Fifth Interim Progress Report on the Ten-Year Plan and Timetable

U.S. Department of Commerce

Penny Pritzker, Secretary

Lawrence E. Strickling, Assistant Secretary
for Communications and Information

April 2015

TABLE OF CONTENTS

A. INTRODUCTION

1. Summary

The National Telecommunications and Information Administration (NTIA) submits this *Fifth Interim Progress Report* in response to the Presidential Memorandum issued on June 28, 2010. The *2010 Presidential Memorandum* directed the Secretary of Commerce, working through NTIA and in collaboration with the Federal Communications Commission (FCC), to identify and make available 500 megahertz of federal and non-federal spectrum by 2020 for expanded wireless broadband use.[1] This report covers the period from October 1, 2013 through September 30, 2014.[2]

In October 2010, pursuant to the *2010 Presidential Memorandum*, NTIA, with input from the Policy and Plans Steering Group (PPSG), issued a Plan and Timetable to achieve the President's 500 megahertz goal over the next ten years.[3] Taking into account the significance of protecting vital government missions that rely on spectrum, the Plan identified over 2,200 megahertz of federal and non-federal spectrum for evaluation, proposed a process for evaluating candidate bands, and set forth the steps necessary to select and make spectrum available for wireless broadband services.

Between October 2010 and September 2014, NTIA and the FCC formally recommended or otherwise identified for study for potential reallocation up to 589 megahertz in the following bands:

- Federal or shared bands (335 megahertz total):
  - 40 megahertz from the 1695-1710 MHz and 1755-1780 MHz bands[4]
  - 100 megahertz from the 3.5 GHz band (3550-3650 MHz)
  - 195 megahertz from two of the 5 GHz bands (5350-5470 MHz and 5850-

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

[2] This report also refers to some activities that occurred between the end of the period and the publication date.

[3] NTIA, *Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband* (Oct. 2010), *available at* http://www.ntia.doc.gov/files/ntia/publications/tenyearplan_11152010.pdf (*Ten-Year Plan*). The PPSG is an advisory group of senior federal officials who advise NTIA on achieving the objectives of the 2010 Presidential Memorandum. *See 2010 Presidential Memorandum* at § 1(c).

[4] The total of 405 megahertz from federal or shared bands in the *Fourth Interim Report* included 70 megahertz from the 1780-1850 MHz band. *See* NTIA, *Fourth Interim Progress Report on the Ten-Year Plan and Timetable and Plan for Quantitative Assessments of Spectrum Usage* (June 5, 2014) at 1, *available at* http://www.ntia.doc.gov/files/ntia/publications/fourth_interim_progress_report_final.pdf (*Fourth Interim Report*). Since, as a result of the AWS-3 transition, some federal agencies are moving systems from the 1755-1780 MHz band into the 1780-1850 MHz band, NTIA has removed the 1780-1850 MHz band from consideration for repurposing under the *Ten-Year Plan.*

5925 MHz)

- Non-federal bands (152-254 megahertz total):
  - 30 megahertz from the 2305-2320 MHz and 2345-2360 MHz bands
  - 10 megahertz from the 1915-1920 MHz and 1995-2000 MHz bands
  - 40 megahertz from the 2000-2020 MHz and 2180-2200 MHz bands
  - 25 megahertz from the 2155-2180 MHz band
  - 5 megahertz from the 2020-2025 MHz band[5]
  - 42-144 megahertz from the 512-698 MHz band[6]

The FCC has initiated rulemaking proceedings for these and other bands based upon its 2010 *National Broadband Plan*.[7] NTIA and the FCC have also made significant progress toward the implementation of the key spectrum-related provisions of the Middle Class Tax Relief and Job Creation Act of 2012,[8] with one spectrum auction occurring in early 2014, another beginning in November 2014, and a third with an anticipated start date in early 2016.

On June 14, 2013, President Obama issued a second, related memorandum, entitled *Expanding America's Leadership in Wireless Innovation*, through which the Administration seeks to make more spectrum available for commercial use by allowing and encouraging shared access by commercial providers to spectrum that is currently allocated for federal use.[9] At the same time, the memorandum recognizes the national interest in protecting current and future

[5] In the *AWS-3 NPRM*, the FCC revised its informal nomenclature to also refer to the 2020-2025 MHz band as *AWS-3*, though the specific statutory provisions and licensing deadline required with respect to the other three bands did not apply to the 2020-2025 MHz band. *See* Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands, GN Docket No. 13-185, *Notice of Proposed Rulemaking and Order on Reconsideration*, 28 FCC Rcd 11479, 11481-82 n. 1 (2013), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-13-102A1_Rcd.pdf (*AWS-3 NPRM*). The FCC has deferred decisions on service rules for this band. *See* Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands, GN Docket No. 13-185, *Report and Order*, 29 FCC Rcd 4610, 4636 ¶ 59 (2014) *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-31A1_Rcd.pdf (*AWS-3 Report and Order*).

[6] The FCC set forth a number of 600 MHz band plan scenarios for between two sets of paired blocks and twelve sets of paired blocks with guard bands (resulting in 42 to 144 megahertz of repurposed spectrum), reflecting the fact that the FCC will not know the exact number of blocks licensed or their frequencies until the incentive auction concludes. *See* Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12-268, *Report and Order*, 29 FCC Rcd 6567, 6585 ¶ 46 (2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-50A1_Rcd.pdf (*Incentive Auction Report and Order*).

[7] FCC, *Connecting America: The National Broadband Plan* (2010) *available at* http://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf (*National Broadband Plan*).

