Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	**)**
	)
Protecting Against National Security Threats to the	**)** WC Docket No. 18-89
Communications Supply Chain Through FCC Programs	**)**

COMMENTS OF NOKIA

Nokia respectfully submits these Comments in response to the Public Notice seeking comment on the Supply Chain Reimbursement Program Study (Report) and Preliminary Catalog of Eligible Expenses and Estimated Costs (Catalog) prepared by Widelity, Inc. to help providers participate in the Secure and Trusted Communications Networks Reimbursement Program.[1]

I.   SUMMARY

In these Comments, Nokia voices its appreciation for the work done by Widelity. We agree with the Report's findings regarding the numerous foreseeable delays program participants may experience as they seek to replace covered network equipment with new, trusted equipment. The Report's recognition of likely delays further demonstrates the need for the Commission to grant a blanket extension of time of 6 months as soon as possible, and to grant additional extensions early in the process to individual companies that ask for additional time.

We also provide our views on the Report's description of Open RAN, and correct certain misconceptions in the Report crediting Open RAN with network innovations, such as use of cloud or virtualization, already routinely incorporated in today's integrated RAN networks. While

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[1] *Wireline Competition Bureau Seeks Comments on a Report and Preliminary Cost Catalog and Replacement List to Help Providers Participate in the Supply chain Reimbursement Program,* Public Notice, WC Docket No. 18-89, DA 21-355 (rel. Mar. 25, 2021) ("*Public Notice*").

Open RAN equipment should certainly be permitted as part of this program, the Commission should not use the Program to pressure carrier's regarding their network architecture decisions.

II. NOKIA'S STRONG HERITAGE PROVIDING AND UPGRADING NETWORK INFRASTRUCTURE

Nokia delivers the industry's only end-to-end portfolio of network equipment, software, services, and licensing that is available globally. Our customers include communications service providers whose combined networks support 6.1 billion subscriptions, as well as enterprises in the private and public sector that use our network portfolio to increase productivity and enrich lives. A leader in each generation of wireline and wireless communications equipment, we are leading the world to adopt end-to-end 5G networks that are faster, more secure, and capable of revolutionizing lives, economies, and societies. Nokia's R&D efforts, including in 5G, 6G and Open RAN, are led by our storied Bell Labs organization, headquartered in Murry Hill, New Jersey.

Nokia is proud of our heritage working to improve service in a wide range of deployment scenarios, including improving communications services to unserved and underserved communities. Among our customer base, Nokia serves over 40 regional and rural operator-customers in the U.S., the key market segment impacted by the Commission's efforts to secure our Nation's communications networks. Nokia is able to leverage products developed at scale for the larger Tier 1 operators and position the identical hardware and software to regional and rural operators. These operators get the benefit of a robust carrier grade ecosystem with cutting-edge advanced features when we use the same equipment for large, medium, and small networks.

III. NOKIA'S SPECIFIC COMMENTS ON THE WIDELITY REPORT

Nokia commends Widelity's efforts to take on the massive task of producing its Report and Cost Catalog on the requirements, timing, and costs involved in removing, replacing, and disposing of covered equipment and services. Nokia was among the parties who participated in that

effort, individually, through several trade associations, and through substantial dialogue with service providers required to replace covered equipment with equipment from trusted vendors, like Nokia. We applaud Widelity's efforts and believe that our inputs are reflected in a number of places in the Report and in the draft Cost Catalog.

