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

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

MEMORANDUM OPINION AND ORDER

JAMES F. HOLDERMAN, District Judge:

Plaintiff and patent-owner Innovatio IP Ventures, LLC ("Innovatio") has sued numerous hotels, coffee shops, restaurants, supermarkets, 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 devices used by the Wireless Network Users to implement their wireless internet networks. (Dkt. No. 819, Ex. A ¶ 10.) The Manufacturers have filed declaratory judgment actions against Innovatio seeking a declaration that the Manufacturers' products, and the networks or systems of which those

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[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 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 twenty-three patents Innovatio has asserted against the Wireless Network Users. (Dkt. Nos. 311-314.) All claims, cases, and parties 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' dispute would be to pause and evaluate the potential damages available to Innovatio if the Defendants are found to infringe Innovatio's patents. (*See* Dkt. No. 614 ("2/21/13 Trans.") at 24:6-26:18.) The Defendants contend that Innovatio's patents are all essential to the operation of the 802.11 wireless standard established by the Institute of Electrical and Electronics Engineers ("IEEE," pronounced "eye-triple-ee"), and that Innovatio is therefore subject to the promises of the prior owners of the patents-in-suit to license the patents on reasonable and non-discriminatory ("RAND") terms. The Defendants assert that, at most, Innovatio can recover no more than a reasonable and non-discriminatory royalty if the Defendants are found to infringe the asserted claims of Innovatio's patents-in-suit.

The impact of the RAND obligation on the recovery potentially available to Innovatio is an issue the parties and the court are addressing at this stage of the litigation to assist the parties. After establishing the potential recovery, the court hopes the parties will be able to evaluate the potential benefit of expending additional resources contesting infringement. Addressing damages first may thus aid settlement of this dispute. Because the impact of the RAND obligation is a

damages question, the parties are entitled to a jury determination on that issue. Both parties have waived that right, however, and agree that the court should decide all RAND-related issues in summary proceedings and, if necessary, a bench trial. (*See* Dkt. No. 600, at 1.)

As a first step to determining the damages to which Innovatio would be entitled, if it proves infringement, the court requested the parties to identify the patent claims that are subject to the RAND obligation. (Dkt. No. 662.) The Defendants contend that all of Innovatio's asserted patent claims are subject to the RAND obligation. Innovatio, by contrast, contends that approximately 168 of its asserted claims are not essential to implement the 802.11 standard, and are therefore not subject to the RAND obligation. The following chart lists the asserted claims of each patent-in-suit with respect to which the parties dispute essentiality, and those on which they agree:

Patent Number	Claims the Parties Agree Are Standard-Essential	Disputed Claims
5,740,366	5-7, 9-12, 15-16, 19-21, 24, 26-29, 32	8, 13, 14, 22, 23, 25
5,940,771	1-7	
6,374,311	35, 37, 39, 41, 43-44, 48, 49, 51, 55, 60, 64	20-24, 26-30, 32-34, 36, 40, 45-47, 50, 53, 54, 56
7,457,646	14-17, 19-21, 26, 29, 31, 32, 34, 35, 39, 40, 43-45, 47, 49-51, 53-56, 59-64, 66-69, 71-73, 79, 83-85, 87, 89, 91-93, 99, 101-104, 107, 108, 111, 112, 114-123, 125-128, 130, 135-137, 143-144	18, 22, 27, 28, 30, 33, 82, 86, 88, 90, 94, 98, 100
7,536,167	73-77, 80-83, 89-97, 100, 102-107, 110-113, 119-127, 130, 132-134, 203	79, 85, 109, 115
7,873,343	1-6, 8-11, 15-20, 22, 23, 25, 28-36, 38-41, 45-50, 52, 53, 55, 58-60	12, 42
6,714,559	6-8	
7,386,002	1-2, 4, 6, 7, 14, 16, 18, 19	
7,535,921	1-5, 7-8	
7,548,553	10-12, 17, 19, 20	
7,916,747	1-3, 5-8, 11, 13, 16, 17, 20-25	
5,546,397		1-5
5,844,893		7-11

6,665,536		1, 5, 8, 10, 11, 13-17, 19-21, 23, 24, 27, 30, 32, 36, 37, 39-42, 49, 50
6,697,415		11, 12, 15
7,013,138		1, 5, 8, 10, 11, 13-15, 17, 18, 21, 24, 26, 28, 36-39
7,710,907		1, 7, 10, 12, 13, 15-17, 20, 21, 23, 24, 30, 33, 35, 36, 38-40, 43, 44, 46-50
7,107,052		1, 5, 6, 8-12, 15, 16
7,710,935		1, 5, 6, 8-12, 15, 16, 25-28, 32-35, 37-42, 44-47
5,295,154	1-7	
5,428,636	1-13	
5,504,746	13-17	
6,826,165	16-20	

The court must determine which of those 168 disputed claims are subject to a RAND obligation.[2]

The question is fully briefed. (Dkt. Nos. 684, 707, 747.) To aid the court in its analysis, the parties have categorized the 168 claims into different technical categories, and they agree that all of the patent claims in each of the categories are either standard-essential or non-standard-essential. (Dkt. No. 774.) Following their initial submission of the categories, the parties further refined the categories and the claims in dispute. The court will use the parties' most recent categorization of the disputed claims. (*See* Dkt. Nos. 795, 797.)

To assist the court in understanding the technology underlying the dispute, the court held an informal discussion regarding the technology with the parties' designated experts and counsel on the record on July 17, 2013. (*See* Dkt. No. 833.) Thereafter, on July 18 and 19, 2013, the court held a bench trial on the essentiality question. (Dkt. Nos. 836-839.) Prior to that bench trial, during the May 30, 2013, status hearing, the court addressed the question of which party bears

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[2] Neither the parties nor the court are aware of any other case that has addressed the question of whether asserted patent claims are standard-essential. (*See* Dkt. No. 616 ("3/14/13 Trans.") at 8:17-9:4.) Judge Robart's opinion in *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013), which addressed the method for calculating a RAND royalty, did not address the essentiality question because the parties in that case agreed which of the asserted patent claims were standard-essential.

the burden of proving that a claim is standard-essential, and also ruled on the question of whether all claims in a patent together must be either standard-essential or non-standard-essential. This opinion provides a further explanation of the court's ruling on those two questions, in addition to resolving the other issues in dispute.

At the July 2013 bench trial, the court heard argument from the parties and also testimony from several witnesses. Innovatio presented the testimony of Dr. Raymond W. Nettleton, an Associate Professor at the University of Colorado. The Defendants presented the testimony of Dr. Stephen B. Wicker, a member of the faculty of the School of Electrical and Computer Engineering at Cornell University. The court also accepted the Defendants' presentation of stipulated testimony from the informal discussion by Dr. Matthew B. Shoemake, a former officer of the IEEE and the CEO of Biscotti Inc. (Dkt. No. 820.) The parties by agreement presented additional testimony on paper by designating portions of the depositions of certain witnesses, including Dr. Nettleton. (*See* Dkt. Nos. 800, 801, 815.) Finally, the parties also agreed to accept the declarations of their respective experts in lieu of direct examination (Dkt. No. 798 ("7/10/13 Trans."), at 34:5-36:8), so the court has treated the declarations of Dr. Nettleton (Dkt. No. 747, Ex. 4), Dr. Shoemake (Dkt. No. 708, Ex. B), and Dr. Wicker (Dkt. No 708, Ex. C; Dkt. No. 790, Ex. A) as if they had given that testimony in court. Finally, the parties have submitted a statement of stipulated facts to which both sides agree. (Dkt. No. 819, Ex. A.)

BACKGROUND

I.   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.

II.   Innovatio's RAND Obligations

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

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[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.)

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. 1948))).

In addition, the parties agree that the terms of the RAND commitment by which Innovatio is bound are established by the current IEEE Standards Board Bylaws promulgated in 2007. (Dkt. No. 684, Ex. B ("IEEE Bylaws"); *see also* Dkt. No. 819, Ex. A ¶ 56.) Moreover, the parties agree that the current IEEE Bylaws provide the applicable terms even though the current IEEE Bylaws were not in effect at the times that Innovatio's predecessors entered into the RAND commitments. (*See* Dkt. No. 759 ("5/30/13 Trans.") at 13:23-16:11.) The court will therefore use the current IEEE Bylaws to define the scope of Innovatio's RAND obligations.

Those bylaws provide as follows:

> IEEE standards may be drafted in terms that include the use of Essential Patent Claims. If the IEEE receives notice that a [Proposed] IEEE Standard may require the use of a potential Essential Patent Claim, the IEEE shall request licensing assurance, on the IEEE Standards Board approved Letter of Assurance form, from the patent holder or patent applicant. . . .

