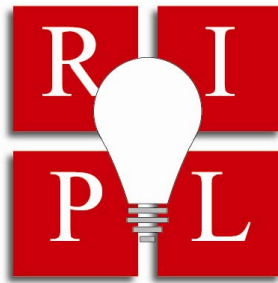


THE JOHN MARSHALL REVIEW OF INTELLECTUAL PROPERTY LAW



RETURNING THE PHOTOGRAPHER'S AUTONOMY: THE INTEGRATION OF BLOCKCHAIN TECHNOLOGY INTO COPYRIGHT REGISTRATION

CLAIRE DEMOS

ABSTRACT

The advent of the Internet, combined with advances in accessible digital technology, have altered both the modern photographer's methodologies and the public's relationship to images online. Subsequent legislation has not evolved at a comparable pace, leaving copyright owners at a significant disadvantage when it comes to protecting their work in the digital environment. This comment specifically looks at the copyright registration process and subsequent legislation such as the Digital Millennium Copyright Act, which has failed to adequately address the copyright owner's insurmountable burden when it comes to detecting infringement online. Continuing developments such as the integration of blockchain-based technology into the registration process may be the most effective method to assist copyright owners in monitoring and protecting their work online, bringing the outdated system current.

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CLAIRE DEMOS*

I. INTRODUCTION

The past two centuries have witnessed significant technological advances in the world of photography.¹ In 1826, French inventor Nicéphore Niépce created the first permanent photograph.² Fast forward to the present day, and social media enthusiasts post approximately 95 million photos and videos to Instagram on a daily basis.³ The advent of the Internet, combined with advances in accessible digital technology, have altered both the modern photographer's methodologies and the public's relationship to images online.⁴ The desire for instantaneous proliferation of content that reaches global audiences has inevitably heightened the potential for copyright infringement.⁵ In contrast, legislative changes occur at a much slower pace⁶ – leaving photographers to rely on outdated methods which effectively preclude protection of their work online.⁷ However, if “the devil is in the [distributed]

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¹ Harvard University Library, *Harvard's History of Photography Timeline*, HARVARD UNIV., <https://projects.iq.harvard.edu/photographpreservationprogram/historyphotographytimeline-about> (last visited June 1, 2018).

² *Id.*

³ See generally Todd Clarke, *24+ Instagram Statistics That Matter to Marketers in 2019*, HOOTSUITE SOC. MEDIA MGMT. (Oct. 5, 2018), <https://blog.hootsuite.com/instagram-statistics/> (“Instagram has over 800 million monthly active users. Among the social networks, only Facebook and Youtube have more people logging in each month. The number of *daily* Instagram users jumped to 500 million (second only to Facebook) from 200 million in just a few months. Instagram users share 95 million posts per day and ‘like’ over 4.2 billion posts per day.”).

⁴ Ian Plant, *Photography, Copyright, and the Internet*, OUTDOOR PHOTOGRAPHER (July 3, 2013), <http://www.outdoorphotographer.com/photography-copyright-and-the-internet>.

⁵ See *Agence France Presse v. Morel*, 2010 U.S. Dist. LEXIS 139103 (S.D.N.Y. Dec. 23, 2010) (Plaintiff, photographer Daniel Morel initiated a claim for copyright infringement against defendant, Agence France Presse (APF) based on a photograph that had been uploaded to Twitter.); *Id.* at 3 (Morel posted a photograph of the 2010 Haitian earthquake to his Twitter account, which was later posted by another Twitter user, to their own page.); *Id.* at 4 (APF located the image from the second user's account); *Id.* (It was then published by APF and subsequently distributed to Getty Images, who both credited the photograph to the second Twitter user.); *Id.* at 5-8.

⁶ Gabriel Horwitz, *It's Time to Modernize The Copyright Office*, FORBES (Jan. 26, 2017), <http://www.forbes.com/sites/washingtonbytes/2017/01/26/its-time-to-modernize-the-copyright-office/#23ddd8c4199>.

⁷ See Tali Dekel & Michael Rubinstein, *Making Visible Watermarks More Effective*, GOOGLE AI BLOG (Aug. 17, 2017), <https://ai.googleblog.com/2017/08/making-visible-watermarks-more-effective.html> (discussing *On the Effectiveness of Watermarks*: “Visible watermarking is a widely-

details,”⁸ the integration of blockchain-based technology⁹ into the United States Copyright Office’s registration process may be an effective means to ensure that copyright owners are better equipped, from the beginning, to deal with this evolving environment.

Part I will discuss the process of obtaining a copyright for a photograph, including statutory requirements, the federal registration process, and subsequent legislation. It will also discuss the history and logistics of blockchain technology. Part II will focus on the difficulties photographers face in protecting and enforcing their rights in the Internet-era. It will dissect the utility of the two most widely used methods to denote or embed authorship data, and discuss how technology has handicapped the copyright owner’s ability to exercise their rights per the legislation. Parts III and IV will discuss the collective concept and model for the image rights management platforms, which are currently engaging blockchain-based technology as a means to address the issue of photographic copyright infringement online. It will also assess how the integration of blockchain-based technology into the copyright registration process could assist in modernizing the current outdated system, including promising developments and criticism.

II. BACKGROUND

“The first generation of the digital revolution brought us the Internet of information. The second generation – powered by blockchain technology – is bringing us the Internet of value: a new, distributed platform that can help us reshape the world of business and transform the old order of human affairs for the better.”¹⁰

A. What is a Copyright?

Black’s Law Dictionary defines copyright as “the right to copy; specifically, a property right in an original work of authorship fixed in any tangible medium of

used technique for marking and protecting copyrights of many millions of images on the web, yet it suffers from an inherent security flaw – watermarks are typically added in a consistent manner to many images. We show that this consistency allows to automatically estimate the watermark and recover the original images with high accuracy.”)

⁸ Nikolai Hampton, *Understanding the Blockchain Hype: Why Much of It Is Nothing More than Snake Oil and Spin*, COMPUTERWORLD (Sept. 5, 2016), <https://www.computerworld.com.au/article/606253/understanding-blockchain-hype-why-much-it-nothing-more-than-snake-oil-spin/>.

