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THE PROPAGATED SIGNAL CLAIM: WHAT IS IT AND WHAT ARE THE INFRINGEMENT CONSEQUENCES?*

I. INTRODUCTION

Propagated signal claims are the latest possible patent claims to follow in the wake of the computer-related inventions claims or "Beauregard" claims. The "propagated signal" claim has been defined as "a claim directed to a manufactured transient phenomenon, such as an electrical, optical, or acoustical signal."[1] This Note will focus on the electrical signal because it is the type most likely to be held statutory subject matter by the United States Patent and Trademark Office (USPTO). The PTO has discussed the possible patentability of the electrical signal.[2] Little is known about the new claim and no specific statute or case law exists that directly addresses the patentability of such a claim. The propagated signal claim, however, will greatly impact businesses and attorneys involved in the software, electrical, computer, and communication industries. Telecommunications companies and Internet Service Providers, in particular face a high risk of infringement liability for communicating these signals.[3] Because software will more than likely be exchanged via the Internet rather than by floppy disk, the new propagated signal claim will be prolific on the Internet. More information is needed on these important new patents not only to help raise awareness about how to write a statutory propagated signal claim, but also to draw attention to possible infringement and the resulting carrier liability.

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[1] Scott A. Horstemeyer & Daniel J. Santos, *A New Frontier in Patents: Patent Claims to Propagated Signals*, SOUTHEASTERN INTELLECTUAL PROPERTY THE NEWSLETTER OF LAW AND POLICY FOR HIGH TECHNOLOGY, August 1998 at 6; also *available at* <http://www.tkhr.com/articles/propag.htm>.

[2] Nancy J. Linck & Karen A. Buchanan, *Patent Protection For Computer-Related Inventions: The Past, the Present, and the Future*, 18 HASTINGS COMM. & ENT. L.J. 659 (1996).

[3] Manual of Patent Examing Procedure (MPEP) § 2106 (7th ed. 1982).

With the on-slaught of algorithm cases, the courts and the PTO have struggled to keep up with the new technological advances.[4] Now all new advancements, like the propagated signal claim, will be evaluated in light of the new guidelines[5] that the PTO developed in response to the algorithm cases and other computer-related inventions cases.[6]

As technology changes, the law struggles to keep pace. Recently, Congress and the President have addressed carrier liability in the copyright context.[7] Carrier liability, however has not been addressed in the patent area and as mentioned earlier, the new propagated signal claims could make infringers of those unaware that they are carrying the signal. The issue of liability will largely depend on how the courts interpret the Patent Act's language defining an infringer as one who "makes, uses, or sells any patented invention."[8]

This Note predicts that the courts will find "propagated signal" claims to qualify as statutory subject matter under the Patent Act and suggests possible ways to deal with the patent infringement issue in the carrier context. Part II explores the history of the algorithm cases and ends with a discussion of the newest computer-related inventions cases. Part III analyzes what the propagated signal claim is and how the new claim can meet the requirements necessary to be statutory subject matter. Part IV suggests that there is a need for legislation to address innocent infringement by signal carriers, such as telephone companies and Internet Service Providers. Part V offers a conclusion.

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[4] *In re* Alappat, 33 F.3d 1526, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994); In re Warmerdam, 33 F.3d 1354, 31 U.S.P.Q.2d (BNA) 1754 (Fed. Cir. 1994).

[5] MPEP, *supra* note 3 § 2106.

[6] *In re* Beauregard, 53 F.3d 1583, 35 U.S.P.Q.2d (BNA) 1383 (Fed. Cir. 1995) (involving a U.S. patent application which ultimately issued as U.S. patent No. 5,710,578); *In re* Lowry, 32 F.3d 1579, 32 U.S.P.Q.2d (BNA) 1031 (Fed. Cir. 1994).

[7] Information Infrastructure Task Force, *Intellectual Property and the National Information Infrastructure* (Sept. 5, 1995) ("NII White Paper").

[8] 35 U.S.C. § 271 (1994).

> (a) Except as otherwise provided in this title, whoever without authority makes, uses, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor [sic], infringes the patent. (b) Whoever actively induces infringement of a patent shall be liable as an infringer.

II. BACKGROUND

Traditionally, patent law has been used to protect tangible inventions and industrial processes. The challenge to the traditional system comes when addressing systems for processing one kind of data into another kind, where the type of machine involved is of no relevance.[9] Inventions that incorporate algorithms are among the latest technological advances to challenge the traditional patent paradigm.[10]

The cases on the patentability of algorithms have paved the way for other computer-related inventions for which patent protection is sought. Employing the law of the algorithm cases, in 1996 the Patent and Trademark Office produced new guidelines for computer-related inventions, which are now part of the Manual of Patent Examination Procedures (MPEP).[11] Faced with a dearth of authority addressing propagated signal claims, the new PTO guidelines and the case law addressing algorithms and other computer-related inventions offer insight into how the courts may analyze the propagated signal claim.

A. ALGORITHM CASES

1. In re Alappat. *Alappat* was meant to resolve the controversy between the Federal Circuit and the Patent and Trademark Office about how a section of the Patent Act,[12] which addresses how an element of a claim may be expressed and construed, should be utilized in patent prosecution matters.[13] The PTO was not applying § 112 in determining statutory subject matter, because the courts had difficulty in demonstrating a uniform standard for evaluating algorithms and other computer-related inventions.

Alappat's invention involved an anti-aliasing technique that eliminated discontinuity or jaggedness, giving the appearance of a

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[9] Richard H. Stern, *Solving The Algorithm Conundrum: After 1994 in the Federal Circuit, Patent Law Needs A Radical Algorithmectomy* 22 AIPLA Q.J. 167, 170 (1994).

[10] Algorithms are mathematical manipulations that transform one kind of data into another.

[11] MPEP, *supra* note 3 § 2106.

[12] 35 U.S.C. § 112, para. 6 (1994).

