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FRAND MARKET FAILURE: IPXI'S STANDARDS-ESSENTIAL PATENT LICENSE EXCHANGE

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ABSTRACT

Intellectual Property Exchange International, Inc. ("IPXI") was formed in 2008 to create a market-based trading exchange for aggregated patent license rights, particularly standards-essential patents ("SEPs"). IPXI based its model on existing commodities exchanges, proposing that non-exclusive patent licenses could be standardized, commoditized, and traded on an open market, thus eliminating costly and inefficient bilateral negotiations and providing a royalty rate likely to be viewed as "reasonable." IPXI's most ambitious offering involved a portfolio of 194 U.S., European and other patents deemed essential to IEEE's 802.11n "Wi-Fi" standard. Despite the backing of several significant patent holders, IPXI's offering failed to attract sufficient interest, and IPXI ceased operations in March 2015. This article analyzes the failure of IPXI based on the documentary record, public statements by IPXI executives and interviews with industry experts. It concludes that, despite its potential to improve the efficiency of the SEP licensing market, factors including a lack of participation by key patent holders, an untested record of enforcing patents against infringers, and constraints imposed by its standardized license offering, led to IPXI's demise.

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INTRODUCTION

It is well-documented that large numbers of patents cover key interoperability standards in fields such as wireless telecommunications, computer networking and semiconductor design.[1] As to any given standard, critical patents ("standards-essential patents" or "SEPs") can be controlled by anywhere from a handful to hundreds of different firms. And while some patent licenses are available on a collective basis through patent pools, the large majority of patents covering technical interoperability standards are not pooled, and must be licensed directly from the patent holders.[2] Moreover, concerns over antitrust and competition law discourage collective negotiation activity, in favor of patent licensing and royalties. Accordingly, most firms wishing to manufacture and sell standards-compliant products must engage in bilateral licensing negotiations with individual patent holders.[3]

Some market participants have observed that the one-off process of bilateral licensing negotiation is time-consuming, costly, non-transparent and inefficient; in some cases, taking years to conclude a single licensing transaction.[4] Due to these high transaction costs, some patent holders elect not to pursue licensing of their standards-essential patents, and some product manufacturers may operate without all the licenses that may be legally required.[5]

Moreover, even when licensing negotiations do occur, there can be considerable disagreement over royalty levels, and other terms that will satisfy a patent holder's obligation to grant licenses on "fair, reasonable and non-discriminatory" ("FRAND") terms,[6] as required by many standard-setting organizations ("SSOs").[7] This lack of consensus has resulted in

1. *See, e.g.*, Knut Blind et al., *Study on the Interplay between Standards and Intellectual Property Rights (IPRs)*, FINAL REPORT 62 (2011), http://ec.europa.eu/enterprise/policies/european-standards/files/standards_policy/ipr-workshop/ipr_study_final_report_en.pdf); Justus Baron & Tim Pohlmann, *Mapping Standards to Patents using Databases of Declared Standard-Essential Patents and Systems of Technological Classification* (2015), http://www.law.northwestern.edu/research-faculty/searlecenter/innovationeconomics/documents/Baron_Pohlmann_Mapping_Standards.pdf.

2. *See* Jorge L. Contreras, *Fixing FRAND: A Pseudo-Pool Approach to Standards-Based Patent Licensing*, 79 ANTITRUST L.J. 47, 75–78 (2013) [hereinafter FRAND].

3. *Id.*

4. Letter from Garrard R. Beeney to the Honorable Renata Hesse, Esq., (Nov. 30, 2012), http://www.justice.gov/atr/public/busreview/request-letters/302094.pdf.

5. Contreras, FRAND, *supra* note 2, at 59–62.

6. The synonymous term "RAND" (reasonable and nondiscriminatory) is also used frequently.

7. To alleviate the risk that patent holders will unexpectedly assert patents against standardized technologies, to encourage the broadest adoption of standards, and to induce manufacturers to make the investments necessary to develop and deploy standardized technologies, many SSOs (also referred to as "standards-developing organizations" or "SDOs") have adopted policies requiring their participants to

significant disputes, litigation and governmental investigations in North America, Europe and Asia.[8]

Finally, concerns have been raised about the potential for excessive aggregate royalty burdens on standardized products, due to the independent and uncoordinated royalty demands of multiple patent holders (royalty "stacking").[9] It has been hypothesized that royalty stacking could lead to depressed manufacturer profits, reductions in competition, increased consumer costs and decreased consumer choice.[10] The combination of these factors has led to increasingly frequent calls for reform of the current patent licensing marketplace, both by commentators and enforcement agencies.[11]

Intellectual Property Exchange International, Inc. ("IPXI") was formed in 2008 to address these challenges by offering a market-based trading platform for aggregated patent license rights. The IPXI exchange model was based on that of long-standing commodities exchanges, such as the Chicago Mercantile Exchange and EUREX. The commodities exchange model has brought stability and liquidity to markets for goods ranging from crude oil and precious metals to soybeans, pork bellies and concentrated orange juice. IPXI's theory was that, like these physical goods, non-exclusive patent licenses could be standardized and commoditized, and thereby traded, on an open market. Enabling market trading of patent licenses would, in theory, eliminate the costly, inefficient and time-consuming bilateral negotiations that currently characterizes such transactions.

In 2014, IPXI launched an offering of 50,000 tradable Unit License Right contracts ("ULRs"), each granting the holder a worldwide right to manufacture and sell 1,000 devices compliant with IEEE's[12] 802.11n "Wi-Fi" standard. Despite the backing of several significant patent holders,

commit to licensing their standard-essential patents ("SEPs") on terms that are FRAND or royalty-free. *See generally* NAT'L. RESEARCH COUNCIL, PATENT CHALLENGES FOR STANDARD-SETTING IN THE GLOBAL ECONOMY (Keith Maskus & Stephen A. Merrill eds., 2013), http://documents.library.nsf.gov/edocs/Patent-Challenges-for-Standard-Setting-in-Global-Economy.pdf [hereinafter NAS REPORT].

8. *See, e.g.,* Contreras, FRAND, *supra* note 2, at App. 1 (cataloging U.S. FRAND-related litigation through 2012); *see also infra* Part II.A.2 (summarizing FRAND litigation concerning the 802.11 standard).

9. Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007).

10. *Id*.

11. *See, e.g.*, Kai-Uwe Kühn, Fiona Scott Morton & Howard Shelanski, *Standard Setting Organizations Can Help Solve the Standard Essential Patents Licensing Problem*, 3 CPI ANTITRUST CHRON. (SPECIAL ISSUE) 1 (Mar. 2013).

12. IEEE is a major international standards organization based in New Jersey, USA. It also serves as the principal U.S. trade organization for electrical and electronics engineers and was formerly known as the Institute of Electrical and Electronics Engineers. IEEE, History of IEEE, https://www.ieee.org/about/ieee_history.html (last visited Apr. 23, 2016).

IPXI's 802.11n offering failed to attract sufficient interest, and IPXI ceased operations in March 2015.

This article analyzes the failure of IPXI based on the documentary record, public statements by IPXI executives and interviews with industry experts. The remainder of this article proceeds as follows: Part I discusses IPXI's proposed commodities exchange for patent license rights, beginning with an overview of commodities exchanges, generally, and then describing the specific features of IPXI's exchange system. Part II moves to IEEE's 802.11 series of wireless networking standards, summarizing the patent disputes that have developed around 802.11 and IPXI's 802.11n offering. Part III offers several possible explanations for the failure of IPXI to achieve market acceptance and concludes with potential directions for future initiatives.

I. THE IPXI EXCHANGE

A. Commodities and Futures Exchanges in General

Formalized exchanges for the purchase and sale of agricultural commodities (corn, wheat, soybeans, cotton, livestock) began to emerge in the United States in the mid-nineteenth century.[13] These institutions—which included the Chicago Board of Trade ("CBOT"), the Kansas City Board of Trade and the New York Mercantile Exchange ("NYMEX")—enabled farmers to store their crops at a centralized warehouse, and then sell them to merchants who would ship them to distribution and retail centers. These transactions were made possible by the exchanges' introduction of standardized contracts pursuant to which all products of a particular class would be sold in standardized quantities, according to common quality grades and on uniform terms of sale. For example, shelled corn is generally priced per bushel (fifty-six pounds) and traded in 5,000-bushel units, and any merchant wishing to purchase corn can do so with the assurance that he or she will receive a nearly identical, fungible product, no matter which farmer grew the crop.

Given the perishable nature of agricultural products, mechanisms were soon established to enable the purchase and sale of these commodities before they were actually delivered—so-called "forward" or "future" contracts. Thus, a farmer anticipating a good crop could sell a contract for corn on the

13. For a general overview of the history and mechanisms of commodities trading and exchanges, see, for example, JULIUS B. BAER, COMMODITY EXCHANGES AND FUTURES TRADING—PRINCIPLES AND OPERATING METHODS (2008); NITI NANDINI CHATNANI, COMMODITY MARKETS—OPERATIONS, INSTRUMENTS, AND APPLICATIONS (2012).

CBOT before it was harvested or even planted, and a merchant interested in securing a supply of corn could purchase that contract. If the farmer eventually failed to deliver due to drought, fire or malfeasance, he would be in breach of the contract and the merchant could recover damages.

For more than a century, agricultural products of increasing variety were the principal commodities traded on these exchanges.[14] Contracts for non-agricultural products such as crude oil, precious metals and energy began to appear in the 1970s. The 1970s also saw the emergence of futures trading in financial products including currencies, stock indexes and mortgage-backed securities. Like the original agricultural commodities, contracts for financial commodities are offered on standardized terms for fixed product units.

The introduction of new tradable commodities to exchanges requires substantial research and market testing. Sandor observes that between 1960 and 1970, fifty-six new commodity futures contracts were introduced on different U.S. exchanges.[15] Of these, only eighteen achieved a measure of commercial success.[16] Numerous factors contributed to the success of new commodities contracts, including support from industry and brokerage houses, the suitability of contract terms to the particular commodity and the liquidity of the market.[17]

Financial futures, as well as other commodities, are traded today via electronic platforms such as the CME Globex system, which handles transactions for the Chicago Mercantile Exchange, CBOT, NYMEX and Commodity Exchange ("COMEX"). CME Globex claims that it handles an annual trading volume of more than $1 quadrillion.[18] It is this electronic trading exchange model that formed the basis for IPXI's unitized patent license approach.

B. Unit License Rights ("ULRs") and the IPXI Exchange

IPXI sought to develop an electronic exchange for patent license rights. The basic tradable unit on the IPXI exchange, analogous to a purchase contract on a traditional commodities exchange, was the Unit License Right

14. *See* Richard L. Sandor, *Innovation by an Exchange: A Case Study of the Development of the Plywood Futures Contract*, 16 J.L. & ECON. 119, 119 (1973) (discussing the expansion of commodities markets to new product categories).

15. *Id*. at 120.

16. *Id*. at 120–21.

17. *Id*. at 135.

18. CME Group, *CME Group Overview*, http://www.cmegroup.com/company/files/cme-group-overview.pdf.

or ULR. Each ULR represented a sublicense to exercise a fixed package of rights under a specified portfolio of patents. The patents included in IPXI's offerings were owned by one or more "Sponsor" firms, which granted IPXI exclusive rights to issue sublicenses under those patents through sales of ULRs.

For example, a particular ULR might represent a prepaid sublicense under 100 different patents owned by five Sponsors in a variety of countries, and might permit the holder to manufacture and sell 1,000 devices covered by some or all of those patents. The holder of the ULR could "consume" these rights to manufacture and sell the requisite number of devices, or resell the ULR on the open market.

Trading of ULRs was to be limited to IPXI "members" that agreed to abide by its rules and procedures.[19] IPXI offered varying levels of membership, ranging from no-fee "purchasing" memberships, that permitted the trading of ULR contracts on the exchange, to higher level memberships, that came with rights to participate on one or more of IPXI's governance and policymaking committees.[20]

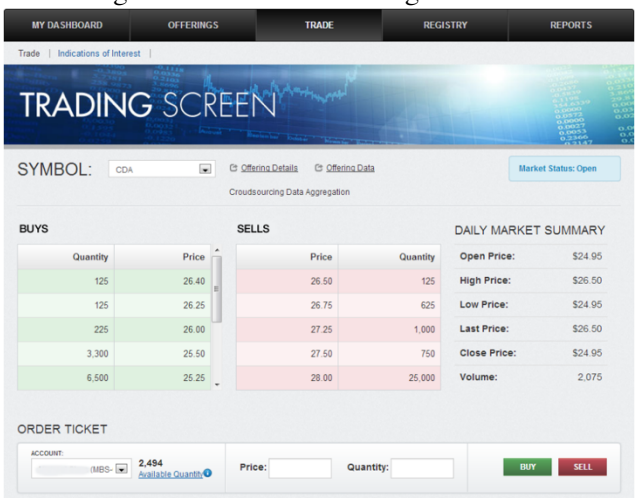
The price at which ULRs would initially be sold was to be determined based on bids submitted by potential purchasers prior to the closing of an offering. Once a sufficient number of bids were received, IPXI would price the offering, and sell ULRs to all bidders at the final offering price. In order to guide bidders, IPXI determined an estimated price for each ULR based on an analysis of the covered patents and relevant market factors. It was contemplated that ULRs would be offered by IPXI in up to three tranches, with the price established for each tranche increasing by approximately 15%. In each such primary offering, IPXI would retain 20% of the proceeds, with 80% going to the relevant Sponsor.

After the initial sale of a ULR by IPXI, members could trade ULRs at market clearing prices on IPXI's proprietary trading platform. In these secondary market transactions, IPXI would retain a commission and remit the remaining proceeds to the Sponsor.

19. Intell. Prop. Exchange Intl., Inc., *IPXI Market Rulebook* (May 20, 2013), http://www.pacificroyalties.com/wp-content/files/IPXI-Intellectual-Property-Market-Rulebook.pdf.

20. IPXI was a wholly-owned subsidiary of Chicago-based IPXI Holdings LLC (Holdings). The members of Holdings included Royal Philips Electronics, CBOE Holdings, Ocean Tomo LLC and other investors. Unlike Holdings, IPXI used the term "member" to designate a participant on its exchange and not an entity having any ownership interest in IPXI.

Figure 1. The IPXI Trading Platform[21]



While IPXI did not portray itself as a patent enforcement entity, it did reserve the right to enforce patents included in its ULRs with the cooperation of the relevant Sponsor.[22] IPXI also established a committee to make potential patent enforcement recommendations.

C. Distinguishing features of the IPXI Exchange

The proposed IPXI ULR model purported to offer several advantages over existing structures for conducting transactions in patent licenses. First, obtaining a ULR on the IPXI market involved substantially less time and effort than negotiating bilateral patent licenses from individual patent holders. Second, by fixing the initial offering price of each ULR, IPXI eliminated price negotiation from these transactions. Third, the standardized nature of ULR rights eliminated negotiation over other license terms and conditions and assured that all licenses were granted on identical and non-discriminatory terms.

Of course, many of these advantages also exist in patent pools, which similarly aggregate patent rights from multiple firms and offer package licenses on standardized pricing and other terms.[23] Like the administrators of patent pools, IPXI conducted an evaluation of the patents contributed by its Sponsors and assessed their essentiality to the relevant industry standards.

21. IPXI Presentation (Nov. 12, 2014) (copy on file with author).
22. *IPXI Market Rulebook*, *supra* note 19.
23. Contreras, FRAND, *supra* note 2, at 73.

The IPXI model differed from patent pools, however, in two key respects. First, whereas IPXI's ULRs could be freely traded by the purchaser on the IPXI exchange, the license rights granted by a patent pool are rarely, if ever, transferrable. Second, pricing for ULRs, after their initial offering, is driven by open market transactions. Thus, if competition by alternative technologies made a particular technology less valuable in the marketplace, the holder of a ULR may sell it at a discount from the original purchase price. Conversely, if a technology increased in value, the price of ULRs could rise on the open market. Pricing of patent pool licenses, however, is generally static.[24]

D. Antitrust Review

Given the novel structure of the IPXI market and the increased scrutiny with which antitrust enforcement agencies both in the United States and Europe have viewed patent licensing transactions, in 2012, IPXI sought a business review letter ("BRL") from the U.S. Department of Justice ("DOJ") prior to launching its first offering.[25] In early 2013 the DOJ issued its response, which was inconclusive at best.[26]

First, the DOJ acknowledged that "IPXI's proposed exchange potentially could generate efficiencies for the IP marketplace and encourage innovation through increased licensing efficiency, sublicense transferability, and greater transparency."[27] Against these pro-competitive benefits, the DOJ assessed the potential risks associated with the proposed exchange. In particular, it questioned the decision of IPXI to prohibit Sponsor patent holders from independently licensing their patents in a ULR's field of use.[28] The DOJ pointed out that such independent licensing, permitted by many patent pools, reduces the risk that the pool will dominate a particular technology market.[29] The DOJ also questioned IPXI's unwillingness to

24. Another feature differentiating IPXI ULRs from patent pool licenses, though not necessarily an advantage of ULRs, is the pre-paid nature of ULR licenses. That is, a ULR represents a defined number of prepaid sublicense rights, and is purchased prior to the manufacture of the relevant devices. Under most patent pool licenses, payment is not required until after a device is manufactured or sold. In this regard, the purchase of a ULR involves a risk that the buyer will not use the associated sublicense rights and may also be unable to resell the ULR to recoup its investment. *See infra* Part III.E.

25. Letter from Garrard R. Beeney, *supra* note 4.

26. William J. Baer, Asst. Att'y. Gen., Letter to Garrard R. Beeney (Mar. 26, 2013), http://www.justice.gov/atr/public/busreview/295151.pdf ("Due to the inherent and potential competitive concerns associated with IPXI's novel business model . . . the Department declines to state its present enforcement intentions regarding IPXI's proposal at this time. We simply do not know enough to conclude that IPXI's activities, once operational, will not raise competitive concerns.").

27. *Id*. at 6.

28. *Id*. at 9–10.

