Apple Inc.'s Response to NIST's Request for Information

Submitted December 20, 2023

I. Introduction

Apple appreciates the opportunity to respond to the September 7, 2023 Request for Information on Implementation of the United States Government National Standards Strategy for Critical and Emerging Technology (CET) from the National Institute of Standards and Technology (NIST) (Docket No. 230818-0199) regarding standards development activities for CET.

Apple values innovation, investing nearly $30 billion in research and development in FY2023 and holding around 70,000 patents worldwide, including more than 35,000 in the United States. Our engineers participate in over 700 standards activities and over 110 diverse standards development organizations (SDOs). We have a significant focus on CET such as communication and networking technologies, semiconductors, and microelectronics, contributing to the advancement of a wide range of standards for communications and networking, including 5G and 6G next-generation cellular networks, Wi-Fi, Bluetooth, Matter, and more. We are also one of the world's top 15 owners of cellular standard essential patents (SEPs).[1]

A critical challenge to U.S. leadership in CET standardization[2] is the ready availability of injunctions or exclusionary relief in certain courts and administrative bodies for SEP holders that have made commitments to license on fair, reasonable, and non-discriminatory (FRAND) terms. The leverage provided to SEP holders by injunctions and exclusionary relief allows them to escape their FRAND commitments and impose excessive, non-FRAND royalties on licensees—or to shut them down entirely. This threat chills standards adoption by U.S. industry and harms the standardization process itself, as discussed in Section III.B.

The United States should lead the way in curtailing such SEP abuse, as described more fully in Section III.D. NIST and the broader U.S. government should strive to support efforts here and abroad that decrease these risks. That includes both learning from and engaging in advocacy and education with relevant stakeholders.

Although U.S. standardization efforts should be led by the private sector, the U.S. government has a critical role to play by participating in and supporting those efforts. As described in Section IV, the U.S. government should assist industry by providing resources, including supporting or developing enhanced digital tools to track standardization efforts and investing in research in order to maintain U.S. preeminence in CETs and drive standards contributions. Further, the U.S. government can better assist stakeholders in navigating the intersection of standards and government by providing more information about applicable regulations and standard-setting activities, and providing more effective access to government for stakeholders to speed the launch of standardization efforts.

---

[1] *See, e.g.*, Tim Pohlmann et al., *Who is Leading the 5G Patent Race? 2023*, LexisNexis, at 9 (Oct. 2023), https://www.lexisnexisip.com/5g-report-2023.

[2] For the purposes of this submission, "standardization" refers to the formal process of developing and establishing technical standards through SDOs.

This response addresses NIST's questions in a narrative form. In the headings to each section, we have indicated the specific questions that are addressed therein.

II. U.S. Private-Sector Leadership in Standardization (Q1, Q2)

The aim of U.S. standards policy should be to benefit the domestic economy by promoting standards that foster the growth of U.S. industry. Doing so requires protecting U.S. industry's ability to both participate in standardization as well as adopt and support standards. U.S. policy should promote competition and innovation both at the standards level and downstream, and should carefully balance the interests of all stakeholders, including standards contributors, downstream adopters, and ultimately consumers. The current U.S. approach to standard setting, where the government promotes and supports private, voluntary, and consensus-based standard setting, is the right one.

By contrast, efforts by certain governments and public bodies to exert pressure to select a specific technology or standardize a technology in a particular way "may have negative implications for innovation"[3] because of the risk of industry being locked in to adopting—or being forced to continue using—inferior technologies. Market-driven standardization ultimately leads to better outcomes, as over a century of U.S. standardization efforts demonstrates.

The U.S. government should therefore continue to promote private, consensus-based standardization efforts, work with other countries to guard against unhelpful government interference in standard setting, and support U.S. private-sector leadership in standards (*see* discussion in Section IV). The best way to ensure that consensus-based standards development continues to advance U.S. interests is to include representation in the standard-setting process from diverse interests that produce a wide range of products throughout the manufacturing chain.

III. The Most Significant Challenge to the Development and Adoption of Standards Is the Availability of Injunctions and Other Prohibitive Orders (Q3)

Currently, the biggest challenge facing standardization is unfair SEP licensing practices. Patent hold up through the unfair enforcement of SEPs has been long recognized as a threat to the adoption and success of standards. The increasing availability of injunctions and exclusion orders around the world is undermining SDO policies aimed at mitigating the power of hold up. NIST should study how this conduct impacts standards development, the adoption and use of the resulting standards, and ultimately consumers. NIST should advocate for sensible and balanced licensing policies.

A. Standard Essential Patents and the FRAND Commitment

The process of consensus-based standardization is cumbersome and, as a result, radical innovation gives way to slower incremental improvements for the standardized technology.[4] Moreover, as a

[3] Knut Blind, *Standards and Innovation: What Does the Research Say?*, at 8, ISO R&I Paper (2022).

[4] *Id.*

standard becomes established, competing solutions are abandoned, removing both the pressure on the standard to innovate and the potential for the emergence of a superior alternative in the future.

