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Subcommittee on Communications and Technology
"Strengthening American Communications Leadership with Open Radio Access Networks"
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Chairman Latta, Ranking Member Matsui, Full Committee Chair McMorris Rodgers, and Full Committee Ranking Member Pallone, thank you for the opportunity to appear before you this morning.

My name is John Baker, and I serve as Senior Vice President for Business Development at Mavenir where I lead our 5G Open RAN efforts. I serve on the boards of the Open RAN Policy Coalition and 5G Americas, and I chair the Industry Engagement Focus Group for the O-RAN Alliance.

Nineteen years ago, Mavenir was founded in Texas to focus on virtualized network software. Over the years, we've been a disruptive industry leader in virtualized core solutions and a pioneer in Open Radio Access Networks. Today, Mavenir is a trusted vendor to more than 250 mobile operators around the world, including the major carriers here in the U.S., and we supply multiple virtualized networks around the world. We also provide Open RAN in multiple networks, including for DISH's 5G standalone network in the U.S., the largest Open RAN network in the world. And, we are proud to have won the 2022 and 2023 5G Challenges conducted by the National Telecommunications and Information Administration (NTIA), in collaboration with the U.S. Department of Defense.[1]

Almost three years ago, I testified before this subcommittee and spoke about how critical it was for the U.S. to embrace Open Radio Access Networks or Open RAN to increase competition, diversify our telecommunications supply chain, improve our wireless networks' resiliency and security, and lead the world in 5G and beyond. Mavenir sincerely thanks this subcommittee for your strong, unwavering support of Open RAN in pursuit of those objectives.

My testimony today will focus on three points:

1. Open RAN is tried, tested, and proven, offering mobile network operators in nearly every region of the world with a diversified supply chain.

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[1] In 2022, Mavenir won the 5G Challenge after successfully developing a fully integrated multivendor end-to-end 5G network. See https://www.ntia.gov/press-release/2022/ntia-and-department-defense-announce-final-winners-2022-5g-challenge. In 2023, Mavenir won two prizes for mobility and handover testing and wraparound testing for the Open RAN central unit (CU) and distributed unit (DU) See https://5gchallenge.ntia.gov/

2. With more operators and suppliers embracing Open RAN, a certification process is needed to prevent vendor lock for 5G and beyond; and

3. Increased investment, creative solutions, and close collaboration between the public and private sector can help ensure Open RAN's success.

1. Open RAN is a proven solution and is being deployed in nearly every region of the world.

Today, there is no question that Open RAN is a proven, secure, and innovative means of delivering wireless networks. Open RAN, which is characterized by proven open and interoperable interfaces between the elements of the radio access network, has disrupted the decades-long practice of a few equipment suppliers providing closed, proprietary systems that lock operators into long-term contracts with no competition or choice in how to design their network.

Open RAN architectures aim to provide a more modular and flexible approach, making it easy for operators to replace or upgrade individual components or even suppliers, while increasing competition in the market. While each component vendor would have to provide the highest quality at the lowest total cost of ownership, successful interworking and integration across the components and software can establish end-to-end performance. DISH has successfully demonstrated that two vendors can interoperate for each element of a network; that is exactly what is required to have "true" Open RAN. The performance of DISH's Open RAN network, embodying Mavenir's Open RAN software, has been independently verified by Signals Research and proves that Open RAN performance is equal to or better than traditional RAN networks in the same region.[2] Open RAN also allows for resiliency,[3] greater energy efficiency[4], and security,[5] advantages that all align with our national and economic security objectives.

The many benefits of Open RAN are why it is being deployed in nearly every region of the world. Globally, there are 12 commercial Open RAN deployments, with 62 additional networks at various stages of deployment, testing, and trialing.

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[2] Vodafone's Open RAN network in parts of the U.K. demonstrated faster connectivity speeds than connectivity speeds provided by the prior, traditional network architecture. See https://www.vodafone.com/news/technology/vodafone-first-open-ran-sites-better-connectivity-busy-seaside-towns

[3] The FCC's Communications Security, Reliability, and Interoperability Council VIII, in its "Report on Challenges to the Development of ORAN Technology and Recommendations on How to Overcome Them", stated "the vendor diversity inherent in Open RAN increases the resiliency of the mobile infrastructure supply chain," accessed at https://www.fcc.gov/file/24520/download.

