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Patent Law Challenges for the Internet of Things

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PATENT LAW CHALLENGES FOR THE INTERNET OF THINGS

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ABSTRACT

   In the near future, emerging technologies will allow billions of everyday devices to be connected via the Internet. This increasingly popular phenomenon is referred to as the Internet of Things ("IoT"). The IoT is broadly defined as technology that allows everyday devices to (1) become "smart" and (2) communicate with other smart devices. Estimates indicate that the market for smart devices, such as wearables, will grow to $70 billion dollars in the next ten years. Like many other emerging technologies, the entrepreneurs and companies developing these applications will seek patent protection for their inventions. In turn, the current U.S. patent system will present challenges for IoT technologies.

   Many of the patent issues that were prevalent for Internet Age inventions will also be of concern for IoT technology. Specifically, IoT technology raises issues concerning patentability, joint infringement and patent quality. This essay provides a brief overview of these issues and concludes that although patentability and joint infringement will present challenges for the IoT, they are not insurmountable. Further, the essay predicts that the new United States Patent and Trademark Office ("USPTO") quality initiatives will likely lead to the existence of IoT patents of a more reasonable scope than the heavily criticized Internet Age patents of the late 90's and early 2000's.

   In sum, the IoT presents tremendous potential for consumers. In addition, this emerging technology will present patent practitioners, policy-makers and scholars with the opportunity to observe, question and, if necessary, modify the patent system to promote innovation and continued growth in IoT technologies and applications.

I. INTRODUCTION

Imagine that as you are leaving work one evening you receive a text message on your smart phone. The message reminds you to pick up milk on your way home. This may sound like a typical occurrence, except instead of the message originating from your spouse or roommate, it was sent by your refrigerator.[1] In addition to this reminder, your refrigerator has also sent information to your car's GPS that contains directions to a grocery store with the best milk price and that is conveniently located on your route home.[2] When you arrive at the grocery store, your milk is bagged and waiting for you. Finally, your credit card is charged for the price of the milk as you leave the store.[3] Welcome to the world of the Internet of Things.

The IoT consists of a complex network of connected smart objects and devices.[4] IoT technology basically consists of three elements: (1) smart devices, (2) protocols for facilitating communication between the smart devices, and (3) systems and methods for storing and analyzing data acquired by the smart devices.[5] How companies will implement

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[1] See Owen Thomas, *What if Our Refrigerators Get a Little Too Smart?*, READWRITE (May 22, 2014), http://readwrite.com/2014/05/22/smart-refrigerators-connected-home-digital-fitness (explaining how a combination of sensors and smart devices, including a refrigerator that could drastically transform an ordinary day of the average citizen); *see also* Avi Itzkovitch, *The Internet of Things and the Mythical Smart Fridge*, UX MAGAZINE (Sept. 18, 2013), http://uxmag.com/articles/the-internet-of-things-and-the-mythical-smart-fridge (discussing various capabilities of a smart and connected refrigerator).

[2] See *Global Patents Reflect Advances in Connected and Self-driving Cars*, ECON. TIMES, Jan. 20, 2015, http://economictimes.indiatimes.com/news/international/business/global-patents-reflect-advances-in-connected-and-self-driving-cars/articleshow/45947342.cms (discussing the increased patent activity in technologies related to automobile navigation telematics).

[3] See Keith Mercier, *The Internet of Things Will Transform Retail As We Know It*, FORBES (Jan. 12, 2015, 9:00 AM), http://www.forbes.com/sites/ibm/2015/01/12/the-internet-of-things-will-transform-retail-as-we-know-it (discussing numerous ways in which the internet of things will transform retail sales).

[4] Gerd Kortuem et al., *Smart Objects as Building Blocks for the Internet of Things*, IEEE 30, 44 (Frederic Thiesse & Florian Michahelles eds., Jan./Feb. 2010), http://www.fahim-kawsar.net/papers/Kortuem.IEEEInternet2010.Camera.pdf.

[5] See Peng-fei Fan & Guang-zhao Zhou, *Analysis of the Business Model Innovation of the Technology of Internet of Things in Postal Logistics*, IEEE 532, 532 (2011) ("The Internet of Things, which bases on the Internet, uses a variety of information sensing identification device and information processing equipment, such as RFID, GPS, GIS, JIT, EDI, and other devices to combine with the Internet to form an extensive network in order to achieve information and intelligence for Entity.").

and use this technology raises a number of issues in various legal contexts including privacy, criminal law, and intellectual property.[6] This essay focuses on some of the intellectual property concerns, namely challenges that patent law may pose for IoT technology.