[8] *See* Pub. L. No. 112-96, Title VI, 126 Stat. 201 (Feb. 22, 2012), *available at* http://www.gpo.gov/fdsys/pkg/PLAW-112publ96/pdf/PLAW-112publ96.pdf (*Tax Relief Act*).

[9] *See* Memorandum for the Heads of Executive Departments and Agencies, *Expanding America's Leadership in Wireless Innovation* (rel. June 14, 2013), *published at* 78 Fed. Reg. 37431 (June 20, 2013), *available at* http://www.whitehouse.gov/the-press-office/2013/06/14/presidential-memorandum-expanding-americas-leadership-wireless-innovatio (*2013 Presidential Memorandum*). The memorandum also strongly encourages the FCC to identify "spectrum allocated for non-federal uses that can be made available to agencies, on a shared or exclusive basis." *Id.* at § 7(b).

government operations.[10] This memorandum directs federal agencies to take a number of steps to accelerate shared access to spectrum, including making quantitative assessments of actual spectrum usage in prioritized frequency bands.[11]

In response, NTIA published a *Plan for Quantitative Assessments of Spectrum Usage* in conjunction with its *Fourth Interim Report*.[12] This plan provides for agency assessments, in 960 megahertz of spectrum, that contain information that NTIA and the Spectrum Policy Team (SPT) will use to help identify bands to be considered for detailed sharing feasibility studies.[13] This includes agency information "on their projected increases in spectrum usage as well as detailed information regarding any non-federal bands in which agency operations could be performed to aid in fulfilling their missions."[14]

2. Key Accomplishments

This *Fifth Interim Progress Report* summarizes and assesses the progress NTIA and the FCC, in collaboration with federal and non-federal stakeholders, made from October 1, 2013 through September 30, 2014 in implementing the October 2010 *Ten-Year Plan*.[15] The key accomplishments for this reporting period include:

- AWS-3 Bands
    - Federal agencies developed transition plans for federal agency systems subject to relocation from, or sharing within, the 1695-1710 MHz and 1755-1780 MHz bands; the Technical Panel approved these plans and NTIA published them;
    - The FCC adopted final service, technical, and licensing rules for the bands, and adopted auction procedures for the AWS-3 auction, scheduled to begin in November 2014;
    - NTIA and the FCC released a Joint Public Notice on procedures for AWS-3 coordination between federal and commercial interests;

[10] "…[W]e must ensure that Federal, State, local, tribal, and territorial governments are able to maintain mission critical capabilities that depend on spectrum today, as well as effectively and efficiently meet future requirements." *Id*. at introduction.

[11] *Id.* at § 3(a).

[12] *Fourth Interim Report* at Appendix A, *Plan for Quantitative Assessments of Spectrum Usage*.

[13] Section 1 (a) of the *2013 Presidential Memorandum* established the Spectrum Policy Team to work with NTIA to implement the memorandum and to monitor the advances in spectrum sharing policies and technologies. It is co-chaired by the Chief Technology Officer and the Director of the National Economic Council, or their designees, and includes representatives from the Office of Management and Budget (OMB), the National Security Staff, and the Council of Economic Advisors.

[14] *Id*. at A-2.

[15] *See 2010 Presidential Memorandum* at § 1(d).

- The Department of Defense (DOD) developed, and NTIA published, a "Workbook" augmenting the statutorily-required transition plans and providing an unprecedented level of information to assist potential bidders, while protecting sensitive government information; and

- The FCC accepted seventy bidder applications to participate in the AWS-3 auction.

- 3.5 GHz Band

  - NTIA, in cooperation with certain federal agencies and the wireless broadband industry, completed initial measurements providing information on the effects of interference between radars and Long-Term Evolution (LTE) systems in the 3550-3650 MHz band;

  - NTIA, through a joint working group with the FCC and DOD, analyzed whether and how to reduce the size of exclusion areas for LTE systems to protect federal radar operations in the 3550-3650 MHz band; and

  - The FCC proposed new rules to enable innovative federal/commercial sharing in the 3550-3650 MHz band.

- 5 GHz Bands

  - The FCC changed rules for U-NII deployment in the 5150-5250 MHz band; and

  - NTIA published studies evaluating potential sharing criteria between commercial Unlicensed National Information Infrastructure (U-NII) devices and federal radiolocation in the 5350-5470 MHz band.

- Other FCC Activities

  - The FCC auctioned wireless broadband licenses in the 1915-1920 MHz and 1995-2000 MHz bands (H Block), yielding the first spectrum auction proceeds deposited to the Public Safety Trust Fund;

  - The FCC adopted rules for the first-ever incentive auction, whereby broadcasters will voluntarily relinquish spectrum rights for a share in the proceeds from auctioning their spectrum for commercial wireless services; and

  - The FCC proposed new rules to provide for unlicensed operations in the white spaces and guard bands that will result from the repacking of the TV broadcast spectrum for the incentive auction.

- Related Activities

  - NTIA, in collaboration with the federal agencies, took initial steps toward quantitative assessments in five frequency bands, totaling 960 MHz of spectrum,

to identify bands for further study toward possible repurposing; and

- NTIA and the FCC issued a Joint Public Notice seeking comments regarding the creation of a "Model City" that would establish a collaborative, real-life demonstration and evaluation environment to support the development and deployment of innovative spectrum sharing technologies.

