



# The Benefits of Spectrum Auctions for Wireless Consumers, Providers, and Federal Agencies

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## Executive Summary

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Since their introduction, the use of auctions to grant spectrum licenses to the commercial wireless industry has been a win-win for America's wireless consumers, wireless providers, and in many cases, federal agencies. Auctions have provided speed, certainty, efficiency, and economic rationality to the distribution of spectrum resources.

For the past fourteen years, innovative legislative tools and funding instruments—like the Spectrum Relocation Fund (SRF)—have supplemented spectrum auctions by enabling federal agencies to more quickly and efficiently relocate their operations from current spectrum to free these frequencies for commercial use. Under this system, relocated federal agencies receive funding from auctions to cover their relocation costs and to explore future research and development. This complementary combination of spectrum auctions and relocation funds has worked well for both federal agencies and commercial stakeholders, allowing for incredible commercial innovation and investment in the wireless ecosystem.

However, the current system could be improved in small but important and impactful ways. Policymakers should enhance the flexibility and funding made available to federal incumbents to allow for future spectrum reallocations. In addition, enhanced flexibility and funding will provide much needed and improved equipment, cybersecurity, and more efficient and interference-free federal spectrum use.

For example, targeting two specific blocks of spectrum (1300-1350 MHz and 1780-1830 MHz) currently held by federal agencies would potentially deliver \$54.7 to \$56.7 billion in new revenue, a portion of which could be used to help federal entities improve existing spectrum management systems and equipment. For these two bands, even the low end of projections would bring in roughly three times the costs (up to \$7.9 billion) of transitioning affected incumbent federal agency users to modern and more efficient communications systems.

## Auctions Have Been Successful and Beneficial For Both Commercial and Federal Entities

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Since the first spectrum auctions in the early 1990s, the Federal Communications Commission's ("FCC" or "Commission") competitive bidding (or auction) process for spectrum licenses has been a complete policy success for the U.S. for several reasons, including revenue raised, speed, and aligned incentives.

As of April 2017, the Commission had completed 88 spectrum license auctions and the total amount of proceeds collected for government use and deficit reduction exceeded \$114 billion.<sup>1</sup> Most recently, the Commission auctioned 28 GHz spectrum licenses, raising more than \$700 million in additional revenue at the end of 2018,<sup>2</sup> and is currently conducting an auction of 24 GHz spectrum licenses.

Notably, while significant and beneficial, the positive effects flowing from auctions are not limited to raised revenue. The use of competitive bidding has also increased the speed of licensing while simultaneously granting a bundle of rights to licensees that are exclusive (entitled to protection from interference) and flexible (allowing licensees to freely innovate).

This combination of speed and aligned incentives has enabled the U.S. wireless industry to invest substantially in the wireless ecosystem. In 2016, the wireless industry as a whole contributed over \$475 billion to the U.S. economy, supporting 4.7 million jobs.<sup>3</sup> And the wireless industry accounted for 2.6 percent of total U.S. gross domestic product, generating \$1 trillion dollars in economic output, making it equivalent to the 24th largest economy in the world (larger than 87 percent of the world's economies, including such nations as Norway, Hong Kong, and Ireland).<sup>4</sup>

Before auctions were used to assign spectrum rights, the FCC used several other approaches to spectrum management, including comparative hearings and lotteries. Policymakers in the U.S., have long held that spectrum rights should be assigned to parties that put it to the best use for society as a whole.<sup>5</sup> Over time, it became clear to regulators that neither comparative hearings nor lotteries could achieve that goal due to significant inefficiencies in the systems.<sup>6</sup>

In contrast, economic theory and results have made clear that auctions are the best way to efficiently and effectively assign spectrum rights.<sup>7</sup> Auctions also allow greater aggregate competition and availability of spectrum for a larger subset of potential wireless providers. Specifically, use of a variety of geographic license area and spectrum block sizes have allowed a variety of interested parties (both large and small) to compete and provide service across the country.

