Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20230

In the Matter of	)	
	)	
The National Strategy to Secure 5G Implementation Plan	)	Docket No. 200521–0144
	)	
	)	

COMMENTS OF ERICSSON

Jared M. Carlson
Vice President
Government Affairs and Public Policy
Ericsson
1776 I Street, NW
Suite 240
Washington, D.C. 20006
Telephone: (202) 824-0112

Barbara Baffer
Vice President
Government and Industry Relations
Ericsson
6300 Legacy Drive
Plano Texas 75034
469-534-5473

June 25, 2020

TABLE OF CONTENTS

Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20230

In the Matter of	)	
	)	
The National Strategy to Secure 5G Implementation Plan	)	Docket No. 200521–0144
	)	
	)	

COMMENTS OF ERICSSON

Ericsson hereby submits comments in response to the Notice and Request for Comments ("Notice")[1] in which the National Telecommunications and Information Administration (NTIA) seeks input to inform the development of an Implementation Plan for the National Strategy to Secure 5G in accordance with the requirements of the "Secure 5G and Beyond Act of 2020."[2]

INTRODUCTION AND SUMMARY

Ericsson is a leading provider and trusted supplier of 5G and information and communications technologies to service providers around the globe. As these comments demonstrate, we are committed to advancing the U.S. 5G marketplace, the U.S. 5G ecosystem, and U.S. global leadership in 5G *with secure 5G networks.*

Ericsson in the United States and Across the Globe. The United States is our largest market worldwide, and Ericsson has a longstanding and expanding commitment to the United States. Our presence in the United States dates back nearly 120 years, and we now have 7,200

[1] National Telecommunications and Information Administration, *The National Strategy to Secure 5G Implementation Plan*, Notice, Request for Public Comments, Docket No. 200521–0144, 85 FR 32016 (May 28, 2020).

[2] Secure 5G and Beyond Act of 2020, Pub. L. No. 116-129, 134 Stat. 223 (2020), https://www.congress.gov/116/plaws/publ129/PLAW-116publ129.pdf.

employees in the United States. As a trusted supplier for numerous domestic service providers, Ericsson has become the leader in North America with a 52 percent share of the Radio Access Network (RAN) equipment market.[3]

As described more fully below, Ericsson brings the following elements to its 5G operations in the United States:

- Nearly 2,500 Ericsson employees work in our North American headquarters, located in Plano, Texas, on the campus which hosts sales and customer unit teams, operations, research and development, corporate functions and the Ericsson Experience Center.

- Ericsson opened the first standalone 5G manufacturing facility in the U.S. in Lewisville, Texas. The 300,000 square-foot, state-of-the-art factory is producing 5G Advanced Antenna Systems to boost network capacity and coverage to meet the rapid demand for 5G as the next evolution of mobile technology rolls out across the United States. The factory puts Ericsson's 5G equipment supply chain close to our U.S. customers, which makes business sense and improves sustainability from an energy efficiency perspective. Ericsson is investing over $100 million in the facility.

- Our five Centers of Excellence (CoE) provide best-in-class field services training and support Ericsson's employees and our partners' employees as well. The CoEs are contributing to a trained 5G workforce, ensuring there are sufficient tower technicians to achieve deployment and replacement operations. In 2019, 847 tower tech trainees completed training at our CoEs.

- We support 65 percent of the 5G deployments across the United States, including efforts to close the digital divide in rural America.

- Our Austin application-specific integrated circuits (ASIC) design and R&D center is a strategic investment in maintaining Ericsson's leadership position in 5G technology. ASICs and software developed in Austin will be instrumental in the global 5G mobile telecommunications infrastructure.

- We created a new innovation hub at Ericsson's Silicon Valley facility in Santa Clara, California, to enable our industry partners and customers to accelerate adoption of advances in artificial intelligence (AI) and machine learning.

[3] Dell'Oro Group, *Advanced Market Research Reports on Network Equipment Services* (Jan. 31, 2020) ("Dell'Oro Group Report").

- We maintain strategic partnerships with NVIDIA, Intel, Qualcomm, Juniper, and many other U.S. companies.[4] Our global sourcing of active components for our 5G radio base stations relies up to 90 percent on U.S. technology suppliers

Ericsson is the frontrunner in mobile infrastructure services. In North America, Ericsson leads with a 27 percent market share in mobile infrastructure services, and globally, excluding the Asia-Pacific region, Ericsson leads with a 30 percent market share.[5]

More broadly, Ericsson is a global 5G leader. Ericsson was the first supplier with commercial 5G live networks on four continents. Ericsson now has 40 live 5G networks in 23 countries. Ericsson's live networks are part of the 94 commercial 5G agreements or contracts the company has with unique operators globally, of which 53 are publicly announced 5G deals. Ericsson has led the way on 5G standards, with the highest share of 5G patent declarations—15.8 percent—of any organization in the world (and we are the largest holder of standard-essential patents for mobile communications, with 54,000 patents). Finally, we participate in more than 100 industry organizations, standards bodies, and other technology alliance groups.

5G as a Game Changer. Below, we first describe the promise of 5G and the opportunity in the United States for 5G deployments to serve as a strategic asset and economic engine.

Roadmap for an Implementation Plan for Secure 5G. We then provide specific recommendations for the U.S. government to implement in response to the four Lines of Effort for implementation of the National Strategy to Secure 5G. These include:

1. Line of Effort One: Facilitate Domestic 5G Rollout—To Facilitate Domestic Rollout of 5G, Open Additional Mid-Band Spectrum, Streamline Zoning and Permitting Processes, and Promote the Development of a Larger 5G Workforce.

---

[4] *See* Prepared Testimony of Jason Boswell, Head of Security, Network Product Solutions, Ericsson North America, before the U.S. Senate Committee on Commerce, Science & Transportation, Hearing on "5G Supply Chain Security: Threats and Solutions," Mar. 4, 2020, *available at* https://www.commerce.senate.gov/services/files/45B9FF6F-280D-44BA-A29B-95B966F12A06.

[5] *See* Dell'Oro Group Report.

