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The Value of Royalty Free Standards

Synopsis

Royalty-Free ("RF") licensing of standard-essential patents ("SEPs") has enabled the rapid proliferation of some of the most successful and widely adopted technical standards, including technologies found in nearly every smartphone and laptop on the market today. While there have also been many widely successful royalty-bearing standards for which licenses to SEPs are promised on fair, reasonable, and non-discriminatory ("FRAND") terms, where the market opportunities exist to incentivize innovators to pursue and support RF standards, those RF standards provide enormous consumer benefits.

As detailed below, when participants choose to develop RF standards, the following benefits are observed:

- Competition between RF and royalty-bearing standards promotes innovation and consumer welfare because contributors strive to improve the quality of the standards and the price of products is reduced. In effect, consumers benefit by having more available options.
- RF licensing simplifies and substantially lowers the costs of using standardized technologies, and thus promotes speedy and expansive adoption of technical standards. Simplifying and lowering implementation costs in this way reduces barriers to entry for everyone and especially for small and midsize potential licensees, including licensees producing low-margin products. Those firms can efficiently incorporate interoperability standards with little to no royalty costs.
- The propensity for patent "hold up" and other abuses by SEP holders, which can raise the costs of implementation beyond what the marketplace can reasonably bear and inhibit innovation, is reduced or eliminated for standards produced under an RF licensing policy.

- Consumers benefit from RF licensing policies because they promote quicker and easier consumer access to transformative technologies, and broader downstream competition among products, resulting in more options, better quality, and lower prices.

- Even without the prospect of contributors monetizing their SEPs, RF standards have attracted substantial technical contributions from many of the world's most innovative companies, which are incentivized by the expansive marketplace opportunities created by the rapid proliferation of the standards. The success of RF standards proves that profits that follow from market development and expansion create significant incentives to innovate, which can in many cases be even more powerful than the potential to monetize patents.

Further, as shown in this paper, Reciprocity Provisions found in RF licensing policies—provisions that require licensees receiving RF licenses to agree to license their own SEPs for that standard on RF terms—preserve the enormous benefits of RF licensing because contributors to the standard need not worry that implementers of the standard will take advantage of an RF license while simultaneously asserting patent claims against other implementers. Reciprocity Provisions are common to almost all IPR policies. For RF licenses with Reciprocity Provisions, those who choose to monetize their patents cannot free ride on the non-monetized contributions of others. Reciprocity Provisions minimize the potential for monetizing parties to disproportionately raise the cost of the standard to others by charging other implementers royalties, thus putting others at a competitive disadvantage and slowing the standard's adoption to the detriment of consumers.

Reciprocity Provisions are narrowly tailored to preserve the enormous benefits of RF licensing. Importantly, these provisions do not limit a patentee's ability to collect royalties unless the patentee accepts an RF license itself and, even then, the provisions only limit the ability to collect royalties for implementations of that RF standard, and not for other implementations that the patents may read on.

In this paper, we address these and other procompetitive benefits of RF licensing. We also raise and respond to claims that RF licensing policies act to reduce innovation incentives, claims that are both logically flawed and contrary to the evidence.

1. Why RF Standards Are Successful

RF licensing models have been adopted by many standards development organizations ("SDOs") with the goal of promoting swift and widespread adoption of their technical standards. Prominent SDOs adopting RF licensing policies include the Worldwide Web Consortium ("W3C"), the Bluetooth Special

Interest Group ("Bluetooth SIG"), and the USB Implementers Forum ("USB-IF").[1] While specific policies may differ, in general, RF licensing policies require SDO participants to agree that they will license SEPs royalty free to any company that wishes to take a license ("RF Commitment"). The policies typically include safeguard "opt-out" mechanisms as well, which allow participants to identify specific Intellectual Property Rights ("IPR") that they are not willing to license royalty free. These opt-out provisions typically require a disclosure that allows the SDO to design the standard around those IPR where practicable. Finally, the RF Commitment usually allows the licensor to condition the RF license on the licensees who reciprocate by offering RF licenses to their SEPs applicable to that same standard ("Reciprocity Provisions").

