7/8 GHz fixed service bands</p>	<p>(8) Expected completion in 2nd Quarter 2009</p>
<p>E.2. Develop and Promote Recognition in the Spectrum Management Community for Best Practices in Spectrum Engineering</p>	<p>Best Practices Handbook</p>	<p>Best Practices Handbook Expected completion in Dec. 2010</p>
	<p>(1) NTIA Report TR-06-444, Effects of</p>	<p>(1) Published in</p>

	Interference on Radar Receivers	Sept. 2006
	(2) NTIA Report TR-07-449 Propagation Loss Prediction Considerations for Close-In Distances and Low-Antenna Height Applications	(2) Published in Jul. 2007
	(3) JSC-CR-06-072, DOD Joint Spectrum Center Report prepared for NTIA, Communications Receiver Performance Degradation Handbook	(3) Published in Nov. 2006
	(4) Technical Memorandum on radiowave propagation modeling	(4) Review by Federal agencies completed in Jul. 2008; expected completion in 4 th Quarter 2009
	(5) Technical Memorandum on antenna modeling	(5) Review by Federal agencies completed in Jul. 2008; expected completion in 4 th Quarter 2009
	(6) Technical Memorandum on single entry interference protection criteria	(6) Federal agencies review to be completed by 3 rd Quarter 2009

E.3. Conduct a Pilot Program to Evaluate Approaches and Techniques to Increase Spectrum Sharing Between Federal and Non-federal Spectrum Users	Establish, conduct and evaluate results of use of devices and technologies to facilitate sharing through Spectrum Sharing Innovation Test-Bed	
	(1) Notice of Inquiry	(1) Jun. 2006
	(2) Notice of Solicitation for Participation in the Test-Bed, 73 Fed. Reg. 6710 (Feb. 5, 2008)	(2) FR Notice published in Feb. 2008
	(3) Submission of Test-Bed Applications	(3) Submitted in Feb. 2008
	(4) Selection of Test-Bed Participants	(4) Completed in June 2008
	(5) Phase I test plans	(5) Expected to be completed in Nov. 2008
	(6) Phase I testing	(6) Expected to commence by Jan. 2009
	(7) FY2008 Test-Bed Progress Report	(7) Expected completion in Nov. 2008

E.4. Develop and Promote the Use of Modern Analytic Tools	Catalog with spectrum management analytical tools	
	(1) Prepare initial spectrum management models and tools catalog for use by Federal spectrum users	(1) Review by Federal agencies completed in May 2008 Expected completion in 3 rd Quarter 2009
	(2) Initial catalog of spectrum management analytical tools provided to Enterprise Architecture Council Working Party 4	(2) Under review by EAC WP 4 Expected completion of 4 th Quarter 2009
	(3) Official catalog is an on-going effort requiring constant updates when new spectrum management analytical tools are developed.	(3) On-going

Project F: Promote Efficient and Effective Use of Spectrum		
<i>Task</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>
F.1. Improve the Technical Planning Process	Recommended changes to the NTIA Manual with respect to the Spectrum Certification process.	Expected completion in 1 st Quarter 2009

Project G: Improve Long-Range Planning and Promote Use of Market-Based Economic Mechanisms in Spectrum

<i>Task</i>	<i>Deliverables</i>	<i>Status/Target Deliverable Dates</i>
G.1. Improve the Processes for Federal Agencies' Spectrum Planning and Produce a National Spectrum Plan	Federal Strategic Spectrum Plan published biannually; Annual Reports on Progress with respect to the President's Initiative; National Strategic Spectrum Plan; guidance to the Federal agencies concerning agency strategic spectrum planning	
	(1) Federal Strategic Spectrum Plan	(1) Published in Mar. 2008
	(2) Activities within WLG-G with respect to Federal agency strategic spectrum planning	(2) On-going
	(3) Update to FSSP	(3) Expected completion of draft in Dec. 2008
	(4) FY2007 Progress Report on the President's Initiative	(4) Expected publication in Nov. 2008
	(5) FY2008 Progress Report on the President's Initiative	(5) Expected completion of draft in Jan. 2008
	(6) Develop a National Strategic Spectrum Plan (NSSP)	(6) Letter to FCC seeking participation in June 2008; expected completion in Jul. 2010
	(6a) Draft options for obtaining data relating to non-Federal spectrum use and future requirements such as NOI	(6a) Expected completion in Jan. 2009
	(6b) Draft outline of NSSP (Note: requires coordination with and participation of FCC)	(6b) Expected completion in Feb. 2009
	(6c) Gather Data	(6c) Jun.-Sept. 2009
	(6d) Draft NSSP	(6d) Expected completion in Feb. 2010

