Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC

In the Matter of	)	Docket No. 210105-0001
	)	
5G Challenge Notice of Inquiry	)	
	)	

COMMENTS OF MAVENIR SYSTEMS, INC.

Mavenir Systems, Inc. ("Mavenir")[1] submits these comments regarding the National Telecommunications and Information Administration ("NTIA") Notice of Inquiry ("NOI") published in the *Federal Register* on January 11, 2021 in the above captioned proceeding. The NOI which seeks input on how to construct a Challenge with the Department of Defense ("DOD") to accelerate the development of the open 5G stack ecosystem in order to support DOD missions. Specifically, the NTIA asks questions on the following topics: (1) Challenge structure and goals; (2) incentives and scope; and (3) timeframe and infrastructure support. Mavenir's comments focus on the goals, incentives and scope of the Challenge. As discussed below, NTIA and DOD should construct a Challenge that preferences U.S.-headquartered companies where the final product has high U.S. content.

As NTIA and DOD create a Challenge to accelerate the development of an open 5G ecosystem to support DOD missions, the agencies should seek to widen the scope of the mobile supply chain and explicitly incentivize and/or preference U.S.-headquartered companies to participate. Doing so will help build an innovation-driven ecosystem that will help advance our country's leadership in 5G both at home and abroad and allow our next generation networks and Armed Forces' needs to be met by American innovators. It also aligns with President Biden's Made-in-America initiative,

[1] Mavenir is a U.S-headquartered supplier of an end-to-end mobile network solution for LTE and 5G with a U.S.-based owner. Mavenir is owned by Siris Capital, a private equity firm based in New York, New York. Mavenir has been a pioneer and provider in the development and supply of virtualized platforms, already supplying many virtualized core elements in the United States for both LTE and 5G. Mavenir has recently added the Radio Access Network (RAN) and 5G core to its portfolio, enabling Mavenir to serve as a complete and secure 4G/5G Core and RAN end-to-end system provider.

which seeks to "ensure that the federal government is investing taxpayer dollars in American businesses – both small and large."[2]

Our mobile networks are currently dominated by a duopoly of foreign-headquartered companies that provide proprietary, closed hardware-based equipment. Simply put, proprietary equipment serves to lock out vendors other than the manufacturer from the network. What this means in the United States is that foreign-headquartered companies sell equipment and services from their own company, blocking American vendors from providing components or services to networks. A more diverse mobile supply chain can help a Challenge to advance U.S. leadership in 5G and meet the needs of the DOD, but it can only be achieved through open and interoperable interfaces, as defined by 3GPP and the O-RAN Alliance.

As an initial matter, we take the opportunity to explain OpenRAN and the various definitions and terms used with this architecture. OpenRAN refers to the disaggregated Radio Access Network (RAN) functionality built using open interface specifications between elements. OpenRAN can be implemented in vendor-neutral hardware and software-defined technology based on open interfaces and community-developed standards. O-RAN, however, refers to the O-RAN Alliance[3] or a designated-specification. In other words, OpenRAN and O-RAN are not the same. Taking this a step further, there is also vRAN, which is an implementation of the RAN in a more open and flexible architecture, which virtualizes network functions in software platforms based on general purpose processors. The terminology becomes particularly important when scrutinizing offerings from various companies. Some companies claim to provide O-RAN architecture, but in practice, those offerings are not OpenRAN. Indeed, those offerings are tied to proprietary equipment that lock out other vendors from a network.

The key concept of OpenRAN is "opening" the protocols and interfaces between the various subcomponents (i.e., the radios, hardware and software) in the Radio

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[2] "President Biden to Sign Executive Order Strengthening Buy American Provisions, Ensuring Future of America is Made in America by All of America's Workers. White House Press Release (January 25, 2021), accessed at https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/25/president-biden-to-sign-executive-order-strengthening-buy-american-provisions-ensuring-future-of-america-is-made-in-america-by-all-of-americas-workers/ (last accessed February 7, 2021).

[3] The O-RAN Alliance is a specification group defining next generation RAN infrastructures, empowered by principles of intelligence and openness. The group's website is https://www.o-ran.org.

Access Network (RAN). As a technical matter, this is what the industry refers to as a "disaggregated RAN". There are three primary elements within the RAN:

(1) the radio unit (RU), is where the radio frequency signals are transmitted, received, amplified and digitized. The RU is located near, or integrated into, the antenna;

(2) the Distributed Unit (DU) is where the real-time, baseband processing functions reside. The DU is located at, or near, the cell site; and

(3) the Centralized Unit (CU) where the slower, packet processing functions reside. The CU is located deeper in the network near the core.

