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INNOVATION, INVENTION, AND STANDARDS

By Michael A. Carrier

The term “innovation” has a spellbinding effect. As innovation is the lifeblood of the U.S. economy, no one can reasonably stand on the opposite side. To do so would cast one’s lot with the fragile sands of backwards thinking and technological regression. For that reason, arguments that changes in the law or industry practice would harm innovation tend to be considered seriously. And such arguments sometimes are vigorously propounded. But that does not mean they are correct. This essay criticizes one of these arguments: that innovation is reflected solely by the initial invention. In the standards context, many who have taken a “pro-licensor” perspective have focused only on the initial invention, claiming that any weakening of patents for or application of antitrust to this stage will harm innovation. These arguments, however, do not capture the economic realities of innovation, which is multi-generational in nature. The debate has most frequently taken place in the context of standards.

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I. INTRODUCTION

The term “innovation” has a spellbinding effect. As innovation is the lifeblood of the U.S. economy, no one can reasonably stand on the opposite side. To do so would cast one’s lot with the fragile sands of backwards thinking and technological regression. For that reason, arguments that changes in the law or industry practice would harm innovation tend to be considered seriously. And such arguments sometimes are vigorously propounded. But that does not mean they are correct.

This essay criticizes one of these arguments: that innovation is reflected solely by the initial invention. In the standards context, many who have taken a “pro-licensor” perspective have focused only on the initial invention, claiming that any weakening of patents for or application of antitrust to this stage will harm innovation. These arguments, however, do not capture the economic realities of innovation, which is multi-generational in nature. The debate has most frequently taken place in the context of standards.

II. STANDARDS CONTEXT

Standards, which are ubiquitous in our economy, are common platforms that allow products to work together. Standards offer significant benefits, but are subject to the increased power that a patent-holder can attain after the standard is selected.

Before selection, a standards development organization (“SDO”) can choose from an array of alternative technologies. But after a standard is chosen and the industry has invested in a particular technology, the owner of a standard-essential patent (“SEP”) could impose excessive licensing terms that reflect not just the value of the patent but also the significant costs of switching to a new technology. The patentee, in other words, could “hold up” the standard’s implementation. This threat of holdup explains why many SDOs have required members to agree to license their SEPs on fair, reasonable, and nondiscriminatory (“FRAND”) terms.

III. INITIAL INVENTION CLAIM

Despite this straightforward story, some with a pro-licensor perspective have claimed that any restrictions on patentees or imposition of antitrust liability would harm innovation.

One recent example of such arguments can be found in the comments filed in response to the government’s 2021 draft policy statement on SEPs. In 2013, the Department of Justice Antitrust Division (“DOJ”) and U.S. Patent and Trademark Office (“PTO”) issued a policy statement that recognized anticompetitive harms from holdup while articulating categories of behavior that would allow SEP holders to obtain injunctions.² Despite this balance, six years later, the DOJ, together with the PTO and National Institute of Standards and Technology (“NIST”), issued a very different statement that, as I have written elsewhere, took a one-sided perspective and relied on “omissions, strawmen, and generalities.”³

The proposed 2021 statement would have reintroduced the nuance present in the 2013 statement. As I explained in my comments to the agencies,⁴ it “offer[ed] a balanced approach that considers the potential abuses on both sides of the table, offer[ed] an elaborate framework for good-faith negotiation, and set[] forth a strongly supported approach to remedies.”⁵ Despite this balance, the draft statement was met with a barrage of comments offering a narrow, one-sided view of innovation.

For example, several comments anticipated that it was only the intellectual property (IP) of the initial inventor (as opposed to anything contributed by “implementers”) that was responsible for innovation. Scholars of “law, economics, and business” stated that IP “significantly boosts innovation” and that “insufficient protection of [IP] generates more severe welfare losses than its overprotection.”⁶ These scholars warned

2 DOJ & PTO, Policy Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments, Jan. 8, 2013, <https://www.justice.gov/atr/page/file/1118381/download>.

3 Michael A. Carrier, *New Statement on Standard-Essential Patents Relies on Omissions, Strawmen, Generalities*, Jan. 13, 2020, <https://news.bloomberglaw.com/ip-law/insight-new-statement-on-standard-essential-patents-relies-on-omissions-strawmen-generalities>.

4 Michael A. Carrier, *Comments on Draft Policy Statement on Licensing Negotiations and Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments*, at 2, Dec. 27, 2021, <https://www.regulations.gov/comment/ATR-2021-0001-0004>.

