



LEADERSHIP

DISCUSS. DEBATE. UNITE. LEAD.

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In September 2017, IP Leadership held its first conference in Europe. The event, which was attended by government enforcers and policymakers, practitioners, and scholars, featured diverse views on topics such as:

- the importance of striking the right balance between the interests of technology contributors and technology implementers;
- possible adverse consequences on innovation and prices for consumers of deterring participation in open, collaborative standards;
- the role (if any) of governments in shaping the intellectual property rights (“IPRs”) policies of private standard-development organizations (“SDOs”);
- proper antitrust analysis in matters involving standard-essential patents (“SEPs”) where a patent holder has made a commitment to license on fair, reasonable and nondiscriminatory (“FRAND”) terms;
- whether small and medium-sized enterprises (“SMEs”) are able to meaningfully participate in, and benefit from, standard-development activities; and
- the issue of at what level in the distribution chain licensing should occur, particularly for the Internet of Things (“IoT”).

This article provides key highlights from the conference, as well as economic analyses of the various topics discussed.

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II. STRIKING THE RIGHT BALANCE BETWEEN INNOVATORS AND IMPLEMENTERS: WHAT'S AT STAKE AND THE ROLE OF GOVERNMENT INTERVENTION

There was a strong consensus among panelists on the need for balance, in both SDO IPR policies and government intervention, between the interests of innovators and implementers. Patrick McCutcheon, a Policy Officer at the European Commission's ("EC's") Department for Research and Innovation, said that balance was necessary in order to determine "a practical and fair definition of what fair and reasonable is and what amounts really to nondiscriminatory" licensing.² Similarly, Emilio Dávila-Gonzalez, Head of Sector ICT Standardization at the EC's Communications Networks, Content and Technology, stated that by balancing the interests of innovators and implementers, SDOs create "sustainable standardization system[s]."³ Another panelist, Bardo Schettini Gherardini, the Director of Legal Affairs for the European Committee for Standardization and European Committee for Electrotechnical Standardization, spoke of how voluntary participation by industry experts is a "win-win" and that without balance "the system will not work."⁴ Another panelist noted that absent balance, "we will not have investments going into open standards, [and] we'll have a lot of proprietary standards instead and proprietary technologies."⁵

The likely consequences of disrupting this delicate balance were underscored by Dr. Jorge Padilla, who assessed the merits of collaborative standards relative to alternatives, such as government set or proprietary (or *de facto*) standards. Dr. Padilla presented a new study that examines the comparative performance of these different types of standards across three industries: the wireless industry, where a collaborative SDO environment prevailed; the personal computing operating system, where Microsoft's Windows constituted a proprietary technology that became a *de facto* standard; and broadcasting, with a government set standard.⁶ Relative to the other industries, the wireless industry was found to have demonstrated greater downstream and upstream (in the form of greater fragmentation) competition.⁷ More generally, the study indicates that collaborative standards result in more competitive and dynamic markets for innovators and lower prices and better quality for consumers.⁸ This is consistent with the available empirical evidence indicating a competitive mobile industry, with output having increased exponentially and market concentration and prices fallen.⁹ For the United States in particular, prices in SEP-reliant industries have decreased more rapidly than in non-SEP-reliant industries.¹⁰ These outcomes, however, depend on SDOs striking the right balance between the interests of innovators and implementers. Indeed, if innovation is not sufficiently rewarded, a collaborative model ceases to work and standards will be established by other means.

Some panelists favored government intervention on the grounds that clarity is needed on the meaning of FRAND. For example, in his keynote address, Antti Peltomäki, the EC's Deputy Director General of the Internal Market, identified three areas of regulatory concern with SDOs, indicating a need for government intervention through the issuance of policy recommendations.¹¹

2 IP LeadershIP Brussels Transcript, Panel 1 at 4 (on file with authors) [hereinafter Transcript].

3 Id. Panel 2 at 11.

4 Id. Panel 2 at 18.

5 Id. Panel 1 at 3.

6 Padilla et al., *Economic Impact of Technology Standards* (2017), <http://www.compasslexecon.com/highlights/economic-impact-of-technology-standards> [hereinafter *Technology Standards*]. The study finds that cooperative standards are a more optimal means of developing technologies that rely on positive externalities flowing between users on a common platform by both allowing firms to focus on niche specializations and creating a level playing field for implementing the common technology standards.