But despite these shortcomings, standards can spur innovation in other ways. Standards can allow companies of all sizes to develop products using the standardized functionality without needing to reinvent the wheel and develop their own proprietary solutions. Standardization allows SMEs to focus on developing separate, unique, and innovative solutions that are driving the development of the Internet of Things (IoT), without needing to invest in developing a proprietary network. The increased competition spurs downstream innovation. In order to realize these benefits, the relevant standards must be successful and widely adopted by product developers.

One significant deterrent to companies' adoption of standardized technologies is the risk of paying non-FRAND royalties for SEPs. The vast majority of SEPs do not claim innovative or valuable technologies. When a technology is incorporated into a standard, it is almost always chosen from among different competing options, which would offer comparable performance in "nearly all cases."[5] The selected technologies, and the patents that read on them, typically become essential not because they are "the best or the only option," but because they were selected and are therefore now "necessary to comply with the standard."[6]

Even where SEPs offer little or no economic benefit over alternatives, companies adopting a standardized feature risk being forced into paying non-FRAND royalties for them. When companies adopt a standardized feature in their products, they can become "locked in" to the standard because of the substantial switching costs that would be incurred to abandon their initial designs and substitute a different technology—assuming they could even compete at all without using the standard if it has become widely adopted and is the only game in town.[7] This "lock-in" effect provides SEP holders with significant leverage to demand non-FRAND royalty rates and other unfair terms from potential licensees, especially in jurisdictions where SEP holders can readily obtain injunctions to exclude potential licensees from the market if they do not agree to the SEP holders' demands. This unearned and unfair leverage based on the fact of standardization is referred to as "hold up." Left unchecked, hold up can be a significant deterrent to the adoption of standards, thereby reducing interoperability and ultimately increasing prices for consumers.

To limit the risk that SEP holders will abuse the market power they obtain through standardization, many SDOs seek commitments from companies participating in standards development to license their SEPs on fair, reasonable, and non-discriminatory (FRAND) terms.[8] These FRAND commitments, which create contractual obligations that do not exist for patents outside of

---

[5] Expert Report of Friedhelm Hillebrand ¶ 11, *Nokia Corp. v. Qualcomm Inc.*, No. 2330-VCS (Del. Ch. May 22, 2008).

[6] *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1233 (Fed. Cir. 2014).

[7] Joseph Farrell et al., *Standard Setting, Patents and Hold-up*, 74 Antitrust L.J. 603, 607 (2007).

[8] *See, e.g.,* Robert Pocknell & David Djavaherian*, The History of the ETSI IPR Policy: Using the Historical Records to Inform Application of the ETSI FRAND Obligation*, 75 Rutgers U. L. Rev. 977, 998–1000 (2023) (linking ETSI's IPR policy to competition compliance and the FRAND principles set forth in the European Commission's 1992 Standards Communication).

standards, are intended to mitigate the risks of patent hold up by providing clarity on the availability of licenses.

Clear and effective FRAND commitments can encourage the adoption of standards and boost innovation. The experience of the Institute of Electrical and Electronics Engineers (IEEE) Standards Association's 2015 Patent Policy update demonstrates the potential benefits that can be achieved when an SDO adopts clear expectations in its IPR policy. The 2015 Patent Policy update clarified when a SEP holder could seek injunctive or exclusionary relief and provided specific guidance on determining RAND royalties.[9] As the DOJ noted in reviewing the proposed changes, such measures could not only "facilitate and improve the IEEE-SA standard-setting process," but "also may further help to mitigate hold up, ensure access to technology necessary to implement IEEE-SA standards, and eliminate certain potentially anticompetitive practices."[10]

The IEEE's 2015 Patent Policy update was a success. The clarity created by the adoption of the 2015 Patent Policy generated greater activity and innovation at IEEE and did not result in any decline in participation by patent licensors. As an example, the number of new Project Authorization Requests (PARs) reported by the IEEE-SA New Standard Committee (NesCom) and PARs for revisions of existing standards rose significantly following adoption of the 2015 Patent Policy. In particular, new PARs more than doubled from 2015 to 2020 (followed by a dip due to COVID-related disruptions in meetings and IEEE's work).[11] Similarly, a 2019 study found that "[t]he number of technical contributions submitted in IEEE 802 working groups has continued to increase since the IEEE patent policy updates, and was in 2018 at the highest level in IEEE's history."[12]

B. The Promise of FRAND Licensing Too Often Falls Short

1. The Proliferation of SEP Injunctions

Notwithstanding their FRAND commitments, SEP monetizers are often able to compel potential licensees to accept non-FRAND terms, typically through the threat of injunctions.[13] Competition authorities in the United States and abroad have recognized this problem for more than a decade. In 2013, the Federal Trade Commission recognized that "[s]eeking and threatening injunctions against willing licensees of FRAND-encumbered SEPs undermines the integrity and efficiency of the standard-setting process and decreases the incentives to participate in the process and

---

[9] IEEE, IEEE-SA Standards Board Bylaws 6.2 (approved Dec. 2014, published Feb 2015), https://web.archive.org/web/20160112145400/http:/standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf.

