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INTRODUCTION

The Canadian Intellectual Property Office (CIPO) issued a moratorium on electromagnetic and acoustic signal claims at the beginning of 2007. CIPO wanted to review international practices and decisions with a view to deciding whether electromagnetic and acoustic signals constitute patentable subject matter. In August of 2007, a Practice Notice settled the question.[1] CIPO decided that electromagnetic and acoustic signals are not patentable subject matter within the meaning of "invention" in s. 2 of the *Patent Act*.

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1 Canadian Intellectual Property Office, Patent Notices (14 August 2007), online: Canadian Intellectual Property Office <http://strategis.ic.gc.ca/sc_mrksv/cipo/patents/pt_notice-e.html>. The notice read as follows:

> *By this notice the Patent Office is formally expressing its position that electromagnetic and acoustic signals are forms of energy and do not contain matter even though the signal may be transmitted through a physical medium. As a result, claims to electromagnetic and acoustic signals do not constitute statutory subject matter within the meaning of the definition of invention in section 2 of the Patent Act. More particularly, an electromagnetic or acoustic signal is interpreted to be neither an 'art' nor a 'process' because it is not an act or series of acts or method of operation by which a result or effect is produced by physical or chemical action. Neither is an electromagnetic or acoustic signal a 'machine', as it is not the mechanical embodiment of any function or mode of operation designed to accomplish a particular effect, or a 'composition of matter', as it is not a chemical compound, composition or substance. An electromagnetic or acoustic signal is taken not to be itself a material product and, therefore, not a 'manufacture.' The position taken in this notice pertains to electromagnetic and acoustic signals per se and does not apply to methods, processes, machines or manufactures involved in the generation, transmission, reception, or processing of signals. The practice expressed in this notice is effective immediately, and supersedes any previously communicated practices related to the patentability of signals.*

Since no Canadian case was before the Patent Appeal Board or the courts, it appears that CIPO simply followed the lead of the United States Patent and Trademark Office (USPTO). In November of 2005, the USPTO stated in its Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility that an electromagnetic signal could not be patented because it was neither a composition of matter nor a manufacture.[2] The USPTO defined manufacture as relating to"structural entities", relying on the definition of manufacture enunciated by the U.S. Supreme Court in *Chakrabarty*.[3]

The U.S. Court of Appeals finally shut the door on the patentability of electromagnetic and acoustic signals in its September 2007 decision in *Nuijten*.[4] Although a strong dissent argued that a signal did fall within the patentable subject matter category of manufacture, the majority held that it did not. Further, the majority clarified that a signal did not fall within *any* of the statutory patentable subject matter categories. A petition for a rehearing *en banc* failed in 2008.

The issue of the patentability of electromagnetic and acoustic signals has not been litigated in Canada. If, however, the issue does come forward for litigation, Canadian courts may decide differently than their American colleagues did. The Supreme Court of Canada's 'Harvard Mouse' decision shows that the Canadian law on patentable subject matter differs from American law. Under the Canadian definition of manufacture, electromagnetic and acoustic signals could constitute patentable subject matter.

I. SCIENTIFIC DEFINITIONS OF ELECTROMAGNETIC AND ACOUSTIC SIGNALS

Signals are an integral part of our daily lives. They allow people who are physically far removed from one another to converse on mobile phones. Signals can stream a live performance in real time into a television set thousands of miles away. But what exactly are they?

Most of us have a general understanding of what a signal is. Webster's New Collegiate Dictionary defines signal as "a detectable physical quantity or impulse (as a voltage, current or magnetic field strength) by which messages or information can be transmitted."[5] A signal is thus physical, detectable and quantifiable. But, Webster's definition also presupposes the presence of coherent intelligence. A sig-

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2 United States Patent and Trademark Office, *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility*, (22 November 2005) at Annex IV, part (c), online: United States Patent and Trademark Office <http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm>.

3 *Ibid.*; *Diamond v. Chakrabarty*, 447 U.S. 303 (U.S., 1980) (in which the U.S. Supreme Court decided that a living, human-made (genetically modified) micro-organism is patentable subject matter as a manufacture or composition of matter within the meaning of the *U.S. Patent Act*, s. 101) [*Chakrabarty*].

4 In *re Nuijten*, 500 F.3d 1346 (C.A.Fed., 2007) [*Nuijten*].

5 Henry Bosley Woolf, ed., *Webster's New Collegiate Dictionary* (Toronto: Thomas Allen & Son Limited, 1980) s.v. "signal" [*Webster's*].

nal occurs when a sender transmits information to a recipient. What follows is an examination of how signals, particularly electromagnetic and acoustic signals, are understood by the scientific and legal community.

(a) Electromagnetic Signals

Electromagnetic signals have been defined as electromagnetic radiation in which associated electric and magnetic field oscillations are propagated through space.[6] Electromagnetic radiation is a series of electromagnetic waves "that are propagated by simultaneous periodic variations of electric and magnetic field intensity, and that include radio waves, infrared, visible light, X rays, and gamma rays."[7] An electromagnetic wave thus consists of a changing electric field and a changing magnetic field.[8] It can exist independently because the changing electric field produces the magnetic field and *vice versa*.[9] The wave's energy flows back and forth between the two fields as it travels through space at the speed of light.[10] An electromagnetic signal is simply an electromagnetic wave that has been altered in such a way that allows it to convey information.

But how is an electromagnetic wave constituted *physically*? The Standard Model describes all known particles and the forces that act between them.[11] All material things are constructions of particles,[12]and forces are the exchange of particles. Electromagnetic interactions are forces.[13]Photons are particles associated with forces.[14]

Photons are elementary particles, meaning they have no further constituent elements.[15] Photons are distinguished from other elementary particles, such as quarks and leptons, by a number of physical qualities.[16] Quarks, for example, have a specific mass whereas photons do not.[17] Furthermore, one of the fundamental proper-

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6 Valerie Illingworth, ed., *The Penguin Dictionary of Physics* (London: Longman Group Ltd., 1991) at 140 [*Dictionary of Physics*].

7 *Webster's*, supra note 5 at 363.

8 Louis A. Bloomfield, *How Things Work, the Physics of Everyday Life* (New York: John Wiley and Sons, Inc., 1996) at 494 [Bloomfield].

9 *Ibid.*

10 *Ibid.*

11 Martinus Veltman, *Facts and Mysteries in Elementary Particle Physics* (Singapore: World Scientific Publishing Co. Pte. Ltd., 2003) at 35 [Veltman].

12 *Ibid.* at 38.

13 *Ibid.* at 53.

14 *Ibid.*

15 *Ibid.* at 55.

16 *Ibid.* at 58.