5 Carrier comments, *supra* note 4.

6 Comments of Scholars of Law, Economics, and Business, at 8, Feb. 4, 2022, <https://www.regulations.gov/comment/ATR-2021-0001-0115>.

that “[e]ven small erosions of [IP] protection are . . . liable to have outsized effects, as freeriding soon becomes a viable strategy,” which “may lead to underinvestment and economic stagnation.”⁷ Similarly, the Innovation Alliance stated that “[t]he U.S. innovation ecosystem is premised on private sector investments of money and talent which is only possible through the incentives provided by strong patent protections.”⁸

Another theme from these commenters was that the draft statement threatened innovation. A group of “legal academics, economists, and former government officials” asserted that the statement “disadvantages U.S. innovators” and “undermines [their] ability to continue investing in the development and commercialization of the foundational wireless technologies that have enabled transformative innovations in markets as disparate as transportation, finance, and healthcare.”⁹ This group concluded that it is “difficult to overstate the risks to the U.S. innovation economy.”¹⁰

Similarly, “former officials from Democratic and Republican Administrations” lamented that the draft statement “would work great harm to the American innovation economy and send a dangerous message to our global competitors regarding the value and enforceability of [IP] rights.”¹¹ The officials worried that “[t]hose who voluntarily contributed technology may simply decide that the hurdles to recouping their investments cannot be justified from a business perspective, resulting in capital being diverted away from technology destined for contribution to standards, or from technology-based innovation altogether,” with “[d]eferred investments in research and development . . . necessarily lead[ing] to decreased innovation.”¹²

In the four years preceding these comments, Makan Delrahim, the head of the Antitrust Division in the Trump administration, had voiced similar views. Delrahim stated that “an antitrust duty to license on FRAND terms would . . . contravene the patent laws’ policy of promoting innovation by offering incentives for holders of valid patents to seek the greatest rewards possible for their inventions.”¹³ Similarly, he “worr[ied]” that “enforcers have strayed too far in the direction of accommodating the concerns of technology implementers who participate in standard-setting bodies, and perhaps risk undermining incentives for IP creators, who are entitled to an appropriate reward for developing breakthrough technologies.”¹⁴ And he lamented that “misapplication of the antitrust laws threatens to disrupt the free-market bargain, which could undermine the process of dynamic innovation.”¹⁵

Delrahim additionally worried that “in recent years, competition policy has focused too heavily” on holdup, “often ignoring what fuels dynamic innovation and efficiency.”¹⁶ He viewed “every incremental shift in bargaining leverage toward implementers of new technologies acting in concert” as potentially “undermin[ing] incentives to innovate.”¹⁷ As a result, he “view[ed] policy proposals with a one-sided focus on the holdup issue with great skepticism because they can pose a serious threat to the innovative process.”¹⁸

Delrahim’s arguments, together with the comments on the draft 2021 statement, had a significant effect. Delrahim changed longstanding bipartisan government positions, gave speeches considered by SDOs and foreign enforcers, and oversaw the filing of amicus briefs and

7 *Id.*

8 Innovation Alliance, Public Submission, at 6, Feb. 4, 2022, <https://www.regulations.gov/comment/ATR-2021-0001-0123>.

9 *Comments on Draft Policy Statement on Licensing Negotiations and Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments*, at 4-5, Feb. 4, 2022, <https://www.regulations.gov/comment/ATR-2021-0001-0136>.

10 *Id.* at 5.

11 *Comments of Former Administration Officials on December 6, 2021 “Draft Policy Statement on Licensing Negotiations and Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments,”* at 2, <https://www.regulations.gov/comment/ATR-2021-0001-0086>.

12 *Id.* at 6.

13 Ass’t Att’y Gen. Makan Delrahim, Remarks at IAM’s Patent Licensing Conference (Sept. 18, 2018), <https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-iam-s-patent-licensing>.

14 Ass’t Att’y Gen. Makan Delrahim, Remarks at the USC Gould School of Law’s Center for Transnational Law and Business Conference (Nov. 10, 2017), <https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-usc-gould-school-laws-center>.

15 *Id.*

16 *Id.*

17 *Id.*

18 *Id.*

issuance of business review letters.¹⁹ And the comments on the 2021 statement likely played a role in the agencies not adopting the statement. The effect of these arguments, however, is not matched by their persuasiveness.

