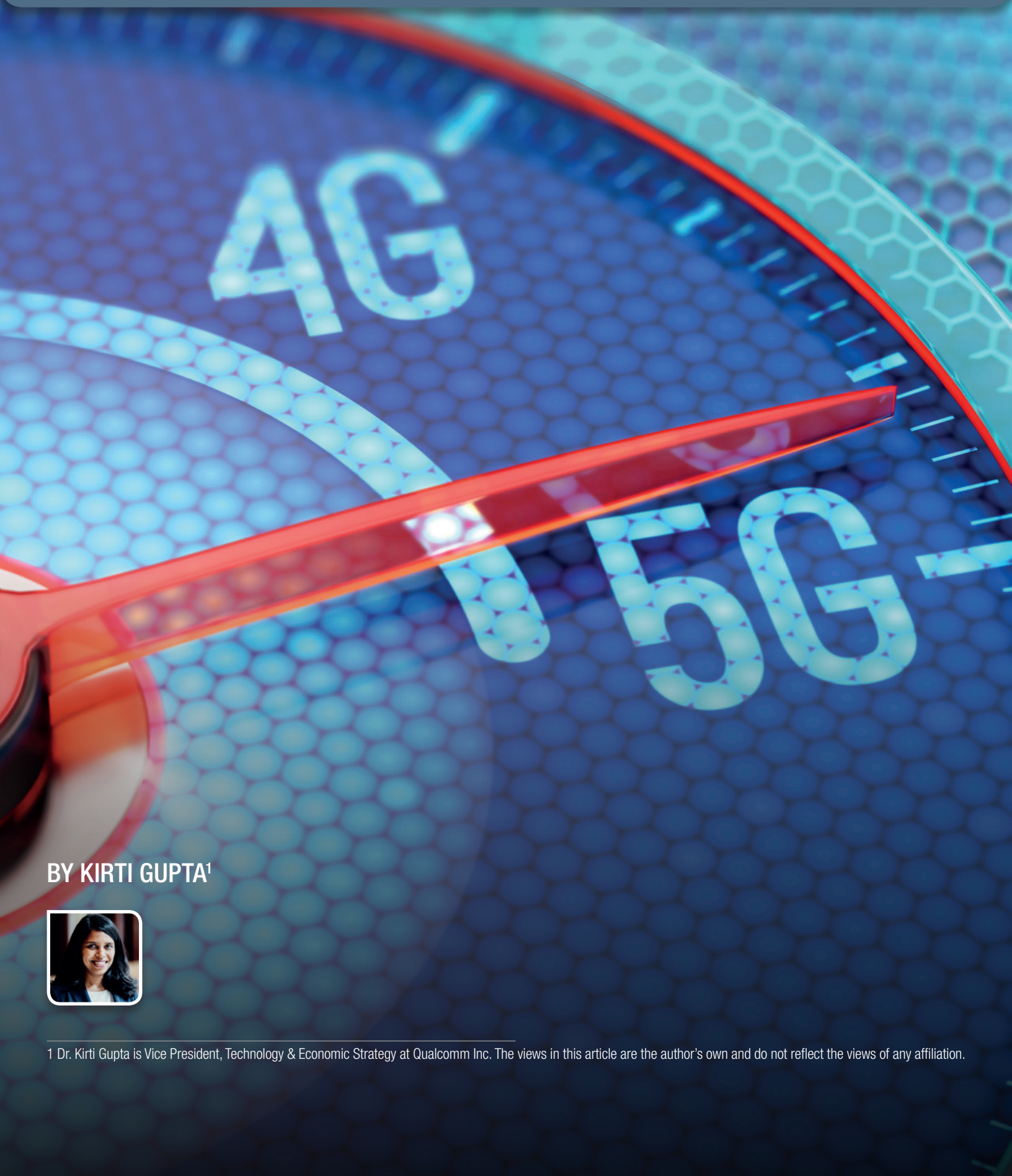
5G AND ITS ANTICIPATED INTELLECTUAL PROPERTY AND ANTITRUST POLICY ISSUES



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I. INTRODUCTION

5G is the game changing generation of mobile connectivity designed to connect everything, everywhere. 5G will eventually connect every car we drive, every home we live in, every appliance we use, every computer or smartphone we own, and every technology we possess, making connectivity accessible across all cases and industries.