Similar to basic internet technology, IoT technologies facilitate collaboration and the sharing of information in a rapid and efficient manner.[7] Accordingly, it is likely that IoT technology will encounter similar patent related challenges to those experienced with Internet Age inventions. Specifically, IoT technology raises issues concerning patentability, joint infringement, and patent quality. This essay provides a brief overview of those issues and concludes that patentability and joint infringement are major challenges for IoT technologies. However, once properly understood, these challenges can be managed and may even present opportunities to improve the current patent system. Further, this essay predicts that the new USPTO quality initiatives, such as post grant procedures and the covered business method review, will likely lead to the existence of IoT patents of a more reasonable scope than the heavily criticized Internet Age patents of the late 90's and early 2000's.

Several commentators have discussed the legal implications of the IoT in broader contexts.[8] In contrast, this essay presents a brief overview of two rapidly developing, doctrinal challenges for IoT technology—patentability and joint infringement.[9] Uniquely, this essay is one of the first to discuss IoT technology in light of the most recent changes to the Federal Circuit's joint infringement jurisprudence.[10] Further, this essay briefly discusses how the USPTO's post grant proceedings might impact the patentability of IoT technology.

According to a recent report by the consulting firm Accenture, IoT is a catalyst for the rapid growth and development of digital businesses.[11] Further, a significant amount of patenting activity and

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[6] *See, e.g.*, Scott R. Peppet, *Regulating the Internet of Things: First Steps Toward Managing Discrimination, Privacy, Security, and Consent*, 93 TEX. L. REV. 85, 117 (2014) (discussing legal issues concerning the Internet of Things such as discrimination, privacy and security).

[7] Fan & Zhou, *supra* note 5, at 532.

[8] *See, e.g.*, Peppet, *supra* note 6; *see also* Kevin Werbach, *Sensors and Sensibilities*, 28 CARDOZO L. REV. 2321, 2323 (2007).

[9] *See* Alice Corp. Pty. v. CLS Bank Int'l, 134 S. Ct. 2347, 2358 (2014) (addressing the issue of patent eligibility); Akamai Techs., Inc., v. Limelight Networks, Inc., No. 09-01372, 2015 WL 2216261, at *6 (Fed. Cir. May 13, 2015) (addressing the issue of joint infringement).

[10] *See Akamai*, 2015 WL 2216261, at *6.

[11] *Digital Business Era: Stretch Your Boundaries*, ACCENTURE TECHNOLOGY VISION, at 59, *available at* http://techtrends.accenture.com/us-en/downloads/Accentu re_Technology_Vision_2015.pdf.

legal developments concern core technologies that are the backbone of IoT—electronic consumer devices and software.[12]

One challenge for inventors of certain types of IoT applications will be overcoming the test for patent eligibility.[13] An inventor may obtain a patent for "any new and useful process, machine, manufacture, or composition of matter."[14] However, courts have struggled to apply this deceptively simple statutory language to Internet Age inventions. One difficulty is that, although the courts have maintained that software is eligible for patenting, software that is simply used to carry out an abstract idea may not be patentable.[15] Since IoT technology will rely heavily on software, it will also be susceptible to patent eligibility challenges.

Another challenge for IoT innovators will be enforcing their patent rights against potential infringers. IoT technology is interactive and collaborative. Specifically, the IoT relies on communication between two or more smart objects and/or consumers.[16] Even if inventors obtain patents on new methods and protocols for facilitating interactivity between multiple participants, the patents still may be very difficult to enforce against multiple infringers.[17] This problem is commonly referred to as joint infringement. The recent case law in this area has struggled to come to a consensus on how liability for infringing interactive method claims is assessed among multiple participants.[18] Thus, even if IoT patentees are successful in obtaining patent protection, the doctrine of joint infringement may pose a second hurdle for patented IoT technology.

Finally, some of the USPTO's new procedures relating to patent quality might have a significant impact on IoT patents. In 2011, President Obama signed the America Invents Act ("AIA") into law.[19]

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[12] See IFI Claims 2014 Top US Patent Assignees, IFI CLAIMS PATENT SERVICES, http://www.ificlaims.com/index.php?page=misc_top_50_2014 (last visited June 5, 2015) (showing that the top 10 assignees of patents in 2014 are software and consumer electronic companies).