7 See id.

8 Id.

9 See Ginsburg, Wong-Ervin, & Wright, *The Troubling Use of Antitrust to Regulate FRAND Licensing*, 10 CPI ANTITRUST CHRONICLE 1, 4-5 (2015) [hereinafter *FRAND Licensing*].

10 Id. at 5.

11 Transcript Keynote at 4. Deputy Director Peltomäki's expressed concerns would ultimately track closely with those put forward by the European Commission in a communication on SEPs, which was released shortly after the conference. See EUROPEAN COMMISSION, COMMUNICATION FROM THE COMMISSION ON STANDARDS ESSENTIAL PATENTS FOR A EUROPEAN DIGITALISED ECONOMY (Oct. 4, 2017), https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-1906931_en.

First, he suggested that implementers may continue to face difficulties identifying the parties from whom they must obtain licenses.¹² He added that increased transparency should improve the standard-development process, whether put forward by the SDO itself, or by regulators.¹³ Second, patented technologies remain difficult to value.¹⁴ While the primary responsibility falls on market participants to address this problem, regulators may be able to assist in certain key areas, such as defining the level of the distribution chain at which SEP licensing should occur. Third, continued uncertainty following the European Court of Justice's ruling in *Huawei v. ZTE*¹⁵ was said to be reflective of an "incomplete" legal framework that might benefit from additional and clearer rules.¹⁶

Some panelists agreed, contending that difficulties in determining a FRAND royalty range allow innovators to abuse their alleged market power by engaging in holdup. As retired Judge Joachim Bornkamm of the Bundesgerichtshof stated, "[i]f the question of FRAND could be easily answered there would not be much of a chance for [holdup]."¹⁷ However, as several panelists observed, the nature of the standard-development process as a repeated game can serve to deter opportunistic behavior by SEP holders for fear of future punishment, such as exclusion from a later standard.¹⁸ Moreover, the available evidence does not support the claim that holdup is widespread. Theories of anticompetitive harm predict systematic opportunism by patent holders and price increases across output markets that depend upon patented technology as an input. These theories predict, in addition to higher final product prices, reduced output and less innovation.¹⁹ As discussed above, evidence suggests that SEP-heavy industries are highly competitive, being characterized by robust innovation as well as falling prices and increased output when compared to industries that do not rely upon SEPs.²⁰

For example, evidence from the smartphone market, which is both standard and patent intensive, is to the contrary: output has grown exponentially, market concentration has fallen, and wireless service prices have dropped relative to the overall consumer price index ("CPI").²¹ More generally, prices in SEP-reliant industries in the United States have declined faster than prices in non-SEP intensive industries.²² A study by the Boston Consulting Group found that, globally, the cost per megabyte of data declined 99 percent from 2005 to 2013 (reflecting both innovations making data transmission cheaper and the healthy state of competition); the cost per megabyte fell 95 percent in the transition from 2G to 3G, and 67 percent in the transition from 3G to 4G; and the global average selling price for smartphones decreased 23 percent from 2007 through 2014, while prices for the lowest-end phones fell 63 percent over the same period.²³ All of this indicates a thriving mobile

12 Transcript Keynote at 4.

13 Id.

14 Id. at 4-5.

15 Case C-170/13 *Huawei Technologies Co. Ltd v. ZTE Corp.*, (July 16, 2015).

16 Transcript Keynote at 5.

17 Id. Panel 3 at 3.

18 Id. Panel 3 at 7-8; see also Larouche & Schuett, *Repeated Interaction in Standard Setting*, TILBURG LAW SCHOOL RESEARCH PAPER No. 16/2016 (2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2792620.