Like previous generations of wireless technologies, 5G strives to solve the complex engineering problems necessary for optimizing data and voice transmission over a fundamentally scarce and expensive physical resource: radio spectrum. The science and engineering that makes wireless communications possible is captured by the creation of 5G technology standards. Technology standards are technical specifications that define and design how 5G works. Technology standards are best understood as the "blueprint" of a building, creating a technical foundation that supports all other products and services that implement 5G worldwide.

Each generation of wireless standards takes about a decade for the standards bodies to develop through a series of "releases," each adding new technical features. The 5G standards process has just begun, and only the first release has been developed so far. It is therefore important for the industry and policy makers to support policies that encourage these 5G and other critical standards attract the best inventors the best inventions, to enable the development of the most useful technologies with the best solutions.

As the success of wireless technologies has grown from 1G through 5G over the last four decades, the growing impact on business has led to an increasing policy focus on standards. The sale of mobile handsets based on 3G and 4G technology standards alone exceeded the sales of all other consumer electronics put together in 2016, and the only industries to surpass mobile phones in revenue were oil, gas, pharmaceuticals, and automobiles.[2] It is therefore not surprising that there has been an enormous focus on standards development organizations ("SDOs"), SDO intellectual property rights ("IPR") policies, and Standards Essential Patents ("SEPs") from the IP and antitrust communities, especially as they relate to wireless technology standards.

This article discusses some of the upcoming policy debates that are anticipated to continue or grow as the 5G ecosystem develops. It also examines a balanced policy framework for incentivizing investment in research and development ("R&D") for foundational technologies such as 5G. Briefly, this article explores why promoting strong IP protections that incentivize costly research is especially important to facilitate the 5G revolution. In order to enforce strong IP protections, the promotion of fair, evidence-based antitrust enforcement worldwide is critical, as is imposing safeguards against the use of antitrust regulation as a tool for implement-

2 For total company revenue for Forbes ranking for top integrated oil companies. IDC CY16 global retail revenue, 17Q2 IDC Worldwide Mobile Phone Tracker. CE Devices: Global Market Forecast per Strategy Analytics, July 2016.

ing industrial policy. Finally, the SDOs themselves, where the standards are being developed, need to safeguard open, transparent, and consensus-based processes to avoid being politicized or dominated by one-sided interest groups.

This article starts by briefly introducing what 5G means and enables in Section II. Section III describes the divide between innovators and implementers of foundational technology standards that has led to much debate in this area, a divide which will continue to grow with 5G. Section IV explores some efforts to redefine fair, reasonable, and non-discriminatory ("FRAND") licensing terms and suggests a more balanced approach, and Section V discusses the importance of balanced SDO IPR policies. Section V concludes.

II. WHAT IS 5G?

5G is a game-changing generation of wireless technology aimed at creating a universal fabric of connectivity. Diverse industries and a variety of products will utilize 5G to communicate with each other.

According to a 2018 report by IHS Markit, 5G will grow global real gross domestic product ("GDP") by an amount equivalent to India's current GDP. By 2035, 5G will be responsible for $1.3 to $1.9 trillion of economic output — and more than 3.6 million jobs — in the United States alone. The worldwide 5G value chain will account for an average of $200 billion in annual investment, supporting as many as 22 million jobs.[3]

In order to connect everything, everywhere, 5G was officially developed with the following key requirements:

1. **Ultra-fast data speeds** that enable unlimited storage on the cloud, access to computing on demand, audio and virtual reality, bringing AI to our daily lives, wherever we are.

2. **Very low latency** (delays no longer than one thousandth of a second) and **ultra-high reliability** that could make possible such things as remote surgery, *safe* self-driving cars that communicate with other vehicles or infrastructure, smart grid sensors in electric and water grids, and more.

3. **Massive Internet of Things ("IoT") and dense networks** that enable smart cities, homes, and wearable devices such as medical sensors that provide 24/7 monitoring wherever you go.

Like previous generations of wireless standards, 5G cellular technologies strive to solve the complex engineering problems related to optimally transmitting data, and the complex scientific issues related to spectrum capacity, speed, security, and reliability. The result of this work, by thousands of teams of engineers from various companies across the world, is a **technology standard**, like the foundation of a building, that forms the base layer upon which other all other parts of the ecosystem are built. For 5G, standards provide the foundation upon which all other wireless products, including the network infrastructure, wireless devices (such as mobile phones and IoT devices), components, and the business models (including new business models like Uber and other apps) that employ those features are built.