17 *Ibid.* at 38.

ties of elementary particles is spin.[18] It can be defined as an internal rotation, like the rotation of a spinning ball. Spin can also be quantized.[19]

Photons have other physical properties. They travel at the speed of light and have a specific momentum.[20] Although a photon has no electric charge and has an extremely small, almost negligible mass, it can still interact with any particle that carries a charge.[21] And all non-elementary particles are capable of emitting or absorbing photons.[22]

Under the Standard Model, electromagnetic waves consist of photons.[23] The idea of an electromagnetic field can be related to the notion of particles.[24] In the same way that light is a collection of photons, an electric field surrounding a charged object is a collection of photons (although these photons are subtly different from those of light).[25] A force, then, is an exchange of particles.[26] Particles with electric charge will interact with electromagnetic fields and thus with photons.[27] Radio waves consist of electrons that run up and down a transmitter's antenna, which emits photons that travel through space and act on the charge in the receiver's antenna.[28]

In returning to the question of how an electromagnetic wave is constituted *physically*, the answer is simple; an electromagnetic wave is a physical entity comprised of elementary particles known as photons, which can be organized in patterns. Although alterations in patterning are transient in nature and occur rapidly, they are nevertheless measurable and quantifiable enough to allow a recipient to interpret them as signals.

(b) Electrical Signals

It is useful to define electrical signals since the majority of the court in *Nuijten* refers to them. Electrical signals are electrical currents created through charges (electrons) in motion. Electrons are negatively charged particles that form clouds around the nucleus of an atom. The nucleus itself consists of positively charged protons and neutral neutrons. An ion is an atom or molecule that has lost or gained

18 *Ibid.* at 55.

19 *Ibid.*

20 *Dictionary of Physics*, *supra* note 6 at 350.

21 *Ibid.* at 53, 76.

22 Veltman, *supra* note 11 at 53.

23 *Ibid.* at 70.

24 *Ibid.*

25 *Ibid.*

26 *Ibid.* at 53, 76.

27 *Ibid.* at 73.

28 Veltman, *supra* note 11 at 76; See Bloomfield, *supra* note 8 at 494.

one or more electrons.[29] A charge arises from an excess or deficit of negative electrons in relation to positive protons.[30]

Contact between two materials causes them to become charged such that electrons are transferred from one material to the other. Rubbing the materials together simply enhances the effect.[31] The transfer of electrons leaves a net positive charge on one body and a net negative charge on the other. Charge is a property.[32] It is neither created nor destroyed; it is simply transferred.[33] "When a net charge is added to a conductor, an electric field will be temporarily established in the body of the conductor."[34] The free electrons then redistribute themselves and, within a fraction of a second, the internal electric field will vanish.[35] An electrical current is the rate of flow of free electrons through a conductive surface.[36] When an electrical current is varied between a sender and a receiver, an electrical signal is created.

(c) Acoustic Signals

Acoustic signals are made up of acoustic waves.[37] Acoustic waves are synonymous with sound waves. Any wave can be characterized as a "disturbance . . . travelling through a medium."[38] An acoustic wave in particular is defined as a wave "that is transmitted through a solid, liquid, or gas as a result of mechanical vibrations of the particles in the medium."[39] The vibrating particles move parallel to the direction of the wave. The wave itself is a pattern of compressions and rarefractions of the medium that travel at the speed of sound.[40] When sound waves pass through the ear, air pressure within the ear fluctuates up and down. These fluctuations are heard as sound.[41] While these pressure waves do not alter the composition of matter, they do alter the angle of the bonds between the atoms that form the matter. The bonds are either shortened or lengthened in response to the acoustic

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29 Harris Benson, ed., *University Physics* (New York: John Wiley & Sons, Inc., 1991) at 433 [Benson].

30 John Daintith, Ph.D., ed., *The Facts on File Dictionary of Physics*, 2d ed. (New York: Facts on File, Inc., 1988) at 31.

31 *Ibid.* at 434.

32 *Ibid.*

33 *Ibid.* at 435.

34 Benson, *supra* note 29 at 473.

35 *Ibid.*

36 *Ibid.* at 524.

37 *Dictionary of Physics*, *supra* note 6 at 6.

38 *Ibid.* at 518.

39 *Ibid.* at 6.

40 Bloomfield, *supra* note 8 at 347.

41 *Ibid.*

wave pattern. An acoustic signal is thus a specific acoustic wave pattern that is embodied in physical matter.[42]

Finally, the issue of whether electromagnetic and acoustic signals can arise naturally or whether they are always man-made should be addressed. A natural phenomenon can create an electromagnetic wave. But such a phenomenon cannot alter the field in such a way as to produce a coherent message. Likewise, a natural phenomenon can create an acoustic wave; but, again, the phenomenon cannot produce a coherent message. Take the example of radio waves. A radio station can emit a single musical note or broadcast an entire song, whereas a natural source of radio waves can only produce a non-refined sound, such as the sound of a waterfall. That is because there is no intelligence behind the naturally created wave. The natural source's output does not *signal* a coherent message to a recipient. The conclusion is that signals, whether electromagnetic or acoustic, are *man-made*.

II. LEGAL DEFINITIONS OF PATENTABLE SUBJECT MATTER

Section 2 of the Canadian *Patent Act*[43] defines invention by enumerating categories: "any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter. . . ."[44] This definition finds its roots in the U.S. definition, which defines *invention* as "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof. . . ."[45] The Canadian statutory definition provides for five categories of patentable subject matter: (1) art, (2) process, (3) machine, (4) manufacture, and (5) composition of matter.

The Canadian *Patent Act*, however, excludes specific subject matter from the s. 2 definition of invention. The *Patent Act* provides that "no patent shall be granted for any mere scientific principle or abstract theorem."[46] Courts have interpreted this provision to mean that there is a distinction between a discovery of a natural phenomenon and something involving the application of human ingenuity.[47] One cannot patent science, math, or computer programs, per se;[48] for example, the famous $E=mc^2$ equation is not patentable. Rather, the application of principles and theorems as an *art, process, machine, manufacture*, or *composition of matter* is patentable. Mathematical equations may form part of a patentable claim, provided

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42 *Ibid.*

43 *Patent Act*, R.S.C. 1985, P-4, s. 2 [*Patent Act*].

44 *Ibid.* at s. 2.

45 *U.S. Patent Act*, 35 U.S.C. § 101.

46 *Patent Act*, *supra* note 45 at s. 27(8).

47 *Harvard College v. Canada (Commissioner of Patents)*, 2002 SCC 76, [2002] 4 S.C.R. 45 (S.C.C.) at para. 46-7 [*Harvard*].

