

# **Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband**



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## Executive Summary

To promote economic growth and unleash the potential of wireless broadband, President Obama unveiled an initiative to reform spectrum policy and improve America's wireless infrastructure. In June 2010, the President signed a Memorandum calling for the National Telecommunications and Information Administration (NTIA), in collaboration with the Federal Communications Commission (FCC), to make 500 megahertz of spectrum available for fixed and mobile wireless broadband in the next ten years. This will improve America's economic competitiveness, create jobs and help maintain America's leadership role in technological innovation. This report outlines the plans and milestones to achieve the President's 500 megahertz goal. The release of this roadmap together with NTIA's Fast Track Evaluation<sup>1</sup> marks the successful completion of a critical step in the process of freeing up 500 megahertz for use by wireless broadband.

Included in this report are innovative mechanisms to ensure the successful implementation of the President's spectrum plan. The report:

- **Identifies over 2200 megahertz of Federal and non-Federal spectrum** that NTIA and the FCC consider prospects for repurposing for broadband use.
- **Sets an aggressive timetable** to make available 500 megahertz of spectrum through government coordination.
- **Calls for new incentives**, including funding agencies for all planning expenses necessary to develop alternatives for legacy assignments of spectrum and provisioning a portion of the proceeds from spectrum auctions to purchase new equipment.

Further, as detailed in the companion Fast Track Evaluation, NTIA has already made substantial progress in identifying spectrum that can be freed up for new uses by:

- **Making available 15 megahertz of spectrum** (specifically 1695-1710 MHz) while protecting, by the use of exclusion zones, NOAA's mission critical functions of weather forecasting and severe storm warnings as well as other uses by a number of Federal agencies.
- **Freeing 100 megahertz of spectrum** between 3550-3650 MHz while protecting, by the use of exclusion zones, U.S. Navy coastal operations and other Department of Defense test and training areas.
- **Identifying two 20 megahertz bands of spectrum (40 megahertz within 4200 and 4400 MHz) that might be freed up** depending upon international reallocation and further study to determine whether radio altimeters actually operate in the 40 megahertz being considered.

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<sup>1</sup> NTIA, *An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, 4200-4220 MHz, and 4380-4400 MHz Bands* (Fast Track Evaluation) (Oct. 2010).

Although there was not sufficient time to complete the analysis of the band within the timeframe of the Fast Track Evaluation, the 1755-1780 MHz band will continue to be a priority for analysis under this Plan and Timetable because it is harmonized internationally for mobile operations, wireless equipment already exists and the band provides signal characteristics advantageous to mobile operations.

## 1. Introduction

To maintain America's leadership in technological innovation and promote economic growth, President Obama unveiled an initiative to reform spectrum policy and improve America's wireless infrastructure. To unleash the innovative potential of wireless broadband, President Obama committed to nearly doubling the amount of spectrum available for commercial wireless broadband services. The Presidential Memorandum signed in June 2010 constitutes a critical first step to creating a more efficient and innovative wireless broadband infrastructure.<sup>2</sup> In particular, this step promises to catalyze new private sector investment and economic activity – enabling industries of the future to emerge and supporting their proven job creation potential. The President's initiative responds to our national imperative of making more spectrum available for emerging technologies by finding opportunities to use the wireless spectrum more creatively and efficiently.

The wireless revolution is an American success story. Modern cell phones and the networks on which they rely not only were invented in the United States, but were revolutionized by American companies, most recently in the development of smartphones. In recent years, owing in large part to the rise of smartphones, the amount of information flowing over some wireless networks has grown at over 250 percent per year,<sup>3</sup> creating what is often referred to as a "spectrum crunch." The U.S. wireless industry is an economic engine with a total economic impact estimated to be at least \$40 to \$50 billion annually.<sup>4</sup> The industry estimates that over 2.4 million American jobs are directly or indirectly dependent on it.<sup>5</sup> We must reform spectrum policy to facilitate the increasing growth in wireless while ensuring no loss of critical existing and planned Federal, State, local and tribal government capabilities that rely on spectrum. For America to continue to lead the wireless revolution, we must put spectrum to its most effective uses and free up additional spectrum to meet the increasing demand for new technologies.

Without public action to free up both Federal and non-Federal spectrum for emerging wireless uses, there is a risk that America may fall behind other countries in the wireless broadband revolution. Along with the growing demands on the spectrum dedicated to commercial wireless services, America's spectrum position is affected by inefficient uses of spectrum by both non-Federal sector licensees and

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<sup>2</sup> Memorandum for the Heads of Executive Departments and Agencies, *Unleashing the Wireless Broadband Revolution*, (Presidential Memorandum), released June 28, 2010, 75 Fed. Reg. 38387 (July 1, 2010), available at <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>.

<sup>3</sup> Lawrence Summers, "Technological Opportunities, Job Creation, and Economic Growth," remarks delivered at the New America Foundation, Washington DC, (June 28, 2010), available at <http://www.whitehouse.gov/administration/eop/nec/speeches/technological-opportunities-job-creation-economic-growth>.

<sup>4</sup> *Id.*

<sup>5</sup> *Ex Parte* Letter from Christopher Guttman-McCabe, CTIA—The Wireless Association® to Chairman Julius Genachowski, and Commissioners Copps and McDowell, Federal Communications Commission (filed July 9, 2009), available at <http://fjallfoss.fcc.gov/ecfs/document/view?id=7019808608>.

government users. This is not surprising given that most allocations of spectrum were made several decades ago when the state of technology was far less advanced.

The broad vision outlined in the President’s Spectrum Initiative is to attract public and private sector investment in emerging wireless broadband services and to promote the more efficient use of spectrum. Three overarching themes flow from this imperative and are embodied in this report. First, the Federal Government must identify and plan for freeing up 500 megahertz of spectrum from Federal and non-Federal allocations to support the robust development of emerging wireless services. Second, the Federal Government must develop new tools and provide new incentives to free up spectrum, both from Federal Government users and non-Federal licensees. Third, the Federal Government must ensure sound government performance and effective use of its spectrum, pushing for effective repurposing, sharing, and innovative uses of spectrum wherever possible.

First and foremost, this report sets forth the roadmap for using all spectrum more efficiently and freeing up spectrum for new uses such as wireless broadband. As a first step in implementing the above strategy, the Federal Government will examine how it currently uses spectrum and identify areas for improvement, consolidation, or sharing (among Federal agencies and between Federal agencies and private users) while encouraging non-Federal licensees to do the same. To facilitate this process, the Department of Commerce, which manages Federal spectrum use, will examine the spectrum now being used by Federal agencies with a commitment to ensure that it is being used most efficiently.

Second, with respect to providing adequate incentives and tools to ensure efficient uses of spectrum, this report explains why new legislative tools are necessary. The Commercial Spectrum Enhancement Act (CSEA)<sup>6</sup> provides a solid foundation for promoting more efficient use of spectrum, but its limitations—a lack of support for up-front planning, cost estimation, design and procurement preparation funds and an absence of more concrete incentives for agencies to change their use of spectrum—should be addressed to better incentivize government agencies to change their existing usage of spectrum. The centerpiece of the needed reform is an appropriate expansion of authorities provided by the Spectrum Relocation Fund. These reforms would enable agencies to undertake fiscally prudent planning, evaluate new uses of spectrum through demonstration projects, and research the use of alternative technologies related to exploring a specific band’s reallocation potential, all to ensure confidence when applied to deployed systems and to enhance the speed with which relocation activities can occur following an auction. Moreover, as explained below, these reforms would also enable agencies to benefit from freeing up of spectrum through additional funds for communications equipment to support their mission.

Changing the incentives around Federal use of spectrum is a major thrust of the President’s Spectrum Initiative. Under the CSEA, agencies are reimbursed after an auction for relocation expenses to relinquish legacy spectrum assignments, but they are challenged in undertaking the necessary efforts to free up spectrum, either for reallocation or for sharing with commercial entities. Going forward, it is

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<sup>6</sup> Commercial Spectrum Enhancement Act (CSEA), Title II of P.L. 108-494, 118 Stat. 3986, 3991 (codified at 47 U.S.C. §§ 151, 301, 302, 303).

critical that agencies participate in a win-win approach to identifying strategies for more efficient use of spectrum, while maintaining essential Federal missions. Whether that process results in the freeing up of spectrum that can be auctioned (say, by enabling two agencies to share spectrum with one another more effectively) or by enabling leased access to spectrum, either outcome is critical to meeting the 500 megahertz commitment.