[10] Letter from Renata B. Hesse, Acting Assistant Att'y Gen., DOJ, to Michael A. Lindsay, Esq., Dorsey & Whitney LLP, re Business Review Letter, at 6–7 (Feb. 2, 2015), https://www.justice.gov/media/1169141/dl?inline.

[11] NesCom Report to the SA Standards Board, at 5 (Sept. 27, 2018), https://app.box.com/s/jxmscm16wet3vlqdxpyb95t1bmh4hb6b; NesCom Report to the SA Standards Board 5 (Dec. 3, 2022), https://app.box.com/s/mxrrlivpd775sdw3qhe0qspxsx820j7h.

[12] *Empirical Analysis of Technical Contributions to IEEE 802 Standards*, IPLytics, at 2 (Jan. 2019), https://web.archive.org/web/20201002075005/https://www.iplytics.com/wp-content/uploads/2019/01/IEEE-contribution-anaylsis_IPlytics-2019.pdf.

[13] A. Doug Melamed & Carl Shapiro, *How Antitrust Law Can Make FRAND Commitments More Effective*, 127 Yale L.J. 2110, 2114 (2018).

implement published standards."[14] Similarly, in 2014, the European Commission recognized that "it is anti-competitive to use injunctions in relation to SEPs" when a "SEP holder has committed to license the SEP on FRAND terms and the licensee is willing to take a licence on such terms" because the "seeking of injunctions can distort licensing negotiations and lead to licensing terms with a negative impact on consumer choice and prices."[15]

Nevertheless, SEP injunctions remain an ongoing and global problem. A recent European Commission survey found that 89% of manufacturers reported threats to their production or sales when negotiating with SEP holders.[16] Similarly, in response to a recent survey of SMEs conducted by the UK Intellectual Property Office, all respondents who had been involved in licensing disputes were concerned by the threat of an injunction.[17]

Injunctions are a particularly pervasive threat in Germany, where some courts evaluating the propriety of an injunction have placed the burden primarily on the potential licensee to demonstrate its willingness to license and its purposeful cooperation in licensing negotiations, without evaluating the SEP holder's conduct or willingness to license on FRAND terms.[18] Subsequent German court decisions have set higher and higher thresholds for licensee demonstrations of willingness and purposeful cooperation that are harder to meet.[19] Last year, for example, Ford took a license with the entire Avanci patent pool immediately after a Munich court awarded IP Bridge—an Avanci member and patent assertion entity—an injunction on the basis of a single SEP that not only stopped sales, but required dealers to recall and destroy all vehicles equipped with mobile phone technology.[20] Even a company the size of Ford had little option but to pay the demanded royalty, regardless of whether it was FRAND.[21]

Similarly, India's High Court of Delhi recently held that Indian courts "can and should" issue injunctions before a FRAND determination has even been made.[22] And courts in Colombia and

---

[14] Federal Trade Commission, Analysis of Proposed Consent Order to Aid Public Comment, *Matter of Motorola Mobility LLC and Google Inc.*, File No. 121-0120, at 2 (Jan. 3, 2013), https://tinyurl.com/bdcme6up.

[15] European Commission, *Antitrust Decisions on Standard Essential Patents (SEPs) – Motorola Mobility and Samsung Electronics – Frequently Asked Questions* (Apr. 24, 2014), https://tinyurl.com/yz8nmym8.

[16] European Commission, *Commission Staff Working Document – Impact Assessment Report* ("Impact Assessment Report"), at 138 (April 27, 2023), https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13109-Intellectual-property-new-framework-for-standard-essential-patents_en.

[17] UK Intellectual Property Office, *SEPs Questionnaire for SME, Small-Cap and Mid-Cap Businesses: Summary of Responses*, Question 29 (July 5, 2023), https://tinyurl.com/24wpc586.

[18] Judgment ¶ 83, Federal Court of Justice, Judgment of 5 May 2020 – KZR 36/17, BGH GRUR 2020, 961 – FRAND-Einwand (*Sisvel v. Haier*) (May 5, 2020), unofficial English translation, https://media.bardehle.com/contentdocuments/ip_reports/20200505-BARDEHLE-PAGENBERG-Sisvel-Haier_judgment-KZR-3617_EN_.pdf.

[19] *See, e.g.*, *Nokia v. Oppo*, Munich Regional Court 21st Civil Chamber, Mar. 23, 2022, No. 21 O 8879 et al. *See also* Mathieu Klos, *Munich Regional Court Takes New Approach to FRAND*, JUVE PATENT (Mar. 28, 2022), https://www.juve-patent.com/news-and-stories/cases/munich-regional-court-takes-new-approach-to-frand.

[20] Joff Wild, *Ford Takes Avanci License in Wake of German Injunction*, IAM (May 31, 2022), https://www.iam-media.com/article/ford-avanci-licence-germany-injunction.

[21] *Id.*

[22] *Intex Techs. (India) Ltd. v. Telefonaktiebolaget LM Ericsson* (Publ), 2023:DHC:2243-DB ¶ 85 (High Ct. of Delhi at New Delhi Mar. 29, 2023).