48 *Schlumberger Ltd. v. Canada (Patent Commissioner)*, 56 C.P.R. (2d) 204 (Fed. C.A., 1998); leave to appeal refused (1981), 1981 CarswellNat 815 (S.C.C.) [*Schlumberger*].

the equation is part of a tangible medium, like a machine.[49] The U.S. applies a similar limitation, known as the "mere principles" doctrine (nature, scientific principles, and abstract ideas).[50] The U.S. Supreme Court applied that doctrine in *Gottschalk v. Benson* to find that a method for converting binary-coded decimal numbers into pure binary numbers was merely a mathematical formula and thus unpatentable.[51]

In light of the above discussion of what constitutes electromagnetic and acoustic signals, and what constitutes patentable subject matter, we can conclude that these types of signals are neither a mere scientific principle nor an art, process, or machine. Furthermore, given the Supreme Court of Canada's definition of a *composition of matter* as "[a] substance or preparation formed by combination or mixture of various ingredients",[52] these signals cannot be deemed a composition of matter. The remainder of this article will examine whether electromagnetic and acoustic signals fall within the category of *manufacture*.

(a) Definition of Manufacture in the Canadian Jurisprudence

Early on, in the common law patent jurisprudence, manufacture was defined as "something made by the hands of man",[53] meaning whatever is made by the hands of man or by man-made devices or machinery. In 1970, a Canadian court stated that "*[m]anufacture* connotes the making of something. It accomplishes some change in the character or condition of material objects."[54]

The 2002 Supreme Court of Canada decision, in *Harvard College v. Canada*, clarified the definitions of invention, composition of matter and manufacture under s. 2 of the *Patent Act*.[55] In *Harvard*, the respondent and patentee, Harvard College, sought product claims on a non-human mammal, an oncomouse. The oncomouse was a genetically altered mouse that contained a patentable gene, known as the oncogene. The issue before the Court was whether higher life forms were a patentable invention under the *Patent Act*.

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49 See: *Motorola Inc. Patent Application No. 2,047,731, Re* (1998), 86 C.P.R. (3d) 76 (Can. Pat. App. Bd. & Pat. Commr.) (in which the Patent Appeal Board found that a machine that performed certain calculations is not merely a mathematical algorithm but rather a machine specifically adapted to carry out the method of solving the algorithm; Compare: *Schlumberger*, *supra* note 49 (which suggests that claiming *Motorola's* mathematical algorithm as a process is unpatentable).

50 Sam S. Han, Ph.D., "Analyzing the Patentability of 'Intangible' Yet 'Physical' Subject Matter" (2002) 3 Colum. Sci & Tech. L. Rev. 2 at 29 [Han].

51 *Gottschalk v. Benson*, 409 U.S. 63 (U.S. Cust. & Pat. App., 1972).

52 *Harvard*, *supra* note 47 at para. 162.

53 *Hornblower v. Boulton* (1799), 8 Term Rep. 95, 101 E.R. 1285 (Eng. K.B.).

54 *Lawson v. Canada (Commissioner of Patents)* (1970), 62 C.P.R. 101 (Can. Ex. Ct.) at 111 Cattanch J.

55 *Harvard*, *supra* note 47.

The Supreme Court held that higher life forms, such as animals, are not patentable inventions. The Court reasoned that higher life forms qualify as neither a patentable *composition of matter*, nor a patentable *manufacture*. The Court also upheld the distinction as to patentability between lower life forms, such as micro-organisms, and higher life forms, such as plants or animals. Specifically, the Court stated that the patentability of lower life forms is justifiable because "micro-organisms are produced '*en masse* as chemical compounds are prepared, and are formed in such large numbers that any measurable quantity will possess uniform properties and characteristics'";[56] the same cannot be said for higher life forms. The Supreme Court, however, reserved its decision as to whether lower life forms constitute a *composition of matter* or a *manufacture*.[57]

While the *Harvard* decision revolved around living matter, the definitions given by the Court to *composition of matter* and *manufacture* are still very much applicable when analyzing non-living matter, such as an electromagnetic signal. The majority made clear that an invention is not "anything under the sun made by man",[58] but that "Parliament chose to adopt an exhaustive definition that limits invention to any 'art, process, machine, or composition of matter.'"[59] The majority explicitly stated that "Parliament did not define 'invention' as 'anything new and useful made by man.'"[60] The majority also found that Parliament chose the definition of *invention* to expressly include certain subject matter as patentable while excluding other subject matter as being non-statutory subject matter.[61]

In its discussion of patentable subject matter categories, the majority defined the meaning of manufacture after a review of various definitions:

> With respect to the meaning of the word "manufacture" (*fabrication*), although it may be attributed a very broad meaning, I am of the opinion that the word would commonly be understood to denote a *non-living mechanistic product or process*. For example, the *Oxford English Dictionary* . . . defines the noun "manufacture" as the following:
>
> > The action or process of making by hand. . . . The action or process of making articles or material (in modern use, on a large scale) by the *application of physical labour or mechanical power*.
>
> The *Grand Robert de la langue française* . . . defines thus the word *"fabrication"*:
>
> > [TRANSLATION] Art or action or manufacturing . . . *The manufacture of a technical object (by someone)*. Manufac-

56 *Ibid.* at para. 200, quoting *Abitibi Co., Re* (1982), 62 C.P.R. (2d) 81 (Can. Pat. App. Bd. & Pat. Commr), at 89. Commr.).

57 *Ibid.* at para. 201, referencing *Chakrabarty*, *supra* note 3.

58 *Ibid.* at para. 158, referencing *Chakrabarty*, *supra* note 3.

59 *Ibid.* at para. 158.

60 *Ibid.*

61 *Ibid.*

> turing by artisans, by hand, by machine, industrially, by mass production. . . .
>
> In *Chakrabarty*, *supra*, at p. 308, "manufacture" was defined as
>
> > *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.*
>
> These definitions use the terminology of "article", "material," and *"objet technique."* Is a mouse an "article", "material", or an *"objet technique"*? In my view, while a mouse may be analogized to a "manufacture" when it is produced in an industrial setting, the word in its vernacular sense does not include a higher life form. The definition in *Hornblower v. Boulton* (1799). . . cited by the respondent, is equally problematic when applied to higher life forms. In that case, the English courts defined *"manufacture" as "something made by the hands of man"* (p. 1288). In my opinion, a complex life form such as a mouse or a chimpanzee cannot easily be characterized as "something made by the hands of man."[62]

The majority held that manufacture should be defined, with a view to common understanding, as a *non-living mechanistic product or process*.[63] The meaning of non-living hangs on the majority's assertion that "[t]he words 'machine' and 'manufacture' do not imply a conscious, sentient, living creature"[64] and that higher life forms cannot be easily characterized as something made by the hands of man.[65] Under its definition, the majority held that a mammal was not a *manufacture*. Therefore, it can be inferred that the *non-living* part of the definition excludes living creatures from the category of manufacture even if they happen to be man-made. The meaning of *mechanistic product or process*, in the definition, can be expanded as well. A mechanistic product or process is one that has new forms, qualities, properties or combinations thereof, and is man-made. It appears that the Supreme Court's definition of manufacture as a *non-living mechanistic product or process* means a *non-living product or process that has new forms, qualities, properties, or combinations thereof, and is man-made.* This definition will be useful later during our analysis of whether electromagnetic and acoustic signals fit within the definition of manufacture.