While we discuss below certain discrete concerns regarding the characterizations and content in the Widelity Report, Nokia does believe that Widelity identified many important issues faced by service providers in removing and replacing covered equipment, including: pre-planning, site surveys, migration planning, decommissioning, project management, ordering/logistics, integration, installation, commissioning, testing, NOC, software integration, RF engineering, leasing, and spectrum planning.[2]

A. **The Report Identifies Numerous Timing Challenges, which Support the Need for an Immediate, Blanket Extension and Individual Extensions of the Initial 12-Month Deadline**

Based on our significant past experiences assisting customers to swap Nokia or a different vendor into their networks, Nokia can attest that replacement of covered network equipment will require careful planning. While time will vary depending on the size and complexity of the swap, Nokia estimates that any given swap under normal circumstances would take approximately one to three years. For most of the smallest carriers that will receive funding, Nokia could *under routine circumstances* commit to a one-year deadline for removing and replacing network equipment. Even under ideal circumstances, however, a network swap for larger networks eligible for funding, due to terrain and the large number of sites, would be expected to well exceed 12 months. Of course, the circumstances surrounding this nationwide effort are far from routine. For all of the reasons set forth in the Report and discussed below, the deployments to replace covered equipment will involve

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[2] *See, e.g., Public Notice* at 8-9.

an unprecedented number of carriers attempting to replace equipment during the same period of time, and concurrently with a parallel nationwide effort to deploy nationwide 5G.

As the Report correctly recognizes:

The following is a list of concerns that we heard in our interview process that may impact the timing and duration of the replacement process.

Manufacturers and RF Consulting, Structural, and Field Engineers may not be in a position to handle the potential onslaught of requests that will occur once the replacement program begins. There may be thousands of towers requiring structural analysis, as well as wireless and broadband networks that will need network engineering design and review.[3]

This is consistent with Nokia's current experience, and its understanding of experience throughout the industry, processing unprecedented demand from service providers facing very different circumstances but all working toward the goal of securing U.S. networks. It is worth noting here that a good deal of work will be needed, and costs incurred prior to service providers submitting applications for reimbursement, causing financial stresses on service providers and their contractors. The thrust of our concern is requesting that the Commission grant blanket and individual extensions of time early in the process to create certainty. However, it is also important that the Commission process applications expeditiously to minimize the gap between: (1) the time critical planning and other costs are incurred; and (2) the reimbursement of those costs.

Among Nokia's largest concerns causing network implementation to exceed 12 months involves structural reinforcements to towers that may be required. As part of the swap process, there will be two sets of equipment on the tower for a period of time, and many towers cannot handle that load. As the Widelity Report recognizes, "the most recent revision [to structural standards] (Rev. H) is a significant revision that modifies and adds parameters to the analysis. . . . The impact for many towers is that they may require additional structural work or will need to be

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[3] *Id.* at 19-20.

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replaced if antenna or line loading is changed."[4] The Report estimates 4-6 weeks to obtain materials for tower reinforcement, but we would estimate simply obtaining the materials is more likely to take 12-16 weeks for modifications and up to 6 months to obtain materials to replace a tower. Depending on the number of structural reinforcements needed, or in some cases the replacement of old towers with new towers, ensuring tower infrastructure can safely carry the increased load could be the biggest challenge to a 12-month schedule.

The Report further notes the expected demand on tower crews and the unpredictable local regulatory processes facing service providers. While the Report indicates at one point industry discussions regarding tower crew availability indicates "there will be adequate resources,"[5] the details in the Report demonstrate reasons to be concerned:

> [T]he replacement process for both broadband and wireless may place a significant demand on a finite number of skilled, trained, and experienced resources. These may include network and RF engineers, structural engineers, manufacturing resources, tower crews and field engineers. . . . [To meet new standards] many towers . . . may require additional structural work or will need to be replaced if antenna or line loading is changed. Those sites requiring tower, antenna, or other outside work may have to undertake a permitting process that is highly unpredictable. In addition to permitting, some locations (such as those that are in close proximity to residential neighborhoods) may have to work through community issues for RF analysis and related public concerns.[6]

Policymakers have long voiced concerns with tower crew resources for the nationwide effort to build-out 5G[7] independent of those crews also being called on to implement the new rip and replace program. Nokia can confirm that our customers consistently voice concerns that tower crew resources may not be sufficient, especially to meet the stringent time constraints posed by the rip and replace program.

