

JMA Wireless' Responses to the National Telecommunications and Information Agency's Request for Comment on Implementing the Public Wireless Supply Chain Innovation Fund, Docket No. 221202-0260; RIN 0693-XC05

Thank you for the opportunity to respond to the National Telecommunications and Information Agency's (NTIA's) request for comment on implementing the Public Wireless Supply Chain Innovation Fund.

JMA Wireless (JMA) is restoring U.S. leadership in wireless technology at a critical time in the transition to 5G. Based in Syracuse, New York, JMA makes the world's most advanced and only all-software-based 5G platform, which it designs, codes, and manufactures at the only U.S.-owned 5G factory in the country. JMA is ushering in a new era of innovation and connectivity for businesses, workers, and most critically, all branches of the U.S. military.

The emergence of 5G presents a once-in-a-generation opportunity to restore U.S. leadership to wireless at a time when our country's economic and national security depends on re-establishing control over our communications technology and rebuilding our industrial independence. As the Innovation Fund is operationalized, it is worth noting:

- **The Time to Invest in ORAN is Now:** ORAN deployments are increasing across the globe, and the U.S. can't be left behind. For example, we worked with Telecom Italia (TIM) to deploy ORAN systems in the Macro environment that currently cover nearly 70,000 residents across two cities in Italy. European ORAN deployments lead domestic ones, and we must change that by investing in American ORAN R&D today.
- **A National and Economic Security Threat:** The United States has finally woken up to what the Chinese Communist Party has known for a long time – that 5G simply isn't "another G." It will become the central nervous system that connects and controls all other infrastructure. The free world will depend on it – our homes, schools, jobs, water systems, electrical grids, transportation networks, manufacturing, and military. It is a strategic asset that America must own.
- **We Must Invest in America:** American tax dollars should be spent on American jobs. Huawei doubled its R&D budget to over \$22B in 2021 – more than any company in the world outside of America – and continues to invest at record levels. Investing in U.S. companies will not only make us safer, and secure the supply chain, but it will accelerate job growth through re-shoring of these critical functions.
- **ORAN is Critical to Our National Security:** The U.S. Department of Defense's future relies on private 5G – and ORAN is critical to make that possible. Through our work, we have helped connect the diverse mission-critical use cases the DoD demands today – from flightline data, to smart logistics, and connecting the frontline soldier on the battlefield. These various use cases demand various radio configurations that are only possible through ORAN – making investing in ORAN domestically a necessity, not an option.

The U.S. must regain its position as a global wireless leader – this critical investment will catalyze additional growth and investment, and help make this country safer and more secure, but only if we invest at home.

For all of these reasons, JMA applauds the government’s initiatives in this respect, particularly including those embodied in the CHIPS Act, and appreciates the opportunity to provide comments to the NTIA on this important matter. For questions, please contact:

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JMA offers the following comments to the questions in the Request for Information:

What are the chief challenges to the adoption and deployment of open and interoperable, standards-based RAN, such as Open RAN? Are those challenges different for public vs. private networks?

There is a perceived lack of maturity for Open RAN solutions that limits spending on “at-scale” deployments that can serve as proof points for the technology. Outside the U.S., this is being solved through accelerating global ORAN deployments, such as our deployment with TIM in Italy where we successfully connected two municipalities and 70,000 residents, demonstrating the ability of leading-edge ORAN solutions to handle the capacity and density requirements of real-world networks. Domestically, we have seen the path to ORAN come through the Department of Defense testbeds. For example, [DoD is deploying a 5G network at Naval Air Station Whidbey Island in Washington state](#) – the ORAN 5G network connects support operations, maintenance and flight traffic management.

Penetration of ORAN into public macro networks faces a more difficult hurdle due to the entrenchment in mobile operator networks of legacy RAN providers and the existing management systems that come with those incumbent solutions.

For the private enterprise, the required level of expertise on mobile wireless and RAN technology is very different from what their current IT organization is accustomed to deploying. As most network customers don’t have the necessary RAN background to stitch together a piecemeal Open RAN solution, they will need to rely more heavily on system integrators or ORAN vendors to provide expertise – that vendor community must have full end-to-end view and capability to be successful, and is very few in number today.