There was, however, a strong dissenting view in *Harvard*. Binnie J. (along with McLachlin J., Major J., and Arbour J.) criticized the majority for taking too limiting a view of the word *manufacture*.[66] Binnie J. suggests that the courts should take "the expansionist view that has characterized patent jurisprudence to date."[67]

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62 *Ibid.* at para. 159 [emphasis added in bold].

63 *Ibid.*

64 *Ibid.* at para. 161.

65 *Ibid.* at para. 159.

66 *Ibid.* at para. 58.

67 *Ibid.* at para. 58.

Binnie J. refers to *Godson on Patents* (2nd ed.), in which it is noted that the word manufacture has received "very extended signification" from the courts.[68] Moreover, Binnie J. writes that "the definition of invention should be read as a whole and expansively with a view to giving protection to what is novel and unobvious."[69] Binnie J.'s comments suggest that he endorses the U.S. Supreme Court's expansive view of invention in *Chakrabarty* as "anything under the sun made by man."

Interestingly, in its 2004 decision in *Monsanto Canada Inc. v. Schmeiser*, the Supreme Court of Canada, with a changed bench, altered its course from the Harvard decision to extend patentee rights to plants as higher life forms.[70] The *Monsanto* decision is noteworthy for its discussion about whether the *transient or disappearing nature* of subject matter excludes it as patentable. The Court said this about the transient nature of life forms: "Further, all members of the Court in *Harvard Mouse* noted in *obiter* that a fertilized, genetically altered oncomouse egg would be patentable subject matter, regardless of its ultimate anticipated development into a mouse."[71] Binnie J., in *Harvard*, had expressly stated that "a 'disappearing subject-matter' exception finds no support in the statutory language."[72] It can thus be concluded that subject matter is not excluded from patentability based on its eventual disappearance, or transient nature; i.e., there is no *disappearing subject matter* exception in Canadian patent law.

This is an important clarification by the Court because electromagnetic and acoustic signals are transient in nature, and yet the Supreme Court's statement makes clear that transience is not cause for excluding subject matter from patenting. As discussed earlier, electromagnetic signals are essentially photons that move at the speed of light. Similarly, acoustic signals are compressions and rarefractions of particles that travel at the speed of sound. These signals only last momentarily. In *Nuijten*, the majority of the U.S. Court of Appeals seems to have excluded electromagnetic signals from patenting based on their transient nature, explaining that the "energy embodying the claimed signal is fleeting and is devoid of any semblance of permanence during transmission."[73] This is an important jurisdictional distinction that CIPO may not have picked up on before issuing its 2007 Practice Notice on the patentability of electromagnetic and acoustic signals.

Unfortunately, there has been no judicial pronouncement as to whether claims to electromagnetic and acoustic signals are patentable. CIPO, in consultation with the Canadian patent bar had, however, authored some guidelines on point prior to issuing its negative Practice Notice in 2007. These are found in the Manual of Patent Office Practice (MOPOP), as authored and continually updated by CIPO. MO-

68 *Ibid.* at para. 57.

69 *Ibid.* at para. 59.

70 *Monsanto Canada Inc. v. Schmeiser*, 2004 SCC 34, [2004] 1 S.C.R. 902 (S.C.C.) [*Monsanto*].

71 *Ibid.* at para. 23.

72 *Harvard*, *supra* note 47 at para. 3.

73 *Nuijten*, *supra* note 4 at 16.

POP defines *manufacture* as "the process of making articles or material (in modern use on a large scale) by the application of *physical labour or mechanical power*, or the *article or material made* by such a process; excludes higher life forms."[74] MOPOP's definition is in keeping with the one provided in *Harvard* (i.e., *a non-living mechanistic product or process*) because the phrase the *application of physical labour or mechanical power* simply means something that is man-made. Thus, the MOPOP definition is also a helpful guide.

MOPOP's Chapter 16, which was revised in 2005, reflected updates in Canadian patent practice regarding computer implemented inventions. To date, MOPOP still defines three possible subject matter categories for computer implemented inventions: (1) art or process (method) claims; (2) machine (apparatus or system) claims; and (3) manufacture (products, computer media, including signals embodying code or data structures) claims.[75] Furthermore, MOPOP defines *manufacture* claims as follows:

> [A] computer readable memory storing statements and instructions for execution by a data processing system to direct the system to function in a particular manner. This program storage device claim is variously referred to as a computer readable medium claim, software claim, record carrier claim, article of manufacture or computer product. The computer product is understood to be a product which is adapted to cooperate with a data processing system rather than being a product which is produced by the data processing system.[76]

MOPOP further explains that a signal claim falls within the *manufacture* category and provides an example of a computer program embodied in a signal medium as follows:

> The *computer medium* may exist in a *transitory state of a propagated signal*. The carrier of the computer program is a transmissible carrier in the following acceptable example.
>
> Example, Claim 6: A carrier wave embodying a computer data signal representing sequences of statements and instructions which, when executed by a processor cause the processor to enrol signature information of an authorized user onto an identification card, the statements and instructions comprising the steps of:
>
> > a) collecting samples of a signal at a rate of at least n times a frequency component of said signal which is to be preserved, where n is an integer greater than four;
> >
> > b) digitally filtering said samples representing said signal to remove high frequencies; and

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74 *Manual of Patent Office Practice*, s. 12.02.01, online: CIPO <http://www.cipo.gc.ca> [emphasis added] [*MOPOP*].

75 *Ibid.* at s. 16.04.

76 *Ibid.* at s. 16.04.03.

c) storing the remaining of the filtered samples on said card.[77]

The above example Claim 6 is useful in providing a sample signal claim. Here, the patentee claims a carrier wave (which is an electromagnetic wave) embodying a computer data signal that contains a complex sequence of statements and instructions for a computer to execute. The statements and instructions are enumerated in steps (a) through (c). However, while MOPOP continues to refer to signals as patentable subject matter under the *manufacture* category, it cannot be relied on as an authority on the subject. Its authority has been undermined by the 2007 Practice Notice.

