February 10, 2021

Submitted via email to 5GChallengeNOI@ntia.gov

Rebecca Dorch
National Telecommunications and Information Administration
U.S. Department of Commerce
325 Broadway
Boulder, CO 80305

Re: CableLabs Comments on 5G Challenge Notice of Inquiry, Docket No. 210105-0001, RIN 0660-XC04

Dear Ms. Dorch,

CableLabs appreciates the opportunity to provide input to the National Telecommunications and Information Administration ("NTIA") and the Department of Defense ("DoD") in response to the Notice of Inquiry ("NOI") regarding the creation of a 5G Challenge to accelerate the development of an open 5G stack commercial market that supports DoD missions.[1] CableLabs is a not-for-profit innovation, research, and development lab whose membership consists of cable operators from across the world and roughly half of its members are also mobile providers.[2] For over 30 years, CableLabs has worked to develop and improve cable and wireless technologies for the secure delivery of high-speed data, video, voice, and other next-generation services, and performs a central role in conformance testing, most notably to ensure the interoperability of cable, optical, wireless, and other network equipment.

As NTIA and DoD well recognize, fifth-generation (5G) wireless communications infrastructure will play a foundational role in realizing the vast potential benefits of emerging technology and the myriad of use cases that will rely on them. In launching the 5G Challenge, NTIA and DoD have an opportunity to identify key hurdles in the race to secure, robust, and interoperable 5G networks and to galvanize stakeholders to overcome the most challenging among those hurdles. The NOI rightfully sets facilitation of interoperability and openness in 5G architecture as the effort's core goal. To achieve this goal, NTIA and DoD should focus the Challenge on the openness of interfaces between the various components – that is, openness distinct from the concept of open-source software. Likewise, stakeholders will need to develop and implement interface standards and specifications to facilitate scale, drive down costs, and enable collaboration and interoperability in the 5G technical

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[1] Department of Commerce, NTIA, 5G Challenge Notice of Inquiry ("NOI"), Docket No. 210105-0001, RIN 0660-XC049, https://www.ntia.doc.gov/files/ntia/publications/fr-5g-challenge-noi-01112021.pdf (hereinafter "NOI").

[2] *See* CableLabs, *Member Companies*, https://www.cablelabs.com/about-cablelabs/member-companies.

arena. However, standards and specifications alone will not be adequate without a robust conformance testing and certification regime to validate and ensure actual interoperability within 5G networks and interworking with adjacent technologies like Wi-Fi 6E.

Amid renewed efforts to address national security and economic concerns shaped by the global information and communications technology environment, the development of this challenge comes at an opportune moment. The success of this effort depends on NTIA's and DoD's ability to target the problem, structure the challenge, and engage a broad and diverse set of experts to participate – all against the backdrop of a wide variety of related 5G policy and technical initiatives underway in the federal government and throughout the industry.

Therefore, CableLabs urges NTIA and DoD to use the challenge development process as an opportunity to collect robust input on both the nature of the challenge and the best ways to address it through an iterative process that draws on, but does not solely rely on, the prize competitions of the past.

At this stage in the challenge development process, CableLabs offers the following four initial suggestions to support NTIA and DoD's goals: (1) focus the 5G Challenge on facilitating widely adopted interface standards and specifications and the development of robust conformance testing regimes, both of which are critical to fostering interoperability; (2) expand the scope of the 5G Challenge to explicitly include complementary, 5G-enabling future technologies in recognition of network convergence; (3) use past challenges for reference – but not precedent – given novel needs in 5G innovation; and (4) make the development of the 5G Challenge an iterative process to best leverage stakeholder expertise. We elaborate on these suggestions below.

1. **Focus the 5G Challenge on Facilitating Widely Adopted Interface Standards and Specifications and the Development of Robust Conformance Testing Regimes, Both of Which Are Critical to Fostering Interoperability.**

The NOI recognizes "'open 5G' architectures that emphasize open interfaces in the network stack" as a key innovation in 5G, citing "the use of open source implementations for various components of a 5G system" in the 5G stack and interoperability among those implementations as the technical motivations for developing this challenge.[3] To facilitate this interoperability, the 5G Challenge must illuminate aspects of the 5G stack that can be – and should be – standardized with open and interoperable interfaces to advance scale, performance, security, and reliability.

NTIA and DoD should be clear about the kind of "openness" central to the success of this 5G Challenge. Though 5G components may utilize "open source" software, a 5G stack does not require the use of open-source software to be open. To be open, a 5G stack requires the interfaces between

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[3] NOI at 1950.

the various components to be ubiquitously compatible and well defined through widely available interface standards or industry specifications. As stakeholders continue to build a variety of implementations across various parts of the 5G stack, these components will need to operate harmoniously to be leveraged across use cases and among the many participants in the 5G ecosystem. Collaboration among equipment manufacturers, network operators, and other experts to coalesce around common interface standards and technical specifications, along with a robust conformance testing regime, will enable this harmonization and allow for a plug-and-play model.