Another challenge is international mobile wireless standards, as the ORAN specifications are still evolving and may not yet address all use-cases or advanced features – which allows incumbents to maintain a competitive edge with proprietary solutions. The way to solve this is coupling ongoing standards efforts – in which the U.S. needs to sharply increase its role – with the automation and agility that a software-based Open RAN network provides.

- a. *What are the challenges for brownfield deployments, in which existing networks are upgraded to incorporate open, interoperable, and standards-based equipment?*

Brownfield networks require exhaustive interoperability testing to ensure smooth handover and coexistence with existing network infrastructure. Additionally, operators may prefer to manage each region with a single management platform. In some cases, a strategy of “green on brown” may apply, adding an additional 5G ORAN layer to an existing LTE location.

What ongoing public and private sector initiatives may be relevant to the Innovation Fund?

Other initiatives that are relevant to the Innovation Fund include other U.S. manufacturing funding in CHIPS; the DoD 5G testbeds where ORAN is deployed or will be deployed; and enterprise private network deployments.

- a. *What gaps exist from an R&D, commercialization, and standards perspective?*

JMA has successfully deployed ORAN solutions for commercial use today in an ORAN-compliant architecture, but this remains an exception in the current commercial environment for ORAN. The standards continue to evolve, and the different ORAN working groups introduce additional standards and interfaces, like those applicable to the RAN Intelligent Controller (RIC), that are not fully defined or consistent. As these standards converge and mature, and clear use cases emerge, these advanced features and capabilities around intelligence and management can be introduced into the ecosystem.

b. *How might NTIA best ensure funding is used in a way that complements existing public and private sector initiatives?*

NTIA can consult with the U.S. Department of Defense to find out what the DoD believes would be most helpful, given that DoD has testbed projects that are operational or soon-to-be operational, and likely has the most complete view among U.S. players of what needs or solutions in the ORAN space remain unmet or unproven. Moreover, it would make sense for NTIA to work with states and other agencies to find infrastructure projects funded by the Infrastructure Investment and Jobs Act that could benefit from incorporating an ORAN network.

Leveraging the Innovation Fund to further incubate these efforts, we can, in the process, develop a U.S. supplier ecosystem of ORAN providers experienced in large-scale deployments for DoD and others. This can help to prove out ORAN at scale, and validate reliability, performance, security, and low latency.

What kind of workforce constraints impact the development and deployment of open and interoperable, standards-based RAN, such as Open RAN? How (if at all) can the Innovation Fund help alleviate some of these workforce challenges?

A pipeline of necessary skillsets play a critical role to accelerate the pace of ORAN development and adoption. Higher education must make telecommunication-centric research and coursework a priority (as is already the case in other parts of the world) along with current focus points on

Information Technology (IT) and Computer Science. In most cases, educated labor emerging from the U.S. higher education system must undergo significant additional training to come up to speed on telecommunication standard practices and concepts. While there are many wireless engineering programs overseas, the U.S. lacks these degree programs, and has to rely on highly-skilled workers from other parts of the world. We can help restore U.S. leadership to wireless by working with major universities to create wireless engineering degree programs that better meet our current workforce challenges. NTIA may wish to consider, in making funding decisions, incentivizing the collaboration of projects and enterprises backed by the Innovation Fund with the relevant departments of U.S. higher education institutions to foster these new programs.

What is the current climate for private investment in Open RAN, and how can the Innovation Fund help increase and accelerate the pace of investment by public and private entities?

Proving out ORAN at scale per and demonstrating an ecosystem that can reduce cost requires lowering the barriers to entry for additional suppliers into the wireless 3GPP market, which in turn requires private investment at a faster pace than what we see today.

To spur this, NTIA should try to fund the selected projects as quickly as possible. Huawei spends north of \$22B annually in R&D, and for the U.S. to compete on the global stage, we must invest more and sooner. The Innovation Fund investments have the capability to encourage more investment, and accelerate the pace of spend by private entities, but a multiplier effect can only be achieved if the Innovation Fund investments are brought to bear in a way that can generate momentum in the immediate term.

Lastly, we must invest in U.S.-based companies. Sending American tax dollars overseas will not provide the return on investment this country deserves. Investing in ORAN in America will provide additional confidence in the market, spur additional investment, and reshore jobs.