It is the interfaces between the RU, DU and the CU that are the focus of Open RAN. By opening and standardizing these interfaces, and incentivizing implementation of the same, we move to an environment where networks can be deployed with a more modular design without being dependent upon a single vendor.

Importantly, open interfaces allow more innovative and agile approaches to networks, enabling upgrades to be made quickly without sending crews to physically replace equipment on towers or at the base. OpenRAN and open interfaces also lower costs because equipment does not need to be replaced; radios and base stations can be combined using less space; and competition among multiple vendors is injected into the ecosystem. Open interfaces and network virtualization also improves security and security monitoring because networks are not locked into one vendor that uses proprietary software, which can be left unprotected or manipulated in a manner that leaves data on the network unsecure and subject to remote control. U.S. suppliers of OpenRAN can offer these benefits to the U.S. government, unlike the closed and costly proprietary technology offered by foreign-owned vendors.

OpenRAN is being deployed today around the world to build next generation networks. Mavenir has deployments underway in Brazil and the United Kingdom with

Telefonica,[4] deployments in the United Kingdom[5] and India[6] with Vodafone, and we are working with DISH to deploy the first standalone network, built with OpenRAN, by year-end.[7] Other OpenRAN suppliers have deployments underway overseas,[8] and Rakuten deployed the first commercial standalone virtualized network, with OpenRAN, in Japan.[9]

We also take this opportunity to clarify the meaning of "open stack" and how it relates to open and interoperable interfaces and how it does or does not relate to open source software:

- Open stack refers to vendors that open up their interfaces to align with standards for interoperability. Within the software, vendors may have their own design-to-perform business logic related to that interface. That logic largely allows vendors to optimize the overall design, while retaining the rights on software, but what the external world sees is still the same standard interoperable interfaces.
- Open source is a community effort to design a framework or utility software, which can be consumed by organizations to build final products with or without modifications. The target is to cut down on the development time for businesses and to increase reusability. The code is made available for everyone to use commercially and to contribute. Interfaces are usually agreed upon by community and development cycle is slow due to large scale involvement.

[4] Fletcher, Bevin. "UK's O2 taps non-traditional vendors for O-RAN project." *Fierce Wireless* (January 16, 2020), accessed at https://www.fiercewireless.com/wireless/uk-s-o2-taps-non-traditional-vendors-for-o-ran-project (last accessed on February 7, 2021).
[5] Ziady, Hanna. "Vodafone wants to end the dominance of Huawei, Ericsson and Nokia." *CNN Business* (October 7, 2019), accessed at https://www.cnn.com/2019/10/07/tech/vodafone-openran-trials/index.html (last accessed February 7, 2021).
[6] Sharma, Ray. "India's Vodafone Idea Deploys Mavenir OpenRAN Solution." *The Fast Mode* (April 23, 2020), accessed at https://www.thefastmode.com/technology-solutions/16954-indias-vodafone-idea-deploys-mavenir-openran-solution (last accessed on February 7, 2021).
[7] Sbeglia, Catherine. "Dish selects Mavenir software for OpenRAN on 5G network." *RCR Wireless* (April 23, 2020), accessed at https://www.rcrwireless.com/20200423/carriers/dish-mavenir-openran-5g-network (last accessed on February 7, 2021).
[8] See enclosed map of OpenRAN commercial deployments compiled by the Telecom Infra Project.
[9] Rakuten Mobile and NEC to Build Open vRAN Architecture in Japan." Rakuten Mobile Press Releases (June 5, 2019), accessed at https://global.rakuten.com/corp/news/press/2019/0605_01.html.

- Open stack components may be used with open source software. For 5G, multiple standards organization, such as the O-RAN Alliance and TIP, have started to define open interfaces, specifically on the RAN side.
- OpenRAN-based systems make use of general purpose hardware and avoid costlier proprietary hardware and supply chain issues. This also promotes healthy competition among the general purpose hardware manufacturers and allows the software companies to provide some of functionalities at a lower cost and better time to market. Most important is to build a larger and secured supply chain allowing everyone to compete in open market as opposed to being part of one or the other proprietary ecosystem.
- The journey for open 5G stack development is not straightforward. The incumbents with proprietary solutions are still interested in keeping their high margin business rolling while the overall telecom industry needs cost efficiency and innovation. This requires support from policymakers to protect innovation and intellectual property of the new open stack players as well as set the success criteria for long-term innovation and growth of these open platforms encouraging the ongoing momentum towards a rewarding 5G ecosystem. A 5G open stack goal also requires new players to take the lead and contribute in standard-setting organizations, like 3GPP where the current proprietary solution foreign vendors are still dominant and have been controlling for decades. Given the global effect of these standards in the ecosystem and the costs involved in supporting such activities, careful planning with new open stack initiatives is required.