At this point it will be helpful to examine the current state of the law on this issue in the U.S. There have been some recent American judicial decisions on point.

(b) Definition of Manufacture in the American Jurisprudence

Before reviewing the case law, it is worth noting, again, that the definition of *invention* under s. 2 of the *Patent Act* is very similar to s. 101 of the U.S. patent statute. Both statutes define *invention as any new and useful process, machine, manufacture, or composition of matter*. Because Canada and the United States are considered "like-minded jurisdictions"[78] when it comes to issues of patentable subject matter, and have similar statutory provisions, the American jurisprudence is helpful in predicting how issues may be decided in Canada.

On 20 September 2007, the United States Court of Appeals for the Federal Circuit in *Nuijten* held that a signal did not qualify as a manufacture, and was thus considered unpatentable subject matter.[79] Nuijten's patent application was directed to a technique for reducing distortion induced by the introduction of *watermarks* (i.e., additional data) into signals. The Court upheld the decision of the U.S.P.T.O. Board of Patent Appeals and Interferences. The Board had held that claims directed to a storage medium having stored thereon a signal with embedded supplemental data (Claim 15), a method of embedding supplemental data in a signal (Claims 1–10), and an arrangement for embedding supplemental data in a signal (Claims 11–13), were patentable. However, the Board rejected Claim 14 and its dependent claims as being unpatentable subject matter. These claims were at issue on appeal.

The majority reviewed each statutory subject matter category and found that a "transitory, propagating signal...is not a 'process, machine, manufacture, or composition of matter . . . under 35 U.S.C. § 101.'"[80] Thus, Claim 14 and its dependent were deemed unpatentable on that basis.

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77 *Ibid.* at s. 16.04.03b [emphasis added].

78 *Harvard*, *supra* note 47 at para. 38.

79 *Nuijten*, *supra* note 4.

80 *Ibid.* at 18.

For our purposes, the majority's analysis of signal Claim 14, under the manufacture category, is relevant. Claim 14 in the *Nuijten* application read as follows:

> [a] signal with embedded supplemental data, the signal being encoded in accordance with a given encoding process and selected samples of the signal representing protection the supplemental data, and at least one of the samples preceding the selected samples is different from the sample corresponding to the given encoding process.[81]

The majority for the Court of Appeals stated that Claim 14 and its dependents covered "transitory electrical and electromagnetic signals propagating through some medium, such as wires, air or a vacuum."[82] But, in terms of the breadth of the claims at issue, the Court of Appeals construed them to mean that "[a]ny tangible means of information carriage will suffice for all of the claims at issue . . . [and] some physical form is required, but any form will do, so long as the recipient can understand the message, the nature of the signal's physical carrier is totally irrelevant to the claims at issue."[83] On a similar claim construction, the Board rejected the claims as unpatentable subject matter because "[t]he signal does not have any physical structure or substance and does not fit within the definition of a 'manufacture' which requires a tangible object."[84] In other words, Claim 14 was not limited to a particular signal medium, as it merely provided for an *encoded signal*.

While it is arguable that the breadth of Claim 14 captured an *encoded hand signal*, the analysis by the majority was limited to a more realistic interpretation of the type of signal contemplated as being an electrical or electromagnetic signal. The majority conceded that the claimed subject matter was "*man-made*, in the sense of having been encoded, generated, and transmitted by artificial means."[85] The Court's concession here is helpful because it implies that these types of signals are not capable of being produced by natural phenomena, rather are clearly man-made.

The majority then relied on the definition of *manufacture* set out by the U.S. Supreme Court in *Chakrabarty*. That Court defined manufacture as 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."[86] The majority in *Nuijten* emphasized the term article within the *Chakrabarty*

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81 *Ibid.* at 6.

82 *Ibid.* at 8.

83 *Ibid.* at 10.

84 *Ibid.* at 7.

85 *Ibid.* at 15 [emphasis added].

86 *Ibid.* quoting *Chakrabarty*, *supra* note 3.

definition to reason that a manufacture must be a tangible article or commodity.[87] On that basis, the majority found as follows:

> A transient electric or electromagnetic transmission does not fit within that definition. While such a transmission is man-made and physical — it exists in the real world and has tangible causes and effects — it is a change in electric potential that, to be perceived, must be measured at a certain point in space and time by equipment capable of detecting and interpreting the signal. In essence, *energy embodying the claimed signal is fleeting and is devoid of any semblance of permanence during transmission*. Moreover, any tangibility arguably attributed to a signal is embodied in the principle that it is perceptible — e.g., changes in electrical potential can be measured. All signals within the scope of the claim *do not themselves comprise some tangible article or commodity*. This is particularly true when the signal is encoded on an electromagnetic carrier and transmitted through a vacuum — a medium that, by definition, is devoid of matter.
>
> We recognize the wave-particle duality as applied to electromagnetic energy. However, the fact that photons traveling at or near the speed of light *behave in some way like particles* does not make them tangible articles.[88]

The reference to the claimed signal being fleeting or devoid of any semblance of permanence suggests that the majority read into the *Chakrabarty* definition a *non-transitory* requirement. However, the U.S. Supreme Court did not enumerate such a limitation in its definition of *manufacture*. This line of reasoning seems to lack jurisprudential foundation. Moreover, the statement that the claimed signals are not a *tangible* article also seems unfounded. What does it mean to be tangible? Is something that is measurable and quantifiable not inherently tangible? It would appear that the statements by the majority are conclusive rather than well reasoned and based on a sound definition of what a tangible article is. The majority's comments[89] are also unsound because, as discussed previously, photons *are* elementary particles. The theory of wave-particle duality speaks to the properties of particles, such as photons, describing them as having wave-like properties, as well as particle-like properties. This theory does not negate the fact that particle physicists have determined that photons are particles, as are quarks, which constitute protons in atoms. It seems that the majority is discriminating between particles, holding that some constitute physical matter, while others do not. But the law does not provide support for such a distinction and neither does science.

Linn J., the lone dissenter in the three-panel *Nuijten* decision, would likely agree with these comments as to the majority's reasoning. Linn J. found that the signal claims fell within the patentable subject matter category of a manufacture.

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87 *Ibid.* at 16.

88 *Ibid.* at 16 [emphasis added].