19 Ginsburg et al., *FRAND Licensing*, supra note 9, at 4.

20 See, e.g. Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 GEO. L.J. ONLINE 48, 61 (2015) (collecting studies at n.49) ("By early 2015, more than two dozen economists and lawyers had disapproved or disputed the numerous assumptions and predictions of the patent-holdup and royalty-stacking conjectures."), <https://www.criterioneconomics.com/docs/antitrust-divisions-devaluation-of-standard-essential-patents.pdf>; LAYNE-FARRAR, PATENT HOLDUP AND ROYALTY STACKING THEORY AND EVIDENCE: WHERE DO WE STAND AFTER 15 YEARS OF HISTORY? (2014) (surveying the economic literature and concluding that the empirical studies conducted thus far have not shown holdup is a common problem), <http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD%282014%2984&doclanguage=en>.

21 According to data from Gartner, worldwide smartphone sales to end-users have increased over 900 percent from 2007 to 2014, and 320 percent from 2010 to 2014. Market concentration in smartphones, as measured by HHIs, went from "highly concentrated" in 2007, as defined by the U.S. Antitrust Agencies' Horizontal Merger Guidelines, to "unconcentrated" by the end of 2012. See Mallinson, *Theories of Harm with SEP Licensing Do Not Stack Up*, IP FIN. BLOG (May 24, 2013), <http://ipfinance.blogspot.com/2013/05/theories-of-harm-with-sep-licensing-do.html>. According to the U.S. Bureau of Labor Statistics, the ratio of the CPI for wireless telephone services to the overall CPI has dropped 34 percent from 2007 to 2014.

22 Galetovic et al., *An Empirical Examination of Patent Hold-Up* (Nat'l Bureau of Econ. Research, Working Paper No. 21090, Apr. 2015), <http://www.nber.org/papers/w21090.pdf>.

23 BEZERRA ET AL., THE MOBILE REVOLUTION: HOW MOBILE TECHNOLOGIES DRIVE A TRILLION DOLLAR IMPACT 3, 9 (The Boston Consulting Grp., Jan. 15, 2015), <https://www.bcgperspectives>.

market as opposed to a market in need of fixing, and suggests the need for caution prior to disrupting the carefully balanced FRAND ecosystem.

Nevertheless, for retired Judge Bornkamm, SDOs conferring SEP holders with market power resulting in holdup constitutes the “core of the problem.”²⁴ Empirical research, however, suggests that the standardization process does not necessarily, and in fact generally may not, confer market power.²⁵ Rather, already more valuable technologies are natural candidates for inclusion in standards such that SDOs tend to “‘crown winners,’ not create them.”²⁶ This evidence is consistent with the institutional mechanics of SDOs, whereby standardized technologies are chosen based upon their technical merits through a consensus-driven or majority-based decision process in which most participating firms are not SEP owners, but implementers.²⁷ Furthermore, any market power held by an SEP holder to extract supra-competitive prices is mitigated by a valid FRAND commitment.²⁸

With respect to calls for clarity, while we agree that from a policy standpoint, if one assumes no error rates, clearer rules are better than less clear rules because clearer rules are cheaper to implement. However, rules aimed at increasing clarity can only be considered procompetitive when supported by evidence that the rule would result in net benefits for consumers. In other words, clarity alone cannot justify policy choices such as requiring licensing at all levels of the distribution chain. Indeed, a rule that allows SEP holders to continue the longstanding industry practice of licensing at the end-user device level would be equally as clear.

Moreover, attempts to regulate SDO policies after standards have been developed could entail significant costs. Specifically, *ex-post* changes in a SDO’s IPR policy were identified at the conference as a form of holdup against SEP holders that could reduce *ex-ante* asset specific R&D investment incentives. Indeed, Dr. Padilla cited recent studies showing that policy uncertainty can have significant negative effects on investment.²⁹ Italian Communications Regulatory Authority Commissioner Antonio Nicita cautioned that policy changes that further constrain the behavior of SEP holders (e.g. prohibitions on the ability to seek or enforce injunctive relief) could increase the incentive of implementers to infringe on valid IPRs if efforts by IP holders to prevent infringement are broadly considered anticompetitive.³⁰ Given the time value of money and the fact that the worst penalty an SEP infringer is likely to face is merely paying after adjudication (likely on a patent-by-patent basis around the world) the FRAND royalty that it should have agreed to pay when first asked, it is easy to understand why holdout can be an attractive strategy for implementers.³¹

[com/content/articles/telecommunications_technology_business_transformation_mobile_revolution/#chapter1](http://www.competitionpolicyinternational.com/content/articles/telecommunications_technology_business_transformation_mobile_revolution/#chapter1).