[13] *In re* Alappat, 33 F.3d 1526, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994).

smooth continuous waveform.[14] Aliasing or oscillation in the waveform is caused by the finite number of pixels contained in a cathode-ray tube.[15] Alappat's invention eliminated aliasing by employing a system where:

> [E]ach vector making up the waveform is represented by modulating the illumination intensity of pixels having center points bounding the trajectory of the vector. The intensity at which each of the pixels is illuminated depends upon the distance of the center point of each pixel from the trajectory of the vector. Pixels lying squarely on the waveform trace receive maximum illumination, whereas pixels lying along an edge of the trace receive illumination decreasing in intensity proportional to the increase in the distance of the center point of the pixel from the vector trajectory.[16]

The patent examiner rejected claim number fifteen[17] as non-statutory subject matter under the Patent Act.[18] The examiner was initially overruled by a three-member panel,[19] but ultimately the majority of the Board affirmed the Examiner's rejection of claim fifteen as non-statutory subject matter.[20] The majority held that "because claim 15 is written completely in 'means for' language and

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[14] *Id.* at 1537.

[15] *Id.*

[16] *Id.*

[17] Claim fifteen reads:

> A rasterizer for converting vector list data representing sample magnitude of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising: (a) means for determining the vertical distance between the endpoints of each of the vectors in the data list; (b) means for determining the elevation of a row of pixels that is spanned by the vector; (c) means for normalizing the vertical distance and elevation; and (d) means for outputting illumination intensity data as a predetermined function of the normalized vertical distance and elevation.

Id. at 1538-39.

[18] *Alappat*, 33 F.3d at 1539.

[19] *Id.*

[20] *Id.*

because these means clauses are read broadly in the PTO to encompass each and every means for performing the recited functions, claim 15 amounts to nothing more than a process claim wherein each means clause represents only a step in that process."[21] The majority also held that § 112, para. 6 does not apply to the evaluation.[22]

On appeal, the Federal Circuit court held that the Board majority erred as a matter of law in not applying 35 U.S.C. § 112, para. 6[23] in reading the means-claims too broadly.[24] The court stated that "claim 15 unquestionably recites a machine, or apparatus made up of a combination of known electronic circuitry elements."[25] Because the claim recites a machine, the claim falls within the necessary requirements for statutory subject matter.[26] However, the court did not end its analysis there. The court addressed the question as to whether or not the claim fell within a judicially created exception to § 101, called the "mathematical algorithm" exception.[27] The court read the plain language of the statute, looked at Congressional intent, and even noted the Supreme Court's broad reading of § 101.[28]

After noting the relevant history, the court stated that the proper inquiry was to look at the entire claim as a whole to see if it is directed to statutory subject matter, because "it is irrelevant that a claim may contain, as part of the whole, subject matter which

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[21] *Id.*

[22] *Id.* at 1540.

[23] 35 U.S.C. § 112, para. 6 (1994) (stating that "an element in a claim . . . may be expressed as a means or step for performing a specified function . . . such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof").

[24] *Alappat*, 33 F.3d at 1540-1541.

[25] *Id.* at 1541.

[26] *Id.* The statute provides: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor [sic], subject to the conditions and requirements of this title." 35 U.S.C. § 101 (1994).

[27] *Alappat*, 33 F.3d at 1543-1544.

[28] The Supreme Court in *Diamond v. Chakrabarty*, 447 U.S. 303, 309, 206 U.S.P.Q. (BNA) 193, (1980) found the scope of patentable subject matter under 35 U.S.C. section 101, included "anything under the sun that is made by man." *Id.* The Supreme Court held "laws of nature, natural phenomena, and abstract ideas" are not included in the scope of patentable subject matter. Diamond v. Diehr, 450 U.S. 175, 185, 209 U.S.P.Q. (BNA) 1, 7 (1981).

would not be patentable by itself."[29] The court concluded that even though claim fifteen was mainly circuitry elements that performed mathematical operations, viewed as a whole, the claim was not an unpractical mathematical concept which may be characterized as an "abstract idea,"[30] but rather a specific machine, a rasterizer for creating a smooth waveform.[31] Thus the claim had a practical application; it was not just a non-statutory "abstract idea." Furthermore, the court stated that the Board majority erred when it stated that claim fifteen read as a general purpose digital computer means to perform various steps and therefore was unpatentable.[32] The court stated that the programmed computer was not precluded from patentability as long as the subject matter meets all the other requirements (novelty, non-obviousness, and utility).[33]

2. In re Warmerdam. *In re Warmerdam*[34] was decided after *Alappat*, at a time when the ramifications of *Alappat* were still not clear. The *Warmerdam* claim illustrates the courts' difficulty in deciding whether a claim is for a mathematical algorithm. Warmerdam's invention was a bubble hierarchy to be used by robots to avoid collision.[35]

The invention claimed to be an improvement of prior art bubble systems.[36] If a robot detected a collision, Warmerdam's invention replaced the spherical bubble zone with a set of smaller, more refined bubble zones, which enhanced the determination of boundary position.[37] Warmerdam distinguished his invention from the prior art, because his invention involved "the generation and placement of the hierarchy of bubbles *along the medial axis of the object.*"[38] The claim consisted of methods for determining measured dimensions and coordinates of the bubble hierarchy as generated and for a general purpose computer with a memory

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[29] *Alappat*, 33 F.3d at 1543.
[30] *Id.* at 1544.
[31] *Id.*
[32] *Id.*
[33] *Id.* at 1545.
[34] *In re* Warmerdam, 33 F.3d 1354, 31 U.S.P.Q.2d (BNA) 1754 (Fed. Cir. 1994).
[35] *Id.* at 1355.
[36] *Id.*
[37] *Id.*
[38] *Id.* at 1356 (emphasis in original).

containing data representing a bubble hierarchy as generated by the claimed methods.[39] "Bubble bursting" was the collision avoidance technique:

> If . . . an intersection is detected, the intersected bubble is burst, and the procedure then repeats itself until it is determined either that (1) the anticipated path does not intersect any of the bubbles at a particular level of the hierarchy, indicating collision avoidance, or (2) the anticipated path intersects one of the bubbles at the lowest level of the hierarchy, indicating that a collision will occur.[40]

Warmerdam's claim was a method claim consisting of seven claims, only claim one through six were at issue on appeal and claim one was the sole independent claim.[41] Claims two through four recited both top-down and bottom-up procedures. Claim five was directed to a machine, and claim six was directed to a data structure generated by the method of any of claims one through four.[42]

The Board sustained the examiner's rejection of claims one through four as non-statutory subject matter because these claims recited a mathematical algorithm.[43] The PTO rejected claim five as indefinite and held claim six to not satisfy the requirements of § 101 because a "data structure" is not one of the items listed in that provision.[44]

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[39] *In re* Warmerdam, 33 F.3d at 1356.

[40] *Id.* at 1356.