Due to the resulting positive results, flexible, exclusive-use licensing policies have long been the cornerstone of the Commission's successful wireless strategy.<sup>8</sup> The U.S. wireless industry has relied upon exclusively-licensed spectrum to transition through four generations of technology—from analog voice in 1G to high-speed data in 4G—to become the global leader in the provision of

4G service.<sup>9</sup> That same success is already being realized through auctions of spectrum that will support 5G advancements and the ability of license holders to repurpose existing spectrum holdings from 4G to 5G. The Commission itself has noted that exclusive-use licensing “strike[s] the right balance between the benefits of competition, on the one hand, and the efficiencies of scale and scope that justify investments of capital and expertise.”<sup>10</sup> Congress has also acknowledged the value of exclusive-use licensing—directing the National Telecommunications and Information Administration (NTIA) in reallocating spectrum to “give priority to options involving reallocation of the band for *exclusive non-Federal use*.”<sup>11</sup> These statements stem from the fact that auctions of exclusive-use spectrum rights have proven successful and now rightly serve as the core of our nation's spectrum management policies.

## Enhancing Spectrum Auctions with Resources for Federal Agencies

With the adoption of the Commercial Spectrum Enhancement Act (CSEA) in 2004,<sup>12</sup> federal agencies receive a centralized and streamlined funding mechanism to recover costs associated with relocating radio systems or sharing spectrum—the Spectrum Relocation Fund.<sup>13</sup>

The SRF was originally designed solely to provide reimbursement to federal agencies for their costs associated with relocating their mission-critical systems and to allow for repurposing of Federal spectrum for commercial services.<sup>14</sup> However, Congress has modified the underlying statute several times to accommodate federal users, allow for more flexibility in the disbursement of SRF funds, and better enable the efficient repurposing of Federal spectrum.

In recent years, Congress has required NTIA to take action to release spectrum from federal to commercial use and to ensure the efficient use of federal spectrum.<sup>15</sup> The Spectrum Act requires NTIA to identify federal spectrum that may be released for commercial use and to manage the transfer process for federal agencies.<sup>16</sup> In addition, the Bipartisan Budget Act of 2015 adds additional requirements in Title X, the Spectrum Pipeline Act of 2015 (“Pipeline Act”), including NTIA coordination

with the FCC to identify additional spectrum to be assigned for non-federal use and authorization of SRF payments to federal entities for research and development activities.<sup>17</sup>

This Pipeline Act broadens the expenses that can be covered by the fund and also authorizes \$500 million specifically to exploring spectrum re-purposing.<sup>18</sup> In 2017, the MOBILE NOW Act<sup>19</sup> took action to accelerate the relocation of Federal entities by allowing existing SRF balances to be transferred to agencies for transition efforts immediately upon completion of an auction, rather than after the actual receipt by the SRF of auction proceeds.<sup>20</sup> Congress intended that by allowing immediate execution of transition plans, agencies would reduce their timelines to vacate, potentially increasing auction proceeds due to the value of accelerated access to the auctioned bands.<sup>21</sup>

As an example of auction benefits, in 2015 the Advanced Wireless System auction (AWS-3) generated \$3.5 billion for the Department of Defense (DoD)—allowing DoD to deploy new equipment, better capabilities, and increase its readiness with \$500 million from the SRF provided for new DoD technologies.<sup>22</sup> The funds also enabled new research by the government into spectrum technology and equipment and allowed for upgraded technology to be

purchased and deployed in a rapid and effective fashion. In sum, the competitive bidding process has not only provided substantial benefits to the commercial industry—it has also provided funding to federal entities to mitigate any mission disruptions. As Maj. General Robert E. Wheeler (USAF Ret.) has said, “the military’s capabilities and systems are greatly improved as a direct result of proceeds of the last two auctions of spectrum reallocated for commercial use.”

