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Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC. 20230

In the Matter of	)	
	)	
Public Wireless Supply Chain Innovation Fund Implementation	)	Docket No. 221202-0260
	)	
	)	

COMMENTS OF CISCO SYSTEMS, INC.

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COMMENTS OF CISCO SYSTEMS, INC.

Cisco Systems, Inc. ("Cisco") hereby submits its comments in response to the Notice and Request for Comments ("Notice")[1] by which the National Telecommunications and Information Administration ("NTIA") seeks input on the implementation of the Public Wireless Supply Chain Innovation Fund (Innovation Fund), as directed by the CHIPS and Science Act of 2022.[2] The Notice requests comments on a number of issues critical to the success of the U.S. government's efforts "to support the promotion and deployment of open, interoperable, and standards-based radio access networks (RAN)" via grants from the Innovation Fund.[3] The law, and the grants it enables via the Innovation Fund, will help ensure that public wireless mobile network operators serving the American public have a sufficiently diverse, competitive, and innovative marketplace for trusted telecommunications equipment.

Cisco is pleased and proud to have served as a significant contributor of technology to each of the three major "greenfield" 5G network deployments built using open, interoperable,

[1] National Telecommunications and Information Administration, *Public Wireless Supply Chain Innovation Fund Implementation,* Notice, Request for Public Comments, Docket No. 221202–0260, 87 FR 76182 (Dec. 13, 2022). https://www.govinfo.gov/content/pkg/FR-2022-12-13/pdf/2022-26938.pdf

[2] Pub. L. 117-167

[3] https://www.federalregister.gov/d/2022-26938/p-8

standards-based RAN: 1) DISH Networks in the United States;[4] 2) Rakuten in Japan;[5] and 1&1 in Germany.[6] Carriers planning future deployments of 5G and next-generation wireless networks can take comfort from the knowledge that Cisco's unparalleled leadership in network transport, data center networking, optimization, and optics can support their pivot to Open RAN network architectures. We, therefore, offer the following comments based upon our experience bringing 5G Open RAN networks from conception to deployment, and we incorporate by reference comments Cisco has previously filed with NTIA on the development of an Implementation Plan for the National Strategy to Secure 5G, which was required by the Secure 5G and Beyond Act of 2020.[7]

The Notice asks questions about a wide array of issues relevant to the implementation of the Innovation Fund. The questions and the answers they will elicit are aimed at accelerating deployment of open, interoperable, standards-based RAN (Open RAN) on a timeline relevant to 5G networks with the aim of spurring more innovation and competition in the market. Cisco contributed to the development of comments filed by several trade associations and coalitions addressing a range of questions, including those filed by the Open RAN Policy Coalition, where Cisco serves as a Board member and Vice Chair. However, for the purposes of this filing, Cisco will focus on a few discrete areas: 1) Testbeds; 2) Security; 3) Management of Non-Technical Risk; and 4) Access to patents required to implement cellular and Open RAN standards.

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[4] https://blogs.cisco.com/sp/cisco-and-dish-delivering-the-promise-of-5g-to-create-a-more-inclusive-future; https://about.dish.com/2022-06-15-DISHs-Smart-5G-TM-Wireless-Network-is-Now-Available-to-Over-20-Percent-of-the-U-S-Population

[5] https://www.rcrwireless.com/20190307/carriers/rakuten-greenfield-approach; https://rakuten.today/tech-innovation/cisco-chuck-robbins-rakuten-mobile-network.html

[6] https://www.rcrwireless.com/20230104/5g/1-1-launch-oran-network-additional-german-cities

[7] https://www.ntia.gov/files/ntia/publications/cisco_ntia_5grfc_docket200521_0144_06252020_final_signed.pdf

TESTBEDS

The Notice raises several questions regarding the nature and types of trials, studies, proofs of concept, pilots, and testbeds most likely to advance the goals of the fund—i.e., accelerating commercial adoption and deployment of open, interoperable, and standards-based RAN.[8] As Cisco noted in its 2020 filing on the National Strategy to Secure 5G:

> Cisco forecasts that the most dramatic changes resulting from 5G technologies will come from its uptake by industrial and enterprise customers, who will benefit from innovations in multi-access edge computing (moving intelligence to the edge of the network) and network slicing (guaranteeing delivery of connectivity with specific, customizable properties).[9]

Cisco then recommended and continues to believe that:

> To advance these innovative possibilities in enterprise autonomy, the Implementation Plan should actively explore different industrial and enterprise use cases for 5G that go beyond simply delivering faster wireless broadband to the consumer.

Accordingly, Cisco recommends that NTIA include initiatives to validate use cases capable of spurring commercial adoption of Open RAN architectures in enterprise deployments of 5G among grants supported via the Innovation Fund.

