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ONE HUNDRED NINETEENTH CONGRESS

Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
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MEMORANDUM

To: Members, Energy and Commerce Committee
From: Majority Staff
Re: Communications and Technology Subcommittee Hearing

I. INTRODUCTION

On Thursday, January 23, 2025, at 10:00 a.m., the Subcommittee on Communications and Technology will hold a hearing in 2123 Rayburn House Office Building titled, "Strengthening American Leadership in Wireless Technology." The following witnesses are expected to testify:

II. WITNESSES

- Michael Powell, President and CEO, NCTA – The Internet and Television Association
- Brad Gillen, Executive Vice President, CTIA
- Diane Rinaldo, Executive Director, Open RAN Policy Coalition
- Chris Lewis, President & CEO, Public Knowledge

III. BACKGROUND

Electromagnetic spectrum (spectrum) is a range of frequencies. Each frequency, or "band," has unique propagation characteristics that are beneficial for certain uses, such as carrying voice and data traffic.[1] Some frequencies are more valuable for carrying traffic over long distances, and other frequencies are better for carrying traffic quickly but only over short distances. Using a combination of spectrum frequencies allows for the creation of seamless communication networks that underpin the wireless economy we rely on today. Spectrum is a finite resource, meaning we cannot create more spectrum in the atmosphere. As technology advances, however, spectrum frequencies can be utilized more efficiently and effectively.

[1] *See* Ling Zhu, *National Spectrum Policy: Interference Issues in the 5G Context*, Congressional Research Service (Feb. 14, 2022), https://crs.gov/Reports/IF12046?source=search.

1. Spectrum Management

Spectrum is used by the federal government and non-Federal users for communications and wireless technology. The National Telecommunications and Information Administration (NTIA), an agency within the Department of Commerce, is responsible for managing spectrum allocations for Federal agency use,[2] and the Federal Communications Commission (FCC) is responsible for managing spectrum use for non-Federal users, which includes commercial (wireless companies), public-safety, educational, and other non-commercial and non-federal users.[3] During the first Trump administration, the FCC made unprecedented amounts of electromagnetic spectrum available for commercial use.

While each agency plays a critical role in managing the systems that utilize their spectrum assignments (radios, radars, etc.), NTIA is statutorily responsible for managing all federal spectrum assignments and representing the views of federal agencies before the FCC.[4] Coordination of federal views by NTIA ensures that federal missions are not negatively impacted as spectrum policy decisions are made, and decisions can be made with a holistic view of affected users. On August 2, 2022, the NTIA and the FCC signed a memorandum of understanding to formalize the existing coordination mechanisms between the agencies.[5]

2. Licensed vs. Unlicensed

One of the FCC's most important goals is to ensure the efficient use of spectrum. Spectrum can be used by commercial entities on a licensed, unlicensed, or shared basis.

Licensed spectrum authorizes a licensee (such as a wireless carrier)—generally on primary, co-primary, or secondary use—to use a spectrum band with protection from harmful interference. Over time, many of these licenses have become "flexible use licenses," which provide for protection from harmful interference if the user meets several technical parameters rather than providing a specific type of service.

Unlicensed spectrum, on the other hand, has no licensee, meaning that no entity pays to use the spectrum. This also means that users are not entitled to protection from harmful interference, and in most cases must not cause interference. The Commission still sets technical parameters for certain bands which facilitates competition and innovation, while protecting incumbents in neighboring bands.

3. Auction Authority

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[2] 47 U.S.C. § 901 et seq.
[3] 47 U.S.C. § 301 et seq.
[4] 47 U.S.C. §§ 902(b)(2)(K), 904.
[5] *See* Memorandum of Understanding Between the Federal Communication Commission and the National Telecommunication and Information Administration (Aug. 2, 2022), https://ntia.gov/sites/default/files/publications/ntia-fcc-spectrum_mou-8.2022.pdf.

The authority for the FCC to auction spectrum licenses expired on March 9, 2023.[6] Spectrum auctions are one of the most heavily utilized mechanisms for making spectrum available for commercial use. Auctions also generate revenue for the Federal government, which historically has been used to fund Congressional priorities and reduce the deficit. Congress first established auction authority for the FCC in the Omnibus Budget Reconciliation Act of 1993,[7] and it has been extended several times since then—most recently in the Consolidated Appropriations Act of 2023.[8]

4. International Harmonization

The International Telecommunications Union (ITU)—a division of the United Nations—manages a global table of spectrum allocations representing treaty-level agreements where countries agree to define uses for certain spectrum frequencies in different regions across the world.[9] Harmonizing spectrum use around the world provides economies of scale to manufacturers of network equipment and consumer devices.