[41] Claim one reads:

> A method for generating a data structure which represents the shape of [sic] physical object in a position and/or motion control machine as a hierarchy of bubbles, comprising the steps of: first locating the medial axis of the object and then creating a hierarchy of bubbles on the medial axis.

Id. at 1357.

[42] *Id.* at 1357-58.

[43] *Id.* at 1358.

[44] *In re* Warmerdam, 33 F.3d at 1358.

On appeal, the court declined to apply the *Freeman-Walter-Abele* test,[45] which was developed to determine whether a claim as a whole recited an algorithm.[46] The court did not employ the test because, as the court pointed out, the weakness of the analysis is that there is no general agreement on the definition of a mathematical algorithm.[47] The court decided instead to utilize the plain language of the statute and the principles articulated by the Supreme Court in *Diehr*.[48] The court decided it was unnecessary to define an algorithm because the dispositive issue was "whether the claim is for a process that goes beyond simply manipulating 'abstract ideas' or 'natural phenomena.' "[49] The court concluded that the claims were just basic mathematical manipulations: the typical abstract idea.[50] The court further rejected Warmerdam's claim that the processes when manipulated were novel because the claims simply did not have that effect.[51] The fifth claim was accepted and the sixth claim was rejected.[52]

These cases provide examples of how the courts and the patent board have handled patent applications for new technology that is being invented. A key point in these cases is that abstract ideas are patentable when reduced to a practical application and therefore are not just mathematical manipulations.

B. DEVELOPMENT OF THE LAW PERTAINING TO COMPUTER-RELATED INVENTIONS

Recently, there has been a great deal of discussion in the area of the patentability of computer software.[53] The problem for patent

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[45] The first step in the analysis is to determine whether a mathematical algorithm is recited directly or indirectly and the second step is to determine whether the claimed invention viewed as a whole is no more than the algorithm itself. The test had been developed through the Supreme Court decisions in the *Freeman*, *Walter*, and *Abele* cases.

[46] *In re* Warmerdam, 33 F.3d at 1359.

[47] *Id.*

[48] Diamond v. Diehr, 450 U.S. 175, 209 U.S.P.Q. (BNA) 1 (1981).

[49] *In re* Warmerdam, 33 F.3d at 1360.

[50] *Id.* at 1360.

[51] *Id.*

[52] *Id.* at 1361. The fifth claim was directed toward a machine which is within section 101 requirements. *Id.*

[53] *See, e.g.*, Richard H. Stern, *An Attempt to Rationalize Floppy Disk Claims*, 17 J. MARSHALL J. COMPUTER & INFO. L. 183 (1998) (discussing the new floppy disk claims).

claimants was that the software by itself would be unpatentable.[54] Two recent cases have been forerunners in the patenting of software related inventions. *In re Lowry*[55] and *In re Beauregard*[56] involved the denial of claims because of the judicially-created rule called the printed matter doctrine.[57] The printed matter doctrine was utilized by the examiners to reject claims directed to printed lines, words, characters, and digits that are contained on a medium and intelligible by human minds.[58] It seemed an unusual usage of the doctrine to apply to abstract ideas in the *Beauregard* case. An analogy will be drawn between the "floppy disk" claims and the new propagated signal claims in order to determine if the signal is statutory subject matter or whether it too falls within the printed matter exception.

1. In re Lowry. *In re Lowry* involved a data structure stored in a computer memory.[59] The purpose of the invention was to maximize structural and functional expressiveness.[60] The computer memory stored a plurality of attribute data objects (ADOs). An ADO was defined as a "primitive data element 'compris[ing] sequences of bits which are stored in the memory as electrical (or magnetic) signals that represent information.' "[61] The arrangement of the ADOs in hierarchically and non-hierarchically related single primitive ADOs is the means for retrieval, addition, and removal of information in the data structure.[62] Claims one through five recited a computer memory storing data structure.[63] Claims six through nineteen claim a data processing

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[54] *In re* Warmerdam, 33 F.3d at 1354.

[55] *In re* Lowry, 32 F.3d 1579, 32 U.S.P.Q.2d 1031 (Fed. Cir. 1994).

[56] *In re* Beauregard, 53 F.3d 1583, 35 U.S.P.Q.2d (BNA) 1383 (Fed. Cir. 1995).

[57] *See In re* Lowry, 32 F.3d at 1583 (describing the printed matter doctrine).

[58] Scott A. Horstemeyer & Daniel J. Santos, *A New Frontier in Patents: Patent Claims to Propagated Signals* (visited Sept. 26, 1998) <http://www.tkhr.com/articles/propag.htm>.

[59] *In re* Lowry, 32 F.3d at 1580.

[60] *Id.*

[61] *Id.* at 1580-81.

[62] *Id.* at 1581.

[63] As an example, Claim one reads:

> A memory for storing data for access by an application program being executed on a data processing system, comprising: a data structure stored in said memory, said data structure including information resident in a database used by said application program and including: a plurality of attribute data objects stored in said memory, each of said

system. Claims twenty through twenty-three, twenty-five, and twenty-eight claimed methods of accessing, creating, adding, and erasing ADOs within the data structure. Claims twenty-six, twenty-seven, and twenty-nine claimed methods of creating and erasing non-hierarchical relationships between ADOs and referent ADOs.[64]

The examiner denied patentability to claims one through five as non-statutory subject matter[65] under 35 U.S.C. § 101 because they were merely abstract ideas. The other claims were rejected as either obvious under 35 U.S.C. § 103 or anticipated under 35 U.S.C. § 102(e).[66]

The Patent Board reversed the decision as to the claims of one through five. The Board found the claims to be articles of manufacture because the claims were "directed to a memory containing stored information."[67] However, the Board affirmed the rejection of claims five through twenty-nine under the aforementioned printed matter doctrine and did not give the data structure any patentable weight.[68] The Board said the proper inquiry is whether "a new, nonobvious functional relationship exists between the printed matter (data structure with ADOs) and the substrate (memory)."[69] The Board concluded that the claims "did not show such a functional relationship."[70]

On appeal to the Federal Circuit, the court distinguished other printed matter cases from this one and held that the printed matter rejection was inappropriate where the claimed invention requires

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> attribute data objects containing different information from said database; a single holder attribute data object for each of said attribute data objects, each of said holder attribute data objects being one of said plurality of attribute data objects, a being-held relationship existing between each . . . thereby establishing a hierarchy of said plurality of attribute data objects; a referent attribute data object for at least one of said attribute . . .