24 Transcript Panel 3 at 4.

25 See Layne-Farrar & Padilla, *Assessing the Link Between Standards and Patents*, 9 INT’L J. IT STANDARDS AND STANDARDIZATION RES. 19 (2011).

26 Layne-Farrar & Wong-Ervin, *Standard-Essential Patents and Market Power*, CUTS INTERNATIONAL 7 (Dec. 2016).

27 See Gupta, *Technology Standards and Competition in the Mobile Wireless Industry*, in HANDBOOK OF STANDARD SETTING (forthcoming 2017), <http://www.georgemasonlawreview.org/wp-content/uploads/2015/06/GuptaTechStandards.pdf>.

28 See Page, *Judging Monopolistic Pricing: FRAND and Antitrust Injury*, 22 TEX. INTELL. PROP. L.J. 181, 206 (2014).

29 Transcript Panel 2 at 14; see also Baker, Bloom & Davis, *Measuring Economic Policy Uncertainty*, 131 Q.J. ECON. 1593 (Nov. 2016) [hereinafter *Policy Uncertainty*].

30 Transcript Panel 3 at 14.

31 As Dr. Layne-Farrar has explained: “Working backwards through a simple example illustrates this point. After litigation is concluded, if an implementer is found to infringe the asserted SEPs it will have to pay FRAND damages/royalties of F . But there is some chance (call it p , where $0 < p < 1$) that the court will decide the litigation in the implementer’s favor, in which case it will pay nothing in damages. Abstracting from litigation expenses that both the plaintiff and the defendant must pay, on the eve of litigation the implementer’s expected loss is only $p \times F$, which is clearly less than F . Stepping back even earlier in time, there is some chance (call it δ , where $0 < \delta < 1$) that the SEP holder will never file suit, say because it is focused on its downstream market or because it is worried about retaliation in other commercial dealings with the implementer. Thus, before the implementer ever makes its first investment in bringing standard-compliant products to market, it faces two options: 1) enter into a license with the SEP holder now and pay the FRAND royalty F with certainty, or 2) practice patent holdout, which has the expected payout of $\delta \times p \times F$, an amount clearly lower than either $p \times F$ or F . It would be entirely unsurprising for a significant number of implementers to choose option 2.” Layne-Farrar, *Why Patent Holdout is Not Just a Fancy Name for Plain Old Patent Infringement*, CPI NORTH AMERICA COLUMN 4 (Feb. 2016), <https://www.competitionpolicyinternational.com/wp-content/uploads/2016/02/North-America-Column-February-Full.pdf>; see also Ginsburg et al., *FRAND Licensing*, supra note 9, at 4-6.

Another economist panelist observed that the Institute of Electrical and Electronics Engineering Standards Association (“IEEE-SA”) 2015 amendments to the IEEE IPR policy have led to a notable decrease in non-duplicate Letters of Assurances (“LoAs”), the licensing commitments given by patent owners for licensing their SEPs on FRAND terms.³² For the flagship IEEE 802.11 Wi-Fi standards, there has been an 86 percent surge in the number of negative LoAs submitted by patent owners relative to the past year. At the same time, almost all of the positive LoAs constitute repeat submissions for which a LoA was already submitted for the same standard under the old policy. A reduced willingness to submit LoAs is a possible indicator of the degree to which the inventors contributing their technologies to standards are willing to invest in R&D and license their IP under the new policy. Furthermore, new IEEE projects initiated via Project Authorization Requests (“PARs”) have dropped by approximately 5 percent in the IP-intensive IEEE 802 working groups, raising the possibility of a broader decline in the standard-development process.

With respect to government issued best practices or other uniform policy recommendations, although uniformity of SDO IPR policies may have some benefits, it also entails potential costs stemming from difficulties associated with the need to keep up with fast-moving technology without knowing how well particular best practices will function.³³ Indeed, uniformity is generally ill-suited to deal with dynamic sectors such as 5G technology.