The win-win approach to spectrum usage also promises to modernize our spectrum management system. Traditionally, most spectrum users adopted very conservative approaches to guarding against interference, often expecting exclusive use of a band of spectrum even when the actual use was not continuous. By providing incentives and opportunities to use modern technologies that mitigate interference and facilitate sharing of spectrum, the Federal Government can change its use of spectrum. In so doing, the government would achieve a three-fold benefit: (1) improving the agency's technological capabilities, (2) enabling the agency to use spectrum more efficiently, and (3) freeing up spectrum for other uses.

In short, President Obama's Spectrum Initiative recognizes an important opportunity for Federal agencies to carry out his commitment to broadband and economic growth for America by improving the efficiency of their own use of the radio spectrum. Additionally, the Federal Communications Commission (FCC) has proposed reforms to authorize incentive auctions for the private sector to do the same. Towards this end, the Administration will work with Congress to develop legislation that provides the FCC with the necessary authority to conduct these auctions and enable current spectrum holders who participate in them to realize a portion of the proceeds.

In addition to improving incentives, the Administration is undertaking reviews of agencies' spectrum usage as part of the work of improving overall government performance. As the Acting Director of the Office of Management and Budget (OMB) recently explained, "[t]he Federal Government largely has missed out on [the modern information technology] transformation due to poor management of technology investments."<sup>7</sup> To ensure that the Federal Government uses information technology most effectively, the government has used "rigorous reviews called 'TechStat Sessions'" managed by the Federal Chief Information Officer.<sup>8</sup> In the case of spectrum usage, the U.S. Chief Technology Officer, working in cooperation with the National Telecommunication and Information Administration (NTIA) and the Policy and Plans Steering Group (PPSG), will seek to use a similar process to a similar effect.

A second principle of enhanced government performance is ensuring accountability and soliciting input from a wide array of outside stakeholders. With respect to ensuring accountability, the NTIA will develop a spectrum inventory to evaluate efforts by agencies to encourage innovative uses of

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<sup>7</sup> Memorandum for the Senior Executive Service, *The Accountable Government Initiative – an Update on Our Performance Management Agenda*, Jeffrey D. Zients, Federal Chief Performance Officer and Deputy Director for Management, Office of Management and Budget (rel. Sept. 14, 2010), available at [http://www.whitehouse.gov/sites/default/files/omb/memoranda/2010/AccountableGovernmentInitiative\\_09142010.pdf](http://www.whitehouse.gov/sites/default/files/omb/memoranda/2010/AccountableGovernmentInitiative_09142010.pdf).

<sup>8</sup> *Id.* at 8.

spectrum and promote sharing opportunities. Such an inventory will, wherever consistent with the need to protect national security and mission critical systems, provide transparency to Federal uses of spectrum. With respect to public input, NTIA will solicit contributions from the Commerce Spectrum Management Advisory Committee on how best to execute the mandate of the President's Spectrum Initiative. The NTIA will also explore whether other mechanisms for public input and technology development—such as the use of prizes and challenges—can inform and improve our Federal system of spectrum management.

The objectives of this report are twofold. First, it embodies a vision for how to improve the use of spectrum for the wireless broadband era. Second, it outlines how to accomplish this vision by improving the existing system of spectrum management, both with respect to Federal users and non-Federal users. Most specifically, this report provides a roadmap for identifying wireless spectrum assigned to both Federal and non-Federal users that can be freed up for wireless broadband, either by auction to private users or through sharing arrangements.

This Plan and Timetable,<sup>9</sup> referred to hereafter as the “Plan,” identifies an initial list of candidate spectrum bands, outlines steps to determine additional candidate bands, and sets out a process to assess and evaluate the feasibility of repurposing the candidate bands. The Plan also identifies what actions may be necessary to make candidate bands available for wireless broadband use within a decade. The initial list of candidate bands contains over 2200 megahertz of Federal and non-Federal spectrum that might provide opportunities for wireless broadband use.

The primary focus of the Plan is on the necessary steps and near-term actions that must be accomplished in the next four years in order to meet the President's 500 megahertz goal within ten years while ensuring no loss of critical existing and planned Federal, State, local and tribal government capabilities.<sup>10</sup> Spectrum identified for reallocation will be repurposed to facilitate (1) exclusive non-Federal use for FCC-licensed wireless broadband systems; (2) shared Federal/non-Federal use (licensed wireless broadband systems); (3) shared Federal/non-Federal use with unlicensed devices; and (4) exclusive use by unlicensed devices. As required by the Presidential Memorandum, this Plan also sets forth the Administration's plan to provide adequate funding, incentives and assistance<sup>11</sup> to those executive branch agencies and other Federal entities affected by repurposing of spectrum.

NTIA is working closely with the Federal agencies and the FCC in the execution of this Plan. NTIA's initial response to the Presidential Memorandum was to undertake a “Fast Track Evaluation” in conjunction with the Federal agencies to identify by October 1, 2010 Federal spectrum that could be made available for wireless broadband use within five years. The Fast Track Evaluation (which is the subject of a separate report)<sup>12</sup> resulted in the identification of 115 megahertz of spectrum used by

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<sup>9</sup> See Presidential Memorandum at § 1(b), 75 Fed. Reg. at 38388.

<sup>10</sup> *Id.*

<sup>11</sup> Presidential Memorandum at § 2, 75 Fed. Reg. at 38388.

<sup>12</sup> Fast Track Evaluation, *supra* n. 1.



Federal agencies that NTIA recommends be made available for wireless broadband use on a shared basis within five years. This Fast Track spectrum represents a significant down payment on the President's vision of making 500 megahertz available for wireless broadband use over the next decade. NTIA looks forward to working with the Federal agencies and the FCC to make the President's 500 megahertz goal a reality that will bring countless benefits to the American economy and the daily lives of all Americans. The roles and responsibilities of key agencies and organizations needed to achieve the objectives of this Plan are documented in Appendix A.

This report is the first step along a ten year path to fulfilling President Obama's spectrum plan as set forth in the Presidential Memorandum issued earlier this year. By providing this public report and explaining the types of administrative effort and legislative reforms that are necessary toward achieving this important re-orientation of spectrum policy, the Administration is engaging the broader spectrum policy community and the public in an important economic policy priority.

## 2. Identification of Initial Candidate Bands

NTIA has identified an initial number of candidate bands to be considered for repurposing in pursuit of the President's goal of making 500 megahertz of spectrum available for wireless broadband. These candidate bands are presented in Table 2-1 and represent an initial list. As explained in this Plan, other bands will be examined as appropriate; however, NTIA believes the bands identified are the most fertile sources for the spectrum called for by the President. Examination of any additional bands will be consistent with the cost-benefit, technical, and operational analyses identified in this Plan. Concurrently, and in support of the 500 megahertz goal, the FCC has begun implementing recommendations in the National Broadband Plan (NBP) to make available, in five years, 300 megahertz of spectrum for mobile uses.<sup>13</sup> In addition, FCC and NTIA are undertaking spectrum inventory analyses, as well as possible measurements of spectrum use that will also inform the consideration of bands identified.

The bands that NTIA and the FCC selected for initial evaluation fall within the range 225 MHz to 4400 MHz. The rationale for selection of this range of frequencies is that the bands below 225 MHz have insufficient usable bandwidth for wireless broadband services, and bands above 4400 MHz do not appear to be of current interest by industry for mobile use. The four bands selected for Fast Track analysis are also included in Table 2-1. The bands that did not meet the conditions for an early Fast Track decision, or in other words could not be completely evaluated before October 1, 2010 and determined to be able to be made available within five years, will be considered potential candidates as part of the longer-term plan set forth in this report. The process outlined in this Plan will identify additional bands for consideration beyond those in Table 2-1 should those bands provide insufficient spectrum for meeting the President's goal of a total of 500 megahertz of Federal and non-Federal spectrum or prove to be otherwise inadequate for further consideration.

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<sup>13</sup> Connecting America: The National Broadband Plan, Recommendation 5.8, at 86 (2010). The National Broadband Plan is available at <http://www.broadband.gov/plan/>.