IV. INITIAL INVENTION CRITIQUE

The first problem that arises from linking innovation with only the initial patentee's contribution is that it ignores the advances contributed by companies that build on the patented invention. As industry organizations have explained, "the assumption that only the upstream inventions that are contributed to standard-setting activities merit protection is . . . incorrect."²⁰ The reason is that "companies that implement standards both make important technical contributions to develop the standards they implement and innovate above the level of a standard to create differentiated products that consumers want to buy."²¹

On an individual level, a single product "can contain a multitude of technological innovations separate and apart from a given SEP."²² For example, "different wireless access points may implement the same standard, but differ significantly relative to other features, such as . . . antenna design, configuration and management, and interference management features that go beyond the standard."²³ Because of this differentiation, "a large enterprise may spend hundreds of dollars for an enterprise-class access point that implements the same standard as a consumer access point that is available for less than 50 dollars at a consumer electronics retailer."²⁴

The smartphone reflects this reality. This device includes "an advanced microprocessor, a sophisticated graphics processor, flash memory, DRAM [dynamic random-access memory], location awareness technology, touch technology, voice recognition, high-definition still and video cameras, video and music replay, power management technology, and an advanced operating system."²⁵ Each of these technologies "provide[s] benefits to end users that are independent of the cellular technology that enables telephony connections."²⁶

V. CUMULATIVE INNOVATION

A focus on subsequent — as opposed to just initial — invention fits into a well-established literature on cumulative innovation. This type of innovation proceeds in a sequential fashion, with innovators "build[ing] on each other's discoveries."²⁷ Industries characterized by cumulative innovation call for nuanced analysis: the optimal breadth of patents is unclear, since stronger patent protection helps the initial innovator but hurts subsequent, "follow-on" innovators, and licensing is critical to keep the path of innovation flowing.²⁸

Cumulative innovation occurs in two primary contexts. In the first, "basic" upstream research is the building block for downstream product applications. The basic research, which has no commercial value by itself, creates gateways — often referred to as enabling technologies or research tools — to products.²⁹ The second context involves lengthy sequences of products, each of which improves upon its predecessor, which are known as "quality ladders."³⁰

19 Michael Carrier, *4 Ways Kanter Should Clean Up DOJ Antitrust Holdups*, LAW360, Nov. 17, 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3966557 (providing detail on these actions).

20 Letter from ACT, The App Ass'n et al., to Ass't Att'y Gen'l Makan Delrahim, at 23 (May 30, 2018), http://actonline.org/wp-content/uploads/05302018_Multi-Assn_DOJ-SEP-White-Paper_FINAL.pdf. See also *id.* at 7 (criticizing distinction between upstream "innovators" and downstream "implementers").

21 *Id.*

22 *Id.*

23 *Id.*

24 *Id.*

25 *Id.* at 24.

26 *Id.*

27 See Suzanne Scotchmer, *Cumulative Innovation in Theory and Practice* (GSPP Working Paper, 1999) (on file with author). See generally Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. ECON. PERSP. 29 (1991).

28 See generally Scotchmer, *Standing on the Shoulders of Giants*, *supra* note 27.

29 Scotchmer, *Cumulative Innovation*, *supra* note 27, at 10.

30 *Id.* at 10, 13.

Cumulative innovation occurs in industries as diverse as automobiles, aircraft, biotechnology, semiconductors, computer hardware, and computer software.³¹ Computer software, for example, can be viewed as “a series of inventions piled on top of each other.”³² Incremental improvement in computer programs offers several advantages: enhancing interoperability, rendering programs more stable, and responding to hardware-based architectural constraints in the industry.³³ Science-based technologies (such as biotechnology, lasers, and superconductors) also emphasize cumulative development, with research and development (“R&D”) efforts seeking to exploit recent scientific advances.³⁴

Across the entirety of industries marked by cumulative innovation, bottlenecks can block the path of innovation, with the latest product generation held hostage to its predecessor. Such holdups are the inevitable consequence of (1) the incremental fashion in which innovation proceeds in certain industries and (2) the patent system, which awards improvement patents to inventions that may be nonobvious to a person skilled in the relevant art but nonetheless cannot be practiced without infringing the earlier patent. The presence of bottlenecks in industries with cumulative innovation necessitates licensing between the initial and follow-on innovator. And it underscores the crucial role played by follow-on development.

VI. PATENT LAW

Patent law supports the economic understanding about innovation. As Doug Melamed and Carl Shapiro have explained, “the patent laws are intended to limit, not maximize, the royalties to which patent-holders are entitled.”³⁵ The patent statute limits infringement remedies to compensatory damages not less than a “reasonable royalty” and enhanced damages up to a specified maximum.³⁶