Brazil have been willing to grant preliminary SEP injunctions with little opportunity for a defendant to meaningfully contest the merits.[23]

Unfortunately, even the United States contributes to the injunction problem, as the ITC has become a favored destination for SEP monetizers to seek a quick exclusion order to use as leverage in licensing negotiations. Although ITC exclusion orders are governed by a "public interest" standard under 19 U.S.C. § 1337—which mandates assessing the impact of an exclusion order on public health and welfare, competitive conditions in the U.S. economy, the production of like or directly competitive articles in the United States, and U.S. consumers—the ITC has been reluctant to recognize the severe harms to the public interest that occur when SEP holders leverage the threat of excluding imports of products in rate disputes, notwithstanding concerns expressed by the FTC. FTC Chair Lina Khan and FTC Commissioner Rebecca Kelly Slaughter recently warned the ITC that "we are increasingly concerned that SEP holders who have committed to license SEPs on [FRAND] terms are seeking exclusionary orders to ban products from the marketplace for the purpose of gaining leverage over existing or potential licensees."[24]

2. The Breakdown of SEP Licensing Impacts the Desirability of Using Standards

Given the widespread availability of injunctive relief and exclusion orders, and the high costs of SEP litigation,[25] there has been a clear and well-documented systemic breakdown in SEP licensing—particularly impacting SMEs. The European Commission recently conducted an SME consultation that documented the shortcomings in the market for SEP licensing. Among its findings, 82% of SMEs reported that "they do not have resources to negotiate with SEP holders or engage in court proceedings," and 80% "noted that they do not know strategies to defend themselves in SEP negotiations."[26]

Highlighting challenges with transparency, 80% of SMEs said "they did not know who owns SEPs relevant to the standard they use and 90% did not know if patents presented to them during negotiations were essential to the standard."[27] These transparency problems are not solely a problem for SMEs: 100% of companies using standards reported insufficient transparency about FRAND royalties, 97% reported insufficient transparency about the SEP landscape, and 93%

---

[23] *See*, *e.g.*, Ryan Davis, *Colombian Court Ends Patent Injunction on Apple 5G Devices*, Law360 (Nov. 17, 2022), https://www.law360.com/articles/1550701/colombian-court-ends-patent-injunction-on-apple-5g-devices; Nokia Interim Report for Q1 2023, at 24 (April 20, 2023), https://www.nokia.com/system/files/2023-04/nokia_results_2023_q1.pdf.

[24] Written Submission on the Public Interest of Federal Trade Commission Chair Lina M. Khan and Commissioner Rebecca Kelly Slaughter in the Matter of Certain UMTS and LTE Cellular Communications Modules and Products Containing Same, Inv. No. 337-TA-1240, at 1 (May 16, 2022), https://www.ftc.gov/system/files/ftc_gov/pdf/Written_Submission_on_the_Public_Interest_if_Chair_Khan_and_Commissioner_Slaughter_to_ITC.pdf.

[25] For example, Lenovo's costs in litigating against InterDigital in the UK were approximately $17 million. *InterDigital Tech. Corp. v. Lenovo Group Ltd.* [2023] EWHC 1578 (Pat) ¶ 35 (June 27, 2023) ("[T]he estimates of their total costs attributable to the FRAND part of this action were: InterDigital: £17.25m; Lenovo: £14.27m").

[26] Impact Assessment Report, *supra* note 16, at 16–17, 36.

[27] *Id*. at 19; *see also* Joachim Henkel, *Licensing SEPs in the IoT-A Value Chain Perspective on the Markets for Technology*, 51 Rsch. Pol'y 1, 6 (2022).

complained of no guidance on FRAND concepts.[28] Opacity is asymmetric, however, with only a small fraction of SEP holders experiencing similar problems.[29] This information asymmetry between licensors and licensees increases the cost of using standards for manufacturers, which deters companies from supporting standards.[30]

Recent UK court decisions have demonstrated how these dynamics play out in negotiations, with smaller players being coerced into accepting excessive royalty rates through hold-up tactics. In *InterDigital v. Lenovo* and *Optis v. Apple*, InterDigital and Optis presented a large number of license agreements with rates "paid only by the smallest and least sophisticated licensees."[31] The courts in both cases rejected these agreements as useful comparables, finding that the rates were excessive.[32] In *InterDigital*, the court determined that these smaller players were paying about 6 to 7.5 times the FRAND rate for InterDigital's patents.[33] The court in *Optis* explained that these type of agreements were not the product of negotiations to a reasonable outcome, but instead were produced by Optis's assertion of "significant pressure" through a "take it or leave it (and we will sue for infringement)" strategy.[34]

Similar problems exist in the United States, as confirmed by a recent study that found "opportunistic behavior by the SEP enforcer in approximately 77% of patent-party level SEP assertions."[35] The Department of Justice observed in 2015 that "litigated cases demonstrate the potential for hold up when owners of RAND-encumbered standards-essential patents make royalty demands significantly above the adjudicated RAND rate," pointing to the examples of *In re Innovatio IP Ventures, LLC Patent Litigation*,[36] where the SEP holder sought royalties 169 times those determined by the court to be RAND, and *Microsoft Corp. v. Motorola, Inc.*,[37] where Motorola demanded royalties 172–231 times the court-determined RAND rate.[38] Notably, when Microsoft faced the prospect of a German injunction on H.264 SEPs as part of its dispute with

---

[28] Impact Assessment Report, *supra* note 16, at 36.