### **CSEA Should Be Altered to Allow Federal Agencies More Flexibility In Use of SRF Funds**

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Although the SRF has been successful, additional changes to the law governing the use of SRF funds would greatly benefit both federal agencies and the commercial wireless industry. Improving accessibility to SRF funds is the most critical change necessary for DoD to help preserve mission-critical functions today.<sup>23</sup>

Agencies are already able to draw from the SRF upfront to cover research and development, but these requests are governed by a lengthy review process to determine the projected increase in value that such research and development might create.<sup>24</sup> More freedom to improve spectrum use efficiency would allow DoD users to more quickly integrate and streamline missions—which would more quickly vacate more spectrum and allow that spectrum to be available for auction.<sup>25</sup>

Relaxing SRF requirements and allowing more use of the funds by DoD could also help improve the authorization and enforcement mechanisms for federal spectrum usage. For example, SRF funds could be utilized to develop a standardized national spectrum data information repository that would serve as the authenticated data source for all federal spectrum usage. As part of this tool, a suite of nationally or federally-agreed-upon modeling and simulation methodologies could be embedded to allow for real-time engineering studies.

Promulgation of this national system would allow rapid information exchange between federal agencies, allowing agencies requesting use of federal spectrum to obtain almost instantaneous certification/assignment such requests. Under this system, all federal spectrum stakeholders (with appropriate clearances) would be able to access a variety of spectrum data such as the type and location of use and technical parameters associated with the use, and enable stakeholders to review this data in an easily understandable format (pictures, mapping, etc.).

Similarly, this system can serve as a stepping stone to the creation of an automated enforcement mechanism that would allow federal agencies to rapidly and efficiently identify and eliminate interference issues (potentially without the need for FCC involvement). All of these efforts would be available on a national level and would allow for more effective use of federal spectrum resources and further enable the possibility of more spectrum sharing in the future with commercial operators.

### **CSEA-Eligible Spectrum Bands Should Be Targeted for Rapid Reallocation**

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Given the incredible success associated with auctions and use of auction revenues to fund the SRF, policymakers should focus on additional spectrum bands that are eligible under CSEA. Two primary targets are the 1300-1350 MHz and 1780-1830 MHz bands that have been subject to extensive discussions between federal and non-federal stakeholders.

NTIA identified both bands as candidates for reallocation in October 2010<sup>26</sup> and both bands would be eligible for auction under the previously-enacted Spectrum Pipeline Act of 2015 and under the MOBILE NOW Act. The Spectrum Pipeline Act of 2015 requires the identification of 30 megahertz of spectrum for reallocation from federal use to be auctioned in 2024<sup>27</sup> and the MOBILE NOW Act requires the FCC and NTIA to make at least 255 megahertz below 6 GHz available for mobile and fixed wireless broadband.<sup>28</sup>

For the 1300-1350 MHz band, the federal government is already studying the feasibility of making a minimum of 30 megahertz in the 1300-1350 MHz band available for non-federal use utilizing SRF funds.<sup>29</sup> The feasibility study is a multi-agency program, called the Spectrum Efficient National Surveillance Radar Program (SENSR), created as a response to the Spectrum Pipeline Act of 2015.<sup>30</sup> The SENSR program aims to study the possibility of consolidating existing radar systems in the 1300-1350 MHz band into another federal band (potentially the 2700-3100 MHz band).<sup>31</sup>

The 1780-1830 MHz band is directly adjacent to the AWS spectrum bands (1710-1780 MHz) and is utilized for commercial mobile services in most countries other than the U.S.<sup>32</sup> One primary federal use of this band is the Air Combat Training System (ACTS) that uses outdated equipment.<sup>33</sup> The ACTS is a major training and rehearsal tool that gives the U.S. an edge in combat operations and there is now equipment available to upgrade its

capabilities.<sup>34</sup> Targeting this spectrum for reallocation to commercial systems and thereby permitting use of CSEA and SRF funds would expedite important DoD modernization at zero cost, enhance capabilities from legacy system, allow complete joint interoperability, and permit enhanced cyber security at the systems level.<sup>35</sup>