The ITU holds its World Radio Conference (WRC) every four years. The last WRC was held in 2023. Considerable planning goes into these conferences, with the U.S. delegation—led by the Department of State, NTIA, and the FCC—working to find consensus within North and South America (the America's region), which they can then present at the WRC.

The U.S. has historically been successful at shaping spectrum policy decisions at the ITU by having a unified position within the country and then encouraging the Americas region to adopt its position.[10] Without a unified U.S. position, adversaries have more of an opportunity to set the standard. Succeeding in shaping ITU spectrum decisions with the U.S. position can provide immense technological and economic benefits for the U.S. and its companies.

5. Radio Access Networks

As wireless technologies evolve, some mobile network operators have explored technical changes to the network component known as the Radio Access Network (RAN). At its core, a RAN connects devices to the core network through a radio link.[11] Today's RAN technology operates using an integrated package of hardware and software, many times locking carriers into a single supplier's proprietary system that is largely not interoperable with hardware or software developed by another supplier.[12] Because of the high barriers to enter the marketplace, and the need to invest billions of dollars annually in research and development to stay competitive, the

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[6] 47 U.S.C. § 309(j)(11).
[7] Omnibus Budget Reconciliation Act of 1993, P.L. 103-66 §6002 (1993).
[8] Consolidated Appropriations Act, 2023, P.L. 117-328, div. O, tit. IX § 901 (2022).
[9] *See* Radio Regulations, International Telecommunications Union (ITU), https://www.itu.int/pub/R-REG-RR.
[10] *See* Clete Johnson, *The Strategic Imperative of U.S. Leadership in Next-Generation Networks*, Center for Strategic & International Studies (Jan. 20, 2023), https://www.csis.org/analysis/strategic-imperative-us-leadership-next-generation-networks.
[11] *See* Dan Jones & Corinne Bernstein, What is radio access network?, TechTarget (Apr. 2021), https://www.techtarget.com/searchnetworking/definition/radio-access-network-RAN.
[12] *See* Melissa K. Griffith, Open RAN and 5G: Looking Beyond the National Security Hype, The Wilson Center (Nov. 2, 2020), https://www.wilsoncenter.org/article/open-ran-and-5g-looking-beyond-national-security-hype.

RAN marketplace has consolidated over time.[13] This has left mobile network operators fewer choices for trusted network equipment. As a result, some operators turn to untrusted vendors due to their ability to offer equipment at lower costs, which can be state-supported entities that are controlled by adversaries and threaten U.S. network security.

Two developments—Virtualized Radio Access Networks (V-RAN) and Open Radio Access Networks (O-RAN)—present opportunities to change this reality. Technical experts believe networks that integrate V-RAN and O-RAN architectures could improve the security of networks.[14] (Radio access networks can be "virtualized" without being "open.") Others have argued that deploying mobile networks with O-RAN could promote competition in the vendor marketplace, diversify the supply of trusted vendors, and decrease prices.[15]

a. Virtualized Radio Access Networks (V-RAN)

V-RAN decouples purpose-built software and hardware so that software can be used on commercial-off-the-shelf equipment. This means mobile network operators can purchase cheaper, "dumb," antennas that can be programmed by sophisticated software solutions, lowering costs and providing greater flexibility. By virtualizing components of the RAN, mobile network operators can make changes to a RAN's software components through the cloud.

b. Open Radio Access Networks (O-RAN)

O-RAN would standardize the technologies within a RAN and require that various components within the network be interoperable regardless of manufacturer or vendor. Today, without O-RAN architecture, the proprietary interfaces among various components of the RAN are not interoperable because they are produced by a single vendor end-to-end.

Deploying O-RAN technology could allow the many components of a RAN to operate with one-another regardless of which company produced each component by standardizing the interfaces that permits interoperability. As a result of this interoperability, many see this as one path for increasing market competition by lowering barriers to entry for any single component in the RAN. Mobile network operators and equipment vendors have been collaborating on technical standards to facilitate the deployment of virtualized and open networks for several years.[16]

6. Public Wireless Supply Chain Innovation Fund

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[13] *See* Nalma Hoque Essing, Jeff Loucks, et al., *The next-generation radio access network: Open and virtualized RANs are the future of mobile networks,* DELOITTE INSIGHTS (Dec. 7, 2020), https://www2.deloitte.com/xe/en/insights/industry/technology/technology-media-and-telecom-predictions/2021/radio-access-networks.html/#endnote-15.