First, in dynamic industries, uniform rules imposed by a regulator can hinder an organization’s ability to adapt to rapidly changing circumstances by adopting the most efficient responsive rules.³⁴ Second, uniform rules can stifle experimentation among different rule frameworks and suppress learnings obtained from empirically observing the costs and benefits associated with a particular rule regime.³⁵ Third, from a governance perspective, in as much as the imposition of uniform rules is coupled with a more centralized decision process, uniformity can come at the expense of the benefits associated with a multi-stakeholder, collaborative and decentralized governance model, resulting in sub-optimal rules.³⁶

All three of these concerns about uniform rules are applicable to standards development for IoT and 5G. First, as more implementers from a range of industries participate in the standard-development process, the diversity and dynamism associated with communication standards will only increase, making an adaptive rule framework even more essential to SDO well-functioning. Second, empirical evidence has confirmed that the policies of SDOs vary over time in response to changing conditions, including the perceived risk of holdup,³⁷ suggesting that SDOs have incentives for varying their policies. Third, as discussed during the conference, private collaborative multi-stakeholder SDOs have been shown to result in greater competition and welfare gains than approaches associated with unilateral rulemaking by a governmental body.³⁸

Lastly, issuance of best practices by a government agency may unduly influence private SDOs and their members to adopt policies that might not otherwise gain consensus support within a particular SDO and that may not best meet the needs of that SDO, its members, and the public. This could occur because the SDO believes failing to adopt the specified best practices is not permitted or because failing to adopt the best practices could subject the SDO and its members to other forms of legal liability.³⁹

32 Transcript Panel 2 at 15-16; see Katznelson, Presentation at IEEE GLOBECOM 2015: Decline in Non-Duplicate Licensing Letters of Assurance (LOAs) from Product/System Companies for IEEE Standards (updated Mar. 30, 2016), <https://works.bepress.com/rkatznelson/80/>.

33 See Kobayashi & Ribstein, *Uniformity, Choice of Law and Software Sales*, 8 GEO. MASON L.R. 261, 275 (1999-2000).

34 *Id.* at 275-76.

35 See Wong-Ervin, *Troubling Aspects of the European Commission’s Standard-Essential Patent Roadmap*, CPI EUROPE COLUMN (May 2017) [hereinafter *EC Standards Roadmap*].

36 See generally Ribstein & Kobayashi, *Uniform Laws, Model Laws and Limited Liability Companies*, 66 U. COLO. L. REV. 947, 951-52 (1995).

37 See Tsai & Wright, *Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts*, 80 ANTITRUST L.J. 157 (2015); Layne-Farrar, *Proactive or Reactive? An Empirical Assessment of IPR Policy Revisions in the Wake of Antitrust Actions*, 59 ANTITRUST BULL. 373 (2014).

38 See Padilla et al., *Technology Standards*, supra note 6, at 25.

39 *EC Standards Roadmap*, supra note 35, at 3.

III. SMEs

Deputy Director Peltomäki's keynote speech highlighted the importance of SMEs being able to participate in, and benefit from, the innovation inherent in the standard-development process.⁴⁰ Patrick McCutcheon added that the intense and expensive litigation which seems to pervade the SEP licensing process can be a barrier toward participation by less capitalized SMEs.⁴¹ Other panelists disagreed, noting that large licensors may not find it rational to sue small implementers who represent only minor revenue streams.⁴² Furthermore, rather than be understood as a market imperfection, lack of engagement from startups and SME SEP holders could be the result of a rational decision not to license their IP.⁴³

Several panelists reiterated Deputy Director Peltomäki's emphasis on transparency as a way to facilitate participation by SMEs.⁴⁴ Other panelists went further, and pointed to the European Commission's efforts to achieve consensus on a methodology for valuing SEPs as a way to assist SMEs in securing early stage funding.⁴⁵ For several panelists, the idea of a "one size fits all" approach to calculating FRAND was fundamentally at odds with licensing technologies for IoT standards, which will be characterized by diversity of industries, technologies, and licensing traditions.⁴⁶ One panelist from Audi added that while agreement upon valuation methodology invariably fails, licensing terms are ultimately reached.⁴⁷ Even one larger implementer expressed concern that valuation guidelines risk becoming too burdensome for technology developers, who would then be pressured to leave the SDO or refuse to sign FRAND commitments.⁴⁸

