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U.S. House Committee on Energy and Commerce
Communications and Technology Subcommittee
"Leading the Wireless Future: Securing American Network Technology"
April 21, 2021

Chairman Doyle, Ranking Member Latta, Full Committee Chair Pallone, and Full Committee Ranking Member McMorris Rodgers, thank you for the opportunity to appear before you this morning.

My name is John Baker, and I am the Senior Vice President for Business Development at Mavenir. My background is in electrical engineering, and I lead the 5G team at Mavenir.

Mavenir is a U.S.-headquartered company, founded 16 years ago and is now among the leaders in the next generation of software-focused mobile networking solutions. Mavenir is the industry's only end-to-end, cloud-native network software provider, and we serve as a trusted software vendor for the major U.S. mobile carriers and more than 250 mobile operators around the world. We are a pioneer in the virtualization of mobile networks, including the transformative architecture called Open RAN, and we supply the largest virtualized network in the world, supporting more than 110 million subscribers. We have Open RAN deployments in Germany, India, the United Kingdom, and here in the U.S., where we are helping DISH to build the nation's first standalone, cloud-native, 5G Open RAN network.

Today's hearing comes at a critical time for the mobile industry and the associated network supply chain. For years, the U.S. and global mobile networking industries have been dominated by legacy suppliers that sell proprietary systems, both hardware and software, for the Radio Access Network (RAN) – one of the two major components of a mobile communications network.[1] These proprietary products lock out other suppliers, severely limiting competition and innovation and increasing risk exposure by forcing operators to be reliant on just one company for the RAN. Unfortunately, thanks to mergers and acquisitions among suppliers over the past 20 years, along with the issues that led to the ban on Huawei and ZTE, two foreign-headquartered companies now supply almost 100 percent of the North American RAN market, constraining or effectively eliminating any U.S.-based competition in the RAN.
The solution to this challenge is to help grow and diversify the RAN supply chain, and that solution is called Open RAN.

[1] The RAN is the most expensive component of a mobile network. The other main component of a mobile network is the Core, for which network specifications have already been made open and interoperable, leading to supplier diversification, innovation, and virtualization.

My testimony today will focus on three main points:

1) how the adoption of Open RAN principles will help build a more robust supply chain ecosystem;
2) why advancement of open and interoperable standards will help the U.S. to lead in 5G and beyond; and
3) how the U.S. government can help support Open RAN deployment here in America.

***1. Open RAN will help build a more robust supply chain ecosystem***

To be clear, Open RAN is not a technology, but rather a shift in how we design and build Radio Access Networks using subcomponents from a variety of suppliers. Open Radio Access Networks are characterized by open and interoperable interfaces between the elements of the network. For this reason, Open RAN injects competition into the supply chain for 4G/5G networks, allowing multiple suppliers to compete to provide different subcomponents within the RAN. Operators have freedom of choice in how they construct their networks, which opens the door for innovation. This open architecture solution is applicable to all radio infrastructure at all frequency bands, including millimeter wave.

The current U.S RAN supply chain is a prized market – the highest margin and most profitable globally. But, it is limited to just two incumbents who have locked up the market with proprietary systems, essentially creating a duopoly. Competition is the bedrock that has facilitated progress and innovation in every aspect of technology – from raw computing power to how we browse the web. As we come closer to realizing the promise of 5G, we must diversify the supply chain and not leave the future of innovation in the hands of those who already dominate the marketplace.

In contrast, the Open RAN ecosystem numbers more than 60 companies,[2] including several U.S. suppliers, such as DISH, Cisco, Intel, JMA Wireless, and Mavenir, who are commercially vying to compete to equip and service the RAN. In addition to creating competition, Open RAN brings significant cost and operational savings[3] and increased security.[4]

Mavenir's overseas Open RAN deployments include Germany, India, and the United Kingdom. In the U.S., we are supplying Open RAN for DISH's standalone, 5G, cloud-native mobile network, which will launch its first major city by the end of September and provide 5G broadband service to over 20% of the U.S. population next year and 70% by June 2023. Importantly, DISH's

[2] These companies comprise the Open RAN Policy Coalition. See full membership list at https://www.openranpolicy.org/about-us/members/. Mavenir is a member of the coalition and serves on its Board of Directors.