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[4] *Id.* at 12.
[5] *Id.* at 63.
[6] *Id.*
[7] *See, e.g.,* Jeremy Horowitz, *U.S. Senate committee tackles shortage of 5G tower climbers,* VentureBeat (Jan. 22, 2020) (available at https://venturebeat.com/2020/01/22/u-s-senate-committee-tackles-shortage-of-5g-tower-climbers/).

The Report also recognizes the seasonality of deployments, referencing snow and ice, migratory bird flight paths, and the inability to obtain helicopters for heavy lifts during fire season when those helicopters are needed for firefighting.[8] Indeed, Nokia has customers in geographies where no deployments are possible for three to four months out of the year due to extreme weather conditions, greatly impacting the 12-month deadline. The list goes on. These delays are entirely foreseeable during a compressed deployment timeline, but outside the control of the service provider.

These multiple stresses on the system indicate that the Commission should grant an extension at the outset to *all* fund recipients of at least 6 months, and liberally grant additional 6 month extensions at the outset to the many carriers who can demonstrate the need for more time. To ensure a smooth process, carriers should know in advance how much time they will have beyond the initial 12 months, and not face uncertainty of seeking last minute extensions, the need for which were foreseeable from the start.

Equipment vendors provide a full schedule with pricing and milestones based on a pre-determined deployment interval. Unless the Commission acts soon to grant blanket extensions (and potentially additional individual extensions), Nokia would need to base its schedule on a 12-month deployment interval. It would not be prudent plan for more than 12 months if an extension has not yet been granted. Service providers would be better served if they have certainty of at least an 18-month deployment interval across the board, and longer upon individual showing of reasonable circumstances, allowing us to better plan equipment and people resources rather than requiring a mid-stream revision of the network deployment plan.

B. The Report's Description of Open RAN Includes Multiple Misconceptions

In addition to Nokia's leadership through each generation of network equipment, we also are leading the way on new architectures including Open RAN, a topic the Report discusses in

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[8] *Public Notice* at 64.

depth. For years, we have driven the policy frameworks and technical specifications of Open RAN through our participation in the O-RAN Alliance, the Linux Foundation's ONAP initiative, ETSI's Multi-access Edge Computing (MEC) initiative, the Telecom Infra Project, the Open RAN Policy Coalition, and more. We are also active participants in multiple real-world deployments involving early stage open interfaces, giving Nokia hands-on experience deploying this network architecture. This experience provides Nokia a deep understanding of the benefits of Open RAN, its development, and under what conditions it is the optimal choice for any given carrier and market.

Opening up components of the RAN through agreements among individual vendors is hardly new. Open RAN, in contrast, presents a paradigm shift where RAN interfaces are built to common specifications so that a service provider will be able to access a market of assorted vendors for different RAN components that have been rigorously tested for interoperability, such as the Radio and the Baseband Unit. The O-RAN Alliance, which is leading the way toward specifications for open interfaces, has made great progress by publishing a specification for the front haul interface, but many other necessary specifications have either not yet been published or are not mature enough to be implemented. Nokia has joined in this effort to quickly develop specifications for this new open marketplace, and believes that Open RAN will be an attractive option for many carriers moving forward.

It is important to clarify, however, that the Widelity Report conflates Open RAN with certain innovations that are not at all dependent on a multi-vendor Open RAN deployment. For example, Nokia has increasingly deployed virtualized RAN and cloud RAN (which Widelity references together as "Centralized-RAN (CRAN)")[9] in its integrated RAN deployments. The benefits of CRAN are not limited to Open RAN. In fact, CRAN is not even an essential aspect of Open RAN deployments although it is anticipated that Open RAN will typically leverage

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[9] *Id.* at 31.

virtualization and the cloud and there will be new entrants offering software based solutions that will further stimulate virtualization. The key point is that the Report suggests that virtualization and cloudification are byproducts of open interfaces when in fact both of those marketplace developments pre-date open interfaces.