How do global supply chains impact the open, interoperable, and standards-based RAN market, particularly in terms of procuring equipment for trials or deployments?

The promise of ORAN is to reduce supply chain constraints by diversifying suppliers. But today, we are limited to just a few telecommunications equipment vendors. The global telecom market lives and dies on its supply chain. It is mission critical that the United States focus on onshoring and investing in America to better control our wireless technology future. Fully validating ORAN will naturally diversify the supply chain, as it will break up the closed stack/lock-in of incumbent vendors, and thus enable an environment when network operators, big and small, can source hardware and software from multiple vendors.

However, this isn't going to fix the supply chain concerns that plague electronics manufacturing of all kinds. But while those issues must also be addressed, the Innovation Fund can't boil the ocean and needs to stay targeted on driving the ORAN ecosystem.

What open and interoperable, standards-based network elements, including RAN and core network elements, would most benefit from additional research and development (R&D) supported by the Innovation Fund?

From a RAN perspective, the radio supply chain could be bolstered to enable more O-RU options for the U.S. domestic market. Many global ORAN radio suppliers have radio options for bands that are ubiquitous globally, like B3 and B7, but there are fewer options for U.S. bands such as B2 and B4/66.

Innovation Fund monies can also be used by ORAN companies to facilitate interoperability testing of alternative/flexible network components that would enable further use cases with DoD. An example of this would be a new, robust, small form factor server for tactical operations, or interoperability between a RAN solution and core selected by DoD.

Are the 5G and open and interoperable RAN standards environments sufficiently mature to produce stable, interoperable, cost-effective, and market-ready RAN products?

With the latest 3GPP and ORAN standards, there is sufficient maturity to support the first wave of stable, cost-effective products that are already being introduced in the commercial market. However, today the full feature set of Open RAN solutions is less broad than that of established incumbent RAN suppliers. The ORAN ecosystem is narrowing this gap through "softwarization" of the RAN which enables automation, streamlined service orchestration, and operations integration with third-party applications, but work remains to be done for ORAN to fully achieve parity.

a. What barriers are faced in the standards environment for open and interoperable RAN?

One barrier is that 3GPP standards have historically defined the working of a fully-integrated technology stack including the RAN, but individual RAN interfaces have not been sufficiently defined to enable interoperability. The ORAN alliance has drastically reduced, but not yet entirely eliminated, this barrier by providing additional standards guidance for purposes of enabling true openness and interoperability.

b. What is required, from a standards perspective, to improve stability, interoperability, cost effectiveness, and market readiness?

Interoperability testing requires significant investment in skilled technical personnel as well as infrastructure and test equipment to ensure a robust solution with a new network component. Better standards, and compliance of each element to those standards as proven with test equipment, can increase the likelihood of successful integration.

c. What criteria should be used to define equipment as compliant with open standards for multivendor network equipment interoperability?

Testbeds, test and integration centers, and test equipment vendors provide mechanisms by which compliance to interoperability can be confirmed. The criteria for validation of compliance to multivendor equipment interoperability are defined by the standards themselves and should be adopted by test equipment vendors in their protocol and interface test equipment. Individual

components can be tested against this equipment and then confirmed in additional end-to-end or functional block testing with both interoperable elements.

What kinds of projects would help ensure 6G and future generation standards are built on a foundation of open and interoperable, standards-based RAN elements?

Deploying 5G ORAN systems now will provide a strong base of lessons learned to develop 6G standards from the ground up on ORAN. 6G standards are currently under development in early stages, so 3GPP and O-RAN considerations for 6G can be taken in tandem.

How can projects funded through the Innovation Fund most effectively support promoting and deploying compatibility of new 5G equipment with future open, interoperable, and standards-based equipment?

A software approach to 5G and ORAN will naturally lead to interoperable solutions and leverage common off-the-shelf hardware for RAN deployments. This is demonstrated in [Whidbey Island](#) – a DoD testbed where a coalition of American providers have proven ORAN works. We need to fund more projects like this to further prove scale and performance to drive the overall ORAN ecosystem.

a. Are interoperability testing and debugging events (e.g., “plugfests ”) an effective mechanism to support this goal? Are there other models that work better?