CableLabs has successfully created fixed broadband interface specifications and provided conformance testing to ensure actual interoperable network equipment for several decades. CableLabs' specifications and testing have enabled rapid and efficient network upgrades and the adoption of next-generation innovations. In CableLabs' over 30 years of experience, open and disaggregated network architectures and specifications, along with thorough conformance testing, have enabled and supported a diverse and competitive vendor ecosystem by incentivizing and rewarding innovation and rapid adoption through market forces. A robust interoperability infrastructure has been a critical component of this success and will likewise be critical to fostering a competitive and robust 5G ecosystem.

2. **Expand the Scope of the 5G Challenge to Explicitly Include Complementary, 5G-Enabling Future Technologies in Recognition of Network Convergence.**

Focusing the 5G Challenge on just the wireless components of the network would ignore the necessary relationships and advancements in adjacent network technologies that will be critical to bringing to fruition the full vision and promise of 5G. A successful 5G deployment will need reliable and fast wireline (Xhaul and transport) connections to meet the end-to-end performance required by 5G applications.[4] Converging wireline and 5G mobile networks, under a common platform, network functions, control, and operations, will offer tremendous benefits and flexibility to both operators and consumers.

Developing open interface standards and specifications at scale with widespread industry buy-in will increase interoperability and diversity in the entire 5G ecosystem, drive innovation, lower costs, and improve architectural security and risk management practices. Including key adjacent technologies such as Wi-Fi, 6G, and fixed broadband (e.g., 10G) within the scope of the challenge will help enable an acceleration of those ecosystems in tandem and encourage network convergence.[5]

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[4] *See* CableLabs, *10G Technology: Low Latency Xhaul,* https://www.cablelabs.com/technologies/low-latency-xhaul.
[5] *See, e.g.*, CableLabs, *10G Platform: What is 10G?*, https://www.cablelabs.com/10g; CableLabs, *Experience 10G: Network Convergence*, https://www.cablelabs.com/network-convergence.

Interoperable, converged networks will deliver a seamless connectivity experience to consumers, enterprises, and DoD missions in an efficient, reliable, and predictable manner. A converged network can better meet the diverse needs of applications envisioned for 5G through seamless and omnipresent connectivity that is faster, more reliable, and more secure. To the extent the 5G Challenge can help DoD participate in this market like other commercial customers, requiring as little bespoke technology and infrastructure as possible, the Department can stimulate the market and propel 5G innovation forward, to the benefit of both commercial and DoD interests.

3. **Use Past Challenges for Reference – But Not Precedent – Given Novel Needs in 5G Innovation.**

Federal agencies have long found success in using challenges – such as incentive prizes, competitive grants, and direct investments – to galvanize the diverse expertise of the private sector, academic, and other non-governmental stakeholders around national goals.[6] As the NOI notes, 5G developers are working to implement novel technical features such as network function virtualization, software defined networking, network slicing, and more. The complexity of 5G network architecture, along with the profound impacts that 5G communications will have throughout the federal government and the broader economy and society, demands careful consideration in pinpointing the appropriate targets to prioritize in the NTIA and DoD challenge. Though this 5G Challenge may be informed by successes and shortfalls of past challenges, it is not a one-to-one scenario and thus necessitates its own challenge structure. As we discuss further below in our last recommendation, this particular 5G Challenge should be a new and standalone initiative developed in close partnership with diverse stakeholders in both the public and private sectors.

4. **Make Development of the Challenge an Iterative Process to Best Leverage Stakeholder Expertise.**

Arguably, the most difficult aspect of developing a challenge is defining the problem to be solved, and this often requires tapping into different types of expertise, including technical experts, industry representatives, academics, and more.[7] NTIA and DoD should conduct broad outreach beyond this NOI to scope the target and structure of this Challenge and provide opportunities for public comment on drafts before adopting a final challenge framework. This will ensure the 5G Challenge is targeted to best support DoD's mission and lay the foundation for widespread participation in the 5G Challenge itself. This iterative process in developing the 5G Challenge should explicitly leverage and augment the parallel advances in other initiatives such as DoD's 5G testbeds

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[6] *See, e.g.,* Office of Science and Technology Policy, *Implementation of Federal Prize Authority: Fiscal Year 2014 Progress Report* (Apr. 2015), available at https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/NSTC/fy14_competes_prizes_-_may_2015.pdf.

[7] *See, e.g.,* Deloitte, *The craft of incentive prize design: Lessons from the public sector* (Jun. 19, 2014), https://www2.deloitte.com/us/en/insights/topics/social-impact/the-craft-of-incentive-prize-design.html.

and the new Public Wireless Supply Chain Innovation Fund managed by NTIA that was established in the FY21 NDAA.

The time is right for NTIA and DoD to invest in fostering an open and interoperable 5G ecosystem. To reap the best dividends on this investment, NTIA and DoD should use the challenge development process to garner the most robust input possible and build a diverse participant base by taking an iterative, collaborative, and transparent approach.

CableLabs appreciates this initial opportunity to provide input on the 5G Challenge and looks forward to working with NTIA and DoD to achieve these important goals.

Sincerely,

/s/ Mark Walker

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