> . . . .

A Letter of Assurance shall be either:

> a) A general disclaimer to the effect that the Submitter without conditions will not enforce any present or future Essential Patent Claims against any person or entity making, using, selling, offering to sell, importing, distributing, or implementing a compliant implementation of the standard;
>
> or
>
> b) A statement that a license for a compliant implementation of the standard will be made available to an unrestricted number of applicants on a worldwide basis without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination.

(IEEE Bylaws § 6.2.) Innovatio's RAND obligations are all of the type described in subparagraph "b." The IEEE Bylaws define an "Essential Patent Claim" to be

> any Patent Claim the use of which was necessary to create a compliant implementation of either mandatory or optional portions of the normative clauses of the [Proposed] IEEE Standard when, at the time of the [Proposed] IEEE Standard's approval, there was no commercially and technically feasible non-infringing alternative. An Essential Patent Claim does not include any Patent Claim that was essential only for Enabling Technology or any claim other than that set forth above even if contained in the same patent as the Essential Patent Claim.

(*Id.* § 6.1.) "Enabling Technology" is further defined as

> any technology that may be necessary to make or use any product or portion thereof that complies with the [Proposed] IEEE Standard but is neither explicitly required by nor expressly set forth in the [Proposed] IEEE Standard (e.g., semiconductor manufacturing technology, compiler technology, object-oriented technology, basic operating system technology, and the like).

(*Id.*)

III.   Technical Background

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. Because the parties

do not distinguish among the various standards in their briefing (citing various amendments but focusing primarily on the 802.11g amendment to the standard released in 2003 and the 802.11n amendment released in 2009), the court accepts as undisputed that a patent claim is standard-essential if it is essential to implement any version of the standard. Periodically, the amendments are "rolled up" and released as a new comprehensive version of the standard. Various versions of the standard are available online at http://standards.ieee.org/about/get/ (last visited July 26, 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.

The 802.11 standard, the formal title of which is "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications" deals explicitly only with PHY and MAC functions. *Id.* at i. Higher level functions that build on the PHY and MAC functions are not explicitly addressed in the 802.11 standard.

Other sections and functions of the 802.11 standard are addressed as necessary in the discussion below.

ANALYSIS

At this stage of the proceedings, the court is faced with only the limited question of which of the asserted claims in Innovatio's patents are standard-essential and thus potentially subject to Innovatio's RAND commitment. As a preliminary matter, the court must first determine which party bears the burden of establishing whether the patent claims are standard-essential.

The Defendants contend that "as the party bound by RAND, Innovatio bears the burden of establishing entitlement to carve out particular patents (or claims) from its RAND obligations." (Dkt. No. 707, at 9 n.10.) That argument is question-begging, however, as the issue in dispute is precisely to what extent Innovatio is bound by RAND.

Innovatio has a more plausible argument when it contends that the assertion of RAND is like an affirmative defense on which the Defendants bear the burden of proof. *Stockton E. Water Dist. v. United States*, 583 F.3d 1344, 1360 (Fed. Cir. 2009), *modified on reh'g in part*, 638 F.3d 781 (Fed. Cir. 2011) ("The proponent of the affirmative defense must prove all elements of the

defense."). The existence of a RAND obligation is comparable to the existence of a license, which is also a contractual commitment limiting the liability of a patent infringer. In a typical patent case, the accused infringer bears the burden of demonstrating the existence of a license, and that it is thus not liable for its infringement. Similarly here, the Defendants as the accused infringers should bear the burden of demonstrating the existence of a RAND obligation that limits their damages if they are found to infringe. The alternative would be to assume in patent litigation that every potentially standard-essential claim is subject to RAND until the patent owner demonstrates otherwise, a rule that would be overly burdensome for patent owners. The court thus assigns to the Defendants the burden of establishing the RAND commitment with respect to each patent claim.

As another preliminary matter, the Defendants contend that Innovatio is obligated to license entire *patents* on RAND terms, rather than merely individual *patent claims*. (Dkt. No. 707, at 18.) Accordingly, the Defendants assert that the RAND commitment applies to an entire patent if any claim in the patent is standard-essential. That argument gains some support from the Letters of Assurance from Innovatio's predecessors, some of which promise to license "patents." (*See, e.g.*, Dkt. No. 709, Ex. 6 ("Intermec will . . . grant a nonexclusive, nontransferable sole and personal license under *any such issued patent* . . . . (emphasis added)).) The problem, however, is that the IEEE Bylaws, which the parties have agreed define the terms of Innovatio's RAND commitment, explicitly provide that "[a]n Essential Patent Claim does not include . . . any claim other than that set forth above even if contained in the same patent as the Essential Patent Claim." (Dkt. No. 684, Ex. B. § 6.2.) The IEEE Bylaws therefore plainly contemplate that some claims, but not others, in a particular patent may be standard-essential.

More generally, patent law looks to individual claims to define the scope of a patent

right. As the Federal Circuit has explained, "[a] patent is infringed if any claim is infringed . . . for each claim is a separate statement of the patented invention." *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1220 (Fed. Cir. 1995); *accord Honeywell Int'l Inc. v. Hamilton Sundstrand Corp.*, 370 F.3d 1131, 1148 (Fed. Cir. 2004) ("Each claim defines a separate invention, whether or not written in independent form; and its validity stands or falls separately . . . ."); *Bio-Tech. Gen. Corp. v. Genentech, Inc.*, 80 F.3d 1553, 1561 n.8 (Fed. Cir. 1996) ("Infringement of one valid and enforceable patent claim is all that is required for liability to arise."). Given that basic attribute of patent law, the promise to license any standard-essential patent must be interpreted as a promise to license only the standard-essential claims, the basic unit for evaluation of any patented invention. The court will therefore evaluate each patent claim separately for standard-essentiality.

I.   The Meaning of "Essential Patent Claim"[4]

The parties agree that the phrase "Essential Patent Claim" is defined by the IEEE Bylaws. The definition in the IEEE Bylaws states the following:

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[4] The Defendants have presented testimony regarding various witnesses' understanding of the definition of an "Essential Patent Claim" in the IEEE Bylaws. (Dkt. No. 800, Ex. A; Dkt. No. 708, Ex. B ("Shoemake Decl.").) This evidence is parol evidence that is admissible only if the contractual language—here, by agreement, the definition in the IEEE Bylaws—is ambiguous. *See Air Safety, Inc. v. Teachers Realty Corp.*, 706 N.E.2d 882, 884 (Ill. 1999) ("If the language of the contract is facially unambiguous, then the contract is interpreted by the trial court as a matter of law without the use of parol evidence. If, however, the trial court finds that the language of the contract is susceptible to more than one meaning, then an ambiguity is present. Only then may parol evidence be admitted to aid the trier of fact in resolving the ambiguity." (citations omitted)); *Foxfield Realty, Inc. v. Kubala*, 678 N.E.2d 1060, 1063 (Ill. App. Ct. 1997) ("In determining the parties' intent, the court simply looks to the contract as ultimately executed; when the contract terms are clear and unambiguous, they must be given their ordinary and natural meaning and no parol evidence may be considered to vary the meaning of the terms; whether an ambiguity exists is itself a question of law for the court."). For the reasons explained in this section, the court finds that the definition of "Essential Patent Claim" in the IEEE Bylaws is not ambiguous, and the court therefore has not considered this testimony.

14

> "Essential Patent Claim" shall mean any Patent Claim the use of which was necessary to create a compliant implementation of either mandatory or optional portions of the normative clauses of the [Proposed] IEEE Standard when, at the time of the [Proposed] IEEE Standard's approval, there was no commercially and technically feasible non-infringing alternative. An Essential Patent Claim does not include any Patent Claim that was essential only for Enabling Technology or any claim other than that set forth above even if contained in the same patent as the Essential Patent Claim.

(IEEE Bylaws § 6.1.) The definition includes two sentences. The first sentence describes the scope of an Essential Patent Claim as any claim "the use of which was necessary to create a compliant implementation" of the 802.11 standard's "mandatory or optional" provisions so long as "at the time of the [standard's] approval, there was no commercially and technically non-infringing alternative." The second sentence carves out an exception to the first sentence by stating that an Essential Patent Claim does not include any claims that are "essential only for Enabling Technology."