3. Activities for the Next Twelve Months

Looking ahead, NTIA and the FCC, in collaboration with federal and non-federal stakeholders, will continue to implement the *2010 Presidential Memorandum*, the *Tax Relief Act*, and the *2013 Presidential Memorandum* to meet growing federal and non-federal spectrum requirements. NTIA will continue to facilitate federal and industry stakeholder engagement through transition of the 1695-1710 MHz and 1755-1780 MHz bands, and will continue to work with the FCC and the DOD to help develop solutions to create a new innovative three-tiered shared service in the 3550-3650 MHz band, consistent with a recommendation from the President's Council of Advisors on Science and Technology (PCAST).[16] In cooperation with the FCC and other stakeholders, NTIA will develop sharing options to accommodate new and innovative broadband applications and devices in the 5 GHz bands. With the benefit of public comment, NTIA and the FCC will further refine the definition of the Model City concept to promote innovative spectrum-sharing technologies. The FCC will continue efforts toward making spectrum above 24 GHz available for mobile services.[17] Finally, to assist in identifying additional frequency bands for potential repurposing, NTIA will work with federal agencies to complete quantitative assessments of actual spectrum use in five frequency bands. Activities and progress in support of each of these goals are outlined in greater detail below.

B. ACTIVITIES AND ACCOMPLISHMENTS

Since October 1, 2013, NTIA and the FCC, along with federal agencies participating through the PPSG, have made substantial progress toward the President's goal of making 500 megahertz of spectrum available for wireless broadband according to the *Ten-Year Plan.* During this reporting period, NTIA chaired three meetings of the PPSG and eight meetings of the PPSG's Spectrum Working Group. As part of the 500 megahertz goal, and in cooperation with NTIA in the case of federal bands, the FCC is working toward the *National Broadband*

[16] *See* PCAST, Report to the President: *Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth* at xiv, Recommendation 7.1 (July 2012), *available at* http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf (*PCAST Report*).

[17] *See generally* Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, GN Docket No. 14-177, *Notice of Inquiry*, 29 FCC Rcd 13020 (2014) *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-154A1_Rcd.pdf.

Plan goal of making 300 megahertz of spectrum newly available for mobile broadband by 2015.[18]

Table B-1 lists the frequency bands that NTIA and the FCC have made available or are investigating for potential repurposing, along with bandwidth totals by category.

Table B-1 Federal, Non-Federal, and Shared Spectrum Bands Under Investigation				
Frequency Band	*Spectrum Made Available (megahertz)*	*Spectrum Identified and In Process (megahertz)*	*Spectrum Under Study (megahertz)*	*Spectrum for Potential Future Study (megahertz)*
WCS: 2305-2320 and 2345-2360 MHz	30			
H Block: 1915-1920 and 1995-2000 MHz	10			
AWS-4: 2000-2020 and 2180-2200 MHz	40			
AWS-3: 1695-1710, 1755-1780, and 2155-2180 MHz		65		
3550-3650 MHz		100		
Incentive Auction 512-698 MHz		42-144		
Radiosondes 1675-1680 MHz			5	
2020-2025 MHz			5	
5350-5470 MHz			120	
5850-5925 MHz			75	
1300-1390 MHz				90
1680-1695 MHz				15
2700-2900 MHz				200
2900-3100 MHz				200
3100-3550 MHz				450
Totals:	**80**	**207-309**	**205**	**955**

1. AWS-3 Bands

On March 31, 2014, the FCC adopted the *AWS-3 Report and Order* establishing service, allocation, and technical rules for the AWS-3 bands (1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz) and setting the stage to make 65 megahertz of spectrum available for flexible

[18] *See National Broadband Plan* at 84, Recommendation 5.8.

use wireless services, including mobile broadband.[19] Provisions of the *Report and Order* establish coordination requirements to temporarily facilitate sharing between incumbent federal systems transitioning from the 1695-1710 MHz and 1755-1780 MHz bands and new, licensed commercial wireless broadband systems following the AWS-3 auction.

On July 18, 2014, NTIA and the FCC released a *Joint Public Notice* establishing a framework for coordination between AWS-3 licensees and affected federal agency incumbents to enable shared use of the 1695-1710 MHz and 1755-1780 MHz bands.[20] Parties have the option to coordinate early access and temporary sharing through portals that NTIA and the DOD are developing for this purpose. In addition, the FCC adopted allocation and sharing rules, contingent on the successful auction of the 1755-1780 MHz band, that will allow DOD access to the 2025-2110 MHz band for military systems on a primary basis, consistent with a DOD plan that helped clear the 1755-1780 MHz band.[21] After the transition of most federal systems to other bands, other provisions of the *AWS-3 Report and Order* will govern sharing between the commercial broadband systems and certain federal systems that will remain in the bands indefinitely.[22]

a) Transition Planning

The *Fourth Interim Report* described revisions to the Commercial Spectrum Enhancement Act (CSEA) enacted as part of the *Tax Relief Act* that expanded the types of costs for which agencies could receive Spectrum Relocation Fund payments and implemented new provisions associated with transition planning for the relocation or sharing of federal spectrum.[23] NTIA facilitated discussion and provided guidance to federal agencies through a Transition Planning Working Group (TPWG) in support of development of their transition plans. NTIA provided the agencies with auction-specific guidance and templates for completing their transition plans for the two bands, as well as submission instructions. Following procedures

[19] *See AWS-3 Report and Order* at 59, footnote 1.

[20] Coordination Procedures in the 1695-1710 MHz and 1755-1780 MHz Bands, *Joint Public Notice*, GN Docket No. 13-185, DA 14-1023 (July 18, 2014), *available at* http://www.ntia.doc.gov/files/ntia/publications/pn-aws3-procedures.pdf and https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1023A1.pdf (*AWS-3 Joint PN*).

[21] *See AWS-3 Report and Order* at 211.