As the agencies create this Challenge, the agencies should support, through tax incentives and preferential treatment, U.S.-headquartered companies to develop and promote an open 5G stack ecosystem that seeks to advance cooperation, collaboration, and interoperability amongst varied open 5G stack components. The agencies should also require use of OpenRAN (open and interoperable interfaces) and prioritize U.S.-headquartered alternatives to foreign-based equipment manufacturers. Preferences for domestic headquartered companies is consistent with a growing trend among U.S.-allied nations around the world. From Europe to Asia, our allies are building their next

generation mobile networks by preferencing suppliers located within their country or continent.[10] For example, the Government of France is preferencing French suppliers and providing project funding in its efforts to reduce its dependency on Huawei.[11] The German government is primarily selecting European suppliers for a similarly-focused effort under a $2.7 billion investment of which at least $412 million will be invested in OpenRAN.[12] Britain announced its "5G Supply Chain Diversification Strategy"[13] and allocated 250 million pounds to help diversify and grow its mobile supply chain, partly through investment in 5G projects, with more than one-half of those funds being directed to OpenRAN.[14] The Indian government is currently drafting its procurement regulations to build its next generation networks, but is expected to preference domestic suppliers.[15] And, Japan has announced a number of tax incentives for products built through open and interoperable interfaces,[16] effectively eliminating participation in their networks by certain proprietary equipment manufacturers.

The American government should follow our allies' lead in supporting, encouraging, and leveraging the innovative, cost-effective, and secure alternatives

[10] Indeed, even the large carriers overseas (i.e. Deutsche Telekom, Orange, Telefonica, Vodafone Group and TIM) have teamed up to collaborate to deploy OpenRAN-based networks across the European Continent. See "Major European Operators Sign OpenRAN MOU". *GSMA* (January 26, 2021), accessed at https://www.gsma.com/futurenetworks/digest/major-european-operators-sign-open-ran-mou/ (last accessed on February 7, 2021). See also "TIM joins the European initiative for the development of OpenRAN solutions" (February 5, 2021), accessed at https://www.bnamericas.com/en/news/tim-joins-the-european-initiative-for-the-development-of-open-ran-solutions (last accessed on February 7, 2021).

[11] See, for example, "Sequans Receives Major Funding Award for 5G Development from the French Government". Sequans Press Release (January 28, 2021), accessed at https://www.nasdaq.com/press-release/sequans-receives-major-funding-award-for-5g-development-from-french-government-2021 (last accessed February 7, 2021).

[12] Cerulus, Laurens. "Berlin's €2B plan to wean off Huawei (and Nokia and Ericsson too)". *Politico* (February 2, 2021), accessed at https://pro.politico.eu/news/germany-huawei-telecoms-plan (last accessed on February 7, 2021).

[13] Department for Digital, Culture, Media & Sport, "5G Supply Chain Diversification Strategy." Government of the United Kingdom (December 7, 2020), accessed at https://www.gov.uk/government/publications/5g-supply-chain-diversification-strategy/5g-supply-chain-diversification-strategy (last accessed on February 7, 2021).

[14] Le Maistre, Ray. "Open RAN architectures at heart of UK 5G projects." *TelecomTV* (January 18, 2021), accessed at https://www.telecomtv.com/content/open-ran/open-ran-architectures-at-heart-of-uk-5g-projects-40645/ (last accessed on February 7, 2021)

[15] Rathee, Kiran. "TRAI Chairman: 'Open RAN will Present Opportunities." *The Indian Express* (January 20, 2021, accessed at https://indianexpress.com/article/business/trai-chairman-open-ran-will-present-opportunities-7153590/ (last accessed February 9, 2021).

[16] Matsubara, Mihoko. "Japan's 5G Approach Sets a Model for Global Cooperation." *LawFare Blog* (September 14, 2020), accessed at https://www.lawfareblog.com/japans-5g-approach-sets-model-global-cooperation (last accessed February 7, 2021).

provided by U.S. vendors of OpenRAN, like Mavenir. If we allow U.S. government funds to be used to purchase equipment with proprietary, closed interfaces manufactured by foreign-headquartered companies, we face the unfortunate reality that U.S. funds will be used to effectively shut down U.S. vendors from ever being able to secure a share of the domestic or global market.

Respectfully Submitted,

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8. OpenRAN Commercial Deployments, Compiled by the Telecom Infra Project: