IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

In re INNOVATIO IP VENTURES, LLC PATENT LITIGATION	)	MDL Docket No. 2303 Case No. 11 C 9308
THIS ORDER APPLIES TO ALL CASES	)	

MEMORANDUM OPINION, FINDINGS, CONCLUSIONS, AND ORDER

JAMES F. HOLDERMAN, District Judge:

Plaintiff and patent-owner Innovatio IP Ventures, LLC ("Innovatio") has sued numerous coffee shops, hotels, restaurants, supermarkets, large retailers, transportation companies, and other commercial users of wireless internet technology located throughout the United States (collectively, the "Wireless Network Users"). Innovatio alleges that the Wireless Network Users provide wireless internet access to their customers or use it to manage internal processes, and by doing so infringe various claims of twenty-three patents owned by Innovatio. (Dkt. No. 198; Dkt. No. 451.)[1]

Cisco Systems, Inc., Motorola Solutions, Inc., SonicWALL, Inc., Netgear, Inc., and Hewlett-Packard Co. (collectively, the "Manufacturers") each manufacture electronic devices used by the Wireless Network Users. (Dkt. No. 819, Ex. A ¶ 10.) The Manufacturers have filed declaratory judgment actions against Innovatio seeking a declaration that the Manufacturers'

[1] The twenty-three patents that Innovatio has asserted in this action are: U.S. Patent 5,295,154, U.S. Patent 5,428,636, U.S. Patent 5,504,746, U.S. Patent 5,546,397, U.S. Patent 5,740,366, U.S. Patent 5,844,893, U.S. Patent 5,940,771, U.S. Patent 6,374,311, U.S. Patent 6,665,536, U.S. Patent 6,697,415, U.S. Patent 6,714,559, U.S. Patent 6,826,165, U.S. Patent 7,013,138, U.S. Patent 7,107,052, U.S. Patent 7,386,002, U.S. Patent 7,457,646, U.S. Patent 7,535,921, U.S. Patent 7,536,167, U.S. Patent 7,548,553, U.S. Patent 7,710,907, U.S. Patent 7,710,935, U.S. Patent 7,873,343, and U.S. Patent 7,916,747.

products, and the networks or systems of which those products are a part, do not infringe Innovatio's patents, and that Innovatio's patents are invalid. (*See* Dkt. Nos. 431, 442; *see also* 12 CV 426, Dkt. No. 1; 12 CV 2773, Dkt. No. 1.) Innovatio, in turn, has alleged that the Manufacturers all infringe the same claims of the twenty-three patents Innovatio has asserted against the Wireless Network Users. (Dkt. Nos. 311-314.) All the pending cases and the parties thereto were transferred for pretrial coordination before this court by the Judicial Panel on Multidistrict Litigation in this MDL case, No. 2303. (Dkt. No. 1.) For ease of reference (and ignoring that some of them are also declaratory judgment plaintiffs), the court will refer to the Wireless Network Users and the Manufacturers collectively as the "Defendants."

Following discovery, but before claim construction, the parties and the court agreed that the best course toward resolving the parties' disputes would be to pause and evaluate the potential damages available to Innovatio if the Defendants are found to infringe the claims of Innovatio's patents. (*See* Dkt. No. 614 ("2/21/13 Tr.") at 24:6-26:18.) The court and all parties agreed to address damages at this stage of the litigation, before a determination on the questions of validity and infringement. The court hopes that by doing so, the possibility of settlement will be enhanced because the parties will be better able to evaluate the potential risks and benefits of expending additional resources in the litigation.

The damages available to Innovatio in this case turn on the determination of a single set of issues relating to the 802.11 wireless standard established by the Institute of Electrical and Electronics Engineers ("IEEE," pronounced "eye-triple-ee"). The prior owners of all of Innovatio's patents contractually agreed with the IEEE to license any patents that were essential to the operation of the 802.11 wireless standard on reasonable and non-discriminatory ("RAND") terms. According to the Defendants, Innovatio's recovery in this case is therefore

limited to a RAND licensing fee for the patents-in-suit. The parties were entitled to a jury determination of damages, including the effect of Innovatio's RAND obligation, but both sides have waived their jury trial right and consented to this court's determination of the disputed damages questions. (*See* Dkt. No. 600, at 1.)

The parties agreed that many of Innovatio's asserted patent claims were essential to practice the 802.11 standard under the definition of essentiality provided in the IEEE bylaws. Following a two-day bench trial on July 18 and 19, 2013, the court determined in a Memorandum Opinion on July 26, 2013, that all of the other 168 patent claims Innovatio asserts, as to which the parties disputed essentiality, were also essential to the operation of the 802.11 standard. *In re Innovatio IP Ventures, LLC Patent Litig.*, MDL 2303, 2013 WL 3874042 (N.D. Ill. July 26, 2013) ("July 26 Order"). Accordingly, for purposes of this proceeding all of Innovatio's asserted patent claims are essential to the 802.11 standard, and all are therefore subject to the RAND obligation.

On September 9 through 12 and 17 through 20, 2013, the court held another bench trial at which the parties presented evidence regarding the RAND rate to which Innovatio is entitled, and limited, if it shows that its patents are infringed. The parties agreed at the beginning of the trial that the court would determine only a RAND rate for infringement of Innovatio's patents by the Manufacturers, and not by the Wireless Network Users. (Trial Tr. 8-10.) The court therefore severed any remaining issues regarding a RAND rate for infringement by the Wireless Network Users to address at a later time. (*Id.* at 10:8-10.) Accordingly, the RAND rate the court determines in this trial applies only to the Manufacturers. This Memorandum Opinion and Order constitutes the court's findings of fact and conclusions of law.

At the trial, Innovatio presented the testimony of five experts: Dr. David Teece, a

professor at the University of California at Berkeley Haas School of Business, who testified regarding RAND policy; Dr. Raymond Nettleton, an electrical engineer and associate professor at the University of Colorado, who testified regarding 802.11 technology; Mr. Chris Bergey, a former Vice President of Marketing at Broadcom Corp. ("Broadcom"), who testified regarding the value of the 802.11 technology to consumers; Mr. Rick Bero, an accountant; and Mr. Larry Evans, a former president of the Licensing Executives Society-USA and the Licensing Executives Society-International, who testified regarding appropriate comparable licenses.

The Manufacturers presented the testimony of Mr. David Djavaherian, Associate General Counsel at Broadcom, who testified regarding the price of Wi-Fi chips, and the transaction in which Innovatio acquired the patents-in-suit; Dr. Matthew Shoemake, an electrical engineer who served as the chair of several working groups that developed the 802.11 standard and testified about that process; Dr. Stephen Wicker, a professor of Electrical Engineering and Computer Science at Cornell University, who testified regarding 802.11 technology; Dr. Gregory Leonard, an applied economist who testified regarding calculating a RAND rate and comparable licenses; and Dr. Matthew Lynde, an applied economist who also testified regarding calculating a RAND rate and comparable licenses.

After considering all of the evidence presented at the September 2013 trial, the court determines for the reasons stated herein that the RAND rate to be paid to Innovatio for licensing Innovatio's portfolio of nineteen 802.11 standard-essential patents[2] is 9.56 cents for each Wi-Fi chip used or sold by the Manufacturers in the United States, subject to the terms of the patents, the applicable statute of limitations, and a finding of infringement.

[2] Because the parties agreed during trial that the four patents in Innovatio's Mesh family of patents need not be considered as part of this proceeding to determine a RAND rate, the court's RAND rate applies only to Innovatio's nineteen non-Mesh family patents.

BACKGROUND

In the July 26 Order, the court explained the relevant background of the IEEE and the 802.11 standard:

> The IEEE is a professional association and developer of technical standards. (Dkt. No. 819, Ex. A ¶ 50.) Beginning in 1990, the IEEE formed a working group to establish the 802.11 standard for the operation of wireless local area networks ("WLANs"—also known as "wireless Ethernet," "Wireless Fidelity," or "Wi-Fi"). (*Id.* ¶ 51.) The IEEE continues to publish amendments to that standard periodically. (*Id.* ¶ 52.) Devices such as wireless routers, laptops, and cell phones that are compliant with the standard will be able to communicate effectively with one another in any WLAN. By establishing the 802.11 standard, the IEEE has ensured that the wireless devices of various manufacturers are interoperable, and that consumers are therefore able to purchase wireless devices from a variety of manufacturers without worrying about whether the devices will be compatible with each other. As a result, consumers experience no switching costs if they choose to buy wireless devices from different manufacturers, leading to greater price competition. *See Microsoft Corp. v. Motorola, Inc.*, No. C10-1823, 2013 WL 2111217, at *5 (W.D. Wash. Apr. 25, 2013) (Robart, J.) (describing the role of standard-setting organizations).
>
> Although the standard-setting process has many potential benefits for consumers, there are dangers. After a standard is established, for example, every manufacturer of compliant products must use the technology stated in the standard. If one particular company owns a patent covering that technology, however, the standard will effectively force all others to buy that company's technology if they want to practice the standard. This requirement allows the company to charge inflated prices that reflect not only the intrinsic value of its technology, but also the inflated value attributable to its technology's designation as the industry standard.

Innovatio IP Ventures, 2013 WL 3874042, at *3.

The court also explained the genesis and nature of the RAND commitments to which Innovatio's patents are subject:

> To avoid this phenomenon (often called "patent hold-up," *see Microsoft*, 2013 WL 2111217, at *10), standard-setting organizations like the IEEE often require owners of standard-essential patents to promise to license their patents on RAND terms before the establishment of the standard. Prior to being acquired by Innovatio, Innovatio's patents were owned by Intermec Technologies Corporation (a subsidiary of UNOVA) and Intermec IP Corporation (collectively "Intemec"), Norand Corporation ("Norand"), or Broadcom Corp. ("Broadcom"). (Dkt. No.

819, Ex. A ¶ 53.) Each of those previous owners of Innovatio's patents agreed to license any standard-essential technology covered by their patents on RAND terms. (*Id.* ¶ 54.) For example, on October 26, 1995, Intermec, wrote to the IEEE that

> [i]n the event that patents issue to, or are acquired by, Intermec in the future which Intermec believes will read on devices operating under the proposed IEEE 802.11 Standard, Intermec will (upon written request from any third party) grant a nonexclusive, nontransferable sole and personal license under any such issued patent on a nondiscriminatory basis, on terms and conditions which Intermec deems reasonable.

(Dkt. No. 709, Ex. 6.) Similarly, on October 17, 2006, Broadcom[3] wrote to the IEEE that, "with respect to any patent(s) and/or patent application(s) that it may hold or control, the use of which would be essential to create a compliant implementation of either mandatory or optional portions of the [Proposed] IEEE Standard," it promised to "grant a license under reasonable rates to an unrestricted number of applicants on a worldwide, non-discriminatory basis with reasonable terms and conditions." (Dkt. No. 709, Ex. 7.) Broadcom and Norand wrote similar letters to IEEE on September 6, 2002, and June 20, 1997. (*See* Dkt. No. 709, Exs. 8-10.)

The parties do not dispute that the letters of Innovatio's predecessors in interest to the IEEE constitute binding contractual commitments to the IEEE and its members. *See Microsoft Corp. v. Motorola, Inc.*, 854 F. Supp. 2d 993, 999 (W.D. Wash. 2012) ("The court agrees with Microsoft that through Motorola's letters to both the IEEE and ITU, Motorola has entered into binding contractual commitments to license its essential patents on RAND terms."); *see also Apple, Inc. v. Motorola Mobility, Inc.*, 886 F. Supp. 2d 1061, 1083 (W.D. Wis. 2012) ("In this case, the combination of the policies and bylaws of the standard-setting organizations, Motorola's membership in those organizations and Motorola's assurances that it would license its essential patents on fair, reasonable and nondiscriminatory terms constitute contractual agreements."). Moreover, this court has already held that those commitments are now binding on Innovatio, and that they can be enforced by the Defendants as potential users of the 802.11 standard and thus third-party beneficiaries of the agreements between Innovatio's predecessors and the IEEE. *See In re Innovatio IP Ventures, LLC Patent Litig.*, MDL 2303, 2013 WL 427167, at *17 (N.D. Ill. Feb. 4, 2013) ("The longstanding rule in Illinois, and elsewhere, is that 'the promisee of a third-party-beneficiary contract may bring suit for a breach of that contract and recover damages therefor.'" (quoting *Carmack v. Great Am. Indem. Co.*, 78 N.E.2d 507, 511 (Ill.

[3] Broadcom acquired Intermec's patents in December 2002, and also owned other patents that were later sold to Innovatio. (*See* Dkt. No. 746, Ex. 3.)

1948))).

Innovatio IP Ventures, 2013 WL 3874042, at *4.

As mentioned above, the twenty-three patents that Innovatio has asserted in this litigation were owned by other parties at various times. In 2002, all twenty-three patents were owned by Intermec. (Trial Tr. 130:1-5 (Djavaherian).) In 2002, Intermec sold the patents, [redacted] (*Id.* at 130:16-132:9.) [redacted]. (*Id.* at 136:18-24.) As part of the transaction, Innovatio also granted a license back to Broadcom for all of the patents that were a part of the deal. (*Id.* at 140:9-11.)

Prior to agreeing to sell the patents, [redacted]. (*Id.* at 138:8-17.)

ANALYSIS

To the best of the court's knowledge and that of the parties, only one other court has previously undertaken a judicial determination of a RAND licensing rate for standard-essential patents: *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013) (Robart, J.). The parties agree that Judge Robart's methodology is appropriate for the court to use here to set a RAND rate in this case. The court will first describe Judge Robart's methodology before discussing several modifications to it in light of the circumstances of this

case.

I. Methodology for Determining RAND Rate

A. Judge Robart's Methodology in *Microsoft v. Motorola*

In *Microsoft v. Motorola*, Microsoft alleged that Motorola[4] breached its contractual obligation to offer a RAND license through two offer letters to Microsoft. *Id.* at *1. The case was headed to a jury to determine Motorola's liability for breaching its contract. Judge Robart explained, however, that "[w]ithout a clear understanding of what RAND means, it would be difficult or impossible to figure out if Motorola breached its obligation to license its patents on RAND terms." *Id.* Moreover, a fact-finder would need to compare Motorola's offers with a RAND rate and "because more than one rate could conceivably be RAND, a reasonable RAND royalty range." *Id.* at *3. Accordingly, Judge Robart first held a bench trial to set a RAND rate and range on Motorola's portfolio of standard-essential patents that could be provided to the jury as part of its deliberations on Microsoft's breach of contract claim. *Id.*

Judge Robart determined that the best way to perform the RAND valuation was to simulate a hypothetical bilateral negotiation between Motorola and Microsoft in the context of Motorola's RAND obligation. To that end, Judge Robart adapted the fifteen traditional *Georgia–Pacific* factors that courts consider to determine the outcome of a hypothetical negotiation. *See Georgia–Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970).

The purpose of conducting such a hypothetical negotiation is "to ascertain the royalty upon which the parties would have agreed had they successfully negotiated an agreement just

[4] The parties involved in *Microsoft v. Motorola* included Motorola, Inc. and Motorola Mobility, LLC. Following the spin-off of Motorola Mobility, Inc. in early 2011, Motorola, Inc. changed its name to Motorola Solutions, Inc., the Manufacturer Defendant in this case. Following Judge Robart's opinion, the court will refer to the defendants in *Microsoft* collectively as "Motorola." *Microsoft*, 2013 WL 2111217, at *1.

before infringement began." *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324 (Fed. Cir. 2009). Accordingly, the court must try, "as best as possible, to recreate the *ex ante* licensing negotiation scenario and to describe the resulting agreement." *Id.* at 1325. For purposes of the hypothetical negotiation, the court assumes that the asserted patent claims are valid and infringed. *Id.*

Because of the unique circumstances of the RAND obligation, however, Judge Robart adapted the fifteen factors for evaluating a hypothetical negotiation by essentially eliminating three of them and modifying or combining others. The modified factors can be summarized as follows:

> *G-P* Factor 1: The royalties received by the patentee for the licensing of the patent-in-suit in other circumstances comparable to RAND-licensing circumstances.
>
> *G-P* Factor 2: The rates paid by the licensee for the use of other patents comparable to the patent-in-suit.
>
> *G-P* Factor 3: The nature and scope of the license.
>
> *G-P* Factor 6: The effect of the patented invention in promoting sales of other products of the licensee and the licensor, taking into account only the value of the patented technology and not the value associated with incorporating the patented technology into the standard.
>
> *G-P* Factor 8: The established profitability of the product made under the patent, its commercial success, and its current popularity, taking into account only the value of the patented technology and not the value associated with incorporating the patented technology into the standard.
>
> *G-P* Factor 9: The utility and advantages of the patent property over alternatives that could have been written into the standard instead of the patented technology in the period before the standard was adopted.
>
> *G-P* Factors 10-11: The contribution of the patent to the technical capabilities of the standard and also the contribution of those relevant technical capabilities to the licensee and the licensee's products, taking into account only the value of the patented technology and not the value associated with incorporating the patented technology into the standard.

> *G-P* Factor 12: The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions that are also covered by RAND-committed patents.
>
> *G-P* Factor 13: The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, significant features or improvements added by the infringer, or the value of the patent's incorporation into the standard.
>
> *G-P* Factor 14: The opinion testimony of qualified experts.
>
> *G-P* Factor 15: The amount that a licensor and a licensee would have agreed upon (at the time the infringement began) if both were considering the RAND commitment and its purposes, and had been reasonably and voluntarily trying to reach an agreement.[5]

See Microsoft, 2013 WL 2111217, at *18-20. Judge Robart relied on each of these factors throughout his analysis. As a practical matter, however, Judge Robart's analysis proceeded in three steps which provide a framework for any court attempting to determine a RAND licensing rate for a given patent portfolio.

First, a court should consider the importance of the patent portfolio to the standard, considering both the proportion of all patents essential to the standard that are in the portfolio, and also the technical contribution of the patent portfolio as a whole to the standard. *See id.* at *20 ("Thus, a patent that is extremely important and central to the standard would reasonably command a higher royalty rate than a less important patent."). Second, a court should consider the importance of the patent portfolio as a whole to the alleged infringer's accused products. *See id.* ("[A] specific [standard-essential patent] may contribute greatly to an optional portion of a

[5] Judge Robart noted that Factor 7 of the *Georgia–Pacific* test, which examines the duration of the patent and the term of the license, is typically irrelevant for a RAND-obligated patent, "because the term of the license would equate to the duration of the patent." *Id.* at *19. This court has therefore omitted Factor 7.

given standard, but if that portion is not used by the implementer, the specific [standard-essential patent] may have little value to the implementer."). Third, the court should examine other licenses for comparable patents to determine a RAND rate to license the patent portfolio, using its conclusions about the importance of the portfolio to the standard and to the alleged infringer's products to determine whether a given license or set of licenses is comparable.

B. Modifications to Judge Robart's Methodology

This court will generally follow a similar procedure to reconstruct a hypothetical negotiation over a RAND rate to license Innovatio's 802.11 standard-essential patents. The court notes, however, some of the distinct circumstances of this patent infringement case that will require some modifications to Judge Robart's approach. First, the purpose of the RAND evaluation in *Microsoft* was to define a RAND rate so that a jury could determine whether Motorola's licensing offers to Microsoft complied with its RAND obligations. Because under the RAND obligation, "initial offers do not have to be on RAND terms so long as a RAND license eventually issues" and "because more than one rate could conceivably be RAND" the court determined a reasonable RAND *range* to give to the jury for its comparison. *Id.* at *2-3. By contrast, the purpose of the RAND determination here is to set damages for infringement of the standard-essential patents. The court must therefore determine a single RAND rate for the purpose of calculating damages, rather than a range.