Table 2-1 Initial Band Candidates that NTIA and the National Broadband Plan Identified

Frequency Band (MHz)	Amount (Megahertz)	Current Allocation/Usage (Federal, Non-Federal, Shared)
(Broadcast TV) <sup>**</sup> VHF/UHF Frequencies <sup>****</sup>	120	Non-Federal
406.1-420 <sup>****</sup>	13.9	Federal
(D-Block) <sup>**</sup> 758-763 <sup>****</sup> 788-793 <sup>****</sup>	10	Non-Federal
1300-1390 <sup>****</sup>	90	Federal
(MSS) <sup>**</sup> 1525-1559 1626.5-1660.5	40	Non-Federal
(MSS) <sup>**</sup> 1610-1626.5 2483.5-2500	10	Non-Federal
1675-1710 <sup>*</sup>	35	Federal/non-Federal Shared
1755-1780 <sup>*</sup>	25	Federal
1780-1850	70	Federal
(AWS 2/3) <sup>**</sup> 1915-1920 <sup>****</sup> 1995-2000	10	Non-Federal
(MSS) <sup>**</sup> 2000-2020 2180-2200	40	Non-Federal
(AWS 2/3) <sup>**</sup> 2020-2025	5	Non-Federal
(AWS 2/3) <sup>**</sup> 2155-2180	25	Non-Federal
2200-2290 <sup>****</sup>	90	Federal
(WCS) <sup>**</sup> 2305-2320 <sup>****</sup> 2345-2360 <sup>****</sup>	30	Non-Federal
2700-2900 <sup>****</sup>	200	Federal
2900-3100	200	Federal/non-Federal Shared
3100-3500	400	Federal/non-Federal Shared
3500-3650 <sup>*</sup>	150	Federal
3700-4200	500	Non-Federal
4200-4400 <sup>****</sup> [4200-4220 & 4380-4400] <sup>*</sup>	200	Federal/non-Federal Shared Federal/non-Federal Shared
<b>Total</b>	<b>2263.9</b>	

- \* Bands selected for Fast-Track evaluation
- \*\* Identified in the National Broadband Plan, Recommendation 5.8, page 86 (using nomenclature contained in Exhibit 5-E)
- \*\*\* NTIA notes the ITU-R SA.1154 Recommendation
- \*\*\*\* Band obligated by a U.S.-Canada or U.S.-Mexico bilateral agreement(s)

### 3. Selection of Bands for Repurposing

#### 3.1. Method of Approach

As stated, the purpose of this Plan is to identify spectrum used by Federal and non-Federal entities and shared spectrum that can be made available for wireless broadband over a ten-year period. To achieve this end, bands will be evaluated to determine their suitability for repurposing, recognizing the need to protect critical existing and planned Federal, State, local and tribal government capabilities.<sup>14</sup> This section of the Report describes how bands will be identified and evaluated for possible repurposing to meet the President's goal.

NTIA and FCC work collaboratively on a variety of spectrum-related matters, including the repurposing of spectrum, and the Presidential Memorandum directs the NTIA to work in collaboration with the FCC to reach the President's 500 megahertz goal. Because NTIA and the FCC have different but complementary roles, the process for reallocating spectrum to meet that goal will vary depending on whether the spectrum is currently allocated for Federal, non-Federal or shared use. Candidate bands depicted on Table 2-1 which are allocated exclusively to non-Federal use (and the non-Federal portion of shared bands) will be the subject of FCC rulemaking proceedings seeking to make the spectrum available for wireless broadband use. Additional authority for FCC to conduct incentive auctions will also be necessary. Many of these bands have been the subject of extensive public input through the NPB and follow-on public notices and events and this public consultation will continue going forward. The process outlined below is applicable to bands depicted on Table 2-1 which are allocated exclusively to Federal use as well as to the Federal portion of shared bands.

Where NTIA identifies Federal exclusive or shared spectrum that may be made available for non-Federal use, FCC rulemakings will be necessary to modify the Table of Allocations, adopt service rules including relocation of incumbents (Federal and non-Federal, as appropriate) or auction rules (as appropriate) and issue authorizations. This process will also enable public input on any technical and operational conditions associated with spectrum used by Federal entities that is ultimately made available for wireless broadband. In addition, the FCC will continue to collaborate with NTIA to identify spectrum shared by Federal and non-Federal entities which can be made available for wireless broadband, and will use its public notice and comment process to enable open and transparent public input for the identification and implementation of bands determined suitable.

Figure 3-1 depicts the methodology for selecting and evaluating candidate bands which are exclusively Federal or shared.

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<sup>14</sup> Presidential Memorandum at § 1(b), 75 Fed. Reg. at 38388.

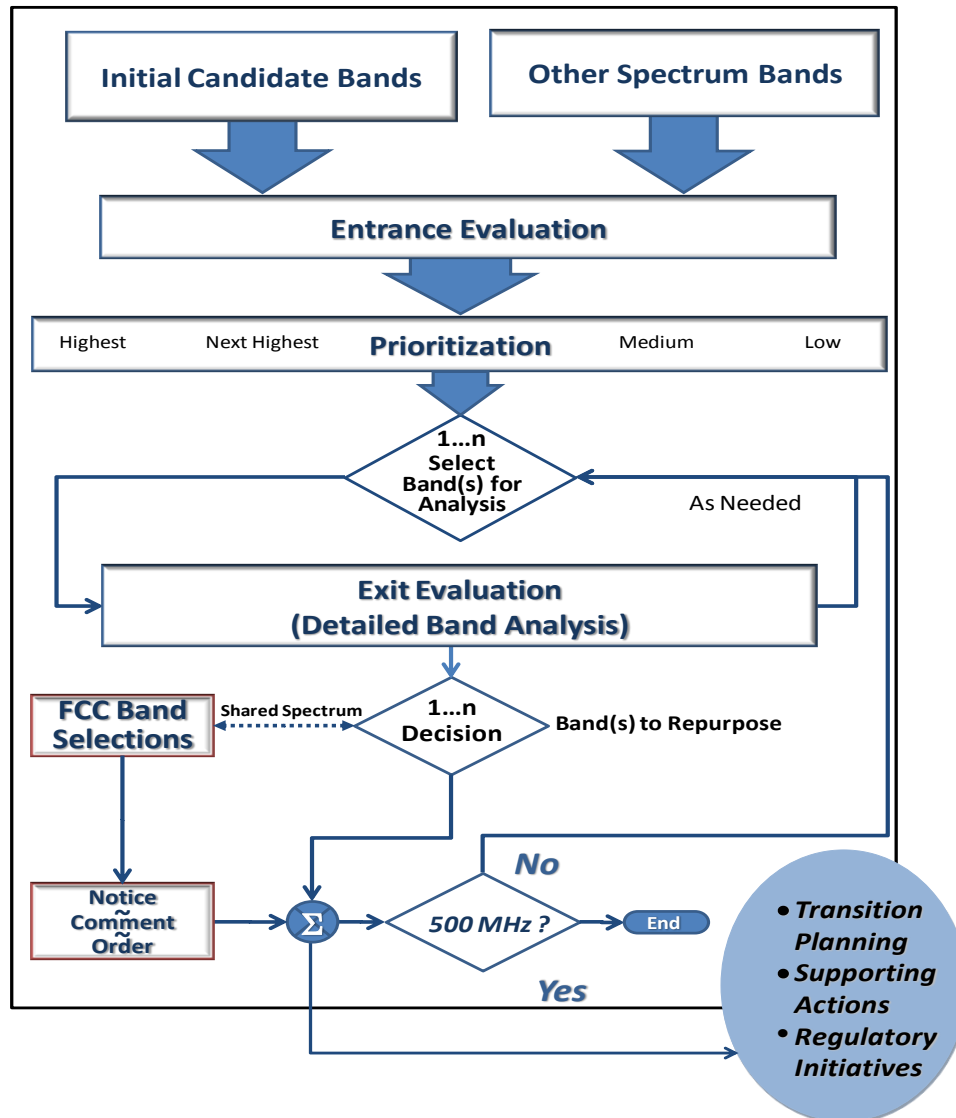


Figure 3-1: Top-Level Band Selection Process

Briefly, NTIA will evaluate those spectrum bands used by Federal entities that have successfully passed a set of conditions determined to be the minimum for acceptance. Bands that are shared between Federal and non-Federal users are also considered as candidate bands for wireless broadband as are bands used exclusively by non-Federal users. Inputs to the process are from several sources. NTIA developed the initial set (see Table 2-1) of candidate bands for evaluation. This initial set includes those bands that were part of the Fast Track Evaluation<sup>15</sup> but could not be evaluated in the timeframe provided or made available for wireless broadband use within five years. This initial set also includes several bands identified in the NBP and recommended that the FCC make available for mobile use within five years. Another source of candidate bands that might be brought into the process are those taken from parts of the radio spectrum not previously considered. Still another source would be any bands

<sup>15</sup> Fast Track Evaluation, *supra* n. 1.

identified as a result of consideration of improved Federal spectrum efficiency or greater Federal-to-Federal sharing.

In order to reach the 500 megahertz goal as rapidly as possible, NTIA will prioritize the candidate bands for analysis and disposition. NTIA will evaluate bands in the highest priority category first and then proceed to evaluate the lower priority bands. NTIA's evaluation will include a determination of which bands are best suited for one or more of the following four repurposing options in order of preference: (1) *Exclusive non-Federal use (licensed)*; (2) *Federal Shared with non-Federal (licensed)*; (3) *Federal and/or non-Federal use shared with unlicensed*; and (4) *Exclusive unlicensed*. Once NTIA arranges the bands into the repurposing category for which they are deemed to be best suited, they will undergo a more detailed evaluation based on *technical, operational, and cost* considerations to ascertain whether or not they can be repurposed within ten years.

