Oceus Networks Response

To NTIA Request for Comments on National Spectrum Strategy

I.   Introduction

Oceus Networks respectfully submits the following comments in response to the Request for Comments (RFC) sought by the National Telecommunications and Information Administration (NTIA) to assist the Secretary of Commerce, through NTIA, in developing a National Spectrum Strategy.[1]   NTIA solicited comments in several areas including "recommended actions as well as information that can improve NTIA's understanding more generally in areas including expanding spectrum access, improving spectrum sharing, enhancing spectrum management, utilizing ongoing research and development activities, fostering global competitiveness, protecting U.S. space assets from RF interference, and augmenting the mission capability of Federal entities." NTIA also invited comment on seven specific questions.   Oceus Networks provides recommendations on expanding spectrum access and enhancing federal agency mission capability and responses to the seven questions.

II.   Experience Designing, Building, Operating Wireless Broadband Solutions For the Federal Government

Oceus Networks, headquartered in Reston, Va., is a provider of commercial standards-based wireless broadband solutions for Federal customers, including for DoD tactical uses. By adapting standards-based commercial technologies to military applications, Oceus Networks offers DoD and its other customers the ability to use best-in-class capabilities and to access the latest commercial devices at far lower costs than those associated with traditional proprietary solutions in a much broader range of bands. In adapting, but not deviating from, 3GPP standards, Oceus Networks is solving relevant challenges with regard to the use of commercial technology for military and other users that rely on secure equipment in mobile tactical scenarios. These challenges include security, jamming, resilience, and mobility (i.e. how to maintain communications where the radio access layer is also moving) to meet the unique requirements of Federal government spectrum users.

Oceus Networks early on in its work identified that access to commercial frequencies is a prerequisite to fully realizing both the technological advantages and economies of scale inherent in commercial wireless. Over the last ten years, Oceus Networks pioneered the concept of bi-directional sharing, i.e. federal access to non-federal frequencies, to a broad range of policy and industry stakeholders including the White House Office of Science and Technology Policy, the Commerce Spectrum Management Advisory Committee (CSMAC), Federal Communications Commission (FCC), and Congress.

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[1] DEPARTMENT OF COMMERCE National Telecommunications and Information Administration, Developing a Sustainable Spectrum Strategy for America's Future, Public Notice; Request for comments, 83 Fed Red 245 (December 21, 2018). [Docket No. 181130999–8999–01] RIN 0660–XC044.

These policy stakeholders continue to explore bi-directional sharing in various ways. For example, Congress in the enacted RAY BAUM's Act directed the FCC to complete a study on bi-directional sharing.[2] The FCC in its 2015 AWS-3 Order raised the question of whether Federal users should have access to commercial bands on Federal lands "that are generally unserved by commercial wireless networks."[3] The CSMAC formed a bi-directional sharing working group to make recommendations on federal access to commercial frequencies.[4]

III. National Spectrum Strategy Must Accommodate Federal Access To Commercial Frequencies To Ensure A Sustainable Spectrum Strategy For Federal Users

Federal Government Wireless Capabilities Require a Federated Approach Using Best-in-Class Government and Commercial Technologies

Federal agencies -- particularly the U.S. military must possess best-in-class wireless capabilities. For the U.S. military that means having systems that outpace our adversaries' capabilities in order to maintain U.S. military superiority.[5] It is well established that federal government use of commercial wireless technology can provide greater capabilities than proprietary technologies at lower costs for mobile broadband type applications. Also, the ability to evolve systems as technology advances is way to ensure evolving capabilities can be leveraged by the federal government. Commercial wireless technologies are just one of the many types of wireless systems our military uses. Advanced wireless capabilities based on commercial technologies are part of a "federated approach" with government developed systems to meet the military's 21st century mission.

Flexible Bi-Directional Sharing Solutions Supports Federal Government Use of Commercial Technologies

To enable use of commercial wireless-based solutions, the U.S. must make real progress on establishing a bi-directional sharing framework. Past efforts have not resulted in a sustainable framework that promotes both economic and national security. Our adversaries are not restricted by inflexible spectrum regulatory frameworks. Our spectrum regulatory framework must evolve to allow for a wider array of users including the federal government. Just as the wireless industry requires certainty to make investments so do innovative companies developing world-class solutions to solve some of our federal agencies greatest challenges. Inclusion in the National Spectrum Strategy represents a needed marker to send signals to companies to make these investments and to policymakers that a framework is long overdue.

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[2] RAY BAUM'S Act of 2018 (PL 115-141), March 23, 2018, Section 610.