89 Bloomfield, *supra* note 8

Linn J. contended that the definition of "manufacture" is not limited to "non-transitory, tangible things."[90] Rather, Linn J. stated as follows:

> Claim 14 is directed to a "manufacture" because the signal is, in the broad sense discussed above, an "article", "produc[ed] . . . for use from raw or prepared materials by giving to these materials [a] new form.". . .Put differently, it is a product of human "art", or ingenuity; it is an application of technology to provoke some purposeful transformation in the real world. Any contrary conclusion must depend on a too-literal reading of either "article" or "material", neither of which appears in the statute, and neither of which any precedent — until today — has imposed as a limitation on the otherwise "expansive" scope of § 101. No matter what form the signal of Claim 14 may take, it *must involve "some physical carrier of information" that is created or manipulated through human activity*, and that physical carrier must function "to convey information to a recipient" — it must signal.[91]

Linn J. points out that there is no non-transitory limitation to articles of manufacture in American jurisprudence. Based on Binnie J.'s comment in *Monsanto*, there is likely no such limitation in Canadian patent law either. Furthermore, these types of signals are man-made, created and manipulated through human activity. Inherent in the creation of a signal is the requirement of a sender and a recipient who can understand the medium chosen to *signal*. Thus, any argument that a natural phenomenon could be responsible for sending these types of signals is unfounded. Linn J.'s dissenting opinion is quite informative with regard to whether electromagnetic and acoustic signals should be deemed patentable subject matter in Canada.

Nuijten was not the first American case that confronted the issue of patenting signal claims. On 20 June 1840, Morse received U.S. Patent No. 1647. In *O'Reilly v. Morse*, the U.S. Supreme Court reviewed the Morse patent and established that certain things were not appropriate subject matter for patent protection, such as the laws of nature, natural phenomena and abstract ideas.[92] The Court held that "the discovery of a principle in natural philosophy or physical science is not patentable."[93] However, the Court upheld the following structural signal claim: "I claim as my invention, the system of signs, consisting of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated, for telegraphic purposes."[94] While the claim reads much like a system claim, the system itself is nothing more than signals (i.e., dots, spaces, and horizontal lines) that are being used to communicate messages. The U.S. Supreme Court, at that time, was persuaded that signals were not a principle of physical science, but rather the production of a "useful result."[95]

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90 *Nuijten*, *supra* note 4 at 2 [Linn J. concurring in part and dissenting in part].

91 *Ibid.* at 19 [emphasis added].

92 *O'Reilly v. Morse*, 56 U.S. 62 (U.S., 1853).

93 *Ibid.* at 116.

94 *Ibid.* at 85.

95 *Ibid.* at 119.

Although other foreign jurisdictions were not thoroughly researched for the purposes of this article, Europe seems to have taken a different, more generous view of the patentability of signal claims. Patents claiming signals are being issued and upheld by the European Technical Board of Appeal, in contrast to their North American counterparts.[96] One European applicant successfully argued before the board that an electronic message is patentable because it is clearly the product of an electronic process, which is also patentable.[97] In that decision, the Board likened

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96 *IBM/Computer programs (T935/97)*, [1999] E.P.O.R. 301 (EPO (Technical Bd App), 1999) (in which the Board ruled that there are many ways to form a claim for a computer program product and that it is not important whether the program is claimed alone, or stored through the means of, or in the form of a signal; i.e. a program stored on disk as a file, or a program transmitted through the internet; the Board stated that "the computer program product comprises a computer-readable medium on which the program is stored, this medium only constitutes the physical support on which the program is saved, and thus constitutes hardware"). See also Jean Hughes, *Patentability of software, comment in IBM/Computer programs Technical Board of Appeal (T935/97)*, [1999] E.I.P.R. N-161[RNF].

97 *LUCENT/Structured voicemail messages (T858/02)* (2005), [2006] E.P.O.R. 6 (EPO (Technical Bd. App.), 2005) (in which the Board of Appeal states:

> IV. The single independent claim 1 reads as follows:
>
> > An electronic message comprising: a plurality of messaging elements, at least one of the messaging elements being associated with at least a portion of the content of the message and at least one of the messaging elements comprising instructions that define a structure of the message; and an address of a recipient of the message on a messaging system that stores the message and is capable of interpreting the instructions, assembling the content-related messaging elements in accordance with the instructions, and presenting the assembled message to the recipient when the recipient retrieves the message from storage.
> >
> > . . . . .
> >
> > **Reasons for the Decision**
> >
> > ***5.1 — The objection under Art.84 EPC***
> >
> > The Examining Division gave Art.84 EPC as its first ground for refusing the application. It would appear that the fundamental objection was that the term 'message' defined neither a physical entity such as a product or apparatus nor an activity such as a method or process, these being the only allowable categories of patent claim. It was not explained how this objection arose from Art.84 EPC. The Board notes that the decision of the Enlarged Board of Appeal G2/88 . . . distinguishes two basic types of claim, namely claims to physical entities and claims to physical activities, at point 2.2, although it goes on to point out that

the electronic message to a television signal which had earlier been held patentable by the Board.[98] The success of the product by patentable process argument in the European forum is interesting. One could similarly argue in the Canadian context that if the process by which the signal is made is patentable subject matter, so too is the resultant product of that process.

III. ANALYSIS OF SIGNALS AS A MANUFACTURE

Recall the Supreme Court of Canada's definition of *manufacture as a non-living mechanistic product or process*. This definition can be parsed to mean *non-living product or process that has new forms, qualities, properties, or combinations thereof and is man-made*.[99] As signals are the product of a process of encoding

> claims including both features relating to physical activities and features relating to physical entities are also possible, and that there are no rigid lines of demarcation between the various possible forms of claims. . . . Article 84 is further mentioned in G 2/88, . . . but only to say that physical entities must be defined in terms of physical parameters of the entity, and physical activities must be defined in terms of their physical steps. . . . The Examining Division considered that a 'message' related to the communication between two entities, and that such a communication could not be considered as a physical entity but rather related exclusively to the information content, which was non-physical information of an essentially abstract character. But when considering the nature or category of a claimed invention attention must be paid to the substance of what is claimed, rather than only taking into account how the claimed subject-matter is designated, which can be deceptive. In the Board's view the content of the information in the message, in the sense used by the examination division, is not claimed. It is commonplace that the same word may be used both for the physical realisation of some information and its content, in the sense of what is understood by its recipient (consider the word 'film'). Thus, whereas the term 'message' may in some contexts refer merely to the information it is intended to convey ('The message of 'Don Quixote' is . . .'), when qualified by the term 'electronic' the natural meaning refers to its physical realisation. An electronic message is an electrical, magnetic or electromagnetic signal or collection of signals and moreover clearly the product of an electronic process. This conclusion is congruent with the decision . . . to grant a patent containing a claim directed to a 'colour television signal.' . . . Thus, the Board concludes that the Examining Division's rejection of the application under Art.84 EPC was not well-founded).