A bedrock principle of the interpretation of legal texts is that a statute or contract "should be construed so that effect is given to all its provisions, so that no part will be inoperative or superfluous, void or insignificant." *Corley v. United States*, 556 U.S. 303, 314 (2009) (citations and internal quotation marks omitted). The exception in the second sentence would be superfluous unless it carves out of the definition territory included by the first sentence. The claims that are "necessary to create a compliant implementation" of the 802.11 standard under the first sentence must therefore include the claims described in the second sentence, those that are "essential only for Enabling Technology." The IEEE Bylaws, moreover, define "Enabling Technology" to be "any technology that may be necessary to make or use any product or portion thereof that complies with the [Proposed] IEEE Standard but *is neither explicitly required by nor expressly set forth in the [Proposed] IEEE Standard*." (IEEE Bylaws § 6.1 (emphasis added).) The first sentence therefore must include claims for technology that are necessary to implement

the 802.11 standard, but that are not explicitly required by the standard. Otherwise, the second sentence would be unnecessary surplusage. Accordingly, a claim may be "necessary for a compliant implementation" without being explicitly required by the standard.

As the first sentence of the definition clarifies, moreover, the term "necessary" does not mean "absolutely necessary." Instead, a claim is "necessary" when there is "no commercially or technically feasible non-infringing alternative" by which to implement the standard. In other words, to determine if a claim is necessary, one must ask if there were commercially and technically feasible non-infringing alternative ways to implement the standard at the time of the standard's approval. Even if some prohibitively expensive alternative technically existed when the standard was approved, a claim may still be necessary, because no alternative was "commercially" feasible. Similarly, even if one could hypothesize an alternative way to implement the standard, a claim is still standard-essential if that hypothetical implementation was not technically feasible when the standard was approved.

The first sentence also describes *when* to evaluate whether a claim is necessary for implementation of the standards: "at the time of the [Proposed] IEEE Standard's approval." If later technological development creates another, non-infringing means to comply with the standard, a patent claim is still standard-essential.

Finally, the second sentence establishes that a claim directed exclusively to Enabling Technology is not essential. Thus, if a patent claim recites only technology that is necessary to implement the standard, but that is not explicitly required by or expressly set forth in the standard, then the claim is not standard-essential, even though it is "necessary" within the meaning of the first sentence. By negative implication, however, a claim directed to both Enabling Technology and to explicit steps of the standard is essential. *Cf. Ventas, Inc. v. United*

States, 381 F.3d 1156, 1161 (Fed. Cir. 2004) ("Where Congress includes certain exceptions in a statute, the maxim *expressio unius est exclusio alterius* presumes that those are the only exceptions Congress intended."). In other words, a claim that recites Enabling Technology may be standard-essential, so long as it also recites technology explicitly required by or expressly set forth in the standard.

The Defendants contend that there is an additional element to the definition of an Essential Patent Claim that they derive by focusing on the phrase "necessary to create a compliant implementation." According to the Defendants, "a compliant implementation" refers to an 802.11 compliant device, such as a laptop, an access point, or a bar code reader, rather than to an implementation of a portion of the standard, such as a MAC or PHY protocol. Put another way, the Defendants contend that "a compliant implementation" refers to an embodiment with standardized features, rather than to the standardized features themselves. The Defendants then point out that a standard-essential claim must be necessary only for "*a* compliant implementation." They thus argue that a claim is standard-essential if the Defendants can point to *any single* 802.11 compliant device that infringes the patent claim, regardless of whether other 802.11 compliant devices must infringe to practice the standard.

In support of that argument, the Defendants highlight § 6.2(a) of the IEEE Bylaws, which refers to "making, using, selling, offering to sell, importing, distributing, or implementing *a compliant implementation* of the standard." (IEEE Bylaws § 6.2(a) (emphasis added).) The Defendants assert that one cannot "make" or "sell" an 802.11 feature, whereas one can make or sell an 802.11 compliant device. The problem, though, is that one does not usually speak of "implementing" a device such as a laptop. Instead one "implements" a standardized feature. The language in § 6.2a of the IEEE Bylaws is therefore unhelpful to interpret the definition of an

Essential Patent Claim.

Moreover, the IEEE Bylaws' definition of an Essential Patent Claim states plainly the referent of the term "compliant implementation." The definition speaks of "a compliant implementation of either mandatory or optional *portions* of the normative clauses" of the standard. A compliant implementation is thus an implementation of any feature specified in a portion of the standard. Stated another way, to "create a compliant implementation" means simply to implement a portion of the standard.

In summary, the IEEE Bylaws' definition presents a two-part test. To prove that a patent claim is standard-essential, an accused infringer must establish by a preponderance of the evidence that (1) at the time of the standard's adoption, the only commercially and technically feasible way to implement a particular mandatory or optional portion of the normative clauses of the standard was to infringe the patent claim;[5] and (2) the patent claim includes, at least in part, technology that is explicitly required by or expressly set forth in the standard (i.e., that the patent claim does not recite only Enabling Technology).

II.   The Parties' Disagreement

The parties' dispute is complex, but their basic disagreement can be demonstrated through a simple hypothetical. Assume that the 802.11 standard requires compliant products to perform steps A, B, and C to communicate with other devices on a WLAN. The parties agree that a patent claim reciting a method with steps A, B, and C is standard-essential. The dispute is

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[5] The Defendants conceive of this requirement as two separate requirements, contending both that (1) an essential patent claim must be necessary for a compliant implementation of the standard, and (2) that there be no commercially and technically feasible non-infringing alternatives. The court reads these two requirements as two sides of the same coin. If there are no commercially and technically feasible non-infringing alternatives, a claim is necessary. Similarly, if a claim is necessary, it means that there are no feasible alternatives with which to implement the standard.

whether a patent claim reciting a method with steps A, B, C, and D is also essential (as the Defendants contend), or if the addition of step D makes that claim non-standard-essential (as Innovatio argues). Of course, the answer may depend on the nature of step D. If step D is an express requirement of a mandatory or optional portion of the standard, then the patent claim is essential. In addition, if step D recites Enabling Technology, then the patent claim is standard-essential. If step D is not an express requirement of a mandatory or optional portion of the Standard, and does not describe Enabling Technology, then the hypothetical patent claim reciting steps A, B, C, and D is non-standard-essential.

Accordingly, the different categories into which the parties have divided the disputed claims are sorted and titled based on the nature of the additional element D that Innovatio contends makes the claims non-standard-essential. The parties have agreed that for purposes of analyzing each category, the other elements of the claims in each of the categories should be considered standard-essential.[6] The court's discussion will therefore focus on the specific element or elements differentiating each category.

Before evaluating the parties' designated categories of claims for standard-essentiality, however, the court must address several arguments that are common to many of the disputed claims and claim categories. Innovatio's infringement contentions include many references to various versions of the 802.11 standard to show the existence of terms of its asserted claims in the Defendants' WLAN systems. (*See* Dkt. No. 708, Ex. 29.) Indeed, in many cases, including for claims that Innovatio now contends are not essential to the 802.11 standard, Innovatio lists no

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[6] In some cases, Innovatio contends that multiple elements of a claim make it non-standard-essential. Some of the claims are therefore included in multiple categories. If any one of the multiple categories including a claim is found to be non-standard-essential, then that claim is non-standard-essential, because it includes at least one element that neither is an express requirement of a mandatory or optional portion of the standard nor recites Enabling Technology.

information in support of its infringement contentions other than references to portions of the 802.11 standard.

The Defendants contend that Innovatio has thus conceded that these claims are standard-essential, or at least that Innovatio's references to the standard are strong evidence that the claims are standard-essential. In support of this reasoning, the Defendants have submitted deposition designations from a number of Innovatio representatives explaining their attempts to license the patents by accusing 802.11 compliant devices of infringement. (Dkt. No. 800, Exs. B, C, D, and E.) The Defendants urge the court to find that all of the claims with respect to which Innovatio's infringement contentions mention the 802.11 standard are standard-essential.

The court is not willing to draw that inference, because Innovatio's mere reliance on portions of the 802.11 standard in its infringement contentions for a claim does not necessarily require that the claim be standard-essential. For example, in the previously discussed hypothetical claim comprising elements A, B, C, and D, where elements A, B, and C are explicitly required by the standard but element D is not, a reference to the standard might validly show the existence of A, B, and C. The patent owner will also have to show the existence of step D in the accused instrumentality using some other evidence, of course, but the mere citation to the standard does not mean the entire claim is standard-essential. Taking the analysis one step further, even a citation to the standard to establish element D does not necessarily mean the standard requires element D. Compliance with the standard may only establish one aspect of element D, and additional evidence could establish other aspects of element D that move element D outside of the standard's requirements.

Moreover, a party need not identify every piece of evidence on which it will ultimately rely to show infringement in its infringement contentions. Instead, it need only identify "where

20

each element of each asserted claim is found within each Accused Instrumentality." L.P.R. 2.2(c). Innovatio's infringement contentions might successfully perform this task with respect to non-standard-essential claims without citing any sources other than the 802.11 standard.[7] Accordingly, Innovatio's failure to cite to anything beyond portions of the 802.11 standard in its infringement contentions with respect to a particular patent claim does not limit Innovatio to using only those portions of the standard to prove its case.