[29] *Id.* Among SEP holders, 19% reported issues with FRAND transparency, 13% reported a lack of transparency on SEP landscaping, and 19% reported a lack of FRAND guidance. Notably, because these percentages include all SEP holders, including companies that support standards in their own products without engaging in aggressive SEP licensing practices, the percentage of SEP monetizers that view these issues as a problem is likely significantly lower.

[30] *Id.* at 29; *see also* David McAdams & David Katz, *Why US Should Help European Efforts to Fix SEP Licensing*, Law360 (Oct. 19, 2023), https://www.law360.com/ip/articles/1734425/why-us-should-help-european-efforts-to-fix-sep-licensing (explaining how information asymmetry in SEP licensing can lead to a market failure).

[31] *InterDigital Tech., supra* note 25, ¶ 516.

[32] *Id.*; *Optis Cellular Tech. LLC v. Apple Inc.* [2023] EWHC 1095 (Ch) ¶ 398(iii)(b)(iv) (May 10, 2023).

[33] *InterDigital Tech. supra* note 25, ¶¶ 583, 813 (InterDigital's proposed comparables had weighted average per unit rates of $1.06 to $1.31; the court-determined FRAND rate was $0.175/unit).

[34] *Optis Cellular Tech., supra* note 32, ¶¶ 398(iii)(b)(iv), 470(ii)(b) (May 10, 2023).

[35] Brian J. Love et al., *Do Standard-Essential Patent Owners Behave Opportunistically? Evidence from U.S. District Court Dockets*, at 22 (Feb. 7, 2023), https://ssrn.com/abstract=3727085.

[36] No. 11-C-9308, 2013 WL 5593609, at *43 (N.D. Ill. Oct. 3, 2013) (Innovatio sought $16.17 per tablet computer, while the court set royalties of $0.0956).

[37] No. C10-1823, 2013 WL 2111217, at *100 (W.D. Wash. Apr. 25, 2013) (Motorola sought $6–8 per Xbox, while the court set royalties of $0.03471).

[38] Letter from Renata B. Hesse, *supra* note 10, at 4 n.17, 7, https://www.justice.gov/atr/page/file/1386871/download.

Motorola, it undertook the burden of relocating its distribution center from Germany to the Netherlands as a protective measure at a cost exceeding $11 million.[39]

This pressure is forcing emerging companies to forego adopting standards. The European Commission's SME study found that many have considered or are considering limiting products or product features because of concerns about SEP licensing, including a supplier of smart electric vehicle chargers that shared that "SEP uncertainty is delaying technology adoption, hindering innovation and engaging resources that could be productively used."[40] After receiving "[t]hreats from one SEP holder," the company is becoming concerned as to the potential aggregate SEP liability.[41] As a result, "[t]he company is now reconsidering whether to include cellular functionality in its future accessories or products."[42] The UK's Intellectual Property Office also recently conducted its own SME survey about SEP licensing. Among the notable findings, all responding SMEs agreed that "the threat of a court-imposed injunction [is] a concern for [them] or [their] business when agreeing [to] a SEP licence."[43]

3. Non-FRAND SEP Royalties Also Distort Standards Development

Excessive, non-FRAND royalties do not just harm standards by slowing and deterring adoption, they can also affect the development of standards themselves, risking the inclusion of inferior technology in standards and chilling standards adoption, which in turn reduces consumer choice while increasing prices. Non-FRAND royalties create exaggerated incentives for firms to focus on maximizing their patent counts and declaring their patents essential—rather than ensuring that standards incorporate the most useful technology. This is the case in cellular technology, where SEP licensing has come to focus on targeting expensive end products rather than components because it is enormously more lucrative to do so. While the number of patents declared essential to cellular standards has increased significantly with each successive generation,[44] essentiality rates for those patents has decreased almost as fast.[45]

In addition, certain standards participants have been found to engage in "just-in-time patenting," whereby they "apply for patents of low technical merit just before a standardization meeting, and then send the patents' inventors to the meeting to negotiate this patented technology into the standard."[46] Another tactic some standards participants have adopted is to seek continuations for their patents after publication of the relevant standard, then tailor those patents' claims to cover the standard after the fact (thus making them "essential"). Indeed, one study found that 84% of SEP continuations were filed after publication of the standard and that standardization leads to an

---

[39] *Microsoft Corp. v. Motorola, Inc.*, 795 F.3d 1024, 1032–34 (9th Cir. 2015).

[40] Impact Assessment Report, *supra* note 16, at 70.

[41] *Id.*

[42] *Id.*

[43] *SEPs Questionnaire for SME, Small-Cap and Mid-Cap Businesses: Summary of Responses*, *supra* note 17.

[44] Tim Pohlmann et al., *Who Is Leading the 5G Patent Race? 2023*, LexisNexis, at 16 (Oct. 2023), https://www.lexisnexisip.com/5g-report-2023.

[45] Impact Assessment Report, *supra* note 16, at 19.

