



January 27, 2023

National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue NW
Washington, D.C. 20230

RE: Public Wireless Supply Chain Innovation Fund Implementation
[FR Doc. 221202-0260]

IBM appreciates the opportunity to respond to the request for comment on *Public Wireless Supply Chain Innovation Fund Implementation [FR Doc. 221202-0260]*.¹ As a leader in Open Radio Access Network (Open RAN) technologies, IBM is eager to provide recommendations that can help ensure the Public Wireless Supply Chain Innovation Fund (“Innovation Fund”) is as effective as possible at accelerating the development and deployment of open 5G technologies.

In particular, IBM recommends the Innovation Fund target three key challenges hindering the widespread adoption of Open RAN technologies: price, performance, and risk. Additionally, IBM recommends structuring the Innovation Fund to maximize its impact on the global 5G marketplace.

Key Challenges to the Deployment of Open RAN

Open RAN technologies are maturing and increasingly proving themselves in real-world commercial environments. While its potential to disrupt traditional, proprietary-RAN-based deployments, and long-term benefits to competition and innovation remains high, Open RAN still faces three key challenges hindering its widespread commercial adoption at scale: price, performance, and risk. While the private sector is driving Open RAN development and deployment, the Innovation Fund could significantly accelerate progress in overcoming these obstacles and make U.S. firms, as well as the global 5G marketplace as a whole, significantly more competitive.

1) Price

The total cost of ownership for Open RAN has proved higher than with legacy technologies. The higher price tag is related to technology and process maturity, the supply chain ecosystem, a lack of economies of scale, and other factors.

An operator buying a classic (closed) RAN solution from an incumbent telecom firm will need to purchase three main things from the provider: a pre-integrated set of products that make up the RAN (which can be very costly, in the hundreds of millions of dollars); services to integrate the RAN and the network core (a relatively minor cost); and project and vendor management for the deployment (a relatively minor cost).

¹ <https://www.federalregister.gov/documents/2022/12/13/2022-26938/public-wireless-supply-chain-innovation-fund-implementation>



By contrast, an operator buying an Open RAN solution needs to purchase: multiple products that make up the RAN (more expensive than classic RAN because smaller vendors don't have the purchasing power to secure volume discounts from their suppliers); services to integrate and test multiple products that make up the RAN (more expensive than classic RAN because classic vendors only have to bear this cost once in a controlled environment in their labs); services to integrate the RAN and network core (equal to or slightly more expensive than classic RAN because market players have less experience); and project and vendor management for the deployment (much more expensive than classic RAN as it is management of multiple products-under-integration, some of which may warrant a risk premium if they have never been integrated before, and potentially require assumption of responsibility for components from different vendors).

It is also important to recognize the potentially high migration costs involved in transitioning from a closed RAN to Open RAN environment. In brownfield deployments where operators already rely on a variety of classic RAN solutions from legacy providers, 5G deployments with Open RAN solutions will pose significantly higher costs than simply upgrading the existing classic RAN solutions from the same vendor.

To address price-related obstacles, the Innovation Fund should:

- Fund projects focused on the large-scale pre-integration of Open RAN components in a testbed setting and document and share the results. This would help address the volume discount and integration and testing issues.
- Establish and support testbeds and sandbox environments with fully functioning system integration (SI) services. This would help address integration and testing issues.
- Prioritize projects that emphasize skills development and knowledge sharing to grow the workforce with the skills and experience necessary to deploy Open RAN technologies. This would help address services and project management issues.
- Fund the end-to-end build of multiple Open RAN solutions that offer key functionality relevant to areas of the 5G marketplace that are particularly dependent on classic RAN solutions from incumbent providers, such as rural carriers. This would help reduce migration costs.

2) Performance

The performance challenges of Open RAN are related to both hardware and software. For hardware, incumbent providers currently have more customized chipsets than those used by Open RAN vendors. These include specialized chipset designs that address specific RAN requirements. Open RAN vendors currently rely on more generalized chipsets. For software, the performance of Open RAN software can lag behind that of incumbents for key functions such as handover, scheduling, latency, and others.