[4] See "Open RAN and Energy Efficiency," *Open RAN Policy Coalition*, accessed at https://www.openranpolicy.org/wp-content/uploads/2021/08/Open-RAN-Energy-Efficiency_.pdf

[5] As NTIA concluded in its "Open RAN Security Report" released in May 2023, the "[u]se of Open RAN does not fundamentally change the risk landscape that also affects traditional RAN developments." See "Open RAN Security Report, *NTIA*, (May 2023), accessed at https://www.ntia.gov/sites/default/files/publications/open_ran_security_report_full_report_0.pdf
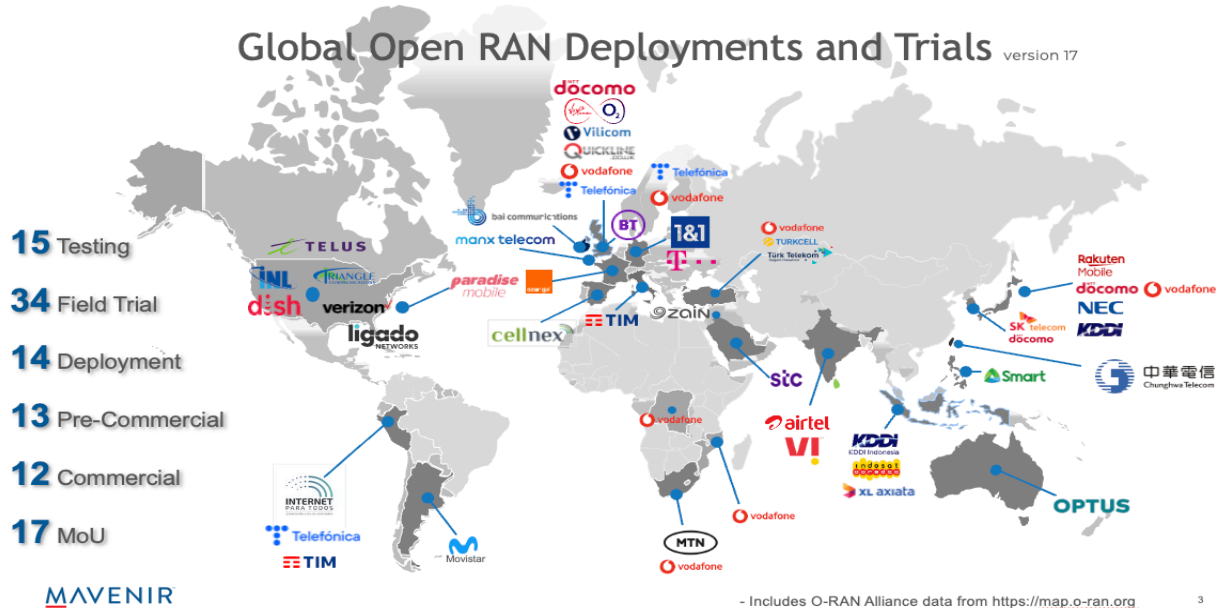
Infographic created by Mavenir, incorporating data from the O-RAN Alliance available at https://map.o-ran.org

The number of Open RAN deployments worldwide will continue to grow as operators in Europe and the Middle East have signed regional Memorandums of Understanding, committing to deploying Open RAN in their networks.[6]

In the U.S., AT&T recently announced[7] that it will deploy Open RAN supplied by Ericsson, a new entrant to the Open RAN market, beginning in 2025. Mavenir applauds AT&T's decision to launch Open RAN and welcomes Ericsson to the Open RAN ecosystem. We look forward to partnering with them and would welcome the opportunity to interoperate with Ericsson, just as we recently did with Nokia.[8]

For our part, Mavenir has 19 Open RAN trials and deployments underway, including deployments in Bermuda, France, Germany, India, the United Kingdom. In the U.S., we ripped out Huawei equipment and replaced it with Open RAN for Triangle Communications in Montana, and as stated above, we supply Open RAN for 10,000 sites in DISH's 5G network.