2. Line of Effort Two: Assess Risks to and Identify Core Security Principles of 5G Infrastructure—Build U.S. Security Policy on Principles of Trustworthiness, Resiliency, and Security by Design.

3. Line of Effort Three: Address Risks to U.S. Economic and National Security during Development and Deployment of 5G Infrastructure Worldwide—Promote Principles and Guidelines Favoring a Robust, Competitive Market of Trusted Suppliers Globally.

4. Line of Effort Four: Promote Responsible Global Development and Deployment of 5G—Leverage Government and Private Sector Stakeholders in the International 5G Ecosystem in Favor of Accelerated U.S. Deployment, Secure Design and Deployment, and a Diverse, Innovative Market of Trusted Suppliers Globally, and Support Strong Intellectual Property Rights.

Collectively, these recommendations constitute both Ericsson's vision for secure 5G, and also its framework for contributing to the U.S. National Strategy to Secure 5G.

DISCUSSION

I. 5G IS A GAME CHANGER AS A STRATEGIC ASSET AND ECONOMIC ENGINE FOR THE UNITED STATES.

Today, America stands at the cusp of a major inflection point: 5G. Whereas 4G was largely consumer use-case driven, 5G will facilitate connections across entire industries, enterprises, and society on a massive scale. 5G communications will dramatically improve wireless network connectivity and contribute trillions of dollars of economic value to 5G-enabled nations.[6] According to Accenture, the U.S. wireless industry is ready to invest $275 billion to deploy next-generation 5G networks, creating 3 million new jobs and adding $500 billion to our economy. 5G will bring these advances through expanded network capabilities in three areas:

1. Network Scale. Compared to 4G, 5G technology is designed to support high-connection densities. A full-scale smart city solution will see connection densities increase by ten to one hundred times—2.5 million devices per square mile, compared to 2,000 with 4G—as

[6] According to one estimate, 5G will enable $13.2 trillion worth of economic output globally by 2035. More cellular phones are sold each day than children are born. In 2019, there were more unique mobile phone users than toothbrushes sold globally. *See* Statista, *A Mobile Connected World, Report on the 3GPP – The Mobile Broadband Technology Standard* (2020).

mobile penetration hits 104 percent and connected civil assets (*e.g.*, light poles, traffic indicators, road cameras) increase.

2. Network Latency. 5G will deliver the low latency necessary for new and innovative applications, such as autonomous cars, and thus manage the higher stakes involved. While a freeze or audio stutter in 4G-delivered video programming does not generally present a dire situation, for Industry 4.0 participants, milliseconds separate a successfully executed emergency operations protocol versus an expensive compressor failure in a plant. 5G also will function with objects in motion and in remote locations, in ways that are not possible with fiber and Wi-Fi.

3. Network Speed. 5G will deliver the gigabit speeds that are at the forefront of America's attention. 5G gigabit speeds offer more than just the ability to watch recreational video in 4K or 8K; they will bring other enormously important benefits. A key example is the direct impact on the quality and accessibility of rural healthcare. 5G can transmit a 30-megapixel image in 0.2 seconds, compared to 26 seconds over a 10 Mbps DSL connection—a lifetime when emergency medical decisions can require split-second decisions.

Early 5G use cases provide an example of how the technology is adaptable for different industry requirements. For example, in the manufacturing context, 5G will permit machine-to-machine and machine-to-human full data integration across the complete industrial value chain, from shop floor to logistics to customer warehouse, via the placement of untethered sensors anywhere. 5G enables live video-based analytics to transition safety measures from reactive to proactive, as well as automated, real-time hazardous materials management and tracking. Additionally, 5G can obviate the need for extensive cable rip-outs during the reallocation of heavy equipment, as robotic mobility can receive an instant upgrade from shop floor to plant-wide (or even cross-plant). With these 5G technology implementations, which Ericsson is developing in its own U.S.-based smart factory, enterprises can expect up to 3.1 percent in revenue gain and 4-to-8 percent improvement in operational costs.

5G can also help bridge the urban-rural digital divide with Fixed Wireless Access (FWA) technology. Rural Americans continue to see their digital infrastructure stagnate at DSL speeds, on which up to 90 percent of households in rural communities rely as their primary form of

internet access. With the right 5G technologies in place, providers can extend their service footprint in up to a 50-mile radius from an existing fiber endpoint to deliver speeds around 25 Mbps within the coverage area. The fiber-like speeds from 5G place rural communities in a better competitive position to attract new business investments, ranging from call centers to data centers to manufacturing centers, which in turn drives the demand for healthcare, entertainment, retail, new housing, etc. With around 20 million unconnected or underserved Americans, a considerable pool of untapped U.S. economic potential resides in waiting. Recently, the FCC recognized the potential for 5G to serve rural areas, allowing for fixed wireless access providers to compete in an auction to provide gigabit services in rural areas.[7]

In short, 5G can provide a major shot of adrenalin to the U.S. economy—but only if the United States can maintain the technology leadership it demonstrated during the 4G era. As discussed in greater depth below, this technological and economic development throughout the United States is an important strategic asset. Much of technology success rests on the first mover's advantage, and a slight lag in 5G deployment could mean that the next strategic technological breakthrough is led by other countries rather than the United States. The technology race is in full swing across multiple fronts, and the U.S. position is severely at risk as compared to the 4G era. For example, it is estimated that China is installing 5G base stations at a rate of about 10,000 per week, whereas the U.S. build rate is 447 sites per week. There are 60 million 5G subscriptions in China (according to operators' public reports) and 1.5 million in the U.S. The sheer size, scale, and complexity of global 5G deployment will require the U.S. government's full attention and sophisticated policymaking capabilities. It is time for the United

[7] Federal Communications Commission, *Rural Digital Opportunity Fund Phase I Auction, Scheduled for October 29, 2020, Notice and Filing Requirements and Other Procedures for Auction 904*, Public Notice, Docket Nos. 20-34, 19-126, 10-90, FCC 20-77 at 38 ¶104 (June 11, 2020).

States to take an affirmative approach to 5G deployment to maintain its leadership position in technology.