The success of standards supported by RF licensing, and the substantial voluntary participation by leading innovators, is a testament to the procompetitive dynamics RF licensing fosters. For example, the Bluetooth SIG was founded in 1998 by Ericsson, IBM, Intel, Nokia, and Toshiba with an RF licensing model. Today, according to Bluetooth SIG, 100% of new smartphones, tablets, laptops, wireless headphones, smart watches, and smart speakers include Bluetooth. An estimated 7 billion Bluetooth-enabled devices will ship annually by 2027.[2] Similarly, the royalty-free USB standard was initially developed by Compaq, IBM, DEC, Microsoft, Intel, Nortel, and NEC.[3] USB has since become ubiquitous in desktops, tablets, laptops, printers, scanners, flash drives, monitors, and many other devices. The standard has improved technically as well, with data transfer speeds growing from 12 Mbps in 1996 to up to 40 Gbps today (and will increase to up to 80 Gbps with the next version of the standard). Earlier this year, in fact, the European Parliament voted to make almost all phones, tablets, and cameras USB-C compliant by 2024, and laptops by 2026.[4] These are just a few well-known examples, but RF standards are numerous. Studies estimate that 21% of the standards included in a laptop and 41% of the standards embedded in a smartphone are royalty free.[5]

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[1] Worldwide Web Consortium Patent Policy, https://www.w3.org/Consortium/Patent-Policy-20040205/; Internet Engineering Task Force, Intellectual Property Rights Policy, https://www.rfc-editor.org/info/bcp79; Bluetooth Patent/Copyright License Agreement, https://www.bluetooth.com/about-us/governing-documents/; USB 3.0 Adopters Agreement, https://usb.org/document-library/usb-30-adopters-agreement.

[2] https://www.bluetooth.com/2022-market-update/.

[3] "USB: Everything You Need to Know," 12 January 2022, available at https://history-computer.com/usbguide/, and Jeffrey Smoot, "The History of USB Standards from 1.0 to USB 4," available at https://www.cuidevices.com/blog/the-history-of-usb-standards-from-1-to-usb4/.

[4] https://www.europarl.europa.eu/news/en/headlines/society/20220413STO27211/usb-type-c-to-become-eu-s-common-charger-by-end-of-2024.

[5] Ann Armstrong, Joseph Mueller & Timothy Syrett, "The Smartphone Royalty Stack Stack: Royalty Demands for the Components Within Modern Smartphones" (2014), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2443848; Brad Biddle, Andrew White & Sean Woods, "How Many Standards in a Laptop? (and Other Empirical Questions)" (2010), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1619440 ("Biddle et al.").

The worldwide web is also rooted in RF standards.[6] The core technologies of HTML and HTTP are promulgated by W3C and supported by RF licensing policies.[7] The widespread use of these and other RF standards in the internet has shaped the modern world, spawned new industries, and lowered barriers to entry and expansion for countless companies worldwide. Importantly, W3C has developed and promulgated these now ubiquitous RF standards despite counting among its more than 400 members[8] innovators every bit as motivated by the goal of profit maximization as any other businesses are.[9]

The success of RF licensing can largely be attributed to the fact that RF licensing policies lower the risk that excessive SEP royalty demands and the threat of SEP injunctions will slow down or prevent the marketplace from adopting the standard in development. Those risks are real. There are hundreds of technical interoperability standards; one study estimates that a modern laptop incorporates 251 technical standards.[10] An estimated 75% of those found in the laptop are royalty bearing.[11]

Some SEP holders take advantage of the position that they have been granted due to the inclusion of their patents in the standard to demand exorbitant royalties, far higher than the royalties they would have been able to obtain based on the intrinsic value of the technology before it became essential to the standard.[12] This type of patent "hold up" can raise the costs of implementation so high that it slows the marketplace adoption of the standard. In these cases, royalty demands and threats of injunctions can have significant detrimental impact by raising the costs of implementation so high that fewer downstream competitors can adopt it. If adopted those increased costs get passed onto consumers. In some extreme cases, vertically integrated SEP licensors could potentially use royalty leverage to hamper or even foreclose competition from downstream competitors.[13]

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[6] Jorge L. Contreras, "Patents and Internet Standards." *Global Commission on Internet Governance paper series* (2016), at 13., available at https://www.researchgate.net/publication/304328950_Patents_and_Internet_Standards ("Contreras, Patents and Internet Standards") ("[T]he primary SDOs responsible for Internet standards, the IETF and W3C, have evolved strong policies and norms favouring RF standards.").