	(6e) Publish NSSP	(6e) Expected completion in Jul. 2010
--	-------------------	---------------------------------------

<p>G.2. Improve Federal Agencies' Processes and Procedures to Better Consider the Economic Value of Spectrum When Investing in Spectrum-Dependent Systems</p>	<p>Guidance to the Federal agencies on compliance with Section 33.4 of OMB Circular A-11 on considering spectrum value when seeking funding for major spectrum-dependent systems; guidance to the Federal agencies concerning integration of spectrum planning with capital and strategic planning</p>	
	<p>(1) OMB guidance - OMB added Section 33.4 to Circular A-11 to require Federal agencies to consider the value of spectrum for major spectrum-dependent systems</p>	<p>(1) Nov. 2004</p>
	<p>(2) Guidance to Federal agencies on compliance with Section 33.4 of Circular A-11 - Draft guidance paper within WLG-G (WLG-G-07/ 39 rev.2) (Note: awaiting input on method for calculating the economic value of spectrum)</p>	<p>(2) Expected completion in Jun. 2009</p>
	<p>(3) Integration of Spectrum Management Decision-making into Agency Capital Planning and Strategic Planning Activities (Note - Draft guidance paper within WLG-G (WLG-G-07/ 39 rev.2) - awaiting input on method for calculating the economic value of spectrum)</p>	<p>(3) On-going</p>
	<p>(4) In conjunction with WLG-F consideration of whether revisions to NTIA Manual may be required (Note - discussions with OMB may be required concerning relationship with Section 33.4)</p>	<p>(4) On-going</p>

<p>G.3. Develop a Plan to Identify and Implement Incentives for Improving Efficiency in Federal Agencies' Spectrum Use (in conjunction with the Office of Policy Analysis and Development)</p>	<p>Incentives Implementation Plan; workshop on economic and other incentives for efficient use of spectrum; study on international practices with respect to incorporation of market mechanisms into spectrum management</p>	
	<p>(1) Prepare Incentives Implementation Plan</p>	<p>(1) Forwarded to the White House in Mar. 2006; published Nov.2008</p>
	<p>(2) Conduct workshop on the use of economic or other incentives in order to increase the efficiency of Federal and non-Federal spectrum use</p>	<p>(2) Feb. 2006</p>
	<p>(3) Examine international practices that incorporate market mechanisms into more efficient spectrum use</p>	<p>(3) Study (unpublished) completed in 2006</p>

<p>G.4 Promote the Implementation of a Wide Range of Incentives to Improve the Efficiencies of Both Government and Private Sector Spectrum Use (in conjunction with the Office of Policy Analysis and Development)</p>	<p>Contractor-produced study providing unit of consumption for spectrum use; revised structure for current OSM cost-recovery fee for Federal agency spectrum use; study on Federal spectrum value and development of fees to promote efficient use of spectrum; draft legislation to implement spectrum use fees; study on sharing between Federal agencies and non-Federal unlicensed systems; study on Federal spectrum rights; proposals to provide Federal agency more flexible rights with respect to spectrum to enable sharing with other Federal agencies and non-Federal entities</p>	
	<p>(1) Enter into contract or MOU with outside organization to develop a unit of consumption for and a methodology to estimate the value of spectrum used by the Federal government (OPAD lead with support from OSM)</p>	<p>(1) TBD</p>
	<p>(2) Consideration of revised structure for administrative cost-recovery fees (OSM lead)</p>	<p>(2) TBD</p>
	<p>(3) Evaluation of possible spectrum use fees applied to Federal agency spectrum use based on spectrum use/value (dependent on completion of contracted study under (1) above)</p>	<p>(3) Expected completion TBD</p>
	<p>(4) Evaluation of possible draft legislation to implement a spectrum use fee (dependent on completion of (1) and (3) above)</p>	<p>(4) Expected completion TBD</p>
	<p>(5) Consideration of possible implementation of spectrum use fees for Federal agencies (dependent on (1), (3), (4) and Congressional action)</p>	<p>(5) Expected completion TBD</p>
	<p>(6) Case study on 5 GHz sharing and specific proposals to increase sharing through new technologies and techniques for dynamic spectrum sharing</p>	<p>(6) Expected completion in Oct. 2008</p>
	<p>(7) Study of the rights afforded to federal spectrum users and proposals to give Federal agencies broader authority to use radio spectrum</p>	<p>(7) Expected completion TBD</p>