Empirical and economic analyses can help to explain the nature of SME participation in SDOs. A recent empirical study evaluating participation by SMEs and startups in the 3G and 4G standard-development processes finds that SMEs consistently represented around 15 percent of participants in meetings.⁴⁹ While less likely to contribute their technologies to standards, SMEs and startups are often specialized in niche areas of expertise, and lack the resources required to perform large scale and risky R&D by sinking costs years in advance without any guarantee of return.⁵⁰ However, when SMEs or startups do contribute their technology for inclusion in standards, their likelihood of acceptance is similar to that of both larger participants, and the firms that represent the majority of contributions to the development of the standards.⁵¹ Thus, the collaborative SDO system seems to be well designed to attract participation by SME licensors.

40 Transcript Keynote at 3-4. The European Commission has in other instances explored concerns that SMEs are in general under-represented in European standardization activities and therefore lack influence in the standard-development process. See ERNST & YOUNG, INDEPENDENT REVIEW OF THE EUROPEAN STANDARDISATION SYSTEM FINAL REPORT, *March 2015*, Ref. Ares (2015)2179280 - 26/05/2015. As the Secretary General of the European Association of Digital SMEs stated, "[e]xperience has shown that standardization processes at the international level can be misused by global actors, like multinational companies, to impose technical solutions and requirements that are less in line with SMEs' needs." Toffaletti, Sebastiano, *European SMEs and Standards* (2016), <http://www.astm.org/standardization-news/?q=first-person/european-smes-and-standards-ma16.html>.

41 Transcript Panel 1 at 3-4.

42 See, e.g. id. 11-12, 18-19.

43 Id. at 5.

44 See, e.g. id. 10-12.

45 Id. at 9-10.

46 Id. at 11-12.

47 Id. at 13.

48 Id.

49 Gupta, *The Role of SMEs and Startups in Standards Development* 5 (Jul. 18, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3001513.

50 Id. at 6-7.

51 Id. at 7-8.

Panelists also recognized the need to consider SMEs on both sides of the standard-development process. As an implementer panelist stated, any government guidance that attempts to set out one methodology for calculating FRAND risks reducing the incentives of SEP holders to invest in the standard development.⁵² Because a uniform methodology would have to accommodate the most complex technologies, SME licensors of technologies that admit of simpler valuation methods may in particular face increased transaction costs by having to comply with a more complicated FRAND methodology.

Lastly, well-intentioned “fairness” concerns could ultimately lead to a less optimal standards regime for SMEs. In addition to the vague and subjective nature of “fairness” concerns, putting pressure on SDO participants to conform to a uniform method of valuation may cause SEP holders to abandon collaborative standards in a way that results in less socially optimal standard-development processes, such as a series of *de facto* proprietary standards. Indeed, as discussed above, collaborative standards have resulted in greater downstream and upstream competition — and therefore more opportunity for SMEs — than either *de facto* proprietary standards or regulatory alternatives.⁵³

IV. END-USER DEVICE LICENSING

As one panelist explained, IoT standard-development brings the issue of at which level licensing should occur to the “center of the debate.”⁵⁴ With respect to the value of a given SEP, retired Judge Bornkamm suggested that end-user device licensing wrongly includes the value of other technologies present in the device.⁵⁵ One implementer from the automobile industry expressed the view that end-user device licensing increases transaction costs for implementers, stating that it would be a “nightmare” for implementers to individually “deal with all our suppliers and try [...] to get the money back for the indemnifications that they have given to us.”⁵⁶ Concerns about high royalties and transaction costs, of course, can be particularly acute for IoT implementers that are also SMEs.

As a threshold matter, the debate seems to ignore the fact that, absent an explicit agreement by a patent holder to limit the rights afforded to it under patent law, licensing commitments cannot later be interpreted to deprive a patent holder of its rights. This includes the core right to exclude, which allows patent holders to choose who to license, who to sue for patent infringement, and who not to sue.