If NTIA determines that a band used by Federal entities should be repurposed and can be made available within ten years, NTIA, FCC, and the Federal agencies will commence transition planning for that band and implement the supporting actions necessary to complete the transition. Bands that NTIA determines to be suitable for repurposing in all aspects other than that of being able to be transitioned within ten years will be returned to the pool of spectrum repurposing candidates for further evaluation.

### **3.2. Band Prioritization and Selection Factors**

The prioritization and subsequent evaluation of candidate frequency bands will be based on a variety of factors, including:

- the amount of useable bandwidth to support wireless broadband and the degree to which that spectrum is contiguous;
- industry interest in the band and the expected auction revenue, if applicable, that the band will yield;
- indirect benefits to the economy of making the band available for wireless broadband;
- the availability of comparable spectrum (or other alternative arrangements) if relocation of incumbent users is necessary;
- the estimated costs of relocating Federal incumbents to another band;
- the impact to services using global allocations that would require international negotiations to bring about reallocation; and
- the likelihood that the band can be repurposed within ten years.

NTIA will consider other factors in assessing Federal candidate bands that relate to how, where and by whom they are used and in all events will ensure that there is no loss of critical existing and planned Federal, State, local and tribal government capabilities in connection with a reallocation. NTIA, in cooperation with the Federal agencies, will develop a set of characteristics for each candidate band with Federal operations that includes, at a minimum, the following:

- a description of how the band is currently used;
- the number and types of different Federal systems operating in the band;
- the number of Federal agencies in the band;

- a measure or description of the complexity of Federal systems currently in the band;
- a depiction of the mission criticality and/or uniqueness of Federal systems in the band;
- the number and types of non-Federal incumbent users (e.g., unlicensed, amateurs, civil aviation, interoperable state and local public safety) in the band; and
- an indication of the degree to which repurposing might impact Federal services and operations.

Tradeoff analyses performed during detailed band analysis could lead to the determination that other factors need to be considered and that entry criteria have to be expanded or otherwise modified. NTIA will develop the criteria and corresponding rationale to establish the set of conditions under which band priorities are established. Also, NTIA in collaboration with the FCC may establish “exclusion zones” identifying certain bands or parts of bands that would be “off limits” or exempt from consideration for this investigation. Exemptions could occur for various reasons that may prevent making spectrum available within ten years, or where it is clear that the benefits of doing so do not exceed the costs.

## 4. Detailed Evaluation of Candidate Bands

NTIA, with the assistance of the Federal agencies through the PPSG, will evaluate candidate bands based on technical, operational and cost considerations. This will aid in the determination of: (1) the candidate bands that are most likely to be successfully made available for wireless broadband and; (2) the wireless broadband use category or categories for which they are best suited. If incumbents are to be cleared from the spectrum they use, alternate or comparable spectrum, new technology, an operational transition, and coverage of relocation or sharing costs will be considered.

Detailed band analysis reports identified by this Plan will describe the bands to be made available for wireless broadband and include: (1) recommendations regarding wireless broadband licensing, sharing and/or band segmentation; (2) the technical and operational assumptions regarding incumbent systems and wireless broadband systems pursuant to which the band was evaluated; and (3) a detailed description of how the band was evaluated and the results of any technical analysis performed.

### 4.1. Technical Considerations

NTIA, with assistance from the Federal agencies, will evaluate the technical aspects of the Federal systems in the Federal candidate bands being considered for repurposing. In performing these technical evaluations, agencies will incorporate operating parameters, mission scenarios, propagation models, key technical assumptions, and other factors into the methods used to address (at a minimum) each of the following:

- technical characteristics of devices in candidate bands;
- technical characteristics and parameters for wireless broadband devices;
- the availability of alternative or comparable spectrum and/or other technology and/or other means offering similar levels of technical performance for those Federal systems that are candidates for relocation;
- technical evaluation of sharing and band segmentation options where applicable; and
- interference effects.

NTIA's detailed analysis will also consider, among other things, the technical feasibility of sharing spectrum (both among Federal users and between Federal and non-Federal users) using geographic separation and temporal sharing within the incumbent band; and the technical possibilities (and limitations) for collapsing existing Federal operations into a portion of incumbent band without impacting critical Federal mission/operational requirements.

### 4.2. Operational Considerations

Agencies will consider the operational impact on affected systems in each of the Federal candidate bands. These include, but are not limited to:

- operational characteristics of candidate bands and those of wireless broadband devices;



- the availability of spectrum with comparable technical characteristics<sup>16</sup> or alternative technology or other means offering comparable or the same levels of operational performance for those Federal systems that are candidates for relocation;
- time required for equipment replacement (including redesign);
- the degree to which any international agreement determined to be necessary for transition can be in place within the ten-year timeframe; and
- the operational impact of a phased transition to new equipment on the transition.

#### **4.3. Cost and Benefit Considerations**

NTIA and the Federal agencies, with guidance from OMB, will develop the guidelines and describe the process by which the agencies will define the costs associated with the repurposing of each of the bands selected. Agencies will develop cost estimates for the relocation of, or sharing by Federal systems, for each designated band. Cost estimates will include engineering and operational analyses, research and development, equipment/system design (modifications or new designs), hardware integration, software development and integration, testing, operational and training costs, installation and maintenance. Cost data will be assembled in such a manner as to ease the development of comparative analyses across systems, across repurposing options, and across candidate bands.

NTIA, in collaboration with the FCC and with advice from the Federal agencies and OMB, will also assess the benefits of repurposing each of the bands selected for evaluation. Benefits will be derived from relevant information on commercial utility of the bands and any technical or operational conditions associated with their potential availability.

The availability of cost and benefit information will help to inform the detailed evaluation of candidate bands on the initial list in Table 2-1, will inform the examination of any additional bands to be considered, and will enable a prioritization for reaching the President's 500 megahertz goal.

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<sup>16</sup> In certain cases, Federal law prescribes particular procedures in connection with the identification of spectrum with comparable technical characteristics, *See, e.g.*, National Defense Authorization Act (NDAA), Pub. L. No. 106-65 (2000).

## 5. Transition Planning

### 5.1. Plan and Timetable

Once a final selection is made of a band or bands to be made available for wireless broadband, transition planning becomes the key focus. The primary responsibility for transition planning lies with the affected Federal agencies, when Federal systems operate in affected spectrum. For non-Federal entities using the spectrum, transition planning will be required by the FCC and licensees. The more comprehensive and thorough the planning is, the better the chances for repurposing within the established timelines. Transition plans, including detailed cost estimates, will be developed within 12 months following final selection of a band. In this regard, the FCC will need adequate time to seek input from non-Federal entities using the spectrum in order to obtain sufficient information on the record on which to base a transition plan.

### 5.2. Planning for Systems to be Relocated

**5.2.1. Determine bands for relocation of systems:** For systems that require relocation, the hardest and most critical transition item is identifying comparable spectrum bands in which to relocate incumbent users of the bands being vacated. Much of this analysis will have been accomplished during the detailed evaluation process outlined in section 4. The identification of alternate comparable spectrum or technologies or other means of meeting the Federal incumbent's mission, and the probability of being able to obtain the comparable spectrum (if applicable), are key considerations that NTIA, with the assistance of Federal agencies, will evaluate when assessing candidate bands. Once NTIA makes a decision regarding where an incumbent is to be moved, then the more detailed and formal process for approving the development or modification of equipment will be accomplished. This is known as the system review process, or the spectrum certification process, and is outlined in the NTIA Manual.<sup>17</sup> Through this structured process that provides for the exchange of data and technical analyses between the NTIA and Federal agencies, agreement is reached concerning the compatibility and availability of frequencies in the relocated bands.

**5.2.2. Determine technology development and/or acquisition imperatives:** As affected Federal agencies prepare to either to relocate current systems or capabilities into alternate bands or to otherwise meet their mission needs they will evaluate a variety of possible solutions. Options include a wide-range of choices including buying commercial off-the-shelf equipment, using commercial services, initiating a new acquisition effort, or investing in technology development directly related to relocation efforts that might provide for completely new alternative approaches to meeting the mission requirement.

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<sup>17</sup> See *Manual of Regulations and Procedures for Federal Radio Frequency Management*, U.S. Dep't. of Commerce, NTIA, January 2008 Edition, May 2010 Revision at §§ 10.1-10.8 (NTIA Manual), available at <http://www.ntia.doc.gov/osmhome/redbook/redbook.html>.