[22] *See id*. at 222. As described in the *Fourth Interim Report*, NTIA had determined, based on Commerce Spectrum Management Advisory Committee (CSMAC) studies, that relocation of some federal systems from the 1695-1710 MHz and 1755-1780 MHz bands was not feasible because of technical or cost constraints; *see Fourth Interim Report* at 12. In accordance with CSEA requirements, NTIA provided notification of this situation to the Chairmen and Ranking Members of the Senate Committee on Commerce, Science and Transportation; and the House Committee on Energy and Commerce. *See* Letters from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to The Honorable John D. Rockefeller IV, Chairman, Senate Committee on Commerce, Science and Transportation, et al., (June 4, 2014), *available at* http://www.ntia.doc.gov/files/ntia/publications/ntia_notice_to_congress_per_47_usc_923j_re_1695_and_1755_sharing_final_06-04-2014.pdf (*NTIA Letters on AWS-3 Relocation*).

[23] *See Fourth Interim Report* at 13-14.

under the revised CSEA, NTIA, the FCC, and Office of Management and Budget (OMB) each appointed one representative to the Technical Panel, established to review the transition plans.[24]

Five federal agencies submitted transition plans for the 1695-1710 MHz band and eighteen agencies submitted plans for the 1755-1780 MHz band, including two plans that contained classified information. The Technical Panel members assessed the transition plans to determine their sufficiency, as well as the reasonableness of the proposed timelines and estimated relocation or sharing costs. As necessary, the agencies modified their plans based on Technical Panel feedback to meet CSEA requirements. On May 7, 2014, the Technical Panel found all transition plans to have met the requirements. On June 4, 2014, NTIA notified the Chairman and Ranking Members of the Senate Committee on Commerce, Science and Transportation, and the House Committee on Energy and Commerce of its determination that relocation of certain federal entities from the 1695-1710 MHz and 1755-1780 MHz spectrum bands is not feasible because of technical or cost constraints.[25]

In accordance with CSEA requirements, NTIA published the agencies' transition plans on July 16, 2014.[26] Since the CSEA procedures preclude the publication of classified or other sensitive information included in the plans, DOD also provided a "Workbook" in the form of a spreadsheet to provide potential bidders transition information on a granular basis. Without revealing sensitive national security information, the Workbook identifies coordination requirements for potential bidders and the potential impact from DOD systems remaining in the band.

b) Estimated Costs and Timelines

On May 13, 2014, NTIA, on behalf of the federal agencies, notified the FCC of the initial estimated relocation or sharing costs and the estimated timelines for federal systems in the 1695-1710 MHz and 1755-1780 MHz bands. The estimated costs totaled approximately $527 Million for the 1695-1710 MHz band and $4.58 Billion for the 1755-1780 MHz band. NTIA also provided these estimates to the House Committees on Appropriations and Energy and Commerce, and the Senate Committees on Appropriations and Commerce, Science, and Transportation, for approval, and to the Comptroller General.[27]

---

[24] *Tax Relief Act* § 6701, 126 Stat. 249-250.

[25] *NTIA Letters on AWS-3 Relocation.*

[26] *Tax Relief Act* § 6701, 126 Stat. 250. *See AWS-3 Transition* web page, *available at* http://www.ntia.doc.gov/category/aws-3-transition.

[27] *See* Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce, to The Honorable Tom Wheeler, Chairman, FCC (May 13, 2014), *available at* http://www.ntia.doc.gov/files/ntia/publications/notification_to_fcc_re_est_costs_for_1695_and_1755_bands_05132014.pdf.

c) AWS-3 Auction

On May 19, 2014, the FCC announced that it would begin its auction for AWS-3 licenses (Auction 97) on November 13, 2014 and sought comment on auction procedures and reserve prices for the 1695-1710 MHz band and the 1755-1780 MHz/2155-2180 MHz band pair.[28] On July 23, 2014, the FCC released a *Public Notice* announcing auction procedures and setting the reserve prices.[29] The reserve prices reflect the estimated costs of sharing and transitioning that the agencies included in their approved transition plans. Under a statutory requirement, the net proceeds from the auction must meet 110 percent of the estimated costs of sharing or clearing.[30] On the basis of this requirement, the FCC established reserve prices of approximately $579 Million for the 1695-1710 MHz band and $10 Billion for the 1755-1780 MHz/2155-2180 MHz band pair.[31] The FCC accepted seventy bidder applications to participate in the AWS-3 auction.[32]

2. 3.5 GHz Band

The *Fourth Interim Report* described the FCC's December 2012 proposal, published in its *3.5 GHz NPRM*, for commercial wireless broadband access to the 3550-3650 MHz band on a three-tiered licensing and access basis using dynamic database management.[33]

During this reporting period, the FCC sought to further refine its earlier licensing proposal, seeking comment on a revised licensing framework and technical requirements through a Public Notice adopted on November 1, 2013.[34] The Public Notice sought comment on

---

[28] *See* Auction of Advanced Wireless Services Licenses Scheduled for November 13, 2014; Comment Sought on Competitive Bidding Procedures for Auction 97, AU Docket No. 14-78, *Public Notice*, 29 FCC Rcd 5217 (2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-14-669A1.pdf.

[29] *See* Auction of Advanced Wireless Services (AWS-3) Licenses Scheduled for November 13, 2014; Notice and Filing Requirements, Reserve Prices, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 97, AU Docket No. 14-78, *Public Notice*, 29 FCC Rcd 8386 (2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1018A1_Rcd.pdf (*AWS-3 Procedures PN*).

[30] *See* 47 U.S.C. § 309(j)(16)(B).

[31] *See AWS-3 Procedures PN*, 29 FCC Rcd at 8438-39.