[8] https://www.federalregister.gov/d/2022-26938/p-60
[9] https://www.ntia.gov/files/ntia/publications/cisco_ntia_5grfc_docket200521_0144_06252020_final_signed.pdf, p.10.

NTIA should also consider how Innovation Fund grants to accelerate Open RAN commercial deployments can help close the digital divide—given the commitment of Congress and the Administration to solve for such connectivity gaps. Network operators, particularly in rural and other underserved areas, are increasingly deploying fixed wireless access (FWA) to address Internet services which would not otherwise be economically feasible. Cisco believes that promoting the use of 5G Open RAN in licensed and unlicensed "midband" and millimeter-wave spectrum will spur innovation and lower deployment costs of FWA. The need to lower costs is particularly important to the smaller operators who currently rely on proprietary technology in their rural deployments. For them—and the customers they serve—a competitive, Open RAN 5G ecosystem of trusted suppliers can be game-changing. NTIA grants that enable multivendor pretested interoperability for FWA network components will help fulfill this vision.

Ultimately, however, as NTIA weighs the importance of testbeds aimed at addressing challenges concerning multi-vendor integration, it must recall that adoption of Open RAN architectures will be driven by mobile network operators and their customers—rather than by vendors or government mandates. The movement to develop Open RAN was initiated by carriers seeking to spur greater competition, innovation, and supply chain diversification through the use of open, interoperable standards. At the same time, their customers and regulators are understandably exacting in their expectations for network security, reliability, and resilience given the criticality of communications networks to our economy. Therefore, any effort to incentivize the development of pilots, plugfests, proofs of concept, testbeds, and small-scale deployments via Innovation Fund grants should be strategically aimed at addressing real-world concerns of the providers who deploy, maintain, and operate mobile networks in the service of

their customers. Once those issues have been addressed, we should expect the market will naturally lower barriers to entry, spur competition, and drive adoption of innovations that leverage more cost and energy-efficient technologies anchored in software, cloud, and virtualization from trusted suppliers.

SECURITY

Questions 17—20 of the Notice address questions about the security of open, interoperable, and standards-based RAN.[10] From the outset, it is worth emphasizing that there have been a number of high-profile efforts to assess and address the security implications of Open RAN architectures, including via robust public private partnerships.[11] The resulting reports identify areas where additional research may benefit from funding via grants from the Innovation Fund. However, it should be noted that these and other reports on 5G security enumerate and explore several issues that are common to any next-generation 5G/6G wireless network architecture where intelligence is shifted to the edge and there is increased reliance on software, cloud, and virtualization.

In some cases, reports purportedly focused on Open RAN security examine security issues common to commercially developed technology generally—e.g., importance of zero trust architectures, risks from relying on open-source software (OSS) libraries, and potential impacts

[10] https://www.federalregister.gov/d/2022-26938/p-64

[11] The Cybersecurity and Infrastructure Security Agency (CISA) and National Security Agency (NSA), through the Enduring Security Framework (ESF), have published a paper titled, "Open Radio Access Network Security Considerations" (September 2022) which assesses the benefits and security considerations with implementing Open RAN architecture. https://www.cisa.gov/blog/2022/09/15/securing-5g-open-ran-architecture-cybersecurity-risks

The Federal Communications Commission's (FCC) Communications Security, Reliability and Interoperability Council VIII published a report entitled "Promoting Security, Reliability, and Interoperability of Open Radio Access Network Equipment" (December 2022) https://www.fcc.gov/file/24520/download

of quantum computer developments on classical cryptographic algorithms. These are clearly not places where NTIA should be prioritizing the money from the Innovation Fund. The fund is nowhere near large enough to tackle problems generally applicable to all 5G networks—much less concerns common to any technology that relies on software, cloud, and virtualization. Security concerns worth addressing with these funds are those specific to multivendor deployments of O-RAN-compliant networks and the interoperability required to achieve that vision.

Moreover, there are potential opportunities for security benefits that may flow from efforts to standardize and specify interfaces within and between sub-segments of RAN networks to enable for multi-vendor deployments. In Cisco's view, publicly specifying the interfaces and building a community around testing and interoperability provides greater visibility and opportunities for threat analysis and mitigation compared to what can be achieved in proprietary systems where the security of the RAN may rely entirely on a single vendor with little external visibility. NTIA should consider as a positive factor in evaluating Innovation Fund grants whether applicants are solving for problems that not only mitigate risk but also hold the potential to boost the security of Open RAN networks beyond the status quo as it exists in single-vendor deployments leveraging proprietary architectures and interfaces.