**5.2.3. Develop implementation testing and/or any modeling and simulation plans required to minimize technical risks associated with relocation:** As part of any new acquisition or system modification program, agencies will address requirements for comprehensive testing and evaluation. Initial efforts should include the application of modeling and simulation to minimize technical risks. As programs progress, all levels of testing should be planned for including initial technology developmental testing to field testing of prototypes to operational test and evaluation. It is important during planning to allow requisite time for required testing within the relocation schedule.

### **5.3. Planning for Systems selected for Band Sharing**

**5.3.1. Develop modeling and simulation plans required to minimize technical risks associated with sharing:** Extensive engineering analysis will be required to properly assess the probability of co-existence of systems without adverse effects on either. An initial action for transition planning for those bands where a decision is made to pursue sharing will be to determine the availability and validity of current models for conducting the analysis. Additionally, an understanding of the current and projected use of the spectrum (e.g., the technical and operational parameters of both the Federal and non-Federal systems) in the bands to be shared is essential to allow for the proper development of operational scenarios for accurate simulations. The careful planning and development of modeling and simulation capabilities is a key element of transition planning for sharing of bands.

**5.3.2. Determine any technology insertion required:** During transition planning for bands selected for sharing, consideration should be given to options involving the use of new technology to meet the Federal agencies needs. Current systems may be able to accommodate sharing with minor adjustments. Additionally, newly acquired systems with this same technology could replace current systems in order to more easily accommodate sharing.

**5.3.3. Develop implementation testing:** To ensure solutions for band sharing will in fact work and provide the additional spectrum access projected without adverse affects to incumbents, testing is critical. Trials and field testing are necessary to confirm successful sharing between systems licensed and/or assigned spectrum for sharing. As noted above, it is important during planning to allow sufficient time for required testing within the reallocation schedule set for sharing.

## 6. Incentives and Assistance

The Presidential Memorandum recognizes that providing adequate funding, assistance and incentives to support Federal and non-Federal repurposing efforts is vital to achieving the President's 500 megahertz goal.<sup>18</sup> For Federal incumbents, additional resources will be allocated for agencies to identify, evaluate, and make available opportunities for relocation, improved Federal sharing and for sharing with non-Federal users. Furthermore, resources for advance planning and upgraded communications capabilities will be allocated to improve the accuracy and detail of relocation schedules and to help foster successful relocation and sharing efforts and provide incentives for proactive participation, while maintaining essential Federal missions. Similarly, incentives structures for non-Federal incumbents will be needed to help maximize usage of currently underutilized spectrum.

### 6.1. Federal Funding and Assistance

Under current law, Federal agencies can only be reimbursed out of auction proceeds for costs of relocating to different spectrum frequencies and maintaining comparable capability of systems, including incidental upgrades that do not significantly change system functions. However, resources are required well before auction proceeds are available – both to support the identification and evaluation of candidate bands for repurposing or sharing and for advance planning to determine accurate relocation timelines and costs to ensure a successful transition. In addition, some relocation costs (such as planning for the redesign of systems currently in production) could significantly accelerate relocations if initiated and appropriately funded in advance of the receipt of auction proceeds.

To implement the Administration's commitment to provide adequate funding and incentives as called for in the Presidential Memorandum, the Administration will, consistent with prudent fiscal management, allocate funds to agencies for the activities discussed above, and expects to propose legislation early in the next Congress to expand and improve the successful CSEA. Specifically, the Administration will propose the following.

**6.1.1 Additional Funds for Advance Planning Prior to Identification of Spectrum for Repurposing:** This would provide agencies with up-front funding to support planning for a potential auction of repurposed spectrum (including shared spectrum). This modest investment could include resources to test the feasibility of alternative spectrum, evaluate the use of different technologies, and undertake any other necessary planning efforts, thereby creating more certainty as to what new spectrum will be (and when it could be) made available. The Director of OMB would certify that any resources made available before an auction would be expected to lead to higher auction bids within a period no longer than ten years.

**6.1.2 Permission to Enter Into Sharing Arrangements and Greater Flexibility to Reimburse for Sharing Arrangements:** The plan would allow agencies to enter into sharing arrangements, upon approval of NTIA, and receive resources to accommodate those arrangements. Payments received from

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<sup>18</sup> Presidential Memorandum at § 2, 75 Fed. Reg. at 38388

private entities would be deposited in the Spectrum Relocation Fund. Also, the proposed legislation would clarify that sharing arrangements are eligible for reimbursement and otherwise liberalize the definition of reimbursable expenses under the CSEA so as to promote more effective relocation, sharing, and innovative uses of the spectrum licensed to the Federal Government.

**6.1.3 Additional Resources to Improve Communications Equipment:** Participating Federal agencies would be eligible to receive up to 20 percent of auction proceeds, in cases where auction revenue is realized, to invest in communication equipment whether or not such equipment is related to the repurposing, provided the amount remaining in the Spectrum Relocation Fund after this payment and payments for relocation expenses is at least 10 percent of the winning bids. This investment would allow Federal agencies to improve capabilities by participating in repurposing efforts. By improving the use of technology by the Federal agencies, the Federal Government could spur a three-fold benefit—improving the agency’s technological capabilities, enabling the agency to use spectrum more efficiently, and freeing up spectrum for other uses.

These proposed changes to the CSEA will also provide resources to Federal agencies for advance planning, including the evaluation of sharing arrangements, and additional flexibility for reimbursement of agency costs to accommodate sharing arrangements, including in certain situations where auctions are not held. As the Presidential Memorandum recognizes, sharing arrangements on geographic or other terms will become more common as spectrum demands increase and thus resources to support Federal agency planning and development efforts for spectrum sharing will be needed. These costs include analysis, modeling, testing and verification, plus any system changes that need to be made to existing systems to accommodate sharing with commercial systems.

Adequate funding of these activities is critical to a successful implementation of the President’s spectrum initiative. Funding of these activities is likely to produce more efficient use of spectrum, reduce costs over the long-run, increase auction proceeds (as applicable), and reduce transition times. For example, increasing the certainty of when and where spectrum will be available will provide a higher comfort level for private bidders to invest in licenses and network build-out. This increased certainty should promote higher bids at auction.

## **6.2 Incentives for Spectrum Licensed to Non-Federal Entities**

As identified in the Presidential Memorandum, incentives for private-sector spectrum incumbents should allow for voluntary transactions to repurpose spectrum towards its most productive use. Given this, the NBP recommends that the FCC be given authority to conduct incentive auctions, where incumbents can voluntarily give up spectrum so that it can be re-auctioned in contiguous blocks with new service rules for higher-value uses, such as mobile broadband. Providing FCC with this authority will align the incentives of existing license holders, potential future license holders, and the Federal Government to create win-win outcomes. The NBP identified this authority as central to the FCC’s ability to make significant new spectrum available for wireless broadband.

## **7. Supporting Actions**

There are a number of supporting actions that need to be undertaken to accomplish the objective of making available 500 megahertz of spectrum for wireless broadband within the next decade. Some of these actions may require legislative authorization or appropriation while other aspects of this Plan are being executed. Some actions, such as the FCC issuing Public Notices and Notices of Proposed Rulemaking to seek information from non-Federal entities and specific comment on proposals, will occur in parallel with transition planning for systems to be relocated. As the process proceeds in identifying bands suitable for wireless broadband, some actions will be initiated even prior to final identification of bands. Early actions with respect to the following are needed to lay the groundwork and provide the support needed to enable the ultimate repurposing in a timely manner so that the spectrum can be put into use to support broadband growth.

### **7.1. Spectrum Relocation Fund**

Agencies must prepare detailed cost and timeline estimates to comply with requirements for requesting transfers from the Spectrum Relocation Fund as specified under the CSEA. The steps to accomplish preparation of detailed cost and timeline estimates to enable the agencies to obtain reimbursement from OMB for relocation are likely to include: (1) identifying options for relocation of systems, including consideration of alternate or comparable spectrum and/or alternative technology or other means; (2) developing budgets associated with each option, for example by conducting a complete inventory of the systems and equipment with assignments in those bands and determining replacement costs; (3) identifying requests pending before NTIA for spectrum certification and assignments in the band(s); (4) coordinating with agency budget officers and program managers to address mission and resource needs; (5) identifying any retrofitting of systems that might be required because of spectrum relocation of the spectrum-dependent components supporting those systems (such as spectrum-dependent systems on-board aircraft or ships); (6) identification of costs to terminate acquisition contracts for systems in development that will operate in bands slated for reallocation; and (7) researching new equipment available for operations in the bands identified for relocation, including discussions with potential vendors.