The court also notes that parties have the opportunity to amend their final infringement contentions in the course of the litigation for "good cause" and "absent undue prejudice" to the other party. L.P.R. 3.4. One example of good cause that the rule provides is a claim construction by the court different from what the party seeking the amendment expected. *Id.* Claim construction has not yet occurred in this case, and Innovatio may thus under the court's Local Patent Rules have opportunities to amend its infringement contentions. In light of those opportunities, it is inappropriate at this point in the litigation process to use Innovatio's infringement contentions to pin it down to a certain position for purposes of deciding an issue related to damages, in which infringement is not at issue. Rather than deciding standard-essentiality on the basis of Innovatio's litigation position with respect to infringement, the court will examine the merits of the question by evaluating the technical content of each category of claims in relation to the 802.11 standard.

Similarly, the argument that Innovatio's asserted claims are standard-essential because Innovatio accuses only 802.11 compliant devices of infringing those claim is unavailing. Most, if not all, wireless devices on the market are 802.11 compliant, so Innovatio's decision to accuse

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[7] The court need not evaluate at this time the sufficiency of Innovatio's infringement contentions in identifying sufficient grounds for its allegations of infringement to allow it to ultimately meet its burden of proof on this issue.

only 802.11 compliant devices is unremarkable. A device's compliance with the 802.11 standard says nothing about whether it also contains other elements that may be covered by a patent but not required by the standard. In that case, the asserted claim could be non-standard-essential.

Another argument common to many of the claim categories relates to the nature of an "optional" portion of a normative clause of the standard. The IEEE Standards Board Operations Manual explains that the IEEE standards include clauses designated by "shall," "should," "may," or "can":

> The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).

> The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

> The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

> The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

(Dkt. No. 709, Ex. C., Ex. 4 ("IEEE Operations Manual") § 6.4.7.) The Defendants contend that mandatory portions of the Standard are those using the term "shall," while optional portions use "may" or "should." Innovatio's counsel, by contrast, distinguished at the July 2013 bench trial between what he called "big-O" optionality and "little-o" optionality. (Dkt. No. 836 ("7/18/13 AM Trans.") at 51:1-52:18.) Big-O optionality is the optionality to which the IEEE Bylaws' definition of an Essential Patent Claim refers, and applies only when the standard explicitly states that a portion of a standard is optional. *See, e.g.*, IEEE Std. 802.11-2007 § 9.1 ("[Point coordination function] is optional in all [stations]."). According to Innovatio, little-o optionality consists of references in the standard using "may" or "should," which do not play a role in

defining standard-essentiality.

There are at least two problems with Innovatio's argument on that point. First, the IEEE Bylaws' definition does not distinguish between types of optionality, nor does it provide any technical definition of the term "optional." Instead, the Bylaws merely speak of "mandatory or optional" portions of the standard. The court does not believe it should define the term "optional" as anything other than its ordinary meaning. Second, the IEEE Operations Manual specifies that "*shall* indicates mandatory requirements." That definition is then immediately followed by the descriptions of "*should*" and "*may*." "Should" means a possibility is recommended, but not required, and "may" means a possibility is permissible. Both of those definitions are consistent with the plain meaning of the term "optional," strongly suggesting the use of "may" or "should" define optional portions of the standard. The court will therefore interpret the use of "may" or "should" to designate optionality for the purpose of determining standard-essentiality.

III.   Category by Category Analysis

The court will now evaluate each of the parties' agreed categories to determine whether the Defendants have established by a preponderance of the evidence that the patent claims in each category are standard-essential.

A.   Category 1: Access Point Having Two or More Transceivers or Radios

Category 1 includes claims that require "[access points] having two or more transceivers or radios." (Dkt. No. 774, at 2.)[8] A "transceiver" is a combined transmitter and receiver, and is a

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[8] Category 1 includes the following patent claims:

- '397 - claims 1-5;
- '893 - claims 7 and 8-11;
- '536 - claims 1, 5, 8, 10, 11, 13-17, 19-21, 23, 24, 27, 30, 32, 36, 37, 39-42, and 50;
- '415 - claims 11, 12 and 15;

synonym for "radio." (Dkt. No. 815, Ex. A ("Nettleton Dep."), at 60:8-12, 61:8-12.) For example, claim 7 of the '893 patent recites:

> A data communication system comprising:
>
> a first wireless transceiver that participates on a first wireless channel to support communication within a cell;
>
> a first plurality of wireless devices that participate on the first wireless channel;
>
> a second wireless transceiver that participates on a second wireless channel to support communication within the cell;
>
> a second plurality of wireless devices that participate on the second wireless channel;
>
> the first and second wireless channels being communicatively incompatible with one another;
>
> and a control circuit, communicatively coupled to both the first and second wireless transceivers, that supports communication among the first and second pluralities of wireless devices.

'893 Patent col.12 ll.56-67 & col.13 ll.1-6. The '536 Patent, which was applied for on July 20, 1999, after the '893 Patent issued on December 1, 1998, and contains numerous claims in Category 1, provides a further explanation of the possible benefits of having a single access point that can communicate through two different transceivers on two separate channels, or frequencies. 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

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

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.

Each of the patent claims in Category 1 similarly describes a system including an access point with multiple transceivers. Innovatio contends that the use of multiple transceivers on an access point is the element "D" that makes each of these claims non-standard-essential. In support, Dr. Nettleton opines that "[t]here is nothing in the 802.11 standard that requires an [access point] to have more than one transceiver, receiver, transmitter or radio for a compliant implementation." (Dkt. No. 747, Ex. 4 ¶ 25.) Dr. Nettleton states that the use of multiple transceivers is not a *mandatory* requirement of the standard, but Dr. Nettleton says nothing about whether it is part of the *optional* portions of the 802.11 standard, which also define standard-essentiality.[9]

On that question, the 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

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[9] Dr. Nettleton makes similar conclusory statements about many of the contested categories of claims. (*See* Dkt. No. 747, Ex. 4 ¶¶ 34, 41, 47, 53, 60, 71, 76, 86, 95, 100, 104, 109, 115, 121, 134, 138, 143, 149, 153, 163, 173, 181, 186, 191.) In each case, even if the court were to accept Dr. Nettleton's comment as true, the claims in that category may be necessary to implement an optional portion of the standard.

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. The stream of data transmitted over each of the multiple antennas is called a "spatial stream." *Id.* § 3.249.

If one chooses to implement the High Throughput optional portion of the standard, moreover, the 2009 Amendments make clear that a high-throughput access point "*shall* support all EQM rates for *one and two spatial streams . . .* using 20 MHz channel width." *Id.* § 20.1.1 (emphasis added); *accord id.* § 20.2.3 ("Support of 20 MHz non-[high-throughput] format and 20 MHz [high-throughput] format with one and two spatial streams is mandatory at [access points]."). Each spatial stream requires the use of a discrete transceiver. Implementation of this optional portion of the standard therefore requires the use of an access point with multiple transceivers. (*See* Nettleton Dep. at 87:19-23.)

Innovatio contends that at least one Defendant offers for sale 802.11 compliant wireless access points with only a single transceiver, indicating that such products are fully capable of complying with the standard. (*See* Dkt. No. 747, Ex. 4 ¶¶ 26-27, Ex. H at 50:24-25, & Ex. I.) That fact is irrelevant, however, as the use of two or more transceivers is nonetheless necessary

26

to implement an optional portion of the standard.

Innovatio also argued at the bench trial that Category 1 claims require that the two transceivers operate on "incompatible channels," *see* '893 Patent cl.7 (requiring that "the first and second wireless channels be[] communicatively incompatible with one another"), whereas MIMO and spatial multiplexing involve a single, compatible channel divided into sub-channels. (7/18/13 AM Trans. at 64:16-65:15.) As Dr. Wicker credibly testified, however, the problem with that argument is that the benefits of MIMO and spatial multiplexing in creating increased data transfer rates are only realized if the two channels are in fact incompatible and therefore capable of transmitting information at the same time on separate spatial streams. (7/18/13 AM Trans. at 88:20-89:14.) Because supporting two spatial streams is mandatory for access points under the 2009 Amendments, *see* IEEE Std. 802.11-2009 § 20.2.3 ("Support of 20 MHz non-[high-throughput] format and 20 MHz [high-throughput] format with one and two spatial streams is mandatory at [access points]."), using two separate incompatible channels must also be mandatory. The court therefore finds that the Defendants have proven by a preponderance of the evidence that the patent claims in Category 1 are standard essential.