[3] Open RAN results in cost efficiencies estimated at 49% savings in CapEx within one year and 31% savings in OpEx over five years. See "Open RAN Integration: Run With It," *iGR* (April 2020), available at https://mavenir.com/resources/open-ran-integration-run-with-it/

[4] See 5G and Open RAN Security: Next Generation Trust, *Open RAN Policy Coalition* (June 25, 2020), available at https://www.openranpolicy.org/resources/

network demonstrates how to complete system integration with a broad supplier ecosystem: Mavenir is one of the 20 suppliers providing Open RAN-based solutions for DISH's network.

Significantly – and I really want to stress this point because many of our nation's rural carriers are in the midst of a taxpayer-funded rip and replace program – a more robust ecosystem of suppliers providing open and interoperable components helps to futureproof networks because we are not forcing operators to rely on just one company to build and service the RAN. Should another national security concern or challenges associated with the financial viability of a single supplier arise, Open RAN would help avoid another costly, taxpayer funded replacement effort because it ensures a diversified, multi-vendor supply chain in which components can easily be substituted and replaced.

***2. Advancement of Open and Interoperable Standards will help the U.S. lead in 5G and beyond***

For the U.S. to lead in next generation networks, the Congress must support an increase in U.S. participation in the international standard setting organizations and advocate for the advancement of open and interoperable interfaces in global standards.

Global standards for mobile technologies are set by 3GPP. However, 3GPP no longer develops open interface specifications, which has unfortunately enabled suppliers to develop proprietary solutions that stifle competition. This has occurred primarily because 3GPP is dominated by the large, incumbent companies - the same companies that currently control the world's mobile network equipment market and have an interest in protecting their dominant market share through their proprietary products. Accordingly, 3GPP has not adopted open and interoperable interfaces for the RAN.

To fill the void in 3GPP standards and to help support open and interoperable specifications, the O-RAN Alliance was founded three years ago. Today, the O-RAN Alliance is led by 28 operators with 240 suppliers participating. O-RAN specifications have helped move the greater RAN ecosystem forward, but its specifications have not been adopted by 3GPP, which remains the primary global standard-setting organization.

To help advance open and interoperable standards and to promote competition, more U.S. companies need to participate in 3GPP. But, participation in 3GPP is expensive and resource-intensive, which has hindered the ability of smaller U.S. suppliers to meaningfully participate. To increase U.S. participation, the U.S. government should work more closely with and financially support U.S. industry involvement in 3GPP. Without more U.S. companies at the table, we will be left with the continued perpetuation of few foreign-headquartered companies dominating the global RAN market with proprietary solutions, and the risk that U.S. companies will be eliminated from competing in this market.

***3. The U.S. government must take further actions to support Open RAN deployment***

We are encouraged and thank the many U.S. policymakers that understand what is at stake, and we are grateful for the bipartisan support from many Members of the House Energy & Commerce Committee who have been strong, vocal advocates for Open RAN. Acting FCC Chairwoman Rosenworcel, Commissioner Carr, and Commissioner Starks have also recognized the transformative benefits of Open RAN, and the FCC recently launched a Notice of Inquiry to examine Open RAN and the benefits that it could bring to our supply chain.

But there is still more that can and must be done. Around the world, allied nations are advancing aggressive policies to build their next generation mobile networks with Open RAN,[5] and some are even preferencing local suppliers to do so.[6] For example, earlier this year, five major European operators signed a Memorandum of Understanding, committing to deploy Open RAN across the European continent.[7] But this full embrace of Open RAN has not yet happened here in the U.S. As a U.S.-headquartered company, there is real concern that the window to supply 5G networks will close, and U.S. companies will be foreclosed from the 5G RAN market abroad and in the U.S.