⁹ Caitlin Moon, *Blockchain 101 for Lawyers Part 1*, LAW TECH. TODAY (Jan. 10, 2017), <http://www.lawtechnologytoday.org/2017/01/blockchain-101-for-lawyers-part-1>. “Blockchain is a distributed ledger (or register) made up of digitally recorded and encrypted (cryptographically hashed) data in the form of blocks, which when connected via the distributed network of computers storing the blocks, form the blockchain.”

¹⁰ Don Tapscott, *The Blockchain Revolution*, YOUTUBE (Jan. 29, 2018), <http://www.youtube.com/watch?v=gZEmasBqfYQ>; see also *Blockchain*, MERRIAM WEBSTER, <https://www.merriam-webster.com/dictionary/blockchain> (last visited Jun. 14, 2018) (for the purposes of this comment, blockchain is defined as a digital database containing information that can be simultaneously used and shared within a large, decentralized, publicly accessible network).

expression, giving the holder the exclusive right to reproduce, adapt, distribute, perform, and display the work.”¹¹ The federal power to grant copyright protection stems from Article 1 of the U.S. Constitution, and provides that, “Congress shall have Power to . . . promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”¹² Despite its early inception, photography was not afforded copyright protection¹³ as an art form until 1884¹⁴ when the Supreme Court in *Burrows-Giles v. Sarony* held that it “entertained no doubt that the Constitution is broad enough to cover an act authorizing copyright of photographs, so far as they are representatives of original intellectual conceptions of the author.”¹⁵ The exclusive rights attributed to photographers (the right to reproduce, prepare derivative works, distribute, and display their work)¹⁶ were codified in The Copyright Act of 1909 and later amended in The Copyright Act of 1976, which remains in effect today.¹⁷ Protection is available for original¹⁸ works of authorship once they are “fixed” in a tangible medium.¹⁹ Copyright is understood to vest instantaneously, so it is not necessary that a work be

¹¹ Tapscott, *supra* note 10.

¹² U.S. CONST. art. I, § 8, cl. 8.

¹³ 17 U.S.C. § 102 (2018).

¹⁴ See *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53 (1884). Plaintiff, photographer Napoleon Sarony initiated a claim for copyright infringement against defendant, Burrow-Giles Lithographic Company, as a response to the company’s unauthorized marketing of Sarony’s portrait of Oscar Wilde (“Oscar Wilde No. 18”). *Id.* at 54. Burrow-Giles argued that photographs could not qualify for copyright protection because they did not constitute “writings” nor the production of an “author” within the language of Article 1, Section 8, Clause 8 of the United States Constitution. *Id.* at 56. The court held that “this photograph [is] an original work of art, the product of plaintiff’s intellectual invention, of which plaintiff is the author, and of a class of inventions for which the Constitution intended that Congress should secure to him the exclusive right to use, publish and sell.” *Id.* at 60. As a result of this landmark case, photography was later codified into copyright law.

¹⁵ *Id.* at 58.

¹⁶ 17 U.S.C. § 106 (2018) (stating “subject to sections 107 through 122, the owner of copyright under this title has the exclusive rights to do and to authorize any of the following: (1) to reproduce the copyrighted work in copies or phonorecords; (2) to prepare derivative works based upon the copyrighted work; (3) to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending; (4) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works, to perform the copyrighted work publicly; (5) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work, to display the copyrighted work publicly; and (6) in the case of sound recordings, to perform the copyrighted work publicly by means of a digital audio transmission.”).

¹⁷ *Id.*

¹⁸ See *Schrock v. Learning Curve Int’l, Inc.*, 586 F.3d 513, 519 (7th Cir. 2009) (discussing elements of originality in a photograph, which may include “composition of the subjects, lighting, angle, equipment selection including film and camera, and evoking the desired expression...”); see also *LaChappelle v. Fenty*, 812 F. Supp. 2d 434 (S.D.N.Y. 2011) (The court determined that when a photographer orchestrates the situation that is photographed, as compared to photographing a ready-made or existing situation, the image may also be original in the creation of its subject.).

¹⁹ 17 U.S.C. § 101 (2018). “A work is fixed in a tangible medium of expression when its embodiment in a copy or phonorecord, by or under the authority of the author, is sufficiently permanent or stable to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration.”

registered;²⁰ once a photographer releases the shutter and the image is recorded, it is considered to be “fixed in a tangible medium.” However, the photographer is not afforded full statutory protection without registration.²¹ To initiate a claim for copyright infringement, registration is required and also establishes a *prima facie* case for its validity.²² Registration is facilitated by the United States Copyright Office and requires completion of a genre-specific application,²³ payment of the associated fee,²⁴ and deposit of a copy of the work as either an uploaded, digital file or a physical copy, mailed to the Library of Congress.²⁵ The Library’s visual archive can be viewed in person or online and, while registration information (type of work, registration number, date, title, description, copyright claimant, date of creation, authorship on application, and names) can be researched using the public card catalog,²⁶ there exists no single comprehensive set of data as each source contains different information.

²⁰ United States Copyright Office, *Copyright Basics*, COPYRIGHT.GOV (Sept. 2017), <https://www.copyright.gov/circs/circ01.pdf> (explaining “Copyright exists automatically in an original work of authorship once it is fixed in a tangible medium, but a copyright owner can take steps to enhance the protections of copyright, the most important of which is registering the work. Although registering a work is not mandatory, for works of U.S. origin, registration (or refusal) is necessary to enforce the exclusive rights of copyright through litigation.”).

²¹ 17 U.S.C. § 106.

²² *Rogers v. Koons*, 960 F.2d 301, 306 (2nd Cir. 1992). “The Copyright Act makes a certificate of registration from the U.S. Register of Copyrights *prima facie* evidence of the valid ownership of a copyright.”

²³ United States Copyright Office, *Registering a Copyright with the U.S. Copyright Office*, COPYRIGHT.GOV (Apr. 2016), <https://www.copyright.gov/fls/sl35.pdf>.