Nokia also takes issue with Widelity's nomenclature, calling some vendors "conservative" and others "CRAN/Open RAN-positive."[10] While Nokia considers itself "CRAN/Open RAN-positive," we also believe that completing the specification process is essential to creating the type of multi-vendor equipment ecosystem anticipated by policymakers and service providers. The Widelity Report also references integrated RAN architectures as "legacy," which is not accurate. The predominant architecture for the newest generation of network deployments uses integrated RAN, often incorporating virtualized and cloud elements. Integrated RAN architectures will continue to be deployed incorporating the newest releases of 5G and continues to innovate toward 6G. We expect integrated and Open RAN architectures to innovate side-by-side in the market for many years to come.

The goal of this Commission proceeding is to secure U.S. networks. Service providers have an immediate need to remove covered equipment without degradation in service to the communities they serve, many of which are rural. There is no doubt that Open RAN offers exciting promise to allow for multiple vendors to compete and potentially specialize on specific RAN components. Nokia agrees that this multi-vendor ecosystem could lead to Open RAN deployments that improve on network performance. But at this stage, lacking scale deployments with objective evidence, improvements to network performance and security based on open interfaces remain aspirational.

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[10] *Id.*

Similarly, the claims about the state of open RAN contained in the Report that providers do not need to make "tradeoffs in performance of one part of the network in order to achieve performance in another part"[11] are conjecture. The specification and development work are proceeding, and this end-state remains the ultimate objective, however, it is not yet a reality. Nokia has had extensive conversations with providers that will be replacing covered equipment, and thus far the interest in Open RAN, including Nokia's offerings, has been limited. The Commission should take notice of this, and the repeated calls from the impacted carriers, to not mandate or attempt to steer their decisions on architectural framework or supplier via the funding rules.

Furthermore, there are concerns outlined in the Report regarding performance degradation in the near term. As Widelity notes, "the multi-vendor model adds significant network complexity for design, construction, integration, deployment, and operations. When operational issues arise, there can be challenges identifying and isolating the communications gaps so they can be remedied."[12] Widelity also notes that "[s]ecurity is also an issue in the multi-vendor model."[13] The vast majority of the applicants for funding in this proceeding are smaller service providers, without the people resources to easily manage multiple vendors including potential new entrants. Many service providers would like to rely on established companies, like Nokia, that have the people resources to quickly correct any network issues that may arise. Indeed, Nokia often finds itself in the role of "fixer" even for glitches unrelated to Nokia's equipment or software because Nokia has the people resources and knowhow many smaller vendors lack.

The Draft Cost Catalog also demonstrates that there are not cost savings being offered through Open RAN equipment estimates compared to integrated RAN estimates. While there are minor differences in proposed costs at the low and high end of the spectrum, the heart of the pricing

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[11] *Id.* at 30.
[12] *Id.* at 33.
[13] *Id.*

range is the same for Open RAN and integrated RAN as set out in the Catalog.[14] That baseline equipment cost must be viewed along with current practical and cost concerns regarding systems integration that are noted in the Report.

In sum, Nokia supports service providers seeking Commission funds for early and evolving Open RAN architectures, such as Nokia's offered solutions. We are excited about the promise of Open RAN, and believe some carriers will choose an Open RAN architecture to replace its covered equipment. However, Open RAN specifications are not yet set for the full complement of RAN components, and Open RAN is not demonstrably cheaper to deploy or manage, as seen in the Widelity preliminary Cost Catalog. As such, we caution the Commission against using the regulatory process to try to influence carriers in their technology choices for receiving funds.

IV.   CONCLUSION

Nokia respectfully requests that the Commission consider the forgoing to grant additional time to carriers for completing their replacement of covered equipment and allow service providers maximum discretion to choose the technology solutions they deem optimal for their networks and the communities they serve.

Respectfully submitted,

Nokia

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[14] *Compare, e.g., id.* at Attachment 2, Catalog of Potential Expenses And Estimated Costs, pp. 13-14.