[46] Byeongwoo Kang & Rudi Bekkers, *Just-in-Time Patents and the Development of Standards*, 44 Rsch. Pol'y 1948, 1948 (2015).

80–121% increase in the probability that a continuation will be filed—an effect that "is largest for firms that collect most of their revenue through licensing."[47] These distortions can have adverse effects on the quality of standards when companies advocate for inferior or unnecessary technologies in order to increase their SEP counts and licensing revenues.[48]

C. Patent Licensing Does Not Drive Standardization

To justify their demands for non-FRAND royalties and injunction threats, some aggressive SEP licensors have advanced a false narrative that frames SEP licensors as "innovators" and SEP licensees as "implementers" that simply adopt standards into their products without further innovation. Relying on this distinction, they argue that standards cannot exist if they, the "true innovators," are not adequately rewarded by recouping their investments through patent royalties. Based on this premise, these SEP maximalists advocate for permissive legal regimes that allow them to exert maximum leverage against potential licensees—often accompanied by threats that they will withdraw from standardization efforts if they do not get their way.

This rhetoric, however, does not match reality. A recent study of 2020 R&D expenditures in the smartphone industry estimated that downstream firms (including Apple) accounted for 95% of the $38 billion in R&D expenditures related to smartphones, while upstream SEP holders accounted for only 5%.[49] That disparity is expected to increase as mobile connectivity is used more broadly in IoT products and the ranks of downstream firms investing in innovation grows.[50] To highlight specific examples, in 2022, Apple, Intel, and Samsung—so-called "implementers"—had three of the ten largest R&D budgets in the world.[51] None of the most vocal, self-proclaimed SEP-holding "innovators"—Qualcomm, Ericsson, Nokia, or InterDigital—were in the top ten.[52] Apple's focus on developing innovative features and deploying these features reliably and at scale has led to Apple being named the most innovative company in the world by Boston Consulting Group's Annual 50 Most Innovative Companies List in every year but one since 2005.[53] By contrast, many companies that proclaim themselves "innovators" have rarely or never appeared.[54] Moreover, Apple and other product suppliers devote significant resources to standards participation and have played key roles in the development of numerous standards.

It is not, and has never been, the case that only a few companies are capable of contributing to standards development, such that the non-FRAND royalties that SEP monetizers seek are necessary for the standardization system to thrive. In fact, there are many reasons why companies

---

[47] Cesare Righi & Timothy Simcoe, *Patenting Inventions or Inventing Patents? Continuation Practice at the USPTO*, at 2 (Feb. 2022), https://www.nber.org/system/files/working_papers/w27686/w27686.pdf.

[48] Melamed & Shapiro, *supra* note 13, at 2116.

[49] Raphaël De Coninck et al., *SEP Royalties, Investment Incentives and Total Welfare*, at 3 (2022), https://fair-standards.org/wp-content/uploads/2023/04/SEP-Royalties-Investment-Incentives-and-Total-Welfare.pdf.

[50] *Id*. at 6.

[51] Alex Irwin-Hunt, *Top 100 Innovation Leaders*, fDi Intelligence (June 19, 2023), https://www.fdiintelligence.com/content/feature/global-innovation-leaders-2022-edition-82527.

[52] *Id*.

[53] Boston Consulting Group, *17 Years of the Most Innovative Companies*, https://www.bcg.com/publications/most-innovative-companies-historical-rankings.

[54] *See id*.

that develop and sell products without seeking to monetize their patents participate in standards development, including:

- ensuring that the standards they support are widely adopted, thereby creating new sales opportunities and access to new consumers and geographic regions;
- developing expertise in the standardized technology to ensure that their engineers can create products that take advantage of the standard's features;
- guiding the development of standards to ensure that they meet the needs of the market; and
- mitigating the risks of a go-it-alone approach to expensive R&D endeavors.

These same benefits hold for companies that both monetize their SEPs and also supply products and services that rely on standards. Indeed, such sales of standardized products and services often dwarf revenues from licensing, making clear that these companies have ample incentive to participate in standard setting outside of licensing revenue. For example, three of the companies that amass the lion's share of cellular SEP royalties also sell cellular components, networking products, and related services, and their revenues from these products and services far exceed their licensing revenues.

D. Steps U.S. Government Can Take to Mitigate SEP Hold Up (Q21)

To foster greater interest and participation in CET standard setting and the use of standards, it is critical that U.S. businesses have assurance that they will be able to license on FRAND terms the patents needed to develop and sell standard-supporting products—without the risk that their innovations and products will be held up by overdemanding licensors.

1. Study How SEP Licensing Affects Standardization

NIST should apply its expertise in standard setting to undertake comprehensive studies that would better inform U.S. government policy on how to make standards more attractive and accessible to the companies developing CETs.

First, NIST should undertake a comprehensive study to assess the added economic cost that the federal government will bear in its procurement and deployment of critical and emerging technologies, including those that are Administration priorities, due to abusive behavior by certain SEP aggressors. As part of the study, NIST should consider the complexities and bottlenecks of how SEPs are used as part of standardization and recommend best practices to facilitate smoother collaboration between patent holders and standards bodies.