To address performance-related obstacles, the Innovation Fund should:

- Document and widely share the technical requirements for chipsets that Innovation Fund projects require to signal the market demand for specialized chipsets. This could help build the business case for semiconductor manufacturers to develop more robust chipsets for Open RAN vendors.



- Fund projects focused on deploying Open RAN in areas where cutting-edge performance is not necessary, as many areas of the 5G marketplace could still greatly benefit from an Open RAN deployment without such functionality.
- Support R&D efforts in the Open Source community (such as the O-RAN Alliance, O-RAN Software Community, Linux Foundation, and Telecom Infra Project) to accelerate the maturation of Open RAN software, including efforts to demonstrate O-RAN interoperability ("PlugFests"), and demonstrate and certify O-RAN Solutions in Open Testing and Integration Centers.

3) Risk

Even when competitive on cost and performance, Open RAN solutions have a greater risk profile than classic RAN solutions provided by incumbent firms. Classic RAN providers have proven products, delivery, and operational capabilities than Open RAN vendors currently lack.

Security risks for Open RAN are particularly relevant, as RAN disaggregation contributes to a more complex threat landscape. Different vendors will have different interpretations of security standards and implement security measures differently across product lifecycles. And, in a disaggregated RAN, there is not a single point of end-to-end oversight like there is with classic, closed RAN. While these security concerns are manageable, this more complex landscape demands a coherent, multi-stakeholder approach to security and the perception of this risk further inhibits Open RAN adoption.

Many of the risk-related obstacles will diminish with time as Open RAN is increasingly deployed in the real world. Actions the Innovation Fund could take to address the price-related obstacles will also help, particularly those devoted to facilitating testing and knowledge sharing. To further reduce risk-related obstacles, the Innovation Fund should:

- Support a series of testbed projects devoted to both proving Open RAN viability and resolving specific concerns and challenges in Open RAN environments such as automation and security.
- Fund only projects with vendors that demonstrate effective compliance to globally recognized security standards, guidelines, and best practices for development to reduce risk (i.e. NIST Cybersecurity Framework, NIST Secure Software Development Framework, ISO 27001, and ISO 20243), as well as supporting efforts with Office of National Cyber Director to harmonize cybersecurity regulations to help make security compliance easier and produce more effective outcomes for the ecosystem.

Maximizing the Global Impact of the Innovation Fund

The 5G marketplace is global, and as such the NTIA would have a greater effect on promoting U.S. competitiveness by supporting U.S. firms pursuing 5G deployments both in the U.S. and abroad. This of course could be limited to like-minded international partners. Grantees not based in the U.S. could also be considered for the Innovation Fund, particularly if they are closely partnered with one or more U.S.-based firms as part of a consortium.



At the same time, NTIA should not prioritize “American-made” network components, as this could greatly restrict the pace at which operators could deploy 5G technologies as well as drive up costs. Rather, NTIA should prioritize components that comply with leading industry standards for security.

Additionally, NTIA should collaborate with like-minded governments in a variety of ways to achieve Innovation Fund goals. First, it should prioritize projects that complement, rather than needlessly repeat, R&D and testing activities supported by other governments’ efforts to support Open RAN, such as the UK’s Open Networks Research and Development Fund.² Second, it should freely share data, vulnerabilities, best practices, and other learnings from Innovation Fund projects with like-minded governments. NTIA established an information sharing agreement on Open RAN resilience and security with Australia in September 2022, and it should seek to establish similar agreements with other nations.³ Third, it should, to the extent feasible, directly engage with like-minded governments to provide joint funding for initiatives that involve firms from both party countries. This could maximize the impact the funding would have, while deepening relationships between U.S. and foreign firms similarly committed to Open RAN.

Once again, IBM appreciates the opportunity to provide comments and we look forward to future engagements. For any questions, please contact Mr. Joshua New at Joshua.New@ibm.com

Sincerely,

A handwritten signature in cursive script that reads "Joshua New".

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IBM

² <https://www.gov.uk/guidance/open-networks-research-and-development-fund>

³ https://ntia.gov/sites/default/files/publications/us-australia_joint_statement_9-14-22.pdf