Id. at 1581.

[64] *In re* Lowry, 32 F.3d at 1581-82.

[65] *Id.* at 1582.

[66] The examiner stated that in light of Patent No. 4,774,661 (Kumpati) the claims were anticipated. *Id.*

[67] *Lowry*, 32 F.3d at 1582.

[68] *Id.*

[69] *Id.*

[70] *Id.*

that the information be processed by a machine, rather than by the human mind.[71] The printed matter doctrine was a major obstacle for the patentability of computer-related inventions; therefore, the courts ruling was of major significance for future computer-related inventions. The court went on to hold that a data structure could be patentable as an article of manufacture and reversed the obviousness rejections of claims one through nineteen.[72]

2. In re Beauregard. The claims at issue in *In re Beauregard*[73] involved an article of manufacture, that is, a storage medium (like a floppy diskette) encoded with a machine-readable computer program code.[74]

A series of traverses of each horizontal stripe from the left side of the polygon to the right side are made and every pixel between the two sides is illuminated transforming an unfilled polygon to a filled one.[75] The claims cover the encoded floppy diskette, per se, standing apart from the computer and screen.[76]

The examiner ultimately found that the claims failed the test for obviousness. The rejection analogized the claimed program code to printed matter.[77]

On appeal the Board held that the printed matter doctrine prevented patentability.[78] Before the case was appealed to the federal circuit, some commentators criticized the utilization of the printed matter doctrine in this case.[79] The criticisms may have

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[71] *Id.* at 1583.

[72] *Id.* at 1584-85.

[73] *In re* Beauregard, 53 F.3d 1583, 35 U.S.P.Q.2d 1383 (Fed. Cir. 1995).

[74] Appellant's Brief at 3, *Beauregard* (No. 95-1054). An example of an article of manufacture claim, or "Beauregard" claim is as follows:

> A computer program embodied on a computer-readable medium for monitoring and controlling an automated manufacturing plant using a telemetered processed data signal comprising: (a) a compression source code segment comprising . . . [recites self-documenting source code]; and (b) an encryption source code segment comprising . . . [recites self-documenting source code].

Horstemeyer & Santos, *supra* note 58, at 4.

[75] Appellant's Brief at 6-7, *Beauregard* (No. 95-1054).

[76] *Id.* at 8.

[77] *Id.* at 2.

[78] *Id.* at 3.

[79] *See, e.g.*, Stern, *supra* note 9, at 201-02 (stating that the "wrong analytic mechanism or at least a suboptimal one, is being used here to determine whether algorithms or computer programs on a floppy disk ought to be protected.").

been heeded, since the federal circuit dismissed the case.[80]

The most probable reason for the PTO wanting to dismiss the case was the federal circuit's opinion that the printed matter doctrine did not apply to claims directed to computer programs in a memory device in *In re Lowry*,[81] which was handed down within days of the *Beauregard* appeal. Once it was established that the printed matter doctrine did not apply to this type of claim, it was apparent Beauregard's claim was patentable; therefore, the case was dismissed.[82]

3. State Street Bank & Trust Co. In *State Street Bank & Trust Co.*,[83] the bank brought suit against the assignee of a patent for a computerized accounting system. The case gives a good overview of how the courts are applying the case law of *In re Alappat*[84] and *In re Warmerdam*[85] to computer-related inventions. The court stressed that the focus of the examination should be whether the practical use of a mathematical algorithm produced a concrete, useful result.[86]

The patent was directed to an accounting system that allowed the monitoring and recording of financial information flow and it made the proper calculations essential to the functioning of a partner fund financial services configuration. The system made expedient, daily calculations allowing a true asset value determination to be available at any given time.[87]

The claim was directed to a data processing system comprised of a computer processor, a storage means, and five algorithm logic circuits to prepare the data and to retrieve data information.[88]

The circuit court held that the claim was directed to a machine and therefore met one of the four statutory requirements of § 101.[89] The district court held the patent invalid because it fell

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[80] *In re* Beauregard, 53 F.3d 1583, 35 U.S.P.Q.2d (BNA) 1383 (Fed. Cir. 1995).

[81] *See supra* notes 55-72 and accompanying text.

[82] *Beauregard*, 53 F.3d at 1583.

[83] State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 47 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1998).

[84] *In re* Alappat, 33 F.3d 1526, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994).

[85] *In re* Warmerdam, 33 F.3d 1354, 31 U.S.P.Q.2d (BNA) 1754 (Fed. Cir. 1994).

[86] *State Street*, 149 F.3d at 1375.

[87] *Id.* at 1371.

[88] *Id.* at 1371-72.

[89] *Id.* at 1372.

within the judicially created exceptions of the mathematical algorithm exception and the business method exception.[90] Because mathematical algorithms are abstract ideas and not useful, they have been held non-statutory in the past.[91] As demonstrated in *Alappat*, the algorithm must be reduced to a practical application to be patentable.[92]

The Federal Circuit held that "the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, . . ., because it produces a 'useful concrete and tangible result' . . . "[93] The court invalidated the *Freeman-Walter-Abele* test[94] and the little utilized business method exception. The court made it clear that when a claim consists of an algorithm it can be patentable if it is directed to a § 101 category and it is reduced to a practical, useful application.

C. MANUAL OF PATENT EXAMINATION PROCEDURES (MPEP)—HOW TO CLAIM COMPUTER PROGRAMS AS "ARTICLES OF MANUFACTURE"

The United States Patent and Trademark Office (PTO) examination guidelines have likened the propagated signal claim to article of manufacture claims because they are "manufactured" and readable by a computer, consequentially the printed matter doctrine does not apply.

The Constitution states that "Congress shall have Power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[95] The Constitution, the Patent Act[96] and the previously discussed decisions of the federal courts are the laws that the PTO examiners must keep in mind in deciding patentability. The PTO has policies set forth in the

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[90] *Id.*
[91] Diamond v. Diehr, 450 U.S. 175, 209 U.S.P.Q (BNA) 1 (1981).
[92] *Alappat*, 33 F.3d at 1543.
[93] *State Street*, 149 F.3d at 1373.
[94] *See supra* note 45 (describing the test).
[95] U.S. CONST. art. I, § 8, cl. 8.
[96] 35 U.S.C. § 101 (1994).

