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: Rakuten Mobile Comments on 5G Challenge Notice of Inquiry
        Docket No. 210105–0001, RIN 0660–XC04

Dear Ms. Dorch:

We appreciate the opportunity to provide input on the National Telecommunications and Information Administration's (NTIA's) and Department of Defense's (DoD's) 5G Challenge. At Rakuten Mobile, we are strong proponents of an open 5G stack. We have deployed the world's first 4G and 5G fully virtualized cloud native mobile network leveraging open RAN and open standards. Our network is software-centric and uses commoditized servers resulting in a highly flexible, scalable, secure, and resilient network. Our network architecture is future-proof, leverages massive automation and allows for substantial reductions in both CAPEX and OPEX.

We have also developed Rakuten Communications Platform – a solution that enables telecommunications providers, governments, and enterprises to easily build secure and open networks.

Below, please find our responses to the 5G Challenge inquiry. We are grateful for the opportunity to provide comments and look forward to working with NTIA and DoD on bringing the best of both the commercial and government sectors together to meeting America's 5G needs.

Kind regards,

Azita Arvani
GM, Rakuten Mobile Americas

I. Challenge Structure & Goals

A. How could a Challenge be structured such that it would take advantage of DOD's role as an early U.S. Government adopter of 5G technology to mature the open 5G stack ecosystem faster, encourage more participation in open 5G stack development including encouraging new participants, and identify any roadblocks to broader participation?

> This Challenge should be for a real deployment. We at Rakuten Mobile have already deployed a commercial 4G and 5G network that is end to end cloud native and leverages open RAN and virtual RAN architecture. We have proved that these technologies can be applied for real deployments and not just trials. 5G Challenge should support and encourage a real deployment of such modern architecture.

B. How could a Challenge be structured to focus on the greatest impediments to the maturation of end-to-end open 5G stack development?

> We see the greatest impediment to the maturation of end-to-end open 5G solution, including open RAN, is treating it as years away and expect that the applicants can only do a trial or a proof of concept. The Challenge should be structured to require participants to provide a production-quality 5G network that runs on the open 5G stack, which would then encourage the deployment of such technology.
> Moreover, the challenge should address openness and virtualization in both the Core of the network and the Radio Access Network (RAN). This is the baseline configuration of the most advanced 5G networks in the world and should be the starting point for the NTIA/DoD Challenge.

C. What should be the goals of a Challenge focusing on maturation of the open 5G stack ecosystem? How could such a Challenge be structured to allow for the greatest levels of innovation? What metrics should be used in the assessment of proposals to ensure the best proposals are selected?

> The Challenge should demand open architecture, which we see as fundamental to the goals of this Challenge. One important metric for determining openness is whether a proposal can demonstrate the use of multiple vendor solutions being part of a 5G stack. If all parts of a 5G stack come from one vendor, then it becomes challenging to assess the openness of the architecture.
>
> Metrics for selection should also include proven use in previous deployments and demonstrated strong network KPI's in production networks.

D. How will the open 5G stack market benefit from such a Challenge? How could a Challenge be structured to provide dual benefit to both the Government and the open 5G stack market?

A 5G Challenge powered by next-generation open architecture and technologies will promote a robust ecosystem for network elements and services, furthering U.S. leadership in 5G and beyond.

Additionally, by engaging U.S. government agencies before the 5G stack is completely matured provides opportunities to ensure that an open 5G stack meets the unique needs of government users alongside the broader commercial market.

II. Incentives and Scope

A. What are the incentives in open 5G stack ecosystem development that would maximize cooperation and collaboration, promote interoperability amongst varied open 5G stack components developed by different participants, and mature desired featured sets faster with greater stability?

The 5G Challenge should be for a real network deployment, applying the end to end open architecture to a real use case. To encourage industry players to join, this should be application of technology to a real use case that can be scaled to larger deployments.

B. Could a Challenge be designed that addresses the issues raised in previous questions and also includes test and evaluation of the security of the components?

Security must stand as a major and non-compromising design principle of any 5G network architecture, especially for a real deployment and especially for DoD. Open architecture facilitates more proactive, forceful and dynamic security capabilities by enabling more visibility and more control points in the network. With the power of leveraging open architecture and technologies comes the responsibility of implementing powerful security postures. Strong security for each and every component of the network has to be required and evaluated for the 5G Challenge.

C. Could a Challenge be designed that would require participants to leverage software bill of materials design principles in the development of components for an open 5G stack?

D. Many open 5G stack organizations have developed partial implementations for different aspects of an open 5G stack. What portions of the open 5G stack has your organization successfully developed with working code? What portions of the open 5G stack does

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your organization believe can be developed quickly (6 months or less)? What development support would best enable test and evaluation of the different elements of an open 5G stack?

Rakuten Mobile has deployed the world's first end to end cloud-native open RAN and virtual RAN 4G and 5G network. This is a commercial network with 4G service that started in April 2020 followed by 5G service in Sep 2020. This is powered by Rakuten Communications Platform (RCP). RCP is a complete multi-vendor open 5G stack that makes it easier for mobile operators, governments and enterprises to implement a cloud native open virtual RAN network at lower cost and in shorter timeframe.

E. What 5G enabling features should be highlighted in the Challenge, such as software defined networking, network slicing, network function virtualization, radio access network intelligent controller, radio access network virtualization?

The 5G Challenge should require building and deploying a future-proof network that starts with end to end open and cloud-native architecture that enables super agility, security, efficiency and resiliency. All the above-mentioned features would be a natural part of such a 5G solution.

End to end automation should be considered as a capability to be assessed in the Challenge.

III. Timeframe & Infrastructure

A. *What software and hardware infrastructure will be needed to successfully execute this Challenge?*

We see that the required infrastructure will be similar to a distributed cloud infrastructure. This would require some data centers (central and edge), COTS servers, fast IP transport, etc.

B. *What is a reasonable timeframe to structure such a Challenge? Should there be different phases for such a Challenge? If so, what are appropriate timelines for each suggested phase?*

A Challenge can be structured in the next 6-12 months.

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