[13] Paul England & Kathleen Murphy, Patent Issues and the Internet of Things, TAYLORWESSING (Feb. 2014), http://www.taylorwessing.com/download/article_patent_iot.html.

[14] 35 U.S.C. § 101 (2012).

[15] See Alice, 134 S. Ct. at 2357.

[16] See Kortuem et al., supra note 4, at 34.

[17] See generally W. Keith Robinson, Economic Theory, Divided Infringement and Enforcing Interactive Patents, 67 FLA. L. REV. (forthcoming 2015) (discussing the impact of various theories for joint infringement liability on the enforcement of interactive inventions).

[18] See, e.g., Limelight Networks, Inc. v. Akamai Techs., Inc., 134 S. Ct. 2111, 2117 (2014) (rejecting the Federal Circuit's partial inducement rule).

[19] Press Release, The White House, President Obama Signs America Invents

The new law allowed the patent office to create several proceedings aimed at increasing patent quality.[20] Three that are relevant for the purposes of this paper include inter partes review, post grant review, and covered business methods review. [21] These procedures will undoubtedly be used to challenge not only the patentability of IoT inventions, but also their scope.

Given the challenges above, what will be the impact of the patent system on IoT technology? Conversely, will IoT technology have any impact on patent law? Answers to these questions are of interest to all stakeholders in the patent system including inventors, policy makers, practitioners, and academics.

Concretely describing and claiming the inventive concepts of IoT technology will be key in overcoming patentability challenges. [22] Similarly, strategic claim drafting will be one way for practitioners to avoid joint infringement issues.[23] In addition, the newly minted USPTO procedures to improve patent quality, such as the post grant review, may impose a higher standard of quality on IoT inventions.[24]

Further, IoT technology will likely provide excellent test cases for the Federal Circuit's most recently formulated test for joint infringement.[25] It is possible that, depending upon the outcome of future joint infringement cases, we may yet again see this issue before the Supreme Court. [26] Accordingly, while the IoT presents an opportunity to change the lives of consumers, it also may present opportunities to change patent law.

This essay proceeds as follows. Part II describes the IoT in more detail. Then, Part III briefly discusses what challenges patent law may

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Act, Overhauling the Patent System to Stimulate Economic Growth, and Announces New Steps to Help Entrepreneurs Create Jobs (Sept. 16, 2011), *available at* https://www.whitehouse.gov/the-press-office/2011/09/16/president-obama-signs-america-invents-act-overhauling-patent-system-stim.

[20] Edward J. Pardon & Shane A. Brunner, *Boosting Creative Competition: America Invents Act*, 85 WIS. LAW. 6 (Oct. 2012).

[21] *See* 37 C.F.R. §§ 42.100–42.304 (2012).

[22] *See* Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1294 (2012).

[23] *See* BMC Res., Inc. v. Paymentech, L.P., 498 F.3d 1373, 1381 (Fed. Cir. 2007), *overruled by* Akamai Techs., Inc. v. Limelight Networks, Inc., 692 F.3d 1301, 1321 (Fed. Cir. 2012).

[24] *See, e.g.*, VirtualAgility Inc. v. Salesforce.com, Inc., 759 F.3d 1307, 1315 (Fed. Cir. 2014) (granting stay in favor of competitor in lieu of post-grant review).

[25] *See Akamai Techs. Inc.*, 2015 WL 2216261, at *8.

[26] *See* Tony Dutra & John T. Aquino, *Federal Circuit Affirms 'Single Entity' Infringement Rule, Will Affect Biopharmas*, BLOOMBERG LAW PHARMACEUTICAL LAW & INDUSTRY REPORT, 13 PLIR 732 (May 22, 2015) (reporting that Akamai plans to file a petition for an *en banc* rehearing).

pose for the IoT industry. Part III first briefly summarizes the current patentability doctrine as it applies to the IoT. Part III then discusses the implications of the joint infringement doctrine and the IoT. Finally, Part III posits what impact the USPTO procedures will have on the IoT.

In sum, the IoT is poised to usher in a new era of convenience and collaboration. But for the IoT to succeed, several patent issues need to be understood.