Further, the other federal systems within the 1780-1830 MHz band are the same systems that were studied and accommodated during the AWS-3 reallocation process (1755-1780 MHz)—meaning that sharing studies are completed for those systems and so the long-term sharing and technical parameters are already well understood. This band has also been identified by DoD as a target for DoD modernization funding.<sup>36</sup> Major General Robert Wheeler recently noted that commercially-valuable spectrum (specifically the 1755-1830 MHz band) is ripening for auction to the benefit of DOD, and that the resulting funds can “pay for” two major DOD requirements: modernizing defense systems transitioning from the auctioned band and upgrading the cyber-security of DoD legacy networks.<sup>37</sup>

Revenue possibilities for these spectrum bands are estimated to be approximately \$62.6 billion (with a downside estimate of approximately \$31.3 billion).<sup>38</sup> With expected costs of clearing of between \$3.67-\$4.17 billion for 1300-1350 MHz and \$2.26-\$3.76 billion for 1780-1830 MHz, these spectrum bands could be expected to raise between \$54.7 and \$56.7 billion (or \$23.4-\$25.4 billion based on the downside estimate).<sup>39</sup>

While a substantial portion of this money would be directed to the Treasury, Congress has an opportunity to modify the existing CSEA statute to allow for more SRF funding and to create additional fund flexibility to enable significant improvements in existing federal agency use of the spectrum. The funds would also allow for rapid reallocation of 100 megahertz of desperately needed spectrum resources to the commercial industry to enable the deployment of next-generation 5G systems.

# ENDNOTES

- 1 Spectrum Auctions: Fiscal Year 2018, Federal Communications Commission, <https://www.fcc.gov/sites/default/files/spectrum-auctions-program-2018.pdf> (last visited Feb. 28, 2019).
- 2 Auction of 28 GHz Upper Microwave Flexible Use Service Licenses For Next-Generation Wireless Services Closes; Gross Winning Bids Amounts Announced For Auction 101, Public Notice, AU Docket No. 18-85, DA 19-23 (rel. Jan. 31, 2019) (noting that \$702,572,410 was raised in the auction).
- 3 See How the Wireless Industry Powers the U.S. Economy, Accenture Strategy Report (2018) at 3, available at <https://api.ctia.org/wp-content/uploads/2018/04/Accenture-Strategy-Wireless-Industry-Powers-US-Economy-2018-POV.pdf>.
- 4 Id.
- 5 47 U.S.C. § 310(d); see also Expanding Flexible Use of the 3.7 to 4.2 GHz Band, Report and Order and Notice of Proposed Rulemaking, 33 FCC Rcd 6915 (2018) (“We note that the ultimate assignment of any license is subject to FCC approval under Section 310(d) of the Communications Act. We therefore seek comment on the application process described above and any other application criteria that may be appropriate to fulfill the Commission’s statutory obligations to license spectrum in the public interest and ensure that spectrum is put to its highest and best use.”).
- 6 See Gregory Rosston, Increasing the Efficiency of Spectrum Allocation, Stanford Institute for Economic Policy Research at 7-8 (2014);
- 7 See Evan Kwerel and John Williams, A Proposal for a Rapid Transition to Market Allocation of Spectrum, OPP Working Paper Series at 37 (2002), <https://www.fcc.gov/reports-research/working-papers/proposal-rapid-transition-market-allocation-spectrum>; Peter Cramton, The Efficiency of the FCC Spectrum Auctions, The Journal of Law & Economics at 727, 735 (vol. 41, no. S2 1998) (“Any auction would look good relative to the FCC’s past experience with comparative hearings and lotteries.”).
- 8 See CTIA Comments, Expanding Flexible Use of the 3.7 to 4.2 GHz Band, et al., GN Docket No. 18-122 at 20-21 (Oct. 29, 2018).
- 9 Id.
- 10 Id.
- 11 47 U.S.C. § 923(j) – Identification of reallocable frequencies (emphasis added).
- 12 Commercial Spectrum Enhancement Act of 2004, Public Law 108 494, 118 Stat. 3986 (2004).
- 13 Commercial Spectrum Enhancement Act Annual Progress Report 2017, NTIA (July 3, 2018), <https://www.ntia.doc.gov/report/2018/commercial-spectrum-enhancement-act-annual-progress-report-2017>.
- 14 Spectrum Management and Special Funds, CRS Report at 1-2 (Oct. 7, 2008), [https://www.everycrsreport.com/files/20081007\\_RS21508\\_12eb6397f984a95ec7411f2fa0a426c142853f88.pdf](https://www.everycrsreport.com/files/20081007_RS21508_12eb6397f984a95ec7411f2fa0a426c142853f88.pdf).
- 15 The National Telecommunications and Information (NTIA): An Overview of Programs and Funding, CRS Report at 5 (May 19, 2017), <https://crsreports.congress.gov/product/pdf/R/R43866>.
- 16 Public Law 112- 96, Title VI.
- 17 Bipartisan Budget Act of 2015, Title X.
- 18 John Eggerton, Legislators United to Fund Spectrum Repurposing Research, Multichannel (June 6, 2018), <https://www.multichannel.com/news/legislators-unite-to-fund-spectrum-repurposing-research>.
- 19 Consolidated Appropriations Act, 2018, P.L. 115-141, Division P, the Repack Airwaves Yielding Better Access for Users of Modern Services (RAY BAUM’S) Act. Title VI of the RAY BAUM’S Act is the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act or MOBILE NOW Act, § 603(a)(1) (“MOBILE NOW Act”).