### **7.2. Agency Budgeting**

To ensure that agencies are able to obtain planning and/or reimbursement funds in the most expeditious and least burdensome manner, at the earliest possible stage, agency program and spectrum managers will work with their capital and strategic planning staffs and agency budget staff, to ensure coordination with the processes for seeking funds for capital investments and to ensure compliance with Administration processes. A component of this will be ensuring that there is an understanding of Administration guidance in seeking funds from the CSEA and other mechanisms for obtaining funds. After enhancements are made to the CSEA, updated guidance will be released which will include the steps needed to enable the agency to obtain pre-auction funds from the Spectrum Relocation Fund, appropriate justification that will need to be submitted to OMB to obtain funds, and the agency's

approximate timetable estimates for when funds would need to be made available for the project. In general, timelines for making funds available and for execution of relocation projects should be such that spectrum is made available for wireless broadband at the earliest practicable time.

### **7.3. Agency Acquisition/Procurement**

Even prior to OMB approval of funds that will be authorized for release to the agencies for planning, reimbursement for system relocations, sharing, or migration to other technologies or other means, affected agencies must identify the acquisition/procurement and contracting actions necessary and develop a timeline. The agencies can commence acquisition and procurement planning for the needed equipment and/or services at the earliest stage possible following a decision on the bands to be repurposed and identification of the comparable spectrum and/or alternative technologies or other means to which the Federal systems will be relocated. The contracting process for agencies is complex and lengthy and planning should begin as soon as requirements for the relocation of systems have been identified. Agency procurement and contracting staff will be briefed and brought into the process by program and spectrum managers so that they can undertake the needed actions.

### **7.4. Legislative**

Although the existing CSEA provides for a relocation process and agency reimbursement, the Federal agencies as well as the commercial licensees reported important challenges with planning and being able to use spectrum. As discussed in Section 6, the Administration is identifying ways to improve the current relocation framework, including proposing legislative changes.

In addition, as identified in Section 6, the FCC should be provided the authority to conduct incentive auctions, which entail sharing a portion of auction revenue with incumbent licensees in exchange for a voluntary contribution of spectrum to new flexible uses such as broadband, thereby making available new spectrum for wireless broadband. This authority is central to the FCC's ability to make spectrum used for non-Federal systems available for wireless broadband in a timely and valuable manner, and the Presidential Memorandum identified the importance of incentives to reaching the 500 megahertz goal.

### **7.5. Regulatory Actions and Rulemaking Proceedings – FCC and NTIA**

NTIA and the FCC will need to modify the U.S. Table of Allocations to reflect any reallocation of spectrum to non-Federal use or to add non-Federal use in cases involving spectrum sharing. To make spectrum available for non-Federal use, candidate frequency bands will need to be identified sufficiently early in the process to allow time for the FCC to seek input from the public on any proposed changes to the Table of Allocations. The Commission may propose service and technical rules either simultaneously or in a subsequent proceeding, depending on what may be appropriate in each case. The allocation and service rulemakings will establish technical, operational and procedural rules for repurposed spectrum and accommodate any shared Federal/non-Federal use. The rulemaking proceedings will also need to consider non-Federal and Federal operations in adjacent bands and

establish adequate out-of-band emission limits to protect operations in those bands. NTIA may also need to take appropriate steps related to the rules or policies governing the relevant Federal services prior to authorizing wireless broadband systems to use the spectrum.

For frequency bands that are to be auctioned, the FCC will need to initiate service rules to conduct the auction in addition to establishing technical and operational rules for the systems that will operate in the repurposed bands. The FCC and NTIA will coordinate guidance concerning relocation timetables so that the auction participants are clearly notified as to when auction winners will have access to the auctioned spectrum. Prior to any auction, if there are geographic aspects to such access, or varying time periods, this information will be developed so that the FCC can make it available to prospective bidders in advance of the auction. In addition, during the relocation process, the FCC, NTIA and the Federal agencies will work cooperatively to ensure that the new non-Federal licensees have access to the frequencies by the dates established, and that a process has been defined for coordination between the licensees and the agencies concerning whether there could be access to certain bands and/or certain locations at earlier dates and the conditions for such early access. For bands identified for exclusive non-Federal uses, the FCC also may need to identify incumbent non-Federal systems that share use of the bands, define a timetable for their relocation, and ensure that those users are accommodated in other spectrum or technologies or through other means.

NTIA will evaluate the Federal systems that may need to continue operating, either permanently or for a period of time after the relocation dates, and determine the actions to be taken by the Federal agencies operating those systems (such as operational or technical revisions to Federal systems) as well as those of the non-Federal licensees, to ensure compatible operations. NTIA may also revise the NTIA Manual to clarify rules concerning the relocation process. NTIA may also evaluate its current rules and processes for spectrum certification and frequency allocations to ensure that those rules and processes support spectrum repurposing. For example, NTIA will consider whether it will place Federal agencies on notice that requests for spectrum certification of new systems will not be supported in frequency bands after a decision has been made concerning the bands to be repurposed, if the systems cannot comply with the agreed conditions for repurposing. This could also apply to applications for additional frequency assignments in these bands. Technical and operational rules are also likely to require revision to enable sharing between Federal and non-Federal systems.

## **7.6. International Agreements**

When determining spectrum availability internationally, it is important to look at U.S. obligations under bilateral and multilateral treaties and other international agreements or obligations; in particular those found in the International Telecommunication Union (ITU), the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the North Atlantic Treaty Organization (NATO), the specific treaties concluded under the auspices of the World Meteorological Organization (WMO), all bilateral agreements in border areas with Canada and Mexico, and host nation agreements.



Within the ITU, spectrum is addressed in the Radiocommunication Sector (ITU-R). Each World Radio Conference (WRC) develops treaty text in the form of international Radio Regulations (RR) to which the United States is a signatory. Within ICAO, Standards and Recommended Practices (SARPs) are contained in the 18 Annexes to the Convention on International Civil Aviation. Universally accepted by the 190 Contracting States of ICAO, they cover all operational and technical aspects of aviation, including the many facilities and services required in support of international aircraft operations. This creates mandatory carriage requirements for specific communications equipment on commercial aircraft. Collectively, they form the basis for the safe and orderly development of international civil aviation. Within IMO, the Safety of Life at Sea Convention (SOLAS) in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships. This also creates mandatory carriage requirements of communications equipment and is applied to vessels according to size. The WMO in partnership with other international organizations develops treaty text on specific issues. The U.S. military also has international obligations under NATO and through host nation agreements with administrations where U.S. forces are deployed.

NTIA and supporting agencies (Federal agencies and FCC) may be required to submit conference proposals through the State Department for future agenda items for those candidate bands with clear reallocation prospects for which there are international implications. These proposals would enable the United States to seek changes, if necessary, in the international regulations in 2016. Because the effective deadline for submission of any U.S. proposal for an item on the WRC 2016 proposal agenda is November 2011, U.S. and regional coordination and agreement has to be achieved prior to this deadline. If the proposal deadline is missed, then the United States will not be able to seek changes to the international regulations until approximately 2020.

Once a conference proposal has been accepted and there is an agenda item for the 2016 or 2020 WRC, NTIA and supporting agencies would be required to submit sharing analyses and potentially, measurement study results. These analyses and studies would examine the potential sharing situation between broadband mobile systems and existing primary allocations.

If ICAO, IMO, NATO or WMO have treaty text addressing the candidate bands, NTIA and supporting agencies will need to submit amendments and analyses concurrently with the ITU process. In these cases, lack of support from ICAO, IMO, NATO, or WMO will most likely result in a negative result within the ITU.

In addition to the regulation of bands by the RR, the United States has 32 bilateral agreements in force with Canada and Mexico that also constitute international obligations<sup>19</sup>. Ten of the bands in Table 2-1 are currently obligated by one or more of those agreements. The United States will collaborate with the governments of Canada and Mexico<sup>20</sup> regarding revision or renegotiation of existing

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<sup>19</sup> U.S. State Department Treaties in Force, Bilateral Agreements with Canada and Mexico (listed alphabetically by country), available at <http://www.state.gov/t/tif/index.htm>.

<sup>20</sup> Information regarding the U.S.-Mexico High Level Consultative Commission on Telecommunications available at <http://www.state.gov/e/eeb/rls/othr/telecom/index.htm>.

agreements where necessary to maximize the efficiency of use of the bands in our common border areas prior to their repurposing.

For more information on the international process see Appendix B.

### **7.7. Enforcement Mechanisms**

Enforcement mechanisms are needed to support various aspects of these repurposing efforts. In the case of spectrum to be shared between Federal and non-Federal users, following adoption of appropriate technical and operational rules, the FCC and NTIA will devise mechanisms and codify them in the FCC service rules and NTIA Manual. These mechanisms will ensure that both sets of users have a clear path to resolve interference and any other sharing issues.