II. BACKGROUND

A. The Internet of Things

Bruce Sterling, a science fiction writer, popularized the idea of an IoT.[27] His vision predicted that physical objects connected to the Internet would be traceable in space and time.[28] Today, technologies such as Wi-Fi connect various devices and allow them to share information.[29] In 2010, for the first time in history, the number of connected devices outnumbered the number of humans.[30] By the end of 2015, it is estimated that there will be 25 billion connected devices on the planet compared to only 7.2 billion people.[31] Accordingly, Sterling's vision is becoming a reality.

Generally, the IoT is defined as an "infrastructure of networked physical objects."[32] This is a paradigm shift from Internet Age technology.[33] The Internet allowed people and things to become interconnected.[34] The true power of the IoT is allowing smart objects to interact and collaborate with each other.[35] In other words, "devices are the users of the IoT network."[36]

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[27] *See* Cory Doctorow, *Bruce Sterling's "The Epic Struggle of the Internet of Things,"* BOINGBOING.NET (Sept. 13, 2014, 6:00 PM), http://boingboing.net/2014/09/13/bruce-sterlings-the-epic-s.html.

[28] *See* Kortuem et al., *supra* note 4, at 49.

[29] *See id.*

[30] *See* Oladayo Bello & Sherali Zeadally, *Intelligent Device-to-Device Communication in the Internet of Things*, IEEE SYSTEMS JOURNAL 1, 1 (2014), *available at* http://syslog.co.in/files/eciot/Intelligent%20Device-to-Device%20Communication.pdf (stating that "[b]y 2010, the number of devices connected to the Internet rose to 12.5 billion while the world's population increased to 6.8 billion . . . .").

[31] *Id.*

[32] Kortuem et al., *supra* note 4, at 44.

[33] Bello & Zeadally, *supra* note 30, at 2 ("Akin to how humans are the users of the Internet, devices [things] are the users of the IoT.").

[34] *Id.* at 1.

[35] Kortuem et al., *supra* note 4, at 50.

[36] Bello & Zeadally, *supra* note 30, at 2.

Particularly, instead of simply facilitating human interaction, the IoT allows devices to interact with the physical environment, gather information from that environment, and share that information with other devices, people, or environments.[37] Technologies and equipment, in addition to the Internet, that provide the platform for the IoT, include smart devices, information processing equipment, and device sensing equipment.[38]

Smart objects—devices with sensing, processing, and communication abilities—are the backbone of the IoT.[39] Smart objects can be used in nanotechnology, electromechanical systems, or digital electronics.[40] These smart objects are connected via network systems that have both short and long-range capabilities.[41] Data captured by smart objects can be transmitted via the network and may also be stored using cloud computing applications.[42]

A typical application of IoT technology will require smart objects to collect data and transmit that data either to other devices or to a central analysis object.[43] The smart objects can be governed by policies with respect to their performance or the environmental data they collect.[44] Based on these policies, smart objects can collaborate with other smart objects or humans.[45] The fields in which IoT technology can be deployed are almost limitless—transportation, finance, and health care are just a few examples.[46]

Because of its possible application to many daily activities, the IoT is a tremendous growth area for innovation. New and innovative routing protocols are needed to allow smart objects to communicate in real-time.[47] Improvements need to be made in device-to-device communication.[48] Further, there is an opportunity to create business models and business methods that will make use of the IoT platform in new and innovative ways.[49] In sum, with the proliferation of connected devices, IoT will affect every person in all walks of life.[50] To

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[37] *Id.* at 1.

[38] Fan & Zhou, *supra* note 5, at 532.

[39] Kortuem et al., *supra* note 4, at 44.

[40] Bello & Zeadally, *supra* note 30, at 2.

[41] *Id.*

[42] *Id.*

[43] *Id.* at 6.

[44] Kortuem et al., *supra* note 4, at 48.

[45] *Id.*

[46] Fan & Zhou, *supra* note 5, at 533.

[47] Bello & Zeadally, *supra* note 30, at 2.

[48] *Id.* at 3.

[49] Fan & Zhou, *supra* note 5, at 536–37 (explaining that business models are needed to maximize the potential of the IoT in China).

[50] *Id.* at 532.

demonstrate the possibilities of this technology, the following section describes a few current examples of IoT technology.

