



Red Hat

**Response of
Red Hat, Inc. (“Red Hat”)**

**to the “The National Strategy to Secure 5G Implementation Plan”
(Docket No. 200521-0144, May 28, 2020)**

**Published by the National Telecommunications and Information Administration
 (“NTIA”) at:**

<https://www.federalregister.gov/documents/2020/05/28/2020-11398/the-national-strategy-to-secure-5g-implementation-plan>

June 25, 2020

Red Hat appreciates the opportunity to comment on the above-referenced matter. Red Hat is a leading provider of open source software solutions, using a community-powered approach to deliver resilient and high-performing cloud, Linux, middleware, storage and virtualization technologies.

Red Hat has a deep interest in this area. Our customers are demanding high-quality, trusted and affordable technology solutions that are found throughout mission-critical systems in the financial, transportation, telecommunications and government (civilian and defense) sectors in the United States and around the world. Red Hat is recognized as one of the world's most innovative companies.

¹

The development of the Implementation Plan of the National Strategy to secure 5G² recognizes the importance of fifth generation wireless technologies (5G) and poses some important questions about how it will unfold. Our comments below touch on a number of questions included in the four lines of effort posed in the Notice.

¹ See Forbes, “The World’s Most Innovative Companies”, 2018, found at: <https://www.forbes.com/companies/red-hat/>.

² March 2020, found at <https://www.whitehouse.gov/wp-content/uploads/2020/03/National-Strategy-5G-Final.pdf>.

Introduction

The widespread adoption of 5G technologies has the potential to make connectivity an even more powerful tool, transforming how we live and work for the better. The increases in network speed and capacity 5G offers will not just improve existing technologies such as video streaming but also enable entirely new applications that existing networks cannot easily support.

This opportunity is about more than the mobile networks that every citizen has come to rely on. It will touch on -- indeed potentially revolutionize -- a wide array of sectors, including automotive and connected vehicles; telemedicine services that can support real-time, high-quality video streaming in rural areas; manufacturing and supply chain; as well as the prospect for smart cities to reach their potential. As a leading voice of the IT industry observes:

“Beyond infrastructure investment, the use cases for 5G are projected to generate significant economic growth. In particular, the increased speed, capacity, and functionality of 5G networks will help to enable the next generation of data enabled innovations such as the Internet of Things (IoT) and artificial intelligence (AI). 5G networks will enable increased speeds and staggering amounts of data – mobile traffic is expected to grow by a factor of 4 from 38 exabytes in 2019 to 160 exabytes per month in 2025 (exabyte = one billion gigabytes).”³

To ensure, to the greatest degree possible, that this potential is both achieved and positive, the National Strategy Implementation Plan must rely on open interfaces and open source-driven technologies, including effective utilization of the cloud. The Implementation Plan should recognize that in all likelihood that rollout will build on a hybrid cloud model. 5G must be “open” so that a diverse pool of suppliers can compete to develop the most innovative, secure, and cost-effective products.

With each generation of wireless technology, the reliance on a hardware-dependent architecture has evolved into incorporating more agile, modular and componentized software solutions. In 5G networks, software can manage network operations and perform operations previously controlled by hardware through network virtualization and cloud computing. In existing wireless communications infrastructure, network performance hinges largely on the technical limitations and proper functioning of specific hardware. Through, for example, network virtualization, 5G networks will likely be less dependent on hardware limitations, as software can emulate the performance of different kinds of specialized hardware and be updated, replaced and repaired remotely.

This more software-centric approach, coupled with effective (especially hybrid) cloud computing architecture, can enable innovation on a massive scale and support new kinds of applications not possible on 4G networks. The **use of open source software supported by a known and recognized vendor** allows greater control by the user; facilitates greater confidence and resiliency by providing the enhanced ability to examine every aspect of code and change what’s not working; increased stability due to less dependence on hardware which must be maintained and replaced regularly to keep up with changes.

³ Information Technology Industry Council, “5G Policy Principles for Global Policymakers”, June 18, 2020, p. 2 , citing <https://www.ericsson.com/en/mobility-report/reports>. Found at: https://www.itic.org/policy/ITI_5G_Full_Report.pdf.

An important corollary to use of open source software, open interfaces can ensure that all the components of a 5G network, from the edge to the core, can more easily interoperate. This not only makes the user experience more efficient, it enables greater competition. Together, the combination of open interfaces and open source, especially when driven by effective hybrid cloud strategies, will most likely enable the full import of the potential of 5G.

Towards Diversity and Resilience in the 5G Ecosystem

The dynamics and economics of reaching the full potential of 5G are, at risk of understatement, complicated and reflect an evolution of the marketplace over many decades. The stark reality is that a meaningful National Strategy and effective Implementation Plan must start with the fact that there is a global choke point facing the availability of essential 5G technologies in all facets of its architecture.

The efforts to promote the 5G ecosystem, unfortunately, rely on and encourage development and use of closed technologies that often prevent the integration of hardware or software from different vendors. This impedes competition and inhibits third parties from developing offerings that will work with those systems. Rather than facilitating a “plug and play” approach to the rollout of 5G, it exacerbates vendor dependency and technology lock-in, and contributes to driving up costs. It also jeopardizes efforts to promote reliability. With a heavy reliance on closed technology from only one provider, the reliability and trustworthiness of the network is risked if the provider becomes unable to maintain these technologies.

Each tier of the 5G network ecosystem can be seen independently in this light.⁴ Take, for example, the radio access network (RAN) layer at the edge of 5G networks. The radio access network relies on various hardware and software components working together to foster connectivity between devices like smartphones, connected vehicles, and sensors and the network core. The use of closed, black-box architectures by some companies prevents their technology from easily, seamlessly, and securely working with technology from any other provider, limiting innovation and competition in the RAN layer.