B.   Category 2: Access Point that Allows Communications Between Two Wireless Transceivers Exclusive of a Wired Link

Category 2 includes only patent claims that have multiple transceivers (and thus were in Category 1 as well). This category includes patent claims that have "a control circuit that accommodates or allows communications between two wireless transceivers 'exclusive of the wired link' or 'exclusive of the wired LAN.'" (Dkt. No. 774, at 2.)[10] For example, claim 1 of the '536 Patent recites an access point in which "the control circuit accommodates communications

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[10] Category 2 includes claims 1, 5, 8, 10, 11, 13, 14, 17, 20, 23, 24, 27, 30 and 32 of the '536 Patent.

between the first wireless transceiver and the second wireless transceiver exclusive of the wired link." '536 Patent col.10 ll.12-14. In other words, the patent describes a device in which a data packet can be sent from one antenna on an access point to the other antenna of the access point through the control circuit in the access point itself, rather than being sent first on a wired connection to a wireless controller outside of the access point.

To show the essentiality of Category 2 claims, Dr. Wicker identifies portions of Innovatio's infringement contentions that refer to portions of the 802.11-2007 standard. (Dkt. No. 708, Ex. C, at 66.) In particular, he cites to § 5.4.1.1 of the 2007 Amendments to the standard, which describes how an access point chooses whether to send a message wirelessly to another station in the same basic service set, or to send the message on a wired link to the distribution system. The section explains first how an access point can invoke the distribution system to send a message to a station connected to a different access point. That example, it says, is "a case in which the [access point] that invoked the distribution service was different from [the access point] that received the distributed message." IEEE Std. 802.11-2007 § 5.4.1.1. In another case, when "the message had been intended for a [station] that was a member of the same [basic service set] as the sending [station], then the 'input' and 'output' [access points] for the message would have been the same." *Id.* According to Dr. Wicker, that sentence means that an 802.11 access point may process a message and send it out through its other antenna without needing to use the wired link to obtain instructions from a wireless controller. To implement that option requires communication exclusive of the wired link.

Dr. Nettleton opines that an alternative would be to use a wireless controller outside of the access point to route the message back out through the access point to another station, and that the messages could travel on a wired link to that wireless controller (Dkt. No. 747, Ex. 4

28

¶ 26.) As Dr. Wicker stated, however, the use of a wireless controller is not commercially feasible because consumers are not willing to purchase multiple devices for their wireless network. (Dkt. No. 790, Ex. A, at 5.)

Even if the alternative were commercially feasible, Dr. Wicker also testified at the bench trial that Dr. Nettleton's alternative is not "non-infringing" because the wireless controller is conceptually a part of the access point. (Dkt. No. 837 ("7/18/13 PM Trans.") at 146:19-21.) As the standard explains, an access point is "a logical entity, and the functions described may be shared by one or more physical entities." IEEE Std. 802.11-2007 § 5.3.2. According to Dr. Wicker, even if one separates the routing function into a separate "box" by using the wireless controller, conceptually one still has an "access point" (the transceiver plus the wireless controller, connected by a wire) that sends messages between the stations without sending any messages beyond the access point to the distribution system. (7/18/13 PM Trans. at 147:22-148:10.) Dr. Nettleton's testimony on this point was not credible because his alternative would still infringe the patent claims because it involves communication *within* an access point, and therefore "exclusive of the wired link" to the distribution system. The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 2 are standard-essential.

C.   Category 3: Access Point with Three Independent Protocols

Category 3 also includes only patent claims that were included in Category 1. This category includes claims specifying that an access point receives and transmits data according to distinct protocol on each of its wireless and wired channels.[11] As the Defendants' expert Dr.

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[11] Specifically, the parties describe this category as including claims that

require an [access point] to "receive data … according to a first protocol; send

29

Wicker points out, claims dependent from each of the independent claims in this category each specify that two of the protocols are the same. (Dkt. No. 708, Ex. C, at 100 (citing, for example, claim 35 of the '536 Patent, which claims "[t]he access point of claim 21, wherein the second and third protocols are the same . . . .").) Because independent claims "must be at least as broad as the claims that depend from them," *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1242 (Fed. Cir. 2003), the "independent protocols" identified in category 3 claims may all be the same protocol, so long as they operate independently of one another on each communication channel. In other words, the three protocols may be identical, but they all must operate separately. The key limitation in Category 3 claims thus amounts to nothing more than that the access points communicate on each transceiver (or wired connection) with distinct protocols. Moreover, all telecommunications systems use protocols in some way, so it is not possible to communicate without a protocol. (Dkt. No. 708, Ex. C, at 100.) Accordingly, any access point that communicates on distinct channels through multiple antennas must use distinct protocols to achieve each of those communications.

Dr. Nettleton posits that an alternative would be to communicate "using a single bus and

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data to a plurality of wireless transceivers [transmitters] … according to at least a second protocol independent of the first protocol; send data to a wired transceiver [transmitter] … according to a third protocol independent of the first and second protocols; receive data from the plurality of wireless transceivers [receivers] according to at least the second protocol independent of the first protocol; receive data from the wired transceiver [receiver] according to the third protocol independent of the first and second protocols; and send data to the processing circuitry [or second circuit] according to the first protocol."

(Dkt. No. 774, at 2.) Category 3 includes:

- '536 - claims 21, 36, 37, and 39-42;
- '052 - claims 1, 5, 6, and 8-11;
- '935 - claims 1, 5, 6, 8-11, 12, 15, 16, 25, 26-28, 32-35, 37-42, and 44-47.

a single protocol to send and receive data . . . instead of using three independent protocols." (Dkt. No. 747, Ex. 4 ¶ 42.) A "bus" is simply a path for transmission of data. (7/18/13 PM Trans. at 182:25-183:3.) Dr. Nettleton's alternative therefore proposes having a single wire and protocol to transmit information among all antennas and the wired connection. As Dr. Nettleton admitted in his deposition, however, no devices actually use that configuration because that configuration would cause congestion and performance would be poorer. (Nettleton Dep. at 126:3-16.) Dr. Wicker confirmed that Dr. Nettleton's proposed configuration would not be feasible without some sort of contention resolution mechanism to resolve any collisions among packets sent using the single protocol. (7/18/13 PM Trans. at 185:16-187:5.) Using such a mechanism would be inefficient. Dr. Nettleton's proposed alternative is therefore not technically and commercially feasible.

Just as the use of multiple antennas on an access point is necessary to implement a high-throughput spatial multiplexing system as specified in the 2009 Amendments to the 802.11 standard, the use of a distinct protocol to communicate with each of those antennas is also necessary. Accordingly, the court finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 3 are standard-essential.

      D.   Category 4: Access Point Having an Interface System that Modularly Receives Transceivers

Category 4 includes claims that "require an [access point] to have at least one 'acceptor' or an 'interface system' for 'modularly receiving' the 'plurality of transceivers'" that are part of an access point. (Dkt. No. 774, at 3.)[12] Innovatio's expert Dr. Nettleton opines that the

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[12] Category 4 includes:

- '536 - claims 37 and 50;
- '138 - claims 37, 38, and 39;

transceivers or radios are "modularly" received if they are "physically separate modules" that can be interchangeably connected to the access point. (Dkt. No. 747, Ex. 4 ¶ 48.) An alternative, he contends, is to build the radio or transceiver directly on to the motherboard of the access point. (*Id.*) Indeed, Motorola's 30(b)(6) witness stated that some Motorola devices use this alternative:

> When we talk about a radio module internally in any case, we're describing a— something which is physically separable from the motherboard of the access point; you know, basically a daughterboard that you plug into the access point. And there are other situations where the radio hardware is built onto the motherboard itself and is not a physically separate module. So we don't refer to it as a radio module in that case. So some of our products have a single radio which is not a radio module. It's a—just a radio.

(Dkt. No. 816, Ex. F at 57:6-15.) Because one could implement the 802.11 standard by using transceivers built directly into the access point motherboard, Innovatio contends that Category 4 claims are non-standard-essential.

The Defendants do not point to any section of the standard requiring that the access point have a system to modularly receive multiple transceivers, and the standard appears to be silent on the question. Instead, the Defendants contend that it is not commercially feasible to sell stations without modular radios. At the informal discussion on July 17, Dr. Shoemake opined that radio modules must be calibrated to ensure that their transmitting power does not exceed FCC limits. (Dkt. No. 820, Ex. A, at 2.) According to Dr. Shoemake, it is much cheaper to accomplish this calibration by manufacturing all of the modular radios at a single location, rather than requiring calibration wherever the motherboards in various devices are manufactured. (*Id.*) In addition, Dr. Shoemake opined that it is easier to make modifications to the radios by removing the module

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- '052 - claims 6, 12, 15, and 16;
- '935 - claims 6, 12, 15, 16, 42, and 45.

and replacing it with another, rather than manufacturing an entire new motherboard. (*Id.*) Accordingly, the industry has coalesced around using modular radios, and Dr. Nettleton was not able to identify any devices without a modular radio on the market. Thus, the court finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 4 are standard-essential, because there is no commercially feasible alternative to using the Category 4 claims to implement the standard.