²⁴ United States Copyright Office, *Copyright Office Fees*, COPYRIGHT.GOV (Apr. 2018), <https://www.copyright.gov/circs/circ04.pdf> (explaining the “standard filing fee for electronic registration is \$55 for basic claims. However, the filing fee is \$35 if you register one work, not made for hire, and you are the only author and claimant . . . The Copyright Office charges a fee for expedited registration and recordation services, called ‘special handling.’ Special handling is available if you have a compelling need related to pending or prospective litigation, customs matters, or contract or publishing deadlines. To request special handling, you must provide a signed statement explaining why you need it, and you must include a certification that the details of your request are correct to the best of your knowledge. The fee for special handling of qualified applications for registration is \$800 per claim.”).

²⁵ 17 U.S.C. § 407 (2018); *see also* United States Copyright Office, *Mandatory Deposit of Copies or Phonorecords for the Library of Congress*, COPYRIGHT.GOV (Sept. 2017), <https://www.copyright.gov/circs/circ07d.pdf> (summarizing the two separate deposit requirements, “section 408 specifies the deposit requirements for registering a work with the Copyright Office. Section 407 specifies the requirements for depositing a work with the Copyright Office for use by the Library of Congress, commonly known as mandatory deposit requirement. Section 407 states that the ‘owner of copyright or of the exclusive right of publication’ in a work published in the United States must deposit the required number of complete copies or phonorecords in the Copyright Office within three months of the date of publication.”).

²⁶ United States Copyright Office, *About the Virtual Card Catalog*, COPYRIGHT.GOV, <https://vcc.copyright.gov> (last visited June 9, 2018) (explaining the U.S. Copyright Card Catalog which, “provides an index to copyright registrations and other public records pertaining to ownership of copyrighted works. The catalog enables users to identify original copyright registration records and other U.S. Copyright Office records from 1870 through 1977. The information in these records typically includes: author(s), title of work, copyright registration number, and effective date of registration. These records do not include the full registration records or copies of deposited works registered with the Copyright Office. The card catalog also contains entries for transfers of ownership, generally one card for each title, assignee, and assignor.”).

B. Copyright and the Internet

In 1998, Congress enacted the Digital Millennium Copyright Act (“DMCA”) in response to technological advances realized as the Internet rose to mainstream prominence.²⁷ “Congress sought to carefully balance the needs of copyright owners [who were now] threatened by the ease of piracy²⁸ in a digital environment with the needs of the public for access to information and creative content.”²⁹ They further recognized that unlimited legal exposure on the part of the Internet Service Provider (“ISP”) may threaten to stifle innovation and investment in online network infrastructure.³⁰ Title II of the DMCA contains safe harbor provisions that clarify the liability of Internet Service Providers when users transmit potentially infringing content over their networks.³¹ Eligibility is contingent upon the ISP’s adherence to certain statutory requirements.³² The most notable provision within Title II is the notice and takedown protocol outlined in Section 512.³³ Once the ISP has received specific notification³⁴ of infringing content on its site from the copyright owner, it

²⁷ Digital Millennium Copyright Act (DMCA), 17 U.S.C. § 1201 (2018).

²⁸ *Piracy*, MERRIAM WEBSTER (Dec. 30, 2018), <https://www.merriam-webster.com/dictionary/piracy> (for the purposes of this comment, piracy is defined as the unauthorized use of another’s production, invention, or conception especially in infringement of a copyright).

²⁹ Steve P. Calandrillo & Ewa M. Davison, *The Dangers of the Digital Millennium Copyright Act: Much Ado About Nothing?* 50 WM. & MARY L. REV. 349, 355 (2008), <https://core.ac.uk/download/pdf/73968377.pdf>.

³⁰ See S. Rep. No. 105-190, at 8 (1998) (stating that “without clarification of their liability, service providers may hesitate to make the necessary investment in the expansion of the speed and capacity of the Internet. . . . By limiting the liability of service providers, the DMCA ensures that the efficiency of the Internet will continue to improve and that the variety and quality of services on the Internet will continue to expand.”).

³¹ See H.R. Rep. No. 105-551, pt. 2, at 49-50 (1998). “[Title II] provides greater certainty to service providers concerning their legal exposure for infringements that may occur in the course of their activities.” See also S. Rep. No. 105-190, at 2. “Title II will provide certainty for copyright owners and Internet service providers with respect to copyright infringement liability online.”

³² 17 U.S.C. § 512(a)(i)-(iii) (2018) (explaining that a service provider “. . . shall not be liable for monetary relief, or, except as provided in subsection (j), for injunctive or other equitable relief, for infringement of copyright by reason of the provider’s transmitting, routing, or providing connections for, material through a system or network controlled or operated by or for the service provider, or by reason of the intermediate and transient storage of that material in the course of such transmitting, routing, or providing connections, if (1) the transmission of the material was initiated by or at the direction of a person other than the service provider; (2) the transmission, routing, provision of connections, or storage is carried out through an automatic technical process without selection of the material by the service provider; (3) the service provider does not select the recipients of the material except as an automatic response to the request of another person.”); see also *id.* § 512(b) (the ISP may not receive any financial benefit directly attributed to the infringing activity in any instance where it is determined to have the “right and ability to control” such activity.).

³³ *Id.* § 512(c)(1)(A) (stating that a service provider will not be liable for storage of infringing material on its system if the service provider “acts expeditiously to remove, or disable access to, the material” upon acquiring knowledge or awareness of its existence); *Id.* § 512(c)(1)(C) (stating that a service provider will not be liable for storage of infringing material on its system if the service provider “upon notification . . . responds expeditiously to remove, or disable access to, the material that is claimed to be infringing.”).

