

Restoring and Revitalizing Technology Markets for Mobile Wireless

Geopolitical Dimensions of Patented Technology Embedded in Standards

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I. INTRODUCTION

Standards are important to the further development and rollout of technologies, including 5G and the Internet of Things (IoT), self-driving cars, and artificial intelligence (AI). The United States' technological leadership is no longer assured in many frontier technologies. Indeed, America's strategic rivals, and in particular China, are focused on and committed to taking away American, European, and Japanese technological and marketplace leadership in emerging technologies. Standards will play a role in such outcomes. This chapter focuses mainly on the licensing of standard-essential patents (SEPs) in foundational or "enabling" 5G wireless technology.

Many policy issues are at hand, have tremendous geopolitical consequences, and cannot be looked at in isolation. For instance, the US Department of Justice (DOJ) is reviewing its antitrust policies toward SEPs. These issues are complicated.

The best way forward with technology development is to incent business enterprises operating in the United States and in allied nations to invest heavily in research and development (R&D), as several of them have done in the past. Success in this regard will promote competition and is the best chance the liberal democracies have to maintain technological leadership – and, along with it, achieve long-term economic growth and national security while advancing long-term consumer welfare.

Given US industrial weakness in manufacturing, it is especially important that the research-intensive sector of the US economy remains viable and robust. The development of the foundational technologies stage of the value chain has anchored US competitive advantage in recent decades, and this advantage needs to be sustained and enhanced, if possible. Doing so will require maintaining the viability of the open innovation model in technology development under guidance from the

European Telecommunications Standards Institute (ETSI).¹ Competition authorities tend to applaud open innovation models,² because they favor new entrants (as compared to the vertically integrated model, which is in effect a closed model because research by the implementer is done in-house).

This chapter endeavors to scope the true nature of SEP issues. It will focus almost entirely on ETSI, whose intellectual property (IP) policy, and its functioning as a standards development organization (SDO), is important to the world economy. In particular, the development and future evolutions of 5G (and 6G that may follow it³) have considerable economic and geopolitical implications for the United States, Europe, and Japan. The chapter also explores the implications for US global technology leadership, competitiveness, and national security of taking a step backward by reinjecting specious antitrust concepts into the analysis.

II. INTELLECTUAL PROPERTY RIGHTS MATTER

In policy circles, there is an all-too-common failure to understand that the weakening of IP results in less innovation and undermines open innovation approaches, thereby favoring vertical integration. At a time when many policy-makers and analysts are concerned about (integrated) Big Tech,⁴ it is paradoxical that many of the same individuals favor the weakening of IP. Yet it is the SEP licensing model that enables open innovation and new entry into existing ecosystems. This policy contradiction indicates a lack of clear understanding that standards development, at least for mobile wireless, is an expensive undertaking that requires spending billions of R&D dollars to create new technologies, which get folded into technological ensembles that become next-generation standards technologies available for licensing to industry. The interoperability and interconnections aspect of SEP licensing is just the wrapper. In particular, five issues are often misunderstood and are addressed in this chapter. These issues arose from:

- ¹ David J. Teece & Edward F. Sherry, *The IEEE's New IPR Policy: Did the IEEE Shoot Itself in the Foot and Harm Innovation?* (Tusher Center for the Management of Intellectual Capital, Working Paper Series No. 13, Aug. 2016), <https://businessinnovation.berkeley.edu/wp-content/uploads/2014/07/Tusher-Center-Working-Paper-No.-13.pdf>.
- ² Open innovation is defined by Henry Chesbrough as the use of purposeful inflows and outflows of knowledge to accelerate internal innovation and expand the market for the external use of innovations. Open innovation eschews the model of closed or vertically integrated R&D where a company relies overwhelmingly on in-house R&D to build its technological capabilities. HENRY CHESBROUGH, *OPEN INNOVATION: THE NEW IMPERATIVE FOR CREATING AND PROFITING FROM TECHNOLOGY* (Harvard Business School Press 2003).
- ³ For a proposal for cooperative research efforts on 6G, see Bruce Guile & Albert Pisano, *International 6G R&D and Innovation Consortium* (BRG Institute, Project Working Paper 2, Oct. 2020), https://static1.squarespace.com/static/5d5f0079edocaf00014c2fe2/t/5ff4cb44a44aa3cf58d2c19/1609879244797/6G-Case-Statement_10-12-20_v2.pdf.
- ⁴ Vertically integrated, not only with respect to the research function but also with respect to design and manufacturing too.

- (i) An implicit belief that new standards technology arrives more or less like “manna from heaven.” The reality is that royalties from SEP licenses provide the income stream that supports the R&D that improves the underlying technology. If the royalty rate is reasonable, and if unlicensed use is minimized, the required R&D can be funded. Absent a robust patent licensing model, vertical integration (closed innovation) is the model that technology implementers would be forced to adopt.
- (ii) An implicit belief that standards development is little more than a matter of agreeing on interconnection protocols. It is quite different. In the case of mobile wireless, the SDO provides the platform for what is likely the largest cooperative R&D endeavor the world has ever seen – bigger and arguably even better than Bell Labs of yesteryear, the disappearance of which was unnecessary collateral damage from an antitrust-driven divestiture of AT&T, which paid too little attention to the future funding of breakthrough innovation.
- (iii) A failure to understand that only four to five companies, most of them in the United States and Europe, provide more than 80% of the most important technology that gets embedded in standards, and that there are over 1,000 implementers, a number that is likely growing with 5G and IoT.
- (iv) A failure to understand that unlicensed use of standards technology is common. Its presence threatens the technology licensing model and hence the open innovation business model that undergirds it.
- (v) A failure to understand that patents are not self-enforcing. Nor is there a unified global enforcement mechanism for SEPs. As a consequence, there is not only unlicensed usage but also forum shopping. Implementers try to “divide and conquer.”

These misunderstandings reflect a lack of appreciation that technological contributions to standards development (with the process managed under ETSI governance rules) require innovators to license their technology (and associated patent rights) to implementers, thereby giving up the right to sole use. This bargain works only if there is the expectation and the reality of royalty income sufficient to support past and future technology development activities. If this aspect is not understood and is not at the core of US public policy deliberations, then companies that seek to avoid paying market rates for the use of standards technology will likely succeed and, in doing so, undermine the long-term viability of the ecosystem. If policymakers and the courts allow even quasi free riding, the United States would be playing into the hands of those who have undermined US technological leadership, manufacturing capacity, and economic security.

A balanced approach is needed. If policy favors either side too much (implementers or upstream innovators), then the robust innovation ecosystem that has historically supported mobile wireless is put at risk.

In the early days of mobile wireless (that is, 2G and 3G), standardization activity was dominated or heavily influenced by vertically integrated firms. Today, the success of the open innovation global standards model has enabled nearly seamless wireless compatibility around the globe and allowed hundreds of new implementers to enter the mobile wireless ecosystem. These companies (for example, Apple, Samsung) typically do not contribute significant patented technology to assist in the creation of high-performance standards. They would prefer to use standards technology for free or for a nominal fee. Inasmuch as implementers can lobby government agencies, their sheer numerosity has tended to drown out the voice and perspective of technology developers. In 5G, for instance, the numbers of likely implementers are in the thousands, whereas the majority of the quality contribution comes from a small handful of companies (most notably, Qualcomm, Ericsson, Nokia, Interdigital, and Huawei) that spend heavily on R&D.⁵

In sum, for decades now interoperability standards have also incorporated technology covered by IP. However, this system is now at risk because the licensing landscape has changed somewhat: (1) The ratio of technology developers/contributors to implementers has diminished; and (2) US (and some foreign) antitrust agencies have injected antitrust issues⁶ into FRAND⁷ deliberations, creating uncertainty that has compromised the functioning of the market for technology. Some of this confusion was cleared up under Makan Delrahim's tenure as head of the DOJ Antitrust Division, but such progress is under threat of reversal under the Biden Administration.

III. THE GEOPOLITICAL ENVIRONMENT

A. *Complex System*

It is no longer acceptable – indeed, it is incredibly risky for Western democracies – for antitrust agencies to formulate policy without consideration of geopolitical consequences. Potential short-term domestic consumer welfare issues pale in comparison to many potentially existential geopolitical threats. Fortunately, dealing presciently with these issues will aid competition and innovation in the United States and elsewhere.

⁵ Huawei's success was aided by low-cost prior access to Western technology achieved by theft and antitrust actions. If the United States and other Western companies do not have the means to support ongoing R&D at the appropriate levels, then Huawei is likely to become the world's dominant technology provider in mobile wireless and related technologies.

⁶ At least in Europe, antitrust agencies intervened based on complaints submitted by implementers concerning licensor behavior.

⁷ FRAND stands for fair, reasonable, and nondiscriminatory (royalty rates).