[7] https://www.w3.org/Consortium/facts.

[8] W3C member list found at https://www.w3.org/Consortium/Member/List.

[9] Contreras, Patents and Internet Standards, note 6, at 13.

[10] Biddle *et al.*, note 5.

[11] *Id*.

[12] *Id*.

[13] To combat the anticompetitive effects of SEP hold-up, many SDOs adopted policies requiring technical contributors to commit to licensing SEPs on Fair, Reasonable, and Non-Discriminatory terms ("FRAND"). FRAND policies are intended to, and often succeed at, curbing SEP hold-up. But even where FRAND policies are in place, royalty-bearing standards often remain prone to abuse by SEP holders who misinterpret those policies, leading to costly litigation and/or the threat of injunction (despite the fact that SEP injunctions themselves are inconsistent with the voluntary FRAND commitment). In some cases, so many firms may claim to hold SEPs for a particular standard that it creates a patent thicket. Even if all SEP holders charge what in isolation appears to be "modest" royalties, the total "royalty stack" significantly increases the costs of adoption, slowing the pace of

RF licensing substantially reduces the risk of patent hold-up.[14] It minimizes disputes over SEP royalty rates and significantly reduces the cumulative impact of even a "stack" of SEP royalty rates on implementations. By eliminating, or at least substantially reducing, the costs and uncertainty of royalty demands, the RF standard becomes simpler, less risky to implement, and thus more widely available sooner. As one scholar notes, RF policies promote distribution of technologies with less "friction" and thus "reduce transaction costs."[15] Practically speaking, completing RF licenses should take substantially less human capital, and be substantially less time-consuming, than negotiating royalty rates for what may be a large number of SEPs.

2. The Downstream Benefits of RF Licensing Provide Substantial Innovation Incentives

When innovators choose RF licensing models it is because of the opportunities RF licensing creates in downstream markets that use the technologies.[16] It is well accepted that the interoperability made possible by technical industry standard setting is beneficial to consumers because it typically enables more competition among implementing technologies and allows for better integration of complementary consumer products and devices.[17] For the same reasons, interoperability enabled by RF standards is beneficial to suppliers in the market too. That is why many of the world's most innovative technology companies readily participate in SDO development and make technical contributions on a royalty free basis. These vertically integrated companies—both SEP holders and downstream innovators—benefit from the adoption of standards even if they do not charge royalties because quick and widespread adoption of the standard increases market opportunities downstream. Even firms that do not supply downstream implementations may be incentivized to contribute to technical standards where they also provide complementary royalty bearing technologies to potential licensees. There are many circumstances where SDOs adopt royalty-bearing FRAND models and produce successful standards. But in the many instances in which leading innovators voluntarily contribute to RF standards the calculation for these vertically integrated firms is straightforward: the

adoption by larger firms and inhibiting the adoption of the standard by smaller and mid-size firms that cannot afford to navigate the patent thicket. SEP abuse by licensors seeking supra-FRAND royalties can also have downstream effects, increasing the cost to consumers.

[14] Jorge L. Contreras, "Technical Standards and 'Ex Ante' Disclosure: Results and Analysis of an Empirical Study" *Jurimetrics*, vol. 53, no. 2, 2013, pp. 163–211, at 178 (describing royalty-free policies as a subspecies of ex ante FRAND commitments).

[15] Greg R. Vetter, "Open Source Licensing and Scattering Opportunism in Software Standards," 48 B.C. L. Rev. 225, 247 (2017).

[16] Martin Husovec, "Standardization, Open Source and Innovation: Sketching the Effect of IPR Policies," in Cambridge Handbook of Technical Standards Law 177 (2019).