The standards developed by the Third Generation Partnership Project ("3GPP") – a group of seven international SDOs – will be accredited by the International Telecommunications Union as the definitive 5G standards. The development of technology standards in 3GPP takes place across various "releases." Each release is made up of a set of core new features or requirements that the industry would like included in the next generation of communications technologies. The first 5G standards release, 3GPP "Release 15," was finalized in March 2018. Several other releases can be expected as 5G develops further over the next five to seven years.

This foundational layer — or **5G technology standards** — is where the real race for 5G is happening.

3 Karen Campbell, et al., *The 5G economy: How 5G technology will contribute to the global economy*, IHS Economics & IHS Technology (January 2017), available at https://cdn.ihs.com/www/pdf/IHS-Technology-5G-Economic-Impact-Study.pdf.

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III. A POLARIZED WORLD: FIGHT OF THE BUSINESS MODELS

The development of mobile technology standards is R&D intensive, requiring early and risky investment in solving complex engineering problems.[4] As with other industries of this nature, only a handful of companies serve as the "R&D arm" of the wireless industry. While hundreds of companies participate in the development of standards, only 10 companies contribute the majority of the technology to these standards. Others in the industry focus on implementing these foundational technologies and building products enabled by them.[5]

As a variety of different 5G use cases develop, entirely new types of vertical markets based on 5G technologies will emerge. The companies that participated in the generation of 3G and 4G standards belonged to the "traditional mobile value chain," including R&D technology companies, component manufacturers, mobile device manufacturers, communications infrastructure manufacturers, and network operators. In the "5G Economy" study, IHS-Markit polls various industries, and ultimately analyzes the impact over 17 different industries that are most likely to use 5G technologies, to estimate the direct and indirect impact of the 5G economy.[6] Such new industry verticals have already started attending the 3GPP standards meetings. For example, participation by the Radio Access Network ("RAN") working groups grew from 148 unique companies attending these standards in 2010 to 262 unique companies in 2017, including never before seen participation from automotive manufacturers, sensor and grid manufacturers, and other industries seeking to use 5G in novel ways.

At the same time, the number of innovators, or companies actively contributing their technologies to wireless standards has fallen significantly. Some once-major contributors, such as Motorola, no longer exist, and the leadership position of some others has significantly weakened. Thus, the gap between the number of innovators and implementers in the standards bodies is larger than ever before.

Contributing technologies to standards requires significant investment in R&D to be made years in advance, as the design of every "G" begins a decade prior to implementation and commercialization (if at all) of that technology.[7] This creates a difficult problem. Unlike other technology fields, technologies incorporated into wireless standards become publicly available and easily accessible. Any return on investment can be recouped via licensing of those technologies only *after* the technologies are made accessible, then implemented and commercialized in tangible products. This process can take years. At the same time, once technologies are incorporated into the standard, implementers need to license the patented technologies. This difference in incentives has led to an innovator-implementer divide, which has polarized the wireless communications industry. This growing divide is likely to further polarize policy discussions around 5G standards as well.

Indeed, over the past decade, some parts of the U.S. government policy have exacerbated the innovator-implementer divide by departing from the traditional view of patents as constitutionally protected property rights. Instead, the Federal Trade Commission adopted the view that government should use antitrust enforcement powers to regulate the licensing of SEPs, in part due to fear of "hold-up" by innovators (or patent owners) by charging higher royalty rates once implementers begin to use the standardized technology. More recently, however, the government has moved toward acknowledging the lack of empirical evidence for hold-up, and the symmetrical risk of "hold-out" by implementers once the technology is successful, by reducing or refusing to pay royalties after the sunk cost investment has been made by the innovators.

4 The mobile industry is one of the most R&D intensive industries world-wide, second only to biotechnology. Thus, all firms aren't capable of investing in long-term, risky, large upfront R&D costs. See, Bezerra, J., Bock, W., Candelon, F., Chai, S., Choi, E., Corwin, J., DiGrande, S., Gulshan, R., Michael, D. & Varas, A. (2015), *The Mobile Revolution: How Mobile Technologies Drive a Trillion-Dollar Impact*, available at https://www.bcg.com/en-us/publications/2015/telecommunications-technology-industries-the-mobile-revolution.aspx.