B. Current Examples of the Internet of Things

Apple has developed an IoT platform called "iBeacon."[51] iBeacon consists of stationary sensors that interact with a smart phone such as an iPhone.[52] For example, an iBeacon sensor placed in front of a store can transmit information such as customized coupons or the location of a desired item to customers as they walk by.[53] The iBeacon platform can also prompt repeat customers with special promotions or personalized messages and recommendations based on their current location or past history with the store.[54] Accordingly, IoT technology will have tremendous value in consumer retail.

In addition to retail, IoT is also being used for industrial applications. In the past few years, General Electric ("GE") has featured smart machines in its advertising.[55] For example, one commercial features KITT—the talking car from the nineteen eighties' television show, Knight Rider.[56]

In the KITT commercial, GE touts its ability to make shipping via rail more efficient with IoT technologies.[57] GE added sensing equipment and onboard computers to a method of transportation that had existed for more than a century to make locomotives and railways "smart."[58] However, the real innovation here is the software that processes the real-time data acquired by the rail system that then instructs the train how fast or slow it can travel.[59] For example, Norfolk Southern estimates that an increase in speed of 1 mph saves the company $200 million annually.[60]

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[51] *See* Hari Gottipati, *With iBeacon, Apple is going to dump NFC and embrace the Internet of Things*, GIGAOM (Sep. 20, 2013, 7:30 PM), *available at* https://gigaom.com/2013/09/10/with-ibeacon-apple-is-going-to-dump-on-nfc-and-embrace-the-internet-of-things (describing Apple Computer's iBeacon feature).

[52] *Id.*

[53] *Id.*

[54] *Id.*

[55] *See* Jim Edwards, *We've Identified by Name All the Robots in the New GE Ad*, BUSINESS INSIDER (Nov. 30, 2012, 9:56 AM), *available at* http://www.businessinsider.com/the-robots-in-the-new-ge-ad-2012-11.

[56] *Id.*

[57] *Id.*

[58] *See* Jon Gertner, *Behind GE's Vision for the Industrial Internet of Things*, FAST COMPANY (June 18, 2014), http://www.fastcompany.com/3031272/can-jeff-immelt-really-make-the-world-1-better.

[59] *Id.*

[60] *Id.*

Acquiring these types of savings due to efficient logistical operations also appeals to the military. IoT technology is unique in its potential to facilitate human interaction with smart devices.[61] In an example of military application of IoT technology, unmanned drones possess functionality that enables them to become powerful sensors that can capture, optimize, and transmit information such as high-definition video for processing.[62] This technology will allow unmanned military units to identify targets of interest in the field and to locate and coordinate efforts with friendly military units nearby.[63]

As demonstrated above, various IoT technology stakeholders exist. They include, but are not limited to, integrated circuit manufacturers, sensing equipment manufacturers, network providers, system integrators, service providers, and users of IoT services.[64] Due to the nature of the technology and the potential commercial rewards, stakeholders in IoT technology will most likely seek patents for their inventions. Part III begins by providing a brief framework for thinking about some patenting challenges with respect to IoT technology.

III. THE PATENT SYSTEM AND THE INTERNET OF THINGS

A. A Patent Framework for IoT

As described previously, the applications of IoT technology are endless. This section prescribes how one might frame IoT technology from a patent perspective. That is, the types of technology that inventors are likely to patent.

The first category consists of methods and protocols for facilitating communication between smart objects in IoT.[65] The Internet was originally designed to allow communication between large and powerful computers.[66] For the IoT, new protocols must be developed for smaller, more mobile devices. For example, 6LoWPAN is an Internet protocol that optimizes the Internet for low power, low bandwidth devices.[67] Another protocol, known as Bluetooth Low

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[61] Kortuem et al., *supra* note 4, at 51.

[62] *See* Christopher Lever, *The Military Internet of Things*, EECATALOG (May 9, 2014), http://eecatalog.com/military/2014/05/09/the-military-internet-of-things.

[63] *Id.*

[64] Fan & Zhou, *supra* note 5, at 532.

[65] Bello & Zeadally, *supra* note 30, at 2–3.

[66] *A Brief History of the Internet & Related Networks*, INTERNET SOC'Y, http://www.internetsociety.org/internet/what-internet/history-internet/brief-history-internet-related-networks (last visited June 1, 2015).

