National Telecommunications and Information Administration (NTIA)

Office of Spectrum Management

Plan to Modernize and Automate the Infrastructure of NTIA Related to Managing Federal Spectrum Use

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1. Background

A key mission of the National Telecommunications and Information Administration (NTIA), U.S. Department of Commerce (DOC), is to manage the use of the radio frequency (RF) spectrum by all federal agencies. NTIA's associated processes and information technology (IT) systems for performing this critical task are outdated, relying on equipment and software that is in some cases over three decades old. There is a need to modernize these systems, especially as NTIA endeavors to make spectrum more accessible for government and commercial users alike.

In anticipation of modernization efforts, NTIA established the Spectrum National Security Systems (SNSS) Program Office on December 3, 2018, to execute all aspects of strategy, planning, directing, managing, coordinating, reporting, and evaluating NTIA Office of Spectrum Management (OSM) spectrum IT systems.

Section 9203 of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (NDAA 21)[1] calls for the Assistant Secretary of Commerce for Communications and Information to submit a report to Congress containing a plan for the modernization and automation of the NTIA infrastructure relating to managing federal spectrum use by covered agencies, to more efficiently manage such use[2]. This provides the modernization plan and addresses the topics called out in the NDAA 21. This modernization report creates the necessary foundation for future enhancements to current legacy systems and a foundation to support future advanced technological capabilities.

2. System Assessment

The NTIA OSM assessed each NTIA spectrum IT system in its IT infrastructure to determine if the system

- is suitable for enhancement, or
- has sustainability issues that will cause high costs, slow enhancements, and/or high failure rates when the system is changed.

The system assessment validated that there are issues with outdated existing NTIA spectrum IT systems that limit their ability to be enhanced and sustained. Spectrum IT system modernization

[1] William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub. Law No. 116-283, Title XCII, sec. 9203 (Jan. 1, 2021).

[2] Section 9203 of the NDAA 21 defines covered agencies as the Department of Defense and other agencies deemed appropriate by the NTIA. NTIA has determined that covered agencies include the agencies belonging to the Interdepartment Radio Advisory Committee (IRAC). Each covered agency is directed to submit a plan to the Assistant Secretary and the PPSG to "modernize the infrastructure of such agency with respect to the use of federal spectrum by such agency so that such modernized infrastructure of such agency is interoperable with the modernized infrastructure of the NTIA." IRAC consists of the Dept. of Agriculture, Air Force, Army, Coast Guard, Dept. of Commerce, Dept. of Energy, Federal Aviation Administration, Dept. of Homeland Security, Dept. of the Interior, Dept. of Justice, National Aeronautics and Space Administration, Navy, National Science Foundation, Dept. of State, Dept. of Transportation, Dept. of the Treasury, United States Agency for Global Media, United States Postal Service, and Dept. of Veterans Affairs

efforts are needed for NTIA to manage spectrum to accommodate the demands of advanced technologies such as securing government missions dependent on spectrum and supporting any repurposing efforts. As the need for electromagnetic spectrum and the importance of properly managing it continues to increase, NTIA will need to modernize its systems to respond to these increasing needs.

3. Acquisition Strategy

The DOC will conduct infrastructure modernization efforts through the NTIA OSM SNSS Program Office. The program office will implement an acquisition strategy in accordance with federal and DOC acquisition guidance. Competition will be sought and promoted to ensure the best value to the government. The acquisition will contain requirements for IT improvements that enable federal agencies to be more efficient and effective in the use of federal spectrum.

4. Timeline

Implementation of the NTIA modernization is contingent upon funding and execution of corresponding contract actions. Development will be planned in phases, with value provided iteratively through multiple deliverables and software releases in each phase.

5. Enhancements and Improvements

The DOC and NTIA have established IT policies and processes to ensure compliance with the United States Code. The modernization effort will adhere to these policies and processes, and will augment them with best of breed security guidance from the Department of Defense to increase the security and reliability of the NTIA IT infrastructure. These policies, processes and guidance will be applied as the modernized infrastructure evolves from the legacy infrastructure. Legacy code and components with reuse potential must meet security policy, guidance, and reliability requirements before reuse in the modernized infrastructure.

NTIA will better support current and future Federal spectrum demands by upgrading systems to the latest enterprise architectures, improving the security and automation capabilities of the federal spectrum management system, improving the integrity and confidentiality of data, developing advanced analytical tools and computer modeling, and reengineering business processes and automating workflows.

The modernization will provide improved engineering capabilities, available over the network to all federal agencies, and enhanced data models to improve interference prediction and frequency nomination. The engineering capabilities, designed in collaboration with the covered agencies to meet agreed-upon analysis requirements, will provide results that improve efficiency of Federal spectrum use, while avoiding harmful interference, and will provide results in a more timely manner than current analysis tools. Efficiencies enable federal agencies to operate spectrum dependent equipment at frequencies, in locations and at times that were not previously permitted due to predicted interference concerns. Also, the “backend” IT improvements themselves will increase the responsiveness, and associated efficiencies. This enables spectrum use efficiencies, improved access for Federal agencies, and improvements with frequency assignment process timeliness.