[3] FCC, *In the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695=1710 MHz, 1755-1780 MHz, and 2155 – 2180 MHz Bands* et al, GN Docket No. 13-185, *Notice of Proposed Rulemaking and Order on Reconsideration* (July 23, 2013) at paragraph 81.

[4] CSMAC Bi-Directional Sharing Working Group, Final Report, Presented at October 9, 2014 CSMAC Meeting, https://www.ntia.doc.gov/files/ntia/publications/bi-directional_final_report_recommedations.pdf

[5] Department of Defense, Summary of the 2018 National Defense Strategy of The United States of America, https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

Access to Commercial Spectrum Extends Wireless Benefits to Broader Communities and Public Safety Response

Access to commercial spectrum by the Federal government also has other benefits. Many communities suffer from the Digital Divide identified by the FCC[6].   The availability of wireless service in these underserved communities are due to a lack of commercial viability for large license holders. The National Spectrum Strategy must acknowledge that commercial operators may not be best incentivized to deliver innovative services to these communities, in all cases, and that new flexible spectrum access models may promote more public benefits. For example, during a natural disaster, private LTE could provide the best and only solution for continued services until commercial service is restored. After Tropical Storm Harvey[7] and Hurricane Michael[8], Aransas and Orange counties in Texas and Bay and Gulf counties in Florida all suffered catastrophic loss of service which continued for several days as documented in the FCC report. Bay County includes the Tyndall Air Force Base. A private cellular LTE network could have provided immediate communications for safety and continuity of operations. However, existing spectrum policies do not allow spectrum managers to operate private communication as a bridge to commercial service.

Private Networks Allow for Enhanced Cybersecurity

For Federal users, private LTE could also address cybersecurity requirements. A government controlled private LTE network directly enables use of Commercial Solutions for Classified (CSfC) tactical security measures. For example, dual tunnel encryption on government controlled systems is authorized by the CSfC tactical annex. This capability greatly expands the suite of applications which can be used during an emergency. In addition, the use of additional wireless security at the network, application, or device layers could be better managed and centrally controlled in a private LTE network.

Military Requires More Flexible and Shared Spectrum Access For National Security

The ability of the DoD to operate in a contested environment must also be considered by the new National Spectrum Strategy. The current regulatory framework identifies narrow bands of spectrum for DoD operations which enable adversaries to directly target the proprietary waveforms developed for use in these allocations.[9] Our adversaries utilize multiple avenues to attack.[10] Part of this attack space directly targets DoD spectrum allocations and radios. A reasonable approach to combat this expansion in the battlespace is to expand the spectrum target space as well.

Vast amounts of spectrum have been allocated to commercial use in the last decade with more being teed up for one industry. While the commercial wireless industry represents a national

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[6] Chairman Pai Remarks to Kansas Broadband Conference, Sep 21, 2017, https://www.fcc.gov/document/chairman-pai-remarks-kansas-broadband-conference.

[7] FCC, Tropical Storm Harvey Communication Status Report, August 30 - September 5, 2017, https://www.fcc.gov/harvey

[8] FCC, Hurricane Michael Communication Status Report, October 11 - October 26, 2018, https://www.fcc.gov/michael

[9] This claim is substantiated by several DoD studies.

[10] PHILLIP A. KARBER, Russia's 'New Generation Warfare', NGA, June 4, 2015

advantage for the U.S. other sectors including the military are being foreclosed from benefiting from technological advancements. A sustainable spectrum strategy requires a framework that works for all users of spectrum. Sharing, including bi-directional sharing, will allows for a more diverse set of users to benefit from the wireless revolution. Oceus Networks strongly encourages the Department of Commerce and NTIA to make sharing a key element of the Strategy.

IV. Responses to Individual Questions

In addition to recommending establishing a strong bidirectional sharing framework, Oceus Networks provides responses to the 7 specific questions NTIA raised in the RFC. The NTIA RFC question is reprinted and the Oceus Networks response follows.

NTIA RFC Question 1. *In what ways could the predictability of spectrum access for all users be improved?*

A flexible bi-directional sharing framework that provides federal users access to non-federal frequencies will allow agencies to purchase and deploy systems based on commercial technology standards. This allows federal users to benefit from billions invested in developing commercial technologies and benefit from the economies of scale that drive down costs. For national security applications, access to multiple federal and non-federal bands is a necessary to enable anti-jamming diversity, support global operations, allow for agile operations, and increase maneuver in the spectrum environment

Predictably of access is also crucial to sustain military testing and training requirements. To maintain U.S. military readiness U.S. troops must train on the same systems that they operate overseas in conflict or other humanitarian or peace-time missions. 4G and 4G to 5G testing is ongoing by the U.S. military, but broader spectrum support is required to allow for full adoption by the government of these solutions. As with commercial uses, 5G will be a network of networks and the military will need to flexible access to mix networks that run on top of commercial spectrum as well as those that run on dedicated federal frequencies.