[67] *See* Ingrid Lunden, *ARM Acquires Internet of Things Startup Sensinode to Move Beyond Tablets and Phones*, TECHCRUNCH (Aug. 27, 2013),

Energy ("BLE"), is designed to allow devices to consume small amounts of energy, thus extending the battery life of mobile devices.[68]

The second category of potential inventions includes consumer devices. The devices or "smart objects" of the IoT will include common household appliances and novel devices that did not exist five years ago. For example, consider a smart toaster and alarm clock that can coordinate a person's wake up time with when their toast is ready.[69] A recent example of a newer device category that will benefit from IoT is wearable devices or "wearables."[70] Wearables are devices that contain basic sensors or complex computing power that can be worn on your person.[71] Examples of wearables include Google glass, various fitness monitors, and the recently released iWatch.[72] These devices not only have the capability to communicate with other devices, but also to track and store an incredible amount of data.[73]

Creators of wearable technology recognize the value of the data their devices can collect. The data is varied—it can be a simple on/off signal from a sensor or complex interactive logs from a wearable device.[74] Accordingly, the third category of patentable technology will most likely be software that will help facilitate the analysis of that data.[75] Further, software will need to be developed to process this information and translate it into useful and actionable intelligence.

Given this framework, a number of patent-related challenges for IoT technology become immediately apparent. The next section of this essay highlights three areas: patentability, joint infringement, and patent quality.

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http://techcrunch.com/2013/08/27/arm-acquires-internet-of-things-startup-sensinode-to-move-beyond-tablets-and-phones/#.

[68] *See* Gottipati, *supra* note 51.

[69] *See* Alexis Lloyd, *If This Toaster Could Talk*, THE ATLANTIC (Sep. 3, 2013), http://www.theatlantic.com/technology/archive/2013/09/if-this-toaster-could-talk/279276/.

[70] *See* Chris Hoffman, *Wearables 101: What They Are, and Why You'll Be Seeing Them a Lot of Them*, HOW-TO GEEK (Jan. 15, 2015), http://www.howtogeek.com/207108/wearables-101-what-they-are-and-why-youll-be-seeing-a-lot-of-them/.

[71] *See* Amy M. Intille, *Video Surveillance and Privacy: Implications for Wearable Computing*, 32 SUFFOLK U. L. REV. 729, 751 (1999) (predicting the capabilities of a wearable computer in the year 2014).

[72] Hoffman, *supra* note 70.

[73] *See* Bello & Zeadally, *supra* note 30, at 2.

[74] *Id.*

[75] *Id.*

B. Patenting IoT Technology

Potential patents on IoT technology will undoubtedly be challenged on patent eligibility grounds because of current controversies surrounding software patents.[76] While the courts have been very careful to say that software is patent-eligible, simply using software to implement abstract ideas is not patentable.[77] Examples of abstract ideas include basic algorithms, principal concepts, and fundamental practices.[78] One historical rationale for preventing the patenting of abstract ideas is that patents were intended to cover devices and things.[79] Another rationale is that allowing patent protection of abstract ideas would stifle innovation because inventors could prevent others from using essential concepts.[80]

Accordingly, patent claims that simply recite an abstract idea are not patent-eligible.[81] For example, the Supreme Court has held that a process claim embodying an algorithm for converting binary-coded decimal numbers into pure binary numbers was patent-ineligible.[82] Further, the Supreme Court recently held that a process claim on the basic concept of hedging against risk in a financial transaction was patent-ineligible because the claim was attempting to cover a fundamental economic practice.[83] On similar grounds, the Supreme Court held a process claim directed toward the concept of intermediated settlement was also ineligible for patenting.[84]

The current test for determining whether an invention is eligible for patenting is articulated in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*[85] There, the Supreme Court set forth a two-step analysis for determining whether a patent claim was directed to a patentable invention.[86]

First, the court must determine whether the claim is directed to a patent ineligible concept such as an abstract idea.[87] Then, if the claim

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[76] *See, e.g.*, Daniel E. Harmon, *Patents in the Balance?: IP Analysts Continue to Ponder Alice Ramifications*, 32 No. 12 LAW. PC 1 (2015).

[77] *See* Alice Corp. Pty. v. CLS Bank Int'l, 134 S. Ct. 2347, 2357 (2014) (concluding that generic computer implementation of an abstract idea is not patentable).

[78] *See id.* at 2355.

[79] Miriam Bitton, *Patenting Abstractions*, 15 N.C. J. L. & TECH. 153, 162 (2014).

[80] *See Alice,* 134 S. Ct. at 2354.