Guidelines, Training Materials, and MPEP that are supposed to reflect the governing law.[97]

Generally, article of manufacture[98] claims that are directed to software are statutory if they are limited to a specific manufacture having a "practical application in the technological arts."[99] This requirement should not be too difficult to establish, as most claims directed to a specific machine or manufacture will have a practical application. The claim had a practical application because it gave the machine a useful function to carry out.

The PTO has divided the claims into four categories: natural phenomenon (energy, magnetism, etc.), nonfunctional descriptive material, functional descriptive material not embodied in a computer-readable medium, and functional descriptive material embodied in a computer-readable medium.[100] Of these four categories, only the final category, the functional descriptive material embodied in a computer-readable medium, is statutory and therefore relevant to the propagated signal claims.

An example of nonfunctional descriptive material is mere data stored on a computer-readable medium. This, unlike computer instructions, does not give the computer any function with which the computer-readable medium is implemented. Other examples of nonfunctional descriptive material include music and literary works. Music and literary works both receive protection through copyright laws.[101]

One example of the unpatentable functional descriptive material not embodied on a computer-readable medium is a computer program *per se*. The claim must state a computer program embodied in a computer-readable medium.[102] Otherwise, the PTO would hold the claim unpatentable on the ground that the claim is directed to functional descriptive material *per se*. By analogy, a propagated signal claim must be stated where the signal

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[97] *MPEP*, supra note 3.

[98] *MPEP* § 2106, at 3 of 7. A manufacture is: "the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations whether by hand-labor or by machinery." *MPEP* § 2106, at 1 of 5.

[99] *Id.* at 4 of 5.

[100] *Id.* at 4-6 of 7.

[101] 17 U.S.C § 101 (1994).

[102] *MPEP* § 2106, at 4-5 of 7.

is embodied in "a carrier wave," in place of a "computer readable medium" in order to avoid the danger of the claim being held non-statutory as a "signal *per se*."[103]

After determining that the claim is functional descriptive material embodied in a computer-readable medium, the examiner must decide if the claim is directed to a specific manufacture or whether the claim covers any manufacture capable of causing a computer to perform the underlying process.[104] A specific manufacture corresponds to either specific software stored on a type of computer-readable medium or specific software embodied on a general type of memory device.[105]

Most patent owners will want a broader coverage for financial reasons; therefore, the claim should try to cover any and every manufacture for causing a computer to perform the underlying process.[106] The examiner must then determine whether the underlying process is statutory before determining whether the claim as a whole is statutory.[107]

The underlying process is statutory if the claim recites (1) post-computer process activity, (2) pre-computer process activity, or (3) a practical application in the technological arts.[108] The post-computer process will not apply to *Beauregard* claims. This process deals with physical acts performed outside the computer.[109] The pre-computer activity will also not be applicable to *Beauregard* claims either. The pre-computer process activity stipulates that "measurements of physical objects or activities . . . be transformed outside the computer into computer data, where the data comprises signals corresponding to physical objects or activities external to the computer system, and where the process causes a physical

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[103] Horstemeyer & Santos, *supra* note 58, at 6.

[104] *MPEP* § 2106, *available at* <http://www.uspto.gov/web/offices/pac/mpep/mpep/.htm>.

[105] *Id.*

[106] One way to accomplish this is by including flow charts and/or state diagrams in the application that are broad enough to cover several different software implementations. If specific code is disclosed in the application, the specification should state that the code demonstrates the preferred implementation of the invention and further, that the invention is not limited to that particular implementation. Horstemeyer & Santos, *supra* note 58, at 5.

[107] *Id.*

[108] *Id.*

[109] *MPEP* § 2106, *available at* <http://www.uspto.gov/web/offices/pac/mpep/mpep/htm>.

transformation of the signals which are intangible representations of the physical objects or activities."[110]

The pre-computer process activity is to be recited as a positive limitation in the claim[111] and therefore, it is inapplicable to a floppy disk claim.

Lastly, when there is no physical transformation outside the computer, the claim must recite a practical application in the technological arts to be held statutory.[112] This is the test that will apply to propagated signal claims. This practical application test means the claim cannot be merely an algorithm, law of nature, or abstract idea. There must be some useful aspect to the claim.

III. PROPAGATED SIGNAL CLAIMS AS ARTICLES OF MANUFACTURE

Propagated signal claims are currently only hypothetical claims, however, they are important to understand. The reason for the new propagated signal claim in the wake of the *Beauregard* or "floppy disk" claims has been hypothesized as the way to capture the full economic benefit of the invention because software will likely be distributed via the Internet rather than through floppy disks.[113]

The Patent and Trademark Office may be prepared to accept these propagated signal claims as statutory. The claims have been classified by their proponents under the article of manufacture category as a result of the analogies that can be drawn between the two claims. As long as the propagated signal claims have a practical application and are embodied in a computer-readable medium, such as a carrier wave, there should not be a barrier to patentability. The claims have already been heralded as the future claims of computer-related inventions as a result of the analogy that can be drawn between these claims and the article of manufacture claims.[114]

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[110] *Id.* at 2-3 of 5.

[111] *Id.*

[112] *Id.* at 2 of 5.

[113] Richard H. Stern, *An Attempt To Rationalize Floppy Disk Claims*, 17 J. MARSHALL J. COMPUTER & INFO. L.J. 183, 185 (1998).

[114] *See* Horstemeyer & Santos, *supra* note 1, at 6 (stating the propagated signal claim is the new frontier in patent claims).

One very promising sign that the propagated signal is likely to be patentable is the fact that the Solicitor of the U.S. Patent and Trademark Office, Nancy J. Linck, has discussed the propagated signal claim in the context of a law review article.[115] A critical point is how the term computer-readable medium will be defined. Linck stated that the term 'computer-readable medium' will likely be read broadly, "perhaps to include a carrier wave for a data signal."[116] A broad reading is a necessity to the survival of the propagated signal claim as statutory subject matter. An example of a patentable claim that has a practical usefulness in the technological arts of monitoring automated processes in a manufacturing plant was described as follows:

> A computer data signal embodied in a carrier wave comprising:
> (a) a compression source code segment comprising . . . [recites self-documenting source code]; and
> (b) an encryption source code segment comprising . . . [recited self-documenting source code].[117]

Thus it seems that if the practical application test is met and if the carrier wave is viewed as a computer-readable medium the claim will be statutory.[118]

As demonstrated by the *Beauregard* claims as articles of manufacture, a more specific way of viewing the requirements are that the claim must:

> (1) be manufactured (not a natural phenomenon), (2) be directed to functional descriptive material embedded in a carrier wave or some other medium (not functional descriptive material per se and not non-functional descriptive material) and (3) recite a

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[115] Nancy J. Linck & Karen A. Buchanan, *Patent Protection For Computer-Related Inventions: The Past, the Present, and the Future*, 18 HASTINGS COMM. & ENT. L.J. 659 (1996).