Plugfests are helpful to an extent, but are generally more valuable as a “proof of concept” or demonstration of basic functionality and capabilities. At the current stage of the development of ORAN, what would be more impactful are additional lab, field, and commercial deployments to prove ORAN solutions not just in concept, but at scale.

How can projects funded through the program most effectively support the “integration of multi-vendor network environments”?

Integrating different ORAN vendor solutions requires unique experience and testing. For example, validation of O-CU/O-DU on a new server, or interoperability testing between O-DU and O-RU requires significant RAN expertise and testing resources (including experienced L1, Operations, Administration, and Maintenance, and Quality Assurance resources, as well as costly test equipment) for a vendor to fully validate a robust Open RAN solution. Funding for interoperability testing and testing environments can significantly increase the possibility of validating new multi-vendor combinations.

How do certification programs impact commercial adoption and deployment? a. Is certification of open, interoperable, standards-based equipment necessary for a successful marketplace?

Certification programs may help, but vendor testing and validation (Quality Assurance) is always required to ensure readiness for commercial adoption and deployment.

b. What bodies or fora would be appropriate to host such a certification process?

ORAN integration centers offer a first level “proof of concept” and basic integration capability of a given ORAN solution. TIP has extended this process further with a “badging” mechanism indicating successful interoperability testing in their lab. Additional testing and hardening of the full solution is always required beyond this for a scalable, robust commercial product.

What existing gaps or barriers are presented in the current RAN and open and interoperable, standards-based RAN certification regimes?

Testing today proves adherence to evolving standards, and as such, is more of a proof of concept that passes basic testing criteria in a lab than a full certification regime.

a. Are there alternative processes to certification that may prove more agile, economical, or effective than certification?

Ultimately, the system must be able to deliver the end-to-end performance that the customer requires for its entailed use cases. For example, in the DoD’s case, the best way to prove this is through the testbeds and installations with real testing of the solution and use case.

What are the foreseeable use cases for open and interoperable, standards-based networks, such as Open RAN, including for public and private 5G networks? What kinds of use cases, if any, should be prioritized?

ORAN is critical to our national security, and as such, military use cases should have the highest priority. The U.S. Department of Defense’s future plans rely on private 5G – and ORAN is critical to make that possible. Through our work, we have helped connect the diverse mission-critical use cases the DoD demands today – from flightline data that is being demonstrated [at Naval Air Station Whidbey Island](#), [to smart logistics](#), and [connecting frontline soldiers](#) on the battlefield. Deploying private 5G to the U.S. Armed Forces isn’t possible without ORAN, as these varied use cases demand various radio configurations that can only connect through an open interface – making investing in ORAN domestically a necessity, not an option. As history has shown, however, governmental imperatives can drive technological advances that ultimately benefit the wider community, and the private 5G network use cases serving enterprise and higher education should be prioritized next.

a. What kinds of testbeds, trials, and pilots, if any, should be prioritized?

There has been significant success demonstrated in the testbed and trial phase, specifically with the U.S. Department of Defense. We now need to shift our focus on scaling these projects so that we can fully demonstrate the success of ORAN.

How might existing testbeds be utilized to accelerate adoption and deployment?

Testbeds provide more opportunities for ORAN commercial deployments, but there must be a path to scale. Testbeds are valid for initial proof of concept, or for interoperability testing with new solution components, though vendor lab testing and QA will always be required.

What sort of outcomes would be required from proof-of-concept pilots and trials to enable widespread adoption and deployment of open and interoperable, standards-based RAN, such as Open RAN?

Proof of concept pilots and trials need to be near-commercial systems demonstrating that they can solve a need for a specific use case -- and do so repeatedly and reliably. Trials that are closer to real deployment scenarios are more valuable at this stage.

How can NTIA ensure that a diverse array of stakeholders can compete for funding through the program? Are there any types of stakeholders NTIA should ensure are represented?

NTIA should give preference to those with in-house R&D and who can continue to sustain the development after the initial phase -- ensuring that the concepts validated are actually brought to market. A focus on domestic R&D will, in and of itself, help diversify an industry that has largely moved offshore over the last several decades.

How (if at all) should NTIA promote teaming and/or encourage industry consortiums to apply for grants?