[32] *See* Auction of Advanced Wireless Services (AWS-3) Licenses; 70 Bidders Qualified to Participate in Auction 97, AU Docket No. 14-78, *Public Notice*, 29 FCC Rcd 13465 (2014) *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1564A1_Rcd.pdf. *See also* Auction of Advanced Wireless Service (AWS-3) Licenses; Status of Short-Form Applications to Participate in Auction 97, AU Docket No. 14-78, *Public Notice*, 29 FCC Rcd 11606 (2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1414A1_Rcd.pdf.

[33] *See Fourth Interim Report* at 19-20. *See also* Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, *Notice of Proposed Rulemaking*, 27 FCC Rcd 15594 (2012), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db1212/FCC-12-148A1.pdf (*3.5 GHz NPRM*).

[34] *See* Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 MHz Band, GN Docket No. 12-354, *Public Notice*, 28 FCC Rcd 15300 (2013), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-13-144A1.pdf.

maintaining the access model with three tiers—Incumbent Access, Priority Access, and General Authorized Access—with the Priority Access tier available on a licensed basis for flexible use services. The Priority Access Licenses, or PALs, would be comprised of ten-megahertz blocks, each covering a census tract for a one-year, non-renewable license term. On January 14, 2014, the FCC held a workshop and issued a call for papers to further explore the requirements, functionality, and technology for spectrum access systems that would coordinate access to the band.[35]

On April 23, 2014, the FCC adopted the *3.5 GHz FNPRM*, taking this input into consideration and proposing specific licensing, technical, and service rules for the Citizens Broadband Radio Service (CBRS).[36] The FNPRM rules follow the three-tiered access model, governed by a dynamic spectrum access system, as the *PCAST Report* had suggested and the *3.5 GHz NPRM* had proposed. The FNPRM also incorporated licensing proposals based on the record in response to the Public Notice. It sought comment on extending the three-tiered regime to the 3650-3700 MHz band. The FCC also sought comment on incorporating the exclusion zones developed in the *Fast Track Report* specifically to protect radar systems in the band, while committing to work with NTIA, DOD, and other federal agencies to reduce the size of the exclusion zones.[37] The *3.5 GHz FNPRM* will further develop a record based on which the FCC can adopt final rules.

Representatives from NTIA, the FCC, and DOD are participating in a joint working group to determine whether the size of exclusion zones, currently based on assumptions made in the *Fast Track Report*, can be reduced. In support of this effort, NTIA has worked in conjunction with industry to perform limited measurements on the effects that different interfering signals will have on radar receivers and LTE receivers.[38]

---

[35] *See* Wireless Telecommunications Bureau and Office of Engineering and Technology Announce Workshop on the Proposed Spectrum Access System for the 3.5 GHz band, GN Docket 12-354, *Public Notice*, 29 FCC Rcd 174 (2013), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-13-126A1.pdf. An archived webcast of the workshop and workshop presentations are available at http://www.fcc.gov/events/35-ghz-spectrum-access-system-workshop.

[36] Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, *Further Notice of Proposed Rulemaking*, 29 FCC Rcd 4273 (2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521099242 (*3.5 GHz FNPRM*).

[37] *Id*. at 4315-16. Based on NTIA recommendations, this spectrum would be made available for sharing using exclusion zones to protect incumbent federal operations. *See* NTIA, *An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, and 4200-4220 MHz, 4380-4400 MHz Bands* at 5-3 – 5-8 (2010), *available at* http://www.ntia.doc.gov/files/ntia/publications/fasttrackevaluation_11152010.pdf. In the *3.5 GHz FNPRM*, the FCC stated its intention to work collaboratively with NTIA and the federal agencies to reduce the exclusion zone distances. *See infra* note 38 and accompanying text.

[38] *See* NTIA, *Effects of Radar Interference on LTE (FDD) eNodeB and UE Receiver Performance in the 3.5 GHz Band*, Technical Report TR-14-506 (July 2014), *available at* http://www.its.bldrdoc.gov/publications/2759.aspx;

3. 5 GHz Bands

Currently, U-NII devices operate in 555 megahertz of spectrum in the 5 GHz band, providing Wi-Fi enabled local area networks to connect smart phones, tablets, and laptops to the broadband network. This spectrum also supports broadband services offered by Wireless Internet Service Providers (WISPs), particularly in rural areas.

a) 5150-5250 MHz Band

On March 31, 2014 the FCC adopted a *Report and Order* that made changes to increase the utility of the 5 GHz band where U-NII devices operate. Specifically, the *Report and Order* removed the indoor-only restriction and increased the permitted power in the 5150-5250 MHz band to make this spectrum more usable for deploying unlicensed wireless broadband services. The *Report and Order* also adopted rules to mitigate potential harmful interference to radar systems in the 5 GHz band. Specifically, the amended rules required security features for all 5 GHz U-NII devices so they cannot be modified to operate in ways inconsistent with the rules. The *Report and Order* also combined certain rules to eliminate inconsistencies.[39]

b) 5350-5470 MHz and 5850-5925 MHz Bands

The *Tax Relief Act* specifically directed NTIA, in consultation with DOD and other affected agencies, to examine the potential for expanded unlicensed use in the 5 GHz band and for the FCC to initiate a rulemaking in this regard.[40] In February 2013, the FCC issued an *NPRM* that proposed to make an additional 195 megahertz of spectrum available for unlicensed use in the 5350-5470 MHz and 5850-5925 MHz bands.[41]

During this reporting period, NTIA, in cooperation with federal and commercial interests and the FCC, continued to work in support of the Department of State's International Telecommunication Advisory Committee for the ITU Radiocommunication Sector (ITAC-R) to further develop technical analysis of sharing techniques and potential mitigation requirements for the 5350-5470 MHz band. This work also supports technical studies in preparation for

---

NTIA, *EMC Measurements for Spectrum Sharing Between LTE Signals and Radar Receivers*, Technical Report TR-14-507 (July 2014), *available at* http://www.its.bldrdoc.gov/publications/2760.aspx.