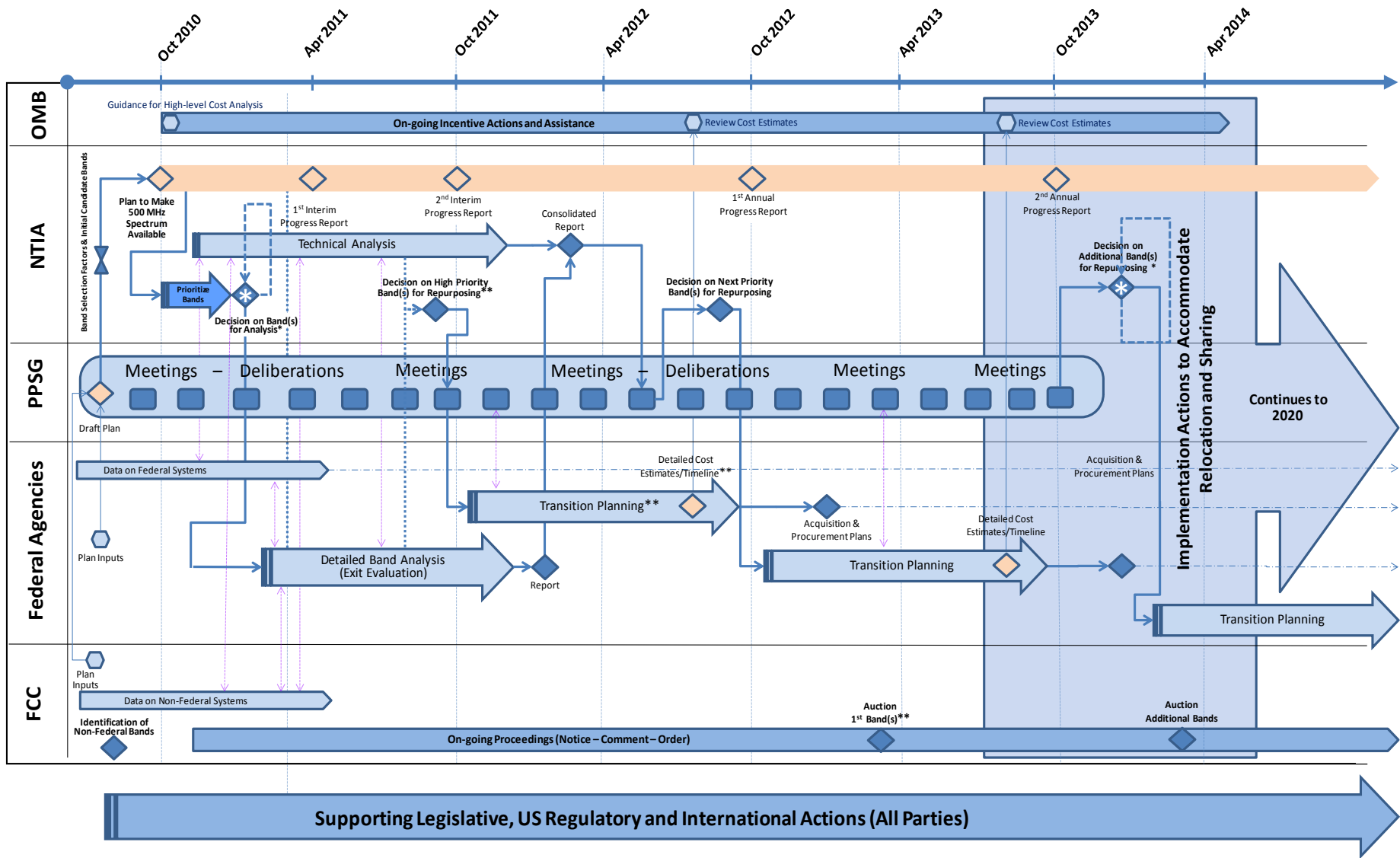
## 8. Planned Actions and Timeline

Table 8-1 shows a brief summary of actions; an estimate of the timelines involved; and projected inputs that will be required from NTIA, FCC, Federal agencies, and OMB for repurposing spectrum for wireless broadband. This effort requires immediate, sustained and coordinated efforts by the key entities involved to achieve the objectives and timetable set out by the President. NTIA and the FCC will work closely to identify and decide which frequency bands are to be evaluated and repurposed, seek input on non-Federal system requirements/characteristics, and report on those candidate bands sufficiently early in the process to allow time to complete allocation and service rulemaking proceedings. Necessary FCC actions will include modifying the Allocation Table, service rulemakings, promulgating incumbent relocation policy and requirements and auction rules. Figure 8-1 provides a graphical representation to describe the interrelationships between the entities and to provide a visual of Table 8-1.

**Table 8-1: Actions and Timetable**

	2010	2011	2012	2013	2014
<b>NTIA</b>					
Identify Band Evaluation Factors and Initial Candidate Bands					
<b>Publish 10-Year Plan</b>	1 Oct 10				
Lead Plan's Implementation					
Assess and identify International Implications				Continue to work International Actions	
Evaluate and Prioritize Bands					
<b>1<sup>st</sup> Selection</b> – 1 <sup>st</sup> Band for Analysis		Jan 11			
<b>Selection(s)</b> – Additional Band(s) for Analysis (as Needed)					
Publish 1 <sup>st</sup> Interim Progress Report		Apr 11			
Conduct Technical Analysis of Bands					
Prepare and coordinate draft proposed agenda item for WRC2016		NLT 1 Sep 11			
<b>Decision #1</b> – High Priority Band(s) to be Repurposed*		Sep 11*			
Publish 2 <sup>nd</sup> Interim Progress Report		Oct 11			
Publish Consolidated Report			Mar 12		
<b>Decision #2</b> – Next Priority Band(s) to be Repurposed			Sep 12		
Develop Transition Plan (Regulatory)					
Publish 1 <sup>st</sup> Annual Progress Report			1 Oct 12		
Publish 2 <sup>nd</sup> Annual Progress Report				1 Oct 13	
<b>Decision Point(s)</b> – Additional Bands to be Repurposed (as needed)					Jan 14
<b>FCC</b>					
Identify Candidate Bands and Seek input from Public (Tech & Ops Info)					
Provide Data on Non-Federal Systems					
Initiate Allocation Rule-making in order of Priority					
Initiate Service Rule-making in order of Priority					
Issue Authorizations for Wireless Broadband (via Auction as approp)*					
Transition Non-Federal Entities					
<b>PPSG/SWG</b>					
Meetings (Recurring, as needed)					
<b>Federal Agencies</b>					
Provide Data on Federal Systems					
Conduct Detailed Band Analysis* (Exit Evaluation)					
Provide Feedback on Priority Band(s) Detailed Analysis		Mar 11/Aug 11			
Publish Detailed Analysis Reports by Band			Feb 12		
Develop Transition Plans*					
Submit Detailed Cost Estimates/Timeline*			Aug 12*	Aug 13	

\* Decision point is Sep 11 if one band is being assessed, otherwise decision point will be moved to Feb 12 if two bands need to be assessed.



\* Additional Recurring Decisions over Time (as needed)      - - - - -> Recurring Loop (as needed)      ······> Interim Feedback/Report      - ······> Continuing over Time

\*\* Decision point is Sep 11 if an agency has one band selected for Detailed Band Analysis. If a single agency has two bands selected to be assessed at the same time, then the decision point is moved to Feb 12 and follow-on dependent actions will be adjusted, as appropriate.

Figure 8-1: Actions and Timeline for Making Available 500 Megahertz of Spectrum

## Appendix A

### Roles and Responsibilities

#### 1. National Telecommunications and Information Administration (NTIA):

The Assistant Secretary of Commerce for Communications and Information is responsible for the execution of this Plan as it relates to making available spectrum occupied by Federal operations in order to achieve its objective as stated in Section 1(a) of the Presidential Memorandum.

#### 2. Policy and Plans Steering Group (PPSG):

a. The PPSG was established to provide advice to the Assistant Secretary on spectrum-dependent telecommunications policies, strategic plans, planned or revised positions on spectrum issues nationally and internationally, and help resolve major spectrum policy issues that affect the use of spectrum by Federal and non-Federal users.

b. The PPSG is a body of senior Federal officials advising the Assistant Secretary on spectrum policy and strategic plans. It serves as a forum for issue resolution and harmonization as determined by the Assistant Secretary and is chaired by the Assistant Secretary.

c. The PPSG has established a working group, named the Spectrum Working Group (SWG), to conduct the more detailed work required to complete actions outlined in this Plan. The SWG is chaired by the Associate Administrator, Office of Spectrum Management, NTIA.

d. PPSG members will review recommendations from its working group and provide final endorsement of proposed spectrum for repurposing via recommendations to the Assistant Secretary.