It is an incredibly exciting time for the telecommunications industry with more than 120 companies in 21 countries now participating in the global Open RAN ecosystem, but we must be

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[6] 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 "Telecom Italia 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. See also "Batelco joins six Middle East operators in an open RAN MOU," *Intelligent CIO,* (March 7, 2022), accessed at https://www.intelligentcio.com/me/2022/03/07/batelco-joins-six-middle-east-operators-in-an-open-ran-mou/
[7] See "AT&T to Accelerate Open and Interoperable Radio Access Networks (RAN) in the United States through new collaboration with Ericsson," (December 4, 2023), accessed at https://about.att.com/story/2023/commercial-scale-open-radio-access-network.html
[8] Mavenir and Nokia recently participated in interoperability testing. Within four days, the two companies successfully proved the interoperability of Mavenir's CBRS Radio Unit and Nokia's AirScale Baseband in accordance with O-RAN Alliance specifications. https://www.nokia.com/about-us/news/releases/2023/11/15/nokia-partners-with-mavenir-to-prove-open-ran-system-performance/

careful that the mistakes of the past that hurt America's leadership in telecommunications are not repeated.

2. <u>The strong embrace of "Open RAN" warrants a formal certification process to prevent vendor lock.</u>

For decades, as a result of years of consolidation among equipment suppliers, the global radio access network marketplace was dominated by a few, foreign-headquartered companies. Those few suppliers, some of which include today's untrusted vendors, controlled the international standard setting body for mobile technologies known as 3GPP and developed closed interface specifications, supporting traditional, proprietary solutions.

Recognizing the need to work on open interface standards, a group of operators founded the O-RAN Alliance in 2018.[9] Today, nearly 300 entities – operators, suppliers, U.S. government agencies, and academics[10] – participate in the O-RAN Alliance and work together on open and interoperable specifications that define the minimum product requirements for each element of the radio access network. Thankfully, the specifications developed by the O-RAN Alliance are now being adopted as part of the 3GPP specifications, providing one coherent specification set for a network– a testament to Open RAN's progress and a job well done for the industry.

However, just as Open RAN has been embraced by nearly all within the industry, we risk repeating history by having suppliers again lock up networks with proprietary solutions that are only partially based on O-RAN Alliance specifications. To truly be Open RAN, a company must (1) support the minimum requirements dictated by the O-RAN Alliance and (2) conduct interoperability testing with other vendors. The challenge here is that there is no formal certification process to confirm that a solution is compliant with O-RAN Alliance specifications. Thus, a company can call its offering "Open RAN" without actually satisfying the criteria to be truly Open RAN. These vendors refer to themselves as single suppliers of Open RAN, and they threaten to upend the benefits that Open RAN offers.

Single vendor Open RAN will hurt the telecommunications leadership that the U.S. is working so hard to achieve. This is why the U.S. government should work with allied governments to encourage operators to fully embrace the deployment of open *and* interoperable networks and publicly support calls for a certification body to ensure that networks are indeed compliant with O-RAN Alliance specifications. Otherwise, networks will remain locked by a single vendor, belying the very benefits that Open RAN bestows.

The U.S. government should also incentivize increased participation from U.S. companies in the international standards bodies and ensure that U.S.-funded specification groups, such as ATIS, promote such open and interoperable standards. Increased participation in standards bodies by U.S. companies will help the U.S. to lead in next generation networks and help the global advancement of Open RAN.

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[9] See O-RAN Alliance website, accessed at: https://www.o-ran.org/about#:~:text=O%2DRAN%20ALLIANCE%20has%20been,Telekom%2C%20NTT%20DOCOMO%20and%20Orange.
[10] See https://www.o-ran.org/membership, which lists the full membership, including several U.S. government agencies: the National Security Agency (NSA), the National Institute of Standards and Technology (NIST), and NTIA.