[81] *See id.*

[82] *See* Gottschalk v. Benson, 409 U.S. 63, 71-72 (1972).

[83] *See* Bilski v. Kappos, 561 U.S. 593, 611 (2010).

[84] *See Alice*, 134 S. Ct. at 2360.

[85] *Id.* at 2355.

[86] *Id.*

[87] *See id.*

is directed to an abstract idea, it is seen patentable only if the court can identify the claim's inventive concept.[88]

The Supreme Court applied this test in its *Alice* decision to conclude that the software related claims at issue were not patentable.[89] Specifically, the Court found that using a third party for intermediated settlement is a fundamental economic practice and therefore, an abstract idea.[90] Moreover, the Court concluded that simply requiring generic computer implementation of that abstract idea did not make the idea patent-eligible.[91]

Data analysis software was mentioned earlier as a technological innovation of IoT technology above. However, the holding in *Alice* could possibly limit what IoT related software is patent-eligible. Based on the *Mayo* framework, novel innovation in software will obtain patent protection only if it solves a technological problem or improves a technological process.[92]

Accordingly, prospective patentees of IoT software inventions will need to craft their patent applications to emphasize "elements" that contribute to their inventions being "significantly more" than an abstract idea.[93]

One consequence of this stricter patentability requirement will be that other non-patentable software and methods will become "open source" where the commercial benefit for developers is derived from ancillary services such as the Software as a Service ("SaaS") business model.[94] Further, because of the *Alice* decision, strong apparatus claims directed to the devices themselves will be increasingly important. In addition to patent eligibility, IoT methods may be susceptible to patent enforcement issues. One such issue that uniquely plagues collaborative and interactive inventions is briefly discussed in the next section.

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[88] *Id.*

[89] *Id.*

[90] *Id.*

[91] *Id.* at 2357.

[92] *See e.g.*, Diamond v. Diehr, 450 U.S. 175, 185–93 (1981) (holding that a process for molding rubber that used a mathematical algorithm was patent-eligible).

[93] *See Alice*, 134 S. Ct. at 2355.

[94] Simon Phipps, *Federal Hearing Today Marks Turning Point in War on Software Patents*, INFOWORLD (Feb. 8, 2013), http://www.infoworld.com/article/2613542/open-source-software/federal-hearing-today-marks-turning-point-in-war-on-software-patents.html?page=2.

C. Enforcing IoT Patents

The nature of IoT technology is interactive. Accordingly, a scenario may arise where the activities of more than one party are involved in possibly infringing a patent. Third party liability for patent infringement is generally addressed under the patent statute's inducement and contributory infringement provisions.[95] However, another highly controversial doctrine referred to as joint infringement may also apply.[96]

Joint infringement deals with the question of whether there can be infringement liability when performance of a method claim is split among multiple parties, actors or devices.[97] The current rule, recently articulated by the Federal Circuit, is that there may be infringement liability when the steps of a method are performed by multiple parties if a single defendant "[e]xercises 'control or direction' over the entire process such that every step is attributable to the controlling party."[98]

Historically, the "control or direction" test has proven to be an incredibly high bar to meet.[99] Accordingly, patentees of IoT technology are better off if they do not have to rely on a joint infringement theory in enforcing their patents. Because confusion has surrounded the issue of joint infringement for several years, practitioners have adopted specific claim drafting techniques to avoid joint infringement problems.[100] Specifically, where possible, practitioners have attempted to draft claims that only require a single infringer.[101] However, careful claim drafting may only be a sub-optimal solution to the problem of joint infringement.

Another more preferable solution would be to clarify how to determine infringement liability when more than one party participates in the infringement of a method claim. Due to its interactive nature, it is likely that IoT technologies will be at the center of any further

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[95] *See* 35 U.S.C. § 271(b)–(c) (2012).

[96] *See* Akamai Techs., Inc. v. Limelight Networks, Inc., 692 F.3d 1301, 1325 (Fed. Cir. 2012), *rev'd* 134 S. Ct. 2111 (2014) (acknowledging the doctrinal difficulties that arise when the acts of more than one party allegedly combine to infringe a method claim).

[97] *See id.*

[98] Muniauction, Inc. v. Thomson Corp, 532 F.3d 1318, 1329 (Fed. Cir. 2008) (citing BMC Res., Inc. v. Paymentech, LP, 498 F.3d 1373, 1380–81 (Fed. Cir. 2007)).