[17] Jiaming Jiang, Rajeev Goel, & Xingyuan Zhang, "IPR Policies and Determinants of Membership in Standard Setting Organizations: A Social Network Analysis," 21 NETNOMICS: Economic Research and Electronic Networking 129, 132 (2020) (noting that SDOs have many procompetitive benefits, including lessening barriers to entry, increasing competition, reducing costs, and increasing consumer welfare).

benefits of RF licensing (quicker and more widespread adoption compared to royalty-bearing standards) outweigh the costs (foregone royalties on SEPs).[18]

Once again, the Bluetooth, USB, and HTML success stories above confirm these dynamics. In fact, in a recent study, two researchers analyzed W3C's 2003 transition from a royalty-bearing FRAND policy to an RF licensing policy and concluded that SDOs that moved from royalty-bearing to royalty-free IPR models experienced "no discernible impact on participation" or the work of the organization.[19] In fact, the researchers noted a 20% increase in contributions from the 50 largest contributors to W3C following implementation of RF licensing. They concluded, "[w]e interpret these results as evidence that any link between IPR policies, innovation, and SDO participation is much weaker than purely theoretical arguments to the contrary often suggest."[20]

3. Impacts on Royalty-Seekers Are Procompetitive

A critical feature of the RF licensing model is that it is voluntary, both for those that participate in the standard-setting process, as well as those who choose to implement the resulting standard in their products or services. Innovators that participate in the standard-setting process choose to do so, knowing they are foregoing potential patent monetization, because they anticipate that they will benefit from the speedy and broad adoption of the standard. Those firms—including those that prioritize royalty revenue—may choose instead to contribute only to SDOs that promulgate royalty-bearing standards. That incentive enhances consumer welfare because a royalty-bearing standard and an RF standard may compete on technical merits. That competition in upstream technology markets, as with competition in product markets, provides yet further incentive to innovate.

In fact, in cases where RF and royalty-bearing standards compete, the availability of RF standards can provide a competitive constraint on royalty-bearing standards and may even temper much of the patent hold-up (including FRAND abuse) described above from occurring with respect to competing standards. For example, the royalty-free USB standard achieved greater commercial success than the royalty-bearing IEEE 1394 (FireWire) standard, leading researchers to note that competition from royalty-free standards "can act as a check on the market power of the owners of standard essential

[18] Jorge L. Contreras, "Patents and Internet Standards," see footnote 6 above, at 13 ("A range of commercial considerations motivate firms to relinquish potentially profitable exploitation of their patent rights in the service of broader commercial goals, such as the seeding of new markets, the establishment of technological leadership and the desire to achieve industry-wide interoperability.").

[19] Timothy S. Simcoe & Qing Zhang, "Does Patent Monetization Promote SSO Participation," 29 November 2021, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3973585.

[20] *Id.*

technology."[21] Similarly, RF standards development has occurred in response to concerns regarding royalties, including W3C and the Wireless Gigabit Alliance, which "wanted to develop a gigabit-speed wireless LAN standard on a royalty-free basis."[22] The fact that competing RF standards may impact the royalties that SEP holders may seek from implementers of competing royalty-bearing standards, however, is not anti-competitive and does not reduce any protectable innovation incentive. No firm is entitled to be free from competition.

4. Reciprocity Provisions Facilitate the Procompetitive Benefits of RF Standards

Reciprocity Provisions are necessary to preserve the innovation incentives standardization generates. The Reciprocity Provisions of most standards – including RF standards – ask that SEP owners give others the same benefits as they receive. Thus, if a party receives FRAND or RF licenses, it is conditional on that party granting the same license to others.

Reciprocity Provisions in an RF context avoid the obvious unfairness of one company voluntarily contributing time and resources to the development of a standard, agreeing to license its SEPs on an RF basis to support the rapid adoption of that standard, and then having to pay royalties to another company that is implementing the standard royalty free. That risk might otherwise deter participation in the development of RF standards.[23] Relatedly, Reciprocity Provisions prevent implementers that voluntarily agree to RF licensing from themselves undermining the benefits of RF licensing policies. These provisions reduce the potential that non-participants who implement the standard will impose substantial royalty burdens on implementations of the RF standard, which would increase the costs of implementing the standard and potentially slow the rapid adoption of the standard. Non-participating implementers imposing royalties would potentially make the standard unavailable to small and midsize firms, or firms selling low-margin products, and many of the consumer benefits that flow from RF licensing would be reduced. Implementers seeking royalties on RF standards could lead to only products with margins large enough to support significant payments to SEP licensors, limiting the choices consumers have and increasing how much they pay for the choices that remain. At a minimum, Reciprocity Provisions enhance downstream competition by helping to ensure a level playing field

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[21] See Justus Baron, Jorge L. Contreras, Martin Husovec, Pierre Larouche, and Nikolaus Thumm, "Making the Rules: The Governance of Standard Development Organizations and their Policies on Intellectual Property Rights," TILEC Discussion Paper DP 2019-021, October 2019, at 64, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3364722.