II. THE UNITED STATES SHOULD EXECUTE THE FOLLOWING RECOMMENDATIONS TO IMPLEMENT THE NATIONAL STRATEGY TO SECURE 5G.

A. LINE OF EFFORT ONE: To Facilitate Domestic Rollout of 5G, Open Additional Mid-Band Spectrum, Streamline Zoning and Permitting Processes, and Promote the Development of a Larger 5G Workforce.

Continued and consistent aggressive policy action in the near-term is necessary to seize the opportunity for U.S. leadership in 5G deployment. Today, the United States is well-positioned for long-term leadership, but with significant government backing for deployment, China threatens to overtake the United States in the 5G ecosystem. This gives China the opportunity to exploit its position and dominate critical 5G applications such as AI, machine learning, or autonomous vehicles. If current trends continue without change, China will seize the mantle of 5G leadership not only in 5G deployment but also with applications and other benefits of 5G.

The United States should therefore act now to gain momentum and global leadership in the race to 5G. At the moment, the United States benefits from its leadership in technology products, services, and participants, but needs advances in 5G deployment fundamentals. The implementation plan for the National Strategy to Secure 5G must address three specific and interrelated areas to speed up 5G buildout: (1) opening up additional mid-band spectrum, (2) streamlining zoning and permitting, and (3) developing the 5G workforce.

Leading in the race to 5G requires a focus on regaining momentum in *all* of these areas. Right now, there is something of a perfect storm brewing. The fact that the U.S. lacks sufficient licensed mid-band spectrum means that, as described below, *more* towers are needed to deliver

5G than would be required if mid-band spectrum were readily available. The need for more towers necessarily requires speedy permitting processes and a sufficient number of tower crews. However, the U.S lags in permitting for new and collocated 5G infrastructure and lacks the number of needed tower crews. Thus, the 5G buildout problem is compounded by insufficient mid-band spectrum *and* by slow permitting processes *and* a lack of tower crews.

1. Open More Licensed Mid-Band Spectrum to Enable 5G Deployment at a Broader Scale.

Globally, wireless operators (and the nations they serve) have coalesced and unified their positions on 5G spectrum. First, high-band (high capacity/more limited coverage) spectrum should be targeted largely for urban markets and at industry specific use cases with low or static mobility needs, such as in manufacturing plants. Second, low-band (low capacity/wide coverage) is used to broaden service areas (*e.g.*, rural) where signal travel is weak. The tradeoff comes in speed due to low-band bandwidth physical characteristics. And third, mid-band spectrum (medium capacity/good coverage) is the prime choice to deploy 5G due to its optimal coverage and capacity balance. This is the sweet spot for operators to push out 5G rapidly and deliver improved speeds across a wide swath of subscribers on the current network grid. And in pursuing new sources of spectrum, we must prioritize dedicated licensed spectrum for 5G and other flexible-use services. Spectrum sharing plays a complementary role but should not form a foundational share of U.S. 5G spectrum.

China, South Korea, Japan, the U.K., and Canada will have, on average, nearly twice the amount of mid-band spectrum as the U.S. by the end of 2022.[8] While we commend the work by

[8] *See* Janette Stewart, Chris Nickerson, Tamlyn Lewis, *5G Mid-Band Spectrum Global Update*, at 1, Analysys Mason (Mar. 2020), https://api.ctia.org/wp-content/uploads/2020/03/5G-mid-band-spectrum-global-update-march-2020.pdf.

the Federal Communications Commission (FCC) in the scheduled release of 280 megahertz of C-band spectrum and 70 megahertz of licensed CBRS spectrum, the United States is still behind its global peers. Based on the total expected mid-band assignment by 2022, Japan will have released 1,000 megahertz of mid-band spectrum, the U.K. 790 megahertz, South Korea 600 megahertz, and China 460 megahertz.[9]

To implement the National Strategy to Secure 5G, Ericsson recommends that the U.S. government work with industry partners in a multipronged approach to make additional mid-band spectrum available for 5G:

a. Spectrum release: The U.S. government should consider releasing spectrum in the 3.1-3.55 GHz band on the successful conclusion of the risk mitigation study. A minimum of 250 MHz of dedicated spectrum at 3.3-3.55 GHz should be targeted for commercial use.

b. Spectrum study and exploration: U.S. government agencies should be required to report regularly on their anticipated future spectrum usage. Through this process, the U.S. government should identify opportunities for commercial operations while maintaining appropriate federal use. This exploration can identify, for example, where federal spectrum is unused, where multiple federal spectrum systems can be combined (*e.g.*, multifunction radars), where federal needs can be met by using commercial services (including 5G), or where federal spectrum use can be accommodated via other technologies (*e.g.*, fiber connections).

c. Spectrum sharing: As a complement to these efforts to explore and release dedicated mid-band spectrum for 5G, Ericsson also supports current efforts by the Department of Defense (DOD), in partnership with the National Spectrum Consortium, to explore ways in which mid-band spectrum currently being used by DOD radar systems can be shared with commercial 5G networks. As noted above, however, a successful 5G strategy requires a good deal of *dedicated* licensed spectrum in addition to shared spectrum. Ericsson has stated at the FCC that at least 100 MHz of contiguous, licensed mid-band spectrum is required for each operator.[10]

[9] *Id*. at 3-5.

[10] *See, e.g.*, Comments of Ericsson, Federal Communications Commission, GN Docket No. 18-122, RM-11791, RM-11778, at 3 (filed Oct. 29, 2018) ("An individual carrier will need access to somewhere on the order of 100 megahertz of spectrum if it is to achieve gigabit-level speeds for mobile broadband service."); *see also* Letter from Mark Racek, Ericsson, to Marlene T. Dortch, Federal Communications Commission, GN Docket No. 17-183 (Mar. 29, 2018) ("In our view, at least 100 MHz is needed on a per carrier basis to fulfill mobile broadband use cases.").