The study should adopt an all-of-government approach and involve other relevant government stakeholders, including the FTC, the DOJ Antitrust Division, and the FCC (in light of the ANPRM on ATSC 3.0). By integrating these agencies into the research process, NIST could ensure they are well informed about the intricate technical processes of standardization, enabling them to better discern between legitimate intellectual property rights protection and anticompetitive conduct.

This collaborative approach would promote a fair and competitive marketplace, while also fostering innovation within the realm of technical standards.

Given the focus on SEP monetization that has been observed during standardization, the NIST study should also seek the involvement of the USPTO. As discussed above in Section B.3, tactics such as "just-in-time patenting" and the pursuit of patent continuations following publication of the relevant standard can distort the true essence of patent protection and potentially weaponize the patent system, reducing or eliminating the potential benefits of standardization. By involving the USPTO, the study could delve deeper into the nuances of patent applications and grants associated with standardization activities. This collaboration would also aid in evaluating the merit of such patents and discerning whether they genuinely contribute to technological advancement or merely serve as tools to leverage an undue advantage in standards negotiations. Drawing from empirical findings, such as the significant increase in the probability of filing a continuation post-standard publication, the study could recommend policy adjustments at the USPTO level to curb manipulative practices, ensuring that the patent system and the standardization process work synergistically for genuine innovation and not against it.

Second, to inform its standards policies, NIST and the Department of Commerce should establish ongoing relationships with a wide range of U.S. industry players that use or are considering using standards. A key aim should be to study how current SEP licensing and litigation practices affect U.S. companies. Such a study could:

- Investigate through surveys and convening forums how U.S. SMEs are coping with the current SEP ecosystem. As noted above, the United Kingdom recently conducted a study of SME experiences with SEP licensing.

- Seek input from industries that currently or are likely to require SEP licensing, including, for example, agriculture, advanced manufacturing, automotive, and healthcare, both to raise awareness of standards and SEP licensing in those industries and to gather information about industry experiences on these topics to date.

This engagement could provide early indications of emerging problems that may interfere with standards participation and adoption. The information gathered could be used to assist SMEs with awareness of and strategies for SEP licensing, thereby reducing the risks associated with adopting standards and increasing their participation in standards development.

Such data would also assist U.S. governmental advocacy with foreign counterparts promoting private-sector-led standardization with balanced SEP/FRAND licensing policies and resisting attempts by foreign governments to promote their own national interests in SEP policy at the expense of U.S. interests.

2. Engage in Advocacy on Critical Standardization Issues

In its advocacy on standardization, the U.S. government should recognize that the monetization of IP rights is not the primary driver of standardization efforts or the primary impetus for most participants' involvement in standard-setting activities (*see* Section C above). Accordingly, the U.S. government should advocate against policies—particularly the ready availability of

injunctions and exclusion orders in SEP licensing disputes—that place the interests of a narrow group of SEP monetizers that make limited contributions to the U.S. economy over the broader interests of industry and consumers.[55]

NIST should also encourage other key stakeholders, such as SDOs, industry bodies, and government agencies, to adopt similar positions. SDOs should be encouraged to develop intellectual property rights policies that provide stakeholders with clearer "rules of the road" when it comes to standards participation and the licensing and litigation of SEPs.[56] In particular, SDOs should be encouraged to adopt policies that (1) expressly prohibit SEP holders from seeking injunctions absent exceptional circumstances, (2) provide more specificity about how to determine FRAND terms, (3) require timely IP disclosure from active participants in the standard-setting process, and (4) make it easier for SMEs and others to conduct top-down apportionment modeling, for example, by implementing an effective declaration regime and maintaining an accurate database of declared IPR. These steps would enhance clarity and assurances that investments in standard setting or the adoption of standardized CET technology in products will not be exploited to obtain unreasonable royalties.

Moreover, in order to support balanced SEP policies, NIST should raise awareness and educate policymakers both within the Department of Commerce and throughout the U.S. government on the details of the standardization process, the importance of balanced SEP licensing policies, and the threat of hold up to U.S. companies.

IV. Support Private-Sector Standardization Efforts (Q5, Q6, Q8, Q13 Q17, Q19)

A. Study and Improve U.S. Government Support for U.S. Standardization Efforts

Standards are substantially driven by technical contributions that address specific market needs. Long-term federal investment in research and analysis of technologies helps create a core body of knowledge that can help facilitate contributions to standard setting by U.S. industry.[57] High-profile and successful examples of such efforts include funding for cybersecurity research at NIST, which has resulted in cybersecurity standards that are used in every aspect of our daily lives such as the Advanced Encryption Standard (AES), and NIST's current work in developing post-quantum cryptographic standards.

The U.S. government should review and increase pre-standardization research spending in order to maintain U.S. preeminence in CETs, including communications and networking technologies. Examples of successful efforts include the NIST-coordinated NextG Channel Model Alliance and the National Science Foundation's RINGS and PAWR programs, all of which seek to accelerate

---

[55] Michael A. Carrier, *Innovation, Invention, and Standards,* CPI Antitrust Chron., at 7 (Sept. 2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4594882.