E.   Category 5: Access Point that Contemporaneously Operates on Two Channels

Category 5 includes all claims that "require an [access point] to have a wireless transceiver system that 'contemporaneously' operates 'on first and second communication channels.'" (Dkt. No. 774, at 3.)[13] As described above, the high throughput PHY of the 2009 Amendments to the 802.11 standard requires that access points be able to transmit multiple spatial streams at once to implement spatial multiplexing and MIMO. Doing so requires the contemporaneous operation of two communication channels. *See* IEEE Std. 802.11-2009 § 20.3.15 ("The [station] may operate in the 5 GHz band and/or 2.4 GHz band. When using 20 MHz channels, it uses channels defined in 17.3.8.3 (5 GHz band) or 18.4.6 (2.4 GHz band). When using 40 MHz channels, it can operate in the channels defined in 20.3.15.1 and 20.3.15.2."); *see also* (Nettleton Dep. at 99:5-12.) The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 5 are standard-essential.

F.   Category 6: A Processor for Implementing Claimed Method Steps;
       Category 7: Handheld Terminal or Handheld Computer;
       Category 8: A Roaming Terminal Keyboard Used to Collect Information
       Communicated

Categories 6, 7, and 8 raise similar conceptual issues, so the court will address them

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[13] Category 5 includes claim 49 of the '536 Patent and claim 36 of the '138 Patent.

together. All three of the categories include dependent claims that depend from independent claims the parties agree are standard-essential. Each of the three categories also add a single element to the independent claim to create the dependent claim. Category 6[14] includes claims requiring steps relating to a sleep operation to be performed "at least in part, utilizing a processor executing software instructions stored in a memory." (Dkt. No. 774, at 3.) Category 7[15] includes claims requiring one of the stations communicating with an access device to be a "hand-held terminal" or "hand-held computer." (*Id.*) Category 8[16] includes claims requiring "utilizing a keyboard of the roaming wireless terminal node to collect information to be communicated to the bridging node." (*Id.*)

Innovatio contends that having elements requiring the use of a processor, a hand-held terminal, and a keyboard, respectively, makes each of these claims non-standard-essential because the 802.11 standard does not require those elements. The Defendants do not contest that the standard does not explicitly require the use of a processor or a keyboard. They point to § 1.2 of the standard as establishing a requirement for the use of hand-held devices:

1.2 Purpose

The purpose of this standard is to provide wireless connectivity to automatic machinery, equipment, or [stations] that require rapid deployment, which may be portable or hand-held, or which may be mounted on moving vehicles within a local area.

IEEE Std. 802.11-2007 § 1.2. This statement does not require the use of a hand-held device,

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[14] Category 6 includes claims 30 and 100 of the '646 Patent.

[15] Category 7 includes claims 27, 28 and 98 of the '646 Patent and claims 79 and 109 of the '167 Patent.

[16] Category 8 includes claim 82 of the '646 Patent.

however, but instead only states the purpose of the standard at a general level.[17] The use of a hand-held device as one of the stations in a WLAN network is thus not a requirement of a mandatory or optional portion of the standard.

Nonetheless, the Defendants contend that the RAND requirement would be reduced to nothing if a patentee who has agreed to a RAND obligation could get around it merely by adding an additional element like "utilizing a processor" to an otherwise standard-essential claim. That concern is particularly great where the additional element is technology as basic as "a processor" or "a keyboard." Even if the use of "a keyboard" or a "processor" is not necessary to implement the standard, the vast majority of computing devices include those two elements. A large chunk of devices using the 802.11 standard are also hand-held. A patentee should not be able to sue the large number of users of these basic elements who are otherwise implementing standard-essential independent claims without being subject to the RAND obligation applicable to the standard-essential independent claims.

Moreover, the obligation to license a standard-essential independent patent claim at a RAND rate would be meaningless if the patent holder could charge an exorbitant fee for a claim dependent on the standard-essential independent claim and reciting only a technically basic additional element. The only additional licensing value that the dependent claim provides above the RAND-obligated independent claim is whatever value is added by the additional element.

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[17] That conclusion is confirmed by the 2012 amendment to the standard, which rewrote the general purpose statement without the reference to hand-held devices:

> The purpose of this standard is to provide wireless connectivity for fixed, portable, and moving stations within a local area. This standard also offers regulatory bodies a means of standardizing access to one or more frequency bands for the purpose of local area communication.

IEEE Std. 802.11-2012 § 1.2.

When that additional element is merely basic technology that adds nothing novel to the claim, that added value is likely to be zero.

The definition of an "Essential Patent Claim" handles this problem by including within its scope claims that recite in part Enabling Technology, or technology that is "necessary to make or use any product or portion thereof that complies with the [Proposed] IEEE Standard," but that is not explicitly required in the standard. (IEEE Bylaws § 6.1.) Dr. Nettleton opines that a processor, a hand-held device, and a keyboard are not necessary to make or use an 802.11 compliant product because one could use a touch screen instead of a keyboard, a laptop instead of a hand-held device, and an application-specific integrated circuit ("ASIC") instead of a processor[18] to perform the functions specified in the claims. (Dkt. No. 747, Ex. 4 ¶¶ 74, 79, 92, 101.)

Those alternatives, however, merely take advantage of creative claiming to try to do an end-run around the concept of Enabling Technology. To see why, consider the keyboard example. No one would dispute that some type of data entry device, whether a keyboard or a touchscreen, is necessary to allow the user to input information to be communicated on an 802.11 WLAN. At the broadest level, the necessary Enabling Technology is *a device of some kind* capable of data entry. Innovatio's patents try to avoid the inclusion of Enabling Technology in the definition of essentiality merely by including an element claiming one version of the

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[18] According to Dr. Wicker, an ASIC may function as a processor, so in some cases at least there may be no difference between an ASIC and a processor. (*See* Dkt. No. 790, Ex. A, at 11 ("ASICs in the communication space generally contain processing circuitry.").) It is also possible that if an ASIC does not act as a processor, it could not offer the control and programmability necessary to implement the standard. (*Id.*) The court's reasoning here nevertheless assumes that an ASIC is a commercially and technically feasible non-infringing alternative.

Enabling Technology (a keyboard), rather than the other version (a touch screen), when both versions were well-known at the time of the invention. Innovatio then attempts to argue that the use of one version of the Enabling Technology is not necessary because one could always use the other version.

If the court were to accept this argument, the concept of Enabling Technology would be meaningless, as one could always claim around it by including claims describing only a subcategory of a type of Enabling Technology. For example, in the case of the hand-held device, a patent could have one claim requiring the use of a roaming terminal that is a "hand-held device," and another claim requiring the use of a roaming terminal that is not hand-held. The fact remains that the use of *some type* of roaming terminal is necessary to implement the standard, however, so a claim element directed at *any type* of conventional roaming terminal must be standard-essential Enabling Technology as well. Similarly, the use of some device to perform the necessary computing functions, whether an ASIC or a processor, is necessary Enabling Technology. A claim element directed at any type of conventional device to perform the necessary computing functions is therefore still standard-essential.

The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in categories 6, 7, and 8 are all standard-essential.

G.   Category 9: Selectively Sleeping Between Consecutive Beacons or Between Non-consecutive Beacons

Category 9 includes claims that "require a second node" such as a terminal or other station to "'selectively' either enter or remain 'in a low power state' between consecutive or non-consecutive beacons." (Dkt. No. 774, at 4.)[19] A "beacon" is a communication between stations or

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[19] Category 9 includes claims 20-24 and 26-30 of the '311 Patent.

access points that shares information about the parameters of the network and the devices on it. *See* IEEE Std. 802.11-2012 § 4.3.8.2. In particular, access points often share information with stations about the access point's presence and parameters. IEEE Std. 802.11-2007 § 7.2.3.1 (describing beacon frames). Category 9 claims provide that a station be able selectively either to sleep in between consecutive beacons, or to remain asleep through several beacons at a time.

