Research Policy 44 (2015) 1948–1961

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

Just-in-time patents and the development of standards

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ARTICLE INFO

Article history:
Received 15 May 2014
Received in revised form 1 July 2015
Accepted 5 July 2015
Available online 31 August 2015

Keywords:
Patents
Standards
Essential patents
SEPs
Strategic behavior
W-CDMA
LTE

ABSTRACT

Modern technical standards often include large numbers of patented technologies that are required to implement those standards. These "standard-essential patents" are very valuable assets, and firms that do not own such patents are prepared to spend billions of dollars purchasing them. Whereas large numbers of standard-essential patents are often taken for granted, this study focuses on the process by which companies obtain such patents. Analyzing original data of a large standardization process, we demonstrate how many companies use a strategy we call "just-in-time patenting": They apply for patents of low technical merit just before a standardization meeting, and then send the patents' inventors to the meeting to negotiate this patented technology into the standard. Our findings have several implications for standard-setting organizations, patent offices, and policymakers, as the inclusion of just-in-time patents may reduce competition and market entry, increase prices, and unnecessarily complicate the technological content of standards.

1. Introduction

In recent years, there has been an explosion of lawsuits over patents in the context of technical standards for smartphones and mobile phones, tablets, personal computers, video consoles, etc. These cases involve many well-known companies like Apple, Samsung, Motorola, Nokia, Google, HTC, Microsoft, Kodak, and BlackBerry. This situation might be further exacerbated by the increasing role of companies that do not manufacture or use their patented technologies, but instead focus on licensing. Such companies, which are also known as non-practicing entities (NPEs), are especially keen on acquiring patents in the above industries (Fischer and Henkel, 2012). In the context of patents and standards, a particularly important role is reserved for standard-essential patents (SEPs), which are also referred to as essential patents. These are patents that are required in order to implement a given standard, no matter whether the standard is set by a formally recognized standards body (such as the GSM standard for mobile telephony set by ETSI, or the MPEG video coding standards set by ITU), or by another type of organization. As a consequence, any company that implements that standard in a product or service will, by definition, infringe upon such patents if it does not have a licensing agreement with the patent owner. Because essential patents are particularly powerful and may give rise to abuse, such as refusal to license or hold-up pricing (Shapiro, 2001; Lemley and

Abbreviations: 2G, Second generation (of cellular wireless technologies); 3G, Third generation (of cellular wireless technologies); 3GPP, Third generation partnership project; 4G, Fourth generation (of cellular wireless technologies); ARIB, Association of Radio Industries and Businesses (Japan); CDMA, Code division multiple access; EPO, European Patent Office; ETSI, European Telecommunications Standards Institute; FRAND, Fair, reasonable and non-discriminatory; FTC, Federal Trade Commission (US); GSA, Global Mobile Suppliers Association; GSM, Global System for Mobile Communications, originally Groupe Spécial Mobile; HSPA, High speed packet access; IEEE, Institute of Electrical and Electronics Engineers; IETF, Internet Engineering Task Force; IPC, International Patent Classification; IPR, Intellectual property right; ISO, International Organization for Standardization; IT, Information technology; ITU, International Telecommunication Union; KIPO, Korean Intellectual Property Office; LAN, Local area network; LTE, Long term evolution; MPEG, Moving Picture Experts Group; NBER, National Bureau for Economic Research (US); NPE, Non-practicing entity; OECD, Organisation for Economic Co-operation and Development; OEIDD, Open Essential IPR Disclosure Database; PATSTAT, EPO Worldwide Patent Statistical Database; RAN1, Radio access network 1 (a 3GPP working group); SEP, Standard-Essential Patent; SIPO, State Intellectual Property Office (the patent office of the People's Republic of China); SSO, Standard Setting Organization; TTA, Telecommunications Technology Association (Korea); UMTS, Universal Mobile Telecommunications System; USPTO, United States Patent and Trademark Office; W-CDMA, Wideband code division multiple access.

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http://dx.doi.org/10.1016/j.respol.2015.07.001
0048-7333/

Shapiro, 2007), many standard-setting organizations (SSOs) have created special regimes under which members or other participants that own essential patents are required to disclose this, and any known essential patent owner is requested to commit itself to license essential patents to any implementer of the standard on the basis of fair, reasonable, and non-discriminatory (FRAND) prices and conditions. Many of the above lawsuits are actually concerned with these licensing commitments.

Companies that own SEPs enjoy a range of benefits, such as revenue-generating opportunities (as explained above, every implementer of the standard is by definition infringing, and thus by definition a potential licensee) and a good bargaining position for negotiating cross-licenses in order to gain access to both SEPs and non-SEPs owned by others. Moreover, at a higher level, Pohlmann et al. (2015) found that the ownership of essential patents boosts the financial returns of firms, while Aggarwal et al. (2011) provide empirical evidence for their positive influence on stock markets' returns. Given the attractiveness of owning such patents, companies that do not hold any (or believe they have too few) often try to purchase them, sometimes at very high prices. For example, in 2010 a consortium that included Apple, Microsoft, Ericsson, Sony, and BlackBerry acquired an important part of the former patent portfolio of now-defunct Canadian telecommunications firm Nortel for US$ 4.5 billion. This portfolio is believed to contain a large number of essential patents for 4G mobile telecommunications. A year later, Google purchased Motorola Mobility for US$ 12.5 billion, and thus acquired a patent portfolio valued by Google at US$ 5.5 billion.[1] These transactions illustrate the value that companies attach to standards-related patents, though it should be noted that in both examples, the portfolios comprised both essential and non-essential patents.