There is reason for concern. In the past, antitrust enforcement actions (including by the Federal Trade Commission (FTC)) in the global technology marketplace have been misadventures in terms of their impact on not only competition but also US global competitiveness. Many are by now aware that China is endeavoring to stack international standards bodies with individuals who swear fealty to China. “China Standard 2035” lays out objectives for blockchain, quantum computing, AI, and other technologies. Impacting and controlling 5G standards development is also part of China’s national mission. The Western democracies must be mindful of these activities and the underlying strategy. It is important to prevent the politicization of the standards development process.⁸ The *14th Five-Year Plan for National Informatization* released in December 2021, for example, restates China’s goals to “create a closed-loop innovation mechanism” to promote “standards building” in prioritized areas such as 5G, Big Data, AI, blockchain, industrial Internet, and so forth, and accelerate the completion and perfection of existing data sharing and data application standard systems. It also anticipates greater integration of China’s information standards efforts into all sectors of the Chinese economy relying upon this “closed-loop” innovation system.⁹ Policymakers and executives and members of standards bodies must be mindful of these activities and the underlying strategy.

The United States’ antitrust policy, if the FTC is to be used as a guide, already has inadvertently strengthened the hand of China. The problems associated with standards technologies are not unlike the problems that the Western democracies are confronting with all emerging technologies. David Delpy, University College London, put it this way:

Now, it’s very difficult for countries to make sure that they get at least a fair share of the return on investment on emerging technologies If everybody’s playing by the same rules, it’s fine. But everybody isn’t playing by the same rules. The issue is, value capture: how do liberal economies capture value in a world where not everybody is liberal?¹⁰

Western democracies must double down on R&D and strengthen the technological capabilities of business firms. That is a big – but necessary – task. The required R&D must, in the main, be private sector funded. For private sector R&D investment to occur, national policy must make sure that SEP owners receive fair compensation, sufficient to support the business models of those Western firms

⁸ China may be somewhat delusional if it believes that providing monetary incentives for Chinese companies to put forward technologies will in and of itself sway professional bodies into not choosing the best technologies to incorporate in a standard.

⁹ DigiChina, *Translation: 14th Five-Year Plan for National Informatization – Dec. 2021* (Jan. 24, 2021), <https://digichina.stanford.edu/work/translation-14th-five-year-plan-for-national-informatization-dec-2021/>.

¹⁰ Richard Hudson, *New Year’s Resolution: Research Group Aims to Fix the Way the World Collaborates on Technology*, *Sci. Bus.* (Jan. 4, 2022), <https://sciencebusiness.net/news/new-years-resolution-research-group-aims-fix-way-world-collaborates-technology>.

that generate the technology that ends up as part of the standards technology ensemble. Supporting the SEP licensing process so that it can, in turn, support the R&D necessary for technology development ought to be the critical policy objective of the DOJ, the United States Patent and Trademark Office, and the US National Institute of Standards and Technology. If achieved, it also will support subsidiary goals with respect to competition and consumer welfare.

B. *The Changing Geopolitical Landscape*

“China Standards 2035,” mentioned in Section III.A, was a galvanizing publication that can serve to remind executives and policy analysts that they need to develop a broader perspective with respect to standards development and standards setting. This initiative builds on “Made in China 2025” and heralds plans and financial and regulatory support for Chinese enterprises, public and private, to take control of the decentralized private (and substantially professionally driven) global standard development process. If successful, China will change the governance of global business, which in turn will augment China’s geostrategic power. There are far-reaching consequences for international business, national security, and competition.

Chinese firms have already obtained substantial representation in the international standard-setting process. Unlike Western representatives, Chinese representatives, whether corporate or government, are held accountable to the nation-state. The Swedish Institute of International Affairs recently noted:

For decades, and almost unnoticed by the general public and politicians, technical standards have been a driving engine behind globalization . . . they [now] run the risk of turning into a core subject of great power competition over high technology . . . Europe emphasizes its commitment to rules-based institutions in world affairs. Hence, it cannot simply adapt the new power approach to technical standards, since this undermines the existing institutional framework.¹¹

The report further noted that China’s state-directed approach to standards development “radically breaks with both the U.S. and European approaches that are both industry driven.” Other sources draw attention to China, noting:

The CCP has seized on the importance of these [standards development] bodies for the dual and mutually reinforcing objectives of increasing national competitiveness and building international influence on technology adoption.¹²

¹¹ Tim Nicholas Rühling, *Technical Standardization, China and the Future International Order: A European Perspective*, SWEDISH INST. INT’L AFFS. (Feb. 2020), at 4–5, <https://eu.boell.org/sites/default/files/2020-03/HBS-Techn%20Stand-A4%20web-030320.pdf>.

¹² Lindsay Gorman, *The U.S. Needs to Get into the Standards Game – With Like-Minded Democracies*, LAW FARE (Apr. 2, 2020), www.lawfareblog.com/us-needs-get-standards-game--minded-democracies.

As a result, one might say that China is “inventing patents,” in the sense that it is diligent about filing for both minor and major inventions. It also is very active at standards-setting meetings and on standards-setting governance.

Unfortunately, there is sometimes limited sophistication in understanding what is going on in the global technology marketplace. Some of this flows from the misreading of patent statistics.

Citing patent analytics company iPlytics, an article in the *Wall Street Journal* recently noted that companies from China own “36% of all 5G standard essential patents” and that “U.S. firms including Qualcomm and Intel hold just 14%.” The article went on to state:

Chinese companies own such a significant share of the patents [that] the Western companies need to pay to license from them, that is, the net royalty payments will be from Western companies to Chinese companies.¹³

This statement could be true only if the quality of Chinese patents is equivalent to or better than Western companies’ patents, or if the infringing sales of Western firms are greater than that of Chinese firms. The licensing jurisdictions also need to be similar for such equivalences to be drawn.¹⁴ The famous quote “not everything that can be counted counts, and not everything that counts can be counted” seems relevant in this context. However, it would be very imprudent to assume that all Chinese patents are valueless.

Patent statistics can be misleading. Regardless, the United States and its allies – including other liberal democracies, particularly Sweden, Finland, South Korea, and Japan – still maintain a fragile lead, even as the trends do not favor liberal democracies. Policy mistakes now could lead to the rapid dissipation of this fragile leadership by the liberal democracies, with very negative knock-on effects for the US economy and competition. In the next section, I step back and review the context in which SEPs need to be understood – at least with respect to mobile wireless.

C. *The 5G Technological Ensemble*

The mobile wireless industry has a remarkable track record of developing continuously evolving and improving interoperable systems technology. GSM, Wideband Code Division Multiple Access (WCDMA), and, more recently, Long Term Evolution (LTE) are examples of successful technologies developed privately and separately, but combined by the 3rd Generation Partnership Project (3GPP), using consensus-driven governance, into a platform with massive economies of scale and scope.

Technology development for 5G occurs in a distributed manner with limited overall end-to-end supervision. A very few companies – such as Qualcomm, Nokia,

¹³ Don Strumpf, *Where China Dominates in 5G Technology*, WALL ST. J. (Feb. 26, 2019), www.wsj.com/articles/where-china-dominates-in-5g-technology-11551236701.

¹⁴ *Id.*

and Ericsson – work hard to help ensure a high degree of end-to-end operability. Without these special efforts, 3GPP could fail. As an organization, 3GPP does not have its own resources to sponsor the development of “gap-filling” technology that, on a standalone basis, may not be financially viable. The real contributions of individual members are hard to calibrate and are not measured merely by counting the number of technical contributions made or patents declared by particular companies.

With 5G, 3GPP has the task of governing a collaborative effort among hundreds of different entities with different interests and incentives. Governance comes in at the time technologies are to be considered for inclusion in a standard. It oversees an iterative, nonlinear, consensus-based approach to technology selection and resulting standards development – systems engineering managed privately and in a decentralized manner. It has worked well, in part because the professionals involved are engineers. Historically, an engineering culture and commercial considerations dominated, and politics were held at bay. Members collectively (by vote) decided on the best technologies to go into a “standard” or new technological ensemble. This may change as Chinese national politics intervene.

Participating firms need confidence that each technology advanced for consideration is robust, has been or will be tested, and can be manufactured, and that the requisite software and applications support will be available. Sponsors of technology then are required to demonstrate that the technology is or can be commercially viable. Hence, by the time that patented technology becomes embedded in the standard, it already has undergone an early assessment as to commercial viability. Licensing executives need to understand this process, as it indicates that patents that are “truly essential” have in all probability passed a litmus test of commercial viability, and thus are likely to have value if indeed they are truly essential and not just “declared essential” by the patent owner.

Feedback from the validation and testing activities is critical and often leads to further development of the technology and/or changes in specification. This process is shown in Figure 1.1. Steps in validation include review, modeling, prototyping, and “plug tests/plug fests,” where designers of equipment or software using the technology proposed for the standard test interoperability of products and designs with those of manufacturers. As standards go through revisions, multiple firms may submit proposals and work together toward final adoption of the standard.

The standard-setting for 5G is a continuous process. Updates are issued periodically. Licensing practices have evolved to support the open interoperable mobile wireless ecosystem, with royalties being set in the marketplace via negotiation at levels sufficient to encourage at least a few companies to make the large investment required to develop new 5G technologies.¹⁵

¹⁵ Qualcomm alone spends over five billion dollars a year mainly on foundational wireless technologies.