³⁴ *Id.* § 512(c)(3)(A)(i)-(vi)

To be effective under this subsection, a notification of claimed infringement must be a written communication provided to the designated agent of a service

must “act expeditiously to disable or remove the infringing material.”³⁵ The photographer as copyright owner, bears the burden of detection; the ISP and its employees are under no duty to monitor or “actively seek out” indications of copyright infringement online.³⁶ This principle was affirmed by the Second Circuit in *Viacom Int'l, Inc. v. YouTube, Inc.*, when the court held that “[w]e do not place the burden of determining whether [materials] are actually illegal on a service provider.”³⁷ That means the ISP’s expeditious removal is entirely conditioned upon the photographer’s timely detection of the infringement, which has become obscured by the content-sharing culture of the internet.³⁸ With the ISP exempt from liability, the photographer’s only recourse for instances of infringement would be against the third party user(s), though “this raises the question of how many times each work was infringed (when it’s [posted? Reposted], viewed by another user who “follows” the original [poster] . . .”).³⁹ Considering that in 2018 there were 8,074 Tweets uploaded per second, 851 images, and 1,389 posts being uploaded to Instagram and Tumblr respectively,⁴⁰ with six new Facebook profiles being created at the same rate,⁴¹ establishing effective means of tracking copyrighted content online is imperative.

provider that includes substantially the following: (i) A physical or electronic signature of a person authorized to act on behalf of the owner of an exclusive right that is allegedly infringed. (ii) Identification of the copyrighted work claimed to have been infringed, or, if multiple copyrighted works at a single online site are covered by a single notification, a representative list of such works at that site. (iii) Identification of the material that is claimed to be infringing or to be the subject of infringing activity and that is to be removed or access to which is to be disabled, and information reasonably sufficient to permit the service provider to locate the material. (iv) Information reasonably sufficient to permit the service provider to contact the complaining party, such as an address, telephone number, and, if available, an electronic mail address at which the complaining party may be contacted. (v) A statement that the complaining party has a good faith belief that use of the material in the manner complained of is not authorized by the copyright owner, its agent, or the law. (vi) A statement that the information in the notification is accurate, and under penalty of perjury, that the complaining party is authorized to act on behalf of the owner of an exclusive right that is allegedly infringed.

³⁵ *Id.* § 512(c)(1)(C).

³⁶ *Id.* § 512(m); *see also* Capitol Records, LLC v. Vimeo, LLC, 826 F.3d 78, 93-94 (2d Cir. 2016).

³⁷ *Viacom Int'l, Inc. v. YouTube, Inc.*, 676 F.3d 19, 32 (2d Cir. 2012) (quoting *Perfect 10, Inc. v. CCBill LLC*, 488 F.3d 1102, 1114 (9th Cir. 2007)).

³⁸ *See* Amicus Brief on behalf of the Recording Industry Association of America, Inc., et. al., at 14-15, *Viacom Int'l, Inc. v. YouTube, Inc.*, 676 F.3d 19 (2007); *see also* Amicus Brief on behalf of the Copyright Alliance, at 20, *Viacom Int'l, Inc. v. YouTube, Inc.*, 676 F.3d 19 (2007) (explaining that “the notice and take-down provisions are of little value for two reasons. First, as soon as infringing material is taken down pursuant to their notifications, users post it again; second, because infringing postings can be downloaded by the public at large, by the time the infringements have been removed, innumerable copies of their copyrighted music have been disseminated without payment to the owners.”).

³⁹ *See* Kate Lucas, *In Lawsuit Against Pinterest, Artist Continues a Crusade for Copyright on the Internet*, GROSSMANLLP.COM ART LAW BLOG (July 23, 2015), <https://www.grossmanllp.com/lawsuit-against-pinterest-artist-continues-copyright-crusade> (discussion regarding a lawsuit filed by fine art and commercial photographer Christopher Boffoli, against the image sharing platform Pinterest.).

⁴⁰ *See generally*, INTERNET LIVE STATS, <http://www.internetlivestats.com/one-second/#instagram-band>.

C. Blockchain 101

“Blockchain is a vast, global distributed ledger or database running on millions of devices and open to anyone, where not just information but anything of value – money, but also titles, deeds, identities, even votes – can be moved, stored and managed securely and privately. Trust is established through mass collaboration and clever code . . .”⁴²

As noted by the World Economic Forum, previous technology sought to carry out established business processes faster and more efficiently,⁴³ whereas, blockchain technology is focused on completely redefining how the processes are initially designed and implemented.⁴⁴ By 2016, approximately twenty-five countries around the world had invested upwards of \$1.3 billion dollars into the technology,⁴⁵ but let’s take a step back and start from the beginning. The concept of blockchain technology was first introduced in 2008 through a white paper entitled “Bitcoin: A Peer to Peer Electronic Cash System,” which was pseudonymously authored by Satoshi Nakamoto.⁴⁶ The paper described Bitcoin⁴⁷ as a “purely peer-to-peer version of electronic cash,” commonly referred to as cryptocurrency,⁴⁸ which would be released to the open source community in 2009.⁴⁹

As the underlying technology, a blockchain is a decentralized network that maintains a public distributed ledger (register) of transactions.⁵⁰ The blocks within

⁴¹ Kit Smith, *47 Incredible Facebook Statistics and Facts*, BRANDWATCH (Mar. 5, 2018), <https://www.brandwatch.com/blog/47-facebook-statistics>. “Facebook adds 500,000 new users every day [and] 6 new profiles every second.”

⁴² Moon, *supra* note 9 (quoting Don Tapscott).

⁴³ Cathy Mulligan, *Still don’t understand blockchain? Let’s untangle the wires*, WORLD ECON. FORUM (Nov. 10, 2017), <https://www.weforum.org/agenda/2017/11/blockchain-bitcoin-ethereum-tech-explained>.

⁴⁴ *Id.*

⁴⁵ R. Jesse McWaters, *A Blueprint for Digital Identity*, WORLD ECON. FORUM (Aug. 2016), http://www3.weforum.org/docs/WEF_A_Blueprint_for_Digital_Identity.pdf.