5 See, Gupta, K. November 2017, *How SSOs Work: Unpacking the Mobile Industry's 3GPP Standards,* available at https://ssrn.com/abstract=3063360 or http://dx.doi.org/10.2139/ssrn.3063360.

6 IHS, *supra* note 3.

7 Some technology standards fail and never see light of day after millions of dollars of investment in R&D. For example, 4G LTE standards are now well known, but other 4G competitors such as WiMAX and UMB that did not succeed in gaining widespread adoption had been created over several years of R&D.

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As the U.S. Department of Justice ("DOJ") has stated:

> It is important to recognize that innovators make an investment before they know whether that investment will ever pay off. If the implementers hold out, the innovator has no recourse, even if the innovation is successful. In contrast, the implementer has some buffer against the risk of hold-up because at least some of its investments occur after royalty rates for new technology have been determined. Because this asymmetry exists, under-investment by the innovator should be of greater concern than under-investment by the implementer.[8]

Policy makers must balance the incentives of inventors and implementers, with measures to sustain incentives to invest in long-term and risky innovation, which ultimately drives economic growth.

IV. REDEFINING FRAND COMMITMENTS

For some time now, scholars, policymakers, and advocates have argued over whether the term Fair Reasonable and Non-Discriminatory ("FRAND"), which describes the patent licensing terms that SDOs typically impose on their members who own SEPs, is defined sufficiently clearly. FRAND typically refers to a commitment by the holder of an SEP to offer a license to implementers of standards-compliant products on "reasonable" terms and conditions, and to make the license available to different parties on a "non-discriminatory" basis. SDOs have refrained from creating exact definitions for these terms and guidelines, instead allowing the parties to a particular negotiation to define the terms of the license.

The flexibility in the definition of a FRAND commitment is viewed by the SDOs and several scholars, policy makers, and operating firms as a practical solution, allowing the involved parties to negotiate terms bilaterally and effectively. FRAND obligations, therefore, can be viewed as an incomplete contract, enforceable (or disputed) under modern contract law, like many other contracts that do not specify price, quantity, or product (for example, franchise contracts).[9]

However, some others portray the contractual flexibility of FRAND commitments as a weakness of the system, causing concern that patent licensing negotiations may lead to violations of competition law. While not necessarily reaching similar conclusions, some scholars and competition agencies have proposed various limitations on the freedom of parties negotiating a license to SEPs. Some of the proposed remedies require that, in order to comply with a FRAND commitment, a patent holder is not entitled to seek injunctive relief against an implementer over the use of its SEPs.

In recent years, some competition agencies around the world, including the Korean Federal Trade Commission ("KFTC"), China's National Development and Reform Commission ("NDRC"), the Japanese Federal Trade Commission ("JFTC"), and the Canadian Competition Bureau ("CCB") have imposed competition law sanctions on the ability to seek injunctive relief for SEPs against "willing licensees." What constitutes a "willing licensee," however, or what obligations need to be fulfilled by licensees and licensors negotiating in good faith, was clarified by the European Court of Justice's ("CJEU's") *Huawei v. ZTE* (2015) decision.[10] It sought to provide a framework for good faith negotiations between rights holders and implementers by identifying obligations for each party at each stage of the licensing negotiations. This framework encourages innovators and implementers to negotiate licensing agreements in good faith, and allows innovators to fulfill their FRAND obligations while minimizing implementers' risk of an injunction. Since this decision, several cases in which injunctions have been sought for SEPs have been handled by the courts without intervention from competition agencies.

As 5G continues to develop, the lopsided risks between inventors and implementers in the current FRAND regime are becoming clearer. There is a need for creating a balanced playing field between the necessary dynamics of inventors making risky R&D investments well before the implementers have adopted new technologies. The current FRAND regime across SDOs requires a commitment only from licensors, but none from licensees. As *Huawei v. ZTE* clarified that there should be obligations on both sides for licensing negotiations, there should also be a commitment from both sides of SDOs for negotiating licenses. Therefore, just as licensors make a commitment to SDOs to offer licenses to

8 Makan Delrahim, Assistant Att'y Gen., Antitrust Div., U.S. Dep't of Justice, Remarks as Prepared for the USC Gould School of Law's Center for Transnational Law and Business Conference (November 10, 2017), available at https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-usc-gould-school-laws-center.