As mentioned above, the 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). Depending on the length of the ListenInterval parameter, which the station chooses, the station may remain asleep only in between two consecutive beacons, or it may remain asleep through several beacons at a time before waking up. *See* IEEE Std. 802.11-2007, at Fig. 11-4 (depicting an example in which a PS station at "extreme low power" wakes up only for the fifth beacon in a series, and another PS

station wakes up for each beacon).[20] Accordingly, infringing the claims of Category 9 is necessary to implement the PS mode of the 802.11 standards. Consequently, the court finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 9 are standard-essential.

H.   Category 10: Terminal Builds an Access Point List Based Upon Signal Strength

Category 10 includes claims that "require a terminal that 'builds and stores a list of access points that are in communication range based at least in part on the strength of a signal received from the access point.'" (Dkt. No. 774, at 4.)[21] According to Innovatio, the significant portion of these claims that makes them non-standard-essential is their requirement that the list be built "based at least in part on the strength of a signal received from the access point." (Dkt. No. 747, at 19.)

Dr. Wicker, citing Innovatio's infringement contentions, points to sections of the 2007 Amendments to the 802.11 standard requiring a station to scan for available access points and to record information about those access points in a "BSSDescriptionSet" or "Basic Service Set Description Set." (Dkt. No. 708, Ex. C, at 54-55.) In particular, § 11.1.3 of the 2007 version of the standard provides that "a [station] shall operate in either a Passive Scanning Mode or an Active Scanning Mode" and that upon receipt of an appropriate request, "a [station] shall

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[20] Examples in the 802.11 standard are not normative. (*See* Dkt. No. 747, Ex. 4, Ex. K ("IEEE Standards Style Manual") § 17.3 ("Examples may be used as illustrations to aid understanding of the standard. Examples are not a normative part of the standard; therefore, requirements shall not be included in the text of the example."). Nonetheless, the example confirms that the standard's requirements offer the functionality of allowing stations to selectively wake-up at every beacon or at every several beacons, depending on the ListentInterval parameter set by the station.

[21] Category 10 includes claims 40, 45, 54, and 56 of the '311 Patent and claim 86 of the '646 Patent.

perform scanning." IEEE Std. 802.11-2007 § 11.1.3. Section 10.3.2.2 then defines the information that a station must store about the access points in a BSSDescriptionSet. *Id.* § 10.3.2.2. That section lists a variety of pieces of information, including the service set ID, a "timestamp" field to synchronize the clock of the station to the clock of the access point, the data rates supported by the access point, the "load" of the service set, which indicates the number of stations using the channel and the percentage of time that the channel is in use, the length of time in between each beacon sent by the access point, and a variety of other pieces of information. *Id.* The list does not, however, include a field for the strength of the signal that the station received from the access point.

The 2012 version of the 802.11 standard, however, added several fields to the BSSDescriptionSet, including a field for "RCPIMeasurement." IEEE Std. 802.11-2012 § 6.3.3.3.2. "RCPI" stands for "received channel power indicator" which is "[a]n indication of the total channel power (signal, noise, and interference) of a received frame measured on the channel and at the antenna connector used to receive the frame." *Id.* § 3.1. An additional section of the 2012 Amendments to the standard describes the process that stations are to follow to perform the measurement of channel power. *Id.* § 10.11 ("Radio measurement procedures"). Moreover, the standard requires stations to have the capability of measuring and reporting RCPI. *See id.* § 10.1.4.3.3 ("If dot11RadioMeasurementActivated is true and if the Request element of the Probe Request includes the RCPI element ID, the [station] *shall include* in the Probe Response an RCPI element containing the measured RCPI value of the received Probe Request frame." (emphasis added)). The Defendants contend that the recording of the RCPI value in the BSSDescriptionSet, as specified in the 2012 standard, constitutes building a list of access points based in part on signal strength, and so infringes Category 10 claims.

Innovatio responds that a requirement that a station measure and report the RCPI does not necessarily mean that the station must "build and store" a list "based at least in part on the strength of a signal received from the access point," as Category 10 claims require. According to Innovatio, the station may build a list based upon any criteria it chooses. Even though it must collect RCPI information, in other words, it need not rely on that RCPI information to build a list. Moreover, as Dr. Nettleton testified, an alternative would be to build a list based on whether the station received a valid beacon from the access point. (Dkt. No. 747, Ex. 4 ¶ 117.) Even accepting that a station may build a list based upon receiving a valid beacon, however, Dr. Wicker testified that a station could not receive a valid beacon unless the signal strength is high enough. (Dkt. No. 838 ("7/19/13 AM Trans.") at 273:5-15.) Dr. Nettleton agreed at his deposition. (Nettleton Dep. at 193:5-13.) Even Dr. Nettleton's proposed alternative would thus build a list based at least in part on signal strength. Dr. Nettleton's opinion on this point is not credible because his proposed alternative is not a non-infringing alternative. The court finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 10 are therefore standard-essential.

I.   Category 11: Access Point Routes Messages Between Other Nodes

Category 11 involves claims which "require[] that a 'bridging node routes messages between other nodes.'" (Dkt. No. 774, at 4.)[22] Defendants' expert, Dr. Wicker, opines that § 5.4.1.1 of the 2007 Amendments to the standard indicates that Category 11 claims are standard-essential. (Dkt. No. 708, Ex. C, at 46-47.) That section describes the role of an "access point" in distributing messages either to the "distribution system" or wirelessly to other stations in the same basic service set. *See also* IEEE Std. 802.11-2007 § 3.40.

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[22] Category 11 includes claims 22 and 94 of the '646 Patent.

First, the standard's use of the term "access point" instead of "bridging node" is not a relevant difference. An access point, according to the standard, is "[a]ny entity that has station (STA) functionality and provides access to the distribution services, via the wireless medium (WM) for associated [stations]." *Id.* § 3.3. In other words, an access point is what allows for the transmission and reception of data from one WLAN to another WLAN or to the wired world. Access points, however, can also relay messages from one node to another node inside a basic service set. *See id.* § 5.4.1.1 (describing the access point's role in sending a message "intended for a [station] that was a member of the same [basic service set] as the sending [station]"). A bridging node, according to the '646 patent, is an "internal node in the spanning tree which is used to 'bridge' terminal nodes together into an interconnected network. . . . A bridge node consists of a network interface function and a routing function." '646 Patent col.9 ll.27-29, 32-34. A bridging node is thus a station with the ability to receive data from one node and transmit it to another node inside a network. For purposes of analyzing Category 11, therefore, an access point does the same thing as a bridging node.

Section 5.4.1.1 of the 2007 Amendments explains how an access point must act as a router under the 802.11 standard. For example, an access point "routes" messages when it chooses whether to rebroadcast them on the wireless medium to another station, or to send them on the distribution system to another access point for distribution to a station in a different basic service set. Section 5.4.1.1 explains this process as follows:

> [C]onsider a data message being sent from [a station in one basic service ("station 1") set to a station in another basic service set ("station 4")]. The message is sent from [station] 1 and received by [an "input" access point]. *The [access point] gives the message to the distribution service of the [distribution system].* It is the job of the distribution service to deliver the message within the [distribution system] in such a way that it arrives at the appropriate [distribution system] destination for the intended recipient. In this example, the message is distributed to [an "output" access point, which] accesses the [wireless medium] to send the

message to [station] 4 (the intended destination).

IEEE Std. 802.11-2007 § 5.4.1.1 (emphasis added). The emphasized sentence describes the point at which the access point must decide whether to send the message to the distribution system or to route it to another station in the same basic service set. As § 5.4.1.1 further explains, this routing function, which allows an access point to distribute messages through the distribution system, "is the primary service used by IEEE 802.11 [stations]."

The standard therefore calls for an access point to be able to act as a bridging node to route data messages from a sending node to a receiving node.[23] Performing this function is optional, of course, as the most basic implementation of the IEEE 802.11 standards is an independent basic service set, which involves only two stations communicating directly. *See* IEEE Std. 802.11-2007 § 5.2.1. Nonetheless, the 802.11 standard supports the use of access points as bridging nodes to route messages between other nodes as an optional feature. The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 11 are standard-essential.

J.   Category 12A: Operating Receiver Circuitry, Transceiver Circuitry, Communication Circuitry, Receiver or Portion of Receiver in Powered Down State

Category 12A involves a variety of other claims that are all directed to power management features of wireless devices.[24] Category 12A claims, all of which require that parts

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[23] Dr. Nettleton contends that an alternative is to use a wireless controller outside of the access point to perform the routing function. As explained above in the discussion of Category 2, however, under the 802.11 standard, a wireless controller is conceptually part of the access point, and so Dr. Nettleton's alternative nonetheless involves the use of an access point to route information.