[39] *See* Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, ET Docket No. 13-49, *First Report and Order*, 29 FCC Rcd 4127 (2014), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0401/FCC-14-30A1.pdf (*5 GHz Report and Order*).

[40] *Tax Relief Act* § 6406, 47 U.S.C. § 1453.

[41] *See* Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, ET Docket No. 13-49, *Notice of Proposed Rulemaking*, 28 FCC Rcd 1749 (2013), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-13-22A1.pdf (*5 GHz NPRM*). The FCC took partial action on the *5 GHz NPRM* in the *5 GHz Report and Order*. For example, the FCC modified certain technical rules for devices authorized to operate in these bands to protect Terminal Doppler Weather Radar. *See 5 GHz Report and Order* at 61-86.

WRC-15.[42]

The ITAC-R developed five studies addressing compatibility between U-NII devices and ground-based, airborne, shipborne, and space-based radar systems, and submitted those studies to the ITU for publication. The studies, which support both the *5 GHz NPRM* and preparations for WRC-15, considered a variety of techniques for the U-NII systems to mitigate interference to the radar systems, including employing dynamic frequency selection, requiring that the systems operate primarily indoors, and limiting the power of the transmitters. While the studies identified specific scenarios in which the U-NII and radar systems would be either compatible or incompatible, all called for further studies.[43]

NTIA and FCC staff are continuing to work with the federal agencies and industry to explore and develop sharing techniques, where feasible, to expand access to the additional 195 megahertz of spectrum proposed in the *5 GHz NPRM*. Key issues include the ability to share with radar systems that have different characteristics from those in the spectrum that is already shared, protections for the earth exploration-satellite service, and protections for Intelligent Transportation Services, especially those involving critical safety of life communications.[44]

4. Other FCC Activities

a) H Block Auction

The *Fourth Interim Report* described the FCC's development of rules and other

---

[42] *See infra* at 14.

[43] *See* ITU Radiocommunication Sector, U.S. contribution to Joint Task Group 4-5-6-7, *Working Document Towards a Preliminary Draft New Report ITU-R M.[5350MHZAERO]—Compatibility Studies Between Radio Local Area Network Systems and Aeronautical Airborne Radar Systems in the 5350-5470 MHz Frequency Bands*, Document 4-5-6-7/492, (Feb. 17, 2014) at 22, *available at* http://www.itu.int/md/R12-JTG4567-C-0492/en; ITU Radiocommunication Sector, U.S. contribution to Joint Task Group 4-5-6-7, *Working Document Towards a Preliminary Draft New Report ITU-R M.[5350MHZ GROUND-BASED RADARS]—Compatibility Studies Between Radio Local Area Network (RLAN) Systems and Ground-Based Radiodetermination Systems in the 5350-5470 MHz Frequency Bands*, Document 4-5-6-7/493, (Feb. 17, 2014) at 22, *available at* http://www.itu.int/md/R12-JTG4567-C-0493/en; ITU Radiocommunication Sector, U.S. contribution to Joint Task Group 4-5-6-7, *Preliminary Draft New Report ITU-R RS.[EESS RLAN 5 GHz]—Sharing Studies Between RLAN and EESS (Active) Systems in the Frequency Range 5350-5470 MHz*, Document 4-5-6-7/704, (July 18, 2014) at 35, *available at* http://www.itu.int/md/R12-JTG4567-C-0704/en; ITU Radiocommunication Sector, U.S. contribution to Joint Task Group 4-5-6-7, *Sharing Between Radio Local Area Network (RLAN) Systems and Radiolocation Service Systems in the 5350-5470 MHz Frequency Range*, Document 4-5-6-7/705, (July 17, 2014) at 12, *available at* http://www.itu.int/md/R12-JTG4567-C-0705/en; ITU Radiocommunication Sector, U.S. contribution to Joint Task Group 4-5-6-7, *Compatibility Studies Between Radio Local Area Network Systems and Shipborne Radiodetermination Systems in the 5350-5470 MHz Frequency Range*, Document 4-5-6-7/707, (July 17, 2014) at 41-42, *available at* http://www.itu.int/md/R12-JTG4567-C-0707/en.

[44] Federal Motor Vehicle Safety Standards: Vehicle-to-Vehicle (V2V) Communications, *Advance Notice of Proposed Rulemaking and Notice of Availability of Technical Report*, Docket No. NHTSA–2014–0022, RIN 2127–AL55 (rel. Aug. 18, 2014), published at 79 Fed. Reg. 49270 (Aug. 20, 2014), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/V2V/V2V-ANPRM_081514.pdf.

preparations for terrestrial wireless broadband use of the 1915-1920 MHz and 1995-2000 MHz bands (H Block).[45] The FCC held an auction for the H Block licenses in early 2014.[46] The auction proceeds met the reserve price of $1.56 Billion and became the first spectrum auction proceeds deposited to the Public Safety Trust Fund established by the *Tax Relief Act*.[47]

b) Broadcast Television Incentive Auction

On May 15, 2014, the FCC adopted the *Incentive Auction Report and Order*, which established rules to create a market-based approach through which television broadcasters may voluntarily give up some or all of their spectrum usage rights during a reverse auction in exchange for auction proceeds from wireless broadband providers buying flexible-use wireless licenses in a corresponding forward auction. The rules established a band plan, set the auction design, established post-auction transition processes, and addressed post-auction regulatory issues.