29. *Id*.

exclude patents that could function as substitutes for one another from a ULR offering, because the inclusion of substitutes in a pooled offering can reduce incentives to innovate.[30] Nevertheless, the DOJ concluded that, at least with respect to patents deemed to be essential to the implementation of a particular standard, it was likely that ULRs would include only complementary patents, and would exclude substitute patents.[31] For these and other reasons, the DOJ withheld judgment regarding its future enforcement intentions regarding the IPXI exchange.[32]

Perhaps because of the noncommittal response by the DOJ, immediately prior to the launch of its 802.11n ULR in October 2014, IPXI commissioned a White Paper by three highly-regarded former governmental officials.[33] The White Paper set out a favorable antitrust analysis of the 802.11n ULR, emphasizing the "numerous and meaningful" efficiencies likely to flow from the offering, while minimizing potential anticompetitive harm that could arise from the offering.

E. Initial ULR Offerings

In June 2013, IPXI launched its first ULR offering for a portfolio of more than 600 organic light emitting diode ("OLED") patents owned by Philips (an IPXI founder). This offering generated relatively little market interest, and was not priced.

Four months later, IPXI launched a second ULR offering covering twenty-one U.S. and UK patents owned by JPMorgan Chase, and prepaid stored value card ("SVC") technology. Each SVC ULR represented a right to manufacture and sell 100 cards. This offering generated sufficient interest to be priced in July 2014 (i.e., there was enough bidder interest that IPXI sold a quantity of ULRs to bidders at $5 per unit), after which the ULRs

30. *Id*. at 8–9.

31. *Id*.

32. *Id*. at 12.

33. David Kappos, Carl Shapiro & Christine Varney, Antitrust Analysis of IPXI's 802.11n Offering (Oct. 2014) (unpublished) (copy on file with author). Kappos, a partner at Cravath, Swaine & Moore LLP and Special Legal Advisor to the Board of Managers of IPXI Holdings, LLC, served as Under Secretary of Commerce and Director of the U.S. Patent and Trademark Office from 2009–13. Shapiro, Transamerica Professor of Business Strategy at the Haas School of Business, University of California Berkeley, served as Deputy Assistant Attorney General for Economics at the Antitrust Division of the U.S. Department of Justice from 1995–96 and 2009–11. Varney, a partner at Cravath, Swaine & Moore LLP, served as a Commissioner of the U.S. Federal Trade Commission from 1994-97 and as Assistant Attorney General for the Antitrust Division of the U.S. Department of Justice from 2009–11.

became eligible for trading on IPXI's market platform.[34] It has been reported, however, that trading volume of the SVC ULR was extremely light, suggesting that most purchasers obtained the ULRs for their own consumption and not for purposes of trading.

II. IPXI'S 802.11N ULR OFFERING

IPXI's offerings of OLED and SVC patent licenses, each backed by a single firm's patents, were only preludes to its most ambitious offering: a multi-firm portfolio of patents covering IEEE's 802.11n Wi-Fi wireless networking standard.

A. The 802.11n Standard

The IEEE 802.11 series of wireless local area networking standards, commonly known as Wi-Fi®, have become ubiquitous around the world. The first version of the standard, 802.11a, was released in 1999. Development of IEEE 802.11n began in 2002. The standard was first released in 2007 and published in final form in 2009. It employs multiple antennae to achieve maximum data transmission rates of approximately 450 Mbps, a significant improvement over the 54 Mbps rates achieved under the previous 802.11g standard (2003).[35] While 802.11n was leapfrogged in 2012 by 802.11ac, IPXI estimated in 2014 that approximately 8 billion wireless chipsets implementing 802.11n would be produced between 2009 and 2019.[36]

1. 802.11 and Patents

The 802.11 series of standards was developed over the course of two decades by employees of hundreds of different firms and institutions collaborating under the aegis of the IEEE Standards Association. Estimates put the total number of patents covering the 802.11 standards at

34. Richard Lloyd, *At Last, Trading on the IPXI Platform Can Begin*, INTELL. ASSET MGT. BLOG (Jul. 22, 2014), http://www.iam-media.com/blog/Detail.aspx?g=5c242975-e147-4be3-a4af-64d802047f4f.

35. Gordon Kelly, *802.11ac vs 802.11n WiFi: What's the Difference*? FORBES (Dec. 30, 2014), http://www.forbes.com/sites/gordonkelly/2014/12/30/802-11ac-vs-802-11n-wifi-whats-the-difference/.

36. Intell. Prop. Exchange Intl., Inc., Preliminary Offering Memorandum—ULR Contracts, WFN1 (Oct. 22, 2014) [hereinafter 802.11n Offering Memorandum].

approximately 3,000,[37] held by 93 different patent holders.[38] Unlike some standards for consumer electronics media (e.g., CD, DVD), only a small fraction of the total number of patents essential to IEEE 802.11 are included in patent pools.[39]

IEEE, like many SSOs, requires that participants commit to licensing patent claims essential to the implementation of IEEE standards on terms that are FRAND.[40] Though IEEE's intellectual property policies are comparatively detailed, and IEEE recently approved a set of amendments clarifying some aspects of the scope and nature of the commitments required of patent holders,[41] the precise requirements of its FRAND commitment are not specified.

2. 802.11 FRAND Litigation

The uncertainty surrounding SSO FRAND commitments has led to substantial litigation over the past several years. IEEE's 802.11 standards have been the subject of several such disputes, probably due to a combination of their popularity, their longevity, and the large number of patents covering aspects of these standards. IEEE 802.11 standards were the subject of dispute in recent cases including *Microsoft Corp. v. Motorola, Inc.*,[42] *Apple, Inc. v. Motorola, Inc.*,[43] *In re. Innovatio IP Ventures, LLC*[44] and *Ericsson, Inc. v. D-Link Systems, Inc.*,[45] to name just a few.

One of the principal points of contention in these cases was whether a patent holder complied with its obligation to charge manufacturers of standards-compliant products a royalty that was "reasonable." To answer this question, courts have been required to determine precisely what the reasonable royalty rate would have been for asserted patents covering the

37. In re Innovatio IP Ventures, LLC Patent Litig., No. 11-C-9308, 2013 WL 5593609, at *43 (N.D. Ill. Oct. 3, 2013).

38. Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 U.S. Dist. LEXIS 60233, at *267 (W.D. Wash. Apr. 25, 2013).

39. For example, Via Licensing offers licenses under a pool of 35 802.11-essential patents owned by five patent holders (primarily older versions of the standard) and Sisvel Patent Pool offers licenses under a number of 802.11-essential patents owned by three patent holders.

40. IEEE Standards Assn., IEEE-SA Standards Board Bylaws, Sec. 6. Patents (2015), http://standards.ieee.org/develop/policies/bylaws/sect6-7.html.

41. *See* Michael A. Lindsay & Konstantinos Karachalios, *Updating a Patent Policy: The IEEE Experience*, CPI ANTITRUST CHRON., Mar. 2015.

42. 2013 U.S. Dist. LEXIS 60233.

43. 757 F.3d 1286 (Fed. Cir. 2014).

44. No. 11 C 9308, 2013 WL 5593609 (N.D. Ill. Oct. 3, 2013).

45. 773 F.3d 1201 (Fed. Cir. 2014).

standard. A sample of the rates determined in these cases is set forth in Table 1 below.

Table 1. FRAND Royalty Determinations for 802.11 in Selected U.S. Cases[46]

Case	Court	No. 802.11 Patents	Per-Device FRAND Royalty	Royalty per Patent
Microsoft v. Motorola	W.D. Wash.	11[47]	$0.03471	$0.003
In re. Innovatio	N.D. Ill.	19	$0.0956	$0.005
Ericsson v. D-Link	E.D. Tex.	3	$0.15	$0.05

As Table 1 illustrates, the range of reasonable royalty rates for patents covering the 802.11 standards varies considerably, from a low of $0.003 per patent in *Microsoft* to a high of $0.05 per patent in *Ericsson*. This variation may be attributed to differences in the value of the specific patents at issue, the validity and infringement of those patents, and other factors. Nevertheless, the fact that court-determined FRAND royalty rates diverge by an order of magnitude for patents covering the same standard has added a significant element of uncertainty to FRAND royalty determinations.

B. The 802.11n FRAND ULR Offering

1. Structure of the ULR

In order to address the inefficiencies and uncertainties surrounding the licensing of patents covering IEEE 802.11n, in October 2014, IPXI launched

46. *Microsoft Corp*, 2013 U.S. Dist. LEXIS 60233, at *297–98; *In re Innovatio IP Ventures*, 2013 U.S. Dist. LEXIS 144061, at *183; Ericsson Inc. v. D-Link Sys., 2013 U.S. Dist. LEXIS 110585, at *72, 89 (E.D. Tex. 2014), *aff'd in part, rev'd in part* 773 F.3d 1201, 1230–32 (Fed. Cir. 2014) (remanding for recalculation of damages and royalty rate because "[i]n this case, the district court erred by instructing the jury on multiple *Georgia-Pacific* factors that are not relevant, or are misleading, on the record before it, including, at least, factors 4, 5, 8, 9, and 10 of the *Georgia-Pacific* factors" and to that end, recommending that "[t]rial courts [] also consider the patentee's actual RAND commitment in crafting the jury instruction").

47. *Microsoft Corp*., 2013 U.S. Dist. LEXIS 60233, at* 159–60 (finding that Motorola asserted twenty-four patents, only eleven of which could potentially infringe Microsoft's products).

an offering of 50,000 ULRs aggregating patents essential to the 802.11n standard. Each of these ULRs represented a sublicense to manufacture and sell 1,000 wireless chipsets conforming to the IEEE 802.11n standard. The bundled rights in each ULR included 194 patents owned by eight different entities: Columbia University, the University of California, Fraunhofer-Gesellschaft, JVC Kenwood, Philips, Mitsubishi Electric, Orange, and Sony. These patents were issued in nineteen different countries, including the United States (sixty-three), Germany (twenty), France (twenty), Great Britain (nineteen), Japan (seventeen) and Sweden (ten). Of the 194 patents, 142 were deemed essential to mandatory portions of the 802.11n standard, and fifty-two were deemed essential to optional portions.[48]

As noted above, IPXI planned to set the price of each ULR offering based on bids received from market participants. To assist with bidding, IPXI estimated the fair price for each 802.11n ULR to be $120 ($0.12 per device or $0.0006 per patent). Compared to the per-patent rates calculated in the judicial decisions summarized in Table 1, the IPXI estimated rate is comparatively low.

2. Quintessentially FRAND?

One of IPXI's principal claims regarding the 802.11n offering was that it would help participating patent holders comply with their obligation to grant licenses on FRAND terms. It claimed that setting ULR offering prices based on bidders' expressions of interest would, by definition, result in royalty rates that met the legal standard of reasonableness. That is, not only was IPXI's estimated offering price of $0.12 per device based on an assessment of judicial and private royalty determinations for versions of the same standard, but any bids made by potential licensees would also reflect rates that those parties viewed as acceptable and, therefore, reasonable. Thus, IPXI claimed that its model would yield prices that were "quintessentially" fair and reasonable.[49]

Despite drawing on input from both buyers and sellers, it is not clear that IPXI's methodology would, in fact, yield a FRAND royalty rate, at least as FRAND has been defined by several courts and commentators. Lemley and Shapiro, for example, argue that a FRAND royalty should take into account the value of a patented technology *before* it is incorporated into a standard, and manufacturers have sunk significant costs into the standardized

48. *IPXI Market Rulebook*, *supra* note 19, at 19 (IPXI staff will evaluate the essentiality to the 802.11n standard of each patent contributed by a Sponsor to the offering.).

49. Letter from Garrard R. Beeney, *supra* note 4.

technology (becoming "locked-in").[50] In other words, the royalty should not be higher simply because a patented technology was incorporated into a standard.[51] But instead of seeking to determine this *ex ante* value, the IPXI model would have established prices *ex post*, after the standard had become locked-in and manufacturers had little ability to migrate to a different technology. As such, the IPXI price may have been what licensees were willing to pay, but this decision would have been influenced by their sunk investments, and would not necessarily reflect the *ex ante* reasonable value of the technology.[52]

C. The Failure of the Offering and IPXI

It is no exaggeration to say that IPXI's 802.11n ULR offering was a failure. Insufficient investor interest was generated even to price the offering. Given the lack of bidders, on March 23, 2015, IPXI announced not only that it was discontinuing the 802.11n offering, but that IPXI itself was shutting its doors.[53] The sudden closure of IPXI surprised many in the industry, leading to speculation regarding the causes of its failure. The next section seeks to shed light on the factors that may have contributed to the failure of the 802.11n ULR to gain market acceptance and the consequent closure of IPXI itself.

III. UNDERSTANDING THE FAILURE OF IPXI

This section draws on both primary documentary sources, as well as personal interviews conducted by the author, to assess the factors that may have contributed to the failure of the 802.11n offering in the marketplace. This inquiry has been limited by the scarcity of public information available regarding IPXI and its operations. As of this writing, the IPXI web site (www.ipxi.com) contains little content aside from press releases and links to news stories, and the IPXI trading platform is no longer accessible. The author was provided with copies of IPXI's offering documentation for the 802.11n ULR, as well as other background materials, by IPXI prior to its shut-down. The author also interviewed representatives of several large

50. Lemley & Shapiro, *supra* note 9, at 2004.

51. *See Ericsson Inc.*, 2013 U.S. Dist. LEXIS 110585, at *86–88.

52. It is worth noting that the White Paper commissioned by IPXI did not claim that IPXI's methodology would yield FRAND royalty rates, but only the more modest claim that its greater transparency would "promote FRAND licensing." Kappos, Shapiro & Varney, *supra* note 33.

53. Intell. Prop. Exchange Intl., Inc., *Corporate Announcement* (Mar. 23, 2015), http://www.oceantomo.com/pdf/ipxi_corporate_announcement.pdf [hereinafter IPXI Shut-Down Announcement].

U.S.-based firms active in 802.11 product markets that were aware of IPXI and its ULR approach but declined to participate in IPXI's offerings. Due to the premature discontinuation of the 802.11n ULR offering, it is not known which firms, if any, bid on or expressed interest in these ULRs.

A. The Missing Threat of Litigation?

IPXI's executives have attributed the exchange's failure to potential patent licensees' unwillingness to obtain required licenses unless threatened with litigation.[54] Though IPXI and its Sponsors retained the ability to enforce the patents that were licensed under the ULRs, IPXI had no history of patent enforcement or litigation, nor any announced plan to commence litigation.[55] Thus, in its shut-down announcement, IPXI explained that "potential licensees made it clear that the only way IPXI would really get their attention was through litigation, and that's exactly what our business model tried to overcome."[56] Or, as IPXI's CEO stated in a press interview, "there was no incentive [for potential licensees] to talk without the threat of litigation."[57]

This line of reasoning places the blame for IPXI's failure on the manufacturers of Wi-Fi enabled products. It essentially accuses these manufacturers of preferring to free-ride on the technical innovations of patent holders, rather than pay royalties. The argument is reminiscent of the music industry's explanation for the collapse of the market for recorded music circa 1999: absent the threat of legal action, consumers would rather steal than buy.

There is, of course, some truth to the notion that patents are valuable only if they are backed-up by the threat of enforcement. Property rights in general, whether representing land, chattels or intellectual creations, have economic value only to the extent that the law provides their owners with the means for excluding others from exploiting those rights. Firms in a competitive marketplace should not be expected to act out of altruism, but out of commercial necessity. If a patent holder has evidenced no interest in enforcing its patents, then infringers would be acting rationally by adopting a "wait and see" approach until presented with a credible threat of

54. *Id.*; Joff Wild, *IPXI Demise Caused by a US Patent System That Offers No Incentive for Good-Faith Licensing, Says Exchange's CEO*, INTELL. ASSET MGT. BLOG (Apr. 7, 2015), http://www.iam-media.com/blog/Detail.aspx?g=93e8d407-b24c-4d9a-a59c-da9fe9e3f578.

55. One interviewee reported that, in its final weeks, IPXI engaged the services of an outside law firm to send notices of infringement and FRAND non-compliance to various 802-11-compliant product manufacturers.

56. IPXI Shut-Down Announcement, *supra* note 53.

57. Wild, *supra* note 54.

enforcement.[58] This approach holds especially true in the context of SEPs, as to which questions of essentiality, validity and infringement remain open until resolved through adjudication.

This being said, it is not the case that all, or even most, patent licenses are negotiated and executed only after threats or commencement of litigation. Firms enter into consensual licensing agreements on a regular basis without any overt threat of litigation. This observation holds true both for SEPs and non-SEPs, and for individual patents, patent portfolios and patent pools. Transactions in all of these licenses are conducted regularly by willing market participants prior to litigation. Thus, it is likely that the absence of a litigation threat was not the only cause of IPXI's failure.

B. Characteristics of the Offering—Patents and Sponsors

If a new restaurant opens but attracts few customers, the first things that one usually questions are the quality and price of its food, its atmosphere and its service. Given that manufacturers of Wi-Fi enabled products did not flock to IPXI's exchange, it is worth considering whether any features of the exchange itself, rather than the opportunistic behavior of potential users, made it unattractive to the market.

As noted above, the 802.11n ULR included licenses under 194 patents, 142 of which were deemed by IPXI to be essential to mandatory portions of the standard. While this is not an insignificant number, it is relatively small in comparison to the thousands of patents estimated to be essential to IEEE's 802.11 standards. Thus, IPXI's ULR could not serve as a one-stop solution for a manufacturer of 802.11-compliant products, nor alleviate the majority of the burden of negotiating bilateral license agreements pertaining to the standard. Rather, the ULR had the potential to eliminate individual negotiations, with only the eight Sponsors of the included 802.11n SEPs. As such, IPXI offered a complex system that was, at best, a partial solution to perceived problems with the SEP licensing market.

More importantly, it is not clear that those eight Sponsors were key players in the 802.11 licensing market. Indeed, of the eight ULR Sponsors, none had an active history of enforcing or licensing patents in the 802.11 marketplace.[59] A recent industry study by Armstrong, Mueller and Syrett

58. Mitch Stockwell & Rodney Miller, *IP Exchange International—The Good, the Bad, the Ugly*, LAW360 (Sept. 24, 2014), http://www.law360.com/articles/576374/ip-exchange-international-the-good-the-bad-the-ugly.

59. IPXI identified only one patent infringement action relating to the 194 patents constituting the 802.11n ULR, a suit between Sony and LG Electronics, which was dismissed without prejudice in 2011. 802.11n Offering Memorandum, *supra* note 36.

identifies patent holders with announced 802.11 licensing programs.[60] These include Lucent, Agere, Motorola, Innovatio, Ericsson and two existing patent pools (Sisvel and Via). None of the IPXI ULR Sponsors appear on this list. Accordingly, the IPXI Sponsors may not have been viewed as threats by the majority of manufacturers.[61] Had IPXI's 802.11n ULR included more patents, or more significant patent holders, its perceived value to manufacturers may have been greater.

C. Legacy Relationships Concerning 802.11

Another factor potentially impacting the attractiveness of the 802.11n ULR was the long history of prior 802.11 standards and licensees. As noted above, 802.11n was not a new standard, but a successor to prior versions 802.11a, -b and -g dating back to 1999. While 802.11n clearly introduced new technological features, such as multiple antennae, its basic architecture built upon a foundation that had already been laid. As such, major device manufacturers had years to solidify patent licensing relationships with the principal contributors to the standard. By the time IPXI's 802.11n ULR was offered in 2014, many industry players may already have had the licensing relationships necessary to implement the standard in their products.

D. Limitations of Standardized ULRs—Cross-Licensing and Non-SEPs

Like all commodity contracts, IPXI's ULRs were defined by a set of uniform, standardized terms. Such uniformity is necessary to enable market trading and pricing. While patent licenses are often granted on bespoke terms that are negotiated bilaterally between licensor and licensee, standardized terms are not unknown in the field of patent licensing. For example, the licenses granted by most patent pools are largely standardized and uniform across transactions.

Nevertheless, standardized terms limit firms' flexibility to enter into transactions that meet their specific needs. In the case of the 802.11n ULR, this constraint may have impacted the desirability of the ULR in two ways. First, when a standardized license right is granted at a uniform price, the licensee is unable to offset part of the license price by licensing its own SEPs

60. Ann Armstrong, Joseph J. Mueller & Timothy D. Syrett, *The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones*, Working Paper (May 29, 2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2443848.

61. These Sponsors may have been viewed by manufacturers as "sleeping dogs," or firms that hold SEPs within their portfolios but do not wish to expend the resources necessary to license and enforce them. A common fear is that "waking" these sleeping dogs to the possibility of patent licensing could raise costs for the entire industry. *See* Contreras, FRAND, *supra* note 2, at 62.

to the patent holder. The practice of cross-licensing is key to many technology markets, and often results in royalty-free exchanges of patent licenses by market participants.[62] Cross-licensing enables the licensee to use its own patents as a currency in obtaining a desired license from the patent holder. Such bargaining is not possible within the constraints imposed by a tradable ULR. Accordingly, potential licensees who might have wished to offset part of their license cost using their own patents may have found the IPXI ULR to be less attractive than a bilaterally-negotiated license.

Second, a standardized ULR contains licenses under a fixed package of SEPs, but without complementary non-SEPs owned by the Sponsor. Some commentators have argued that licenses of SEPs alone are not widely desired in the market, as major patent holders control both SEPs and non-SEPs that are desirable for products complying with a standard.[63] While some patent pools have successful licensing programs covering only patents that are essential to a standard (e.g., the CD and DVD patent pools), participants in some markets may desire licenses under both SEPs and non-SEPs, an option that was not available through the proposed ULR.

E. The Cost of Prepayment

Most patent licenses bear royalties on an earned pay-as-you-go basis. That is, royalties are calculated as a percentage of the licensee's net revenue earned from sales of covered products. As such, royalties are not due unless and until covered products are sold. Thus, the profits of both the patent holder and the licensee are tied to the licensee's sales.

The license rights accompanying a ULR, on the other hand, are purchased up-front. One 802.11n ULR costing $120 permits the purchaser to manufacture and sell 1,000 802.11n-compliant devices. If the purchaser finds that it does not need all of the license rights that it has purchased, it can resell any undepleted ULRs on the open market, and recoup its costs. By the same token, if it finds that it has not purchased enough license rights, it can purchase additional ULRs on the open market. These dynamics enable commodities markets across a broad range of goods to operate efficiently.

However, it is not clear that manufacturers believed that the IPXI exchange would offer sufficient trading volume to afford them this degree of

62. Carl Shapiro, *Navigating the Patent Thicket: Cross-Licenses, Patent Pools and Standard Setting*, *in* INNOVATION POLICY AND THE ECONOMY, Vol. 4, at 119 (A.B. Jaffe, J. Lerner & S. Stern, eds., 2004).

63. *See, e.g.*, Michele K. Herman, *How the Deal Is Done, Part 1*, LANDSLIDE 38 (Sept.–Oct. 2010) (arguing that product manufacturers "generally do not want a license only to essential claims, but rather to all of the patent claims that their commercial implementations infringe").

liquidity. Thus, unlike pork bellies, which can reliably be purchased on the "spot" market at predictable prices when the need arises, additional 802.11n ULRs might or might not have been available to satisfy a manufacturer's requirements. Likewise, if a manufacturer over-purchased ULRs and the market for 802.11n devices dropped sharply, it may have questioned its ability to resell unused ULRs on the open market to recoup its costs.

Thus, the pre-paid nature of ULR contracts imposed a financial risk on licensees that did not exist with traditional pay-as-you-go patent licenses. If licensees over-purchased, they might not be able to recoup the cost of their over-investment, and if they underpurchased, they might not be able to access additional ULRs at expected prices.

F. Artificial Scarcity and the Fallacy of Market-Based FRAND Pricing

One of IPXI's principal claims was that its open market pricing mechanism would, by definition, establish the FRAND royalty rate for the patents covered by its ULR. That is, if the price for these licenses were established by willing bidders in an open market, then it must be reasonable. However, this reasoning ignores another principal feature of the IPXI exchange model: scarcity. Unlike physical commodities such as wheat, crude oil and gold that are traded on traditional commodities exchanges, patent licenses are non-depletable. That is, there is no natural limit on the number of licenses that may be granted under a particular patent. One patent, in theory, may be licensed to an infinite number of licensees without depleting the strength of the original resource. Unlike wheat, the overall supply of which may fluctuate from year to year generating price variation based on demand, an owner of patents may always create more license rights at no additional cost.