NON-TECHNICAL RISK MITIGATION

As NTIA considers whether there are technical areas of risk from multivendor, interoperable, standards-based deployments that may benefit from Innovation Fund grants, there should be some reflection of why this path was vital to U.S. national security in the view of the President and the Congress. If the U.S. does not have a robustly competitive ecosystem with

a diversity of trusted supply chain sources, wireless providers will face unacceptable risks to the security, stability, and resilience of their 5G and next-generation networks. Congress passed and the President signed the Securing 5G and Beyond Act in 2020[12], authorized development of the Innovation Fund via the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021[13]; and appropriated $1.5 Billion dollars to this fund via the CHIPS and Science Act of 2022[14] as part of a strategic effort to address the absence of a sufficiently robust and competitive marketplace of trusted 5G equipment sources. The necessity of mitigating the risks that led to the adoption of the Innovation Fund remains central to discussions of how grants might effectively bolster the security of open, interoperable, and standard-based multivendor networks—because the question of whether the presence of a competitive ecosystem of trusted RAN technologies is a national security imperative has already been clearly answered in the affirmative.

ACCESS TO PATENTS REQUIRED TO IMPLEMENT CELLULAR AND O-RAN STANDARDS

In his July 2021 *Executive Order on Promoting Competition in the American Economy,*[15] the President adopted a "Whole of Government" approach to promoting competition in the U.S. economy. One aspect of that approach was the Administration's support for "the continued development and adoption of 5G Open Radio Access Network (O-RAN) protocols and software," including "measures that might promote increased openness, innovation, and competition in the

[12] Pub. L. 116-129
[13] Pub. L. 116-283
[14] Pub. L. 117-167
[15] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/07/09/executive-order-on-promoting-competition-in-the-american-economy/).

markets for 5G equipment."[16] To realize the President's goal of promoting the development and adoption of open, interoperable, standards-based RAN, NTIA and other parts of the Administration should recognize the threat that abusive patent licensing practices can play to the realization of the vision of a competitive market for RAN equipment.

Specifically, RAN incumbents that own patents—which they claim are essential to implement the 5G standard and related standards developed by the O-RAN Alliance—may seek to use the threat of injunctions and exclusion orders to coerce prospective entrants to pay super-competitive royalties to commercialize the cellular radio equipment that forms a critical component of Open RAN systems. The "whole of government approach" should include close coordination between NTIA and the Patent and Trademark Office, the Antitrust Division of the Justice Department, and the Federal Trade Commission to promote increased transparency regarding the terms on which patents claimed to be essential to cellular standards are offered for license,[17] and regarding compliance by owners of those patents with the commitments to license on Fair, Reasonable, and Non-Discriminatory (FRAND) terms they voluntarily undertook through their participation in standards development organizations. In particular, Administration advocacy in support of the presumptive unavailability of injunctions issued by federal courts or exclusion orders issued by the International Trade Commission in disputes involving patents subject to FRAND licensing commitments will help limit the use of the threat of injunctions or

[16] *Id.* at 5(l)(iii).

[17] *Cf.* Brian Love and Christian Helmers, *Are Market Prices for Patent Licenses Observable? Evidence From 4G and 5G Licensing* 24 Colum. Sci. & Tech. L. Rev 55 (2022) (available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4020536) (concluding that pricing information for licenses to patents essential to implement 4G and 5G cellular standards is for the most part unavailable to prospective licensees or to the public).

exclusion orders to compel companies seeking to compete with RAN incumbents to pay excessive royalties for patents essential to implement cellular and O-RAN standards. In considering applications for funding Innovation Fund grants, NTIA should evaluate whether applicants are abiding by commitments to allow FRAND licensing of patents essential to the implementation of O-RAN and other standards supporting adoption and deployment of open, interoperable, multi-vendor advanced wireless networks.

CONCLUSION

Cisco is eager to see NTIA move forward with administration of the Innovation Fund, which Congress and the Administration created to accelerate the real-world commercial deployment of open, interoperable, standards-based RAN networks at scale. As NTIA proceeds, we urge that efforts to fund testbeds and pilots are aimed at addressing concerns that might otherwise slow market adoption of Open RAN architectures at scale. Grants to address security issues should be aimed at mitigating concerns identified as specifically relating to interoperable, multi-vendor RAN deployments and not problems common to both proprietary and open networks—or generally applicable to technology leveraging software, cloud, and virtualization. Efforts to address security concerns should further be considered against the backdrop of the necessity for Open RAN architectures as a mechanism to effectively mitigate non-technical market risks caused by the current absence of a resilient, robust, and competitive market for innovative and trusted sources of telecommunications equipment in the Radio Access Network. And finally, NTIA should look to ensure the Innovation Fund grants are aimed at ameliorating the threat that abusive patent licensing practices can play to the realization of the vision of a competitive market for RAN equipment.

Thank you again for your attention to these vital matters. Cisco is grateful for the opportunity to provide these comments and would welcome any further opportunity to amplify the points made here or to answer any questions they may raise.

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