This page intentionally blank

Appendix B

Presidential Initiative on Spectrum Management: Published Reports and Reference Documents

1. Presidential Memorandums

Memorandum for the Heads of Executive Departments and Agencies on Spectrum Policy for the 21st Century. 69 Fed. Reg. 1568 (Jan. 9, 2004), 39 Weekly Comp. Pres. Doc. 726, 727 (May 29, 2003) available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2003_presidential_documents&docid=pd09jn03_txt-19.pdf.

President's Memorandum on Improving Spectrum Management for the 21st Century, 49 Weekly Comp. Pres. Doc. 2875, §3(c) (Nov. 29, 2004) (2004 Executive Memorandum) available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2004_presidential_documents&docid=pd06de04_txt-11.pdf.

2. Task Force Reports

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy Initiative: Report 1* (2004) (Recommendations of the Federal Government Spectrum Task Force), available at http://www.ntia.doc.gov/reports/specpolini/pressspecpolini_report1_06242004.htm.

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy Initiative: Report 2* (2004) (Recommendations from State and Local Governments and Private Sector Responders), available at http://www.ntia.doc.gov/reports/specpolini/pressspecpolini_report2_06242004.htm.

3. Implementation Plan

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President's Spectrum Policy Initiative – Implementation Plan*, March 2006, available at <http://www.ntia.doc.gov/osmhome/reports/ImplementationPlan2006.htm>.

4. Annual Progress Reports

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President’s Spectrum Policy Initiative: First Annual Progress Report* (unpublished).

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President’s Spectrum Policy Initiative: Second Annual Progress Report* (October 2007), available at <http://www.ntia.doc.gov/reports/2007/SpectrumPolicySecondReport2007.pdf>.

5. Federal Strategic Spectrum Plan

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President’s Spectrum Policy Initiative: The Federal Strategic Spectrum Plan* (March 2008), available at <http://www.ntia.doc.gov/reports/2007/SpectrumPolicySecondReport2007.pdf>.

6. International Reports


National Telecommunications and Information Administration, U.S. Department of Commerce, *World Radiocommunication Conferences: Recommendations for Improvement in the U.S. Preparatory Process*, NTIA Report No. 05-427, May 2005, available at http://www.ntia.doc.gov/reports/wrc/wrc_05232005.htm.

National Telecommunications and Information Administration, U.S. Department of Commerce, *Spectrum Policy for the 21st Century – The President’s Spectrum Policy Initiative: Improving International Spectrum Management Policies and Framework* (March 2008).

7. Spectrum Sharing between Federal, State and Local Public Safety Entities

National Telecommunications and Information Administration, U.S. Department of Commerce, *A Public Safety Sharing Demonstration*, June 2007, available at <http://www.ntia.doc.gov/reports/2007/NTIAWARNReport.htm>.

8. Technical Studies

Report No.	Report Title
08-451	Assessment of Alternative Future Federal Land Mobile Radio Systems (Acrobat PDF 978 Kb)
07-447	Assessment of Federal and Non-Federal Land Mobile Radio Frequency Assignment Methodologies (Acrobat PDF 477 KB)
JSC-CR-06-072	Communications Receiver Performance Degradation Handbook - November 2006 (Acrobat PDF 1,682 KB)
06-440	Federal Land Mobile Operations in the 162-174 MHz Band in the Washington, D.C., Area Phase 1: Study of Agency Operations - August 2006 (MS Word, 151 pages) [also available in Adobe Acrobat format - 12.5Mb].
05-432	 Interference Protection Criteria: Phase 1 - Compilation from Existing Sources technical report (514 KB) [also available in MS word format (2.2 MB)].
TR-07-448	Measurements to Characterize Land Mobile Channel Occupancy for Federal Bands 162-174 MHz and 406-420 MHz in the Washington D.C. Area
TR-07-449	Propagation Loss Prediction Considerations for Close-In Distances and Low-Antenna Height Applications