2. *Zoning and Permitting Processes Should be Streamlined to Reduce 5G Deployment Timelines Significantly.*

The United States needs an additional 500,000 to 800,000 small cells to achieve the necessary 5G coverage and capacity goals. Much of the current macro tower network infrastructure is upgradeable to 5G but will require small cell sites for network densification. With these anticipated volumes, any delays to site acquisition timelines have significant repercussions. While we applaud the federal government policies, and many state and local governments' initiatives, to accelerate deployment,[11] more action is necessary to incentivize and streamline the zoning and permitting processes for small cell deployment. Ericsson also commends the FCC for its recent action smoothing the path for speeding 5G through collocation of equipment on existing towers.[12]

Specifically, to implement the National Strategy to Secure 5G, Ericsson recommends the following three steps:

a. Continue to push the STREAMLINE Act to fast-track approvals and maintain coordination with State and Local authorities. The STREAMLINE Act would fast-track approvals while maintaining some state/local jurisdictional approval authority. This approach can increase public awareness of the benefits and advantages of 5G and can also help accelerate the siting and permitting processes. For example, South Korea has done much to gain support from its public citizenry, who welcome widespread

[11] *See, e.g.*, Federal Communications Commission, *The FCC's FAST Plan*, https://www.fcc.gov/5G (last visited June 24, 2020) ("Under Chairman Pai, the FCC is pursuing a comprehensive strategy to Facilitate America's Superiority in 5G Technology (the 5G FAST Plan). The Chairman's strategy includes three key components: (1) pushing more spectrum into the marketplace; (2) updating infrastructure policy; and (3) modernizing outdated regulations."); *Wireless Infrastructure*, https://www.fcc.gov/wireless-infrastructure (last visited June 24, 2020) ("To provide certainty and encourage efficient review, the FCC has adopted 'shot clocks' that establish time frames within which State and local governments must complete their reviews.")

[12] *See* Federal Communications Commission, *Implementation of State and Local Governments' Obligation to Approve Certain Wireless Facility Modification Requests Under Section 6409(a) of the Spectrum Act of 2012*, Declaratory Ruling and Notice of Proposed Rulemaking, WT Docket No. 19-250, RM-11849, FCC 20-75 (rel. June 10, 2020); *see also* FCC Commissioner Brendan Carr, Twitter (June 9, 2020, 11:49 am), https://twitter.com/BrendanCarrFCC/status/1270382638331826178 ("Connecting America's towns and communities with high-speed Internet service has never been more important. We should not delay work that can help close the digital divide. Grateful that the FCC majority just voted to make it easier for tower crews to connect Americans today.").

connectivity. This approach has contributed to South Korea being ranked second globally in terms of 5G penetration.

b. Enforce Section 6409's Shot Clock and Deemed Granted regulations. Enforcement is the real issue. Rather than comply with the language of the statute and the FCC's interpretation, local governments sometimes challenge the deemed grant (which occurs when a local government fails to act on a permit request within a set period of time) in court, resulting in delays that the statute was intended to avoid.

c. Relax National Environmental Policy Act (NEPA) regulations including State Historic Preservation Office reviews, Tribal Historic Preservation Office reviews, environmental reviews, etc. While the FCC's 2018 order[13] helped by exempting certain small wireless facilities from environmental and historic preservation review, last year the D.C. Circuit struck down parts of the order exempting small cells from NEPA and National Historic Preservation Act requirements.[14] Going through a full NEPA process can delay 5G deployments by 120 days.

d. Remove zoning special use requirements and treat small cell deployments as permitted uses. Small cells are like Wi-Fi access points and, in most places, Wi-Fi deployments do not require special zoning permissions from jurisdictions. Removal of such special permissions will greatly accelerate small cell deployment timelines.

e. Continue to allocate Federal funds to incentivize rollouts and address permitting delays that are a result of municipal staff shortages by increasing municipal funding for additional staff in order to review the influx of small cell applications. Rural and remote areas often do not enjoy the technological advancements seen in urban areas due to the lack of useable digital infrastructure (*e.g.*, fiber). Proper application of funds can help expedite deployment in these regions by eliminating costly delays in the review of applications and processing of permits, helping to close the digital divide.

3. Develop the 5G Workforce to Enable Higher Build Volume and Accelerate 5G Deployment Across the United States.

Quite simply, without 5G workers to build infrastructure, there are no networks. Tower technicians have a uniquely difficult profession. Technicians regularly scale hundreds of feet of tower, carrying 50-60 pounds of equipment, in gusts of 15-20 mph winds. These factors naturally limit the selection pool of candidates who are capable of doing and willing to do this work. The

[13] Federal Communications Commission, *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Second Report and Order, WT Docket No. 17-79, 33 FCC Rcd 3102 (2018).

[14] *United Keetoowah Band of Cherokee Indians in Oklahoma v. FCC*, 933 F.3d 728 (D.C. Cir. 2019).

United States, with 27,000 tower technicians currently, needs an additional 20,000 to build out 5G at scale.[15]

Current tower technicians often have significant experience with traditional macro cell sites but minimal familiarity with small cells and non-traditional sites such as rooftops. The material technology differences between macro and small cells mean that the transferable knowledge and skillset is limited, and workers need to ramp up quickly on the service requirements for different types of small cells. Additionally, macro sites typically reside in structured environments such as well-defined or zoned areas, whereas small cell installation will frequently occur in populous urban areas that typically have more extensive regulations regarding traffic, safety, construction, and other issues that the workers must adhere to or risk financial or legal penalties.

This is why Ericsson is prioritizing worker training in our own 5G strategy. As noted above, our enhanced tower technician training facilities in Texas provides best-in-class field services training and support for Ericsson's employees and our Ericsson partners, with 847 tower techs trained last year. Efforts such as these deserve government support and urgent public-private partnership. Therefore, to implement the National Strategy to Secure 5G, Ericsson urges the federal government to collaborate with state and local governments and industry partners on the following approaches to developing the workforce:

a. Vocational education awareness (state and local level): State education boards should emphasize the option of 5G vocational skills earlier in the U.S. education cycle.

[15] *See* Majority Statement of Chairman Roger Wicker (R-MS), U.S. Senate Committee on Commerce, Science & Transportation, Hearing on "The 5G Workforce and Obstacles to Broadband Deployment," Jan. 22, 2020, *available at* https://www.commerce.senate.gov/2020/1/the-5g-workforce-and-obstacles-to-broadband-deployment/a753f360-1f29-4450-9058-66f884b32905# ("According to reports, the United States faces a 5G labor shortage. Estimates suggest there are approximately 27,000 tower climbers prepared to install 5G equipment. However, it is projected that 20,000 more tower climbers are needed to accelerate the deployment of 5G in order to win the race and secure the first-mover advantage in the United States.").

b. Vocational curriculum development (state and local level): State education boards should work with industry participants to create standardized curriculums around 5G vocational skills.

c. At the federal level, the TOWER Infrastructure Deployment Act (H.R. 3255) would direct the FCC to address this issue and develop recommendations for Congress on ways to encourage a larger 5G workforce. Congress should pass this bill to expedite efforts to increase the 5G workforce in the U.S.

B. LINE OF EFFORT TWO: Build U.S. Security Policy on Principles of Trustworthiness, Resiliency, and Security by Design.

Ericsson's global leadership in communications security is built on the principle that networks must, from the outset, be trustworthy, resilient, and secure by design based on rigorous open and interoperable security standards. We take a holistic approach to ensure that security is built into the network from the start, across the supply chain, software and hardware development, testing, implementation, and operation. For many years, Ericsson has worked systematically to incorporate "security by design" into all phases of product development, and we have a well-established internal governance framework for product security.

1. Support Industry Leadership and Government-Industry Partnership in Supply Chain Security.

To secure and maintain the integrity of our supply chain, in all of Ericsson's manufacturing and software development facilities worldwide, we rely on tight quality controls, traceability and integrity checks, regular site audits, tests, and verifications to ensure compliance with our own security standards and appropriate industry specification guidelines.

All of Ericsson's software, for example, is verified, cryptographically signed, and distributed centrally from Sweden, and, when so required, under Swedish export licenses. We have strict software version controls with check-in/check-out security, meaning that both the Ericsson employee who wrote the code and the individual who reviewed/accepted the changes are logged. Binaries are provided via secure download from the Ericsson Software Gateway in

Sweden, including a signature which provides a trust anchor that ensures the software originated from Ericsson and has not been tampered with in transit.

Since 2018, we also have been executing a regionalization strategy for our supply chain to place manufacturing and development as close to the customer market as possible in order to mitigate potential risks or regional disruptions and reduce dependence on one supply site or vendor. With this experience, we also contribute to industry and government-industry initiatives to ensure 5G security and supply chain security. These include the Communications Sector Coordinating Council (CSCC), the Council to Secure the Digital Economy (CSDE), the National Security Telecommunication Advisory Council (NSTAC) and its current work analyzing the security impact of software-defined networking (SDN); and the Communications Security, Reliability, and Interoperability Council (CSRIC), which makes security policy recommendations to the FCC. Ericsson is working across several working groups in the current iteration of CSRIC focusing on 5G security. We are also participants in the groundbreaking work of the DHS ICT Supply Chain Risk Management Task Force, a formal, action-oriented collaboration between industry and government.

To implement the National Strategy to Secure 5G, Ericsson recommends that the U.S. government redouble its support for these promising partnerships that bring industry's real-world experience and expertise to bear on policy development aimed at supply chain security.

2. Promote U.S., Allied, and Industry Leadership in Standards Development.

The importance of the 3d Generation Partnership Project (3GPP), cannot be overstated. 3GPP is a partnership of seven telecommunications standard development organizations (SSOs) from around the world that provides an open, transparent, and established setting to develop critical global standards for wireless communications. As a 2017 Forbes article noted, "3GPP is

crucial to today's cellular standards" and has been the "most instrumental in establishing the truly global cross-industry interoperable wireless broadband standards"[16] that billions of global citizens and countless businesses rely on every day.

Concerns over increased Chinese presence in 3GPP stem largely from misconceptions about how the organization functions, its openness, and the erroneous focus on IP contribution counts. 3GPP is a member-driven organization that comprises approximately 700 member companies from dozens of countries. It is important to understand that 3GPP does not define standards; instead, its member companies form various groups to define technology specifications for all parts of cellular networks. Member companies vote, with one vote per company, and they agree on specifications which are then proposed to different standards setting organizations across the world—such as the Alliance for Telecommunications Industry Solutions (ATIS) for the United States—for policy and implementation. Any company may join and develop its own set of products (integrated or open) based on the technical specifications. Current industry network development built on 3GPP specifications benefits from a standardized environment to deploy platforms, applications, and services. 3GPP has been very effective in its over twenty-year history by establishing a commonality in the wireless space that has allowed innovation to flourish. Creating an alternative to the 3GPP would unravel the common fabric of standards that allows for the seamless use of billions of wireless devices. It would also create significant confusion in the marketplace as well as differing and competing standards, regressing us back to the 2G days, where there was GSM for Europe, TDMA/CDMA for the U.S., and PDS for Japan.

[16] Patrick Moorhead, *The Crucial Role Of Wireless Industry Standards In 5G*, Forbes (Sept. 1, 2017), https://www.forbes.com/sites/patrickmoorhead/2017/09/01/the-crucial-role-of-wireless-industry-standards-in-5g/#78e01d452cff.

A 2019 RCRWireless article provides a concise summation of the importance of 3GPP: "3GPP is a truly democratic, consensus-based organization. Its structure and culture that encourages collaboration, even among bitter business rivals, has made it a premier standards development organization."[17]

Ericsson is a leader in developing the standards for 5G security through 3GPP, and we consider standards development a foundational component of good security assurance. We are also engaged in an effort through ATIS, supported by DOD, to develop standards for securing the 5G supply chain. Technical standards are crucial for security because they give all suppliers and carriers an open and transparent opportunity to identify and correct technical vulnerabilities, leading to effective network configuration and deployment.

5G is different from previous generations of wireless communications. Unlike the advances from 1G to 2G to 3G to 4G, 5G is a new network architecture. 5G network functions will happen through a "virtualized" cloud-based network allowing tailored security solutions for each different network function that will provide unprecedented capabilities for specialization in security for different isolated critical functions. These configurations in real-world deployments will be different in every case, but they should always be based on the rigorous, open, and interoperable standards that Ericsson is helping to develop, and they should be bolstered by government-industry coordination efforts that are presently underway.

Technical standards are crucial for security because they give all suppliers and carriers a common—and open and transparent—technical understanding of interoperability and security, allowing for the vetting, identification, and correction of technical vulnerabilities. They also will

[17] Prakash Sangam, *The inside story of 3GPP–Who are the unsung heroes that create the standards? (Analyst Angle)*, RCRWirelessNews (Aug. 19, 2019), https://www.rcrwireless.com/20190819/analyst-angle/inside-story-3gpp-analyst-angle.

ensure that the 5G ecosystem remains diverse and competitive, as new participants are able to compete with established global suppliers, making for a robustly competitive marketplace.

U.S. and allied vendors maintain solid leadership positions in technology standards (including in 3GPP), development, and sales market share and 3GPP despite the increase of China's global presence through Huawei and other Chinese vendors. Huawei's technology contributions have indeed increased since 4G, but the rest of the 3GPP community has been active and engaged as well. As of the recent 5G New Radio Release 1, Ericsson still maintains its leadership position in developing standards while Nokia, Qualcomm, and new entrants like Intel also post impressive results as well. Concerns about U.S. representation in 3GPP should diminish given the significant market share exposure these companies have domestically, and because, as described below, the United States has a deep technology bench as multiple industries intersect on the path to 5G. The U.S. industrial base across all segments of the 5G ecosystem—RAN, transport, core, business applications, and devices—is very strong, and this strength is represented in 3GPP and other pertinent standards and technical specification organizations.

3. Promote Best Practices in Configuration and Deployment.

When fully realized, 5G will be "virtualized" across a service-based architecture—meaning that the core network functions will happen through a cloud-based and "software defined" network, which in turn will allow tailored security solutions for each different network function, also known as a network "slice."

Virtualized networking will allow for unprecedented specialization in security—for instance, separating mission-critical network instances such as connected medical devices from less critical devices and functions. These new architectures and technologies will also facilitate more discrete control of access to data, topology obfuscation between network segments, greater

requirements on inter-element encryption, provisions for extended authentication, enhanced privacy protections for subscribers, and many other new capabilities. Individual configurations in real-world deployments will be different in every case, but in all cases they should be based on the rigorous, open, and interoperable standards that Ericsson is helping to develop now.

C. LINE OF EFFORT THREE: Promote Principles and Guidelines Favoring a Robust, Competitive Market of Trusted Suppliers Globally.

A key strategic goal for public policy aimed at a secure and trusted 5G supply chain should be to maintain a global, competitive, diverse market of trusted suppliers. Over the past two decades, the global market of wireless communications equipment suppliers has seen significant consolidation, but today there are a number of suppliers of 5G RAN equipment in addition to Ericsson. Additional suppliers, including U.S. companies, provide different elements of core network equipment, and evolving innovations in open and interoperable networking and virtualization will allow new participants to enter the marketplace and compete with established global suppliers. Therefore, even with prohibitions or bans on certain vendors, the 5G ecosystem presently is diverse and competitive—attributes that are imperative not only for ever-advancing innovation but also to ensure security and resiliency throughout global networks. Network security is a global issue, not just a domestic one, and security on a global level only reinforces and enhances security here at home. Diversity in the network also avoids "single point of failure" problems and limits espionage and sabotage vulnerabilities.

1. Focus on Identifying and Promoting Principles for Trusted Suppliers Globally.

The U.S. government should continue to advance principles and guidelines favoring trusted suppliers and supply chains on a global basis. We all have a mutual interest in a diverse and competitive market—suppliers and service providers alike. We agree with the principles that security and trust are two independent factors that need to be assessed to protect 5G networks.

These principles are key to establishing an end-to-end view of risk across the multiple layers of telecommunications infrastructure.

The Administration and Congress should remain attentive to factors that might promote—or undermine—the development of a secure and robust marketplace of trusted suppliers in the U.S. and globally. To that end, Ericsson recommends the following approaches to implement the National Strategy to Secure 5G:

- The United States must play a leading role in shaping ICT standards, and DOD and its interagency partners, including the FCC, NIST, and NTIA, should actively participate in 3GPP.

- Congress should appropriate funding for replacement equipment in the United States, as is envisioned in the Secure and Trusted Communications Networks Act, and create the Supply Chain Security Trust Fund which provides grants to replace equipment in certain U.S. networks through the FCC's ongoing proceeding.

- The DOD should adopt its plans to engage with international standards organizations as outlined in DOD's 5G strategy plan.[18]

Additionally, the Prague Proposals for 5G—recommendations developed by thirty-two countries, including the United States—provide a prominent platform for free market democracies to promote the rule of law, independent judiciary, corporate transparency and accountability, and security by design, in order to promote multiple market participants and avoid dominant players that can pose threats to national security. The House of Representatives passed H. Res. 575, affirming the United States' support for the Prague Proposals. Additionally, a working group convened by the Center for Strategic and International Studies (CSIS) recently

[18] *See* Department of Defense, *Department of Defense (DoD) 5G Strategy (U)*, at 6-7 (May 2, 2020), https://www.cto.mil/wp-content/uploads/2020/05/DoD_5G_Strategy_May_2020.pdf ("DoD will work with industry, academia, standards setting bodies, and government research labs to develop and deploy techniques and technologies across DoD devices and infrastructure that ensure protected and resilient utilization of 5G networks. ... To promote high-quality, protected, and reliable 5G devices and applications, the U.S. must play a lead role in shaping information and communications technology standards. DoD will fully implement its Standards Engagement Plan and will actively participate in the 3rd Generation Partnership Project (3GPP) organization.").

developed *Criteria for Security and Trust in Telecommunications Networks and Services*, published on May 13, 2020.[19] These criteria are intended to be practical, concrete criteria for governments and network operators to implementing the Prague Proposals and the European Union's 5G Toolbox to assess trustworthiness and security. These industry and government efforts should be continued and strengthened to implement the National Strategy to Secure 5G.

2. Focus on Trusted Technology Innovation and Diversity.

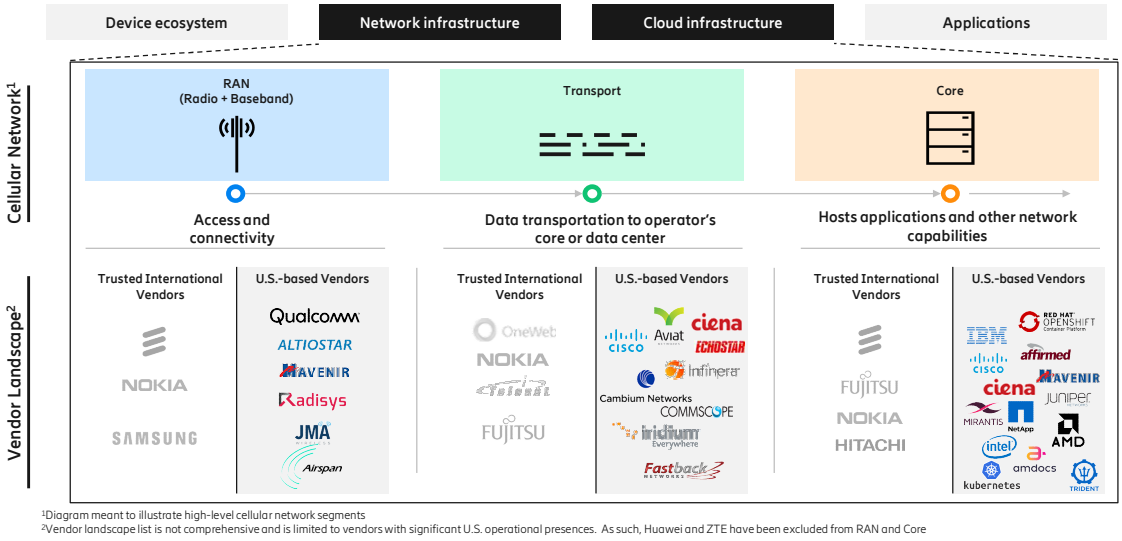
At a surface level, it is understandable that the lack of large U.S.-headquartered companies supplying integrated RAN has prompted policy questions, but this status quo does not present genuine strategic concern. The United States has a very strong industrial base across the 5G ecosystem, from core network, orchestration, transport, RAN chipsets, and hyperscale cloud providers that extend the 5G platform into advanced developer ecosystems. Indeed, 60 to 70 percent of the component value for any RAN vendor, Huawei included, is of U.S. origin. Ericsson's global sourcing of active components for our 5G radio base stations relies up to 90 percent on U.S. technology suppliers, and we maintain strategic partnerships with NVIDIA, Intel, Qualcomm, Juniper, and many other U.S. companies.[20] The National Strategy to Secure 5G should leverage and promote this diverse innovation among U.S. and other trusted supplier-based countries with whom the United States has cooperative defense relationships.

---

[19] *See* Center for Strategic and International Studies, *Criteria for Security and Trust in Telecommunications Networks and Services* (May 13, 2020), *available at* https://www.csis.org/analysis/criteria-security-and-trust-telecommunications-networks-and-services ("These criteria rely primarily on publicly available information to allow for an assessment of the trustworthiness and security of a potential supplier and to describe domestic policies to guide responsible and necessary actions to safeguard telecommunications networks. These criteria are derived from different assessment tools, such as foreign investment screening, national security reviews, and commercial practices, and allow for fact- based decisions on how trustworthy a supplier is likely to be.").

[20] *See* Prepared Testimony of Jason Boswell, Head of Security, Network Product Solutions, Ericsson North America, before the U.S. Senate Committee on Commerce, Science & Transportation, Hearing on "5G Supply Chain Security: Threats and Solutions," Mar. 4, 2020, *available at* https://www.commerce.senate.gov/services/files/45B9FF6F-280D-44BA-A29B-95B966F12A06.

As illustrated below, from the RAN, to transport, to the core, the vendor ecosystem is diverse.



[1]Diagram meant to illustrate high-level cellular network segments
[2]Vendor landscape list is not comprehensive and is limited to vendors with significant U.S. operational presences. As such, Huawei and ZTE have been excluded from RAN and Core

Furthermore, Ericsson is a member of the O-RAN Alliance, an organization that is advancing technical specifications for Open Radio Access Network (Open RAN) which brings promising opportunities including RAN programmability, software/hardware disaggregation, and open interfaces to enable more flexibility Such open solutions will see their first market appearance in selective deployments such as small cells, rural, and nationwide greenfield deployments. Carriers and suppliers are presently developing interfaces that allow for 5G deployments, including hardware "mix and match." Technical and delivery requirements such as spectral efficiency, data processing, security, and systems integration complexity, need time to reach parity compared to a fully integrated radio, but Ericsson is firmly committed to bring together all relevant players and alliances in industry to innovate at global scale.

At the same time, the U.S. must not lose sight of the 5G race and maintain its market-based approach through technology-agnostic policies supporting equal and fair treatment for open RAN and integrated RAN to access government grants/funds. For example, the Utilizing Strategic Allied (USA) Telecommunications Act, sponsored by Sen. Mark Warner (D-VA), is a promising approach to funding 5G R&D efforts and providing momentum towards open-architecture, software-based wireless technologies and funding innovative technologies in the U.S. 5G ecosystem. Ericsson recommends that the National Strategy to Secure 5G leverage such 5G funds.