[5] The German government has announced a $2.7 billion investment of which at least $412 million will be invested in Open RAN. See 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. In addition, Britain announced its "5G Supply Chain Diversification Strategy" to help diversify and grow its mobile supply chain, partly through multimillion investment in 5G projects, with more than one-half of those funds being directed to Open RAN. See Government of the United Kingdom's Department for Digital, Culture, Media & Sport, "5G Supply Chain Diversification Strategy," (December 7, 2020), accessed at https://www.gov.uk/government/publications/5g-supply-chain-diversification-strategy/5g-supply-chain-diversification-strategy. The Government of the United Kingdom also announced a $350 million project to develop Open RAN systems and equipment. See 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/. Japan has announced a number of tax incentives for products built through open and interoperable interfaces. See Matsubara, Mihoko, "Japan's 5G Approach Sets a Global Model," *Law Fare* (September 14, 2020), accessed at https://www.lawfareblog.com/japans-5g-approach-sets-model-global-cooperation

[6] See "Sequans Receives Major Funding Award for 5G Development from French Government," *Nasdaq* (January 28, 2021), accessed at https://www.nasdaq.com/press-release/sequans-receives-major-funding-award-for-5g-development-from-french-government-2021. See also Rathee, Kiran, "Trai Chairman: 'Open RAN will present opportunities," *Indian Express* (January 20, 2021), accessed at https://indianexpress.com/article/business/trai-chairman-open-ran-will-present-opportunities-7153590.

[7] See Major European Operators Sign Open RAN MOU*, GSMA* (January 26, 2021), accessed at https://www.gsma.com/futurenetworks/digest/major-european-operators-sign-open-ran-mou/. See also Tomas, Juan Pedro, "Telecom Italian Joins Alliance to Promote O-RAN technology," *RCR Wireless* (February 8, 2021), accessed at https://www.rcrwireless.com/20210208/carriers/telecom-italia-joins-alliance-promote-oran-technology.

To help advance Open RAN in the U.S., we strongly recommend the following three actions:

1. **Fund the Public Wireless Supply Chain Innovation Fund**:

Last year, thanks to the leadership of Chairman Pallone, Ranking Member McMorris Rodgers, Congresswoman Matsui, Congressman Guthrie, and Congresswoman Eshoo – and Senators Warner and Rubio – Congress authorized the Public Wireless Supply Chain Innovation Fund, which was originally included in the U.S.A. Telecommunications Act and passed as part of the FY 2021 National Defense Authorization Act. This new grant program will help companies like Mavenir and JMA Wireless expand in the U.S., while also helping to spur increased U.S. manufacturing and leadership in 5G. The funds will benefit U.S. suppliers and U.S. leadership in several ways, including by helping American innovators build manufacturing facilities to produce open and interoperable network components, reshoring key manufacturing back from China, and creating labs for the ongoing certification of interoperability for the multi-supplier ecosystem. Congress should now quickly appropriate the requested $3 billion to fund the Public Wireless Supply Chain Innovation Fund to help advance Open RAN and its many benefits.

2. **Promote competition**:

While there are no dominant U.S. companies selling into the 5G equipment market, there are many viable U.S. companies with leading technology who are vying to engage. Rather than advocate for a particular U.S. company, our policies must advocate for an American principle: competition. For mobile networks, this competition has a name, and it's Open RAN. The best way to advance U.S. leadership in 5G is to enact policies that encourage Open RAN deployment and the supplier competition that will surely follow.

3. **Provide financial incentives:**

To help smaller companies to scale and compete with the dominant, incumbent equipment manufacturers, the U.S. government should provide other financial incentives, such as loan guarantees, tax incentives, and funded demonstration networks to propel our mobile carriers to pursue Open RAN deployments. By adopting policies that support Open RAN, we can ensure that our mobile network supply chains are more resilient and strengthen U.S. leadership.

Thank you for the opportunity to appear before you today. I look forward to your questions.