[116] *Id.* at 677.

[117] *Id.*

[118] *MPEP* § 2106, *available at* <http://www.uspto.gov/web/offices/pac/mpep/mpep/htm>.

> practical application in the technological arts or cover a specific manufacture.[119]

When drafting a propagated signal claim, there are many points to consider. The practical application of the claim should be recited as a limitation in the claim to be considered in the determination of whether the statutory requirement is met. To err on the side of caution, the carrier wave or propagated medium in the claim must be written in the claim because of the uncertainty surrounding the claim. For the most part there should not be a problem with having to recite the carrier wave; however, the problem could arise with "a purely digital signal comprised of a stream of bits being transmitted in a digital format without being modulated onto an analog carrier wave."[120] This type of propagated signal may be unpatentable if a strict form of the claim is insisted upon.

There are still other issues that must be addressed and worked through concerning the propagated signal claims. Until there is an actual attempt at patenting a claim, many of the issues will remain unresolved. Since there is such uncertainty, one must cover all the bases and include other claims that have always been patentable. As for current signal claims, it is relatively safe to say the claims, if stated as the examples previously given, will be considered statutory subject matter and thus patentable.

IV. THE ADVANTAGES AND POTENTIAL PROBLEMS OF LIABILITY WITH THE NEW PROPAGATED SIGNAL CLAIMS

A. GENERAL ADVANTAGES AND DISADVANTAGES OF THE PROPAGATED SIGNAL CLAIM

The newest computer-related claim has many advantages and a few disadvantages that must be addressed. As mentioned earlier, the new propagated signal claim will allow the realization of the full economic benefit of software commerce since future distribution of the software will be via the Internet.[121] A more negative view

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[119] Horstemeyer & Santos, *supra* note 1, at 6.
[120] *Id.* at 7.
[121] Stern, *supra* note 113, at 183.

of the effect of greater software protection is the concern that since the computer industry was able to achieve such global prominence without the patent protection and, as a result the protection may only result in slowing down the progress of the industry.[122] This argument is counter-intuitive because patent protection will give researchers and developers even more incentive to invest in research with the assurance that their ideas will receive greater protection. The very purpose of patent protection is to provide economic incentive in order to continue the creation of new inventions.

One aspect of the propagated signal claim is that it will increase the breadth of coverage of the patent. The increased coverage is viewed as an advantage to patent owners. For telecommunications companies, however, it is another source of infringement liability.[123] The problem of the propagated signal claim being overbroad is seen as causing "significantly greater damage to the balance between enablement and claim scope that existing patent law provides."[124] The simple way that direct infringement can be detected may be viewed as either an advantage or disadvantage, depending on whether the point of view taken is that of an owner or an Internet Service Provider. Direct infringement can be detected by capturing the signal and analyzing it through a "computer, an oscilloscope, and/or a spectrum analyzer."[125] With the ease of detectability comes the ease to which infringement liability can be placed on Internet Service Providers and therefore, the number of infringement actions against Internet Service Providers will be certain to increase.

Another financial advantage of the propagated signal claim for patent owners is that it can reduce the number of claims required for computer-related inventions and therefore reduce the costs of applying for patents. This is accomplished as the need for separate receiver and transmitter claims is eliminated.[126]

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[122] Linck & Buchanan, *supra* note 115, at 678.

[123] *See* discussion *infra* Part IV.B (discussing carrier liability).

[124] Stern, *supra* note 113, at 214. Stern further states that the claims should be limited in "terms to the environment of the apparatus or process claims on which they are based, and thus to the enabling disclosure behind them." He also suggests format restrictions on the propagated signal claim that should also be required of floppy disk claims. *Id.*

[125] Horstemeyer & Santos, *supra* note 58, at 8.

[126] *Id.*

B. INFRINGEMENT LIABILITY PROBLEMS

A major concern with the new propagated signal claim is the effect it will have on Internet Service Providers, telephone companies, and, as a result, the public at large in the form of increased rates. There is always some uncertainty any time there is rapid development in technology that surpasses the present state of the law. Recently, there has been an attempt to address carrier liability in the copyright area; however, no such effort has been made for patent law. The discussion will include: (1) the potential problems of addressing carrier liability within the current scheme of patent law; (2) how the issue of carrier liability is being handled in the copyright area and (3) how this may help with solutions for addressing carrier liability in the patent area.

Infringement of a patent is defined as "whoever without authority makes, uses, offers to sell, or sells any patented invention . . ."[127] Direct infringement of a propagated signal is easily detectable by computers or oscilloscopes. The propagation of a patented signal makes direct infringers of Internet Service Providers who are not even aware they are carrying the signal. There is no "innocent infringement" exception to patent law. As set out in the statute, direct infringement is a strict liability offense. Internet Service Providers who are merely communicating the signal, with no knowledge and often no control over the signal, could be direct infringers. Another category of potential infringers is that of the manufacturer, seller, and user of the transmitters and receivers for communicating the signals.[128] They all "make" the signal through replicating the signal in order to propagate it and/or "use" the signal.

An argument has been made that merely propagating a signal would not be direct infringement because the signal must have some functional purpose to be patentable and, if the only function is propagation, it would not be patentable and therefore, there would be no infringement.[129] However, if the signal is patented

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[127] 35 U.S.C. § 271(a) (1994).

[128] Horstemeyer & Santos, *supra* note 58, at 8.

[129] E-mail correspondence with Dan Santos, a patent attorney with the law firm of Thomas, Kayden, Horstemeyer, & Risley, LLP in Atlanta, Ga. (Nov. 2, 1998).

and is useful, then the propagation of the signal could lead to direct infringement if replication for propagation occurs. Of course this is assuming the use is an unauthorized use, where there are no license agreements.

If not found to be directly infringing, the Internet Service Provider could be liable for active inducement infringement or even contributory infringement.[130] Contributory infringement and active inducement infringement both require the element of knowledge in order to trigger liability.