Spectrum automation and workflows will be enhanced through:

- Data format, data content, and data validation improvements that increase interoperability, reduce manual efforts, and improve spectrum analyses;
- A single integrated source for NTIA spectrum data, which reduces effort to find and retrieve the latest spectrum data; and
- Workflow improvements including an automatic assignment capability for use in limited scenarios that speeds processing and reduces manual (i.e., human-in-the-loop) effort.

Timeliness of information requests and data accessibility will be improved through new automated services that permit search and retrieval of NTIA spectrum information over classified and unclassified networks, within data security constraints.

6. Operations and Maintenance Plan

Operations and Maintenance (O&M) activities begin immediately upon deployment of a solution (aka version release) to the production environment. Due to the agile nature of this modernization, O&M activities begin early in the lifecycle with the deployment of the first capability to production. NTIA will continue support of all current legacy systems through its existing IT investments until those systems' capabilities are migrated to the modernized architecture.

7. Coordination Strategy

NTIA will leverage existing interagency coordination frameworks of the Policy and Planning Steering Group (PPSG) and the Interdepartment Radio Advisory Committee (IRAC). Coordination will identify goals and parameters for measuring success, and align regulations and procedures as defined in the *NTIA Manual*.[3] This coordination process will help define, validate and implement testable requirements and interoperability specifications, and plan the transition to the newly modernized capabilities.

NTIA will coordinate IT Modernization efforts through already established committees and working groups. This will ensure the best return on investment across the spectrum community. The high-level coordination will start with the PPSG. The PPSG, an interagency group composed of senior-level federal government officials representing major spectrum stakeholders, advises the Assistant Secretary for Communications and Information and NTIA on spectrum policy matters. Coordination will also occur through the IRAC. The IRAC is comprised of federal agency representatives and provides advice to NTIA on spectrum management matters[4]. The basic functions of the IRAC include assisting the Assistant Secretary in assigning frequencies to U.S. Government radio stations and in developing and executing policies,

[3] National Telecommunications and Information Administration (NTIA), Manual of Regulations and Procedures for Federal Radio Frequency Management, September 2017 Revision of the May 2013 Edition. Document available at https://www.ntia.doc.gov/page/2011/manual-regulations-and-procedures-federal-radio-frequency-management-redbook.

[4] See footnote 2 for members of the IRAC.

programs, procedures, and technical criteria pertaining to the allocation, management, and use of the electromagnetic spectrum.

NTIA will continue to coordinate agency-to-agency as needed to support adoption and integration of capabilities through Technical Exchange Meetings, Interagency Agreements, Memorandums of Understanding, Interconnect Agreements, and Interface Control Documents.

NTIA will work through these coordination mechanisms to collaboratively identify requirements for and, within resource constraints, collaboratively pursue enhancements to electromagnetic spectrum analysis tools, and modeling and simulation processes and technologies.

As discussed above, Section 9203 of the NDAA 21 directs each covered agency to submit a plan to the Assistant Secretary and the PPSG to "modernize the infrastructure of such agency with respect to the use of federal spectrum by such agency so that such modernized infrastructure of such agency is interoperable with the modernized infrastructure of the NTIA." The Department of Defense is defined as a covered agency by statute. NTIA has identified additional covered agencies to include the agencies belonging to the IRAC. NTIA will execute this coordination strategy to align the NTIA modernization with covered agency plans and implementations to address the constraints and timelines of each covered agency.

8. Manually Intensive Processes

The NTIA Spectrum IT Infrastructure is inherently linked to the federal regulations and procedures in the NTIA manual, which include manually intensive spectrum management processes. IT modernization efforts that improve security, upgrade technologies and update software architectures can proceed at low risk without changes to spectrum regulations or procedures. However, many value-added enhancements and changes to manually intensive processes do require regulation or procedure changes. NTIA plans to define the regulation and procedures changes for the improvements before expending resources on the corresponding IT changes to avoid costly rework.

The federal frequency assignment process is manually intensive, and the modernization plans to reduce the corresponding level of effort through new features such as a mechanism to automatically assign frequencies, when human intervention is not required. NTIA will pursue requirements for addressing other manually intensive processes through the coordination mechanisms discussed in the previous section.

9. Success Metrics

High-level metrics that evaluate IT modernization success are being developed, in coordination with the covered agencies, to measure operational availability, system security improvements, system enhance-ability and sustainability improvements, interference prediction improvements, frequency assignment and certification automation improvements, and corresponding data access improvements. Metrics are also being devised to track corresponding regulatory and process changes needed to inform and adopt the IT changes.

10. Cost Estimate

The FY 2021 Budget included a request of $25 million to begin the modernization of NTIA's spectrum management system. Initial funding is anticipated to come from the Department of Commerce's non-recurring expense fund in FY2022. The Administration has not yet produced an updated estimate of the total cost of modernization for future years.

11. Conclusion

In summary, NTIA and covered agencies rely on NTIA spectrum IT systems to fulfill their responsibilities managing federal electromagnetic spectrum, and this report plans time-phased solutions to address problems with outdated legacy systems. There is a means for communicating with the spectrum community when planning, coordinating and implementing these changes at NTIA, and for collaborating with other covered agencies' as they modernize their spectrum IT infrastructures.