Many cases have limited the amounts a patentee can recover,³⁷ with William Lee and Doug Melamed pointing out that “courts generally show concern about overcompensating standard-essential patent-holders.”³⁸ For example, the court in *Ericsson, Inc. v. D-Link Systems, Inc.* made clear that “the patentee’s royalty must be premised on the value of the patented feature, not any value added by the standard’s adoption of the patented technology.”³⁹ Similarly, the court in *Commonwealth Science & Industrial Research Organization v. Cisco Systems, Inc.* explained that the value of the patented technology “is distinct from any value that artificially accrues to the patent due to the standard’s adoption,” and that “[w]ithout this rule, patentees would receive all of the benefit created by standardization — benefit that would otherwise flow to consumers and businesses practicing the standard.”⁴⁰ And the court in *Microsoft Corp. v. Motorola, Inc.* stated that “standards threaten to endow holders of standard-essential patents with disproportionate market power” and that “once a standard has gained such widespread acceptance that compliance is effectively required to compete in a particular market, anyone holding a standard-essential patent could extract unreasonably high royalties from suppliers of standard-compliant products and services.”⁴¹

31 Thomas M. Jorde & David J. Teece, *Innovation, Cooperation, and Antitrust*, in ANTITRUST, INNOVATION, AND COMPETITIVENESS 48 (Thomas M. Jorde & David J. Teece eds., 1992); Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979–1995*, 32 RAND J. ECON. 101, 102 (2001); Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 1987 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 788; Scotchmer, *Cumulative Innovation*, *supra* note 27, at 1.

32 FED. TRADE COMM’N, ANTICIPATING THE 21ST CENTURY: COMPETITION POLICY IN THE NEW HIGH-TECH, GLOBAL MARKETPLACE, ch. 8, at 18 (1996); Scotchmer, *Standing on the Shoulders of Giants*, *supra* note 27, at 29. Bessen & Maskin demonstrate that because of the sequential and complementary nature of innovation in the software industry, patent protection has reduced innovation and social welfare. They substantiate their hypotheses with observations of cross-licensing in the computer and semiconductor industries, the positive relationship between innovation and firm entry, and the correlation between the extension of patent protection to software in the 1980s and a relative decline in R&D activity. See James Bessen & Eric Maskin, *Sequential Innovation, Patents, and Imitation* (MIT Working Paper No. 00-01, 2000), <http://www.researchoninnovation.org/patent.pdf>.

33 Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1620–22 (2003).

34 Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 883 (1990).

35 A. Douglas Melamed & Carl Shapiro, *How Antitrust Law Can Make FRAND Commitments More Effective*, 127 YALE L.J. 2110, 2121 (2018).

36 See 35 U.S.C. § 284 (2012).

37 See e.g. *Microsoft Corp. v. Motorola, Inc.*, 795 F.3d 1024, 1031 (9th Cir. 2015); *VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1326 (Fed. Cir. 2014); *In re Innovatio IP Ventures, LLC Patent Litig.*, 2013 WL 5593609 (N.D. Ill. Oct. 3, 2013); *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324 (Fed. Cir. 2009).

38 William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385, 430 (2016) (emphasis in original).

39 773 F.3d 1201, 1232 (Fed. Cir. 2014).

40 809 F.3d 1295, 1305 (Fed. Cir. 2015).

41 696 F.3d 872, 876 (9th Cir. 2012).

VII. IDENTITY

A final point that calls into question the linkage between the initial inventor and innovation involves the identity of the companies that have made the narrow arguments summarized in this piece. These actors criticized the proposed 2021 statement, which, as discussed above, would have reintroduced balance. But empirical analysis casts doubt on the assumption that these are the only companies that contribute to innovation. After reviewing the comments filed with the government, Brian Scarpelli concluded that “[t]he companies supporting the revisions” — in other words, follow-on developers rather than SEP holders — “play a significant role in American innovation.”⁴² In particular:

- “The R&D expenditures from U.S. companies directly supporting reasonable limits on exclusionary relief exceeds \$170 billion, dwarfing the \$8 billion spent on R&D by U.S. companies opposing them.”⁴³
- “Supporters of the revised policy have been granted about 220,000 patents compared with about 30,000 patents by those that oppose it.”⁴⁴
- “[O]f the 2.2 million U.S. jobs created by companies that responded . . . , 97% were created by companies that support the agencies’ reasonable restrictions on exclusionary relief for SEPs.”⁴⁵

In short, a narrow set of SEP holders does not offer the only relevant perspective on innovation.

VIII. CONCLUSION

The claim that innovation will be harmed by even modestly limiting the rewards for the initial generation of inventors has been loudly voiced. But this finite category cannot claim to be the exclusive engine of innovation. The crucial role played by licensees, cumulative nature of innovation, limiting doctrines of patent law, and stakeholders’ contributions ensure a central place in innovation analysis for follow-on developers.

⁴² Brian Scarpelli, *Biden Should Act Now To Finalize SEP Draft Policy Statement*, LAW360, May 9, 2022.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*



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