9 Joanna Tsai & Joshua D. Wright, Standard Setting, *Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts*, 80 ANTITRUST L.J. 157 (2015).

10 Case C-170/13, *Huawei Technologies Co. Ltd. v. ZTE Corp.*, ECLI:EU:C:2015:477.

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implementers on FRAND terms, some commitment from licensees should also be required to abide by the FRAND terms *at the time of* or *before* standards development, prior to inventors incurring all the R&D costs for developing the standard.

In addition, competition law sanctions on the ability to seek injunctive relief for SEPs leads to "efficient infringement" of innovators' patent rights. By eliminating the threat of an injunction for patent infringement, implementers are incentivized to hold out. In the event of a patent lawsuit, the worst-case scenario for implementers is that they pay reasonable royalties to the SEP owner—likely years after dispute resolution—making it more attractive to delay payment. As the DOJ has explained:

> Patents are a form of property, and the right to exclude is one of the most fundamental bargaining rights a property owner possesses. Rules that deprive a patent holder from exercising this right—whether imposed by an SSO or by a court—undermine the incentive to innovate and worsen the problem of hold-out. After all, without the threat of an injunction, the implementer can proceed to infringe without a license, knowing that it is only on the hook only for reasonable royalties.[11]

V. MAINTAINING BALANCED SDO IPR POLICIES

Traditionally, SDOs have followed principles of technical meritocracy, with the best technologies chosen based on the principles of consensus or majority voting. However, due to the growing innovator-implementer divide in the standards bodies, several SDOs have faced aggressive lobbying efforts to change their IPR policies *ex post*, well after the innovators have already made substantial investments in R&D and the standards development process is underway or completed. SDOs with governance rules that do not follow the principles of balance, openness, transparency, due process, consensus-based decision-making, and inclusive voting processes have been subject to such policy changes.

IEEE-SA's 2015 patent policy change is one of the most important examples of such an *ex post* SDO IPR policy change. IEEE-SA is known for its widely used 802.11 family of standards for wireless Internet connections ("wi-fi"). In March 2015, IEEE-SA made significant and controversial changes to its patent policy, widely interpreted to favor implementers. The most important aspects of the new policy include the following:

- Calculation of "reasonable royalties" based on the value that a patent claim contributes to the "smallest saleable component" that practices that claim;
- "Reasonable royalties" imply the "*ex ante*" value of the patented invention, excluding any value resulting from the inclusion of the invention in the standard;
- Comparable licenses only include those not obtained under the threat of an injunction;
- Patent owners cannot seek injunctions unless the implementer fails to participate in or comply with the outcome of an adjudication, including an affirming first-level appellate review.[12]

During the development of this IPR policy, some commentators raised antitrust concerns about the revised IPR policy possibly facilitating a buyer's cartel.[13,14] In light of these alleged and serious antitrust concerns, IEEE requested a business review letter from the Antitrust Division at DOJ to assess whether the revised policy would comply with U.S. law. The Antitrust Division determined that the revised policy would have procompetitive effects by increasing clarity around the meaning of the FRAND obligation.[15] However, this decision prompted an unprecedented spike in negative letters of assurances ("LoAs"), or commitments from patent owners NOT to license their SEPs under this new revised policy, making licensing and implementation of IEEE standards more uncertain than ever.[16]

11 Delrahim, *supra* note 8.

12 See http://standards.ieee.org/develop/policies/bylaws/sect6-7.html.

13 Letter from J. Gregory Sidak, Chairman, Criterion Economics, L.L.C., to Hon. Renata Hesse, Deputy Assistant Attorney General, U.S. Department of Justice (January 28, 2015).

14 IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments ID No. 38 (comments of Dina Kallay, Director for IP and Competition, Ericsson).

15 Business Review Letter from Hon. Renata B. Hesse, Acting Assistant Att'y Gen., U.S. Dep't of Justice, to Michael A. Lindsay, Esq., Dorsey & Whitney, L.L.P. (February 2, 2015), available at http://www.justice.gov/atr/public/busreview/311470.htm.

16 Gupta, Kirti & Georgios Effraimidis, *IEEE Patent Policy Revisions: An Empirical Examination of Impact,* available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3173799.