3. **Further investments, creative solutions, and close collaboration between the public and private sectors can help ensure Open RAN's success.**

Mavenir appreciates the continued support from Congress and the Administration to strengthen the Open RAN ecosystem. The authorization and full funding of the Public Wireless Supply Chain Innovation Fund, a dedicated source of funding to promote Open RAN and enhance U.S. competitiveness, will undoubtedly make important contributions to Open RAN. We also thank NTIA for its stewardship of this program. In addition to this support, further investments, creative solutions, and close collaboration between the public and private sectors are needed to help small and mid-sized companies better compete around the world and help Open RAN to succeed.

The reality is that in the global marketplace, we face competition from China – and specifically suppliers that are backed by financing from the Chinese government. To help U.S. suppliers better compete and drive the entire Open RAN ecosystem forward, we have three recommendations for future investments.

First, support Open RAN radio manufacturing. Currently, the large vendors deploy networks with their own proprietary radios without making them available for licensing or interoperability testing. If Open RAN suppliers cannot interoperate with radio access network radios, which connect the cell tower to a network, we run the risk of not being able to deploy a truly interoperable network, thus defeating the many benefits that Open RAN brings.

Second, help promote price parity for semiconductors used in Open RAN networks. In today's market, large vendors receive lower pricing terms for the same semiconductors that small or mid-size vendors buy because the chips industry prices by volume. The higher the volume purchased, the lower the cost of each component. This advantages the largest suppliers and results in higher costs for smaller vendors, making it even more difficult for smaller suppliers to compete.[11] Federal programs, such as the Public Supply Chain Wireless Innovation Fund, could help remedy this disparity, increase smaller companies' competitiveness, and advance a more diverse wireless supply chain.

Third, funding of test centers should be for certification and product validation. Today's ecosystem already supports 18-plus testing labs globally with an additional 7 labs in the U.S., which are separate from labs operated by individual vendors. If there is not an increase in the number of vendors or the research and labs are not connected into the product development process, today's vendors will not be able to financially support this large number of test organizations. Undoubtedly, there will be right sizing as suppliers cannot be burdened with these costs.

In addition to investments, creative solutions and close coordination between the Open RAN ecosystem and public sector can help U.S. suppliers better compete against competitors from China. One such area ripe for exploration is project finance. We recognize that this topic is not within this Committee's jurisdiction, but we urge Congress to find ways to make working capital

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[11] See "How to Fix Open RAN in the U.S., *Light Reading*, (February 13, 2023), accessed at https://www.lightreading.com/open-ran/how-to-fix-open-ran-in-the-us

more accessible and available to small and mid-size U.S. suppliers through programs at the Export Import Bank of the U.S. and the Development Finance Corporation. Another opportunity is presented with the FCC's 5G Fund, which should be used to advance Open RAN and reinvigorate U.S. telecommunications leadership.[12]

Lastly, we appreciate this committee's strong advocacy to fully fund the budget shortfall within the FCC's Secure and Trusted Communications Networks Reimbursement Program, and we echo your calls for full funding. Mavenir is engaged in several projects to "rip and replace" untrusted equipment in our country, including an Open RAN deployment with Triangle Communications, but because current funds only cover 40% of each project,[13] paticipants are at risk of not being fully reimbursed for work already performed in accordance with the law.

Thank you again for convening today's hearing and for the opportunity to testify. I look forward to your questions.

[12] The FCC recently adopted the 5G Fund Further Notice of Proposed Rulemaking and completed a comment cycle. In our comments, Mavenir urged the Commission to include rules related to using Open RAN technologies in 5G Fund-supported networks. See Comments of Mavenir Systems, Inc., accessed at https://www.fcc.gov/ecfs/document/10231694928246/1
[13] See "Secure and Trusted Communications Networks Reimbursement Program Report" prepared by the FCC's Wireline Competition Bureau, accessed at: https://docs.fcc.gov/public/attachments/DOC-390614A1.pdf