The question is how companies obtain essential patents in the first place. To answer this, one needs to consider the standardization process. Most SSOs create standards on the basis of technical proposals and suggestions from participants, and decide on the basis of consensus. In principle, any interested party can become a participant. Thus, in the case of telecommunications technology or IT, it is mainly companies that participate, although other stakeholders such as users, research organizations, or governments may also join in. A technical committee or a comparable group meets to discuss technical approaches to meeting the standards' design requirement, and to eventually decide, on the basis of consensus, on the final version of the standard. The committee may include technologies in the standard that are patented by the participants, but may also knowingly or unknowingly incorporate technologies covered by the patents of others. It is not unusual for a final telecommunications, consumer electronics, or IT standard to incorporate many, and sometimes thousands of, patented technologies: these are the essential patents. Although quite a few standards in areas other than those mentioned above also cover patented technology, their numbers of essential patents are typically much lower.

The inclusion of patented technologies in a standard can be a good thing, as these technologies may improve, for example, the standard's performance, cost-effectiveness, or environmental friendliness. In such cases, the costs of essential patents (i.e., the licensing fees and the associated costs, such as the resource-consuming licensing negotiation processes) may be worth the additional value of the standard. However, if such patents are included without their contributing substantially to the standard's value, it could be considered suboptimal from the public's perspective in terms of social welfare (although perhaps optimal from the perspective of an individual patent owner). In recent years, several observers have raised concerns about the undesirable inclusion of patented technologies. Even insiders have expressed concerns about the standard-setting process, during which parties can propose technologies:

> "... just for getting patented technology into the standard rather than to improve the standard [...] No mechanism exists to determine whether a patent claim brings a standard forward (real innovation) or just tries to get a patent into the standard in order to make money."[2]

One such strategy was recently outlined at a public conference by a former director of the research laboratory of a large, multinational company.[3] He explained how he would send staff to a standardization meeting, and that right after the meeting, they would brainstorm in the hotel room about how to combine elements that had been mentioned by other participants, and then immediately prepare patent applications for these (see Section 3 for more about this process). During standardization meetings, the authors also saw how companies were strategically filing patents during and just before the meetings, in order to have these technologies included in the specified standard.

In this study, we investigated whether participants in standardization processes indeed conducted "just-in-time patenting" by patenting technologies with low technical merit (that thus contribute little to the standard) just before a standardization meeting, and then attending that meeting to negotiate inclusion of the technology into the standard.

2. Existing literature on standard-essential patents

Problems that arise as a result of the inclusion of patented technologies in standards have been a topic of research for more than a decade. Much of the focus of this research has been on the effects of such technology inclusion on the market and on competition, including concerns about patent holdup, royalty stacking, and ambush or patent blocking (see, e.g., Lemley and Shapiro, 2007; Bessen, 2004; Farrell et al., 2007; Lindsay, 2012; Geradin et al., 2008; Sidak, 2009; Lerner and Tirole, 2015; Lerner and Tirole, 2014). The societal and policy relevance of this phenomenon is reflected in recent studies by the US National Academies of Science (Maskus and Merrill, 2013), reports by the Federal Trade Commission (e.g., FTC, 2011), studies conducted for the European Commission (e.g., Blind et al., 2011; Bekkers et al., 2014), investigations by the European competition authorities (Buehler et al., 2014), and publications of standards-setting organizations (SSOs) themselves (e.g., ITU, 2014). The competition and antitrust concerns related to essential patents are also summarized in a recent special issue of the *Antitrust Bulletin* (see Besen and Levinson, 2012) and in a book published by the American Bar Association on the antitrust aspects of standards setting (Kobayashi and Wright, 2010).

The question as to how patented technology becomes included in standards in the first place has only recently received attention. Related questions concern how SSOs select technologies for their standards, and how firms promote their own patented technology for inclusion in those standards.

Rysman and Simcoe (2008) observed that, on average, patents disclosed as essential have a higher forward citation score than

[1] Data on the basis of Google's Securities and Exchange Commission (SEC) filing. See CNET, July 25, 2012, "Google: Motorola's patents, tech are worth $5.5 billion."

[2] Presentation by Dirk Weiler, chairman of the ETSI General Assembly and chairman of ETSI's IPR Special Committee, titled "Standards Related Patent Quality: a view from a standardisation organization." Presented at the EC/EPO Workshop on "Tensions between intellectual property rights and standardisation: reasons and remedies." Brussels, November 22, 2010. Retrieved January 3, 2011 from http://ec.europa.eu/enterprise/sectors/ict/files/ict-policies/5 weiler en.pdf.

[3] Reference available from the authors, upon request.