In response, companies new and old, in the United States and globally, are applying this open approach to the 5G space, both at the RAN layer and beyond, with hopes of driving even greater vendor diversity, resilience and promoting innovation and economic growth. This is a reflection of the growing recognition by many in industry that collaborating around a set of open approaches are vital to their business and a robust 5G network, just as they are vital to national security and the economy. Open technologies have been critical to the success of generations of technological advancement, including the Internet itself.

⁴ Discussion of 5G often assumes that it is merely an update of prior generations of mobile networks. While 5G entails similar qualities as found in 4G and its predecessors, it is at its core a fundamental shift in its breadth and scope. 5G, as highlighted above, utilizes an unprecedented amount of software, is less hardware-centric and seeks to effectively utilize strategic assets via cloud computing (especially through a hybrid cloud model). A meaningful National Strategy Implementation Plan will necessarily require industry and governments in the United States and abroad to agree on a common model that clearly defines what 5G infrastructure entails and to reach a common understanding of various tiers and implementations that are now underway and foreseeable in the future.

The O-RAN published specifications⁵ is a multiplier, potentially enabling exponential growth in 5G by fostering healthy competition in software communities. Contributors define open specifications so that components from different companies can work together to form a “best of breed” solution. Industry efforts like the O-RAN standard break down “walled gardens” and drive innovation.

Next Steps

The NTIA Notice asks how the United States Government (USG) can best facilitate the domestic rollout of 5G technologies and the development of a robust domestic 5G commercial ecosystem? Below are some broad recommendations on how to approach this challenge. We also call to your attention other, more detailed approaches that have been published.⁶

First and foremost, **governments should pursue national 5G strategies promoting the adoption of open architectures and open source-driven cloud technologies**. A clear policy statement that recognizes the power of open innovation would capitalize on the strength of the software development and computing industries and ensure that small and large firms alike could be globally competitive in 5G.

As part of national 5G strategies, governments should also **use existing promotion authorities and procurement mechanisms to advance open 5G technologies**. For example, in the United States:

- The Department of Defense should use its procurement authorities to fast-track and give preferred consideration for 5G solutions that utilize open architectures, especially O-RAN and open source cloud technologies, in its 5G infrastructure pilots.
- The Federal Communications Commission should encourage industry to only fund the purchase of 5G telecommunications equipment that utilizes open architectures.
- Encourage participation in the recent initiative launched by NIST’s National Cybersecurity Center of Excellence (NCCoE) to work with industry to demonstrate how 5G architecture components can provide security capabilities that can mitigate risks and meet industry sectors’

⁵ <https://www.o-ran.org/specifications>. “O-RAN Alliance members and contributors have committed to evolving radio access networks around the world. Future RANs will be built on a foundation of virtualized network elements, white-box hardware and standardized interfaces that fully embrace O-RAN’s core principles of intelligence and openness. An ecosystem of innovative new products is already emerging that will form the underpinnings of the multi-vendor, interoperable, autonomous, RAN, envisioned by many in the past, but only now enabled by the global industry-wide vision, commitment and leadership of O-RAN Alliance members and contributors.”

⁶ See generally, Information Technology Industry Council, “[5G Policy Principles for Global Policymakers](#)”, June 18, 2020 cited above.

compliance requirements.⁷ As reported,⁸ It will ultimately result in a NIST Practice Guide as a Special Publication '800' series that “can assist organizations that are considering adopting and deploying 5G technology with the design, acquisition process (including Request for Information and Request for Proposal development and response), integration, and operation of 5G-based networks. The findings from this work can be used by NIST and the industry collaborators to prioritize their contributions in standards developing organizations.”

Additionally, **governments should incentivize and accelerate competitiveness in 5G**. In the United States, the federal government should:

- **Accelerate research and development of open 5G technologies by industry, research agencies, and academia.** This could include direct financial incentives for organizations leading these efforts; tax incentives, such as an increase in the R&D tax credit specifically for 5G investments; and investments in human capital, such as working with the National Science Foundation to spur R&D and skills development. This could also include an emphasis on open interfaces in federal research agencies and incorporate the use of open interfaces in 5G pilot projects. A sustained pipeline of R&D can help to promote networking innovation as well as develop incentives to help ensure a diverse pool of trusted suppliers over the long term.
- **Support the rapid deployment of open 5G technologies.** This could include grants and interest-free loans for companies and municipalities to deploy 5G networks built with open-source driven architectures.

The deployment of 5G networks is underway, but the many challenges and questions surrounding its evolution remain. The more quickly that national governments move to focus on how to encourage and accelerate the adoption of open 5G technologies and architectures, the more likely that we will maximize the potential of and resilience of the 5G ecosystem – for consumers, the economy, and national security. Otherwise, there will be a repeat of the previous experience of new generations of mobile networks that relied on closed architecture.

Please do not hesitate to contact us if you have any questions.

Contact:

Mark Bohannon
Vice President, Global Public Policy
Red Hat, Inc.
markb@redhat.com

Cherl Bruner
Public Policy Director
Red Hat, Inc.
cbruner@redhat.com

⁷ National Institute of Standards and Technology, “5G CYBERSECURITY Preparing a Secure Evolution to 5G”, April 2020, found at:

<https://www.nccoe.nist.gov/sites/default/files/library/project-descriptions/5G-pse-project-description-final.pdf>,

⁸ “NIST Invites Industry to Demonstrate 5G-Security Platforms”, May 20, 2020, found at:

<https://www.nccoe.nist.gov/news/nist-invites-industry-demonstrate-5g-security-platforms>.