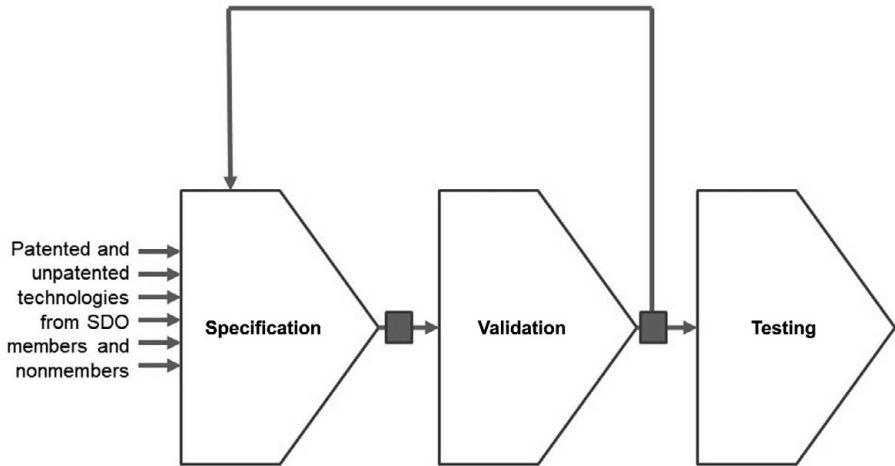


FIGURE 1.1. Some elements of standards development

D. *Technological Ensembles and the Global Open Standardization Miracle*

As noted earlier, some observers have the naïve belief that standard-setting is just a matter of choosing compatibility/interoperability standards – like choosing between two- and three-pin electrical sockets and plugs. In reality, the situation is radically different.

Standard development is a distributed global R&D activity that takes place under loose 3GPP/ETSI governance.¹⁶

It is perhaps helpful to recognize that 3GPP is akin to a special kind of global technology development consortium that functions as the mobile wireless ecosystem's R&D arm for developing, assembling, and then standardizing foundational technologies.¹⁷ Tens of thousands of engineers work on 5G foundational technologies. They are loosely coordinated by SDOs that work with 3GPP. This amazing technology development program – with billions of R&D dollars spent each year – is

¹⁶ In the 1980s and 1990s, the International Telecommunications Union (ITU) played a major role with standard-setting for fixed-line telecom. Under the ITU, a new organization that orchestrated mobile wireless technology development was born: 3GPP. The 3GPP was established in 1998 when ETSI partnered with seven other SDOs around the world to develop technologies for 3G cooperatively. 3GPP is the de facto nexus for the remarkable combining of research efforts by the companies that are inventing 5G wireless technologies. Qualcomm, *Understanding 3GPP – Starting with the Basics* (Aug. 2, 2017), www.qualcomm.com/news/onq/2017/08/02/understanding-3gpp-starting-basics.

¹⁷ *Id.*; David J. Teece, *Profiting from Innovation in the Digital Economy: Enabling Technologies, Standards, and Licensing Models in the Wireless World*, 47 *RSCH. POL'Y* 1367 (Oct. 2018).

mainly privately funded, and the technologies are combined in powerful ensembles by engineers operating under rules established by 3GPP/ETSI.

3GPP periodically releases documents incorporating important new advances in the foundational technologies from the research activities of global mobile wireless technology companies. For example, Release 16 was published in July 2020.¹⁸ After a release document is published, it usually takes at least a year before cell phone and other subscribers have access to the fruits of the new technology. Infrastructure companies such as Ericsson, Nokia, Samsung, LG, Huawei, and Cisco have to design the technologies into their equipment; and chip and device manufacturers such as Samsung, Apple, LG, Motorola, ZTE, and Huawei have to embed them in new modems and in new generations of their devices. The network service providers also must install the requisite equipment upgrades for benefits to be realized. They do so, however, long after the standards technology is developed, whereas those that develop standards technology do so without the confidence that their technologies will ever be incorporated in the standards or have commercial payoff of any kind.

3GPP epitomizes cooperative global technology development at its apogee. It is a corollary of the US and European-led post-World War II liberal system of cooperative innovation and distributed economic organization. It is the de facto orchestrator of discoveries and inventions relevant to the mobile wireless ecosystem. With China's rise and expressed desire to dominate standards setting, this delicate organizational arrangement will be put at risk, particularly if the United States does one more antitrust policy zigzag.¹⁹

The type of governance that 3GPP affords is unique as to its global scale and scope. It is rule based and consensus driven. Constituencies include technology developers, systems operators, device makers, and governments around the world.

As described in Section IV, patents are important in the mobile wireless cooperative ecosystem, because patent licensing is how the global sharing and financing of new technology is achieved. Proprietary 2G, 3G, 4G, and now 5G technologies, many of them foundational, have been made available via nonexclusive patent licenses to the whole world, generation after generation. This is a major reason for the success of the mobile wireless ecosystem over the past 30 years. It has afforded countless benefits to billions of users, and fueled competition and economic growth in the United States and abroad. The licensing system promotes both interoperability and entry by device manufacturers by providing a necessary suite of technology input solutions.

¹⁸ 3GPP, *Release 16*, www.3gpp.org/release-16.

¹⁹ Examined more closely, 3GPP is a cluster of national and regional telecommunication standards organizations. It organizes its work into three different streams: radio access networks, services and system aspects, and core network and terminals for which 3GPP develops the technical specs. These are then converted into standards by seven regional standards-setting organizations (SSOs) that form the 3GPP partnership.

IV. THE SALIENCE OF PATENTS AND PATENT LICENSING TO COMPETITION AND THE ROBUSTNESS OF THE INNOVATION ECOSYSTEM

While technology is adopted into the standards by vote of the members, developers who contribute patented technology do so only because of SDO rules requiring that patent owners who provide patents for inclusion in the standard “make licenses available” on the expectation that implementers/users take licenses and pay royalties, rather than infringing willy-nilly. That is, everyone can have access to 5G standardized technology (at least for a reasonable period of time) through patent licenses, but licensees must be willing to pay royalties. Commercial terms nevertheless must be FRAND. This two-way commitment somehow must be enforced for the open global R&D super consortia that is 3GPP to be viable.

As already noted, the open innovation mobile wireless technology model has become fragile. There are now thousands of downstream device manufacturers, but only a handful of firms provide 80% of the foundational technology that is incorporated into standards.²⁰ 5G connectivity would not be possible without decades of upstream R&D on foundational technologies by companies such as Ericsson, Nokia, Qualcomm, Samsung, and LG, as well as new players such as ZTE and Huawei. However, many downstream device manufacturers try to avoid paying royalties altogether.

A smoothly functioning market for patent rights cannot simply be assumed. A primary reason is that patents are not self-enforcing. When patents are issued, the invention is available for use worldwide through concurrent publication of the patented invention. The patented technology does not enjoy an automatic monetary collection mechanism. To some (unscrupulous or simply opportunistic) industry participants, the publication of patents and associated standards is an invitation for unlicensed use of the patented technology, because policing unlicensed usage is difficult and often costly. “Catch me if you can” is an all-too-common attitude that sometimes is aided and assisted by poorly designed competition policies.

Furthermore, the 2006 US Supreme Court decision, *eBay, Inc. v. MercExchange, LLC*,²¹ had the effect, as a practical matter, of eliminating injunctive relief as a remedy for patent infringement in a wide range of circumstances. The decision put the US technology market and R&D spending to support standards at risk. I signed an amicus brief against *eBay*, because handicapping the right to enjoin would deeply compromise the licensing marketplace. Many of my fears have been realized, as “holdout” – discussed at length in the next part – is indeed a major problem today.

²⁰ In certain key industries (for example, wireless and automotive), the number of potential licensees is fairly small.

²¹ 547 U.S. 388 (2006).

In sum, if the patent owner does its part and “makes licenses available,” there is no guarantee that users will take a license and begin to pay royalties. The patent owner still needs to develop a licensing program and persuade unlicensed users to sign up and pay royalties. In the absence of injunctive relief and/or strong business ethics, that is a difficult and costly mission. Put differently, the patent owner is left with very limited means to bring putative licensees to the bargaining table unless courts or international trade regulators block market access for infringers.

V. THE FRAND ROYALTY APPROACH

A. FRAND and the Open Innovation Ecosystem

The mobile phone industry was in its infancy when ETSI was founded. The focus then and now is on what, in modern terms, we think of as creating a robust innovation ecosystem.

... the ETSI IPR POLICY seeks a balance between the needs of standardization for public use in the field of telecommunications and the rights of the owners of IPRs ... IPR holders whether members of ETSI and their AFFILIATES or third parties, should be adequately and fairly rewarded for the use of their IPRs in the implementation of STANDARDS and TECHNICAL SPECIFICATIONS.²²

In what follows, I give consideration to these issues, with specific reference to ETSI policy. I also consider the cost of error and elaborate the point that under-rewarding the patent holder of an enabling technology²³ has very high societal costs and should be avoided.

From the outset, ETSI recognized the need for a forward-looking approach to technology development on mobile wireless. The original architects of ETSI’s IP policies sought a “balancing of the interests” of technology contributors (patent owners) and implementers.

ETSI started as a European governmental initiative to assemble a broad set of actors committed to fairness and benefits to the broader telecommunications sector (ecosystem) and consumers. This broad constituency is still apparent today and includes chipset designers and fabricators, handset and base station makers, cellular service providers, app developers, and, of course, consumers.

The standards development system was not designed to favor one constituency over the others, or downstream over upstream. Indeed, initial versions of the ETSI IP policy that did not attract technology developers were rejected in favor of versions

²² ETSI, *ETSI Directives – v44 – 21 December 2021, Rules of Procedure* at Annex 6 (Dec. 21, 2021), https://portal.etsi.org/directives/44_directives_dec_2021.pdf.

²³ An enabling technology is a generic or “platform” technology that has applications in many products/areas of application. It is a junior general purpose technology. *See, for example*, Teece, *supra* note 17.

that yielded “balance.” When standards technology contributors enable so much of the subsequent downstream innovation, it is critical that technology developers not be shortchanged. This conclusion is not only consistent with ETSI IP policy, but also economically desirable and therefore entirely reasonable from a public policy perspective.

SDOs require that, before technologies are accepted into a standard, members that own patented technologies are “prepared to grant irrevocable licenses on fair, reasonable and non-discriminatory (‘FRAND’) terms and conditions under such IPR.” What is “fair and reasonable” (FR) and what is “nondiscriminatory” (ND) often raise questions. In this chapter, I will address only the FR aspect of FRAND, in the context of ETSI.

There is little doubt – and Dr. Bertram Huber, an ETSI founder representative, confirms this view²⁴ – that ETSI was concerned with establishing a vigorous standards process to support the development of a robust telecommunication industry in Europe and around the world. ETSI requires FRAND commitments from its technology contributors, with the expectation that implementers would take a license under FRAND terms.

B. Patent Holdup: A Theory in Search of a Problem

As noted, a vigorous mobile telecommunication industry requires a robust innovation ecosystem. Various parties and occasionally antitrust regulators have clumsily tried to undo ETSI’s rules with respect to FRAND issues by advancing the concept of “patent holdup.”²⁵ Patent infringement by implementers is excused and even encouraged by a “fig leaf” in the form of this antitrust theory of “patent holdup”: “holdup” because the implementer supposedly only knows the royalties they must pay after they have committed capital. The theory chooses to disregard the R&D investments made by the technology developers.

By way of background, consider the sequencing of investment in the development and deployment of standardized technology. Figure 1.2 shows the sequencing of investments, which has important implications for licensing dynamics. Stage one investments are made having no guarantees that they will be successful; and even if it is technologically successful to some degree, the discoveries may not be good enough to go into the 5G standard. The fact that R&D to develop foundational technologies takes place before the equipment and device makers invest puts the licensor in a weak bargaining position with respect to the implementers/licensees. Moreover, there is no guarantee that the technology will be adopted over competing alternatives. This position is amplified by the twin facts that patents are not self-

²⁴ Author conversations with Dr. Bertram Huber (2017).

²⁵ ETSI leaves the rate to negotiations between the parties under the shadow of the FRAND commitment.

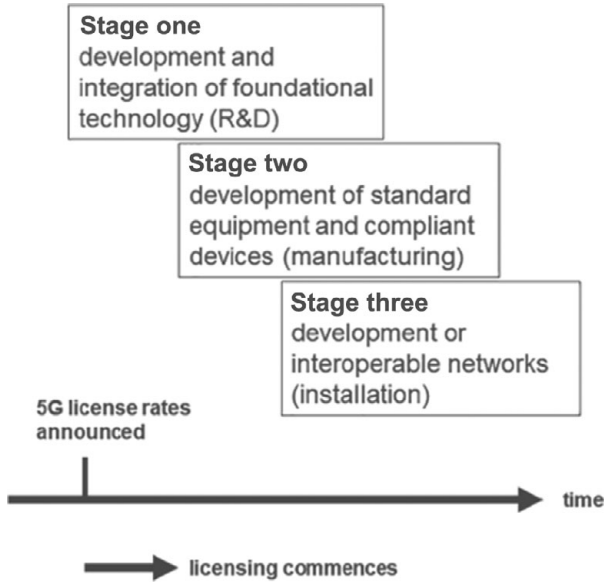


FIGURE 1.2. Sequencing of development and deployment of wireless infrastructure technology

enforcing and injunctions nearly impossible to come by in the United States post-*eBay*. Enforcement requires a court of law to back up the patent owner with an injunction or something similar. Otherwise “strategic” or “unscrupulous” putative licensees will engage in the similar sounding – but essentially inverse – practice of “holdout.” As Makan Delrahim, then the head of the DOJ Antitrust Division, noted:

If the implementers hold out, the innovator has no recourse, even if the innovation is successful. In contrast, the implementer has some buffer against the risk of hold-up because at least some of its investments occur after the royalty rates for new technology could have been determined. Because this asymmetry exists, under-investment by the innovator should be of greater concern than under-investment by the implementer.²⁶

Put differently, implementers can “hold out,” not take a license, and try to dodge paying royalties. To explore these issues further, one must examine in more detail FRAND issues

The mischief comes from implementers, aided and abetted by theoretically oriented academic economists whose models appear to have impacted antitrust enforcement agencies. Academic economic models of “patent holdup” ignore sunk

²⁶ Makan Delrahim, assistant attorney general, US Department of Justice, remarks as prepared for the USC Gould School of Transnational Law & Business Conference (Nov. 10, 2017), www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-usc-gould-school-laws-center.

R&D investments by technology developers. They also ignore longer-term business model issues associated with funding R&D. These proclivities create a penchant for seeing royalties as SEP “taxes” and not precious fuel to support R&D.

The intellectual history of patent “holdup” theory is checkered. In my view, in the context of SEPs, it is a theory in search of a problem. It has been an economically damaging red herring that has compromised licensing activities and US technology leadership.

The first (mis)application of the holdup concept to the realm of patents was a paper published by Carl Shapiro in 2001.²⁷ Some IP scholars in the legal academy subsequently became aware of, and actively advanced, these patent holdup theories. Meanwhile, other scholars and practitioners actually close to the world of licensing understood this work to be theoretical musing and little else. There was considerable surprise when it was taken seriously by antitrust agencies and some courts.

The assumptions of rampant opportunism and guile by upstream technology providers lie at the heart of holdup theory.²⁸ Needless to say, there is no empirical support for either assumption in the context of patents. The theory also assumes that patents are self-enforcing (that is, there is an injunctive right appended to every patent exercisable at the discretion of the (SEP) patent owner), despite *eBay*. This constellation of assumptions is quite fanciful.

The theory – and theory is all it is – is sometimes articulated in terms of a patent owner promising to one or more implementers one rate, and specific investment is made by an implementer on the basis of that promise. The narrative is that patent owners subsequently, without good reason, strategically increase royalty demands once the implementer is locked in and committed to downstream investments. There is no evidence that patent holdup has ever occurred.

More commonly, the patent owner promises to make licenses available on FRAND terms, but without specifying in great detail until later on which rates it would seek to charge. Moreover, the right to enjoin, when it exists, requires the action of a court. There are, of course, reputational risks that technology developers would have to take should they act egregiously. Needless to say, there are contractual protections for implementers, which are, according to the law of many jurisdictions, third-party beneficiaries of the agreement between the SDO and the patent owner to set royalties that are FRAND.²⁹

Technology developers, by contrast, can negotiate only after they have sunk their R&D investments and after their technology has survived a selection process to get

²⁷ CARL SHAPIRO, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in INNOVATION POLICY AND THE ECONOMY 119–50 (Adam B. Jaffe, Josh Lerner, & Scott Stern, eds., 2001).

²⁸ OLIVER WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS, A STUDY IN THE ECONOMICS OF INTERNAL ORGANIZATION* (1975); OLIVER WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING* (1985).

²⁹ China does not support third-party beneficiary theories.

into the standard. Thus, technology developers are at least as vulnerable to “reverse holdup” or, as it is more commonly known today, “holdout” by implementers, as implementers are vulnerable to hold up by developers.³⁰ Indeed, given that implementers could, but rarely do, seek licenses before they start making standards-compliant products, and the length of time that it takes licensors to conclude agreements with industry players, and the considerations noted below arising from the nature of the enforcement of patent rights, the dangers of holdout are quite real and substantially underestimated.³¹ Although the theory of holdup historically has been advocated more vocally, it is holdout that is the greatest risk to licensing of ETSI standards.

Nevertheless, numerous implementers and some nation-states making standards-compliant products have found it convenient to claim to be victims of “holdup.” China, for example, has also tried at the World Trade Organization (WTO) to have all SEPs declared barriers to trade.³²

C. Patent Holdout

Fortunately, in recent years, policy concern over holdout has received some attention. As noted earlier, Makan Delrahim, the former head of the DOJ Antitrust

³⁰ Luke Froeb & Mikhael Shor, *Innovators, Implementers and Two-Sided Hold Up*, ANTITRUST SOURCE (Aug. 2015). Froeb and Shor state that the “innovators’ hold-up problem is more difficult to overcome” than any holdup problem facing the implementers. Under the leadership of Makan Delrahim, the DOJ Antitrust Division acknowledged that the holdup of innovators is a more serious problem than the holdup of implementers, discussed *infra*.

³¹ This point is also made by Delrahim: “As a result [of hold-out], SEP holders either receive a below-FRAND payment, obtaining damages on the fraction of their portfolio that has been successfully litigated, or they need to file sequential litigation to obtain payment for all of their infringed SEPs . . . [P]atent hold-out can be a very attractive strategy for standards implementers.” Delrahim, *supra* note 26, at 5. For similar sentiments, see Anne Layne-Farrar, *Why Patent Hold-Out Is Not Just a Fancy Name for Plain Old Patent Infringement*, COMPETITION POL’Y INT’L (Feb. 8, 2016); Michael Renaud, James Wodarski, & Sandra Badin, *Efficient Infringement and the Undervaluation of Standard-Essential Patents*, IAM (2016); Richard Epstein & Kayvan Noroozi, *Why Incentives for “Patent Hold-Out” Threaten to Dismantle FRAND, and Why It Matters*, 32 BERKELEY TECH. L.J. 1381 (2017).

³² “China is of the view that, IPR issues in preparing and adopting international standards have become an obstacle for Members to adopt international standards and facilitate international trade. It is necessary for the WTO to consider negative impacts of this issue on multilateral trade and explore appropriate trade policies to resolve difficulties arising from this issue.” WTO, *Intellectual Property Right (IPR) Issues in Standardization, Committee on Technical Barriers to Trade*, G/TBT/W/251 (May 25, 2005), https://docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S009-DP.aspx?language=E&CatalogueIdList=84617,75721,51689,62632,61290,61833,52016,60561,72578,90497&CurrentCatalogueIdIndex=9&FullTextHash=1&HasEnglishRecord=True&HasFrenchRecord=True&HasSpanishRecord=True. Zhang Ping, a leading Chinese scholar who has trained a generation of Chinese professionals in IP, standards, and antitrust, similarly has relied heavily on Shapiro and Lemley in her influential book. ZHANG PING & MA XIAO, *STANDARDIZATION AND INTELLECTUAL PROPERTY STRATEGY* 39 (2nd ed. 2005).

Division, made considerable progress in helping develop the understanding that “collective holdout” behaviors in standard-setting are more pernicious and likely than unilateral holdup by SEP holders.³³ The recognition that holdup is a red herring is what may have led Contreras to argue that:

To the extent that hold-up impedes the efficient operation of standard-setting processes, SDOs can, and have, adopted internal procedures, including disclosure and licensing requirements, to curtail that behaviour ... it may thus be time to close the debate over the systemic prevalence of this form of behaviour.³⁴

From an empirical perspective, Heiden and Petit note the emergence of a “long tail” of implementers or micro-vendors that are individually small but collectively account for a reasonable share of industry revenue, and that are not licensed.³⁵ Many of these implementers are based in China. They note in this context that “a systematic patent trespass effect can be deemed to occur when 30% or more of a relevant market is unlicensed.” They relate this to a collective action problem: “why take a license if your competitors do not?” They note that the “systemic effect of patent trespass is primarily experienced through the impact on the technology market through the development of consensus-based standards.”³⁶ Heiden, Padilla, and Peters note the presence of a similar “collective action” problem resulting in widespread holdout in the IoT sphere.³⁷

These empirical observations echo the findings of Judge Essex of the US International Trade Commission (as summarized by Renaud, Wodarski, and Badin):

[T]here is no evidence to support the notion that owners of SEPs have engaged in patent hold-up either in the investigations before him or in the telecommunications industry more generally. Rather, the evidence is all on the side of patent hold-out. The implementers of the standards are using the patented technology incorporated in the standards without authorization and without even engaging in licensing negotiations because they know that the worst that can happen is that they get sued, are found to infringe and are made to pay the same FRAND rate that they would have had to pay for using the patented technology in the first place.³⁸

In summary, then, the very non-self-enforcing nature of patent rights directly indicates why holdout rather than holdup is a problem that we should expect to see

³³ Delrahim, *supra* note 26.

³⁴ Jorge L. Contreras, *Much Ado about Holdup*, 2019 U. ILL. L. REV. 875, 904 (2019).

³⁵ Bowman Heiden & Nicolas Petit, *Patent “Trespass” and the Royalty Gap: Exploring the Nature and Impact of Patent Holdout*, 34 SANTA CLARA HIGH TECH. L.J. 179–249 (2018).

³⁶ *Id.*

³⁷ Bowman Heiden, Jorge Padilla, & Ruud Peters, *The Value of Standard Essential Patents and the Level of Licensing*, 49 AIPLA Q. J. 1 (2021).

³⁸ Renaud et al., *supra* note 31. Judge Essex further concluded that this situation was “as unsettling to a fair solution as any patent hold up might be.”

in licensing SEPs. My own experience with examining the smartphone licensing landscape in the context of litigation, and the empirical observations of other commentators, supports this. Royalty revenues are a small share of both the overall value-added from mobile telecommunications and smartphone implementers' revenues.³⁹ This calls into question the predictions of holdup theory and is consistent with the reality that holdout is an important characteristic of the licensing landscape today.

The reason that holdout is a present, and perhaps growing, danger is because it is a profitable strategy for implementers. It is profitable in part because of the weakness of injunctive relief, the fragmentation of the patent enforcement landscape at the global level, and the lack of corrective mechanisms in damages and license awards by courts.

D. *Holdup versus Holdout: Time to Close the Debate*

Empirical studies have established the irrelevance of holdup theories. Notwithstanding this fact, implementers remain willing and eager to advance such theories. At the same time, it is now widely accepted that contractual mechanisms to redress holdup are available, should it ever occur.⁴⁰

Galetovic, Haber, and Levine⁴¹ provide a sophisticated empirical analysis with regard to the holdup issue. They find that “products that are SEP-reliant have experienced rapid and sustained price declines over the past 16 years,” and that the “prices of SEP-reliant products have fallen at rates that are not only fast relative to a classic hold-up industry, they are fast relative to the patent-intensive products that are not SEP-reliant.” Using a quasi-natural experiment to study the effect of the *eBay* decision on relative price declines in SEP-reliant versus non-SEP-reliant industries, they also do not find that prices in SEP-reliant industries were more affected by *eBay* than in non-SEP-reliant industries. If holdup were more of a problem in SEP-reliant industries, one would have expected to see a greater effect of *eBay* in these industries than in those not driven by SEPs.⁴²

³⁹ Alexander Galetovic, Stephen Haber, & Lew Zaretzki, *An Estimate of the Average Cumulative Royalty Yield in the World Mobile Phone Industry: Theory, Measurement and Results*, 42 TELECOMM. POL'Y 263 (2018). The authors estimate that, relative to smartphone manufacturer revenues of \$425 billion in 2016, royalties were around \$14 billion, or 3.3%.

⁴⁰ Further, it is not credible to think that sophisticated implementers in today's technology markets, with decades of SEP licensing and negotiating experience, are naïve with respect to what SEP holders might demand by way of royalties and non-price terms. Thus, what is being termed holdup is really just an assertion – that in circumstances where implementers plunge into making standards-compliant products before licensing the relevant SEPs, the threat of an injunction can confer substantial bargaining power upon the SEP holder and enable it to extract “too much” for a license.

⁴¹ Alexander Galetovic, Stephen Haber, & Ross Levine, *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549 (2015).

⁴² *Id.*

The Galetovic et al. findings are unsurprising. The presence of the FRAND commitment, the lack of availability of injunctive relief (particularly in the United States), the repeat-game nature of standardization,⁴³ and the bargaining power of many implementers (for example, their ability to prolong litigation) all militate against holdup. Most fundamentally, holdup is unlikely in a setting where the implementer or prospective licensee can use the technology without paying for it, and injunctions are close to nonexistent, except perhaps in European courts. There is no way that the SEP holder or licensor by itself can prevent infringing use. Accordingly, there is a fundamental difference between “ordinary” goods and services, on the one hand, and IP, on the other – a point that Germany’s Federal Court of Justice recently recognized:

[U]nlike buyers of goods and services— standards implementers are in the favorable position to be able to access protected technology needed for producing standard compliant products, even without an agreement with the patent holder.⁴⁴

The court’s observation is another way of saying that patents are not self-enforcing. A patent holder cannot do what most suppliers of goods and services can do, which is simply to withhold supply to those customers who do not pay for the good or service.⁴⁵ Instead, patent holders must resort to costly and time-consuming litigation to enforce their rights. In such litigation, the risks to licensors and licensees are asymmetric. For example, a court decision that is substantially different from the licensors’ position on the FRAND value of its portfolio potentially can have a significant adverse impact on that licensor’s longer-term licensing strategy. Akemann, Blair, and Teece note:

Intuitively, patent holders who face the prospect of having to litigate repeatedly against multiple infringers have to be concerned about what might be termed a “one-way ratchet” effect. If the patent holder wins one case against one infringer that does not mean that others will agree to take a license ... [H]owever, if the patent holder ever loses a case – especially on validity grounds – then there is likely to be a significant adverse effect on the patent holder’s ability to gain license revenue from that patent in the future. In effect, the patent holder has to “win them all”, while the infringers may only have to “win one.” In this way ... risks

⁴³ SEP holders who wish to continue participating in repeat rounds of standards-setting activities run the risk that other members will seek to exclude them from future standardization activities if they are seen to have violated their FRAND commitment.

⁴⁴ English-language summary of *Sisvel v. Haier*, KZR 36/17 (Nov. 2020), <https://caselaw.fipcouncil.com/german-court-decisions/federal-court-of-justice-bgh/sisvel-v-haier>.

⁴⁵ While this problem of not being able to exclude infringers automatically also could apply to the circumstance of a non-SEP patent that a firm wishes to utilize exclusively in its own products, it may be more acute in the world of ETSI-related SEPs, where rights have to be enforced against multiple infringers, raising the costs of both detection and enforcement.

associated with a single loss . . . could lead to a set of rates in the marketplace that are significantly depressed relative to actual value.⁴⁶

As noted earlier, the antitrust frameworks that employ holdup are static. They take the funding of (foundational) wireless technology for granted. This further undermines their relevance. It is hard not to agree with Barnett that the academy has led the judiciary and policymakers astray.⁴⁷

Accordingly, it is time to shut down the antitrust ruse of patent holdup – not resurrect it, as the DOJ’s draft policy statement on remedies for the infringement of SEPs (issued in December 2021 and withdrawn in June 2022) sought to do.⁴⁸ Should evidence of holdup ever emerge, the theory can be resuscitated; but it doesn’t deserve time on the agenda now.

We nevertheless are left with the fallout of previous US policy misadventures in the form of: (a) some foreign competition agencies and bureaus using the holdup argument to support mercantilist policies and favor national champions;⁴⁹ and (b) a sense that the debate perhaps has come to a stalemate with legitimate arguments and evidence on both sides. The assessment in (b) is inappropriate. The weight of the evidence favors holdout as the problem. Holdup is merely a theoretical possibility remote from real-world situations. On the other hand, many SEP holders must wait years before they can achieve a license with implementers, or else must resort to litigation – a move that carries asymmetric risks for SEP holders, as discussed later – before they are able to obtain any payment. Moreover, the failure to enter license agreements with particular licensees almost always will have negative consequences for the SEP holder’s broader licensing program.

Additionally, through delaying tactics, licensors may be able to extract significant discounts for past use, benefit from statutes of limitations on past damages, and benefit from potential expiry of patents that they have infringed for many years. If the worst outcome for an infringer is that ultimately it ends up paying a FRAND rate on only some portion of its infringing sales, it will have a great deal of bargaining power

⁴⁶ Michael Akemann, John Blair, & David Teece, *Patent Enforcement in an Uncertain World: Widespread Infringement and the Paradox of Value for Patented Technologies*, 1 CRITERION J. INNOVATION 861 (2016).

⁴⁷ Jonathan M. Barnett, *Has the Academy Led Patent Law Astray?*, 32 BERKELEY TECH. L.J. 1313 (2017).

⁴⁸ US Department of Justice. US Patent and Trademark Office and National Institute of Standards and Technology Withdraw 2019 Standards-Essential Patents (SEP) Policy Statement (June 8, 2022), www.justice.gov/opa/pr/justice-department-us-patent-and-trademark-office-and-national-institute-standards-and; US Department of Justice. Public Comments Welcome on Draft Policy Statement on Licensing Negotiations and Remedies for Standards-Essential Patents Subject to F/RAND Commitments (Dec. 6, 2021), www.justice.gov/opa/pr/public-comments-welcome-draft-policy-statement-licensing-negotiations-and-remedies-standards.

⁴⁹ It may be more precise to say that certain competition regulators are using patent holdup as theoretical justification for taking mercantilist actions to reduce royalty rates for local device manufacturers.

to bring to negotiations with SEP holders, meaning that infringement and holdout usually will be profitable strategies.

I consider there to be an urgent need in many jurisdictions to bring “balance” to SEP licensing in the cellular mobile space. While important new cases are moving to recognize the key role of technology developers, implementers still can engage in holdout with only distant sanctions to worry about.

One obvious lever is to strengthen the existing injunctive relief regimes to provide the licensee with stronger incentives to negotiate a license.

However, changes to injunctive relief may be practically difficult to achieve. In this context, FRAND royalty determinations in litigations may play an important restorative role too. Critical to this endeavor of bringing balance is the recognition that infringement and holdout must not be profitable. Recalcitrant licensees must not be put on the same footing as those who were (more) willing to sign up for licenses on FRAND terms. Nor must competition enforcement agencies assist renegades in their quest to avoid paying royalties or to crank down FRAND rates to below reasonable levels.

An important question that should be addressed is whether an “unwilling licensee” – one that is not prepared to accept any license terms other than those that it deems to be FRAND – should lose the benefit of the licensor’s FRAND commitment. This means that not only should injunctive relief be immediate from the moment that the licensee’s unwillingness is established – as the UK courts recognized in a recent decision involving Apple and Optis, and as has been common in mainland Europe – but also potentially that royalty rates in damages awards need not be based on assuming that the FRAND constraint applies.

Inherently, a FRAND royalty rate is reasonably linked to the (likely) value contribution of the technology to the product. However, as discussed earlier (and in more detail later), holdout exerts other costs on the licensor, especially on its overall licensing program. Damage awards based solely on the value contributed to the product may not suffice to restore the licensor’s economic position to where it would have been absent the infringing behavior. Nor would they truly address the harm to the licensing marketplace that holdout behavior inflicts.⁵⁰

⁵⁰ David Teece, Peter Grindley, Edward Sherry, & Keith Mallinson, *Maintaining Ecosystem Innovation by Rewarding Technology Developers: FRAND, Ex Ante Rates and Inherent Value* (Working Paper Series No. 21, Tusher Center on Intellectual Capital, Apr. 24, 2017). However, even if punitive or exemplary damages and enhanced injunctive relief are ambitious and unlikely steps, courts can and should take measures to recognize the distinction between willing and unwilling licensees. One important and constructive step concerns the use of the licensor’s existing licenses or other parameters of a licensor’s existing licensing program in evaluating FRAND rates to apply to infringers who have compelled litigation. The key consideration is that, even in any given licensing situation between a given licensor and a given licensee, a range of rates (here, “rates” is used as a shorthand for terms of agreement, including non-price terms) may be consistent with meeting the “balance” envisioned in FRAND. The theoretical upper bound for this FRAND range is, as I explain, the value

In practice, many licensees will obtain rates that are well within the FRAND range (and perhaps even below it), because the licensor will be prepared to accept low rates to achieve (relatively) quick settlement and avoid litigation. It would be wrong for courts to base rates for infringers on these negotiated rates without recognizing the context in which these rates were achieved. To do so would put the unwilling licensee on the same footing as the willing licensee. Instead, court-awarded rates (whether applied to licenses or past-use damages) at a minimum should be based on the FRAND (benchmark) rate. However, even this may be too lenient a corrective for the problem of holdout.

Further, the nondiscrimination (ND) prong of FRAND should not be invoked as a reason to base awards either on “best prices” or even averages across licensees – the ND prong cannot be interpreted in such a way that nondiscrimination trumps the fundamental idea of balance. The comparison of royalty rates achieved by different licensees is at most relevant for an ND analysis to the extent that differences in royalty rates distort competition.⁵¹ If two licensees operate very different business models and aim at very different market segments, then unwarranted distortions to competition are unlikely. Royalty rates paid to individual licensors are a small sliver of the implementer’s overall cost stack, and so differences in these rates paid are unlikely to distort competition.⁵²

As noted earlier in Section IV (especially Figure 1.2), the commonplace situation that exists is one in which an implementer begins manufacturing devices and implementing SEPs long before taking licenses to any of them. Many licensors issue notice letters to implementers years after use of the SEPs actually began. It is often at least a couple of years before licenses are agreed. Reasonably often, there is

contribution that the technology makes to the product, which I refer to as a “FRAND benchmark rate.” This value contribution should be allowed to reflect the value that the technology offers as part of a standard. In practice, this value contribution will be difficult or impossible to measure. It could be conservatively proxied, however, by using the upper end of negotiated licenses or “standard program rates.” (Such proxies are likely to understate the FRAND benchmark rate because, as explained herein (and *id.*), all licensees will have bargaining power sufficient for them to extract a significant share of the value contribution of the technology for themselves.)

⁵¹ Of course, the issue here is what is meant by “ND” in ETSI’s conception of FRAND, as opposed to what sort of behavior is sanctionable under antitrust law. So-called secondary-line price discrimination in the provision of licenses would not be sanctionable in the United States under antitrust laws, but it might be in Europe. But even under the latter, more expansive, price discrimination regime, a mere difference in royalty rates would not in itself be seen to distort competition. Given this backdrop of antitrust law and given the complete lack of evidence that ETSI has ever seriously contemplated a hard-edged MFN (most favored nation)-style nondiscrimination policy, the persistent advocacy of such an approach by some implementers is unmerited. David J. Teece, Edward F. Sherry, & Peter C. Grindley, *On the “Non-Discrimination” Aspect of FRAND Licensing: A Response to the Indian Competition Commission’s Recent Orders*, 30 IIMB MGMT. REV. 10 (2018), <https://doi.org/10.1016/j.iimb.2017.09.002>.

⁵² Further, many negotiated licenses involve lump-sum payments, which do not affect marginal pricing and production decisions.

no agreement, and unlicensed use continues unabated. In many cases, perhaps something close to a decade will go by before litigation is launched, and then perhaps one or two further years will pass before any decision – and before any court-awarded damages or court-determined license are made available. In all, a decade or more might pass before the infringer pays anything for its use, by which point a new generation of the standard has replaced the old standard upon which the litigated decision was based!