[56] *See*, *e.g.*, Renata Hesse, Deputy Assistant Att'y Gen., Antitrust Division, DOJ, *Six "Small" Proposals for SSOs Before Lunch*, at 9 (Oct. 10, 2012), https://www.justice.gov/d9/atr/speeches/attachments/2015/06/25/287855.pdf.

[57] U.S. Government National Standards Strategy for Critical and Emerging Technology (May 2023), https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf.

research in 6G technology development. These programs are already resulting in U.S. industry contributions to cellular standards promulgated by the 3GPP grouping of SDOs.[58]

Such investments are particularly important at the dawn of 6G. The U.S. government should take the opportunity to promote U.S. leadership in 6G in light of the experience of 5G, where other global players such as China and the European Union made concerted efforts to dominate both the communications networks and the standards that govern these technologies.[59] The U.S. government may also benefit from joining efforts with U.S. industry in early stages of the standards process in defining the 6G use cases and applications that are most relevant to government agencies.

Another way the U.S. government can support continued U.S. leadership in standardization, a key objective of the National Standards Strategy, would be for agencies that participate and have voting privileges in key standardization activities support U.S. industry representatives competing for leadership roles in standards organizations such as 3GPP. To achieve this objective, U.S. government representatives should engage in ongoing dialogue with private-sector participants that are active in CET standardization efforts.

B. Develop a Dashboard to Track Standardization and the Extent of U.S. Involvement

It can be difficult for companies to track where standardization is occurring and the extent of U.S. industry involvement in different standards. To assist engagement in standards development by the private sector, it would be useful for NIST to maintain a more user-friendly dashboard of the main ongoing standardization efforts, including by working in collaboration with the State Department to identify International Telecommunication Union (ITU) standardization activities in CETs, and U.S. government standards engagement activities with other government entities such as in the U.S.-EU Trade and Tech Council, the Quad, etc. NIST should support ANSI efforts to expand industry engagement in the development of international standards in bodies such as ISO, IEC, and ISO and IEC Joint Technical Committee (JTC1) activities by raising awareness of CET standardization work underway in these bodies through the NIST Manufacturing Extension Partnership (MEP) program and the Manufacturing Institute Program.

C. Track Regulations Regarding Standards

Tracking laws, regulations, guidelines, and policies regarding standards can be a costly and difficult exercise for companies participating in standards, especially SMEs. The U.S. government, with USTR and NIST leadership, should assist stakeholders to navigate the intersection of standards and government regulation. One way to do so would be to track domestic

---

[58] *See, e.g.*, Platforms for Advanced Wireless Research (PAWR), *New Investments in PAWR Program Strengthen US Commitment to Wireless Research in 5G, 6G, and Beyond*, CISION PR Newswire (Dec. 1, 2022), https://www.prnewswire.com/news-releases/new-investments-in-pawr-program-strengthen-us-commitment-to-wireless-research-in-5g-6g-and-beyond-301688289.html.

[59] Martijn Rasser et al., *Edge Networks, Core Policy Securing America's 6G Future*, CNAS (Dec. 2, 2021), https://www.cnas.org/publications/reports/edge-networks-core-policy.

and foreign regulations regarding standards for CETs, organize this information, and make it readily available to U.S. companies. This process could entail:

- Obtaining and publishing relevant information regarding international laws and regulations pertaining to CETs through the U.S. WTO TBT Inquiry Point and Notification Authority housed at NIST.

- Ensuring that the regulations and standards currently available at standards.gov (including through the Standards Executive Resources[60] and Standards Information Center[61]) and in NIST's SIBR database[62] are organized as clearly and coherently as possible to be easily accessible to the private sector.

- Publicizing and promoting the use of these digital tools to SMEs and other U.S. industry players who may not be aware of or currently using these resources.

D. Provide a Public/Private Interface

The U.S. government should also provide greater direct support to U.S. companies looking to adopt standards, proliferate them, and participate in standardization by establishing means to interface directly with the relevant regulatory and government authorities on issues related to standards. Providing formal channels and facilitating communication with the relevant industries could remove significant and unnecessary barriers to adopting and supporting standards. This interface could also offer guidance to industry on navigating domestic and potentially international regulations regarding standards. Support could also be provided through online portals that could build on the guidance, referrals, and resources currently made available through the Standards Information Center accessible at standards.gov. NIST should also create opportunities for industry engagement with federal agencies' standards executives by designating time on the Interagency Committee on Standards Policy and its subgroup meetings to engage with the private sector.

NIST should also facilitate ongoing dialogues between private-sector experts and U.S. government policymakers to assist policymakers in understanding the dynamics of how, where, and why the private sector engages in CET standardization. Information exchanged through these dialogues could help policymakers understand potential unintended consequences of policies that they may be developing and can also position the private sector to assist in achieving these policy objectives while minimizing adverse outcomes to U.S. industry and the private sector.

---

[60] NIST, Standards Executive Resources, https://www.nist.gov/standardsgov/standards-executive-resources.

[61] NIST, Standards Information Center, https://www.nist.gov/standardsgov/standards-information-center.

[62] NIST, Standards Incorporated by Reference (SIBR) Database, https://sibr.nist.gov.