Dr. Padilla suggested that while much of the debate about whether to require licensing at the component level takes a “quasi kind” of “ethical and moral perspective,” the debate should instead be driven by “efficiency considerations.”⁵⁷ From the perspective of competition and consumer welfare, end-user device level licensing is a longstanding practice among non-vertically integrated SEP holders who have neither the incentive nor the ability to exclude downstream component makers, which strongly indicates that the practice has legitimate procompetitive rationales.⁵⁸ In terms of overall welfare, Gerard Llobet and Jorge Padilla show that, compared to per unit component royalties, ad-valorem royalties based on the price of the end-user device tend to decrease the prices paid by consumers, particularly in the context of successive monopolies, which result in double-marginalization. Specifically, they find that “the resulting price in the final market is never higher under ad-valorem royalties. The reason is that ad-valorem royalties are more similar to fixed fees than per-unit royalties. As a result, they make the double-marginalization problem less severe, generating lower distortions in the final market.”⁵⁹ The authors also conclude that ad-valorem rates tend to spur innovation. These rates tend to benefit upstream producers without hurting downstream

52 Transcript Panel 1 at 13.

53 See Padilla et al., *Technology Standards*, supra note 6, at 22.

54 Transcript Panel 2 at 20.

55 Id. Panel 3 at 11-12.

56 Id. Panel 1 at 13.

57 Id. Panel 2 at 20.

58 See Blecker, Sanchez & Stasik, *An Experience-Based Look at the Licensing Practices that Drive the Cellular Communications Industry: Whole Portfolio/Whole Device Licensing*, 221 LES NOUVELLES 221 (2016).

59 Llobet & Padilla, *The Optimal Scope of the Royalty Base in Patent Licensing*, (Jun. 25, 2014), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2417216.

producers. When there are multiple upstream developers with complementary innovations, “numerical results indicate that ad-valorem royalties typically work better [because] by increasing upstream profits they generate a positive feedback on the incentive to innovate of all parties.”⁶⁰

During the conference, Dr. Padilla also highlighted how requiring SEP holders to license at the component level in order to aid SMEs would encumber them with large transaction costs as they try to comprehensively license their technology at multiple levels of the distribution chain.⁶¹ Another panelist from the University of Liège School of Law noted that because the “long tail” of SME licensees, who may be more likely to not take a license, will represent a greater amount of revenue for SEP holders in IoT standards, requiring licensing at all levels could increase the degree of holdout and reduce *ex-ante* incentives to invest in the standard.⁶²

In order to fully appreciate the industry practice of licensing at the end-user device level, it is important to understand the nature of technologies incorporated in 3G and 4G standards. Specifically, these technologies are designed to optimize the usage of a scarce and expensive physical resource — the radio frequency spectrum — and thus enhance the performance of the entire wireless system and network, making their value derivative of functionalities well beyond a specific component or the device. For example, one study that examined a representative sample of patents in a large portfolio of SEPs owned by Ericsson found that more than 80 percent of the SEPs read on the cellular network or the end device, and not on an individual component.⁶³

V. CONCLUSION

The IP Leadership Brussels conference brought forth both a learned and diverse set of perspectives on the standard-development process, the question of whether FRAND is somehow “broken” and in need of fixing, the proper way to ensure SME engagement, and the merits of imposing component level licensing. While the advent of IoT and evolution toward 5G will undoubtedly present regulators and industry participants with new challenges, the existing SDO environment typifies a collaborative and innovative process that has facilitated immense consumer benefits. This evidence suggests caution prior to issuing policy recommendations that are not responsive to empirically demonstrable problems, and which might disrupt an otherwise well-functioning standard-development ecosystem.

⁶⁰ Id. at 6-7.

⁶¹ Transcript Panel 2 at 20.

⁶² Id. Panel 3 at 15.

⁶³ Putnam & Williams, *The Smallest Salable Patent-Practicing Unit (SSPPU): Theory and Evidence*, 41 *tbl.* 3, (Sept. 2016), <http://www.ipleadership.org/articles/smallest-salable-patent-practicing-unit-ssppu-theory-and-evidence>.