Even then, the licensee may pay no more than a relatively low rate that is deemed to be FRAND – often on the basis of rates derived from comparable licenses without necessary adjustments to account for the difference between willing licensees and those who force the licensor into litigation. Alternatively, this rate may be based on inherently licensee-friendly formulations such as the “top-down” method of allocating some aggregate reasonable royalty among the different licensors. Either way, a licensee that delays or strings out discussions has little incentive to take a license – at worst, it will have to pay the same FRAND rate that it would have paid anyway. At best, it secures an advantage over its licensed rivals by remaining under the licensor’s radar.

Growing diversity in the nature and geographic loci of implementers and the emergence of new use cases such as those associated with IoT exacerbate the problem. The share of implementers with licenses likely is falling, and at least in some environments – such as the licensing of IoT implementers – a collective action problem is emerging in which widespread infringement may be self-perpetuating.⁵³ The source of the collective action problem is simple: Licensed users will see themselves as being competitively disadvantaged relative to unlicensed users.

That such pervasive problems exist is not surprising. The perverse focus on holdup and the introduction of antitrust lawsuits has made these problems worse. Attention to the specifics of licensing negotiations and actual business behavior always has suggested that holdout rather than holdup is the bigger problem.

VI. RESTORING AND REVITALIZING TECHNOLOGY MARKETS

A. Why Corraling SEP Infringers Is Difficult

The primary issue that should animate competition policymakers and the courts is the threat posed to open consensus-based standards development by holdout behavior. At its root, a holdout licensee will do no worse than a willing one; and it might well do better. That is, it could end up paying nothing or, by negotiating a license

⁵³ Heiden & Petit (2018), *supra* note 35, provide statistics that suggest that licensing coverage fell from roughly 73% of “implementing firms that are potential licensees” in 2006 to 39% of such firms in 2016. Their results appear to be based on interviews that they conducted with licensing experts and firms that are participants in the licensing marketplace. They attribute this “patent trespass” to a long tail of unlicensed implementers.

late in the day (when most of its sales and profits from using the technology are safely in the past), pay heavily discounted rates.

Similarly, consider a situation in which the licensor offered a license on FRAND terms, and the licensee declined such a license and made counteroffers that were not FRAND or otherwise indicated its unwillingness to take a license on FRAND terms. In this case, even if the licensee were enjoined, it can still avail itself of a FRAND license at some point in the future.

The perennial availability of a FRAND license weakens even the power of any injunctive relief remedy – where such is available. It encourages the licensee to try its luck in the courts rather than negotiate for a license. If the licensee escapes an injunction, it can continue to enjoy the benefit of infringement perpetually or until it forces the licensor into conceding terms that it likes.⁵⁴ Alternatively, if the licensee is informed, it may still have the option to have the injunction lifted by accepting a FRAND license – possibly the very same FRAND license it had been offered and turned down before. Nonetheless, the threat of injunction can still have a powerful effect on some recalcitrant licensees.

The present standardization and licensing systems lack sufficient corrective or countervailing forces to prevent this problem from not just entrenching itself but getting worse – as the unlicensed share of the industry increases, the stronger will be the incentives for other firms to resist taking licenses too. Short of some form of enhanced damages, there do not seem to be innate solutions to this problem of potential mass infringement – at least not for implementers who are not major contributors to standards and therefore do not face consequences for past opportunistic conduct.

Worse still, there is some indication that holdout is now something of a norm – for example, very few implementers sign a license anywhere close to their date of first infringement, and most limit the period of past use for which they pay royalties and/or are able to negotiate steep discounts for past infringement. Thus, as delay and discounts related to that delay become a norm across all implementers, the harder it becomes to sanction such behavior through the standard-setting process.

Instead, it seems that the best restraint on holdout is likely to arise from a willingness on the part of the courts (and the competition agencies) to engage with the intent of the FRAND commitment (that is, to recognize fully the centrality of balanced incentives to ETSI's standardization activities). It also is important that

⁵⁴ In *Apple v. Optis*, 2021 EWHC 2564 (Pat.), there was another possibility, which arises in the context of the “FRAND injunction” paradigm used in the United Kingdom. Under this paradigm, an injunction is an alternative to accepting a license on FRAND terms. In that proceeding, Apple had communicated to the court its unwillingness to accept FRAND terms as determined by the court. This put Apple into the category of an “unwilling licensee,” and the court ruled that this meant the injunction could be applied even before the court determined FRAND terms. In the alternative scenario, Apple would have continued to infringe Optis's SEPs at least until the court handed down a decision on FRAND terms, which Apple then could elect to refuse.

antitrust enforcement agencies keep their distance and don't provide a helping hand to infringing holdouts.

B. *Strengthening Injunctive Relief*

The most obvious factor encouraging holdout is the difficulty of obtaining injunctive relief. No US court has granted an injunction in a SEP-related case, at least not since *eBay*. The situation in Europe is somewhat better than that in the United States, and there is a well-developed framework (Huawei-ZTE) for assessing when injunctive relief is an appropriate remedy.⁵⁵ However, even that framework arguably provides too much leeway to the putative licensee or infringer. This can be understood usefully by contrasting the Huawei-ZTE framework to Germany's "Orange Book" standard.⁵⁶

Under Germany's Orange Book standard, an infringer could avail itself of a competition law defense against an injunction only if it had made an unconditional offer to license either on terms that the SEP holder could not reasonably refuse or at a rate proposed by the SEP holder but subject to review and modification by courts. Under Huawei-ZTE, the licensee is not required to make such commitments. Importantly, the "unconditional" commitment to license under Orange Book means that the acceptance of a license cannot be delayed through challenges to selected patents on validity and infringement grounds. The Orange Book standard was seen as very generous to patentees and was not designed in the context of ETSI SEPs, where the SEP holder has made an explicit FRAND commitment. Nonetheless, some of its provisions may have merit in the context of cellular SEPs. As a practical matter, the licensing of ETSI-related SEPs is almost always at the portfolio level. Portfolios that have been licensed and/or litigated frequently almost certainly contain at least some valid and infringed patents. In this context, the leeway of licensees to resist taking portfolio licenses by challenging specific patents

⁵⁵ Judgement of the Court of Justice of the European Union, Case C-170/13, Huawei Technologies Co. v. ZTE Corp and ZTE Deutschland GmbH. This decision spelled out the sequence of steps that licensor and licensee must undertake in order to show that they are negotiating in good faith toward an agreement on FRAND terms. If the licensee is unable to show evidence of its willingness to accept a license on FRAND terms (for example, by making counteroffers based on FRAND, or putting money into escrow to contribute toward payment for past infringement, or by not making timely responses to the licensor's offers), it may be appropriate for the licensor to seek injunctive relief under this framework.

⁵⁶ The Orange Book was a document setting out technical standards relating to recordable compact discs. In this case, Philips – which had been a key contributor to the standards – sought an injunction against several manufacturers on the grounds of infringement of its SEPs related to the Orange Book. One of the defendants then attempted to mount a competition law defense on the grounds that Philips had a dominant position in relation to one of its SEPs, and was seeking to abuse this dominant position by seeking an injunction. The German Federal Court's decision in this case spelled out the circumstances in which a competition law defense could be used to avoid an injunction in relation to SEP infringement.

on validity and infringement grounds (as allowed under Huawei-ZTE) is an avenue for delay and another mechanism by which licensees are able to raise SEP holders' enforcement costs. The practical upshot is that under the Huawei-ZTE regime, holdout has become easier, and SEP-related injunctions have become harder to obtain.

The UK Supreme Court in *Unwired Planet International Ltd v. Huawei Technologies (UK) Co. Ltd* devised the concept of a “FRAND injunction.”⁵⁷ Injunctions were available only at the point that the licensee turned down a FRAND determination from the court. In practice, this allows licensees to go all the way up to the “FRAND trial” without any penalty for infringement – in the United Kingdom, the trial to determine FRAND terms would occur after a typically lengthy and costly process of validity and infringement trials, as well as trials on separate, discrete issues. Again, given this potential for delay and given that the licensee's worst-case scenario is a court-determined FRAND license, the threat of an injunction in the UK court may not be a powerful motivation for implementers to negotiate a license with urgency. Indeed, some implementers may be quite happy to accept an injunction in the relatively small UK market if the alternative is to avoid a global license agreement on terms determined by a UK court.⁵⁸

C. Adjusting Damages to Disincentivize Holdout

Courts should recognize that holdout creates significant economic harms for the SEP holder in question, to the innovation ecosystem, and for the licensing marketplace. The problem in individual litigations is typically that a given SEP holder has failed to secure a license after a prolonged period of infringement by the implementer. As noted, the harm in that particular case is not just the cost of delayed payment to the patent owner, but the indirect harm to the SEP holder's licensing program.

There are clear externalities in licensing – securing a given license can confer credibility and momentum for the SEP holder's broader licensing efforts. Conversely, failure to secure a license can damage progress with other would-be

⁵⁷ *Unwired Planet International Ltd. v. Huawei Technologies (UK) Co. Ltd.* [2020] UKSC 37.