The FCC crafted a band plan to accommodate market variation depending on the amount of spectrum recovered in a market, and created a new geographic market unit—the Partial Economic Area—to permit entry by providers on a localized basis, while allowing markets to be easily aggregated on a larger geographic scale.[48]

The band plan also includes guard bands that the FCC will make available for unlicensed use.[49] The FCC proposed rules to provide for unlicensed operations in these guard bands as well as in the white spaces that will result from repacking the spectrum through the incentive auction.[50] The proposed rules would modify and build upon existing rules that allow unlicensed operation in the white spaces in the TV bands through a database that protects incumbent TV broadcasting and other radio services from harmful interference.[51] The proposal would allow for higher power operations in rural areas to better support delivery of wireless broadband service to

---

[45] *See Fourth Interim Report* at 18-19.

[46] *See* Auction for H Block Licenses in the 1915-1920 MHz and 1995-2000 MHz Bands Rescheduled for January 22, 2014; Notice of Changes to Auction 96 Schedule Following Resumption of Normal Commission Operations, AU Docket No. 13-178, *Public Notice*, 28 FCC Rcd 14529 (WTB 2013), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-13-2033A1.pdf.

[47] *See* Auction of H Block Licenses in the 1915-1920 MHz and 1995-2000 MHz Bands Closes; Winning Bidder Announced for Auction 96, AU Docket No. 13-178, *Public Notice*, 29 FCC Rcd 2094 (WTB 2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DA-14-279A1.pdf; *Tax Relief Act* § 6401(c)(4) (47 U.S.C.§ 309(j)(8)(F)).

[48] *Incentive Auction Report and Order* at ¶¶ 17-18.

[49] *Id*. at ¶ 22.

[50] *See* Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, ET Docket No. 14-165, *Notice of Proposed Rulemaking*, 29 FCC Rcd 12248 (2014), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db1001/FCC-14-144A1.pdf.

[51] *See id*. at ¶¶ 3, 10-12.

those areas.[52]

The FCC will be taking action on related issues in advance of the auction, including establishing auction procedures, addressing inter-service interference rules, and acting on matters regarding low power television.[53]

5. Related Activities

a) International Activities

Staff from NTIA, the FCC, the State Department, other federal agencies, and the telecommunications industry continued domestic, regional, and international preparations for WRC-15, to be held November 2-27, 2015 in Geneva, Switzerland under the auspices of the ITU. WRC 15 Agenda Item 1.1, a key issue on the conference agenda with implications for the execution of the Ten-Year Plan, will be "to consider additional spectrum allocations to the mobile service…to facilitate the development of terrestrial mobile broadband applications."[54] ITU Member States will take into consideration a number of factors, particularly protecting existing services from interference, in developing their positions on allocations.

Since early 2012, the ITAC-R has been preparing technical studies related to Agenda Item 1.1 and participating in a Joint Task Group (JTG) the ITU-R established to compile studies and propose methods to satisfy the Agenda Item, based on contributions from member states and other ITU-R members. WRC-15 deliberations for frequency bands under this Agenda Item would involve whether or not to modify frequency allocations in the *ITU Radio Regulations* to support worldwide terrestrial mobile broadband in particular frequency bands.[55] The ITU-R will hold a Conference Preparatory Meeting (CPM) March 23 through April 2, 2015 to consolidate the studies and methods to satisfy all items on the WRC-15 agenda.

During this reporting period, NTIA prepared for and participated in the final three meetings of the JTG, at which that group completed its work on Agenda Item 1.1 for the CPM.[56] NTIA, the FCC, and the State Department also developed and approved numerous WRC-15 proposals under Agenda Item 1.1. Specifically, the United States supports worldwide frequency allocation for terrestrial mobile broadband in most of the 470-698 MHz band, but does not support additional allocations in the 420-450 MHz, 1164-1610 MHz, 1435-1535 MHz, 2025-2110 MHz, 2200-2290 MHz, and 5000-5030 MHz bands. The United States further proposes to

---

[52] *See Id.* at ¶¶ 44-53.

[53] *See* Fact Sheet: Summary of Upcoming Proceedings Related to the Incentive Auction (May 15, 2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DOC-327101A1.pdf.

[54] *See* ITU Radiocommunication Sector, *Draft CPM Report*, Document CPM 15-2/1 at 6 (Sept. 19, 2014) *available at* http://www.itu.int/md/R12-CPM15.02-C-0001/en (*WRC-15 Draft CPM Report*).

[55] *See* ITU, *Radio Regulations*, Vol. I–Articles (Edition of 2012), *available at* http://www.itu.int/pub/R-REG-RR/en.