Second, the parties in *Microsoft* did not focus on the question of whether the allegedly standard-essential patents were in fact essential to the standard. Instead, whenever the essentiality of a patent was doubtful, the court concluded that "the implementer in a hypothetical negotiation would view [the allegedly standard-essential] patents with skepticism." *Id.* at *53. The court then concluded that the "parties to a hypothetical negotiation would sit down at the

bargaining table and examine the[] patents for their importance" to the standard, and would conclude that "their value would be diminished by the lack of better evidence regarding their true relevance."[6] *Id.* By contrast, this court has already held a separate proceeding to determine the essentiality of Innovatio's patents, and has determined that they are all standard-essential. The question therefore arises of whether the court should adjust the license rate for patents whose essentiality was questionable prior to the court's adjudication.

Making such an adjustment may seem reasonable, for "[t]he hypothetical negotiation tries, as best as possible, to recreate the *ex ante* licensing negotiation scenario and to describe the resulting agreement." *Lucent Techs.*, 580 F.3d at 1325. *Ex ante*, prior to infringement, the parties do not know whether a court would determine a given patent to be standard-essential, and so one might argue that the licensing negotiation should account for that uncertainty.

The problem with that argument is that the hypothetical negotiation is a counter-factual that the court usually relies on only after establishing liability. At the time of the hypothetical negotiation, the parties in actuality would not have known whether a given patent is valid or infringed, and the alleged infringer would have had the option of contesting these issues in court. Nonetheless, by the time the damages phase of an infringement suit arrives, the court has determined infringement and validity, thus foreclosing the hypothetical negotiator from benefiting from any uncertainty as to future court rulings. *See LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 76 (Fed. Cir. 2012) ("In considering the fifteen *Georgia–Pacific*

[6] Judge Robart's discounting assumes that an implementer would choose not to license a non-essential patent because it could practice the standard without that patent. In an infringement context, the alleged infringer has already allegedly chosen to implement the non-essential patent. In that context, the licensing rate should be increased for patents of doubtful essentiality, on the ground that the infringement damages for such a patent would not be limited to a RAND rate, and that the patent owner could therefore seek typical patent damages for that patent.

factors, it is presumed that the parties had full knowledge of the facts and circumstances surrounding the infringement at that time."). Stated another way, the hypothetical negotiator could no longer leave the negotiating table to contest liability in court, and could no longer demand the benefit of uncertainty about a court's rulings. Accordingly, "[t]he hypothetical negotiation also assumes that the asserted patent claims are valid and infringed," *Lucent Techs.*, 580 F.3d at 1325, because no hypothetical negotiation would have taken place if it were otherwise. The patent infringer gets no discount on its licensing fee because of uncertainty about its liability that has since been cleared up by litigation.

Analogously, it would be inappropriate to adjust the RAND rate based upon pre-litigation uncertainty about the essentiality of a given patent. Now that the court has adjudicated essentiality, the patent owner cannot leave the hypothetical negotiation on the ground that it will contest essentiality in court. The RAND obligation requires that it grant a license. Thus, unlike Judge Robart, the court will not adjust the RAND rate in light of pre-litigation uncertainty about the essentiality of a given patent.

Finally, the court notes that in light of its conclusion in Part II, *infra*, that the appropriate royalty base in this case is the Wi-Fi chip, the small module that provides Wi-Fi capability to electronic devices in which it is inserted, steps one and two of Judge Robart's methodology effectively merge. Because the purpose of a Wi-Fi chip is, by definition, to provide 802.11 functionality, determining the importance of Innovatio's patents to the 802.11 standard also determines the importance of those patents to the Wi-Fi chip. Accordingly, the court's analysis does not include a separate section evaluating the importance of Innovatio's patents to the accused products, but instead merges that analysis into the inquiry about the importance of Innovatio's patents to the 802.11 standard.

C. The Date of the Hypothetical Negotiation

The Federal Circuit has stated that "in each case there should be only a single hypothetical negotiation date, not separate dates for separate acts of infringement." *LaserDynamics*, 694 F.3d at 76. Here, the parties agree that the appropriate date for the hypothetical negotiation is 1997, about the time of the initial adoption of the 802.11 standard, and therefore approximately the time when the Manufacturers began selling 802.11 compliant products that allegedly infringed the patents. (*See* Trial Tr. 1867:2-19, 1924:2-1925:2.) The parties agree that the negotiating parties would have negotiated a single license covering all subsequently obtained 802.11 standard-essential patents, and that it is therefore appropriate to use 1997 as the date of the negotiation for all of the patents, including those that were applied for and issued after that date.

D. Concepts Relevant to the RAND Determination

1. Avoiding Patent Hold-Up

As mentioned above, one of the primary purposes of the RAND commitment is to avoid patent hold-up, which occurs when the holder of a standard-essential patent demands excess royalties after standard implementers are already locked into using the standard. (*See* Trial Tr. at 189:21-190:21 (Teece).) After a standard is adopted, implementers of the standard invest significant resources to ensure that their devices comply with the standard. Following that investment, switching to an alternative technology would be prohibitively expensive, and in any case would take the implementer out of compliance with the standard. In that situation, the patent holder can demand excessive royalties far beyond the fair value of its technological contribution to the standard, merely because the implementer has no choice but to pay. The RAND commitment, which standard-setting organizations extract from patent holders prior to adopting

their technology into the standard, prevents patent holders from demanding excessive royalties that capture value beyond the value of the patented technology itself. *See Microsoft*, 2013 WL 2111217, at *10 ("The ability of a holder of [a standard-essential patent] to demand more than the value of its patented technology and to attempt to capture the value of the standard itself is referred to as patent 'hold-up.'"). If hold-up occurs, implementing the standard becomes excessively expensive for consumers, undermining the standard-setting process and jeopardizing further adoption of the standard. *Id.* at *10-11.

The parties disagree about the seriousness of the concern of patent hold-up, although they agree that it is a potential problem. Dr. Teece testified that in his opinion, patent hold-up "is very rarely ever seen." (Trial Tr. 189:24-25 (Teece).) In addition, he noted that it is often difficult to distinguish the value of the underlying technology from the value of standardization, because the effectiveness of the technology at enabling interoperability often creates some of the value of the standard. (*See id.* at 217:18-20 ("Well, there's a recursive element which you're omitting, which is also the value that the . . . technology provides to the standard itself."). By contrast, Dr. Leonard testified that hold-up is of significant concern, because it can jeopardize adoption of the standard, harm consumers, and even harm other holders of standard-essential patents who cannot recover all their patents are worth after other parties have extracted hold-up value from the market. (*Id.* at 1897:1-1898:12 (Leonard).) According to Dr. Leonard, "that's why it's important that the RAND royalty reach the right balance. It's both got to . . . appropriately reward the contributor, but it can't go beyond that, because then it's starting to get value for things it didn't do." (*Id.* at 1899:15-19.)

Moreover, Broadcom expressed the concern that patent hold-up is a significant problem in the industry in an August 5, 2011 letter to the FTC. (DTX-668.) As the letter explains,

"Broadcom believes that many companies that have invented the technology incorporated into standards continue to feel the effects of patent holdup directly." (*Id.* at 1.) Moreover, "patent holdup means higher prices and fewer choices for the many millions of consumers of standards-based products." (*Id.* at 2; *see also id.* ("From Broadcom's perspective, far from being a 'rare disease,' patent ambush is widespread, and we believe that instances of patent ambush that are currently festering below the surface will continue coming to light as standards-based litigation continues to proliferate."). David Djavaherian, Associate General Counsel at Broadcom, testified that this concern was not merely theoretical for Broadcom, as it had seen a number of entities attempt to assert 802.11-essential patents, driving up costs in the industry. (Trial Tr. 145:14-146:10 (Djavaherian).) [redacted]

In light of all of the testimony, and particularly the evidence about Broadcom's real-world concerns about patent hold-up, the court concludes that patent hold-up is a substantial problem that RAND is designed to prevent. The court's RAND rate therefore must, to the extent possible, reflect only the value of the underlying technology and not the hold-up value of standardization. *Microsoft*, 2013 WL 2111217, at *12 ("In the context of a dispute concerning whether or not a given royalty is RAND, a proper methodology used to determine a RAND royalty should therefore recognize and seek to mitigate the risk of patent hold-up that RAND commitments are intended to avoid.").

At the same time, the court finds Dr. Teece's testimony regarding the difficulty of distinguishing between the intrinsic value of the technology and the value of standardization to be persuasive. Part of the intrinsic value of a technology may precisely be the ease with which it

can be adopted into a standard. For example, a technology may more easily interface with other extant technologies by making more efficient use of an existing infrastructure or requiring less modification to other technologies. Moreover, in a hypothetical negotiation occurring just prior to adoption of the standard (and before a patent holder knows whether its technology will be adopted into the standard), an inventor would be able to capitalize on this value by arguing that potential licensees should pay more for a technology that more easily integrates with the licensee's other technology. The court's analysis of the technical value of Innovatio's patents to the 802.11 standard will therefore take into account the ease of those patents' integration into the standard as a whole.

2. Royalty Stacking

Another concern of the RAND obligation is to prevent "royalty stacking." This concern arises because most standards implicate hundreds, if not thousands of patents, and the cumulative royalty payments to all standard-essential patent holders can quickly become excessive and discourage adoption of the standard. *See Microsoft*, 2013 WL 2111217, at *11. Therefore, the determination of a RAND royalty must "address the risk of royalty stacking by considering the aggregate royalties that would apply if other [standard-essential patent] holders made royalty demands of the implementer." *Id.* at *12; *see also id.*at *11 (RAND commitments should be interpreted "to grant licenses on terms that are objectively commercially reasonable taking into account the overall licensing situation and including the cost of obtaining all necessary licenses from all other relevant patent holders for the technologies in the end product"). Mr. Djavaherian explained that Broadcom is also concerned about the problem of royalty stacking:

> [T]he concern is that if you don't take into account the whole gambit of patents that may potentially apply to a particular standard, in setting the rate of any patent within that standard, you can end up with a situation where the aggregate royalty stack is much, much higher than would seem to be reasonable and much, much

> higher than would be required for the standard to be successful and to allow companies to invest in, you know, exploitation of the standard.

(Trial Tr. 145:5-13 (Djavaherian).)

On the other side, Innovatio's expert Dr. Teece expressed his view that stacking is only a concern if the stack does not accurately reflect the value of the patented technology. (Trial Tr. 175:22-176:14 (Teece) ("Bad stacking is if you're not adding value, but you're adding to the costs.").) If the technology is accurately valued, stacking the royalties for each invention merely reflects the value that is created by combining many inventions into a single product. (*Id.*) That synergy is good, according to Dr. Teece, and not of concern when setting a RAND royalty.

Based on the testimony of Mr. Djavaherian and Dr. Teece, the court concludes that royalty stacking may be a concern when setting a RAND rate to ensure that the asserted patents are not overvalued compared to the technological contribution they make to the standard. Practically speaking, that means that the court should consider royalty stacking as a way of checking the accuracy of a proposed RAND royalty's correspondence to the technical value of the patented invention. Imagine, for example, that the court has determined that a given patent portfolio provides 25% of the functionality of a standard, and that the court is considering a proposed RAND rate based on that determination. Logically, the other standard-essential patents outside of the portfolio should comprise 75% of the value of the standard, or three times the value of the asserted portfolio. If an independent evaluation of the technical merit of those other standard-essential patents would suggest a value greater than three times the royalty for the asserted patent portfolio, however, it would suggest that the court has overvalued the asserted portfolio.

In making this determination, the court notes that it is not appropriate to determine the value of the non-asserted standard-essential patents based merely on numbers. If a patent holder

owns ten out of a hundred patents essential to a given standard, it does not automatically mean that it contributes 10% of the value of the standard. *See Microsoft*, 2013 WL 2111217, at *11 (relating a "commonly understood principle of proportionality that [c]ompensation under [RAND] must reflect the patent owner's proportion of all essential patents" and noting that "[t]his is not simply a numeric equation but the compensation must, within reasonable bounds, reflect the contribution" (quoting a Motorola submission to the ETSI)). As a practical matter, therefore, this analysis will necessarily be imprecise, as the court cannot undertake a full technical evaluation of the hundreds or thousands of patents that sometimes comprise a standard. Nonetheless, the concern of royalty stacking requires that the court, to the extent possible, evaluate a proposed RAND rate in the light of the total royalties an implementer would have to pay to practice the standard.

Moreover, the court is sensitive to Mr. Djavaherian's concern that royalty stacking may push prices "higher than would be required for the standard to be successful." (Trial Tr. 145:11 (Djavaherian).) In evaluating a potential RAND royalty, therefore, the court will consider whether the overall royalty of all standard-essential patents would prohibit widespread adoption of the standard.

3. Incentivizing Inventors to Participate in Standard-Setting Process

Third, a RAND rate must be set high enough to ensure that innovators in the future have an appropriate incentive to invest in future developments and to contribute their inventions to the standard-setting process. As Judge Robart put it, "[t]o induce the creation of valuable standards, the RAND commitment must guarantee that holders of valuable intellectual property will receive reasonable royalties on that property." *Microsoft*, 2013 WL 2111217, at *12.

Innovatio's expert Dr. Teece opined that one threat to this objective is "reverse hold-up,"

which is the concern that implementers of the standard will infringe standard-essential patents without taking a license, thereby forcing innovators to engage in costly litigation before realizing the value of their inventions. (Trial Tr. 190:10-21 (Teece).) The International Trade Commission recently expressed this concern in a final determination on an investigation:

> In reverse patent hold-up, an implementer utilizes declared-essential technology without compensation to the patent owner under the guise that the patent owner's offers to license were not fair or reasonable. The patent owner is therefore forced to defend its rights through expensive litigation. In the meantime, the patent owner is deprived of the exclusionary remedy that should normally flow when a party refuses to pay for the use of a patented invention.

Certain Elec. Devices, Including Wireless Commc'n Devices, Portable Music and Data Processing Devices, and Tablet Computers, Inv. No. 337-TA-794, at 63 (July 5, 2013) (Final). The court is not persuaded that the concern of reverse patent hold-up is relevant in this case, as there is no evidence before the court that Innovatio or its predecessors ever offered the Manufacturers a license, or that such an offer was rejected on the ground that it was not fair or reasonable. Moreover, the court is not persuaded that reverse hold-up is a significant concern in general, as it is not unique to standard-essential patents. Attempts to enforce any patent involve the risk that the alleged infringer will choose to contest some issue in court, forcing a patent holder to engage in expensive litigation. The question of whether a license offer complies with the RAND obligation merely gives the parties one more potential issue to contest. When the parties disagree over a RAND rate, they may litigate the question, just as they may litigate any issue related to liability for infringement.

The ITC's decision suggests that a RAND situation is indeed unique because an injunction is unavailable to the holder of a RAND-obligated patent. Unlike in a typical patent case, therefore, the holder of RAND-obligated patents cannot halt infringement while it pursues monetary remedies in court. As this court has previously explained, however, the question of

whether a RAND obligation precludes an injunction is "muddled" and "the subject of substantial, often contradictory, academic commentary." *In re Innovatio IP Ventures, LLC Patent Litig.*, 921 F. Supp. 2d 903, 916 (N.D. Ill. 2013). Even assuming that the holder of RAND-obligated patents cannot seek an injunction, however, it is plain that the injunction threat does not preclude all patent litigation. The court does not believe that the removal of the injunction threat in a RAND context would so significantly alter the balance of power in patent litigation as to put undue litigation burdens on the RAND-obligated party who, after all, voluntarily assumed the burdens of the RAND obligation.

Although the court is aware that alleged infringers may force RAND-obligated patent holders into court to enforce their patents, therefore, this reality does not present significant concerns unique to the RAND context. The court will therefore not give the ability of alleged infringers to force a lawsuit any special consideration in the RAND analysis beyond what it receives in a typical patent case. The court will, however, consider whether the proposed RAND rates provide a sufficient return to give innovators an incentive to invest in new technology and to make their technology available to standard-setting bodies.

II. Determining an Appropriate Royalty Base

As a preliminary matter, the parties dispute the royalty base that the court should use to calculate the RAND royalty. The parties' positions on the proper royalty base represent two fundamentally opposed methods for calculating the appropriate royalty in this case. Accordingly, the court must first determine the proper royalty base before proceeding to the rest of the RAND analysis.

Innovatio contends that the court should calculate the royalty as a percentage of the selling price of end-products with wireless functionality, including laptops, tablet computers,

printers, access points, and the like. Under Innovatio's proposed method, the court should then discount the final selling price of end-products by what it calls a "Wi-Fi feature factor," which will "take into account the value of the end product (e.g., the access point or terminal device) that is attributable to the 802.11 functionality." (Dkt. No. 895, at 2.) For example, Innovatio proposes that a laptop with wireless functionality has a feature factor of 10%, reflecting that, in light of its many other functions, only 10% of the value of a laptop is due to Wi-Fi. (*Id.* at 3.) By contrast, an access point has a feature factor of 95%, reflecting that almost all of the value of an access point is due to the Wi-Fi functionality it provides. (*Id.*) After multiplying the feature factor by the price the Manufacturers charge for the end-products, Innovatio has proposed that the court multiply by a 6% benchmark royalty rate, derived from comparisons with what Innoatio argues are comparable licenses for other 802.11 standard-essential patent portfolios. Innovatio's proposed method, for example, results in royalties on average of approximately $3.39 per access point, $4.72 per laptop, up to $16.17 per tablet, and up to $36.90 per inventory tracking device (such as a bar code scanners).

The Manufacturers, by contrast, contend that the court should calculate the royalty as a percentage of the price the Manufacturers paid for each wireless chip, a small silicon device about the size of a dime that is inserted during manufacturing into an electronics device, such as a laptop computer or wireless access point, to provide the device with 802.11 wireless functionality. Each of the accused end-products in this case includes at least one Wi-Fi chip. According to the Manufacturers, the court should determine the weighted average selling price of a Wi-Fi chip over time. The court should then determine the percentage of that price attributable to the average operating profit of a chip maker, which the Manufacturers contend represents the maximum amount available for intellectual property royalties. Next, the court must apportion the

resulting amount, which represents the maximum royalty for all of 802.11 standard-essential patents, to account for the patented features in this case. (*See* Trial Tr. 1912:3-10, 1920:25-1921:12 (Leonard) (describing the "Top Down" approach to calculating royalties).) The result of the Manufacturers' methodology is a royalty of between .72 cents and 3.09 cents per chip, significantly less than Innovatio's proposed royalties.[7]

The argument over the appropriate royalty base to calculate patent damages is not unique to the RAND context, but is instead common to non-RAND patent cases. The overall goal of patent damages is to "award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer." 35 U.S.C. § 284. The Federal Circuit has explained that "[w]here small elements of multi-component products are accused of infringement, calculating a royalty on the entire product carries a considerable risk that the patentee will be improperly compensated for non-infringing components of that product." *LaserDynamics*, 694 F.3d at 67. Accordingly, the court must calculate royalties "not on the entire product, but instead on the 'smallest salable patent-practicing unit.'" *Id.* (quoting *Cornell Univ. v. Hewlett–Packard Co.*, 609 F. Supp. 2d 279, 283, 287–88 (N.D.N.Y. 2009).

The parties presented extensive testimony and argument disputing the smallest salable patent-practicing unit in this case. Innovatio contends that many of its patent claims read on to systems and methods involving apparatuses beyond the Wi-Fi chip, including antennas, access points, processors, and radios. For example, claim 1 of the '397 patent recites:

> A high reliability access point for use in a wireless local area network, comprising:

[7] The Manufacturers also proposed two other methodologies to confirm the royalty they calculated based on the chip price. The court will discuss those methodologies below.

> at least two wireless adapters wherein each adapter includes an RF radio,
>
> control processor means for handling low level protocol for said wireless adapter and antenna means operably connected to said adapter for transceiving radio signals; and
>
> central processing unit means operably connected to each of said wireless adapters for controlling high level communication protocol for said high reliability access point.

'397 Patent cl.1.) According to Innovatio, it is not possible to provide Wi-Fi functionality or to practice this claim only with a Wi-Fi chip. Instead, one must have at least an access point with a control processor, a central processor, antenna, and an RF Radio. Similarly, claim 1 of the '771 patent recites:

> A radio frequency data communication system that supports data collection within a premises, the radio frequency data communication system comprising:
>
> a plurality of roaming terminals operational within the premises;
>
> one or more base stations, each having a radio frequency transceiver, located within the premises; each of the one or more base stations transmitting a pending message list at each of selected time intervals;
>
> each of the plurality of roaming c terminals comprising a data collection system having a battery power supply and a radio frequency transceiver;
>
> the plurality of roaming terminals selectively communicative with the one or more base stations; and
>
> each of the plurality of roaming terminals selectively deactivating the radio frequency transceiver through a plurality of the selected time intervals, and synchronizing the activation of the radio frequency transceiver to receive the pending message list following the plurality of the selected time intervals.

'771 Patent cl.1. Innovatio asserts that to practice that claim, from the Sleep family, one needs at at least an access point and several stations. Innovatio therefore contends that the "smallest salable *patent-practicing* unit" is the system including all of the end-product devices, not the Wi-

Fi chip.[8]

The Manufacturers, by contrast, presented evidence that all of the features of the 802.11 standard are "implemented" on the Wi-Fi chip, which includes both hardware and software to run the 802.11 features of any device in which it is inserted. (*See, e.g.*, Trial Tr. 1670:2-15 (Wicker).) Innovatio's expert Dr. Nettleton agreed that the Wi-Fi functionality is implemented on one or more Wi-Fi chips. (Trial Tr. 453:11-14 (Nettleton).) The court understands that testimony to mean that all of the instructions to the various devices mentioned in the claims of Innovatio's patents that operate Wi-Fi are included on the chip. According to the Manufacturers, that fact means that the smallest salable patent-practicing unit is the Wi-Fi chip. Moreover, calculating royalties based on the price of the end-products would invite error, as those end-products include myriad features that are unrelated to Wi-Fi.

In support of their argument, the Manufacturers note the Federal Circuit's endorsement in *LaserDynamics* of a phrase from the *Cornell* decision suggesting that the proper royalty base is "the smallest salable infringing unit *with close relation to the claimed invention*." *LaserDynamics*, 694 F.3d at 67 (emphasis added) (quoting *Cornell*, 609 F. Supp. 2d at 287-88). Because Innovatio's patents did not invent access points, radios, or antennas, but instead only a method for using those devices, the instructions for which are contained on the Wi-Fi chip, the Manufacturers conclude that the smallest salable patent-practicing unit is the Wi-Fi chip. The Manufacturers also contend that the Federal Circuit's decision in *Lucent Technologies* supports their position. In that case, the patent-in-suit claimed

[8] In this case, Innovatio is not asserting the entire market value rule, an alternative path by which it could justify calculating a royalty based on the end-product price. *See LaserDynamics*, 694 F.3d at 67 ("The entire market value rule is a narrow exception to this general rule [that royalties should be calculated based on the smallest salable patent-practicing unit].").

> A method for use in a computer having a display comprising the steps of
>
> displaying on said display a plurality of information fields,
>
> identifying for each field a kind of information to be inserted therein,
>
> indicating a particular one of said information fields into which information is to be inserted and for concurrently displaying a predefined tool associated with said one of said fields, said predefined tool being operable to supply information of the kind identified for said one field, said tool being selected from a group of predefined tools including a tool adapted to supply an individual entry from a menu of alternatives and at least a tool adapted to allow said user to compose said information, and
>
> inserting in said one field information that is derived as a result of said user operating said displayed tool.

Lucent Techs., 580 F.3d at 1310-11. Even though the claim in *Lucent* involved a method for operating a computer and display to implement a "date-picker" in Microsoft Outlook software, the court held that it was error to present the jury with evidence regarding the revenue for the Microsoft Outlook software as a whole. *Id.* at 1335-39. The Manufacturers stress that *Lucent* did not even consider using the computer or the display as the royalty base, even though those devices were explicitly mentioned in the claim and were necessary to practice the claim. Instead, the Federal Circuit focused on the question of whether Microsoft Outlook was an appropriate base, or if the royalty inquiry must apportion down further to isolate the value of the date-picker, a minor feature of Outlook. *Id.* at 1338. The Manufacturers contend that, similarly, it is irrelevant here that Innovatio's claims mention end-products that Innovatio's patent claims plainly do not protect from infringement. Using those end-products as a royalty base would include value far beyond the patented features of the 802.11 standard that Innovatio's patents do protect.

Beyond the court's resolution of the parties' dispute about the application of the "smallest salable patent-practicing unit" test to Innovatio's asserted claims here, Innovatio's application of its approach did not credibly apportion the value of the end-products down to the patented

features. In light of that failure of proof, the court has no choice based on the record but to calculate a royalty based on the Wi-Fi chip.

The requirement that a patentee apportion his damages in every case to the value of the patented features is well over a century old. As the Supreme Court explained in 1884, "[t]he patentee . . . must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features, and such evidence must be reliable and tangible, and not conjectural or speculative." *Garretson v. Clark*, 111 U.S. 120, 121 (1884) (quotation marks omitted); *see also LaserDynamics*, 694 F.3d at 67. Innovatio asserts that its apportionment proceeded in two steps, first by apportioning the value of the end-products down to 802.11 through the application of the "Wi-Fi feature factor" and second, by applying the benchmark royalty of 6% based on licenses of comparable portfolios of 802.11 standard-essential patents and patents essential to other comparable standards. (Dkt. No. 953, at 5-8.) After evaluating all of the evidence, the court finds that Innovatio accomplished neither step of the apportionment credibly.

A. Innovatio's First Apportionment: "Wi-Fi Feature Factor"

The first step of Innovatio's approach to apportionment was performed by Innovatio's expert Christopher Bergey, a former Vice President of Broadcom who worked to develop a business and marketing strategy for 802.11 chips and other products. (*See* Trial Tr. 581:25-582:12, 583:7-24 (Bergey); PTX-985.) The concept of a "Wi-Fi feature factor" was not something with which Mr. Bergey had experience prior to this case, but was instead developed by Mr. Bergey and Innovatio's lawyers. (Trial Tr. 591:16-592:3 (Bergey).) In addition, Mr. Bergey admitted that he was aware of no other case or scholarly publication that had ever used the feature factor concept. (*Id.* at 593:4-22.) Moreover, he admitted that he had no opinion on

whether it was an appropriate methodology for apportionment in patent cases. Specifically, Mr. Bergey testified in part as follows:

> Q. I'm saying you are unaware of a single case where this approach has been taken, correct?
> A. Correct. I'm not well versed in patent cases.
> Q. Well, what do you mean by that?
> A. I . . . couldn't tell you if this is something that's widely used or not widely used.
> Q. You have no idea whether this approach has ever been used?
> A. I do not know.
> Q. Or whether it's an appropriate approach?
> A. It seems logical to me, and I know that this is an emerging, you know, area of law where there is a lot of challenges, but . . . I allow that to the experts and, you know—
> Q. And on this issue, you're not an expert, right? Fair?
> A. On which issue?
> Q. On the issue of whether this is even the right approach to take.
> A. Again, I think it's logical, but, you know, I think that's up to others in the case to determine, you know, what they want to use.
> Q. Because you don't have any expertise or training to say yourself whether or not it's appropriate, right? You're not a lawyer, for example?
> A. I believe my education allows me to say I believe it's accurate, but if it's appropriate, no, I don't believe I'm qualified.

(*Id.* at 592:15-593:15.)

Mr. Bergey's testimony about the methodology he used to produce the Wi-Fi feature factor confirms that his approach was not based on an established method of analysis, but is instead speculative and subjective. For example, Mr. Bergey determined a feature factor of 95% for access points, wireless radio modules, and dongles[9] merely by evaluating that the "primary purpose" of the access point was to provide 802.11 functionality. (*Id.* at 619:13-17 ("So the rest of the methodology—so, I mean, really the first test was to look at this product and to say, is the sole primary purpose of this product 802.11? And if it is, then obviously the feature factor would

[9] A dongle is a device that can be purchased separately and plugged into a computing device through a USB port or other port to provide wireless functionality. (*Id.* at 666:17-667:5.)

tend towards 100%. An example of this is an access point."). From there, Mr. Bergey testified that "we provided—subtracted 5% for, you know, potential—to be conservative, for potential things like power over Ethernet." (*Id.* at 627:10-12.) The 5% reduction was not based on any articulated quantitative measure, but instead merely reflected Mr. Bergey's speculation to account for other features in the device apart from 802.11.

The problem with that approach was revealed on cross-examination, where Mr. Bergey was asked about a variety of other features in an access point that either enhance the value of the 802.11 access point beyond mere 802.11 connectivity, or else do not contribute directly to 802.11 functionality. For example, Mr. Bergey testified that the 95% feature factor for access points included the value of an "easy-to-install, multi-purpose mounting bracket" that was included in one of Cisco's access points. (*Id.* at 803:20-25) The feature factor also included the value of an Ethernet connection to an access point, something covered by another technical standard altogether and outside the scope of 802.11. (*Id.* at 803:12-21.) Despite the undisputed fact that neither of those features has anything do with 802.11 connectively, the same 95% feature factor would therefore apply to an access point with no mounting bracket or Ethernet connection as would apply to an identical access point with a mounting bracket and Ethernet connection. Mr. Bergey's methodology thus fails to account accurately for the value provided by non-802.11 features of access points, wireless modules, and dongles.

As another example, Mr. Bergey was presented with another Cisco access point that included a software feature providing "[t]roubleshooting forensics for faster interference resolution and proactive action." (*Id.* at 807:1-7.) Mr. Bergey testified that he did not believe that such a troubleshooting feature was part of the 802.11 standard, but that he nonetheless did not exclude it from his feature factor. (*Id.* at 807:10-18.) The court concludes from the above

testimony that Mr. Bergey did not use a reliable method to calculate the value in an access point that is attributable to the 802.11 standard, as opposed to other proprietary features that a manufacturer may choose to include in an access point. Merely discounting the value of the access point by 5% "to be conservative," with no further analysis, is not adequate. The court therefore finds Mr. Bergey's analysis of the feature factor of access points, wireless modules, and dongles to lack credibility.

Mr. Bergey's determination of feature factors for other categories of accused products similarly lacked a credible methodology. With respect to wireless firewalls, for example, Mr. Bergey determined his feature factor of 20% to 50% by comparing the prices of firewalls with Wi-Fi compared to otherwise identical firewalls without Wi-Fi. (*Id.* at 640:1-22.) According to Mr. Bergey, the price difference between the two products shows the price that a consumer would be willing to pay for the Wi-Fi feature, all else remaining constant. (*Id.*) He then divided the price a consumer would pay for Wi-Fi by the total price of the product to determine his feature factor. That methodology could hypothetically provide some quantitative rigor to Mr. Bergey's opinion. The problem, however, is that he obtained the price data merely by searching the internet for list prices on nine select products (out of hundreds of accused products in this case) from a single retailer. (*See id.* at 641:24-642:14; PTX-1027.14-15.) Even though one of the Manufacturers, SonicWALL, provided actual pricing data on products with and without Wi-Fi, Mr. Bergey ignored that data and instead used the prices that he could find through his own searches on the internet. (Trial Tr. 643:2-8, 840:17-841:13 (Bergey).) That data is inherently unreliable, as the list prices available from one retailer on the internet for a handful of products may not be reflective of the actual prices that the Manufacturers have charged for all of their accused products. One problem, for example, is that past pricing data may differ from the current

prices Mr. Bergey found on the internet. (*See id.* at 843:14-25.) The unreliability of the data is confirmed by the lack of precision in Mr. Bergey's resulting feature factor, which ranged from 20% to 50%, a significant difference.

Mr. Bergey used a similar method to calculate a feature-factor for printers of alternatively 10% to 20%, or $50. In the case of printers, however, Mr. Bergey's opinion was based on the prices with and without Wi-Fi of only four products that he was able to find online. (*See* PTX 1027.21; Trial Tr. 673-677 (Bergey).) The court finds that Mr. Bergey's opinion, which was based on so few data points, is not credible.

Mr. Bergey's conclusion that a laptop has a 10% feature factor is equally unreliable, as it is based merely on speculation. Mr. Bergey testified on this point as follows:

> Q. So what information—given the lack of price-delta information, what information do you use as an input . . . to determine your Wi-Fi feature factor for a laptop?
> A. Well, so, since the price delta wasn't available, I used a couple inputs. One was there was an ASP provided around some of the dongles or what we're defining as dongles in this case, and that average selling price was $42, which was fairly similar to, you know, within 10, 20% of the $50 delta for printers. But, again, as I mentioned, you know, the printer connectivity tends to be single band, single spatial stream, whereas—and an optional feature; whereas in the laptop, typically the products are multiple spatial streams, multiple bands and, you know, capable of throughputs of, you know, hundreds of megabits per second, if not approaching a gigabit at this point in time. So it's much more advanced, and so I felt like it was appropriate to consider—consider, you know, doubling that $50 because the complexity was—was at least twice that of what was in the single band, single spatial stream products.
>
> And so that was where we came up with—I came up with a hundred dollars. And then if you compare that to the average selling price of the HP laptops in this case, which is $786, you know, it's a little bit more than 10%, but conservatively 10%.

(Trial Tr. 682:5-683:7 (Bergey).) The court discerns no reliable basis from those comments for Mr. Bergey's conclusion, other than his speculation that the wireless capability of a laptop is worth twice as much to consumers as the wireless capability of a printer. Mr. Bergey then

compounded that speculation in calculating a 20% to 30% feature factor for electronic tablets, which was based on his "belief that Wi-Fi is even more important in a tablet because [of] the fact that tablets are, you know, even more mobile than notebooks." (*Id.* at 688:23-25; *see also id.* at 693:6-14.) That speculation is not credible, and in any case provides no quantitative or objective means for evaluating Mr. Bergey's opinion.

Similarly, Mr. Bergey concluded that inventory tracking devices like bar code scanners have a 30% to 50% feature factor based on his own subjective impressions of the importance of Wi-Fi:

> Q. So given the lack of price-delta information, what were you able to conclude about the appropriate Wi-Fi feature factor for these devices?
> A. Well, so, as I mentioned that, you know, generally, these are not just 802.11 devices, so they failed that test; but, generally, they were a dual-purpose device. One was, again, doing something with the data, and the other was just to pass that on. So in that case, it's kind of a 50/50 split. However, there are devices that do not only have 802.11 as the connectivity but also have a cellular connection. So in that case, I felt like giving it more of a 30% type of a matter was more appropriate because 802.11 is not the sole transport back to the Internet or, you know, wherever the data is heading.

(*Id.* at 695:11-14.) The court can discern no reasonable basis for assigning a feature factor of 50% merely because Wi-Fi is one of two features in a product. With no substantive analysis of the relative value of the two features, that result cannot be reliable. By Mr. Bergey's reasoning, for example, the feature factor of the radio in a car that both transports its occupant and plays radio would also be 50%, an absurd outcome. In sum, the court finds Mr. Bergey's testimony about the Wi-Fi feature factor of the accused devices to be not credible.[10] Innovatio therefore has not presented a credible means to apportion the price of the accused products down to the value

[10] Mr. Bergey also suggested at times that his feature factors were based on the percentage of components in a product's bill of materials that were dedicated to Wi-Fi. (*See, e.g.*, *id.* at 622:2-5.) There is no evidence, however, that the percentage of components dedicated to a particular feature corresponds to the value of that feature to consumers.

of the 802.11 standard. Because Mr. Bergey's apportionment to the value of the 802.11 standard as a whole is a crucial part of Innovatio's overall attempt to apportion to the value of the patented features, Mr. Bergey's failure dooms Innovatio's entire apportionment analysis.

B. Innovatio's Second Apportionment: License Benchmark Rate

The second stage of Innovatio's apportionment, which was performed by Innovatio's licensing expert Larry Evans, is problematic as well. According to Mr. Evans, the price of the accused end-products, adjusted by the Wi-Fi Feature factor, should be multiplied by a 6% licensing rate. (Trial Tr. 929:2-7, 1231:19-1232:4 (Evans).) Mr. Evans derived that 6% rate by evaluating what he considered to be comparable licenses for other standard-essential patent portfolios that Dr. Nettleton opined were of equivalent or lesser value than Innovatio's patents. (*See id.* at 945-992.)

The court has two concerns with Mr. Evans's apportionment down to the patented features using a benchmark license rate. First, the Federal Circuit has expressed skepticism about performing an apportionment by varying the licensing rate. As the Federal Circuit explained in *LaserDynamics*, for example, a patentee cannot avoid the entire market value rule merely "by the use of a very small royalty rate." *LaserDynamics*, 694 F.3d at 67; *accord Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1320 (Fed. Cir. 2011) ("The Supreme Court and this court's precedents do not allow consideration of the entire market value of accused products for minor patent improvements simply by asserting a low enough royalty rate."). Although Innovatio is not seeking the application of the entire market value rule in this case (*see* Trial Tr. 1484:1-3), the Federal Circuit's concern about adjusting the licensing rate to account for a larger base applies equally here. *See Cornell*, 609 F. Supp. 2d at 286 ("An over-inclusive royalty base including revenues from the sale of non-infringing components is not permissible simply because the

royalty rate is adjustable."). In essence, that method of calculating a royalty conflates two steps of the royalty analysis and thereby increases the risk of error.

Additionally, as explained later in the opinion, this court finds that as a factual matter none of Mr. Evans's proposed licenses are in fact appropriate for a comparative analysis in the RAND context. *See infra* Part IV.B. They are therefore not reliable benchmarks by which Innovatio may apportion the value of the patented features in the claims of its patent portfolio from the value of wireless connectivity in general.

In sum, Innovatio has provided the court no legally sound and factually credible method to apportion the price of the accused end-products to the value of only Innovatio's patented features. The court therefore has no choice but to look to the Manufacturers' proposed method of calculating a RAND royalty based on the price of a Wi-Fi chip. Accordingly, for purposes of this opinion the court will consider the price of a Wi-Fi chip to be the appropriate RAND royalty base.

III. The Importance of Innovatio's Patents to the 802.11 Standard

A. Technical Background of 802.11 Standard

The court has previously explained the basic technical background of the 802.11 standard:

> The 802.11 standard establishes protocols for establishing wireless communications among devices in a local area. The IEEE has promulgated various amendments to the standard over the years, which are designated by letters, such as 802.11a or 802.11g. . . . Periodically, the amendments are "rolled up" and released as a new comprehensive version of the standard. . . .[11]

[11] Various versions of the standard are available online at http://standards.ieee.org/about/get/ (last visited Sept. 27, 2013). For simplicity, and following the industry practice, the court cites the amendments and the roll-ups of the standard by the year in which they were released. For example, § 1.1 of the 2012 version of the standard will be cited as IEEE Std. 802.11–2012 § 1.1.

A group of devices, or "stations," communicating on an 802.11 WLAN is known as a "service set." IEEE Std. 802.11–2012 § 4.3.1. In an independent basic service set, two or more stations communicate directly with one another. Id. § 4.3.2. More often, however, stations communicate through an access point, a device through which the communications of many stations in the service set can be routed, to form a "basic service set." *Id.* § 4.3.4.1. There may be multiple access points in a service set. In addition, an access point may be connected to a "distribution system" (for example, an Ethernet connection to the internet), which allows it to communicate with other access points and stations in other service sets. *Id.* § 4.3.6. The 802.11 standard does not define any of the functionality of the distribution system itself. *Id.* § 5.5 ("The implementation of the [distribution system] is unspecified and is beyond the scope of this standard."). A network of service sets is known as an extended service set. *Id.* § 4.3.4.2.

The 802.11 standard is a set of traffic rules that the access points use to direct the wireless traffic among stations in a service set. Protocols for traffic direction are necessary because wireless devices communicate via radio waves. If two stations attempt to transmit a message at the same time on the same radio frequency, the waves will interfere with one another (often called a "collision"), causing the resulting message to be incomprehensible. To avoid collisions, the 802.11 standard prescribes a medium access control ("MAC") protocol to ensure that only one station is speaking at a time, and that other stations are listening to it when appropriate. *See id.* §§ 5–6. Because many stations are portable and battery-powered, minimizing power usage is important. Consequently, the 802.11 MAC protocol includes provisions that allow stations to "sleep" when they are not communicating with the access point, and to "wake up" at various intervals to retrieve any messages that may be waiting for them. *Id.* § 10.2.

In addition to the need to avoid collisions, wireless networks also face the competing challenge of including as much information as possible in the radio waves to enable a quicker transfer of information. The 802.11 standard prescribes several different physical layer ("PHY") protocols that prescribe how information should be encoded in each radio wave by varying its frequency, amplitude, or phase. Different PHY protocols have different advantages. *See id.* § 7. For example, the frequency-hopping spread spectrum PHY instructs stations periodically to change or "hop" frequencies based on a predetermined pattern, thus making collisions less likely. *See id.* § 14. The direct sequence spread spectrum ("DSSS") PHY multiplies each data bit to ensure that if some bits are lost, the receiving station can still interpret the message. *Id.* § 16. Thus, instead of sending "10," the device might send "1111100000." Even if the receiving device hears the corrupted message 1101100100, it can still interpret the message as "10." The DSSS PHY is reliable, but sends information at a lower rate than other PHY protocols. In another example, the orthogonal frequency division multiplexing ("OFDM") PHY defines various "symbols" (comprising radio waves of a certain frequency and amplitude) to signify multiple data bits. *Id.* § 18. As a

> result, stations using OFDM can transmit a greater volume of information. The 2009 Amendments to the 802.11 standard introduced the high throughput ("HT") PHY specification, which uses multiple antennas transmitting on different frequencies at one time to increase still further the efficiency of data transfer. *Id.* § 20.

Innovatio IP Ventures, 2013 WL 3874042, at *5-6.

B. Alternative Technologies That Could Have Been Adopted Into the Standard

Modified *Georgia-Pacific* Factor 9 requires the court to consider the utility and advantages of the patented property over alternatives that could have been written into the standard instead of the patented technology in the period before the standard was adopted. *See Microsoft*, 2013 WL 2111217, at *19. The relevance of possible alternatives to the hypothetical negotiation is obvious, as the presence of equally effective alternatives to the patented technology that could have been adopted into the standard will drive down the royalty that the patent holder could reasonably demand. The reason is that if the patent holder demands a royalty that is too high, the standard-setting body will simply adopt the other alternative for a lower price. The court will therefore consider the presence of alternatives that could have been adopted into the standard as it evaluates the Innovatio patents' contribution to the 802.11 standard. The parties, however, present two significant disputes about how the court should evaluate potential alternatives.

First, the parties disagree about how the court should treat alternatives that were patented, and therefore not publicly available for no charge. The Manufacturers contend that patented technology can be considered an alternative, and that it can be just as effective at driving down the price as technology in the public domain. In support of that view, Dr. Leonard testified that economic models suggest that if two patented and equally effective alternatives both cost the same amount (i.e., charge the same royalty), the two patent holders would negotiate the price

down to effectively zero (ignoring the cost of implementing the alternatives), because both desire to have their technology incorporated into the standard, and both know that their technology will be worth practically nothing if it is not adopted into the standard. (Trial Tr. 2004:2-2005:6, 2078:15-2079:22 (Leonard).) The Manufacturers therefore contend that even patented alternatives can effectively drive down the price in the *ex ante* hypothetical negotiation.

By contrast, Innovatio contends that no patent holder would accept a royalty that is effectively zero, because innovators must be compensated for their work or they will not participate in the standard. As Dr. Teece explained, the economic models suggesting that two holders of patented technology would negotiate down to practically zero is based on the implausible assumption that the only negotiating factor is price. (Trial Tr. 199:10-200:16 (Teece).) The court agrees that it is implausible that in the real world, patent holders would accept effectively nothing to license their technology. Moreover, even assuming that patent holders agreed to essentially give away their technology so that it will be adopted into the standard, such a low return for the patent holders would discourage future innovators from investing in new technology and from contributing their technology to future standards. (*Id.* at 200:17-201:1.) Accordingly, the court will consider patented alternatives, but will recognize that they will not drive down the royalty in the hypothetical negotiation by as much as technology in the public domain. In other words, the existence of patented alternatives does not provide as much reason to discount the value of Innovatio's patents as does the existence of alternatives in the public domain.

Second, the parties dispute whether a proposed alternative that was publicly known at the time of standard adoption (for example, through its publication in an industry journal) is

sufficient to make an alternative "available" to the IEEE.[12] The Manufacturers' position is that any publicly available alternative could have been adopted into the standard. Innovatio contends, by contrast, that an alternative is only available if there is evidence that the IEEE actively considered it as part of their deliberations about setting the standard.

The Manufacturers' position appears to be based on an intuition that the determination of what is available is analogous to the determination of what constitutes prior art for the purposes of an invalidity analysis. *See Voter Verified, Inc. v. Premier Election Solutions, Inc.*, 698 F.3d 1374, 1379 (Fed. Cir. 2012). When determining what constitutes prior art, however, the court's inquiry is driven by the statutory requirements for determining whether a patentee is entitled to the benefits of his claimed inventions. *See* 35 U.S.C. § 102 (providing that a person is not entitled to a patent if "the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention"). When determining a RAND royalty, by contrast, the court's goal is to reconstruct a plausible hypothetical licensing negotiation between the parties immediately before the adoption of the standard. As part of that hypothetical RAND negotiation, the parties would no doubt discuss the likelihood of the patented invention being adopted into the standard. As part

[12] Dr. Shoemake testified that the 802.11 standard was formed by groups of engineers in a "subcommittee" that issued a call for proposals to address a particular area. (Trial Tr. 1310:1-14.) As a result of the call for proposals industry participants came and presented their proposals to the subcommittee. (*Id.* at 1310:15-19.) Members of the subcommittee voted, sometimes in multiple rounds, until the body achieved a 75% consensus on a proposal. (*Id.* at 1310:20-1311:10.) Proposals were only adopted if they achieved that 75% consensus. (*Id.*) The entire process often took months or years before a particular portion of the standard was adopted. (*Id.*) Because of the requirement of 75% consensus, often the subcommittee had to merge or alter different proposals to make them acceptable to a larger group of people. (*Id.* at 1311:1-1312:1.) For simplicity, the court will refer to the "IEEE" as the body that considered 802.11 proposals and adopted the standard, even though it was a subcommittee within the larger IEEE organization that in fact performed that work.

of that discussion, they would consider other alternatives that the IEEE could adopt. If a proposed alternative had not even been presented to the IEEE, however, it is implausible to believe that asserting such a technology as a plausible alternative would be an effective negotiating point, as it is exceedingly unlikely that the IEEE would adopt such an alternative.[13] Moreover, an alternative that was not even considered by the IEEE is not likely to be equally as effective as the patented technology that was adopted into the standard. Rather than second guessing the technical expertise of the many engineers and technicians who participated in the development of the 802.11 standard, the court will assume that technology that did not even merit a mention by the IEEE in its deliberations about the standard was not likely to have been a serious contender for adoption into the standard. Accordingly, the court will only consider technology that was considered by the standard-setting body when determining whether there are alternatives to the patented technology that could have been adopted into the standard.

As a final note about alternatives, Dr. Nettleton testified that the features in Innovatio's Channel Sharing and Sleep families "trace back" to the version of the 802.11 standard adopted in 1997. (Trial Tr. 309:13-23 (Nettleton).) The court understands that testimony to mean that the standards-setting body was locked into using the Channel Sharing and Sleep family patents as of 1997. The court's analysis with respect to those families therefore evaluates alternatives available in 1997. Dr. Nettleton testified that the Multi-Transceiver family of patents "trace back" to the version of the 802.11 standard adopted in 1999, and so the court will evaluate

[13] Dr. Shoemake described at least two instances in which he was aware of the IEEE adopting alternatives that had not been presented to the IEEE in formal submissions, but which instead came out of the collective knowledge of the group. (Trial Tr. at 1325-1327.) At that point, however, the alternatives were explicitly considered by the IEEE standards body, and so were no longer in the category of being merely "publicly available" knowledge that was available somewhere.

alternatives for that family as of 1999. (*Id.*) The court will also assume that the parties to the hypothetical negotiation in 1997 would have been aware of those alternatives available in 1999 for purposes of evaluating Innovatio's Multi-Transceiver patent family.

C. Innovatio's Patents

For the purpose of the RAND trial the parties have divided Innovatio's patents into four "families," each reflecting a set of functions relevant to one area of 802.11 operation. Part way through the trial, the parties came to an agreement that none of the Manufacturers' accused products practice the 802.11s standard, to which Innovatio's Mesh family of patents is applicable.[14] Accordingly, the parties agreed that the court need not consider Innovatio's Mesh family of patents when determining a RAND rate. (Trial Tr. 2330:1-20.) The RAND rate that the court determines in this case therefore does not reflect the value of Innovatio's Mesh family patents. The court will now evaluate the importance of each patent family to the overall 802.11 standard.

1. The Channel Sharing Patent Family[15]

As Innovatio's expert Dr. Nettleton testified, the Channel Sharing patent family includes patents that facilitate the communication of many devices on a single radio frequency while

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[14] The Mesh family includes the following claims:

'154 Patent, claims 1-7;
'636 Patent, claims 1-13;
'746 Patent, claims 13-17; and
'165 Patent, claims 16-20.

[15] The Channel Sharing family includes the following claims:

'559 Patent, claims 6-8;
'002 Patent, claims 1, 2, 4, 6, 7, 14, 16, 18, and 19;
'921 Patent, claims 1-5, 7, and 8;
'553 Patent, claims, 10-12, 17, 19, and 20; and
'747 Patent, claims 1-3, 5-8, 11, 13, 16, 17, and 20-25.

avoiding collisions. A collision occurs when two devices both transmit at the same time on the same frequency, causing the signals to interfere and to become unintelligible to other devices. (Trial Tr. 1548:14-1549:13 (Wicker).) In particular, the patents are directed at four features of the standard, which Dr. Nettleton labeled RTS/CTS, CTS to Self, Block Ack, and PS-Poll.[16] (Trial Tr. 364:3-8 (Nettleton); *see also id.* at 314-319.)

RTS/CTS refers to a method to solve the "hidden-node problem." (*Id.* at 312:9-15.) The hidden-node problem refers to a situation in which two terminals are both in range of an access point, but are out of range of each other. (*Id.* 312:17-23.) Because each of the terminals cannot monitor the transmissions from the other terminal, they may each attempt to transmit at the same time, causing a collision. (*Id.*)

The RTS/CTS system solves the problem by requiring terminals to reserve the communications medium, or radio frequency channel, with the access point before transmitting. As Dr. Nettleton explained, "RTS" stands for "request to send" and "CTS" stands for "clear to send." In essence, in an RTS/CTS system, a "Terminal A" that wishes to send a message to the access point first must send an RTS. Only after the access point receives the RTS and sends back a CTS in response can Terminal A then transmit its message. Because all terminals are within range of the access point, all terminals will hear the CTS, which informs them how long Terminal A will be speaking, essentially clearing the medium for the transmission and thereby avoiding the hidden node problem. Following the data transmission from Terminal A to the access point, the access point will send an acknowledgement to indicate that it received the

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[16] Although Dr. Nettleton listed PS-Poll as part of the Channel Sharing patent family functions, it relates primarily to the Sleep patent family, and the court will evaluate it as part of its evaluation of the Sleep patent family.

message. (*Id.* at 315-316.)

A CTS to Self function similarly allows the access point to reserve the medium for its transmissions by indicating to other devices how long it intends to transmit a packet of data. (*Id.* at 318:20-25.) The Block Ack feature allows the system to work more efficiently by waiting until a recipient has received a "block" of multiple data packets before sending a single acknowledgement that it received all of them. (*Id.* at 319:1-8.)[17]

Dr. Nettleton testified that the hidden node problem is an important issue in wireless networks. (Trial Tr. 315:13-15 (Nettleton).) He also noted that a 2012 article in the *Smart Computing Review* concluded that "[h]idden nodes are a fundamental problem that can potentially affect any wireless network where nodes cannot hear each other." L. Boroumand, *A Review of Techniques to Resolve the Hidden Node Problem in Wireless Networks*, SMART COMPUTING REV., Apr. 2012, at 95, 96.[18] Moreover, the article cited research suggesting that 40% of data packets are lost due to the hidden node problem, compromising the efficiency of the network. *Id.*

By contrast, Dr. Wicker testified that the RTS/CTS mechanism is rarely used in typical commercial or consumer situations (such as inside a Starbucks coffee shop) because the spaces are small enough and open enough that there is rarely a hidden terminal. (Trial Tr. 1562:12-

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[17] Dr. Wicker presented general testimony indicating that Innovatio's patents did not invent the RTS/CTS, CTS to Self, Block Ack, and PS-Poll mechanisms. (*See* Trial Tr. 1558:22-1560:11 (Wicker).) When asked what the patents did invent, however, Dr. Wicker stated that "[t]he patents invented an exchange of messages as an attempt to alert others and reserve the channel. In other words, to prevent others from jumping in during the communication between two stations." (*Id.* at 1560:5-11.) That description of the invention appears to merely describe the RTS/CTS and CTS to Self functions at a general level. In the absence of further testimony regarding what Dr. Wicker meant when he said that Innovatio did not invent the patented functions, the court will discount his testimony on that point.

[18] The article is PTX-652.

1564:1 (Wicker).) Moreover, in such situations, it is often more effective simply to transmit the data packet, rather than prefacing it with an RTS/CTS communication that unnecessarily consumes bandwidth and makes the network less efficient. (*Id.*) Accordingly, most wireless devices can turn off the RTS/CTS function or set it to operate only when transmitting large data packets that are more likely to cause collisions. (*Id.* at 1567:3-11.)

The 802.11 standard itself confirms Dr. Wicker's testimony. Section 9.2 of the standard provides that:

> The RTS/CTS mechanism cannot be used for [data units] with broadcast and multicast immediate address because there are multiple destinations for the RTS, and thus potentially multiple concurrent senders of the CTS in response. The RTS/CTS mechanism need not be used for every data frame transmission. Because the additional RTS and CTS frames add overhead inefficiency, the mechanism is not always justified, especially for short data frames.

IEEE Std. 802.11-1997 § 9.2. Thus, the RTS/CTS mechanism cannot be used whenever a terminal is transmitting to multiple access points, and it may be inefficient when the communication involves short data frames. The standard also confirms that RTS/CTS is merely an add-on to the standard that need not always be turned on, because "[t]he fundamental access method of the IEEE 802.11 MAC is a [distributed coordination function] known as *carrier sense multiple access with collision avoidance*, or CSMA/CA," a different MAC protocol. *Id.* § 9.1.1.

Nonetheless, Dr. Wicker admitted that RTS/CTS can be a useful mechanism, particularly in larger settings or obstructed settings like a factory floor where there are likely to be hidden nodes. (Trial Tr. 1563:20-1564:1 (Wicker).) That testimony is consistent with the "sniffing" data that the parties submitted providing an analysis of the types of packets that were transmitted over certain 802.11 networks in commercial settings. *See In re Innovatio IP Ventures, LLC Patent Litig.*, 886 F. Supp. 2d 888, 890 (N.D. Ill. 2012) (describing sniffing and authorizing a protocol allowing the parties in this case to conduct sniffs of publicly available networks). The

Manufacturers presented data from six randomly chosen sniffs indicating that at most only .12% of all packets sent on a network were Block Ack messages and .23% were RTS messages. (*See* Trial Tr. 1582-1583 (Wicker); DTX-514; DTX-518; DTX-519; DTX-521; DTX-525; DTX-538.) By contrast, Innovatio presented other selected examples. In one example, RTS packets comprised about 20% of data packets[19] sent and about 4% of all packets. (*See* Trial Tr. 1764:1-1767:3 (Wicker); DTX-925K.) In another example, RTS packets comprised 45% of data packets and about 6% of all packets. (Trial Tr. 1768:15-1729:21 (Wicker); DTX-925L.) In yet another example, CTS packets comprised 25% of data packets and 10% of all packets. (Trial Tr. 1770:12-1771:9 (Wicker); DTX-925M.) In a final example, about 9% of all packets were acknowledged using the Block Ack feature. (Trial Tr. 1771:21-1773:9 (Wicker); DTX-925N.)

That sniffing data is consistent with the testimony that the patented features of the Channel Sharing patent family are used infrequently, but that they can be quite useful in certain circumstances to add additional efficiency and reliability to communications using the 802.11 standard. In other words, the patents describe one efficient, reliable way of solving the hidden node problem, a central obstacle in at least some networks. That solution is not feasible in all circumstances, however, and it is occasionally less efficient because it requires the transmission of extra frames. Accordingly, networks need not implement it at all times. Nonetheless, the Innovatio Channel Sharing patent family can reduce data packet collisions and remove congestion, thus enhancing reliability and efficiency of wireless communication in a given

[19] Dr. Wicker opined that comparing the number of RTS packets or CTS packets to the number of data packets, rather than to all packets sent, was not an appropriate comparison. (*See* Trial Tr. 1855:2-19 (Wicker).) Because the RTS/CTS mechanism can only potentially be used every time that a wireless station is going to send a data packet, however, the court believes that the ratio of RTS packets to data packets is a relevant comparison. That ratio should indicate roughly the proportion of times that RTS/CTS is used out of the number of times it possibly could be used.

wireless network. In light of all the evidence, the court finds that the Innovatio Channel Sharing family patents are of moderate to high importance to the standard.

Dr. Wicker proposed several alternatives means to solve the hidden node problem that could have been used instead of the features in Innovatio's Channel Sharing patents. The first is "Point Coordination Function" or "PCF," an alternative in which the access point asks each terminal in the network in turn if it has something to transmit, rather than waiting for terminals to reserve the access medium. (Trial Tr. 1594:9-13 (Wicker).) PCF is an alternative that was adopted as an option in the 802.11 standard, and so could be used if the features of Innovatio's patents were not in the standard. *See* IEEE Std. 802.11-2012 § 9.2.3. Dr. Wicker testified that PCF is more efficient in circumstances with high traffic, but less efficient in other circumstances. (Trial Tr. at 1594:22-1595:5 (Wicker).) Similarly, Dr. Wicker proposed MSDU Aggregation, an alternative to Block Ack that also cuts down on the number of acknowledgements that must be sent. (*Id.* at 1615:16-20.) MSDU Aggregation is also in the standard. IEEE Std. 802.11-2012 § 9.8. In MSDU Aggregation, data is bundled together into a small number of large packets, and each large packet requires only a single acknowledgement. (Trial Tr. 1802:24-1804:16 (Wicker).) Larger packets, however, have a greater potential for error as other terminals might try to access the medium during the longer period a large packet is being sent. (*Id.* at 1804:17-23.) Eliminating Innovatio's Channel Sharing patents and relying on either PCF or MSDU Aggregation would therefore remove some functionality from the standard. PCF and MSDU Aggregation are therefore not equally effective alternatives that could have been used instead of the patented features of Innovatio's Channel Sharing patents.

As another alternative, Dr. Wicker proposed "Busy Tone Multiple Access" or "BTMA," an alternative system in which one sub-channel of the available bandwidth is dedicated to

transmitting a "busy signal" every time a terminal is using the communication medium. (*Id.* at 1596:13-1597:19.) BTMA is not in the standard, but was proposed in a December 1975 paper by Fouad A. Tobagi and Leonard Kleinrock. (DTX-383.) That paper was cited in a footnote of a 1994 submission to the IEEE 802.11 standard-setting body proposing a system in which "[a]n intending user listens for [a] quiet channel (or doesn't) and transmits a message to a known peer station." (DTX-1093)[20] In that case, however, the sub-channel of bandwidth dedicated to the busy signal is not available to transmit information, removing a part of the system's ability to transmit information. (Trial Tr. 1599:9-1600:4; 1600:17-21 (Wicker).) Again, Innovatio's patents are a superior alternative.

Dr. Wicker next proposed an alternative to Block Ack called Hybrid ARQ, which he described as "a form of error detection and error correction." (Trial Tr. 1617:5-6 (Wicker).) Under Hybrid ARQ, a terminal will detect that a packet that was part of a collision has errors in it, and will request retransmission of that packet. (*Id.* at 1617:5-12.) Hybrid ARQ was discussed at a 1992 meeting of the IEEE standards-setting body, as indicated in the minutes of that meeting. (DTX-1097, at 17.) Those minutes indicate however that "ARQ lowers the efficiency" of transmissions in certain circumstances. Accordingly, the court determines that it is not as effective as Innovatio's Block Ack.

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[20] Evidence regarding whether various alternatives were proposed to the IEEE was presented at trial by Dr. Wicker. (*See, e.g.*, Trial Tr. 1610:3-1611:21 (Wicker) (describing the 1994 submission).) Innovatio objected at trial to this testimony on the ground that it went beyond the scope of the opinions in Dr. Wicker's report. (*Id.* at 1603:5-9.) The Manufacturers responded that Dr. Wicker's report did explain his testimony on available alternatives, and that the testimony about the IEEE submissions became necessary only after the court made its position clear during the course of the trial that alternatives that had not been presented to the IEEE would not be considered. (*Id.* at 1606:9-23.) After reviewing Dr. Wicker's report, the court overrules Innovatio's objection to testimony about the presentation of proposed alternatives to the IEEE.

Finally, Dr. Wicker proposed frequency hopping, a technique adopted in the original version of the 802.11 standard and currently found in § 14 of the 2012 version of the standard. (Trial Tr. 1620:12-1622-9 (Wicker).) Under frequency hopping, a transmission is sent on multiple frequencies. If two transmissions collide, therefore, they collide with different hopping patterns, and the receiving terminal can usually decipher the intended message. (*Id.* at 1621:11-17.) As Dr. Wicker also testified, however, frequency hopping uses additional bandwidth (*id.* at 1620:12-14), and adopting frequency hopping would require additional changes to the standard (*id.* at 1808:16-18). Moreover, § 14 of the 2012 version of the standard provides that "[t]he mechanisms described in this clause are obsolete," raising questions about the viability of frequency hopping in the standard as it has progressed over time. IEEE Std. 802.11-2012 § 14.1. Accordingly, the court determines that frequency hopping does not provide all the same benefits as the features in Innovatio's Channel Sharing family, which again is a superior alternative.

In sum, the court concludes that although some of the proposed alternatives could provide some of the functionality of the patented features, none of them would provide all of the flexibility and functionality that the 802.11 standard has with the features of Innovatio's Channel Sharing family incorporated. These proffered alternatives therefore do not alter the court's conclusion that the Channel Sharing family is of moderate to high importance to the 802.11 standard.

2. Multi-Transceiver Family[21]

The Multi-Transceiver family involves patents that claim a method for operating an access point with multiple transceivers, or radios. Because this family of patents was at issue in the court's earlier essentiality trial, the court has already described the general benefits of this patent family:

> According to the '536 Patent, that setup "will greatly increase the reliability of a particular access point, as well as increase the reliability of the entire network." '536 Patent col.5 ll.23–25. The benefits arise from a variety of different mechanisms. Each transceiver of the access point could receive a signal of a different quality on each channel, for example, allowing the control circuit to choose to listen to the stronger signal. *Id.* col.5 ll.64–67 & col.6 ll.1–7. Alternatively, the access point could transmit through one transceiver and listen to the message on the other transceiver to determine if the correct message was sent. *Id* . col.6 ll.47–49. In yet another embodiment, each transceiver can transmit different information on a separate frequency to minimize the possibility of interference between the transmissions of two devices both attempting to communicate with the access point at the same time. *Id.* col.8 ll.36–43.

Innovatio IP Ventures, 2013 WL 3874042, at *13. In sum, the ability to use multiple transceivers in an access point allows the network to transmit at two frequencies (typically one in the 2.4 GHz band and one in the 5.0 GHz band), greatly increasing the reliability and efficiency of the network, and allowing it to transmit more data in a shorter period of time. (Trial Tr. 332:4-20; 376:1-7 (Nettleton); Trial Tr. 1651:18-25 (Wicker).) Moreover, in the July 2013 essentiality trial, the court found the following:

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[21] The Multi-Transceiver family includes the following claims:

'397 Patent, claims 1-5;
'893 Patent, claims 7-11;
'536 Patent, claims 1, 5, 8, 10, 11, 13-17, 19-21, 23, 24, 27, 30, 32, 36, 37, 39-42, 49, and 50;
'415 Patent, claims 11, 12, and 15;
'138 Patent, claims 1, 5, 8, 10, 11, 13-15, 17, 18, 21, 24, 26, 28, and 36-39;
'907 Patent, claims 1, 7, 10, 12-13, 15-17, 20-21, 23-24, 30, 33, 35-36, 38-40, 43-44, and 46-50;
'052 Patent, claims 1, 5, 6, 8-12, 15, and 16; and
'935 Patent, claims 1, 5, 6, 8-12, 15, 16, 25, 28, 32-35, 37-42, and 44-47.

> [T]he 2009 Amendments to the 802.11 standard, which defined the 802.11n standard, make plain that the use of dual transceivers is required at least in an optional portion of the standard. The 2009 Amendments introduced a new functionality known as "High Throughput PHY." IEEE Std. 802.11–2009, at 1 ("Amendment 5: Enhancements for Higher Throughput"). High Throughput defines features that allow transfer of data at higher rates than previous versions of the standard. *Id.* § 5.2.9 ("The IEEE 802.11 [high-throughput station] provides physical layer (PHY) and medium access control (MAC) features that can support a throughput of 100 Mb/s and greater, as measured at the MAC data service access point (SAP)."). The High Throughput PHY does so, among other innovations, through the use of "multiple input, multiple output (MIMO) operation" and "spatial multiplexing." *Id.* The 2009 Amendments define MIMO as "[a] physical layer (PHY) configuration in which both transmitter and receiver use multiple antennas," *id.* § 3.237, and spatial multiplexing as "[a] transmission technique in which data streams are transmitted on multiple spatial channels that are provided through the use of multiple antennas at the transmitter and the receiver," *id.* § 3 .248.

Innovatio IP Ventures, 2013 WL 3874042, at *14. Dr. Nettleton explained that using multiple transceivers in the 802.11n standard also allows a device to be backwards compatible with earlier versions of the 802.11 standard, insofar as one of the antennas can communicate with devices using earlier protocols. (Trial Tr. 332:15-20 (Nettleton).) The Multi-Transceiver patents are therefore essential to a key part of the 2009 Amendments to the standard, allowing the realization of multiple benefits.

Dr. Wicker testified that there were a variety of other mechanisms in the 802.11n standard that are designed to be backwards compatible. (Trial Tr. 1652:9-23 (Wicker).) He did not explain, however, whether all of those mechanisms must be used to make an 802.11n device backwards compatible, or if some of them could be omitted while maintaining backwards compatibility. The court therefore finds that Dr. Wicker has not presented a plausible alternative to the Multi-Transceiver patent family that provides the same backwards compatibility.

In addition, Dr. Wicker testified that there are a variety of other ways to increase the throughput of a wireless network, so that it can transmit more data, without using multiple

transceivers. (*Id.* at 1652:15-1653:13, 1658:20-1659:21.) For example, he listed using a higher order modulation scheme, using alternative channel coding, increasing the bandwidth of the channel, increasing the signal power, and decreasing noise and other interference. (*Id.*) Obviously, many of those alternatives have their own downsides, such as requiring additional bandwidth or increasing the likelihood that a transmission will interfere with other signals. Regardless, all of these techniques are things that network operators can do to increase throughput regardless of whether an access point has one or multiple transceivers. (Trial Tr. 335:3-9 (Nettleton); Trial Tr. 1820:20-1821:1 (Wicker).) There also was no testimony that these alternatives provide all of the flexibility of multiple transceivers, such as allowing an access point to monitor two signals and choose to listen to the stronger signal. Dr. Wicker's alternatives for providing additional throughput are thus not complete replacements for the Multi-Transceiver patents.[22]

The Manufacturers nonetheless argue that the availability of other means of increasing throughput would depress the price Innovatio could charge for its patents in the hypothetical negotiation. If Innovatio charged too much, the Manufacturers argue, the standards-setting body could opt to use other methods to increase throughput. On the other hand, such an alternative would be somewhat distasteful to the standards-setting body in light of the other benefits of using multi-transceivers and a desire not to leave out of the standard such an effective means of increasing throughput. The presence of alternative means of increasing throughput therefore may depress slightly the price Innovatio could charge for its Multi-Transceiver patents, but would not

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[22] Dr. Wicker also proposed as an alternative using only the 5 GHz band, and not the 2.4 GHz band. (Trial Tr. 1659:17-21 (Wicker).) Obviously, that alternative provides less throughput than using both the 2.4 GHz and 5 GHz bands, and is therefore not as effective.

totally destroy their value in the *ex ante* negotiation.

Dr. Wicker also cited U.S. Patent No. 5,101,406, the "Messenger Patent," which discloses a system for using multiple transceivers in a wireless network, was filed on August 28, 1989, before any of the Innovatio patents were filed. (Trial Tr. 1653:18-1654:7, 1665:7-1668:14 (Wicker).) According to Dr. Wicker, the Messenger Patent both shows that Innovatio's patents were not the first to use multiple transceivers, and provides a viable alternative that could have been used instead of Innovatio's patents. Dr. Nettleton testified, however, that the Messenger Patent contemplated dividing up an existing frequency band, rather than simultaneously using both the 2.4GHz and the 5 GHz bands, thereby using less bandwidth and transmitting less data overall. (Trial Tr. 429:11-17 (Nettleton).)[23] In addition, the Messenger Patent teaches that each station randomly chooses a frequency before transmitting to the access point. '406 Patent Abstract; *see also* (Trial Tr. 429:3-10 (Nettleton).) According to Dr. Nettleton, such a "terminal-driven" system is not an effective way to set up a multiple access system, because the access point cannot initiate communications with the terminals. (Trial Tr. 429:3-10, 500:20-25 (Nettleton).) Dr. Wicker did not credibly refute those assertions. Accordingly, the court determines that the Messenger Patent does not provide a system as effective as that taught by the Innovatio patents.

Nonetheless, the Messenger Patent at the least does indicate that the concept of using multiple transceivers in a wireless network was well known apart from the Innovatio patents. The value that the Innovatio patents provide is therefore not the concept of using multiple

[23] Dr. Nettleton also testified that if one were to run the Messenger Patent system on two separate bandwidths, one would need to install multiple transceivers in each station, whereas the Innovatio patents require multiple transceivers only in each access point. (*Id.* at 430:4-12.) Installing multiple transceivers in each station presumably adds additional expense to a wireless system, and therefore constitutes a disadvantage of the Messenger Patent system.

transceivers, but instead a means for effectively implementing that concept to expand and enhance communication capacity efficiently. That contribution is significant.

Taking into account all of the above evidence, the court determines that Innovatio's patents in the Multi-Transceiver family are of moderate to high importance to the 802.11 standard. The patents are essential to the use of multiple transceivers in a wireless network, an innovation that provides many benefits including increasing the throughput of the system. Innovatio's patents did not originate the idea of using multiple transceivers but taught an effective way of implementing that idea. Finally, other means of increasing throughput provide some of the benefits of the Multi-Transceiver patents and therefore diminish their importance slightly. All of those factors combine to show that the Multi-Transceiver family patents are of moderate to high importance to the 802.11 standard.[24]

3. Sleep Family[25]

The Sleep family of patents claim methods for allowing stations to conserve power by operating in a powered-down state, but periodically waking up to determine if there are messages waiting for them at the access point. The court has generally described the operation of the

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[24] The Manufacturers presented evidence of a single "sniffing" file in which very little data was sent on the 5 GHz band. (DTX-1071; Trial Tr. 1654:8-1655:23 (Wicker).) There is no evidence in the record regarding how that file was selected, however, or whether it is representative. The court therefore discounts this sniffing evidence in evaluating the importance of the Multi-Transceiver family.

[25] The Sleep family includes the following claims:

'366 Patent, claims 5-16, 19-29, and 32;
'771 Patent, claims 1-7;
'311 Patent, claims 20-24, 26-30, 32-37, 39-41, 43-51, 53-56, 60, and 64;
'646 Patent, claims 14-22, 26-35, 39, 40, 43-45, 47, 49-51, 53-56, 59-64, 66-69, 71-73, 79, 82-94, 98-104, 107, 108, 111, 112, 114-123, 125-128, 130, 135-137, 143, and 144;
'167 Patent, claims 73-77, 79-83, 85, 89-97, 100, 102-107, 109-113, 115, 119-127, 130, 132-134, and 203; and
'343 Patent, claims 1-6, 8-12, 15-20, 22, 23, 25, 28-36, 38-42, 45-50, 52, 53, 55, and 58-60.

802.11 sleep function in the essentiality trial:

> [T]he 802.11 MAC layer includes a protocol for a power save ("PS") function that allows battery-powered stations to save power by staying "asleep" and periodically "waking up" to receive messages from an access point. The 802.11 standard specifies that a station wakes up only to receive selected beacons from an access point. The station remains awake if the beacon indicates that the access point has a data message for the station to receive, but otherwise goes back asleep and wakes up only to receive the next scheduled beacon. Table 11–1 of the 2007 Amendments to the 802.11 standard describes a station operating in PS mode:
>
>> [The station] listens to selected Beacon frames (based upon the ListenInterval parameter . . .) and sends PS–Poll frames to the [access point] if . . . the most recent Beacon frame indicates [data waiting to be sent to the station]. The [access point] shall transmit [data] to a PS [station] only in response to a PS–Poll from that [station] . . . . In PS mode, a [station] *shall be in the Doze state and shall enter the Awake state to receive selected Beacon frames,* to receive broadcast and multicast transmissions following certain received Beacon frames, to transmit, and to await responses to transmitted PS–Poll frames . . . .
>
> IEEE Std. 802.11–2007 § 11.2.1.1 (emphasis added).

Innovatio IP Ventures, 2013 WL 3874042, at *20-21. The benefits of conserving power are obvious for battery-operated devices, which can operate longer without requiring that the battery be charged. Although the use of the sleep function is optional in the 802.11 standard, therefore, it is used by the vast majority of 802.11 battery-operated devices. (Trial Tr. 336:8-20 (Nettleton).) Dr. Nettleton testified that the power-saving features of the sleep mode have been essential to the success of battery-operated 802.11 devices. (*Id.*)

Dr. Wicker testified, however, that Innovatio's sleep-mode patents cover only a portion of the technology necessary to implement the sleep-mode functions of the 802.11 standard. (Trial Tr. 1625:13-18 (Wicker).) Dr. Nettleton agreed. (Trial Tr. 374:12-18 (Nettleton).) For example, Innovatio's patents cover, among other things, the exchange in which an access point sends a beacon with a "traffic indication map" or "TIM" to indicate whether a station has any buffered

messages, and the station responds with a PS-Poll to indicate that it is ready to receive the data transmission of those buffered messages. (*Id.* at 374:24-375:2; Trial Tr. 1628:14-1629:4 Wicker).) They thus cover the portion of the sleep mode that allows sleeping stations to retrieve messages from the access point during the periods that they are awake.

Dr. Wicker presented several alternatives to Innovatio's Sleep patents. The first is U.S. Patent No. 5,029,183, the "Tymes Patent," which was filed in 1989 and issued in 1991, well before the 802.11 standard was adopted. Rather than having an access point send a beacon with a TIM to an awakened station when the station has pending messages, the Tymes Patent teaches a system in which the station sends a "NOP" or "no-operation" signal each time that it wakes up, so that the access point can then send data to the station. (Trial Tr. 1627:15-1628:8 (Wicker); *see also id.* at 1640:15-17 ("So there's basically an empty packet that says I'm here and I'm awake, and if there are any pending messages, the messages will be delivered upon receipt of that packet.").) According to Dr. Wicker, the Tymes Patent system is "a little more flexible" than the system in the Innovatio patents, because "[t]he [NOP] can be sent at virtually any time, as opposed to requiring that the unit wake up in particular fixed times." (*Id.* at 1642:1-4.)

One disadvantage of the Tymes Patent, however, is that it allows only the station, and not the access point, to initiate communications. (*Id.* at 1818:22-1820:9.) Alternatively, Dr. Wicker testified that the Tymes Patent system can be "turned around" so that communication can originate at the access point, and not the station. (*Id.* at 1819:7-12.) The Tymes Patent cannot allow initial communications in both directions, however, unlike the Innovatio system, in which an access point can send a TIM or a station can send a PS-Poll. (*Id.* at 1819:13-1820:1.) The court presumes that limitation creates some disadvantage for the Tymes Patent, although the parties provided no evidence about how significant it is.

Regardless of the relative advantages of the Tymes Patent, there is no evidence that the Tymes alternative was submitted to the IEEE standards-setting body. The Manufacturers point to a passage in a July 1993 submission to a IEEE 802.11 committee that provides as follows:

> Stations operating in the Power Save Polling mode (PSP) will transmit a short Poll frame to the AP, which will respond with the corresponding frame. Such stations may choose to listen to each TIM or may choose to listen only to occasional TIMs, depending upon their desired level of power consumption and performance.

(DTX-1096, at 12.) That passage immediately follows a discussion of using TIMs that are "periodically generated by the [access point]." (*Id.*) In that context, the quoted passage appears to describe the system in Innovatio's patents involving a TIM/PS-Poll exchange, however, not the system of the Tymes Patent in which the station initiates communications with a NOP. Accordingly, there is no evidence that the Tymes Patent was submitted to the IEEE standards-setting body, and so it is not a viable alternative.

Dr. Wicker also presented an alternative called "TDMA" or "Time Division Multiple Access," which assigns each station a time in which it can receive messages, thus allowing it to sleep between its assigned times. (Trial Tr. 1635:21-1636:12 (Wicker).) TDMA was proposed to the IEEE standards-setting body in a May 1991 submission. (DTX-1099, at 1; Trial Tr. 1637:10-1638:9 (Wicker).) Adopting TDMA would require a significant change to the basic contention-resolution mechanism of the 802.11 standard, CSMA-CA, however. (*See* Trial Tr. 1814-1817 (Wicker).)[26] Consequently, it would require significant changes to many other parts of the

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[26] Dr. Wicker testified that the current standard uses time slotting in certain places in the standard, and that various kinds of time slotting can coexist with the CSMA-CA protocol. (*Id.* at 1816:3-9.) As the court understands it, though, the proposal of using TDMA as a replacement for the sleep function would involve a fundamental shift to the standard. Rather than allowing stations and access points to communicate as necessary, and then resolving collisions with the

standard as well. Moreover, common sense suggests that time slotting can be inefficient, particularly when there are many stations in a network, but only a few desire to transmit at a particular time. Those stations must wait through the time slots of all other, non-transmitting stations, which merely wastes time. TDMA is therefore not a viable alternative.

As a final alternative, Dr. Wicker proposed a proprietary system of RAM Mobile Data, Inc., known as "Mobitex." (*Id.* at 1642:8-15; DTX-453.) Under the Mobitex system, after an awakened terminal receives a message that it has messages at the access point waiting for it, it merely stays awake to receive the message, rather than sending a PS-Poll to the access point. (Trial Tr. 1645:8-1646:3 (Wicker).) Dr. Wicker opined that Mobitex would be just as efficient as the Innovatio patents, and in some cases more efficient, as there would be no need to send a PS-Poll. (*Id.* at 1647:3-7.)

Although the Mobitex specification is marked "confidential" and states that it is "[t]o be released only to individuals authorized by RAM Mobile Data" (DTX-453, at 1), Dr. Wicker testified that RAM Mobile Data distributed the document widely, that he taught it in his classes in the early 90s, and that it was well known in the industry. (Trial Tr. 1642:18-25, 1811:6-21 (Wicker); *see also* Dkt. No. 934, Ex. 47, at 26:14-27:22; Dkt. No. 934, Ex. 49, at 70:24-71:4.) Moreover, the Mobitex system was proposed in a July 1993 submission to the IEEE standards-setting body. (DTX-1096, at 12 ("describing "Power Save Non-Polling mode").)

There is evidence, however, that the Mobitex system would not work as well as the system in the Innovatio Sleep patents. Dr. Nettleton testified, for example, that the absence of the PS-Poll means that the access point has no guarantee that the station is in fact awake. It may

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CSMA-CA mechanism, the TDMA protocol would relegate stations to communicating only during designated time slots.

consequently transmit its messages to particular device, wasting time and bandwidth. (Trial Tr. 503:20-504:1 (Nettleton).) Another problem is that the access point in Mobitex must transmit all pending messages for all stations at one time, causing it to monopolize the channel for some period of time, preventing other communications. (*Id.* at 504:5-8.) The court therefore determines that Mobitex is not a viable alternative to the Innovatio Sleep family patents.

Finally, the court notes that the parties submitted sniffing data regarding the percentage of sleep mode related packets sent in a wireless network. The six sniffing cases that Dr. Wicker randomly selected indicate that at most .15% of all packets are PS-Poll packets. (Trial Tr. 1632:24-1633:3 (Wicker); DTX-514; DTX-518; DTX-519; DTX-521; DTX-525; DTX-538.) Innovatio contends that it is not appropriate to look at only PS-Poll packets and submitted other data indicating that a somewhat higher percentage of packets involved a station entering power save mode in general. (*See* PTX-925F; PTX-925H; PTX-925I.) That sniffing data does not significantly alter the court's conclusions about the importance of Innovatio's Sleep patents one way or the other, as the court has no benchmark for understanding how that data relates to the number of devices using the Innovatio patented features, which extend beyond merely PS-Poll packets. *See Innovatio IP Ventures*, 2013 WL 3874042, at *20-24 (describing Innovatio Sleep family patented features including selectively sleeping for varying amounts of time, operating various circuitry in a powered-down state, and deleting old buffered messages with an "aging function").

Considering all of the evidence, the court concludes that Inovatio's Sleep family patents are of moderate importance to the standard. Although sleep mode operation is optional, it is significant to battery-operated devices that must conserve power. There were no available alternatives at the time of standardization that would have provided all of the functionality of

Innovatio's patents. Nonetheless, Innovatio's patents are not sufficient in themselves to cover all of the features of 802.11 sleep mode, which includes many other technologies. Accordingly, the court concludes that Innovatio's patents are of moderate importance to the standard.

IV. Comparable Licenses

The next phase of the analysis requires the court to evaluate the licenses that the parties have proposed as comparable licenses appropriate for determining a RAND rate under modified *Georgia-Pacific* Factors 1 and 2.

A. Innovatio's License to Broadcom

Before analyzing the parties' proposed comparable licenses, the court notes that the patents-in-suit have been licensed by Innovatio back to Broadcom as part of the deal in which Innovatio purchased [redacted], including the twenty-three at issue here, from Broadcom for [redacted] in 2011. (Trial Tr. 138:24-139:3, 140:9-11 (Djavaherian).) Hypothetically, that transaction should provide the most appropriate comparable license for determining the value of the twenty-three patents-in-suit, as it involved a license of exactly these patents. As a practical matter, however, neither party offered an effective means of isolating the value of a license for the twenty-three patents from the rest of the transaction. Presumably, the value of the license was deducted during the parties' negotiation from the price of the patents without the license to arrive at the final purchase price that Innovatio paid to Broadcom.

Ultimately, however, there is no information in the record by which the court can determine either the price of the patents without the license or the value of the license itself. Moreover, there is no evidence that Innovatio and Broadcom negotiated the sale of the patents by determining an initial price and then deducting the price of a license. [redacted] (*See id.* at 134:7-10

(explaining that Broadcom [redacted]).)

Another problem is that the [redacted] purchase price itself undoubtedly reflects a significant discount for the risk that the patents could not be successfully monetized, including the risk of proceeding in this litigation. Accordingly, the court determines that it cannot ascertain the value of the Broadcom-Innovatio license sufficiently to use the transaction between Broadcom and Innovatio as a comparable for determining a RAND rate. The price at which Innovatio purchased the patents-in-suit will therefore play no role in the court's determination.[27]

B. Innovatio's Proposed Comparable Licenses

As described above, Innovatio proposed that the court determine a RAND rate using the price of the accused end-products as the royalty base. Consistent with that position, all of Innovatio's proposed comparable licenses calculated a royalty on the basis of end-product prices. As described below, however, the court finds that none of Innovatio's proposed comparable licenses are appropriate for determining a royalty in the RAND licensing context. Accordingly, there is no credible basis in the record for calculating a RAND royalty on the basis of end-product prices.

1. Motorola Mobility, Inc./VTech License

Innovatio's first proposed comparable license is a December 1, 2011, agreement between Motorola Mobility, Inc. ("MMI")[28] and VTech Holdings Ltd., the "world's largest manufacturer

[27] Similar problems infect the [redacted] price at which Broadcom purchased the patents-in-suit from Intermec. Accordingly, the court will not rely on that transaction either in determining a RAND rate.

[28] Motorola Mobility, Inc. is not a party to this litigation and is distinct from Motorola Solutions, Inc., which is a party to this litigation.

of cordless telephones, and the largest supplier of electronic learning products from infancy to preschool in the US and Western Europe." (PTX-964.) [redacted]

Judge Robart considered and rejected the MMI-VTech license as an appropriate comparable license when he determined a RAND rate to license Motorola's 802.11 and H.264 standard-essential patents. *Microsoft*, 2013 WL 2111217, at *66-68. Even though the patents at issue in the *Microsoft* litigation were the same as those included in the VTech license, Judge Robart rejected the MMI-VTech license after concluding that the license rate in the agreement was determined only as a part of a package deal involving the larger cordless phone patent litigation between VTech and MMI. *Id.* at *66. He came to that conclusion based on an e-mail from VTech to MMI stating that "[w]e could enter into a long term license [for the 802.11 and H.264 patents] *as part of the agreement we are trying to settle* on the assumption that we would list products using MMI's IP after determining that they qualified." *Id.* at *66.

[29] The H.264 standard is promulgated by the International Telecommunication Union and relates to advanced video coding technology. *See Microsoft*, 2013 WL 2111217, at *1.

Second, Judge Robart concluded that at the time of trial VTech had paid only trivial royalties for selling products under MMI's 802.11 and H.264 standard-essential patents. *Id.* at *67. He thus concluded that the 802.11 and H.264 patents were a trivial part of the overall deal, and were thus unreliable indicators of appropriate 802.11 and H.264 royalty rates. *Id.* Judge Robart also noted that MMI and VTech entered into the agreement only after the litigation between Motorola and Microsoft had already commenced. *Id.* Judge Robart thus concluded that MMI may have engineered the MMI-VTech agreement only to bolster its position in the Microsoft-Motorola litigation, further casting doubt on its validity as a comparable license. *Id.*

Innovatio has not presented any evidence sufficient to undermine Judge Robart's conclusions. Innovatio did present evidence through Mr. Evans that VTech has since enjoyed some commercial success with respect to products using 802.11 technology. In particular, VTech's 2013 Annual Report noted that VTech's North American revenue rose by 17.3% to $361.9 million dollars, and that "[t]his robust performance was driven by a full-year sales contribution of the product line and the launch of three second generation consoles, InnoTab 2, InnoTab 2S and InnoTab Baby." (PTX-964, at 9.) The InnoTab 2S is an 802.11-enabled product. (PTX-965.) There is no specific evidence regarding how much of VTech's success is due to 802.11-enabled products, however. The court therefore has no basis by which to determine whether VTech has paid substantial royalties to MMI under the license agreement for the use of MMI's 802.11 patent portfolio.

As an additional problem, there is no evidence in the record by which the court could determine how to value MMI's 802.11 patents compared to the H.264 patents in MMI's portfolio. For example, the bulk of the licensing royalty may have covered the H.264 patents, with only a small amount covering the 802.11 patents. Innovatio thus has not shown that the

royalty in the MMI-VTech license accurately reflects the value of MMI's 802.11 patent portfolio.

After evaluating all of the evidence, the court agrees with Judge Robart and finds that the MMI-VTech license was merely a small part of a larger licensing agreement that the parties entered into to settle significant litigation. Accordingly, the license rate is likely the product of the settlement negotiation between the parties, and not an accurate market-determined rate for MMI's patents. Moreover, there is some possibility that the MMI-VTech rate was engineered by MMI to justify its position in the *Microsoft* litigation, and does not actually reflect a significant exchange of value between the parties. Considering all of those problems, the court finds that it is inappropriate to rely on the MMI-VTech license to determine a RAND rate here.

2. Symbol Licenses with Proxim and Terabeam

Innovatio next proposes that two licenses entered into by Symbol Technologies, Inc. ("Symbol") to license its 802.11 patents to companies making wireless bar code scanners would be appropriate comparable licenses. The agreements arose out of infringement litigation between Symbol and Proxim, Inc. ("Proxim") in the District of Delaware. *Symbol Techs., Inc. v. Proxim Inc.*, No. 01-801 (D. Del.). Symbol won a jury verdict against Proxim finding that Proxim infringed Symbol's U.S. Patent Nos. 5,029,183 and 5,479,441, two patents essential to the power-saving features of the 802.11 standard. *See Symbol Techs., Inc. v. Proxim, Inc.*, No. 01-801, 2004 U.S. Dist. LEXIS 14949, at *2 (D. Del. July 28, 2004). The jury awarded Symbol a 6% royalty on sales of Proxim's 802.11 wireless bar code scanners, amounting to a total of $22.9 million, plus interest. *Id.* at *30. On July 28, 2004, the court denied Proxim's post-trial motions and affirmed the jury award, but denied Symbol a 6% royalty payment on future infringing sales. *Id.*

Several days later, Symbol moved for a permanent injunction. Dkt. No. 354, *Symbol Techs., Inc. v. Proxim, Inc.*, No. 01-801 (D. Del. Aug. 6, 2004). Shortly thereafter, Symbol and Proxim settled the litigation in an agreement including payments totaling [redacted] from Proxim to Symbol. (*See* PTX-919.) As part of the settlement, [redacted] (*Id.* § 4.1.) The settlement agreement also [redacted] Innovatio contends that the royalty rate of 6% is an appropriate comparable for determining a RAND rate for Innovatio's patents.

Thereafter, another company called Terabeam, Inc. acquired the assets of Proxim, but did not assume the cross-license agreement between Proxim and Symbol. (Trial Tr. 960:14-19 (Evans).) As a result, the product lines Terabeam acquired from Proxim were unlicensed, and Symbol sued Terabeam for patent infringement on October 8, 2005. (*Id.* at 961:5-7; PTX-309, at 1.) Symbol and Terabeam settled that lawsuit in a settlement agreement dated February 24, 2006. (PTX-309.) In addition to the settlement agreement, the parties executed a "Patent Licensing Agreement" under which [redacted]. (PTX-308, at 3.) The Patent Licensing Agreement provided for [redacted], as well as the transfer of certain intellectual property from Terabeam to Symbol. (*Id.* at 10, 19.) The Patent Licensing Agreement included the following statement:

(*Id.* at 10.) In addition, the February 24, 2006, settlement agreement stated (*See* PTX-309, at 8.) Innovatio contends that the Symbol-Terabeam settlement also supports a 6% RAND rate here.

The problem with using the Symbol-Proxim and Symbol-Terabeam agreements as comparable license agreements is that they were both adopted under the duress of litigation and, in particular, a jury verdict awarding Symbol $22.9 million for Proxim's infringement. A proposed comparable license's origin in litigation of course does not automatically disqualify it from consideration. *See ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860, 872 (Fed. Cir. 2010) (explaining that "the most reliable license in this record arose out of litigation"). In this case, however, there is a plain correlation between the jury verdict and the amounts of both of the license agreements. Proxim entered its license agreement with Symbol facing a jury verdict of $22.9 million and the possibility of an injunction, suggesting that the amount may have reflected some hold-up value. Similarly, Terabeam could not credibly have contested its liability against Symbol in light of the likely *res judicata* effect of the Symbol-Proxim litigation against Terabeam, who was then standing in Proxim's shoes. Both the Symbol-Proxim and Symbol-Terabeam agreements were therefore affected by the coercive effect of the $22.9 jury verdict in favor of Symbol, rather than merely the licensing value of the 802.11 patents at issue.

The influence of the jury verdict on the license agreements in itself would not be

problematic, as jury verdicts can be data points providing a comparable license rates for use in hypothetical negotiations. Under the modified *Georgia-Pacific* factors, however, the court should consider only licenses that arise out of circumstances comparable to RAND licensing circumstances. Here, there is no evidence that the jury in the Symbol-Proxim litigation was aware of Proxim's RAND obligations when it determined its verdict, or that it was instructed on the effect of the RAND obligation on the royalty amount. Accordingly, there is no evidence that the Symbol-Proxim jury verdict was based on RAND considerations. Judge Robart came to the same conclusion when evaluating the Symbol-Proxim and Symbol-Terabeam agreements. *Microsoft*, 2013 WL 2111217, at *71 ("Mr. Dailey, who provided the only substantive testimony regarding the Symbol–Proxim license, did not know whether the jury had been instructed that there were RAND limitations on the royalties that could be awarded. (11/20/12 Tr. at 81:20–24 (Dailey Testimony).) Thus, there is no indication that Symbol and Proxim negotiated for the patents at issue (the '441 and '183 Patents) under the RAND obligation.").

An additional problem with both the Symbol-Proxim and Symbol-Terabeam agreements is that the royalty rates Innovatio would like to extract from them have an ambiguous relationship to the total consideration actually exchanged. In both cases, the parties' agreements merely indicate that Symbol valued the consideration at a certain royalty rate, but did not actually calculate the payment exchanged based on that royalty. The amount at which Symbol valued a particular agreement is much less relevant to determining a RAND royalty here than is the actual consideration exchanged. The court therefore finds that the parties in a hypothetical negotiation would not consider either the Symbol-Proxim or the Symbol-Terabeam licenses to be appropriate comparable licenses for determining a RAND rate.

3. Symbol/LXE License

Next, Innovatio proposes two licenses between Symbol and LXE, Inc., both granting LXE a license under [redacted] for LXE to manufacture and sell its wearable and non-wearable barcode reader. (Trial Tr. 987-991 (Evans).) [redacted] (PTX-322.) [redacted] (PTX-323.)

The problem with both of those licenses is that Innovatio presented no evidence indicating how many patents Symbol owned at the time, or about how valuable Symbol's 802.11 standard-essential patents were compared to other patents in its portfolio that might read on to the licensed barcode scanners. Moreover, Mr. Evans did not know how many of Symbol's patents were 802.11 standard-essential, and how many were non-standard-essential or related to other technologies, and he did not take those factors into account in determining that the Symbol-LXE agreements were comparable. (Trial Tr. 1157:3-1158:6 (Evans).) The parties to a hypothetical negotiation would not consider the Symbol-LXE license agreements without knowing what portion of the royalties in those agreements were attributable to Symbol's 802.11 patents, and the parties would not consider the Symbol-LXE agreements without that information. The court therefore will not consider the Symbol-LXE agreements as comparable licenses for determining a RAND rate.

4. Qualcomm/Netgear License

Innovatio also proposes as a comparable license an April 2, 2013, license agreement between Netgear and Qualcomm. (*See* PTX-333.) The agreement licensed [redacted]

(Trial Tr. 973:23-974:13 (Evans); PTX-333 § 5.2.2.) According to Mr. Evans, (Trial Tr. 974:14-23 (Evans); PTX-333, at 21.) The royalty for licensing Qualcomm's portfolio was (PTX-333 § 5.2.2.) Qualcomm and Netgear negotiated the license at arm's length, meaning that the agreement was not formed in the context of litigation between the negotiating parties. (Trial Tr. 955:13-16 (Evans).)