⁴⁶ Bernard Marr, *A Very Brief History of Blockchain Technology Everyone Should Read*, FORBES (Feb. 16, 2018), <http://www.forbes.com/sites/bernardmarr/2018/02/16/a-very-brief-history-of-blockchain-technology-everyone-should-read/#2be53bab7bc4>; *see also* Dylan Yaga, Peter Mell, Nik Roby & Karen Scarfone, *Blockchain Technology Overview*, NAT’L INST. OF STANDARDS & TECH., (Jan. 2018), <https://csrc.nist.gov/CSRC/media/Publications/nistir/8202/draft/documents/nistir8202-draft.pdf>.

⁴⁷ *Bitcoin*, MERRIAM WEBSTER, <https://www.merriam-webster.com/dictionary/Bitcoin> (last visited June 6, 2018) (for the purposes of this comment, Bitcoin is defined as a digital currency created for use in peer-to-peer online transactions.).

⁴⁸ *Cryptocurrency*, MERRIAM WEBSTER, <https://www.merriam-webster.com/dictionary/cryptocurrency> (last visited June 6, 2018) (For the purposes of this comment, cryptocurrency is defined as any form of currency that only exists digitally, that usually has no central issuing or regulating authority but instead uses a decentralized system to record transactions and manage the issuance of new units, and that relies on cryptography to prevent counterfeiting and fraudulent transactions.).

⁴⁹ Marr, *supra* note 46 (quoting FT Technology reporter, Sally Davis, “Blockchain is to Bitcoin, what the internet is to email. A big electronic system, on top of which you can build applications. Currency is just one.”).

⁵⁰ Thomas Maddrey, *Blockchain’s Definitional Problems: Analyzing the Role of Imprecise Terminology as A Source of Confusion About Blockchain*, MADDREY PLLC CREATIVE BUS. LAW BLOG

the chain are comprised of “digitally recorded and encrypted (cryptographically hashed) data, that when connected through the distributed network of computers, form [a] blockchain.”⁵¹ An individual network is comprised of an unspecified number of computers, located anywhere in the world.⁵² These computers are referred to as the “nodes” and individually, they may hold either a part or the entirety of the blockchain.⁵³ Across the network, their function is to apply the blockchain’s specific computational algorithm to verify the blocks and permit their permanent addition to the chain.⁵⁴ Before content is added to the chain, it is cryptographically “hashed,” which means that it is encrypted to create a short digest of the original data.⁵⁵ It is this “hash” of data that is stored in the block and transferred in encrypted form, to the chain.⁵⁶ Each block is time-stamped upon creation and can be added to the chain only after the time-stamp has been both applied and verified by the nodes across the network.⁵⁷

Blockchains have the ability to be either public or permissioned (private).⁵⁸ With a public blockchain the network is open to anyone wanting to join and/or participate, whereas access to the permissioned blockchain is based on an invitation which then requires further validation.⁵⁹ Arguably the most important aspect of blockchain technology is that it is decentralized, which means that no central authority controls the network and there is no single server to which all the nodes in the network are connected.⁶⁰ The discussion surrounding blockchain has expanded to explore other potential applications of the technology, aside from its inaugural

(Nov. 16, 2017), <http://law.maddreypllc.com/creative-business-law-blog/2017/11/16/uqwkql5rdqmm55p0gauok35wknjdx>.

⁵¹ Moon, *supra* note 9.

⁵² *Id.*

⁵³ *Id.*; see also Yaga et al., *supra* note 46, at 9, 25.

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ Moon, *supra* note 9 (explaining that “it is important to note that the encrypted hashed data is what is stored in the block and transferred to the blockchain; not the actual underlying data itself. It is simply a digest not a complete record of the data. Further, the hashed data is stored across multiple machines, which is what makes it more difficult to hack.”); see also Yaga et al., *supra* note 46, at 12 (stating that hashing “is a method of calculating a relatively unique fixed-size output (called a message digest, or just a digest) for an input of nearly any size (e.g., a file, some text, or an image. . . A hashing algorithm used in many blockchain technologies is the Secure Hash Algorithm (SHA) with an output size of 256 bits (SHA-256).”); see also *id.* at 20 (discussing the *Merkle tree*, “rather than storing the hash of every transaction within the header of a block, a data structure known as *Merkle tree* is utilized. A Merkle tree combines the hash values of data together until there is a singular root (*a Merkle tree root hash*). The root is an efficient mechanism used to summarize the transaction in a block and verify the presence of a transaction within a block.”).

⁵⁷ Moon, *supra* note 9.

⁵⁸ Praveen Jayachandran, *The Difference Between Public and Private Blockchain*, IBM (May 31, 2017), <https://www.ibm.com/blogs/blockchain/2017/05/the-difference-between-public-and-private-blockchain> (stating “the sole distinction between public and private blockchain is related to who is allowed to participate in the network, execute the *consensus* protocol and maintain the shared ledger. A public blockchain network is completely open and anyone can join and participate in the network. The network typically has an incentivizing mechanism to encourage more participants to join the network. Bitcoin is one of the largest public blockchain networks in production today.”); see also Yaga et al., *supra* note 46, at 36-39 (discussing blockchain categorization).

⁵⁹ Jayachandran, *supra* note 58.

⁶⁰ Maddrey, *supra* note 50.

introduction into the financial world.⁶¹ Applications are already being implemented across a wide-ranging spectrum of industries, and there are several that specifically target artists and entrepreneurs seeking to address intellectual property concerns.⁶² The following sections will focus on technology-induced challenges faced by the copyright owner and conceptualize a blockchain-based solution.

III. ANALYSIS

This section will begin by reviewing two of the most popular methods photographers utilize to protect their work online and how their efficacious nature is diminished through a combination of basic internet protocol and widely accessible editing techniques. Then it will discuss how these compromised methods of protection have exacerbated the difficulty of monitoring content online and have essentially rendered the DMCA notice and takedown procedures insufficient to aid the copyright owner in combatting infringement. Finally, this section will touch upon litigation as an additional option for the photographer, hinging on circuit-specific interpretation of the registration requirement, which combined with blockchain-based technology, could revolutionize the modern copyright system.