[56] *See WRC-15 Draft CPM Report* at 19-80.

defer action on the 5350-5470 MHz band until the following WRC.[57]

NTIA, along with representatives of the Federal Government, industry, and other interested parties, will continue to develop U.S. proposals and positions for WRC-15 and seek support for U.S. proposals from other countries and regional groups.

b) Proposed Model City for Demonstrating and Evaluating Advanced Spectrum Sharing Technologies

The *2010 Presidential Memorandum* directed NTIA, in cooperation with the National Institute of Standards and Technology (NIST), the National Science Foundation, and federal agencies, to take certain actions to explore innovative spectrum-sharing technologies.[58] The *PCAST Report* further recommended the creation of an urban Test City "to support rapid experimentation in spectrum management technology and practice."[59]

On July 11, 2014, NTIA and the FCC issued a Joint Public Notice seeking public comment on establishing a public-private partnership to facilitate the creation of an urban test city that would support rapid experimentation and development of policies, underlying technologies, and system capabilities for advanced, dynamic spectrum sharing.[60] The Notice contemplates that the "Model City" could include large-scale, sustainable facilities for systems-level testing in real-world environments across multiple frequency bands, including public safety bands and selected federal bands. Through this Notice, NTIA and the FCC also sought comments on the Model City concept in conjunction with the Center for Advanced Communications (CAC) and the FCC's experimental licensing program.[61]

Several stakeholders, including carriers, original equipment manufacturers, trade associations, and cities filed responses to the Public Notice.[62] The responses generally commended the joint NTIA/FCC initiative, and commenters expected a significant, positive impact on spectrum sharing technology development and testing. NTIA and the FCC, in collaboration with the federal agencies, are evaluating the comments to further refine the definition of the Model City concept and to determine the next steps on the Model City

---

[57] NTIA continues to publish approved U.S. proposals for WRC-15 at http://www.ntia.doc.gov/page/us-proposals.

[58] *See 2010 Presidential Memorandum* at § 3.

[59] *See PCAST Report* at xiv, Recommendation 6.1.

[60] *See Model City for Demonstrating and Evaluating Advanced Spectrum Sharing Technologies*, Joint Public Notice (rel. July 11, 2014), published at 79 Fed. Reg. 41262 (July 15, 2014), *available at* http://www.ntia.doc.gov/federal-register-notice/2014/request-comments-model-city-demonstrating-and-evaluating-advanced-spect.

[61] NTIA and NIST established the CAC in 2013. *See NIST and NTIA Announce Plans to Establish New Center for Advanced Communications*, Press Release (June 14, 2013), *available at* http://www.ntia.doc.gov/press-release/2013/nist-and-ntia-announce-plans-establish-new-center-advanced-communications.

[62] *See* http://www.ntia.doc.gov/federal-register-notice/2014/comments-model-city-demonstrating-and-evaluating-advanced-spectrum-shar.

principles, design, collaboration, and governance.

c) Quantitative Assessment of Spectrum Usage

As the *2013 Presidential Memorandum* directed, NTIA included in its *Fourth Interim Report* a "plan directing applicable agencies to provide quantitative assessments of the actual usage of spectrum" in prioritized bands from the *Third Interim Report* and in "such other bands as NTIA and the SPT determine have the greatest potential to be shared with non-federal users."[63] Appendix A to the *Fourth Annual Report*, which NTIA published on June 5, 2014, contained the *Plan for Quantitative Assessments of Spectrum Usage*, including a methodology for the assessments.[64] The plan requires that federal agencies provide a quantitative assessment of their "actual use of spectrum" in five frequency bands, totaling 960 megahertz of spectrum, that meet the criteria from the *2013 Presidential Memorandum*:

Table B-2 Spectrum Bands Subject to Quantitative Assessment	
Frequency Band (MHz)	**Amount (megahertz)**
1300-1390	90
1675-1695	20
2700-2900	200
2900-3100	200
3100-3550	450
Total	**960**

The *2013 Presidential Memorandum* required that each agency submit its final assessment to NTIA and the SPT within twelve months after NTIA released the plan, *i.e.*, by June 5, 2015.[65]

In July 2014, NTIA provided the federal agencies with lists identifying, from the data NTIA maintains, their frequency assignment and spectrum certification records in the five frequency bands subject to the assessments. In accordance with the plan, NTIA requested that the agencies review and verify the information in those records. All agencies provided their responses to NTIA by the August 8, 2014 target date.

By January 5, 2015, the agencies must identify any additions, modifications, and deletions for the data that NTIA will use in the quantitative assessments, and provide their estimated time of use for each frequency assignment, in accordance with guidance in the plan.[66] To accurately specify the time of use parameter for each assignment, the agencies must

[63] *2013 Presidential Memorandum* at § 3(a).

[64] *Fourth Interim Report* at Appendix A: *Plan for Quantitative Assessments of Spectrum Usage*.

[65] *See 2013 Presidential Memorandum* at § 3(a). On June 5, 2015, the applicable agencies are required to submit their final quantitative assessment to NTIA and the SPT.

[66] *See Fourth Interim Report* at A-3 to A-5.

understand and correctly take into consideration the nature of each system and its mission requirements. To this end, NTIA will meet regularly with the agencies to ensure that both NTIA and the agencies are consistently employing the correct methodology to determine the coverage area and time of use for each system.

NTIA will aggregate the individual agencies' quantitative assessments for each of the five frequency bands. NTIA and SPT will use the resulting aggregated quantitative assessments to help identify bands to be considered for detailed sharing feasibility studies.

C. CONCLUSION

NTIA and the FCC, together with the federal agencies in the PPSG, are continuing to work diligently toward achieving the goals of the *2010 Presidential Memorandum* through ongoing rulemaking proceedings and implementation of the *Ten-Year Plan,* applicable provisions of the *Tax Relief Act*, and the *2013 Presidential Memorandum*. Activities for the next twelve months will focus on transitioning the 1695-1710 MHz and 1755-1780 MHz bands to shared federal/non-federal use, promoting three-tiered shared access using a dynamic spectrum access system in the 3550-3650 MHz band while protecting federal radar operations, continuing work to identify sharing solutions at 5 GHz, and further refining the proposed Model City concept to promote innovative spectrum-sharing technologies. In addition, NTIA will work with the federal agencies to complete quantitative assessments of five frequency bands totaling 960 megahertz of spectrum.