Infringement can occur only when there is an unauthorized use.[131] If someone is a licensee or has the patent owner's permission to send the signal over the Internet there can be no liability. The use by the carrier should be impliedly authorized by the agreement. If there is an argument that the use is not authorized and that the carrier indirectly infringed or infringed by inducement, intent to infringe must be shown.[132] The intent would be a difficult element to prove, which may afford the Internet Service Providers or telephone companies some protection.

Perhaps the probability of liability will induce companies to have license agreements. The Internet Services Providers and other intermediaries will insist on indemnity for possible infringement. The economic effect on the software industry will be that fewer small firms will be able to compete in the market because they are unable to provide the indemnification to the Internet Service Providers.[133]

The new propagated signal claims raise a variety of concerns. Uncertainty is one such concern. Specifically how the courts will handle the new issues of carrier liability in light of the possible patentability of the propagated signal claims is unknown. Looking at the developments of the law of the Internet in the copyright area could offer some guidance.

Copyright law protects original works "fixed in any tangible medium of expression."[134] One question answered affirmatively

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[130] 35 U.S.C. § 271(b)-(c) (1994).

[131] *Id.* § 271(a).

[132] *Id.*

[133] *See* Stern, *supra* note 9, at 188 (stating that the new signal claims may lead to a greater concentration in the software industry because new, small firms cannot provide indemnification to Internet Service Providers).

[134] 17 U.S.C. § 102(a) (1994).

is that the data sent via the Internet is "fixed in a tangible medium of expression."[135] Copyright protection gives the owner the exclusive rights to distribution, reproduction, performance, etc.[136] Copyright infringement over the Internet can be done very quickly, easily, and inexpensively. It just takes a matter of minutes to post something on a bulletin board to be read by thousands.

Under copyright law there is a complete defense to copyright infringement called "fair use."[137] The term "fair use" has not yet been precisely defined; however, some examples of what constitutes fair use have been given.[138] To determine fair use, the court must consider four factors:

> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for non-profit educational purposes; (2) the nature of the copyrighted work; (3) the amount and substantiality of the portion used in relation to the copyrighted work as whole; and (4) the effect of the use upon the potential market for or value of the copyrighted work.[139]

The fair use doctrine is the best way to handle the challenges that the new exploiting technology presents to the copyright law

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[135] *See* MAI Sys. Corp. v. Peak Computer, Inc., 991 F.2d 511, 518, 26 U.S.P.Q.2d (BNA) 1458, 1463 (9th Cir. 1993) (stating that the representation created in the RAM is permanent enough to be communicated for a time greater than the transitory duration).

[136] 17 U.S.C. § 106 (1994). Bills were sent to Congress to amend this section to include the right to electronic transmission. H.R. 2441, 104th Cong., 1st Sess. (1995).

[137] 17 U.S.C. § 107 (1994). In addition to the digital transmission language, new language would be added to the end of section 107:

> In making a determination concerning fair use, no independent weight shall be afforded to-(1) the means by which the work has been performed, displayed, or distributed under the authority of the copyright owner; or (2) the application (to the work) of an effective technological measure (i.e. a measure designed to protect the copyright owner's rights in the contents of the work through encryption, scrambling, or means of controlling access to or recording of the contents.

H.R. 2241, *supra* note 136.

[138] 17 U.S.C. § 107 (1994). Some examples are copies for "purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research . . ." *Id.*

[139] 17 U.S.C. § 107 (1994).

arena. It gives guidance to the scope of the infringement, which is necessary with the development of floppy disk and propagated signal claims in the patent law area.[140]

There is some uncertainty and debate as to the role of the fair use doctrine in the use of copyrighted materials by means of the digital network. Guidelines to help decide what constitutes fair use in the digital environment have been proposed.[141]

Liability of On-line Service Providers may be direct, contributory, or vicarious. Contributory infringement liability can be assessed if a person or entity "with knowledge of the infringing activity, induces, causes or materially contributes to the infringing conduct of another."[142] Vicarious liability is viewed in the traditional sense of being held liable for the actions of someone else because of their relationship. Vicarious liability in copyright developed from the "dance hall cases" in which dance hall owners were held liable for infringing performances because they could control the premises and they received a financial benefit.[143] Vicarious liability came to the forefront when the Clinton administration stated that even unaware on-line service providers could be held liable for copyright infringement of third parties.[144] Intent or knowledge is not necessary to impose vicarious liability on on-line service providers.

There has been criticism of the Clinton administration's position on vicarious liability.[145] The analogy taken by the Administration that on-line service providers are like photo developers and bookstores does not make sense. The level of control over the

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[140] *See* Stern, *supra* note 113, at 217 (proposing restrictions on the floppy disk claims and propagated signal claims).

[141] CRAIG JOYCE ET AL., COPYRIGHT LAW 800 (4th ed. 1998), suggesting " '[u]p to 10% or 1000 words, whichever is less,' of text material or '[u]p to 10% or 2500 fields of cell entries, whichever is less, from a copyrighted database. . . .' "

[142] Sega Enter. Ltd. v. Maphia, 857 F. Supp. 679, 686, 30 U.S.P.Q.2d (BNA) 1921, 1926 (N.D. Cal. 1994) (quoting Casella v. Morris, 820 F.2d 362, 365, 3 U.S.P.Q.2d (BNA) 1340, 1342 (11th Cir. 1987)).

[143] *See* Shapiro, Bernstein & Co. v. H.L. Green Co., 316 F.2d 304, 307, 137 U.S.P.Q. (BNA) 275, 277 (2d Cir. 1963) (discussing the case law development of vicarious liability).

[144] Information Infrastructure Task Force, *Intellectual Property and the National Information Infrastructure* (Sept. 5, 1995) 117 [hereinafter NII White Paper].

[145] *See* Ian C. Ballon, *Pinning the Blame in Cyberspace: Toward a Coherent Theory for Imposing Vicarious Copyright, Trademark and Tort Liability for Conduct Occurring Over the Internet*, 18 HASTINGS COMM. & ENT. L.J. 729, 744 (1996) (discussing liability of on-line service providers).

inventory that a bookstore owner has is much greater than the control on-line service providers have over billions of bits of data that flow through the Internet, not to mention the millions of users who can view the infringing material as it passes through the Internet.[146]

The view taken by the NII White Paper has also been contradicted by the judicial branch. In *Religious Technology Center v. Netcom on-line Communications Services, Inc.*,[147] the plaintiff wanted the service provider to block infringing messages from being posted on its bulletin board. The court found that Netcom was not liable for direct infringement merely because it installed and maintained a software system that automatically forwarded messages received onto the Usenet.[148] The judge stated that it would be unreasonable to hold the entire Internet liable for conduct it could not reasonably control because of the volume of data passing through it.[149] The court also addressed the issue of vicarious liability and held that Netcom could not be held liable because it did not receive a direct financial benefit from the infringement.[150]

In the copyright area, efforts are being made to address the infringement liability issues. Legislation adding new technical language has been proposed; standards for fair use in the digital environment have been proposed; and cases have addressed the issue of on-line service providers' liability. Perhaps some answers can be found for liability of patent infringement on the Internet.