[14] *See* 451 Research, *Security Benefits of Open Virtualized RAN,* S&P GLOBAL MARKET INTELLIGENCE (May 2020), https://www.redhat.com/cms/managed-files/ve-451-research-telco-vran-security-analyst-material-f23695-en.pdf.

[15] *See* Robert D. Atkinson, Doug Brake, and Alexandra Bruer, *Open Radio Access Networks: A Primer for Policymakers,* INFORMATION TECHNOLOGY & INNOVATION FOUNDATION (Nov. 1, 2021), https://itif.org/publications/2021/11/01/open-radio-access-networks-primer-policymakers/.

[16] *See*, *O-RAN Specification,* O-RAN ALLIANCE (accessed Jan. 11, 2024), https://www.o-ran.org/specifications.

The Public Wireless Supply Chain Innovation Fund (Innovation Fund), authorized under the FY 2021 National Defense Authorization Act[17] and funded through the CHIPS and Science Act of 2022,[18] is a $1.5 billion program enacted to support promotion and deployment of O-RAN in the United States. A major goal is to support the growth of domestic equipment manufacturers—the largest equipment manufacturer globally is Chinese-based Huawei, while the next two are also based outside the United States—Ericsson (Sweden) and Nokia (Finland).[19] The Innovation Fund provides grants to facilitate the promotion and deployment of O-RAN networks by accelerating commercial deployment of interoperable 5G equipment; promoting a multi-vendor environment; identifying compliance standards; and promoting security features in these networks.[20]

NTIA has released three Notices of Funding Opportunity,[21] and has awarded over $530 million from the Innovation Fund.[22]

[17] William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, P.L. 116-283, tit. XCII § 9202 (2021).
[18] Chips and Science Act, P.L. 117-167, div.A, § 106 (2022).
[19] Stefan Pongratz, *Worldwide Telecom Equipment up 3 percent in 2022,* DELL'ORO GROUP (Mar. 16, 2023), https://www.delloro.com/worldwide-telecom-equipment-up-3-percent-in-2022/.
[20] *Public Wireless Supply Chain Innovation Fund*, National Telecommunications and Information Administration (accessed Oct. 17, 2023), https://www ntia.gov/page/innovation-fund.
[21] "Notice of Funding Opportunity, Public Wireless Supply Chain Innovation Fund Grant Program – Expanding Testing and Evaluation," National Telecommunications and Information Administration (rel. Apr. 12, 2023), https://www.ntia.gov/sites/default/files/publications/pwscif_final_nofo.pdf; "Notice of Funding Opportunity, Public Wireless Supply Chain Innovation Fund Grant Program - NOFO 2 – Open Radio Commercialization and Innovation," National Telecommunications and Information Administration (rel. May 7, 2024), https://www.ntia.gov/sites/default/files/2024-05/pwscif-nofo-2-final.pdf; "Notice of Funding Opportunity, Public Wireless Supply Chain Innovation Fund (PWSCIF) Grant Program NOFO 3 – Software Solutions for Industry Verticals and Integration Automation" National Telecommunications and Information Administration (rel. Dec. 17, 2024), https://www ntia.gov/sites/default/files/2024-12/pwscif_nofo_3.pdf.
[22] *Biden-Harris Administration Awards $117 Million For Wireless Innovation*, National Telecommunications and Information Administration (Jan. 10, 2025), https://www ntia.gov/press-release/2025/biden-harris-administration-awards-117-million-wireless-innovation.

IV. KEY QUESTIONS

- What role does licensed and unlicensed spectrum play in our economy?
- How do the FCC and NTIA coordinate spectrum management activities?
- What effect would ceding leadership on spectrum policy have on our economic and national security?
- How will O-RAN and V-RAN promote greater supply chain security?
- How quickly can O-RAN and V-RAN networks get deployed?

V. STAFF CONTACTS

If you have any questions regarding this hearing, please contact Kate O'Connor Harper or Elaina Murphy of the Committee Staff at (202) 225-2927.