#### 3. Spectrum Working Group (SWG):

a. The PPSG established the SWG to serve as the focal point for information exchange between NTIA and Federal agencies to identify 500 megahertz of spectrum to be made available within ten years to support wireless broadband services.

b. The SWG's primary function is to assist with development and coordination of NTIA's plan for identifying current spectrum for repurposing. Upon finalization of the Plan, the SWG will serve as the primary group for coordinating inputs and review of the detailed evaluations of repurposing candidate bands as well as the final recommendations proposed to the PPSG.

#### **4. Federal Communications Commission (FCC):**

a. The FCC is an independent Federal agency, directly responsible to Congress, which was established by the Communications Act of 1934. It is responsible for managing spectrum use by non-Federal entities, including the private sector, and state and local governments. Among other things, Section 1 of the Communications Act requires that spectrum management decisions promote new technologies and services, efficient use of the spectrum, interference protection among licensed stations, public safety, and international harmonization of spectrum use. See Communications Act of 1934, as amended, 47 U.S.C. § 151 *et seq.*

b. The FCC makes decisions in a transparent and open process in accordance with laws such as the Administrative Procedures Act and Paperwork Reduction Act, which govern the FCC's interactions with the public and the management of public resources, including spectrum. To this end, the FCC seeks comment on proposed rule changes and direct input from potential users of the spectrum prior to adopting any rules changes.

c. NTIA has invited the FCC to participate in the PPSG and SWG to provide updates at the meetings on FCC actions and the status of its efforts to identify spectrum for wireless broadband.

d. The NTIA and the FCC will collaborate to gather sufficient information regarding non-Federal uses of the spectrum and system characteristics. This includes information required to properly assess the viability of different bands under consideration and consists of such things as technical characteristics of spectrum-dependent devices, interference limits, operational and geographic needs, etc.

#### **5. Office of Management and Budget (OMB):**

a. OMB will provide representatives and participate as a member of the PPSG and SWG.

b. OMB will provide recurring updates at the PPSG and/or SWG meetings on OMB actions and the status of efforts to ensure adequate funding, incentives and assistance to support execution of this Plan.

#### **6. Federal Agencies:**

a. "Federal agencies," as used in this Plan, refers to those Federal agencies or other Federal entities that use spectrum, and as such, have a stake in the identification of spectrum for repurposing.

b. Federal agencies will provide representatives to the PPSG and SWG and support development and execution of this Plan. This includes providing information and data, as requested, as well as conducting reviews and analyses, as required, to properly assess bands.

c. Upon selection of bands, Federal agencies operating systems in those bands will be responsible for developing transition plans to support making the spectrum available within the required time period.

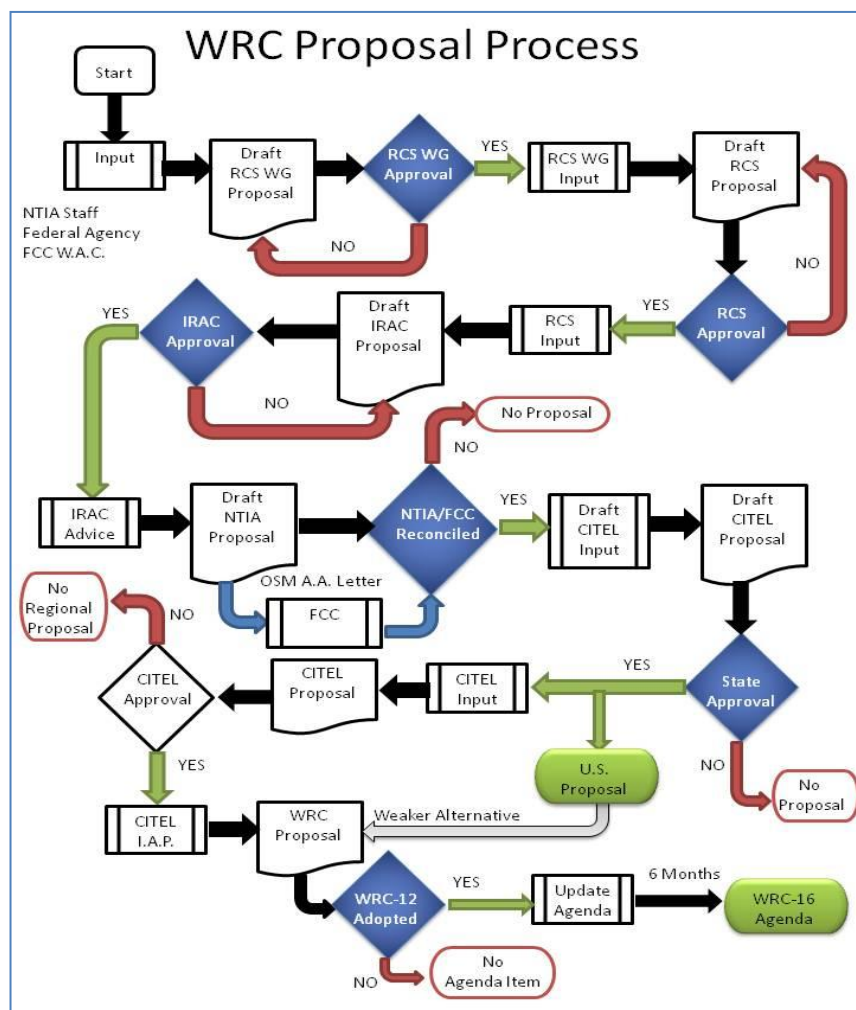
7. **Other Executive Branch Participants:** Representatives of the Office of Science and Technology Policy, the National Economic Council, and the National Security Staff will also participate in the PPSG.
  
8. **Other Executive Branch Processes:** Agency issues that remain unsolved by the PPSG process and/or agency issues (i.e., National Security) requiring decisions that extend beyond the authorities of the PPSG process may require higher level interagency process committees, deputies committees, or principal committees.



## Appendix B

### International Radio Regulation Change Process and Implications for Ten-Year Plan and Timetable

If a decision is made to repurpose bands that will require modification to the international Radio Regulations (RR), the United States must then consider developing a proposal to place this issue on the agenda for a future World Radiocommunication Conference (WRC). WRCs occur approximately every four years. To consider an allocation change on a WRC agenda, an agenda item must be agreed upon at the previous WRC. Therefore, to effect such a change, a minimum of four years is required and ultimately, the agreement of the other member states of the ITU. As Figure B-1 shows, developing a new agenda item for the WRC by the Federal Government is a long, multi-step process.



**Figure B-1: U.S. International Radio Regulation Change Process**

A new proposal must be coordinated through the Radio Conference Subcommittee (RCS) and the Interdepartment Radio Advisory Committee (IRAC), which provide advice to the National Telecommunications and Information Administration (NTIA). Taking this advice into consideration, NTIA would then approve a draft proposal on behalf of the Federal agencies. Each of the Federal agencies has its own internal process to prepare input into the RCS/IRAC process. NTIA would submit the draft proposal to the FCC for their consideration in their WRC process. If the FCC agrees to the proposal and reconciles the proposal with NTIA, then the proposal goes to State Department for its approval and ultimate submission to the Inter-American Commission on Telecommunications (CITEL) Permanent Consultative Committee (PCC) II. If CITEL countries adopt the proposal as an Inter-American Proposal (IAP), they submit it to the WRC. If the United States is unsuccessful in getting an IAP for the item, it can submit the proposal directly to the WRC. However, it has less chance of success without regional support. If the WRC agrees to place this issue on the agenda of the following WRC, then the appropriate ITU-R study groups and working parties would conduct technical, operational, and procedural studies over a four-year period. At the end of the four years, the ITU-R would present the results of its work and recommendations on how to satisfy this agenda item to the appropriate WRC. The WRC may decide to take action (change the RRs) or not take action on the agenda item. If the WRC decides to make no changes regarding this issue, then the United States will have to re-evaluate changing the domestic allocations in the relevant bands due to international treaties and/or obligations.

In summary, the process to obtain a new WRC agenda item, conduct and complete necessary ITU technical, operational and procedural studies, and obtain an international allocation and/or regulatory provisions in the Radio Regulations is a 6-8 year process. During this period, the United States would also be working to update treaty text in the relevant international bodies (International Civil Aviation Organization (ICAO), International Maritime Organization (IMO), North Atlantic Treaty Organization (NATO), etc.) if the item impacts issues covered by their treaty text (such as Safety of Life at Sea or SOLAS<sup>21</sup> requirements) and there will also be a need to update host nation agreements. This can have an impact on the overall timeline. A complete analysis of international implications of a domestic reallocation of a candidate band will be conducted as part of the evaluation process described in the Plan.

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<sup>21</sup> The SOLAS Convention in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships.