

## Public Submission

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Mr. David F. Alderman  
c/o Standards Services Division  
National Institute of Standards and Technology  
U.S. Department of Commerce

**Subject:** Qualcomm Response to the Request for Information for the Study on People's Republic of China ("PRC") Policies and Influence in the Development of International Standards for Emerging Technologies

**Reference:** 86 Fed. Reg. 60801 (Nov. 4, 2021); Docket # 2021-24090

Dear Mr. Alderman:

Qualcomm Incorporated<sup>1</sup> (together with its subsidiaries, "Qualcomm"), a U.S. company with its worldwide corporate headquarters in San Diego, California, has been the world's leader in wireless research and development ("R&D") and a leading supplier of wireless semiconductor chipsets for over thirty-five years. As a leader in advanced wireless communications, Qualcomm has a long history of success in contributing technology inventions to global standards. Qualcomm has made significant contributions to the major cellular standards, including the second generation ("2G"), third generation ("3G"), and fourth generation ("4G"), and it is now leading in the fifth generation ("5G") as well as in the revolutionary open RAN<sup>2</sup> network architecture. Qualcomm has also been a significant contributor to the wireless LAN standards, beginning with the important 802.11n, as well as to many other standards. Overall, Qualcomm participates directly (by attending meetings and making technical submissions) and indirectly (by performing

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<sup>1</sup> Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated, operates the Qualcomm CDMA Technologies ("QCT") semiconductor business, which develops and supplies integrated circuits and system software based on 3G/4G/5G and other technologies for use in mobile devices, wireless networks, devices used in the Internet of Things, broadband gateway equipment, consumer electronic devices, and automotive systems for telematics, connectivity, and digital cockpit (also known as infotainment). Qualcomm Incorporated includes Qualcomm's licensing business, Qualcomm Technology Licensing ("QTL"), and the vast majority of its patent portfolio.

<sup>2</sup> "Open RAN" stands for "open or disaggregated radio access network" and refers to a 5G network that relies on technology architecture, including software and hardware components, that can be provided by multiple vendors and interoperate through open protocols and interfaces, including but not limited to standards adopted by the Third Generation Partnership Project (3GPP), Open Radio Access Network (O-RAN) Alliance, Telecom Infra Project, or any similar set of open interoperable standards for multi-vendor network equipment.

R&D) across over 200 standards and industry organizations worldwide with a team of thousands of engineers that are specialized in the various technical aspects of wireless communications, software, and systems. These engineers are backed up by tens of thousands of engineers researching and developing products, most of which heavily rely on standards.

Qualcomm is accordingly very familiar with the standards ecosystem and appreciates the opportunity to provide the following submission to the Department of Commerce's Notice requesting comments pursuant to Section 9414 of the 2021 National Defense Authorization Act's mandate "to conduct a study and provide recommendations with respect to the effect of policies of the PRC and coordination among industrial entities within the PRC on international bodies engaged in developing and setting international standards for emerging technologies."<sup>3</sup>

Global standards that are developed by standards development organizations ("SDOs") through an open, consensus-based, and industry-led standardization process are a key component of the telecommunications sector in which Qualcomm operates. By SDOs, we mean all organizations—including consortia—that develop specifications, common testing, and certification procedures. Qualcomm's activities focus primarily on industry-led standards, which are standards developed through individual company initiatives and the cooperation of private firms. Industry-led standards are voluntary in the sense that their development and implementation are left to the market. In the cellular and Wi-Fi space, global standards developed through an open, consensus-based, and industry-led standardization process have been extremely successful, providing the foundation for a thriving ecosystem that has benefited consumers and businesses all over the world.

However, the development of global standards in the technology sector is far from straight-forward. It is an R&D-intensive process that requires cooperation and coordination among hundreds of companies and thousands of engineers. Private companies make significant investments in risky R&D to develop the technologies that ultimately become part of the standard. Industry participants from all over the world then work together on iterative R&D to address technical problems and develop the relevant standard. Once a standard is developed, manufacturers implement it into their products and services, making it available to consumers and businesses. The entire process—from initial technology development to final implementation into a product—typically takes many years and requires a careful balancing of all stakeholders' interests.

In the last decade, China has undoubtedly become an important player in global standardization activities. That is because China has recognized standards' strategic importance for technological leadership and has accordingly made involvement in standardization activities a top priority for the country. China has also recognized the link

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<sup>3</sup> Dep't of Commerce, Bur. of Indus. & Sec., Study on People's Republic of China (PRC) Policies and Influence in the Development of International Standards for Emerging Technologies, Notice of Request for Public Comments, 86 Fed. Reg. 14308 (Nov. 4, 2021).

between protecting intellectual property rights (“IPRs”) and standardization. The participation of firms from different countries, including China, as well as the recognition of the importance of IPRs, are positive developments that foster the success of global standards. Other positive developments include China’s move towards a more market-oriented standardization process, commitment to increased openness of foreign participation, and agreement to focus on “quality over quantity” in standardization activities.

To avoid the undue control of any single firm or country, or group thereof, standards must be developed in accordance with important procedural principles. Although SDOs typically adequately ensure that standardization processes are fair and open, there are cases where governments or other entities distort standardization activities. Accreditation groups, such as the American National Standards Institute, have no real ability to influence SDOs outside the United States, other than by setting a good example. Hence, the Federal Government can and should take steps to preserve an open, consensus-based and industry-led standardization ecosystem.

It bears emphasis that if standards developed through an open, consensus-based and industry-led process fail, “standards”, or “commonly adopted technology solutions” will be set in a different way. They may be replaced with standards controlled by a single company that has sufficient power to push the market to adopt its own proprietary solution. These standards may not be open, allowing a single company to control access to the entire market and ultimately stifle competition and innovation. Alternatively, a country’s government may feel the need to step in and set its own standards. In either case, economies that are centralized and state-controlled, including China, will have a natural advantage to set and control standards that companies will be forced to adopt regardless of their ultimate merit. Neither of these outcomes would serve the interest of the U.S. economy and its consumers.

Therefore, it is essential that the United States develop a comprehensive national standards policy that safeguards open, consensus-based, and industry-led global standards developed domestically and internationally.

## **I. Executive Summary**

The Federal Government should adopt a comprehensive national standards policy that will promote and safeguard standards developed through an open, consensus-based, and industry-led process. In particular, the Federal Government should address issues that undercut the success of these standards, such as the following:

- Ensure that SDOs adhere to principles of due process and fair governance that encourage broad participation in standardization activities and promote widespread implementation of the developed standards.
- Remove barriers to participation in standardization activities both for U.S. and foreign companies, given that such barriers might force some companies to

cede ground to their competitors and/or encourage fragmentation among standards, including the creation of regional standards.

- Provide adequate protection of IPRs, which are essential for companies to compete for standards and product leadership. Investment in the critical R&D to develop the technologies that are the foundation of many standards is usually funded with the expectation of such adequate protection.
- Cooperate with like-minded countries to adopt policies that are necessary to preserve the success of global standards developed through an open, consensus-based, and industry-led process.
- Avoid basing policies on simplistic statistics, such as the number of attendees, chair positions, or patents, and instead examine a variety of factors such as an SDO's governance processes and the quality of technologies to correctly understand and identify leaders in the standardization ecosystem.

To provide the necessary context for Qualcomm's suggestions and help inform NIST on the current standards development landscape, this submission addresses the following issues: (1) Qualcomm's role in global technology SDOs; (2) China's growing influence in technology standards; (3) the importance of global standards; and (4) recommended policies that the Federal Government can and should adopt.

## **II. Qualcomm's Role in Global Technology Standards Developing Organizations**

Qualcomm, a company founded in 1985 by former professors of digital communications and information theory, is the global industry leader in innovative R&D and productization of advanced wireless communications. The company has a long history of contributing its technologies to many well-established SDOs and developing products that implement these technologies. As noted above, its revolutionary technologies have been essential to the creation, development, and commercialization of the past four generations of wireless technology, as well as to Wi-Fi, Bluetooth, and many other industry standards.

For instance, Qualcomm has developed technologies that enable wireless communications by optimizing the use of the fundamental and scarce resource radio frequency spectrum for digital voice and data communications. Qualcomm has also led the development of wireless communications technology through its long history of successfully submitting technology proposals to many SDOs, including, for example, the 3rd Generation Partnership Project ("3GPP"), the standards body that drives most of the evolution of cellular technology. Significantly, Qualcomm successfully submitted its code division multiple access ("CDMA") technology to the Telecommunications Industry Association ("TIA") TR45 standards body. This served as the basis for one of the major 2G standards enabling digital voice calls and text messages. This standards process evolved in 3GPP2 for 3G development which, based upon Qualcomm's contributions, developed high-rate packet data for mobile systems, thus enabling a myriad of applications on mobile devices. Qualcomm's work became the basis for the two groups

of widely deployed 3G standards developed by 3GPP and 3GPP2, and their later generations. Subsequently, Qualcomm led the design and development of 4G cellular technology, based on new technology and algorithms, by relying upon orthogonal frequency division multiple access (“OFDMA”). The technologies, which were developed by Qualcomm for these standards, are foundational to the entire mobile ecosystem.

Today, Qualcomm leads the way in the design and development of 5G technologies and standards—the most ambitious project of the mobile industry so far. For example, Qualcomm led the acceleration of the non-standalone (“NSA”) mode in 5G new radio (“NR”) Release 15, and contributed key technologies to Release 15, Release 16 and Release 17, expanding 5G into new industries. In addition to cellular technologies, Qualcomm has been and continues to be at the forefront of driving a broad set of standards and ensuring their success in the global marketplace for other technologies, such as Wi-Fi, Bluetooth, and MPEG. Qualcomm’s product catalog includes processors, modems, RF systems, connectivity solutions, and optimized software—everything needed to build premium wireless products and applications. The technologies developed by Qualcomm wirelessly connect billions of small devices that have enabled enhanced mobile broadband and which has led to a proliferation of downstream industries, including smart phones and all their applications such as smart-phone-based navigation systems; a massive Internet of Things (“IoT”) connecting wearables, smart cities, and smart homes; and mission-critical services that are required for automotive, robotics, and healthcare industries to securely transmit critical information as fast and as reliably as possible.

Qualcomm’s leadership in wireless communications technology and standards, and support for the broader innovation ecosystem, is only possible through Qualcomm’s sustained commitment to R&D. Of Qualcomm’s approximately 42,000 employees, the majority are engineers, many of whom focus on core long-term R&D. For the past several years, Qualcomm has spent approximately \$60 billion in R&D and has annually reinvested over 20% of its yearly revenues in R&D. Qualcomm’s portfolio of inventions includes over 140,000 granted and pending patents across more than 100 countries and jurisdictions.

### **III. China’s Growing Influence in Technology Standards**

Technology standards play a strategically important role in today’s world. It is widely understood that “[w]hoever has control of industrial norms for telecommunications, electricity transmission and artificial intelligence is in a position to dominate.”<sup>4</sup> A number of companies, including Qualcomm, have long recognized the strategic importance of technology standards. However, few companies have the technical expertise and resources to develop the technology to be able to substantially contribute to technology-based standards. These companies are usually the leaders in their industry. China has now clearly recognized the competitive value of standards for establishing

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<sup>4</sup> Valentina Pop et al., *From Lightbulbs to 5G, China Battles West for Control of Vital Technology Standards*, WALL STREET J. (Feb. 8, 2021), <https://www.wsj.com/articles/from-lightbulbs-to-5g-china-battles-west-for-control-of-vital-technology-standards-11612722698>.

technological leadership and has taken important steps to foster its role in standardization activities.<sup>5</sup>

In 2015, President Xi Jinping observed that “standards are the commanding heights, the right to speak, and the right to control. Therefore, the one who obtains the standards gains the world.”<sup>6</sup> China has accordingly made participation in standards development a top priority for the country, and numerous statements by Chinese public officials make clear that China is aspiring to become a leading player in global standards development. For example, Foreign Ministry spokesperson Zhao Lijian famously said that China seeks “to provide a blueprint for formulating global standards.”<sup>7</sup> China has also shown a continuing attention to their patent holdings and their patent system, as well as a deep understanding of how important IPRs are for standards and technological leadership.<sup>8</sup>

To expand China’s involvement in standards development, China has embarked on an expansive and well-coordinated strategy. Most recently, in 2020, it announced its “China Standards 2035 Plan” to set global standards for emerging technologies such as 5G, IoT, AI, and clean energy by increasing the quantity of Chinese-owned international standards and leadership positions in well-established international SDOs.<sup>9</sup> This comprehensive strategy has proven to be successful—China has rapidly increased its participation, representation, and influence across many well-established SDOs. Indeed, the United States-China Economic and Security Review Commission highlighted in its 2021 Report to Congress that “Chinese companies and other entities are actively shaping standards in collecting, protecting, and governing data.”<sup>10</sup>

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<sup>5</sup> See Justus Baron & Olia Kanevskaia, *Global Competition for Leadership Positions in Standards Development Organizations* (March 31, 2021), at 1.

<sup>6</sup> RUSH DOSHI ET AL., BROOKINGS INST., *China as a “Cyber Great Power”: Beijing’s Two Voices in Telecommunications*, (Apr. 2021), at 16, [https://www.brookings.edu/wp-content/uploads/2021/04/FP\\_20210405\\_china\\_cyber\\_power.pdf](https://www.brookings.edu/wp-content/uploads/2021/04/FP_20210405_china_cyber_power.pdf).

<sup>7</sup> *Id.* at 15.

<sup>8</sup> See Toby Mak, *China Releases 14th Five-Year Plan Notice on Intellectual Property - China to More than Double Number of Foreign Patents by 2025*, THE NAT’L L. REV. (Oct. 29, 2021), <https://www.natlawreview.com/article/china-releases-14th-five-year-plan-notice-intellectual-property-china-to-more-double> (citing China’s five-year plan on IPRs available at [http://www.gov.cn/zhengce/zhengceku/2021-10/28/content\\_5647274.htm](http://www.gov.cn/zhengce/zhengceku/2021-10/28/content_5647274.htm)).

<sup>9</sup> See INFO. TECH. & INNOVATION FOUND., *Mapping the International 5G Standards Landscape and How It Impacts U.S. Strategy & Policy* (November 8, 2021), <https://itif.org/publications/2021/11/08/mapping-international-5g-standards-landscape-and-how-it-impacts-us-strategy>.

<sup>10</sup> U.S.-CHINA ECON. AND SEC. REV. COMM’N, *2021 Report to Congress* (Nov. 17, 2021), at 8, [https://www.uscc.gov/sites/default/files/2021-11/2021\\_Annual\\_Report\\_to\\_Congress.pdf](https://www.uscc.gov/sites/default/files/2021-11/2021_Annual_Report_to_Congress.pdf).

## A. China's Increased Participation Across SDOs

Historically, the large majority of attendees in the major SDOs came from the United States, Japan, and Europe.<sup>11</sup> This pattern has changed in the last decades, in particular due to the rising participation from China.<sup>12</sup>

In the last two decades, China has significantly increased the number of its attendees in several key SDOs. Consider for example, the 3GPP, which is best known for its work in the development and maintenance of 3G, 4G, and 5G. More and more Chinese companies have joined 3GPP so that approximately 20% of the 3GPP members are now Chinese companies. (Meanwhile, North American companies compose about 25% of the memberships, and European companies compose about 30%.) The number of attendees from Chinese companies has also increased substantially. It should be noted that since the beginning of COVID-19, the number of participants in 3GPP has increased dramatically, as a result of the ease of calling into versus traveling to meetings. However, the number of Chinese participants has increased more dramatically than participants from other countries. It should also be noted that China has the largest 3GPP based cellular network in the world for both 4G and 5G, with over 1 million 5G cells deployed.

There has been also an increase in Chinese representation in leadership positions at 3GPP. During the same period, the number of chair positions held by Chinese companies has increased by 46%. Researchers have also observed that “more than any other organization,” Huawei is recruiting individuals with relevant SDO experience,<sup>13</sup> which “increases the company’s chances of holding key SDO leadership positions.”<sup>14</sup>

China has similarly increased its representation in the Institute of Electrical and Electronics Engineers (“IEEE”) standards groups. Huawei had the second largest number of attendees (second only to Qualcomm) in IEEE 802.11, responsible for developing and maintaining the global standards for Wi-Fi, which provides local broadband access for a wide range of devices.

China has also increased its involvement in video compression standards, such as MPEG, which are of great strategic relevance now that video represents about 80% of all Internet traffic.<sup>15</sup> Chinese companies have substantially enhanced their participation in the relevant video codec SDOs, emerging as the world’s major participants, while there has been a decreased participation from North America.

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<sup>11</sup> See *Global Competition for Leadership Positions in Standards Development Organizations*, *supra* note 5 at 1, 36.

<sup>12</sup> See *id.* at 1.

<sup>13</sup> *Id.* at 3.

<sup>14</sup> *Id.* at 33.

<sup>15</sup> Greg Jarboe, *By 2021, 80% of the World’s Internet Traffic Will Be Video [Cisco Study]* (Nov. 14, 2017), <https://tubularlabs.com/blog/video-2021/>.



## B. Leadership: Maintaining Focus on Quality Rather Quantity

The increased participation of Chinese companies in various SDOs has led to a frenzy to understand who the leading companies are, particularly in the context of foundational standards such as 5G. Commentators have raised concerns with China's increased influence and, at times, the press has proclaimed Chinese companies as global technology leaders.<sup>16</sup> Yet, several recent reports have come to the unanimous conclusion that, despite the rapidly rising influence of Chinese firms in well-established SDOs, western countries and long-time R&D intensive firms continue to maintain their leadership.<sup>17</sup> In other words, although China is making the effort to catch up, the United States and European countries continue to lead in key technological sectors.

It is worth noting that when discussing technological leadership, some commentators routinely make a profound error by relying on simple counts of the total number of patents.<sup>18</sup> The economic literature has long acknowledged that counting patents as a measure of innovative output is meaningless.<sup>19</sup> As the U.S. State Department has correctly emphasized, when it comes to patented technologies, *quantity* does not equal *quality*.<sup>20</sup> Indeed, even China has now recognized the importance of focusing on the quality rather than on the quantity of technologies contributed to industry standards.<sup>21</sup>

The same holds also for other quantitative data. Simply looking at the number of attendees or chair positions is insufficient to understand the standardization landscape. It is necessary to examine a variety of factors, such as governance processes, quality of

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<sup>16</sup> See, e.g., Hideaki Ryugen & Hiroyuki Akiyama, NIKKEI ASIA, *China leads the way on global standards for 5G and beyond* (Jul. 25, 2020), <https://asia.nikkei.com/Politics/International-relations/China-leads-the-way-on-global-standards-for-5G-and-beyond>.

<sup>17</sup> See, e.g., *Global Competition for Leadership Positions in Standards Development Organizations*, *supra* note 5 at 3; *Mapping the International 5G Standards Landscape and How It Impacts U.S. Strategy & Policy*, *supra* note 9.

<sup>18</sup> See, e.g., Dan Strumpf, *Where China Dominates in 5G Technology*, WALL STREET J. (Feb. 26, 2020) (citing the number of patents as reported by the data-analytics firm IPLYTICS), <https://www.wsj.com/articles/where-china-dominates-in-5g-technology-11551236701>; see also IPLYTICS, *Who is Leading the 5G Patent Race? A patent Landscape Analysis on Declared 5G Patents and 5G Standards Contributions* (Nov. 2019), <https://www.iplytics.com/wp-content/uploads/2019/01/Who-Leads-the-5G-Patent-Race-2019.pdf>; IPLYTICS & IAM, *Who is Leading the 5G Patent Race?* (July 2019), <https://www.iam-media.com/who-leading-5g-patent-race-july-2019-update-part-two>.

<sup>19</sup> See, e.g., Jean Lanjouw, Ariel Pakes & Jonathan Putnam, *How to Count Patents and Value Intellectual Property: The Uses of Patent Renewal and Application Data*, 46 J. INDUS. ECON. 405, 413 (1998) (“[T]here is little doubt that the variability in patent value significantly reduces the efficacy of patent counts as a measure of invention.”); see also HUDSON INST., *5G Technological Leadership* (Dec. 2020) at 2, [https://s3.amazonaws.com/media.hudson.org/Hudson\\_5G%20Technological%20Leadership.pdf](https://s3.amazonaws.com/media.hudson.org/Hudson_5G%20Technological%20Leadership.pdf).

<sup>20</sup> U.S. DEP’T OF STATE, *5G SECURITY – HUAWEI: MYTH V. FACT* (2020), <https://www.state.gov/wp-content/uploads/2020/11/5G-MythsFact-508.pdf>; see also *5G Technological Leadership*, *supra* note 20 at 2 (emphasizing that “merely counting the number of patents in a company’s portfolio cannot provide reliable information about the company’s innovative contribution. What matters is the quality, not the quantity of patents.”).

<sup>21</sup> XINHUA NEWS AGENCY, *National Standardization Development Outline* (Oct. 2021), [http://www.news.cn/politics/zywj/2021-10/10/c\\_1127943309.htm](http://www.news.cn/politics/zywj/2021-10/10/c_1127943309.htm) (translation available at <https://cset.georgetown.edu/publication/the-chinese-communist-party-central-committee-and-the-state-council-publish-the-national-standardization-development-outline/>).



technologies, importance of working groups, and other variables, to properly assess who the technological leaders are. Also in this context, it is well understood that the United States, and Qualcomm specifically, maintains global technological leadership.<sup>22</sup>

### **C. Examples of Emerging Technology Standards with Increased Participation from China**

Although China and its companies cannot yet claim a leadership position, it is clear that they are rapidly expanding their global influence in the development of foundational standards for emerging technologies. China is investing heavily in R&D and standardization activities, as well as in the development of its own standards.<sup>23</sup> The scope and depth of China's involvement are evident just by looking at a few examples.

In the automotive industry, for example, China is investing significant resources in all aspects of automotive standardization. China is the leading country in the deployment of the cellular vehicle-to-everything ("C-V2X") standard,<sup>24</sup> which is the cellular communication technology based on the cellular systems. C-V2X is the key that will unlock the promise of intelligent transportation systems. Chinese ministries have issued several C-V2X development promotion policies encouraging the deployment of the standard.<sup>25</sup> After issuing the "Smart Vehicles Innovation Development Strategy" in February 2020, China began production of smart vehicles equipped with C-V2X technology.<sup>26</sup> Nearly 90 cities have already partnered with local wireless network operators and deployed tens of thousands of roadside units to demonstrate intelligent highways and urban intelligent networked roads.<sup>27</sup> C-V2X is expected to be included in approximately half of new cars in China by 2025, when China also plans to begin testing 5G New Radio ("NR")-V2X technology as part of its long-term plan for a standard smart vehicle system. Meanwhile other countries, including the United States, are still discussing the implementation of the C-V2X standard.

Beyond the connectivity technology, a number of initiatives in Chinese standardization groups cover a wide variety of automotive technologies, including:

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<sup>22</sup> See, e.g., Pier Luigi Parcu et al., *SSOs v. Silos and the "Quality of Innovation"* (Mar. 24, 2020), <https://www.competitionpolicyinternational.com/ssos-v-silos-and-the-quality-of-innovation/>.

<sup>23</sup> Central Comm. of CPC & the State Council, *National Policy for Standard Development* (Oct. 2021), [https://www.ccps.gov.cn/xtt/202110/t20211011\\_150793.shtml](https://www.ccps.gov.cn/xtt/202110/t20211011_150793.shtml).

<sup>24</sup> OEMs' announcement in SOPing C-V2X, including FAW-Hongqi (E-HS9), SGM (GL8), Audi (A7L), GAC (AION V), Ford (Explorer, Edge P), SAIC (MARVEL R), HH (HiPi X), Nio (ET7), Zhiji (L7).

<sup>25</sup> Yu Shengbo, CHINA SOC'Y OF AUTOMOTIVE ENGINEERS, *Introduction of China C-V2X Industry and Standards*, [https://www.itu.int/en/ITU-T/extcoop/cits/Documents/Meeting-20200909-e-meeting/17R1\\_CSAE\\_Status-report.pdf](https://www.itu.int/en/ITU-T/extcoop/cits/Documents/Meeting-20200909-e-meeting/17R1_CSAE_Status-report.pdf).

<sup>26</sup> C-V2X商用路标发布！13家车企抱团支持 (Apr. 18, 2019), <https://zhuanlan.zhihu.com/p/62943604>.

<sup>27</sup> 重磅干货|城市级智能网联示范区情况全扫描 (June 2020), <https://mp.weixin.qq.com/s/szb0mKPSQANObiwdssYz3g>.

- Technology components of AD/ADAS, including the millimeter wave (“mmWave”) radar interference avoidance solution.<sup>28</sup>
- In-vehicle connectivity: The AutoWi standard was created within the SparkLink Alliance which only consists of Chinese entities and then presented to the China Communications Standards Association (“CCSA”) and to the National Technical Committee of Auto Standardization (“NTCAS”) as a technology to replace Wi-Fi and Bluetooth for in-vehicle connectivity.<sup>29</sup>
- In-vehicle communication: China is leading a discussion for Wired Media Transmission to replace CAN/Vehicular Ethernet which enables communication within the car components.<sup>30</sup>
- Vehicle operating system (“OS”): Chinese companies are driving the development of OS to control the whole electrical/electronic (“EE”) architecture, including cockpit, control system, over-the-air (“OTA”) and cloud components.<sup>31</sup>

China is also focusing on local standards in the context of IoT. For example:

- SparkLink is encouraging the adoption of AutoWi in smart homes which could potentially replace Wi-Fi, Bluetooth and Zigbee, well recognized standards used worldwide.
- China Academy of Information and Communications Technology (“CAICT”) has established Open Link Alliance (“OLA”) to support the unification of smart home protocols, and OLA reportedly plans to expand to B2B applications and verticals in the future.<sup>32</sup>
- A CCSA Smart Home sub-working group was recently upgraded to a full working group dedicated to smart home standardization<sup>33</sup> and it is developing a Chinese

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<sup>28</sup> See NAT’L TECHNICAL COMM. OF AUTO STANDARDIZATION (2021), <http://www.catarc.org.cn/standardplan.html> (discussing the automotive radar performance requirements and test methods); TELEMATICS INDUSTRY APPLICATION ALLIANCE (Nov. 16, 2021), <https://www.tiaa.org.cn/index/published/detail.html?id=77> (discussing automotive millimeter wave radar interference sensing and avoidance specification).

<sup>29</sup> CHINA COMMUNICATIONS STANDARDS ASSOCIATION (Aug. 30, 2021), <http://www.ccsa.org.cn/new> (discussing technical requirements of automotive wireless short-range communication system); NATIONAL TECHNICAL COMM. OF AUTO STANDARDIZATION (2021) <http://www.catarc.org.cn/standardplan.html> (discussing the technical requirements and test methods of Automotive specific wireless short-range transmission system); SPARKLINK ALLIANCE, <http://sparklink.org.cn/en/> (accessed on Dec. 1, 2021).

<sup>30</sup> NATIONAL TECHNICAL COMM. OF AUTO STANDARDIZATION (2021), <http://www.catarc.org.cn/standardplan.html> (discussing the technical requirements and test methods for vehicle mounted wired high-speed media transmission systems).

<sup>31</sup> NATIONAL TECHNICAL COMM. OF AUTO STANDARDIZATION, OS Study Reports (May 2020) <http://www.catarc.org.cn/upload/202109/22/202109221130345380.pdf> (including Vehicle-Control OS Architecture Study, General Technology Study, On-Board OS Architecture Study, and On-Board OS General Technology Study); China Industry Innovation Alliance for the Intelligent and Connected Vehicles (Oct. 2021) (discussing the ICV Vehicle-control OS FuSa Technical Requirement), <http://www.caicv.org.cn/index.php/newsInfo?id=442>.

<sup>32</sup> OPEN LINK ALLIANCE, <https://www.ola-iot.com/rule.html>.

<sup>33</sup> CHINA COMM. STANDARDS ASSOCIATION, 关于在TC11下成立智能家居工作组（WG4）、在TC10下成立智慧杆塔任务组（TF1）的通知 (2020), <http://www.ccsa.org.cn/detail>.

version of the “CHIP/OCF” protocols for a smart home application layer. Chinese companies are encouraged to align the protocol for smart homes and enable interworking.

#### **IV. Importance of Global Standards**

The importance of global standards cannot be overstated. When a standard is adopted globally, companies have access to large markets worldwide, without the need to adjust their products or services to national requirements. This enables market participants to achieve enormous economies of scale, which is the crucial factor in creating incentives to invest in R&D and contribute to the standardization process in the first place. Global standards also encourage innovation by motivating participation, collaboration, and competition from a diverse set of companies to create the best possible technical solution, thus leading to higher quality and less expensive products for all consumers.

For example, cellular standards that Qualcomm helped develop have delivered major advances in the telecommunications sector, greatly benefiting consumers and the economy. Specifically, the global average cost of mobile subscriptions relative to maximum data speed has decreased by more than 99% between 2005 and 2020. As of 2017, the number of mobile connections surpassed the number of people on the planet. Smartphones have also become much more affordable: their average selling price has decreased by almost 20% over the last decade although their capabilities (in terms of connection speed, CPU speed, and memory) have increased significantly. This robust growth in bandwidth, combined with falling costs, has spurred extensive follow-on innovations, resulting in the tremendous variety of new entrants.

For global standards to succeed, it is critical that they are developed through an open, consensus-based, and industry-driven standardization process in which companies and their engineers can cooperate freely and fairly to select optimal technologies based on technical merits. It is particularly important that participation is open to all parties who are directly and materially interested in any given standards activity. The Federal Government recognizes the importance of the openness of the standardization process. Yet, its policies have not always accounted for these principles and have instead sometimes posed unintended barriers to SDO participation.

For example, in May 2019, the U.S. Department of Commerce added Huawei and sixty-eight of its non-U.S. affiliates to the Department’s Entity List, prohibiting the export, reexport or transfer to Huawei of items subject to export control regulations.<sup>34</sup> The Department subsequently issued a broad authorization, which was extended several times, for companies to engage with Huawei “as necessary for the development of 5G standards as part of a duly recognized international standards body.”<sup>35</sup> In August 2019, the Department added forty-six additional non-U.S. Huawei affiliates to the Entity List.<sup>36</sup> Since then, many Chinese companies have been added to the Entity List, some of which participate in international standards. In June 2020, the Department promulgated a

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<sup>34</sup> Dep’t of Commerce, Bur. Indus. & Sec., 84 Fed. Reg. 22961, 22961–22968 (May 21, 2019).

<sup>35</sup> Dep’t of Commerce, Bur. Indus. & Sec., 84 Fed. Reg. 23469, 23468–23471 (May 22, 2019).

<sup>36</sup> Dep’t of Commerce, Bur. Indus. & Sec., 84 Fed. Reg. 43493, 43493–43501 (Aug. 21, 2019).

narrow interim final rule that “authorize[d] certain releases of technology,” such as low-level technology designated as EAR99, to Huawei for the purpose of contributing to the revision or development of a standard.<sup>37</sup> However, the interim rule does not apply to all Entity List persons, some of whom participate in standards-related activities. Further, even as to Huawei, the rule is narrowly worded and is ambiguous whether it covers all standards-related activities. These developments constrain U.S. companies from participating in key standardization activities even when such cooperation is essential. They undermine the ability of U.S. companies to maintain their role in global standards development and might even force them to cede their leadership position to their competitors. Furthermore, much of increase Chinese domestic standards activities has occurred after the Chinese companies, beginning with Huawei, were placed on the Entity List.

Similarly, the process for obtaining visas has limited open participation in SDO activities. Robust standards development requires the cooperation of industry experts from all over the world. Ensuring that skilled engineers, regardless of their country of origin, can obtain a visa in a timely manner to join the SDOs’ meetings is essential. Unfortunately, the U.S. process for these technology professionals is outdated and does not reflect today’s fast pace of technology evolution. As a result, delegates from foreign countries, particularly from China, often face difficulties in attending SDOs’ meetings that take place in the United States because the processing time to obtain a visa is too long. This is detrimental for the success of global standards and for U.S. companies in particular.

In the short term, such logistical issue undermines the ability of the United States to serve as a meeting location. In the longer term, the inability for companies to participate in global standardization activities encourages countries to develop their own standards, which in turns leads to fragmentation and undermines the success of global standards.

## **V. The Support of the Federal Government Is Critical to Preserve Global Standards**

The Federal Government should preserve global standards that are developed through an open, consensus-based, and industry-led standardization process. To that end, we recommend that the Federal Government pursue the following policies: (1) promote the SDOs’ adherence to a **rules-based-ecosystem**, based on principles of fair governance and due process; (2) **remove barriers** to participation in standardization activities; (3) **protect a strong IPR regime** to ensure the incentives to invest in long-term R&D and standards remain by remunerating innovators; and (4) pursue **multilateral cooperation** between the United States and other countries in developing global standards in a rules-based ecosystem.

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<sup>37</sup> Dep’t of Commerce, Bur. Indus. & Sec., 85 Fed. Reg. 36719, 36719–36748 (June 18, 2020).

### **A. The Federal Government Should Promote Fair Governance and Due Process in SDOs**

U.S. leadership in global standards has been possible due to these institutions adhering to a rules-based ecosystem governed by principles of openness, transparency, consensus, and majority voting. Private firms have an incentive to participate in standardization activities and adhere to the developed standards when the standardization process is open and fair, and the standard is important for their current or potential future business. Much of the time, SDOs are successful in ensuring that processes are fair and open. However, there are cases in which governments or other entities distort standardization activities for pursuing their specific interest, interfering with the process of competition on a level-playing field based on technological merit. As explained above, accreditation groups such as the American National Standards Institute have no real ability to influence SDOs outside of the United States other than by setting a good example. Therefore, it is important that the Federal Government take the necessary steps to promote respect for fair governance and due process in standardization activities.

Among other things, the Federal Government should take actions when it observes that a given SDO, or one of its participants, engages in a behavior that is inconsistent with the principles of fair governance and due process. Congress should also enact the U.S. Innovation and Competition Act (“USICA”), passed by the Senate, which recognizes that “the principles of openness, transparency, due process, and consensus in the development of international standards are critical,” and the NIST for the Future Act, passed by the House Science Committee. These bills appropriately require the U.S. Government to support private sector-led development and use of global standards. As part of those efforts, the Federal Government should adopt a unified federal policy to promote the use of standards developed by SDOs that adhere to core principles of due process.

### **B. The Federal Government Should Remove Barriers to Participation in Standardization Activities**

The Federal Government should remove unnecessary barriers to the participation of companies and individuals in SDO activities to ensure that the standardization process remains open. SDO membership affords an organization the opportunity to participate in meetings, vote for a technical solution’s inclusion in standards, and apply for leadership positions in an SDO’s various working groups. If companies (or their representatives) cannot participate in standardization activities, they cannot contribute to the development of the standard. This might encourage them to abandon the SDO altogether and focus on developing their own standards, which in turn leads to fragmentation.

To avoid that outcome, the Federal Government should remove unnecessary participation restrictions in standardization activities. For example, the U.S. Department of Commerce should ensure that export control-related restrictions do not undermine the

ability of U.S. companies to participate in key SDOs. The Federal Government should also ensure that foreign experts, regardless of their country of origin, are able to travel to the United States to participate in the relevant standardization activities.

### **C. The Federal Government Should Protect a Strong IPR Regime**

To promote the development and adoption of global standards that rely on the most advanced technologies and respond to market needs, the Federal Government should encourage private companies to participate in standardization activities. IPRs play a fundamental role in maintaining a firm's incentives to invest in R&D and pursue leadership in standards and product development.

With over 20% of revenue invested in R&D since 2006—a number already exceeding more than \$60 billion—Qualcomm understands the importance of strong IPRs.<sup>38</sup> Companies cannot continue making costly and risky investments in R&D unless they can monetize their successful inventions. Strong IPRs, including patents, play a fundamental role in ensuring that companies are fairly compensated for contributing their inventions to global standards. Absent strong IPRs, only companies that receive significant public funding, or those that can monetize their investment through mechanisms other than licensing, will be able to compete in innovative markets.

Although NIST has long recognized the importance of IPRs, recent policy developments suggest that the Federal Government is moving backwards on patent issues, particularly in the context of standard-essential patents. For example, the recent executive order on “Promoting Competition in the US Economy” emphasizes the importance of U.S. market leadership but suggests a revision of the Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments which was jointly published by NIST, the U.S. Patent & Trademark Office, and the U.S. Department of Justice, Antitrust Division in 2019. That statement was meant to uphold the availability of patent remedies, such as injunctions, for standards-essential patents, as they are available to all patents. In other words, the joint statement's goal was to treat all patents the same, and not disadvantage standards-essential IPRs.

Weakening IPRs in general and standards-essential IPRs in particular is extremely damaging for the United States and the ability of its companies to lead in emerging technologies. That is particularly evident if one considers that China has recognized the importance of IPRs and is taking steps to strengthen its domestic IPRs system.

### **D. The Federal Government Should Pursue Multilateral Cooperation Between the United States and Other Countries to Preserve Global Standards**

Finally, the United States alone cannot protect global standards developed through an open, consensus-based, and industry-led standardization process. Instead, this protection must occur at the global level through multilateral cooperation where each

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<sup>38</sup> See QUALCOMM, *Research* (accessed on Nov. 24, 2021), <https://www.qualcomm.com/research>.

country recognizes the importance of global standards. To this end, the Federal Government should actively pursue multilateral cooperation and work with other countries to ensure a functioning and open standardization system by seeking mutual consent on issues such as due process, reasonable visa systems, strong IPRs, and export controls. In addition, working towards a common regulatory environment, such as on privacy and security, simplifies standardization and product development, as well as provides greater consistency and benefits for consumers.