⁵⁸ Of course, this option is not straightforward. The margins from UK sales relative to the cost of making those sales may be substantial (as much of the implementer's cost base is incurred to support global rather than UK sales, it will still incur most of these costs even if it ceased its UK operations). Nonetheless, the implementer will consider the fact that in the alternative – where it took a license on terms decided by the court – it would pay royalties on all its global sales. Further, it also might worry that other licensors will use the UK courts to pursue global royalty claims. In this situation, the additional royalties it could pay would cumulate to a potentially substantial amount – whereas the benefit of remaining in the UK market would not change. Accepting a UK injunction will prevent other claimants from pursuing claims in the United Kingdom. Clearly, the smaller the implementer's anticipated UK sales, the easier it will be to accept an injunction. Further, if global FRAND rates were applied just to UK past sales, this also might be conducive to the strategy of accepting an injunction.

licensees. In particular, some implementers – especially those in product segments such as IoT or among implementers focused on some emerging markets and on China – will seek to tie either the terms of a license (for example, payment) or the very signing of a license to the SEP holder’s success in signing on other implementers that they perceive as being in the same segment. There may be a broader impact on the licensing marketplace as a whole. Akemann, Blair, and Teece explain how widespread infringement begets more infringement, thus creating a “bandwagon effect”:

[W]hen there are many infringers, each infringer might believe there is a perceived safety in numbers, as each infringer might believe that the chance it will be pursued is low . . . the patent holder cannot refuse to supply the technology in the way that suppliers of tangible goods can . . . We would therefore expect to see that royalties negotiated in a marketplace with widespread infringement will typically be lower than those negotiated in circumstances where infringement was less common . . . In this regard it is worth emphasizing the significant and asymmetric risks that a patent holder faces as it tries to enforce its patent rights against a long line of potential infringers.⁵⁹

How courts handle issues such as damages or the terms of FRAND licenses can thus have an impact in terms of not just alleviating economic harm arising from prolonged infringement, but also correcting the distortions in the wider licensing marketplace that arise from allowing such conduct to persist. The actions that courts take today will dictate not just future litigation outcomes, but future negotiations in the marketplace – which always happen in the “shadow of the court.”

D. *Limiting the Availability of FRAND*

Consider an SEP holder that has been attempting to negotiate a license with an implementer for several years and finally has brought the matter to litigation. If the evidence suggests that the putative licensee essentially had no interest in negotiating a license on FRAND terms, is it adequate that the redress available is a license on FRAND terms, and damages for past infringement on FRAND terms? This is problematic for two reasons: (a) It potentially puts the litigious infringer on the same footing as more willing licensees; and (b) it actually does not restore the SEP holder into the position it would have been had the infringement never taken place, as the SEP holder will not be compensated adequately for the harm it has suffered as a result of the infringement. While in principle the harm caused by the delay in taking the license might be quantifiable, the harm to the wider licensing program may not be so readily quantifiable. With respect to addressing the harm caused just by the delay to taking the license, courts should be prepared to address this harm and

⁵⁹ Akemann et al., *supra* note 46, at 873–75 (citations omitted).

to do so in an economically robust way – for example, instead of using statutory interest rates in damages awards, courts could use the licensor’s cost of capital or some other measure of economic opportunity cost to address the issue.

More importantly, instead of giving the licensee the choice of eventually taking a FRAND license, once a licensee has been found unwilling, the most obvious corrective is to withdraw the option of a FRAND license. The threat of being found unwilling and thus losing an entitlement to a FRAND license is likely more potent than the threat of being enjoined (which will only apply in a single jurisdiction anyway) and then being able to claim a FRAND license to lift the injunction. (If courts across different jurisdictions consistently applied this logic, then it would also prevent the situation wherein the implementer can swallow an injunction in a less important jurisdiction and then prevail upon another court to award it a FRAND license.)⁶⁰

These proposals might seem radical to some and might push courts into territory that seems controversial. After all, there is nothing explicit in the ETSI IP policy that suggests that the FRAND commitment applies regardless of the licensee’s willingness; but nor is there an explicit provision that limits its application in the case of an unwilling licensee. To the extent that above-FRAND awards might contain a deterrent element, they may be seen by some as legally difficult to justify, but they are economically very easy to justify.⁶¹ Nonetheless, at least the broader concept of restoring the licensor’s economic position by recognizing the harm it suffers from infringement fits in with the idea of restorative or equitable damages, rather than being punitive.⁶²

A minimalist measure that would at least somewhat restore the balance is that courts should not give unwilling licensees the same terms as willing ones. Quite often, the determination of FRAND rates is based (at least partly) on a review of the licensor’s “comparable” licenses. In many instances, the rates that the licensor negotiated with the licensee might reflect concessions that were made in the context of meaningful negotiations. The licensor has an interest not just in securing the best “rates” but in ensuring that its licensing program maintains momentum (given that concluding license agreements lends impetus to concluding other licensing

⁶⁰ In this case, the injunction may be lifted if the parties negotiate a license, but that negotiation does not have to be bound by FRAND terms. To the extent that the SEP holder may be able to extract value based on excluding the implementer from the marketplace altogether, a part of the supra-FRAND value extracted is to compensate the SEP holder for the broader harm that the licensee’s conduct has inflicted on it, while the remainder serves as a deterrent that could sharply correct incentives in the marketplace.

⁶¹ For example, in the United Kingdom, punitive or exemplary damages are rarely available, although perhaps deliberate or misleading conduct by the licensee to avoid taking a license might conceivably qualify.

⁶² In non-SEP-patent cases, courts sometimes award damages on a “lost profits” basis, rather than a reasonable royalty basis. This is conceptually similar to recognizing the economic loss created by infringement that I refer to previously.

agreements – that is, there are externalities at work). Clearly, such a calculus does not apply in the case of the unwilling licensee, and equally clearly, there is a compelling policy rationale for not putting unwilling and willing licensees on the same footing. Put another way, while a range of rates may be consistent with FRAND, the unwilling licensee ought not be entitled to the “best” rate in that range, or even the average rate in that range. In fact, it would still be quite accommodating to give it a rate that is at the top end of the FRAND range.

E. *The Role of Competition Policy*

With their endorsement of holdup theories, US competition agencies sometimes have eschewed an evidence-based approach to antitrust and wittingly or unwittingly aided and abetted patent holdout, thereby compromising the development of foundational technology that supports innovation and drives dynamic competition. The primary beneficiaries of this strategy are new entrants in China that end up receiving a discount, and/or escape royalty payments for many years – and often permanently.⁶³

Competition policy needs to favor the future and embrace innovation and business models that support innovation in the key enabling technologies. They must support innovation both upstream and downstream. Avoiding the temptation to resurrect patent holdup arguments is the most concrete step that can be taken to help innovation and competition. Challenging the open innovation model simply plays into the hands of those that might prefer vertical integration of upstream wireless technology and downstream devices.

VII. CONCLUSION

Markets for technology don't function well without strong IP.⁶⁴ Technology still may get developed without IP protection, but such developments will be confined to vertically integrated enterprises. Technology needs to be embedded in, and priced into, goods and services supplied via integrated enterprises. That is how consumers and producers usually pay for technology licensing.⁶⁵ The same is true for many intermediate products, such as automotive parts. Only in unusual cases is the division of labor between technology developer and product maker nearly complete, at which point the technology is made available through licensing.

⁶³ Even if they ultimately pay royalty payments, they do so on terms that have been adjusted downward artificially under the threat of antitrust intervention.

⁶⁴ David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RSCH. POL'Y 285 (1986).

⁶⁵ David J. Teece, *Business Models, Business Strategy and Innovation*, 43 LONG RANGE PLAN. 172 (2010).

Mobile wireless is different. 3G, 4G, and (hopefully) 5G wireless telecommunications are cases in point. Competition agencies should rejoice and support rather than undermine the (licensing) business models. Paradoxically, competition policy advocates admire open innovation models. “Consumers benefit from open innovation strategies,” according to the FTC,⁶⁶ in part because it allows specialization to flourish. Open innovation models require that licensing regimes be supported with royalties that are paid in a timely fashion at levels sufficient to draw forth the investment needed to make the ecosystem robust.

Unlocking the full potential of 5G, 6G, and other frontier technologies will require robust patent protection to ensure rewards sufficient to induce investment in new technologies. Each generation of wireless technology – 3G, 4G, now 5G – has taken more than five years (10 years for 5G) to define and many more years to perfect. While initial 5G wireless standards have been set, there will be many updates and improvements.

If competition agencies fail to recognize holdout issues and use antitrust to shield unwilling licensees, such decisions will stimulate the emergence of a vertically integrated “Big Tech” business model in mobile wireless and transfer wealth to “net user” economies that primarily specialize in the adoption and imitation of new technologies, rather than into critical R&D for next-generation wireless. Not much in this scenario is appealing from a competition policy perspective. Should this scenario play out, it will be necessary to declare that policy mistakes helped destroy the greatest model of technological cooperation and innovation that Western civilization ever created. The poorest members of global society, who have benefited enormously from mobile technology, are likely to suffer disproportionately. Adopting a broader intellectual framework that recognizes the unique requirements of open innovation along with geopolitical realities should help avoid such a calamity.

⁶⁶ Federal Trade Commission, *The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition* 7 (Mar. 2011), www.ftc.gov/sites/default/files/documents/reports/evolving-ip-marketplace-aligning-patent-notice-and-remedies-competition-report-federal-trade/110307patentreport.pdf.