[22] *Id*. at 69.

[23] Eli Greenbaum, "Puzzles of the Zero-Rate Royalty," *27 Fordham Intell. Prop. Media & Ent. L. J.* 1, 27 (2016) ("These provisions can reassure potential participants that their involvement in a standards process or open source development will not be abused by potential rivals."); John M. Murray, "Antitrust and Patent License Agreements: A New Look at the Grantback Clause in High Technology Markets," *3 Case W. Res. J. L. Tech. & Internet 299*, 306-307 (2012) ("Thus, without grantback clauses, important technology might not be disseminated between firms. Dissemination of technology can have important competitive effects that should not be discounted, particularly in high technology markets.").

among potential licensees, reducing the risk that some enjoy RF implementation and others pay a high cost for the same technologies. In this way, Reciprocity Provisions are an essential part of RF licensing policies. As explained above, the RF licensing that generates substantial downstream competition and consumer benefits attracts innovators because the RF license promotes rapid adoption of standards and increased marketplace opportunities. Reciprocity Provisions aim to preserve those benefits, and thereby preserve incentives for innovators to contribute time and resources to RF standards development.[24]

Further, Reciprocity Provisions do not harm innovation incentives. While the justifications for Reciprocity Provisions are strong, any potential risks are dubious and, even if material, are far outweighed by the procompetitive benefits of RF licensing. The primary argument raised against Reciprocity Provisions is that they allegedly eliminate a licensee's ability to obtain compensation for an SEP it holds over the same standard and thereby undermine incentives to innovate. First, the argument ignores that the licensee obtains substantial value in the form of licenses to standardized technology on an RF basis. Indeed, the same downstream market opportunities that incentivized the SDO participants to license their patents on an RF basis are available to the licensee. Second, the reciprocity commitment is narrow in that it only applies to the use of SEPs for that standard, leaving the licensee free to monetize those patents in other implementations and other standards. Finally, the Reciprocity Provision is voluntary as no one is forced to license the implementation. A company could choose to use only a royalty bearing standard and not a competing RF standard. Justifiably, they would not be able to employ others' proprietary technology for free if they are not prepared to reciprocate. The reciprocity provisions have no impact on non-implementers, who remain free to obtain licensing fees for any SEPs they may possess.

Conclusion

RF licensing models have proven successful and have been major drivers of technical innovation that improves the lives of users everywhere. Where innovators are willing to collaborate and contribute technology on an RF basis, those innovators benefit from the downstream markets that RF licensing opens and expands, and so do consumers. To the extent RF standards compete with and impact pricing of royalty-bearing standards and abusive practices such as "hold up" by SEP holders, that is beneficial to competition from which no market participant should be insulated. Finally, to the extent that

[24] See the paper by twenty one academics that highlights the need to preserve the royalty free standards ecosystem: Contreras, Jorge L. and Bekkers, Rudi and Biddle, Brad and Bonadio, Enrico and Carrier, Michael A. and Chao, Bernard H. and Duan, Charles and Gilbert, Richard and Henkel, Joachim and Hovenkamp, Erik and Husovec, Martin and Jakobs, Kai and Kim, Dong-hyu and Lemley, Mark A. and Love, Brian J. and McDonagh, Luke and Scott Morton, Fiona M. and Schultz, Jason and Simcoe, Timothy S. and Urban, Jennifer M. and Xiang, Joy, "Preserving the Royalty-Free Standards Ecosystem", University of Utah College of Law Research Paper No. 524, 28 October 2022, available at: https://ssrn.com/abstract=4235647.

developers of standards seek reciprocity from implementers of the RF standard, it is a reasonable and narrow condition necessary to preserve the incentives that generate the substantial procompetitive benefits RF standards provide.

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NOTE: The positions and statements presented in this paper do not necessarily reflect the detailed individual corporate positions of each member.