A. Current Methods of Protection

In an effort to market their brand, photographers often rely on sharing their work online through personal portfolio websites and social media platforms, which leaves them susceptible to having their work stolen or misused.⁶³ Digital technology now provides that copies of photographs existing online are perfect replicas of the original file as it was uploaded.⁶⁴ The addition of watermarks and the inclusion of artist-identifying information within the digital photograph's metadata are two protective methods now compromised by technological advances, which preclude the photographer's ability to utilize the full statutory protections provided per the DMCA.

⁶¹ *Id.*

⁶² *Id.*

⁶³ Liz Dowthwaite, Robert J. Houghton & Richard Mortier, *How Relevant is Copyright to Online Artists? A Qualitative Study of Understandings, Copying Strategies, and Possible Solutions*, 21 FIRST MONDAY J. 5, 19 (2016), https://www.researchgate.net/publication/301828673_How_relevant_is_copyright_to_online_artists_A_qualitative_study_of_understandings_coping_strategies_and_possible_solutions.

⁶⁴ Alexander Savelyev, *Copyright in The Blockchain Era: Promises and Challenges*, NAT'L RESEARCH UNIV. SCH. OF HIGHER ECON. (Nov. 21, 2017), <https://dx.doi.org/10.2139/ssrn.3075246>.

1. Watermarks

Visible watermarks,⁶⁵ which typically involve overlaying a semi-transparent layer containing a name or logo onto the source image, are the most commonly utilized method for “protecting” photographs online.⁶⁶ Despite being a fairly standard practice, the assumption that watermarks actually preclude infringement is not necessarily accurate.⁶⁷ “Manually, the task of removing a watermark from an image is tedious, and even with state-of-the-art editing tools it may take a Photoshop expert several minutes to remove a watermark from one image.”⁶⁸ However, Google research scientists presenting at the 2017 Computer Vision and Pattern Recognition Conference,⁶⁹ revealed a computer algorithm known as “multi-image matting,”⁷⁰ that is able to successfully remove watermarks from photographs, in batch process, providing unobstructed access to the underlying original images.⁷¹ The theory behind multi-image matting largely relies on the notion that most watermarks are typically added in a consistent manner across a large quantity of photographs, i.e. stock photos.⁷² The algorithm must first identify which aspect(s) within the

⁶⁵ *Watermark*, MERRIAM WEBSTER, <https://www.merriam-webster.com/dictionary/watermark> (last visited July 1, 2018) (for the purposes of this comment, a watermark is defined as a marking in paper resulting from differences in thickness usually produced by pressure of a projecting design in the mold or on a processing roll and visible when the paper is held up to the light); see also Todd Vorenkamp, *The Pros and Cons of Watermarking*, B&H EXPLORA, <https://www.bhphotovideo.com/explora/photography/tips-and-solutions/pros-and-cons-watermarks-photographs> (last visited July 1, 2018) (discussing watermarks in photography, “technically originating in the art of papermaking, in photography, the watermark is a superimposed image, logo, or text placed over a photograph – usually as a method of identifying the image’s creator.”).

⁶⁶ Dekel & Rubinstein, *supra* note 7 (discussing *On the Effectiveness of Watermarks*).

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ See generally, THE COMPUT. VISION FOUND., <http://cvpr2018.thecvf.com> (last visited June 4, 2018) (The Conference on Computer Vision and Pattern Recognition is “the premier annual computer vision event [comprised of] the main conference and several co-located workshop and short courses. With its high quality and low cost, it provides an exceptional value for students, academics and industry researchers.”).

⁷⁰ Dheeraj Singaraju & René Vidal, *Interactive Image Matting for Multiple Layers*, 2008 IEE CONFERENCE ON COMPUT. VISION & PATTERN RECOGNITION (2008), <http://www.vision.jhu.edu/assets/SingarajuCVPR08-1.pdf> (explaining that “image matting deals with finding the probability that each pixel in an image belongs to a user specified ‘object’ or to the remaining ‘background’. . . Image matting refers to the problem of assigning to each pixel in an image, a probabilistic measure of whether it belongs to a desired object or not. This problem finds numerous applications in image editing, where the user is interested only in the pixels corresponding to a particular object, rather than in the whole image. In such cases, one prefers assigning soft values to the pixels rather than a hard classification. This is because there can be ambiguous areas where one cannot make clear cut decisions about the pixels’ membership. Matting therefore deals with assigning a partial opacity value $a \in [0, 1]$ to each pixel, such that pixels that definitely belong to the object or background are assigned a value $a = 1$ or $a = 0$ respectively. More specifically, the matting problem tries to estimate the value a_i at each pixel i , such that its intensity I_i can be expressed in terms of the true foreground and background intensities F_i and B_i as $I_i = a_i F_i + (1 - a_i) B_i$.”).

⁷¹ Dekel & Rubinstein, *supra* note 7.

⁷² Tali Dekel, Michael Rubinstein, Ce Liu & William T. Freeman, *On the Effectiveness of Visible Watermarks*, THE COMPUT. VISION FOUND. (2017), http://openaccess.thecvf.com/content_cvpr_2017/papers/Dekel_On_the_Effectiveness_CVPR_2017_paper.pdf.

collection of images repeat.⁷³ Once the “matted”⁷⁴ watermark is identified, recovery of the underlying image hinges on further dissection of the photograph’s layer paths.⁷⁵ The watermark (“foreground”) is separated into its image and opacity⁷⁶ components, which allows for reconstruction of the underlying (“background”) image.⁷⁷ To counteract the ease of removal, Google suggests that photographers introduce “inconsistencies” into their watermarks, specifically in the form of additional transformative layers.⁷⁸ But according to Google’s research, the algorithm is still able to remove the watermark from a photograph despite the addition of inconsistencies, albeit at a slightly lower ratio⁷⁹ of success – and could still be achieved in its entirety, with some light Photoshop. While use of the algorithm definitely requires a certain level of sophistication, a quick Google search for “removing watermarks” yields extensive results, including step-by-step tutorials of various removal methods and techniques.⁸⁰ Whether visible watermarks actually serve as an effective deterrent for copyright infringement largely depends on the technical sophistication and patience of the potential infringer.