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There is evidence of various SDOs rejecting the adoption of IEEE-style policy changes for defining reasonable royalties, after a long process of deliberation.[17] One of the main reasons for this is the differences in the governance structure across SDOs. While IEEE is governed under an appointment-based leadership model, most SDOs have an election-based leadership. In an appointment-based system, leaders of a board are chosen by current and outgoing leaders, and in the long run its membership runs the risk of losing touch with appropriate representation across the member organizations at the level of workers, whose interests are at stake. An election-based SDO, by contrast, selects its leadership by vote of the existing members.

In light of the importance of SDO governance to innovation, it is critical that policy makers ensure that the principles of balance, openness, transparency, due process, and consensus-based decision-making are reflected in the rules of standards bodies, and that the rules are adequately enforced to discourage behavior that decreases innovation and competition. It is important to ensure that standards bodies do not change the policies *ex post*, years after R&D costs have been incurred, by later reducing the price of patented technology and imposing random price caps, defining new methods for the calculation of royalties, or reinterpreting the pre-existing standards IPR policies or industry practices established for decades.

A recent study examining how other SDOs responded to IEEE's 2015 policy changes noted that antitrust regulators around the world are beginning to recognize the risks of unbalanced IPR policies and how safeguards protecting principles of openness, transparency, balance, due process, and consensus-based decision-making in SDO governance mitigate these risks and promote competition and innovation.[18] The European Commission, for example, recently published a study examining SDO governance, recognizing the dangers of one-sided IPR policy changes, noting IPR policy changes that commit an SDO to one side of the discussion necessarily "affect generalized commercial practices and have redistributive implications for a large range of SDO stakeholders."[19] DOJ has stated that "the Antitrust Division will... be skeptical of rules that SSOs [standards bodies] impose that appear designed specifically to shift bargaining leverage from IP creators to implementers."[20]

In addition, DOJ recently suggested to the American National Standards Institute ("ANSI") that: "It is important for standards organizations to have balanced representation in their decisional bodies so that their actions are not susceptible to the outsized influence of one group or another. To achieve that balance, and to ensure that the output of the Task Group is reflective of the full range of views, the [U.S. Government] suggests that standards bodies include members with diverse interests in the area of standard setting in their leadership committees and the decision making bodies on policy changes, specifically, both from the innovator and the implementer side."[21]
Such a recommendation should apply to all standards bodies broadly.

17 These SDOs include: including ETSI, JEDEC, Accllera, TSDSI, IETF, 5GAA, and DVB.

18 Gupta, Kirti, *Changing the Rules of the Game Ex-Post: Standards Development Organization Governance and Why It Matters*, working draft, July 2019.

19 Baron, J., Contreras, J., Husovec, M., and Larouche, P. (2019), *Making the Rules: The Governance of Standard Development Organizations and their Policies on Intellectual Property Rights*, page 149, available at http://publications.jrc.ec.europa.eu/repository/bitstream/JRC115004/sdo_governance_final_electronic_version.pdf.

20 Remarks of Assistant Attorney General Makan Delrahim at the USC Gould School of Law (November 10, 2017), available at https://www.justice.gov/opa/speech/assistant-attomey-general-rnakan-delrahimdelivers-remarks-usc-gould-school-laws-center.

21 A similar language was used in the letter from the U.S. Dep't of Justice (Antitrust Division) to ANSI in March 2018, when one-sided policy changes were being considered by ANSI's IPR policy governing body, available at https://www.justice.gov/atr/page/file/1043456/download.

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VI. CONCLUSIONS AND RECOMMENDATIONS

5G wireless technology is ushering in a whole new generation of mobile connectivity, designed to connect everything, everywhere. This game-changing technology has captured the attention of policymakers across the U.S. government, from Congress, to the national security community, to trade negotiators, to SDO participants.

Standards embody the science and engineering that make wireless technology work. Standards describe in detail how specific technical systems and features function, so that anyone can manufacture a product compliant with those specifications. This technical work is carried out by engineers working through international SDOs, striving to ensure only the best technology is included in the standard.

To ensure innovation and competition in global standard setting, public policy must:

- Promote voluntary, consensus-based standardization, so that standards development is based on technological merit decided by consensus among engineers, and not based on any national political or economic interest.

- Ensure that the intellectual property rights ("IPR") policies of SDOs are balanced and do not discriminate between inventors and IPR owners on the one hand, and implementers on the other.

Any IPR policy changes to SDOs should be analyzed to make sure they are not one-sided, and that principles of openness, transparency, consensus, and due process are followed in any proposed changes to the policies.

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