# ENDNOTES

- 20 Thune Applauds Senate Passage of His MOBILE NOW Act, John Thune U.S. Senator for South Dakota (Aug. 3, 2017), <https://www.thune.senate.gov/public/index.cfm/2017/8/thune-applauds-senate-passage-of-his-mobile-now-act>.
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- 22 Maj. Gen. Robert E. Wheeler (Ret), Next Steps to Revolutionary Change of Spectrum Usage, at 6 (May 24, 2017), <https://c4i.gmu.edu/wp-content/uploads/AFCEA-GMU-2017-Wheeler.pdf> (“Wheeler Keynote”).
- 23 James Lewis, Spectrum Management for Economic Growth and National Security, CSIS Technology Policy Program at 8 (2017), [https://csis-prod.s3.amazonaws.com/s3fs-public/publication/170404\\_Lewis\\_SpectrumManagement\\_Web\\_Rev.pdf?XijFJ0kHnStbN\\_UM2Jzn9flJW\\_HLTuFK](https://csis-prod.s3.amazonaws.com/s3fs-public/publication/170404_Lewis_SpectrumManagement_Web_Rev.pdf?XijFJ0kHnStbN_UM2Jzn9flJW_HLTuFK).
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- 25 Id.
- 26 Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband, NTIA (Oct. 29, 2010), <https://www.ntia.doc.gov/report/2010/ten-year-plan-and-timetable-make-available-500-megahertz-spectrum-wireless-broadband-pre>.
- 27 Bipartisan Budget Act of 2015, Title X. The Spectrum Pipeline Act also requires the FCC and NTIA to submit two additional reports in 2022 and 2024, each identifying an additional 50 MHz for reallocation. Id.
- 28 MOBILE NOW Act at § 603(a)(1).
- 29 Government Request for Information, Program Title: Spectrum Efficient National Surveillance Radar (SENSR), FAA (June 3, 2017), <https://faaco.faa.gov/index.cfm/attachment/download/73821>.
- 30 See id.
- 31 See Fact Sheet - Spectrum Efficient National Surveillance Radar (SENSR), Federal Aviation Administration (June 2, 2017), [https://www.faa.gov/news/fact\\_sheets/news\\_story.cfm?newsId=21734](https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=21734).
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- 38 C. Bazelon, The Next Wave of Spectrum Reallocation: The Value of Additional Mid-Band Spectrum Reallocations at 16 (Nov. 14, 2017), <https://docs.house.gov/meetings/IF/IF16/20171116/106636/HHRG-115-IF16-20171116-SD005-U5.pdf>.
- 39 Id. at 18.



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