2. Metadata

Another method that photographers use to assist with identification and tracking of their work online is the addition of metadata within their image files. Metadata⁸¹ is a consolidated set of data that describes and provides details about a larger set of information.⁸² When a photograph is taken, a specific set of data regarding the logistics of the image is assigned to the file; generally, this consists of

⁷³ Dekel & Rubinstein, *supra* note 7.

⁷⁴ *Id.* (Explaining that a ‘matted watermark’ is “the watermark image times it’s spatially varying opacity, i.e., alpha matte.”).

⁷⁵ *Id.*

⁷⁶ *Opacity*, MERRIAM WEBSTER, <https://www.merriam-webster.com/dictionary/opacity> (last visited July 5, 2018) (for the purposes of this comment, opacity is defined as the quality or state of a body that makes it impervious to the rays of light); *see also Opacity*, IDIGITALPHOTO, <http://www.idigitalphoto.com/dictionary/opacity> (last visited July 6, 2018) (defining opacity in photography as the “(1) measure of a medium’s ability to restrict the transmission of light. *It is the ratio of the incident light to the transmitted light.”).

⁷⁷ Dekel & Rubinstein, *supra* note 7; *see also* Mix, *Google-made Algorithm Automatically Removes Watermarks from Stock Photos*, THE NEXT WEB (Aug. 18, 2017), <https://thenextweb.com/google/2017/08/18/google-watermark-stock-photo-remove/> (quoting Tali Dekel and Michael Rubinstein, “If a similar watermark is embedded in many images, the watermark becomes the signal in the collection and the images become the noise, and simple image operations can be used to pull out a rough estimation of the watermark pattern.”).

⁷⁸ Will Nicholls, *AI Can Easily Erase Photo Watermarks: Here’s How to Protect Yours*, PETAPIXEL (Aug. 18, 2017), <https://petapixel.com/2017/08/18/ai-can-easily-erase-photo-watermarks-heres-protect/>.

⁷⁹ *Id.*

⁸⁰ Filmora MVP, *How to Remove Watermarks from Images (Easier than Photoshop!)*, YOUTUBE (Aug. 20, 2017), <https://www.youtube.com/watch?v=SOR3nKzhoco>.

⁸¹ *Metadata*, MERRIAM WEBSTER, <https://www.merriam-webster.com/dictionary/metadata> (last visited July 1, 2018) (for the purposes of this comment, metadata is defined as data that provides information about other data).

⁸² *Photo Metadata*, INT’L. PRESS TELECOMM. COUNCIL (2018), <https://iptc.org/standards/photo-metadata/>.

information regarding the location, date, time, and camera settings.⁸³ The International Press Telecommunications Council's⁸⁴ Photo Metadata Standard⁸⁵ is the most widely used method to describe photographs, and provides that metadata can be stored either internally, within the image file, or externally, as an additional accompanying file or extension.⁸⁶ There are three main categories⁸⁷ of metadata, the most relevant to this comment being "rights," which serve to identify the photographer and is essential for copyright protection.⁸⁸ This data is relevant whether the photographer is cataloging their own personal image library or entering keywords to track usage online.⁸⁹ However, issues arise as it has become standard practice for the majority of social media and cloud-based platforms⁹⁰ to strip photographs of their metadata immediately upon upload, notwithstanding the device utilized.⁹¹ This policy generally stems from privacy and safety concerns associated with amateurs and minors unknowingly disclosing private information online.⁹² Though the copyright issues associated with standardized removal of data are readily apparent considering how many photographs are uploaded and shared on a daily basis. Consider that even DropBox⁹³ removes metadata upon upload, which provides that images shared internally or from the photographer to the client directly, are

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.* ("[The] IPTC Photo Metadata sets the industry standard for administrative, descriptive, and copyright information about images.")

⁸⁶ *Id.* (explaining that metadata can exist either (1) internally, embedded in the image file, in formats such as JPEG or TIFF, or (2) externally, outside the image file in a digital asset management systems (DAM) or by a "sidecar" file, such as XMP, or eternal XML-based news exchange format file as specified by the IPTC).

⁸⁷ *Id.* (explaining the three categories of metadata: (1) *Administrative*, which contains identification of the creator, creation date and location, contact information for licensors of the image, and other technical details; (2) *Descriptive*, which contains information about the visual content, including headline, title, captions and keywords – this can be done using free text or codes from a controlled vocabulary; and (3) *Rights*, which contains copyright information and underlying rights in the visual content including model and property rights, and rights usage terms.).

⁸⁸ INT'L PRESS, *supra* note 82.

⁸⁹ Kristin Twiford, *Did You Know That Social Media Sites Strip Images of IPTC Metadata?*, LIBRIS, <https://librisblog.photoshelter.com/social-media-flickr-dropbox-strip-images-of-iptc-metadata/> (last visited June 27, 2018).

⁹⁰ Joe Mueller, *What Social Networks Protect Your EXIF (And GPS Location) Data From Other Users?*, GPS FOR TODAY (Jan. 29, 2013), <http://www.gpsfortoday.com/what-social-networks-protect-your-exif-and-gps-location-data-from-other-users/> (summarized discussion of metadata retention rate by platform: Whether uploaded from a cell phone app or a computer, Facebook removes all EXIF data from a photo; Twitter used to maintain EXIF data in the user's profile picture, however, now it removes the data when a new picture is uploaded; LinkedIn, Myspace, and Instagram remove all EXIF data from photos uploaded. Pinterest (except for Android users), Flickr, and Google+ all retain EXIF data. For Tumblr it depends how the photo was uploaded, images uploaded directly from a cell phone will be wiped of all EXIF data whereas images uploaded from a computer will retain their metadata.).

⁹¹ Twiford, *supra* note 89 (noting that certain platforms retain select metadata depending upon whether the photograph was uploaded via a cell phone or a computer).

⁹² Mark Millian, *Digital Photos Can Reveal Your Location, Raise Privacy Fears*, CNN (Oct. 15, 2010), <http://www.cnn.com/2010/TECH/web/10/15/photo.gps.privacy/index.html>.