A flexible bi-directional sharing framework is needed as the secondary market has failed to provide smaller players predictable access. While the ability to sublease spectrum is currently supported by rule, there is limited incentive for license holders to negotiate these spectrum arrangements. For example, in rural areas, these areas many times lie fallow. However, a leasing arrangement may require more resources to administer than their intrinsic value to the licensee thus deals which would promote greater spectrum efficiencies are not made. Remote locations are of special interest to the Department of Defense and the Department of Homeland Security and the inability of these federal agencies to gain access present a missed opportunity to bolster the security of our nation and borders.

NTIA RFC Question 2. *To what extent would the introduction of automation facilitate assessments of spectrum use and expedite the coordination of shared access, especially among Federal and non-Federal spectrum stakeholders?*

Automation is a critical component of promoting shared access. In many cases where a commercial licensee has spectrum but has little incentive to share automated systems could overcome a lack of action due to high transaction costs or lengthy sharing studies.

NTIA RFC Question 3 *What is the practical extent of applying standards, incentives, and enforcement mechanisms to promote efficient and effective spectrum use?*

Standards remain the hallmark to provide guidance, repeatability, and predictability in the development of efficient spectrum use. However, it is often observed that applying standards may result in unintended consequences where the results do not match. This can be objectively measured in rural, remote, and tribal areas which have been termed the digital divide between the urban digital capabilities and the lack of services available in remote areas.

NTIA RFC Question 4. *How might investment in RDT&E improve spectrum-utilization methods, and spectrum-sharing tools and techniques?*

Time-based and usage-based solutions should be considered to commoditize spectrum. There may be opportunities to create continuous revenue streams for the use of available spectrum allowing the highest bidder to provide the most robust service. This service may be able to be sold and resold based on the use and need of the industries making the investment.

NTIA RFC Question 5. *What are the risks, if any, to the global competitiveness of U.S. industries associated with spectrum management and policy actions?*

Rigid adherence to the allocation table will leave innovative and niche U.S. industry players behind. Existing policies have resulted in a digital divide where resources are targeted to areas of most economic value. Oceus Networks does not advocate an artificial licensing requirement where large geographic areas are targeted with minimal coverage. However, long-term micro licensing could provide a means to commoditize remote areas and place fallow spectrum into use. Long-term use must be supported to allow this to be economically viable to the license holder and to the micro licensee.

However, carriers are generally loath to enter into leases that are long term or a subset of a larger market area to preserve their future optionality in servicing these areas. The lack of willingness to resell disaggregated spectrum for cellular testing at ranges that fall within a large license area foreclose military opportunities to use 4G and future 5G based systems on bases and test ranges.

NTIA RFC Question 6. *How could a spectrum management paradigm be structured such that it satisfies the needs of commercial interests while preserving the spectrum access necessary to satisfy the mission requirements and operations of Federal entities?*

As the nation continues development of private LTE and 5G solutions, spectrum policies must have greater flexibility. Private networks will be developed using both licensed and unlicensed spectrum. These networks will have access to many fixed broadband locations but will require the ability to reach users. Private systems, isolated from the Internet, will control manufacturing, monitor crops, and many other IoT solutions which are yet to be imagined. A critical component of this solution is network isolation to harden networks against cyber intrusion.

NTIA RFC Question 7. *What are the likely future needs of spectrum users, both terrestrially and for space-based applications, within the next 15 years? In particular, are present allocations of spectrum sufficient to provide next generation services like Fifth Generation (5G) cellular services and emerging space-based applications? For commenters who assert that existing allocations are insufficient, NTIA is interested in understanding better the amount of spectrum presently available to provide particular services (or similar services) and estimates of the amount of additional spectrum in each frequency band that the commenter believes is needed.*

Oceus Networks views tactical mobile broadband and military use of IoT as drivers for military spectrum policy. The current exclusive allocation and licensing framework will not support the needs of all users. Increased sharing including bi-directional sharing is the only way that U.S. policymakers can ensure all future needs are met.

V.   Conclusion

Oceus Networks believes that the National Spectrum Strategy must ensure U.S. leadership in both commercial wireless and national security remain a U.S. competitive advantage. To achieve this, the Strategy must establish flexible spectrum sharing access policies for the federal government to leverage 4G and 5G technologies. The federal government, especially the U.S. military, will need expanded access, including bi-directional sharing, to meet their 21st century mission. A sustainable spectrum strategy demands no less.

Respectfully submitted,

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January 22, 2019