Any consortium should be able to demonstrate the end-to-end delivery of its idea. A preference should be given to any R&D organizations that have existing customers and opportunities that can implement their work in real-world scenarios. Additionally, they should promote and drive the U.S.-based ORAN ecosystem. To the extent that a single entity cannot fulfill all these requirements, promotion of these imperatives by NTIA will naturally encourage the kinds of collaboration that will increase the chances of concepts progressing to real-world solutions.

How can the fund ensure that programs promote U.S. competitiveness in the 5G market?

The way to ensure U.S. competitiveness in the 5G market is to invest the money in domestic R&D. American tax dollars should be spent on American jobs.

Huawei doubled its R&D budget to over \$22B in 2021 – more than any company in the world outside of America – and continues to invest at record levels. Investing in U.S. companies will not only make us safer, but accelerate job growth through reshoring of these critical positions.

a. Should NTIA require that grantee projects take place in the U.S.?

Yes it should. There is no bigger threat to our economic or national security than outsourcing our 5G technology. The United States has finally woken up to what the Chinese Communist Party has known for a long time – that 5G simply isn't "another G." It will become the central nervous system that connects and controls all other infrastructure. The free world will depend on it – our homes, schools, jobs, water systems, electrical grids, transportation networks, manufacturing, and military. It is a strategic asset that America must own.

Beyond the basic logical premise that American tax dollars be spent on American jobs, we must squarely face the reality that the future wars will be won through technology, not bullets, and this

country is currently at a severe disadvantage. The time to invest domestically is already overdue, and we can't afford to wait any longer. Huawei doubled its R&D budget to over \$22B in 2021 – more than any company in the world outside of America – and continues to invest at record levels. Investing in U.S. companies will not only make us safer, but accelerate job growth and secure the U.S. supply chain through reshoring of critical function.

And ORAN is the path that makes this happen. The U.S. Department of Defense's future plans rely on private 5G – and ORAN is critical to make that possible. Through our work, we have helped connect the diverse mission-critical use cases the DoD demands today – from flightline data, to smart logistics, and connecting the frontline soldier on the battlefield. These various use cases demand various radio configurations that are only possible through ORAN – making investing in ORAN domestically a necessity, not an option.

b. How should NTIA address potential grantees based in the U.S. with significant overseas operations and potential grantees not based in the U.S. (i.e., parent companies headquartered overseas) with significant U.S.-based operations?

This program has an opportunity to advance both our country's economic and national security. 5G is a strategic asset that the country must own. This means American tax dollars should be spent on American jobs. If we continue to outsource this critical R&D to other countries, we will never be able to restore wireless leadership to the U.S.

However, we should also pay close attention to situations where even U.S.-based companies, or non-U.S.-based companies in aligned nations, may have significant R&D presences in parts of the world that are either hostile to U.S. interests or porous from the perspective of intellectual property protections. In making its funding decisions, NTIA should place the onus on Innovation Fund recipients to demonstrate not only that U.S. tax dollars will help restore U.S. wireless technology leadership, but that the risk of technology transfer to non-aligned nations at U.S. taxpayer expense is entirely eliminated.

c. What requirements, if any, should NTIA take to ensure “American-made” network components are used? What criteria (if any) should be used to consider whether a component is “American-made”?

NTIA should mandate the same criteria laid out in the Build America, Buy America legislation, but dynamically, as those requirements are expected to become more stringent over time. This will help drive U.S. leadership in 5G and drive U.S. manufacturing as we reshore critical jobs back home.

How, if at all, should NTIA collaborate with like-minded governments to achieve Innovation Fund goals?

The goal of the CHIPS legislation is to drive U.S. competitiveness at home and bolster the ORAN ecosystem. If U.S. taxpayer dollars are going to be spent, they should align with the goals of the legislation and bolster industry at home.

One area where cooperation with like-minded countries makes sense is around standards. This will help drive the U.S. ORAN ecosystem and benefit our allies as well.

Another area to collaborate in is spectrum – as there are multiple examples of countries demonstrating the success of the shared spectrum model – without it private wireless is simply not viable. Shared spectrum is necessary to drive the success of ORAN as it provides choice to build unique components for multiple verticals.