98 *Ibid.*

99 *Harvard*, *supra* note 47.

information into some medium, we can eliminate the term *process* from further analysis.

(a) A Product with New Forms, Qualities, or Properties

As previously explained, electromagnetic signals are photons that take on a specific form to communicate a message. While a photon can be distinguished from other particles based on its properties, it is no less a particle. It is true that photons do not form parts of objects, like chairs and tables. This job is reserved for other particles such as neutrons and protons. However, it seems that authorities on this subject are making an arbitrary distinction between particles. For example, the Court in *Nuijten* classified some particles as matter while excluding others such as photons as non-matter, even though a photon has physical characteristics that are measurable. Electromagnetic signals (photons) are products that are produced by a *man-made* process and have specific measurable *forms, qualities, and properties*. The Court in *Nuijten* also suggested that an article of manufacture needs mass; however, this requirement is not part of the *Chakrabarty* definition. The fact that photons essentially have no mass does not change the fact that they possess other physical properties, such as momentum and the ability to interact with other matter and cause it to be disturbed in some way.

CIPO, in its 2007 Practice Notice, seems to take a view similar to the majority's in *Nuijten*. CIPO also added a new qualifier to the definition of *manufacture* with its statement that electromagnetic signals are not in themselves *material* products. This qualifier is not found in the Supreme Court's definition of *manufacture*. Rather, the Supreme Court refers to *mechanistic* products or processes, not *material* products or processes. As such, CIPO's position is tenuous.

Similar arguments may be made vis-à-vis acoustic signals. These signals manifest themselves physically as vibrations of particles in a particular medium. While acoustic signals are fleeting, the compression and rarefaction of the particles *mechanistically* change the *form* of the medium. Thus, this detectable and measurable form is a *mechanistic product*.

(b) Non-Living and Made by the Hands of Man

Electromagnetic signals (i.e., photons) clearly do not constitute living matter. Although electromagnetic or acoustic waves can be created by a natural phenomenon, such waves are disturbances[100] that do not *signal* information. Rather, signals that carry information from a sender to a recipient can only be man-made. Thus, one must distinguish electromagnetic signals created by man from electromagnetic waves, which may or may not be created by man. Moreover, applicants who have sought to claim a signal have expressly limited the claim by referring to a *signal*. For example, Claim 6 from MOPOP's Chapter 16 clearly refers to a signal, as does *Nuijten's* Claim 14.

100 *Dictionary of Physics*, *supra* note 6 at 518.

(c) Analogous to Computer Readable Media Claims

A concern with CIPO's rejection of signals as patentable subject matter is that the rejection is based on form rather than substance. Computer readable media claims are considered patentable subject matter under the s. 2 definition of inventive subject matter of the *Patent Act*. MOPOP's Chapter 16 provides that a computer implemented invention may be a patentable *manufacture* if claimed as a computer readable claim, provided the claim recites "the material or physical medium in a positive manner, storing or embodying the computer readable code of the computer program for execution in the computer."[101] For example, a signal carrying computer readable code is patentable subject matter, provided it is claimed as stored on a physical medium, such as "computer readable memory"[102] or as a "computer product."[103]

However, claiming a signal as embodied in a computer readable memory, adds nothing inventive to the subject matter. Rather, it merely forces the patent applicant to pigeon hole his or her invention into a certain claim form in order to get patent protection. Yet, electromagnetic signals are essentially a type of computer readable media: they can be read by computers upon receipt. As such, by not permitting claims to signals, it seems that CIPO is favouring a *form over substance* approach in that there is no substantive difference between claiming a signal and computer readable memory storing that same signal. Electromagnetic signals should, in fact, be considered a patentable manufacture, given the patentability of other similar forms of computer readable media.

The U.S. also appears to take a similar *form over substance* stance regarding the patentability of computer readable media versus that of signals. The Court in the *In re Beauregard* decision held that signals embodied in a *tangible medium* constitute patentable subject matter.[104]

(d) Relative Importance of Signal Claims

Signals may be protected as patentable subject matter if claimed as computer readable media. There is unique enforcement and jurisdictional consideration granted to signal claims. This makes the securing of a claim quite valuable to a patentee.

However, enforcement may be feeble if the signal claim is not in place; it may be difficult for a patent owner to try to enforce a claim on the process of generating a signal when a pirate infringes the process.[105] On the other hand, to enforce a

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101 *MOPOP*, *supra* note 74 at s. 16.04.03a.

102 *Ibid.*

103 *Ibid.*

104 In *re Beauregard*, 53 F.3d 1583 (C.A. Fed., 1995).

105 Richard H. Stern, "Patenting Signals" (March/April 1998) IEEE Micro 6 at 8.

secured signal claim, a patent owner need only show the transmission of the infringing signal.[106]

To highlight jurisdictional considerations, the following hypothetical scenario may be helpful. Suppose a valid Canadian patent claims a computer readable memory embodying a novel signal. Also, imagine that there is no equivalent U.S. patent. Now, a U.S. company decides to use the signal patented in Canada throughout the U.S. Of course, because there is no U.S. patent, the U.S. company is free to do so. However, the signal claimed in the Canadian patent is being clearly transmitted from Detroit to Windsor. Windsor residents are therefore taking advantage of the signal. To enforce its claim against the pirates, the Canadian patentee would be required to prove that individual Windsor residents are downloading the signal onto computer readable memory. Suing each resident would likely be very ineffective and cost prohibitive. Unfortunately, under the current patent scheme, the patent owner has little choice. Although the Canadian patent owner may be able to sue the U.S. company for inducing infringement, it may be difficult for the patent owner to prove that the U.S. company *knowingly induced* the Windsor residents to infringe the Canadian patent.[107] But, if the patentee had a signal claim, the signal claim could make the U.S. company a direct infringer rather than an indirect infringer.[108]

Another benefit to allowing signal claims is that it may reduce the number of claims currently required to adequately protect the invention.[109] Currently, patentees will draft signal claims, as to computer readable memory or to a process for encoding a signal, in a variety of *forms*. Referring back to the *Nuijten* application, the signal was claimed in three other patentable forms: (1) as a storage medium having stored thereon a signal with embedded supplemental data (Claim 15), (2) as a method of embedding supplemental data in a signal (Claims 1–10), and (3) as an arrangement for embedding supplemental data in a signal (Claims 11–13). Are these forms of claiming the signal truly necessary, or is it a case of allowing form to trump substance? Claiming a signal in a storage medium adds nothing to the inventiveness of the subject matter.