Other areas in which we recommend the U.S. invest in the near term include funding for the Secure and Trusted Communications Network Act. Congress passed the Act earlier this year, but funding has yet to be appropriated. Speeding secure 5G technologies to rural areas in an "easy win" in the race to 5G. In the future, Ericsson recommends that the U.S. government invest in programs such as:

- DOD Collaboration on 5G research collaboration and advanced prototyping;
- Ecosystem Innovation on 5G Platforms through advanced industry partnerships;
- 5G Supply Chain Capabilities such as manufacturing and advanced service delivery capabilities;
- 5G Product Development focused on integrated open network architecture, cloud RAN, network exposure, orchestration, AI, and edge; and
- 6G Advanced Research (funding early research).

All of these initiatives, both near term and long term, will promote innovation and diversity among trusted suppliers.

D. LINE OF EFFORT FOUR: Promote Responsible Global Development.

1. Leverage Government and Private Sector Stakeholders in the International 5G Ecosystem in Favor of Accelerated U.S. Deployment, Secure Design and Deployment, and a Diverse, Innovative Market of Trusted Suppliers Globally.

As discussed in detail above, participating in technical standards setting organizations and related initiatives based on developing qualitative criteria for evaluating trustworthiness and security is an important component of maintaining U.S. leadership in 5G and promoting U.S.-based technology in 5G. Such U.S. and multinational efforts, and the innovative and competitive advances that have come from them, have characterized the U.S. and allied leadership in deploying secure wireless communications technology.

The National Strategy to Secure 5G should focus specifically on the strategic goals outlined above to promote responsible global development and deployment of 5G. The strategy should leverage all domestic and international government and private sector stakeholders toward those affirmative goals—namely, accelerated U.S. deployment; secure supply chain, design and deployment; and a diverse, innovative market of global suppliers.

In addition to the recommendations we have outlined above in Lines of Effort One, Two, and Three, Ericsson also recommends that this should include engagement with allied governments, standards organizations and related technical specification initiatives, providers of financing such as the U.S. International Development Finance Corporation, as well as technical collaboration, research and testing with network operators and suppliers in the United States and allied countries. These affirmative strategic goals will likely be effective over the long term in markets and regulatory jurisdictions outside the United States, and therefore the resulting global market and policy advances would benefit the U.S. National Strategy to Secure 5G.

2. Support Strong Intellectual Property Rights.

Support for intellectual property rights also plays a key role in the development of 5G. Robust respect for intellectual property (IP) and an open, transparent, balanced and voluntary consensus-based standards development process are essential to ensure the long-term security, interoperability, viability, and competitiveness of the marketplace for 5G. IP encourages further investment in R&D for 5G and beyond by providing innovators with the ability to create value for consumers, recoup a fair share of that value, and reinvest in the creation of key technology. This recurring investment in the innovation ecosystem ensures the vibrancy of diverse business models by allowing for more players in the marketplace offering an array of the best technology available, with a competitive, broader base of innovators and implementers, that ultimately benefits consumers. Strong IP protections and the openness of the standards development process also protect against technology theft and help ensure the trustworthiness and security of 5G networks.

An open, transparent, balanced, and voluntary consensus-based standards development process (such as the process used at 3GPP and its regional partners) creates a dynamic and competitive marketplace enabling the development of the best technology. FRAND licensing (that is, licensing on Fair, Reasonable, and Non-Discriminatory terms) is a critical aspect of the continued innovation and competitiveness in 5G. A FRAND licensing framework provides access to the standard by the ecosystem, encourages competition, creates wide choices for consumers, and improves product quality. Ericsson, as a leading supplier of wireless network equipment, a leading contributor to standardized technologies, a leading member of SDOs and both a licensor and licensee of patents that are essential to implementation of voluntary collaborative standards, holds 54,000 granted patents. The continued viability of investment in

collaborative technology standards development, whether by Ericsson or others, however, depends upon the continuation of a balanced approach to FRAND licensing. On one hand, FRAND allows third parties—including competitors—access to the cutting-edge patented technology essential to the standards. This is especially important in industries that demand technical interoperability (like 5G) to achieve broad commercial success and increases the incentive for competitors to collaborate on technical development and contribute their best technology for the good of the whole market. Agencies of the U.S. government, including the DOJ and the USPTO, recognize that this cooperation is pro-competitive and benefits consumers.[21] On the other hand, FRAND adequately and fairly rewards innovators for their contribution of cutting-edge patented technology into open standards, which in turn promotes continuous innovation. These goals work together to form a delicate balance between the interests of innovators and technology users and have served well in a period of rapid technological advances.

The December 2019 joint policy statement issued by the DOJ, USPTO, and NIST on FRAND licensing reinforced the importance of balance in the innovation ecosystem and affirmed the commitment by U.S. agencies to promote policy goals that encourage the long-term viability and diversity of competitive business models for the licensing market that ultimately benefits consumers. The importance of this goal to support the FRAND balance through comprehensive and sensible governmental policies in this area also extends beyond U.S. borders. Other countries look to the U.S. for guidance on issues relating to global standards and FRAND licensing. We encourage the continued support for policies that reflect these important principles

[21] *See* Remarks by Alexander Okuliar, Deputy Assistant Attorney General, Antitrust Division, U.S. Department of Justice, before the Intellectual Property Rights Policy Advisory Group of the American National Standards Institute, May 28, 2020, *available at* https://www.justice.gov/opa/speech/file/1281926/download.

and provide a clear, balanced and unified message on the importance of respect for IP protections, U.S. private sector leadership in open, transparent, and voluntary consensus-based SDOs, and robust support for FRAND licensing commitments.

CONCLUSION

Ericsson fully supports the Administration's effort to develop an Implementation Plan for the National Strategy to Secure 5G in accordance with the "Secure 5G and Beyond Act of 2020," and urges that NTIA incorporate the recommendations set forth above.

Respectfully submitted,

ERICSSON

By: _/Jared M. Carlson/_____

Jared M. Carlson
Vice President
Government Affairs and Public Policy
Ericsson
1776 I Street, NW
Suite 240
Washington, D.C. 20006
Telephone: (202) 824-0112

Barbara Baffer
Vice President
Government and Industry Relations
Ericsson
6300 Legacy Drive
Plano Texas 75034
469-534-5473

June 25, 2020