But in order to create a market in tradable ULRs, IPXI was required to limit the number of ULRs available to the market. Only in this way could a viable secondary market for ULRs be sustained (i.e., one in which sellers were not competing with an endless stream of new ULRs offered by IPXI or its Sponsors). IPXI's initial tranche consisted of 50,000 ULRs, which would authorize the manufacture and sale of up to 50 million 802.11n chipsets, far lower than its lifetime projection of 8 billion chipsets. It is not difficult to envision a scenario in which the initial supply of ULRs was too low to meet market demand for worldwide production of standards-compliant devices. Of course, IPXI could then issue additional ULRs, as it contemplated doing in subsequent tranches. But if it did not, then the price of existing ULRs on the secondary market would rise in response to demand.

One result of such dynamics might be the emergence of speculation and arbitrage in the market for ULRs. One could easily imagine non-practicing ULR "trolls" quickly buying up offerings of important ULRs solely to resell them to manufacturers at elevated prices. Of course, the existence of speculators in commodities markets is hardly a new phenomenon, and some credit the existence of such speculators with giving needed liquidity to commodities markets.[64] The more important question, however, is whether the existence of such a secondary market would benefit either innovation or consumers of standardized products. It is far from clear that any such benefits would emerge.

Furthermore, the manufactured scarcity of ULRs suggests that their pricing would not necessarily reflect a 'reasonable' royalty rate, notwithstanding IPXI's intentions. One need only consider for a moment the impact of supply on pricing to realize that much of the pricing of IPXI's offering should depend not on the value of the patents constituting its ULR, but on the number of ULRs that IPXI decided to issue. That is, IPXI estimated a "reasonable" price of $120 per ULR ($0.12 per device). But what if, instead of 50,000 ULRs, IPXI instead issued 100,000, or 100 million? It is hard to imagine that supply would play no role in the pricing of the commodity, and one could comfortably assume that the per-device price of a ULR in an offering of 100 million should be substantially lower than in an offering of 50,000. And if this is the case, which price represents the FRAND rate? Would patent holders be deemed to have complied with their FRAND obligations, as IPXI seems to suggest, by offering a limited number of licenses at an elevated price? The answer is uncertain, and several market participants expressed both confusion and skepticism regarding IPXI's pricing model.

G. Social Factors

Finally, it is clear that some combination of social and attitudinal factors contributed to IPXI's lack of market acceptance. First, IPXI may have suffered from a general unease regarding the value and strength of issued U.S. patents in the wake of the Supreme Court's decision in *Alice Corp. v. CLS Bank Intl.*,[65] just a few months before the initiation of marketing for the 802.11n ULR. In *Alice*, the Court cast significant doubt on the viability of patents covering software inventions. And while 802.11n is not a software specification per se, a mood of anxiety (or hopefulness, depending on one's

64. *See* Sandor, *supra* note 14, at 125–26.
65. 573 U.S. __, 134 S. Ct. 2347 (2014).

perspective) seems to have affected both the patent bar and the technology sector in the months following *Alice*. This, coupled, with increasing invalidation of patents by the newly-empowered Patent Trial and Appeal Board ("PTAB")[66] may have caused potential licensees to question the wisdom of purchasing licenses under a portfolio of 194 patents of unknown durability.

Perhaps most importantly, IPXI's proposed 802.11n ULR offering was very different and more complex than the typical patent licensing transaction. It involved uncertainty (in the number of ULRs to purchase), as well as potential loss (if too many or too few ULRs were purchased). And, as heard during one interview, "patent lawyers aren't commodities traders." Thus, while commodities and futures exchanges are familiar features of financial markets, they are unfamiliar in the world of patent licensing. The in-house patent and licensing attorneys who were presented with IPXI's exchange faced an unfamiliar, complex and potentially risky mechanism that was untested and without precedent in their field.[67] As such, it is not surprising that acceptance was slow to materialize. And given IPXI's rapid closure (only six months after the initiation of the 802.11n offering), its structure and risks may not have had enough time to gain acceptance among a skeptical, uncertain and risk-averse community of potential licensees.[68] In sum, the cultural gulf between the worlds of commodities trading and patent licensing may simply have been too great to bridge in the short time that IPXI had.

CONCLUSION

IPXI identified real inefficiencies in the current system for licensing standards-essential patents. It developed a market-based exchange for the trading of ULRs in an attempt to address these inefficiencies and to provide greater uniformity, speed and transparency to patent licensing transactions. Nevertheless, IPXI failed to establish a market for its offering of 802.11n ULRs, leading to its rapid demise.

66. *See, e.g.*, Peter J. Pitts, '*Patent Death Squads' vs. Innovation*, WALL ST. J. (Jun. 10, 2015).

67. *See* Sandor, *supra* note 14, at 132 (highlighting the importance of industry buy-in for the pricing basis of the highly successful plywood trading contract on the Chicago Board of Trade, and how industry input caused a complete revision of the commodity pricing structure prior to the commencement of trading).

68. The short time period during which IPXI attempted to market and launch its 802.11n ULR may also have been a factor in its demise. Gaining market acceptance of a radically new mode of conducting patent licensing transactions would have taken time. *See* Sandor, *supra* note 14, at 131 (describing a seventeen-month "inventive process" leading to the introduction of the plywood trading contract).

IPXI's assertion that the failure of its ULR offering can be attributed to a lack of threatened patent litigation against the manufacturers of standardized products tells only part of the story. Other weaknesses in both the content of the 802.11n ULR and the structure of the ULR offering itself also contributed to IPXI's failure to gain market acceptance. IPXI's proposed ULR exchange left many questions unanswered, making manufacturers cautious about embracing its new model. And unlike traditional commodities exchanges, which arose from practices implemented by buyers and sellers of goods, the IPXI exchange did not emerge as a grassroots effort by patent holders or manufacturers to improve the basis on which they transacted business. Rather, IPXI was a financially-motivated undertaking that had the potential to introduce significant uncertainties and disrupt and complicate an already-contentious market for patent licenses. As such, it is not surprising that there was not widespread support for the exchange from patent holders or manufacturers of standards-compliant products. Nevertheless, the lessons learned from the IPXI experiment should be useful in future efforts to improve the efficiency and transparency of patent licensing transactions and the rationalization of FRAND commitments.