(e) Public Policy Considerations

One concern raised by the Supreme Court in *Harvard* relates to balancing the promotion of ingenuity with other competing social considerations.[110] In the case of eclectromagnetic and acoustic signals, patentability does not involve moral considerations of the sort which arise in the patenting of a life form. Signals involve

106 *Ibid.*

107 See *Slater Steel Industries Ltd. v. R. Payer Co.* (1968), 55 C.P.R. 61 (Can. Ex. Ct.) (in which the Court summarizes Canadian law on inducing infringement).

108 See Jeffrey R. Kuester & Scott A. Horstemeyer & Daniel J. Santos, "A New Frontier in Patents: Patent Claims to Propagated Signals" (1998) 17 J. Marshall J. Computer & Info. L. 75 at 87.

109 *Ibid.*

110 *Harvard*, *supra* note 47 at para. 185.

non-living subject matter. As discussed above, they fall readily within the already patentable subject matter category of computer readable media. Research and development in the area of information technology would likely be stimulated if inventors were allowed to patent signal claims because of the added protection that claims provide to a patentee. Thus, the public policy benefits of promoting ingenuity in this technical field most likely outweigh any potential social concerns.

Also, given that s. 27(3) of the *Patent Act* was repealed in 1993, (this provision prohibited patenting of an invention that had "an illicit object in view"), it would seem that *value judgments* have no place in assessing patentability.[111] If governments want to regulate particular subject matter, specific legislation should be enacted to do so. After all, not all invented subject matter is patented. The *Patent Act* and CIPO cannot, and should not, be used to regulate whole subject matter areas. Other government departments are better equipped to do this. With respect to pharmaceutical patents, for example, Health Canada oversees health and safety risks related to the sale and use of various consumer products across Canada.

IV. RECOMMENDATIONS

(a) Han's Disclosure Test

Sam Han suggests a possible solution to the problem of how to examine patentability of signals.[112] Han suggests that the terms *new* and *useful* in 35 U.S.C. s. 101 should play a role in the analysis of patentable subject matter. Han advocates a four-part test, whereby an examiner would perform a sequential review of the claims by stepping through ss. 101 (which delineates patentable subject matter), 112 (which requires an enabling disclosure for the claimed subject matter), 102 (which requires that the invention be new), and 103 (which requires it to not be obvious) of the U.S. patent statute.[113] Han's four-part test would undertake the following analysis to determine patentability:

1) According to 35 U.S.C. s. 101 and the *Chakrabarty* decision, is the subject matter *made by man*?

   If answered in the negative, the subject matter is considered non-statutory and thus unpatentable;

   If answered in the affirmative, the subject matter is considered statutory; move on to step 2;

2) According to 35 U.S.C. s. 112, is the written disclosure sufficiently enabling for one of skill in the art to reproduce the subject matter (e.g., generate such a signal)?

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111 See Bita Amani, *State Agency and Patenting of Life in International Law: Merchants and Missionaries in a Global Society* (Aldershot, Hampshire: Ashgate Publishing, Forthcoming August 2009) at 176.

112 Han, *supra* note 50.

113 *Ibid.* at 64–73.

If answered in the negative, the claimed subject matter is not patentable for insufficient disclosure;

If answered in the affirmative, there is sufficient disclosure; move on to step 3;

3) According to 35 U.S.C. s. 102, is the subject matter novel?

If answered in the negative, the claimed subject matter is not patentable;

If answered in the affirmative, move on to step 4;

4) According to 35 U.S.C. s. 103, is the subject matter obvious?

If answered in the affirmative, the claimed subject matter is not patentable;

If answered in the negative, the claimed subject matter is patentable.

In step one, Han does not contemplate pigeon-holing the subject matter into a specific category like that of composition of matter. Rather, Han suggests that because "anything under the sun may be manipulated by man to a useful end, everything should be regarded as being within s. 101."[114] Han also suggests that the "degree of abstraction" (or "abstract" nature) of the claim should be determined under step two's 35 U.S.C. s. 112 analysis.[115] If the subject matter is too abstract, the claimed subject matter cannot be reproduced by the skilled artisan. Han is referring to the exclusion of abstract ideas and mere principles from patenting. While steps three and four add nothing new to the current analysis, they ensure that the review of novelty and obviousness requirements are separate from the step one inquiry of what is made by man. For example, if a signal contemplated something already produced by a natural phenomenon or already existing in nature, that signal could not be patented.

Han's disclosure test is useful in emphasizing the importance of the disclosure requirement. Whether the claimed subject matter is too abstract is a determination that should follow a determination of whether the subject matter is patentable.

(b) A Canadian Disclosure Test for the Manufacture Category

In the Canadian context, a similar disclosure test to that of Han's could be applied. However, given the differences in Canadian and American law as to patentable subject matter, step one would need to be modified. In addition, a modified-Han analysis would need to be reserved for the manufacture category of claims.

114 *Ibid.* at 64.

115 *Ibid.*

The other three steps would remain quite similar. The Canadian analysis could break down as follows:

1) According to s. 2 of the *Patent Act* and the Canadian jurisprudence, does the subject matter involve a *non-living product or process made by the hands of man that has new forms, qualities, properties, or combinations thereof?*

   If answered in the negative, the subject matter is considered non-statutory and thus unpatentable;

   If answered in the affirmative, the subject matter is considered statutory; move on to step 2;

2) According to s. 27(3) of the *Patent Act*, is the written disclosure sufficiently enabling for one of skill in the art to reproduce the subject matter (e.g., generate such a signal)?

   If answered in the negative, the claimed subject matter is not patentable for insufficient disclosure;

   If answered in the affirmative, there is sufficient disclosure; move on to step 3;

3) According to s. 28.2 of the *Patent Act*, is the subject matter novel?

   If answered in the negative, the claimed subject matter is not patentable;

   If answered in the affirmative, move on to step 4;

4) According to s. 28.3 of the *Patent Act*, is the subject matter obvious?

   If answered in the affirmative, the claimed subject matter is not patentable;

   If answered in the negative, the claimed subject matter is patentable.

The above analysis conforms to the recent jurisprudential statements on patentable subject matter. It appears that CIPO did not follow this type of analysis. The Supreme Court in *Harvard* states that a manufacture is a *non-living mechanistic product*. CIPO has injected a new and troublesome requirement into the definition of *manufacture* by adding the term *material* before *product* in its Practice Notice to draw its conclusion that an electromagnetic signal is not a manufacture.

CONCLUSION

The author concludes that electromagnetic and acoustic signals are patentable subject matter under the manufacture category. This conclusion is based on the author's finding that the legal definition of *manufacture* encompasses the scientific definitions of electromagnetic and acoustic signals. Should this conclusion be adopted in Canada, the four-part analysis recommended above would provide a helpful guide to courts and patent office examiners in analyzing this type of patentable subject matter for patentability.