[99] At the time of this writing the author is not aware of any district court cases where the direction or control test was satisfied.

[100] *See* BMC Res., Inc. v. Paymentech, LP, 498 F.3d 1373, 1381 (Fed. Cir. 2007), *overruled by* Akamai Techs., Inc. v. Limelight Networks, Inc., 692 F.3d 1301 (Fed. Cir. 2012).

[101] *Id.*

development in the law. It is possible that IoT technology will become so prevalent and integrated into our daily lives that it will force the judiciary and lawmakers to rethink how to determine liability for multi-party infringement.

An area where policy-makers have caused further development relates to patent quality. The next section briefly describes the USPTO's patent quality initiatives.

D. Patent Quality

The issue of patent quality is closely related to concerns regarding patent eligibility and patent enforcement. Currently, the USPTO's Patent Trials and Appeals Board conducts hearings for reviewing and challenging granted patents on a number of grounds.[102] Inter partes review ("IPR") is a proceeding for reviewing the patentability of one or more claims on novelty or non-obviousness grounds.[103] The post grant review ("PGR") proceeding reviews the patentability of one or more claims of a granted patent on any ground of patentability, including eligibility under § 101 and whether the claims comply with the written description and enablement requirement.[104] Finally, the transitional program for covered business method patents ("CBM") is a proceeding for reviewing the patentability of one or more claims in a business method patent.[105]

In combination with the *Alice* decision,[106] the threat of PGR and CBM proceedings will likely cause the quality of IoT technology patents to rise. Recent statistics suggest that PGR and CBM petitions challenging patent claims on patent eligibility grounds have a high likelihood of being granted.[107] Further, to date, few, if any, claims

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[102] *See* William Hannah, Comment, *Major Change, New Chapter: How Inter Partes Review and Post Grant Review Proceedings Created by the America Invents Act Will Shape Litigation Strategies*, 17 INTELL. PROP. L. BULL. 27 (2012), for an in-depth overview of IPR and PGR.

[103] *See Inter Partes Review*, U.S. PATENT AND TRADEMARK OFFICE (July 17, 2014, 6:57 PM), http://www.uspto.gov/patents-application-process/appealing-patent-decisions/trials/inter-partes-review.

[104] *See Post Grant Review*, U.S. PATENT AND TRADEMARK OFFICE (July 17, 2014, 6:59 PM), http://www.uspto.gov/patents-application-process/appealing-patent-decisions/trials/post-grant-review.

[105] *See Transitional Program for Covered Business Method Patents*, U.S. PATENT AND TRADEMARK OFFICE (July 17, 2014, 7:00 PM), http://www.uspto.gov/patents-application-process/appealing-patent-decisions/trials/transitional-program-covered-business.

[106] *Alice*, 134 S. Ct. at 2347.

[107] *See* H. Wayne Porter, *The Role of Post-Grant Reviews in Patent Challenges Before the PTAB*, 7 LANDSLIDE 25, 27 (2015) (stating that even before the *Alice*

challenged on patent eligibility grounds have survived CBM review.[108]

Innovators in the IoT technology area must respond to this new reality in two ways. First, they must draft stronger and more robust patents that will be able to withstand challenges under IPR, PGR, and CBM review. This primarily means drafting claims for IoT inventions that are patent-eligible. Second, innovators should choose trade secret protection as an alternative to patenting for important, but not necessarily patent-friendly innovations. As a result, patentees of IoT technology will likely be more selective in the types of inventions they seek to patent.

IV. CONCLUSION

IoT technology raises issues concerning patentability, joint infringement, and patent quality. Although patentability and joint infringement will be a major hurdle for the IoT, it is not an insurmountable problem. Further, the new USPTO quality initiatives, such as post grant procedures and the business method review, will likely lead to the existence of IoT patents of reasonable scope.

Due to future changes in the law regarding patentability and joint infringement, it is important for practitioners to understand current best practices for overcoming these challenges. In addition, as more patents are subject to the USPTO's post grant procedures, inventors will uncover additional best practices for drafting claims for IoT technology.

Moreover, if IoT technology will be as popular as it is estimated, there may also be opportunities for the IoT industry to influence patent law. Specifically, cases involving these technologies may bring about further developments in the law with respect to patentability and the enforcement of interactive claims.

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decision, 90% of CBM petitions instituted on patent eligibility grounds were granted).

[108] *Id.*