The court declines to accept the Qualcomm/Netgear license as an appropriate comparable license for determining a RAND license in this case, for two reasons. First, according to Mr. Evans, Qualcomm's portfolio of patents that were included in the license agreement included "something like " patents. (Trial Tr. 1177:13-16 (Evans).) Dr. Nettleton testified that Qualcomm actually owned "33,000" patents. (Trial Tr. 354:3-8 (Nettleton).) The large number of Qualcomm patents included in the license agreement with Netgear suggests that the royalty rate in that agreement would not be appropriate for an agreement including only twenty-three patents.

According to Dr. Nettleton, the number of patents involved in the deal should not disqualify the license as a comparable, because the licensing agreement was narrowly focused on only , and it is likely that Netgear did not require all of Qualcomm's patents to manufacture and operate those products. (*Id.* at 354:1-355:10.) Moreover, Dr. Nettleton testified that in his view, Innovatio's patent portfolio is just as important to the 802.11 standard as Qualcomm's is to the 802.16 and 802.20 standards. (*Id.* at 470:12-20.) The court finds that opinion not credible in light of Dr. Nettleton's statement that he

did not review any of the Qualcomm patents, and that he did not know how many of them were standard-essential. (*Id.* at 471:2-19.) The court also finds Dr. Nettleton's statement to lack credibility in light of his admission at his deposition that his opinion "literally has no defensible basis." (*Id.* at 472:1-9.) He also stated that "Qualcomm's portfolio of patents is overwhelming and huge and all-encompassing," and that his opinion was "a lot more subjective than it should have been." (*Id.* at 472:16-22.) In light of that testimony, the court finds Dr. Nettleton's testimony that Innovatio's patents are just as important to 802.11 as Qualcomm's are to 802.16/20 not credible. The large number of Qualcomm patents therefore makes the Qualcomm-Netgear license an inappropriate comparable.[30]

Second, the Qualcomm-Netgear license involved the 802.16 and 802.20 standards, rather than the 802.11 standard. Dr. Nettleton testified that the 802.16 and 802.20 standards are part of the "4G standards" for cellular connections and they, like 802.11, are "wireless air interface standards." (Trial Tr. 354:24-355:10 (Nettleton).) However, there is no evidence in the record regarding the comparative commercial value of 802.11 networks versus 802.16/20 networks. The court thus has no basis to conclude that a license for 802.16/20 devices would be an appropriate comparable for an 802.11 license. *ResQNet.com*, 594 F.3d at 871 (rejecting proposed comparable licenses where there is "little or no evidence of a link between the . . . licenses and the claimed invention").

Accordingly, the court determines that in the hypothetical RAND negotiation, the parties would not rely on the Qualcomm-Netgear license agreement to assist in ascertaining an appropriate RAND royalty rate.

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[30] The court also notes Dr. Leonard's testimony that Qualcomm's patents gave it a "very strong position." (Trial Tr. 2030:4-10 (Leonard).)

C. The Manufacturers' Proposed Comparable Licenses

1. The Via Licensing Patent Pool

Dr. Lynde, an expert witness advanced by HP and SonicWALL, proposed that the court determine a RAND rate by looking at the Via Licensing Patent Pool. According to Dr. Lynde, the Via patent pool was formed in October 2003 for the purpose of licensing 802.11 patents at RAND-compliant rates. (Trial Tr. 2148:1-6 (Lynde).) The pool evaluates submissions from holders of alleged 802.11 standard-essential patents to determine if they are in fact essential, and then offers a license at fixed rates on all of its 802.11 patents. (*Id.* at 2148:7-20.) The pool charges the same rates for the entire pool, no matter how many patents are included. (*Id.* at 2227:16-21.) Accordingly, Dr. Lynde testified that the pool arrangement avoids the problem of royalty stacking, as it reflects a single rate for, in theory at least, all 802.11 standard-essential patents. (*Id.* at 2145:3-2146:14.) After collecting royalties, the pool then distributes the proceeds to patent holders using a formula based on the proportional number of patents the patent holder has in the pool, without regard to the relative merit of the patents. (*Id.* at 2157:3-10 (explaining that the Via pool distributes royalties on a "per-patent basis").)

The Via pool charges a license fee of between $0.05 and $0.55 per unit, depending on the volume of units purchased. (*See* DTX-1607.) Based on those numbers, and using several different assumptions for the total number of 802.11 patents, Dr. Lynde calculated that a reasonable royalty for Innovatio's 802.11 essential patents would be between .03 cents and 4.16 cents. (Trial Tr. 2157:3-24, 2161:15-2162:17 (Lynde); DTX-2009; DTX-2010.)

There are several problems with the use of the Via pool as an indicator of a RAND rate in this case. The first is that the pool has attracted only five licensors, thirty-five patents, and eleven licensees. (Trial Tr. 2148:16-20 (Lynde).) The Via pool has therefore been relatively

unsuccessful in attracting licensors. (*Id.* at 2226:1-8.) Dr. Lynde testified that the reason may be that the prices are too high to attract licensees willing to pay the fees. (*Id.* at 2226:1-15.) The court finds it more plausible, however, that the prices are too low to give patent holders a reasonable return on their technology. In any case, the Via pool has not been successful and therefore has limited utility for determining a RAND rate. *See Microsoft*, 2013 WL 2111217, at *88 ("[T]he Via Licensing 802.11 patent pool has not been successful in encouraging widespread adoption of the 802.11 Standard through buy-in to the pool of licensors and licensees. As stated, the purpose of the RAND commitment is to achieve widespread adoption of the standard. It stands to reason then that the less a patent pool achieves widespread adoption of the standard, the less relevant the pool becomes as an indicator of a RAND royalty rate.").

Another problem with the Via pool was well articulated by Judge Robart. As Judge Robart explained:

> the court notes that the Via Licensing 802.11 patent pool as a de facto RAND royalty rate for Motorola's 802.11 [standard-essential patent] portfolio suffers from the same concerns as all patent-counting patent pools in regards to the court's RAND-modified Georgia–Pacific methodology. Namely, the Via Licensing 802.11 pool does not distinguish between patents in the pool on the basis of technical merit, but rather gives the exact same royalty to all patents in the pool. Also, the pool does not consider the importance of patents to the implementer's products.

Microsoft, 2013 WL 2111217, at *88. Moreover, as Dr. Teece testified, because the Via patent pool does not allocate royalties based on relative merit, patent holders with valuable patents will not contribute their technology to the pool. (Trial Tr. 203:14-22 (Teece).) Those patent holders will instead attempt to license their patents bilaterally, where they often can obtain higher rates. As a result, the pool rates may be considerably depressed, a fact with which Dr. Lynde did not disagree. (Trial Tr. 2165:22-24 (Lynde) ("And the pool rates might be lower than they would be with the participation of extremely high-value patents.").)

Ultimately, Judge Robart did rely on the Via pool in determining a reasonable royalty in that case. *Microsoft*, 2013 WL 2111217, at *89. In doing so, however, Judge Robart determined that the 802.11 patents at issue in that case were not important to the 802.11 standard. *Id.* at *64 ("In sum, the court concludes that the #571, #398 and #563 Patents contribute very little to the standard."); *see also id.* at *56-64 (making similar findings with respect to Motorola's other 802.11 standard-essential patents). Using the Via patent pool, which the evidence shows did not include high-value patents, to calculate a RAND rate for low-value patents may be appropriate. By contrast, this court has determined that Innovatio's patent portfolio is of moderate to moderate-high importance to the 802.11 standard. In that context, the Via patent pool is not an appropriate comparable license. Accordingly, the court will not consider the Via patent pool when determining a RAND rate in this case.

2. Non-RAND Comparable Licenses

Dr. Lynde also presented the court with brief testimony regarding four licenses for 802.11 technology that did not arise in the context of a RAND obligation. (Trial Tr. 2143:1-7 (Lynde).) Those four licenses are the CSIRO/Radiata license, the CSIRO/Netgear settlement, the ARM chip license, and the CSIRO/HP settlement. (*Id.* at 2143:8-17.) Although Non-RAND indicators are not directly comparable to a license in the RAND context (and are inappropriate comparators under modified *Georgia-Pacific* Factor 1), Dr. Lynde testified that they provide an upper bound above which a RAND royalty should not go. (*Id.*)

The court does not take a position on the question of whether non-RAND licenses can ever be useful in determining a RAND rate. In this context, however, Dr. Lynde presented only brief testimony about the patents and technology covered by the three CSIRO licenses and the ARM chip license. (*Id.* at 2175:23-2178:22.) That testimony, combined with other evidence in

the record, is insufficient for the court to determine the relative merit of the patented technology in each of those licenses compared with the technology in Innovatio's patents. Accordingly, the court rejects Dr. Lynde's non-RAND licenses and finds that they are unreliable indicators in this case of the appropriate RAND rate.

V. Other Methods of Calculating a RAND Rate Presented at the September 2013 Trial

In light of the absence of any comparable licenses, the court will consider other methods that the parties proposed for determining the RAND rate that the parties would have agreed to in the hypothetical negotiation.

A. Dr. Leonard's "Bottom Up" Approach

The Manufacturers' expert Dr. Leonard presented a "Bottom Up" approach for calculating a RAND royalty. In essence, the Bottom Up approach suggests determining the cost of implementing reasonable alternatives to the Innovatio patents that could have been adopted into the standard, and dividing that cost by the total number of infringing units to determine the maximum per unit royalty Innovatio's patents would have merited in the 1997 hypothetical negotiation. (Trial Tr. 2005:14-2007:5 (Leonard).) The Bottom Up approach is based on the theory that a hypothetical licensee in the 1997 negotiation would not pay more for Innovatio's patents than the amount necessary to adopt an alternative.

As the court found in in Part III.C above, however, there are no alternatives to the Innovatio patents that would provide all of the functionality of Innovatio's patents with respect to the 802.11 standard. Moreover, Judge Robart rejected such an "incremental value" approach on the ground that an accurate analysis is too complicated for courts to perform:

> In practice, approaches linking the value of a patent to its incremental contribution to a standard are hard to implement. Calculating incremental value for multipatent standards "gets very complicated, because when you take one patent out of a standard and put another one in you may make other changes, the

> performance of the standard is multidimensional, different people value different aspects."

Microsoft, 2013 WL 2111217, at *13. As a final problem with the Bottom Up method, Dr. Leonard did not account for the royalty that the alternatives to Innovatio's patents might be able to charge. As explained in Part III.B above, however, patented alternatives are also able to command a royalty, because it is unlikely that the market would drive the price of all patented technology to zero. For all of those reasons, the court rejects Dr. Leonard's Bottom Up approach as an appropriate method for calculating a RAND royalty in this case.

B. Dr. Leonard's "Top Down" Approach

Dr. Leonard also presented an approach for calculating a RAND royalty that he described as the "Top Down" approach. Although the Top Down approach is not perfect, no approach for calculating a RAND rate is in light of the inherent uncertainty in calculating a reasonable royalty. *Cf. Unisplay, S.A. v. Am. Elec. Sign Co., Inc.*, 69 F.3d 512, 517 (Fed. Cir. 1995) (calculating a reasonable royalty "necessarily involves an element of approximation and uncertainty"). The uncertainty is heightened here, where the court must reconstruct a hypothetical negotiation under a variety of assumptions and inferences about the influence of the RAND obligation on hypothetical parties negotiating at a hypothetical time under hypothetical circumstances. After considering all of the factors, however, for the reasons set forth below the court determines that the Top Down approach best approximates the RAND rate that the parties to a hypothetical *ex ante* negotiation most likely would have agreed upon in 1997, before Innovatio's patents were adopted into the standard. The court will therefore use the Top Down approach, with appropriate modifications, to calculate a RAND rate.

In summary, the Top Down approach starts with the average price of a Wi-Fi chip. (Trial Tr. 1920:23-1921:2 (Leonard).) Based on that average price, Dr. Leonard then calculated the

average profit that a chipmaker earns on the sale of each chip, thereby isolating the portion of the income from the sale of the chip available to the chipmaker to pay royalties on intellectual property. (*Id.* at 1921:3-7.) Next, Dr. Leonard multiplied the available profit on a chip by a fraction calculated as the number of Innovatio's 802.11 standard-essential patents, divided by the total number of 802.11 standard-essential patents. (*Id.* at 1921:8-12.) Dr. Leonard also provided several alternative calculations for this step by varying the denominator of the fraction to account for varying conclusions about the value of Innovatio's patents to the 802.11 standard. (*See id.* at 1982:23-1984:4.)

Dr. Leonard's approach has several significant advantages. First, by taking the profit margin on the sale of a chip for a chip manufacturer as the maximum potential royalty, it accounts for both the principle of non-discrimination and royalty stacking concerns in RAND licensing. Considering the profit of the chip manufacturer on the chip, rather than the profit margins of the Manufacturers on the accused products, is appropriate because a RAND licensor such as Innovatio cannot discriminate between licensees on the basis of their position in the market. Thus, the RAND rate that the court determines here should be the same RAND rate that Innovatio could charge to chip manufacturers on its patent portfolio. If the royalty is excessive in comparison to a chip manufacturer's profit margin on a chip, therefore, the royalty is too high. In the hypothetical negotiation, chip manufacturers facing a demand for a royalty far outstripping their expected profit margin would not agree to take a license on the patents, but would instead exit the chip-making business.

Moreover, when evaluating whether the total royalties on all 802.11 standard-essential patents are too high, royal stacking concerns confirm that the court should guard against a potential royalty exceeding the current profit margins for the chips. Judge Robart accepted the

testimony of an expert adopting this view:

> [B]ecause the risk of "royalty stacking" inflates the impact of any royalty on a company's bottom line, even a 1% royalty is a "high ceiling" benchmark. This is because the profit margin on semiconductor chips is narrow, and several royalty payments can quickly subsume a company's expected profits. (*See* 11/14/12 Tr. at 70:1–6 (Ochs Testimony).) Indeed, "you can't pay too many royalties before you just run out of profit." (*Id.* at 70:2–3.)

Microsoft, 2013 WL 2111217, at *94. Dr. Leonard's method of basing the total potential royalty for all 802.11 standard-essential patents on the chipmaker's profit insures that the total royalty stack will not exceed an amount that would force chipmakers out of the business. It therefore appropriately simulates the decisions that chipmakers would make in the hypothetical RAND negotiation, when Innovatio's patents were not yet part of the standard. In that situation, chipmakers would lobby for alternative technologies to be adopted into the standard, or would leave the chip-making business altogether, rather than pay a royalty that would obliterate their profits.

Innovatio's expert Dr. Teece cautioned against this view. (Trial Tr. 201:3-202:1 (Teece).) He testified that in some cases, widespread infringement may have allowed manufacturers to set their prices very low, essentially ignoring the value of the intellectual property included in their products. (*Id.* at 201:18-19.) Once that value is priced back in (through proper RAND valuations both in court and through licensing negotiations), manufacturers' current profit margins will certainly be obliterated, but manufacturers will respond simply by raising their prices.

The court agrees that the profit margin on an accused product is not always dispositive for determining a RAND rate. *See Douglas Dynamics, LLC v. Buyers Products Co.*, 717 F.3d 1336, 1346 (Fed. Cir. 2013) ("This court has held that an infringer's net profit margin is not the ceiling by which a reasonable royalty is capped." (citing *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1338 (Fed. Cir. 2004))). It is, however, something the court may consider as part

of modified *Georgia-Pacific* Factors 12 and 13. In the record of this case, moreover, there is no evidence of widespread infringement of 802.11 standard-essential patents. To the contrary, Dr. Leonard testified that Broadcom, Intel, and Atheros, three major Wi-Fi chip manufacturers, are all licensed under Innovatio's patents. (Trial Tr. 2036:3-16 (Leonard).) Those three manufacturers, representing a significant portion of the chip market, have already in essence paid a royalty for the use of Innovatio's technology, and can exert downward price pressure on any currently unlicensed chip manufacturer that tried to raise its prices to account for a royalty to Innovatio. Accordingly, in light of all the evidence, the existing profit margin on chips is the likely ceiling on Innovatio's RAND royalty, and is therefore an appropriate starting point from which to calculate that royalty.

A second advantage of Dr. Leonard's Top Down approach is that it apportions to the value of Innovatio's patented features without relying on information about other licenses that may or may not be comparable to accomplish the apportionment. As mentioned above, the Federal Circuit has expressed skepticism about apportioning using comparable licenses. *See LaserDynamics*, 694 F.3d at 67; *see also Uniloc USA, Inc.*, 632 F.3d at 1320. Dr. Leonard's method of apportioning avoids this problem. In addition, RAND licenses are relatively rare in the marketplace at this time, as evidenced by the parties' struggles to identify an appropriate comparable license in this case and the court's rejection of their proposals. Courts and participants in industries governed by standards have not focused on the RAND issue until relatively recently. Indeed, Judge Robart's opinion in the *Microsoft* case, which issued in April 2013, only a few months ago, represents the first judicial attempt to identify a RAND rate. Accordingly, there are few available comparable licenses that were negotiated in the RAND context. Until more RAND licenses are available, courts and litigants must look to other methods

for calculating a RAND royalty, such as Dr. Leonard's Top Down proposal.

Third, Dr. Leonard's method provides some quantitative and analytical rigor to the RAND analysis. The method requires verifiable data points, such as the number of 802.11 standard-essential patents, the average price of a chip, and the average profit of a chip manufacturer, as inputs. Dr. Leonard's method thus allows the court to base its RAND rate on objective considerations and sound hypotheses, rather than on mere speculation. *Cf. ResQNet.com*, 594 F.3d at 869 ("[A] reasonable royalty analysis requires a court to hypothesize, not to speculate.").

Fourth, and finally, Dr. Leonard's proposal does not apportion to the value of Innovatio's patented features based solely on the numerical proportionality of Innovatio's patents to all 802.11 standard-essential patents. To the contrary, the Top Down method provides a means by which the court can account for its conclusion that Innovatio's patents are of moderate to moderate-high importance to the standard, and therefore more important than the average 802.11 standard-essential patent, without sacrificing quantitative rigor and objective verifiability.

The court will therefore accept Dr. Leonard's Top Down approach to determine the appropriate RAND royalty that the parties to the hypothetical negotiation in 1997 likely would have adopted. Before applying the Top Down approach to calculate the appropriate RAND rate, the court will first determine the value of the quantitative inputs to Dr. Leonard's method.