As discussed previously, Internet Service Providers could be held liable for direct infringement of the propagated signal claims. Even though the infringement may be "innocent", it does not matter because direct infringement is a strict liability offense. To address this problem new legislation should be introduced to carve out an exception for service providers who are merely propagating or communicating the signal without knowledge of the infringement.

Just as there is a fair use doctrine consisting of four criteria necessary to evaluate the defense in the copyright area, there

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[146] *Id.*

[147] Religious Tech. Ctr. v. Netcom On-line Communications Servs., Inc., 907 F. Supp. 1361, 37 U.S.P.Q.2d (BNA) 11545 (N.D. Cal. 1995).

[148] *Id.* at 1372.

[149] *Id.* at 1372-73.

[150] *Id.* at 1376-77.

should be a kind of "fair use" of a patented propagated signal. One factor to consider is the nature of the use or making of the signal. If the Internet Service Provider is merely communicating the signal without knowledge, this should be weighed in its favor towards a fair use. The same concerns expressed in *Netcom* about holding the entire Internet liable for copyright infringement because of all the billions of bits of information being passed through the Internet are relevant to the infringement of propagated signal patents because of all the different signals being communicated along the Internet.

Even though the signal may be replicated for propagation, if the Internet Service Provider had no knowledge of the infringement and did not initiate the signal, it should not be held liable. It seems that the policy of encouraging inventions through patent protection does not outweigh the substantial hardship that direct infringement would impose on Internet Service Providers and telephone companies. The costs of infringement would probably be spread to the public through higher service rates.

Another factor to consider is the amount of control over the transmission of the signal that the Internet Service Provider can exercise. There are so many different signals being propagated and initiated and so many ways to generate a signal that control of them may be difficult. Perhaps a distinction could be made between content providers and access providers.[151] Content providers may exercise more control over what signals are being transmitted in the system than just access providers.

Lastly, a court could consider the ability that an infringer has to cross license. It seems that most carriers or other infringers would be able to cross license, but the field is so technical and could become increasingly more specialized so that cross licensing would be difficult to accomplish. An example of when a party may have a difficult time cross licensing is when the propagated signal claim is designed to protect a computer program in an area of business that is foreign to the infringer.[152] In this situation, the inability to cross license should be a factor weighed in the infringers favor, because it shows lack of awareness about the signal and provides

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[151] In the copyright case of *Netcom I*, 907 F. Supp. at 1372-73, the court suggested this distinction may be considered in determining direct infringement. Ballon, *supra* note 145.

[152] Horstemeyer & Santos, *supra* note 58, at 8.

a party with little opportunity to avoid the patent infringement.

One alternative to an absolute defense to patent infringement is to have a set standard for determining patent infringement. Perhaps there could be a limit set as to the number of times that a patented signal could be communicated over the Internet before an infringement liability suit is brought. This standard would give the Internet Service Provider a warning that the signal is patented and a chance to find a means to block the signal if it is an unauthorized use.

Even though the propagated signal claim is currently hypothetical, it is inevitable. The traditional system for patent liability may be utilized, but it would be a difficult route to follow. The traditional system could cause great concern for Internet Service Providers. The best approach that companies could take is to require license agreements that include indemnification for potential infringement actions. The software companies should be responsible for any potential liability that their new claims may incur.

V. CONCLUSION

The Internet has made quite an impact on the development of intellectual property law. The ever-changing technology is forcing courts to try and apply the traditional intellectual property rule to this nontraditional technology. The demand on the legal system has been great. The need to adapt and develop both new ways of handling the inventions and new ways of conducting commerce is ever-present.

Patent protection for computer-related inventions has been a necessary yet confusing development. The courts have struggled to decide what is statutory subject matter versus what is just abstract ideas, laws of nature, or natural phenomena and therefore, non statutory subject matter. *In re Alappat*[153] demonstrated that some mathematical formulas were just ideas and therefore non-statutory, unless reduced to a practical application. The case of *In re Warmerdam*[154] demonstrated the difficulty the courts had in

[153] *In re* Alappat, 33 F.3d 1526, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994).
[154] *In re* Warmerdam, 33 F.3d 1354, 31 U.S.P.Q.2d (BNA) 1754 (Fed. Cir. 1994).

determining when a claim is just a mathematical algorithm since there was no working definition. *Warmerdam* reiterated the requirement that the mathematical idea must have a practical application.

The most significant cases that ushered in the propagated signal claim are *In re Lowry*, *In re Beauregard*, and *State Street Bank*. These cases ended the use of the printed matter doctrine so that it no longer applied to data read by a computer. The claims allow for the propagated signal claims to be held statutory by analogy, as long as the courts interpret a carrier wave to be a computer-readable medium. The guidelines for the claims state that the claim must be functional descriptive material embodied in a computer-readable medium and it must have a practical application in the technological arts. As long as the propagated signal claim meets these guidelines when written, they should be held statutory.

An area of concern is carrier liability if these propagated signal claims are held to be statutory. Copyright law has tried to adapt itself to the new infringement possibilities provided by the Internet. The most useful doctrine for the copyright law is the fair use doctrine. Liability of on-line service providers is still a debated issue, but many of the same concerns apply to the patent infringement liability of on-line service providers and therefore, need to be discussed as it has in the copyright area.

The courts could carve out an exception for "innocent" infringement by evaluating whether the company knew or should have known it was infringing and how much control over the propagation of the signal could have been exercised. Increased liability of the Internet Service Providers will likely increase the cost of service to the subscribers.

Regardless of whether the court employs the existing liability system or whether some new criteria is developed, the constant need for adapting and redefining the limits will be ever-present in the patent law arena. The propagated signal is likely to be the next type of patent claim to be held statutory. There will be many new issues to address; however, the signal claims hold wonderful advantages for the patent owner and will continue to provide incentive for discovering ingenious computer-related inventions.

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