[24] Category 12A includes the following patent claims:

- '311 - claims 32-34, 36, 40, 46, 47, 50, 53, and 54;

of a wireless terminal be "powered down" at certain times, are thus similar to the claims in Category 9. Terminals operating in a powered down state and then waking long enough to receive a message during a communication session or for a fixed period are plainly part of the 802.11 PS function, which provides that "[i]n PS mode, a [station] shall be in the Doze state and shall enter the Awake state to receive selected Beacon frames." IEEE Std. 802.11-2007 § 11.2.1.1; *see also id.* § 11.2.1.7 ("The [station] shall remain in the Awake state until it receives the data or management frame in response to its poll or it receives another Beacon frame [indicating] that the [access point] does not have any [data] for this [station]."); *id.* ("A [station] that stays awake to receive [multicast data] shall remain awake until the More Data field of [the multicast data] indicates there are no further [multicast data] or until [it receives information] indicating there are no more [multicast data to be transmitted]."). The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 12A are standard-essential.

        K.   Category 12B: Bridging Node Storing Pending Messages

Category 12B includes claims that "require a bridging node to store pending messages awaiting delivery until delivery is successful; to store such messages until a predetermined number of beacons occur and/or first messages have been transmitted and delivery is unsuccessful; or to remove such messages from the queue where delivery is unsuccessful." (Dkt. No. 797, at 4.)[25] These claims provide for the deletion of messages that are not successfully

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- '646 - claim 33;
- '167 - claims 85 and 115; and
- '343 - claims 12 and 42.

[25] Category 12B includes claims 13, 14, 22, and 23 of the '366 Patent and claim 88 of the '646 Patent.

delivered to their destinations within a predetermined period of time through the use of an "aging function." The 802.11 standard describes the use of such an aging function to delete messages that are "buffered," or stored, for an excessive period of time without a successful delivery: "An [access point] can delete buffered frames for implementation-dependent reasons, including the use of an aging function and availability of buffers. The [access point] may base the aging function on the listen interval specified by the non-[access point station] in the (Re)Association Request frame." IEEE Std. 802.11-2007 § 11.2.1.5 (describing PS function operation during the "contention period"). That section of the standard describes an optional implementation of an aging function. Similarly, § 11.2.1.6 describes a mandatory implementation: "An [access point] shall have an aging function to delete pending traffic buffered for an excessive time period. The exact specification of the aging function is beyond the scope of this standard." *Id.* § 11.2.1.6 (describing PS function operation during the "contention free period").

Innovatio contends that its patent claims relate to the "exact specification" of an aging function that is beyond the scope of the standard. That argument fails, however, because the "aging function" claims in Category 12B describe the aging function at a broad level of generality, providing only for the deletion of messages that are not successfully delivered. *See, e.g.*, '366 Patent cl.22 (providing that a terminal "remove from the queue those of the messages awaiting delivery where delivery is unsuccessful"). Accordingly, one could not implement any aging function, regardless of its exact specification, without infringing Innovatio's "aging function" patent claims.

To be sure, Category 12B claims speak of exercising an aging function based on "a predetermined number of beacons," *see, e.g.*, '366 Patent col.21 ll.31-34., whereas the standard requires an aging function based on "an excessive time period," IEEE Std. 802.11-2007

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§ 11.2.1.6. A beacon is transmitted at a regular interval, however, so a "predetermined number of

beacons" describes a time interval. *See id.* § 7.3.1.3 ("The Beacon Interval field represents the

number of time units (TUs) between target beacon transmission times (TBTTs)."). Accordingly,

the patent describes an aging function with no more detail than the aging function that the 802.11

standard requires. Because the 802.11 standard provides that access points "shall" have an aging

function, the court finds that the Defendants have proven by a preponderance of the evidence that

the claims in Category 12B are standard-essential.[26]

L.   Category 12C: Spanning Tree

Category 12C includes claims requiring that "a plurality of bridging devices participate in

spanning tree routing or a bridging node is a node of a spanning tree."[27] The claims in this

category specify the use of a "spanning tree" to network multiple stations together. Both the '366

Patent and the '646 Patent describe a spanning tree as follows:

> To set up the network, an optimal configuration for conducting network
> communication spanning tree is created to control the flow of data
> communication. To aid understanding by providing a more visual description, this
> configuration is referred to hereafter as a "spanning tree" or "optimal spanning
> tree".
>
> Specifically, [the] root[s] of the spanning tree are the gateways; the branches are
> the bridges; and non-bridging stations, such as RF terminals, are the leaves of the
> tree. Data are sent along the branches of the newly created optimal spanning tree.

'366 Patent col.2 ll.32-43; '646 Patent col.2 ll.64-67 & col.3 ll.1-6. As Dr. Wicker further

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[26] Dr. Nettleton opines that a non-infringing alternative to using an aging function would
be to have a periodic reboot to flush messages from the memory of the access point. (Dkt. No.
747, Ex. 4 ¶ 131.) Rebooting instead of deleting messages, however, would still constitute an
"aging function," and is not non-infringing. Moreover, as Dr. Wicker testified, rebooting would
be inefficient and not commercially feasible. (7/19/13 AM Trans. at 324:2-8.)

[27] Category 12C includes claims 8 and 25 of the '366 Patent and claims 18 and 90 of the
'646 Patent.

explained at the bench trial, a spanning tree is a network of nodes that interconnects all nodes, but in which there is exactly one path between any two pair of nodes. (7/19/13 AM Trans. at 330:12-23.) The advantage of having only one path between each pair of nodes is that a message will not "loop" in a circle without ever being transmitted to its proper destination. Dr. Wicker testified that a spanning tree is a concept relevant at the distribution system layer, because it describes the manner in which access points are connected together in a distribution system. (*Id.* at 332:8-20); *see also* '646 Patent col.2 ll.45-50.

Innovatio contends that because the 802.11 standard does not specify distribution system implementations, *see* IEEE Std. 802.11-2007 § 5.5 ("The implementation of the [distribution system] is unspecified and is beyond the scope of this standard."), the use of a spanning tree cannot be standard essential. Dr. Wicker testified, however, that the use of a spanning tree is necessary to operate any distribution system in a technically feasible manner. (7/19/13 AM at 332:21-333:6.) Not using a spanning tree would cause multiple addressing loops that would slow communication and may cause data to be lost. As Dr. Nettleton stated in his deposition testimony:

> Disadvantages of not using a spanning tree would be basically that you would be building links that are not required, and you would also be running the risk of addressing loops. If everything works correctly, you can have loops all over the place. If something goes wrong and you have—have an addressing loop, then the signal just keeps going round and round and never gets anywhere.

(Dkt. No. 815, Ex. B. at 334:3-10.) In other words, a spanning tree is necessary to implement any distribution system on which an 802.11 compliant device might send messages. Moreover, an optional feature of the 802.11 standard is the ability to send messages to a distribution system. *See, e.g.*, IEEE Std. 802.11-2007 § 5.2.3 (describing the communication of messages from an access point to a distribution system). The use of a spanning tree is thus Enabling Technology

necessary for the implementation of the option of using a distribution system. The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 12C are standard-essential.

      M.   Category 13: Access Point Programmed with Network Configuration

Category 13 includes claims that "require the [access point] to have circuitry programmed with a network configuration . . . to selectively route data." (Dkt. No. 795, Ex. A.)[28] Category 13 claims are similar to Category 11 claims in that they require the access points to route messages to other terminals. The 802.11 standard requires access points to route messages for the reasons explained above with respect to Category 11. Category 13 additionally requires, however, that the access point have "circuitry programmed with a network configuration" to do the routing. Dr. Nettleton explains that a wireless controller or wireless switch connected to the access point through a wired connection could provide the processing circuitry that allows the access point to route the data, rather than having that circuitry in the access point itself. (Dkt. No. 747, Ex. 4 ¶ 54.) Thus, Dr. Nettleton asserts that Category 13 is non-standard-essential for the same reasons as Category 2, which requires that the access point process messages "exclusive of a wired link" to a wireless controller or switch.

As explained above in the discussion of Category 2, however, under the 802.11 standard, a wireless controller is conceptually part of the access point. Dr. Nettleton's opinion on this point is not credible because his proposed alternative nonetheless involves the use of an access point to route information. The court therefore finds that the Defendants have proven by a preponderance of the evidence that the claims in Category 13 are standard-essential.

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[28] Category 13 includes claim 36 of the '536 Patent, claim 5 of the '052 Patent, and claims 5 and 37 of the '935 Patent.

CONCLUSION

For the reasons explained above, the court determines that the claims of Categories 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12A, 12B, 12C, and 13 are all standard-essential. A status hearing is set for 7/30/13 at 10 am to set further dates.

ENTER:

James F. Holderman

JAMES F. HOLDERMAN
District Judge, United States District Court

Date: July 26, 2013