VI. RAND Determination

A. The Price of a Wi-Fi Chip

First, the court must determine the price of a Wi-Fi chip to use in the calculation. Dr. Leonard proposed that the court rely on a 2010 report from ABI Research, a market research company relied upon by the industry, titled "Wi-Fi IC Market Data." (DTX-1559 ("ABI

Research Report"); *see also* Trial Tr. 1921:13-1922:1 (Leonard).) That ABI Research Report calculated or projected the average selling price of a Wi-Fi chip in each year from 2000 to 2015, and also provided figures for the number of units sold in each year. (*See* DTX-1559, at tbl.1-1.) The prices varied from a high of $37 in 2000, when 5.4 million Wi-Fi chips were sold, to a projected low of $2.54 in 2015, when over 2.015 billion chips will be sold. (*Id.*) The following chart summarizes the ABI Research Report data from table 1-1 of DTX-1559:

Year	Average Price of Chip	Number of Units Sold (millions)
2000	$37.00	5.4
2001	$29.03	7.5
2002	$17.17	23.1
2003	$12.10	43.2
2004	$7.57	81.5
2005	$5.76	158.8
2006	$5.59	203.6
2007	$5.47	307.2
2008	$4.73	459.6
2009	$3.75	591.3
2010	$3.53	761.4
2011	$3.41	1001.1
2012	$3.28	1270.4
2013	$3.05	1548.8
2014	$2.81	1801.5
2015	$2.54	2015.5

From that data, Dr. Leonard took a weighted average for all chips sold from 2000 to 2013, which yielded a chip price of $3.99.

The ABI Research Report represents the only full market data in the record regarding the price of Wi-Fi chips. Other evidence presented at trial includes Mr. Djavaherian's testimony that [redacted] (Trial Tr. 126:6-20 (Djavaherian)), [redacted] Mr. Bergey [redacted] testified that the numbers in the ABI Research Report were too low, because there are

disproportionately more basic Wi-Fi chips that are sold at lower prices. (Trial Tr. 707:1-7 (Bergey).) Mr. Bergey also testified that the chips in the accused products would have cost [redacted] during the time he was working at Broadcom from 2002-2011. (*Id.* at 708:22-709:24.) Mr. Bergey confirmed, however, that chip prices have declined significantly since 2005, partly because of a reduction in the amount of silicon necessary to manufacture a chip. (*Id.* at 712:6-14, 766:4-10 (describing market pressures that reduce the "silicon cost" of a chip).)

In light of all that evidence, the court believes that it is appropriate to rely on the ABI Research Report to determine the average price of a Wi-Fi chip in this case. It is not appropriate, however, to take a weighted average of the annual ABI Research Report data, because the weighted average discounts the chip price significantly because of the disproportionately large number of chips that have been sold in recent years, when the price of a chip was low. The court infers that this significant increase in Wi-Fi chip sales is due to the increased demand for Wi-Fi products resulting from the interoperability of the products due to standardization.

The court must, however, not consider the effect of standardization when evaluating the *ex ante* negotiation in 1997. Dr. Leonard testified, for example, that the hypothetical negotiation must take place in the *ex ante* world, before the patents were incorporated into the standard and without taking into account the success of the standard. (Trial Tr. 2020:3-2021:2 (Leonard); *see also* DDX-5, at 48 (Leonard demonstrative slide explaining that the *ex ante* analysis must analyze a royalty "prior to adoption and lock-in").) Indeed, those parameters are necessary to avoid capturing the value of the standard itself in the royalty resulting from the hypothetical negotiation, rather than just the value of the underlying technology in the asserted patents. As Judge Robart explained when developing the modified *Georgia-Pacific* factors:

> [A] reasonable royalty would not take into account the value to the licensee created by the existence of the standard itself, but would instead consider the

> contribution of the patent to the technical capabilities of the standard and also the contribution of those relevant technological capabilities to the implementer and the implementer's products. This is because there is substantial value in the agreed standard itself apart from any contribution of the patented technology to the standard, and the RAND commitment exists so that [standard-essential] patent holders cannot demand more than they contribute.

Microsoft, 2013 WL 2111217, at *18.

Moreover, the parties have not presented any evidence that the parties to a hypothetical negotiation in 1997 would have considered the success of the 802.11 and the large number of chips being sold in later years. *See Lucent Techs.*, 580 F.3d at 1327 (parties to the hypothetical negotiation may "consider the expected or estimated usage (or, for devices, production) of a given invention, *assuming proof is presented to support the expectation* (emphasis added)). Accordingly, the court finds that the parties to a hypothetical negotiation in 1997 would not consider a weighted average leading to a depressed chip price. The parties would, however, have been aware of the 1997 price of a Wi-Fi chip, and would also have been able to hypothesize that the price of that chip would probably drop over time. They would therefore likely conclude that an average price of a chip over the life of Innovatio's patents would be an appropriate measure to incorporate into their royalty.[31] Accordingly, a weighted average, which discounts the price based on the success of the standard in recent years, would not be appropriate.

[31] Of course, the hypothetical negotiators would not have actually used the Top Down method to calculate a royalty, and so they would not use the average chip price in calculations such as the court is performing here to arrive at a RAND royalty. Among other problems, in 1997 prior to the adoption of the standard, they would not have been aware of the total number of 802.11 standard-essential patents, and so could not actually use the Top Down method. Nonetheless, as described above, the average profit on a chip would have represented a reasonable upper bound for a royalty on all 802.11 standard-essential patents. The likely average profit on a Wi-Fi chip in the future (calculated from the likely average price) would therefore have been on the minds of the hypothetical negotiators in 1997, and represents a real constraint on the royalty at which they would have arrived in their negotiations. The Top Down method merely provides a means of quantifying the effect of the likely average price and profit of a Wi-Fi chip on the hypothetical negotiations in 1997.

Rather than using Dr. Leonard's figures, therefore, the court will calculate the price of a chip by merely averaging the price of a chip from 1997 through 2013.[32] Because the ABI Research Report only has data back to 2000, the court will plug in $37, the price of a chip in 2000, for each of the preceding three years 1997, 1998, and 1999. The following table reflects the annual average chip price for 2000 to 2013 from the ABI Research Report (DTX-1559, at tbl. 1-1), along with the court's extrapolations about the price of a chip in 1997-1999:

Year	Average Price of Chip
1997	$37.00
1998	$37.00
1999	$37.00
2000	$37.00
2001	$29.03
2002	$17.17
2003	$12.10
2004	$7.57
2005	$5.76
2006	$5.59
2007	$5.47
2008	$4.73
2009	$3.75
2010	$3.53
2011	$3.41
2012	$3.28
2013	$3.05

The average of the price for those years is $14.85.[33] The court will use $14.85 as the chip price,

[32] All but three of Innovatio's patents have expired or will expire by the end of 2013, meaning the negotiators in 1997 would have considered that year the effective end of the prospective horizon for licensing Innovatio's patents. (*See* DTX-15, at 4 (summarizing the expiration date of Innovatio's patents).)

[33] [redacted]

because the parties in a hypothetical negotiation in 1997 would likely settle on approximately that number when determining the appropriate chip price to consider when setting a RAND rate.

B. The Chipmaker's Profit Margin on a Wi-Fi Chip

To determine the profit margin on the sale of a Wi-Fi chip, Dr. Leonard examined the operating profit for Broadcom's sales of Wi-Fi chips from 2000 to 2012. (*See* DTX-78; DDX-5, at 32; Trial Tr. 1941:15-1942:25 (Leonard).) The average profit margin over those years was 12.1%. [redacted] (Trial Tr. 126:25-127:7 (Djavaherian).) Finally, Dr. Lynde evaluated evidence from Broadcom and Marvell, another chip manufacturer, that led him to conclude that the profit margin on a Wi-Fi chip is between 9.4% and 14.4%. (Trial Tr. 2171:20-2172:22 (Lynde); DTX-2011.) Dr. Lynde's testimony also confirms Dr. Leonard's number of 12.1%. The court will therefore use 12.1% as the profit margin on a Wi-Fi chip.

C. The Total Number of 802.11 Standard-Essential Patents

Dr. Leonard suggested that the court use 3000 as a reasonable estimate of the number of 802.11 standard-essential patents to use when determining a RAND rate. To arrive at his number of 3000 standard-essential patents, Dr. Leonard relied primarily on a July 2013 report by the PA Consulting Group, a management consulting firm with a technology division. (DTX-255 ("PA Report"); Trial Tr. 1954:7-1956:5 (Leonard).) According to the deposition testimony of Diego Giancola, an employee of PA Consulting Group, the PA Report was developed in response to demand from a number of customers in the industry. (*See* Dkt. No. 954, Ex. 52, at 11:22-12:20, 18:21-19:14 (designated deposition testimony of Diego Giancola).) Cisco, one of the Manufacturers, inquired through its counsel in this litigation about the report before it was completed, but it does not appear that Cisco itself commissioned the report. (*See id.* at 15:19-

16:5.) In light of the testimony of Dr. Leonard and Mr. Giancola, the court determines that the PA Report is admissible as a market report under FRE 803(17). The PA Report, based on a search of all patents for keywords related to the 802.11 standard and a technical analysis of a portion of the search results, concludes that there are 3106 patents potentially essential to the 802.11 standard. (PA Report at 9.) The PA Report stresses, however, that it has not performed a complete legal analysis of the patents, and that its conclusion is only that those patents may be *potentially* essential. (*Id.* at 2.)

In addition, Innovatio's expert Dr. Nettleton testified that there are "at least hundreds" of 802.11 standard-essential patents, and he did not disagree with an assertion that there are "a couple of thousand patents" covering the 802.11 standard. (Trial Tr. 362:20-24, 363:5-10 (Nettleton).) In addition, Judge Robart found that 92 entities have submitted letters of assurance to the IEEE indicating that they would license their over 350 patents at a RAND rate, and at least another 59 companies have filed blanket letters of assurance covering an undisclosed number of patents. *See Microsoft*, 2013 WL 2111217, at *52. If the court assumes that Innovatio has an average size patent portfolio, and that each of the 59 companies submitting blanket letters of assurance has twenty-three patents like Innovatio, there would be approximately 1700 standard-essential patents. That is consistent with Judge Robart's acceptance of Dr. Lynde's testimony in that case that there are possibly "thousands" of patents essential to the 802.11 standard. *Id.* Finally, in this case, Dr. Lynde relied on another report by Sunlight Research and concluded that there are 3,266 patents aside from Innovatio's patents that are potentially essential to the 802.11 standard. (Trial Tr. 2162:2-8 (Lynde); *see* DTX-539.)

Taking into account all of the evidence and Judge Robart's findings on this question, the court determines that the PA Report's number of approximately 3000 is a credible account of the

number of potentially standard-essential patents. Nonetheless, there is no guarantee that all of those approximately 3000 potentially essential patents are in fact essential. Indeed, the court notes that in the *Microsoft* case, Judge Robart explained that at least one of Motorola's alleged standard-essential patents was found not to be standard-essential by the Via Patent Licensing pool. *Microsoft*, 2013 WL 2111217, at *88. It is likely that many other allegedly standard-essential patents would be found not essential after undergoing a judicial analysis such as the one this court conducted during the July 2013 essentiality hearing to determine that all of the claims in Innovatio's twenty-three patents are standard-essential. Innovatio's confirmed standard-essential patents are by virtue of that confirmation more valuable to the 802.11 standard than many of the potentially essential patents, at least some of which will be found to be not essential.

Accordingly, the court will use Dr. Leonard's suggested number of 3000 802.11 standard-essential patents. Nonetheless, the court will conduct the remainder of the analysis cognizant of the fact that many of those 3000 patents are likely less valuable to the standard than Innovatio's patents because their essentiality has not been judicially confirmed.

D. Calculation

The court is now ready to calculate using Dr. Leonard's Top Down analysis. Dr. Leonard provided three calculations for the court's consideration, depending on whether the court determined that Innovatio's patents were in the top 50% of the 3000 802.11 patents, in the top 20%, or in the top 10%. Specifically, Dr. Leonard adjusted the value attributable to Innovatio's patents in each of those cases by relying on a 1998 article finding that the top 10% of all electronics patents account for 84% of the value in all electronics patents. (*See* DTX-192, Mark Schankerman, *How Valuable is Patent Protection? Estimates By Technology Field*, 29 RAND J. ECON. 77, 94 tbl.5 & n.12 (1998).) For example, for the top 10% hypothesis, Dr. Leonard

multiplied the profit margin on a Wi-Fi chip by 84% to determine the percent of that value attributable to the top 10% of all 802.11 standard-essential patents. (*See* DDX-5, at 43.) He then multiplied that value by 23/300 (Innovatio's patents divided by 10% of all 802.11 standard-essential patents) to determine Innovatio's share of the value in the top 10% of 802.11 standard-essential patents.

As described above, the court has found that Innovatio's patents are all of moderate to moderate-high importance to the standard, meaning that they provide significant value to the standard. Because 84% of the value in electronics patents is found in the top 10% of electronics patents, the court can conclude that any patents providing significant value are likely among the top 10% of all patents essential to the 802.11 standard. Moreover, a large percentage of the 3000 standard-essential patents are less valuable to the standard than Innovatio's patents because they have not had their essentiality confirmed, further indicating that Innovatio's patents are in the top 10%. The court therefore finds that Innovatio's patents are in the top 10% of all 802.11 standard-essential patents.[34]

All that remains is to perform the calculations. Multiplying the average Wi-Fi chip price of $14.85 by a profit margin of 12.1% yields an average profit of $1.80 on each chip. That $1.80 represents the total profit available to a chipmaker out of which to pay royalties for intellectual property. Next, the court multiplies $1.80 by 84%, the value attributable to the top 10% of 802.11 standard-essential patents, to obtain $1.51, the value attributable to the top 10% of all

[34] Obviously, in a patent portfolio like Innovatio's, some patents may be more valuable than others. The court's finding may be interpreted as a finding that on average, Innovatio's patents are in the top 10% of all patents essential to the 802.11 standard, and that it is appropriate to determine a RAND royalty on that basis.

802.11 standard-essential patents. Finally, the court multiples $1.51 by 19/300[35] to determine the pro rata share of the value in the top 10% of all 802.11 standard-essential patents attributable to Innovatio's nineteen-patent portfolio. The result is 9.56 cents. Accordingly, Dr. Leonard's Top Down method yields a RAND rate of 9.56 cents per Wi-Fi chip, which the court adopts as a RAND rate for licensing Innoatio's 802.11 patent portfolio.

E. Comparison to Other RAND Rates Determined in Litigation

As a final stage of the analysis, the court will test the RAND rate of 9.56 cents per Wi-Fi chip to determine if it compares favorably with other RAND rates determined in litigation.

1. *Microsoft v. Motorola*

In *Microsoft v. Motorola*, Judge Robart determined a RAND rate for licensing allegedly standard-essential patents owned by Motorola to Microsoft for use in Microsoft's X-Box. *Microsoft*, 2013 WL 2111217, at *53-55. Although Motorola alleged that twenty-four of its patents were essential to the 802.11 standard, the court determined that the Xbox used only eleven of Motorola's twenty-four patents. *Id.* The court concluded that a RAND license for those eleven patents would be 3.471 cents per unit for the Xbox, and that a reasonable range for a RAND rate would be between 0.8 cents per unit and 19.5 cents per unit. *Id.* at *101.[36]

The court's RAND rate of 9.56 cents per Wi-Fi chip is comfortably within Judge Robart's reasonable range for a RAND rate for Motorola's eleven standard-essential patents.

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[35] Although Innovatio's portfolio includes twenty-three patents, the parties agreed that the court need not consider the four Mesh family patents for purposes of determining a RAND rate in this trial. (Trial Tr. 2330:1-20.) The court will therefore use nineteen as the numerator, rather than twenty-three, as in Dr. Leonard's calculations.

[36] The court also determined that the royalty rate for other Microsoft products would be 0.8 cents per unit, based on the conclusion that the parties did not present any evidence that those other products used the 802.11 standard. *See Microsoft*, 2013 WL 2111217, at *4.

Moreover, 9.56 cents per unit is approximately three times Judge Robart's RAND rate of 3.471 cents per unit. As mentioned above, however, Judge Robart concluded that Motorola's patents were only of minimal value to the standard, *id.* at *56-64, whereas the court here has found that Innovatio's patents are of moderate to moderate-high importance to the standard. A multiplier of about three is a reasonable difference between the two royalties to account for the greater importance of Innovatio's patents to the 802.11 standard.

Accordingly, the court concludes that the RAND calculations in the *Microsoft* case confirm the reasonableness of the court's determination of a RAND rate for Innovatio's 802.11 standard-essential patents.

2. *Ericsson v. D-Link*

In June 2013, a jury found that three of Ericsson's 802.11n standard-essential patents were infringed and awarded damages in the amount of $10.1 million. *Ericsson Inc. v. D-Link Sys., Inc.*, No. 10-CV-473, 2013 WL 4046225, at *1 (E.D. Tex. Aug. 6, 2013). Based on that verdict, the court calculated a RAND rate of 15 cents per unit for the infringement, which it awarded to Ericsson as an ongoing future royalty. *Id.* at *21, 23. The jury was plainly instructed on the RAND obligation, and rendered its verdict taking RAND into account. *Id.* at *22.

The jury obviously provided no explanation of how that RAND rate was determined, and so the court has no information about how important the jury believed Ericsson's patents to be to the 802.11n standard. Dr. Nettleton testified that based on his analysis, the patents in the *Ericsson* case were more valuable than Motorola's patents in the *Microsoft* case, but still "far short" of Innovatio's standard-essential patents. (Trial Tr. 356:5-13 (Nettleton).) On cross-examination, however, he agreed that the basis for his conclusion was brief and "quite possibly" conclusory. (*Id.* at 476:6-18.) The court therefore finds Dr. Nettleton's opinion on this point to

lack credibility. Without any further evidence about the comparability of the 802.11 patents in *Ericsson* to Innovatio's patents here, the RAND rate determined in that case is of limited value for confirming this court's RAND rate. Nonetheless, the court notes that the 15 cents per unit rate in *Ericsson* is close to the court's 9.56 cent RAND rate. Accordingly, the verdict entered in *Ericsson* also provides some supportive confirmation of the court's RAND rate.

CONCLUSION

For the reasons stated above, the court determines based on the record in this case that the RAND rate to be paid to Innovatio for licensing Innovatio's portfolio of nineteen 802.11 standard-essential patents is 9.56 cents for each Wi-Fi chip used or sold by the Manufacturers in the United States, subject to the terms of the patents, the applicable statute of limitations, and a finding of infringement. Defendant Lowe's Home Center's motion to withdraw its motion to strike (Dkt. No. 904) is granted. Docket number 897 shall be struck from the record. The motions of various Wireless Network Users to exclude testimony regarding a RAND rate applicable to Wireless Network Users (Dkt. Nos. 896, 898, 902) are denied as moot in light of the court's decision to sever those issues from the September 2013 trial. The Manufacturer's motions to exclude the testimony of Christopher Bergey (Dkt. No. 913) and Larry Evans (Dkt. No. 914) are denied. The parties' joint motion to admit exhibits (Dkt. No. 915) is granted. The Manufacturers' motion for judgment pursuant to Rule 52(c) (Dkt. No. 940) is denied. Innovatio's motion to file excess pages in opposition to the Manufacturers' Rule 52(c) motion (Dkt. No. 951) is granted. Finally, the court considers Defendants' Renewed Objections to Magistrate Judge Schenkier's August 21, 2012 Order (Dkt. No. 786) to be moot. If the parties need to raise again any issues related to that motion not mooted, they will be granted leave to do so. A status hearing is set for

10/10/13 at 10 am. The parties shall file an agenda for the status hearing, including proposals for setting further dates to resolve this litigation, by 10/8/13.

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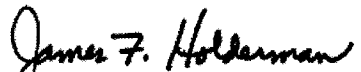

JAMES F. HOLDERMAN
District Judge, United States District Court

Date: September 27, 2013