⁹³ *See generally*, DROPBOX, <https://www.dropbox.com> ("DropBox is a global collaboration platform where content is created, accessed, and shared." It is a file hosting service that offers cloud storage for personal use or business, file synchronization, and client software.).

already void of adequate identification before they even reach their intended end audience.⁹⁴ “If your organization is using DropBox or Flickr for photo sharing among your own team or with outside stakeholders . . . you run the risk of losing valuable information in the process. Flickr does not preserve any metadata – even [Exchangeable Image File Format data] EXIF⁹⁵ – when someone uses the ‘save as’ function. Neither does DropBox.”⁹⁶ As a society that heavily relies on imagery to communicate, copyright owners who take proactive measures to identify and protect their work online should not have their data involuntarily removed – often times without their knowledge.⁹⁷

B. Legislative Impact

Title II of the Digital Millennium Copyright Act essentially lets the Internet Service Provider off the hook as long as they comply with the “notice and takedown” procedures.⁹⁸ The burden of infringement detection is placed *solely* on the copyright owner,⁹⁹ despite the inconceivably high volume of potential online activity to be monitored.¹⁰⁰ “In real terms, it is extremely hard for an artist to protect their rights. The nature of the Internet, with instant transfer of information and this increased culture of sharing, means we now have a ‘generation of users who freely disregard

⁹⁴ Twiford, *supra* note 89; *see also* Mueller, *supra* note 90.

⁹⁵ Nasim Manruov, *What is EXIF Data?*, PHOTOGRAPHY LIFE, <https://photographylife.com/what-is-exif-data> (last visited Apr. 4, 2018) (explaining that EXIF Data, Exchangeable Image File Format data is the information automatically recorded when a photographer uses a digital camera to capture an image. EXIF Data is “comprised of a range of settings such as ISO speed, shutter speed, aperture, white balance, camera model and make, date and time, lens type, focal length and more.”).

⁹⁶ Twiford, *supra* note 89.

⁹⁷ Mueller, *supra* note 90 (see commentary following the blog post. According to Khürt Williams, “It should not be the responsibility of any of these online sites to strip EXIF information from photos. . . . As a photographer I want to EXIF information in my images to be retained. When someone uses one of my photos they pulled from Instagram or Pintrest or Google+ or Flickr, etc. how else can I prove that my image is being used wit my permission if the EXIF is stripped? As a photographer I want the EXIF retained [or] else I can’t show others what camera settings I used to capture the image or where the image was captured.”).

⁹⁸ Morgan E. Pietz, *Part I Article: Copyright Court: A New Approach to Recapturing Revenue Lost To Infringement: How Existing Court Rules, Tactics From the “Trolls,” and Innovative Lawyering Can Immediately Create A Copyright Small Claims Procedure That Solves Bittorrent and Photo Piracy*, 64 J. COPYRIGHT SOC’Y 1, 3 (2017) (stating, “when it comes to enforcement of copyright, there is one thing upon which most can agree: the current system in the United States is not very good. Or, to put it perhaps more accurately, the Copyright Act of 1976, which was largely negotiated in the 1950s and 1960s, was never designed for an Internet-connected world. Thus, when the U.S. Congress gave us much of the key legal framework that currently governs the modern information economy, the telegraph was still on the cusp of being replaced by the fax machine and most music was sold on vinyl records. Little wonder, then, that Maria Pallante, the former Register of Copyrights, testified to Congress in 2013 that our copyright law ‘is showing the strain of its age and requires your attention.”).

⁹⁹ *Id.*

¹⁰⁰ Annemarie Bridy, *Three Notice Failures in Copyright Law*, 96 B.U. L. REV. 777, 778 (Jan. 3, 2016) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2710341.

copyrights,¹⁰¹ and are often unaware [that] they are doing so.”¹⁰² Upon affirmative notice of infringement, the ISP is tasked to quickly remove the content;¹⁰³ however, some circuits have sought to increase the copyright owner’s burden, holding that they must first conduct an analysis to determine whether the material discovered constitutes a fair use before issuing a removal request.¹⁰⁴ However, even after a takedown request is granted and the content is removed, there is nothing to stop an infringing user from simply reposting and/or downloading the removed content.¹⁰⁵

It is understood that providing adequate notice of protection is an important step in protecting content online.¹⁰⁶ But copying a photograph off the Internet is simply just a matter of the user performing a simple right-click and selecting to save it to their desktop. Additionally, as discussed *supra*, the photographer’s proactive methods to deter infringement, without litigation, have been rendered insufficient by technological advances; “. . . the DMCA takedown procedure is seen by content owners as an ineffective and expensive game of whack-a-mole that seldom succeeds in permanently removing infringing content, once such content is disseminated online.”¹⁰⁷ To exacerbate the situation even further, individual infringers need not even personally attempt copyright circumvention tactics, as such practices are now standard procedure for the majority of social media and cloud-based platforms.¹⁰⁸ The judiciary has taken notice of the gravity of the situation, as the Ninth Circuit recently limited the availability of DMCA safe harbor protection for social media platforms and similar sites that employ moderators to review user-submitted content in copyright cases.¹⁰⁹ Though unfortunately platform-initiated removal of a

¹⁰¹Dowthwaite, Houghton & Mortier, *supra* note 63 (quoting Jessica Gutierrez Alm, *Transcending Intellectual Property Rights: “Sharing” Copyrights: The Copyright Implications of User Content in Social Media*, 35 HAMLINE J. PUB. L. & POLY 104 (Fall 2013)).

¹⁰² *Id.*

¹⁰³ See Amicus Brief on behalf of the Recording Industry Association of America, Inc., et. al., at 14-15, *Viacom Int’l, Inc. v. YouTube, Inc.*, 676 F.3d 19 (2007); see also Amicus Brief on behalf of the Copyright Alliance, at 20, *Viacom Int’l, Inc. v. YouTube, Inc.*, 676 F.3d 19 (2007) (explaining “the notice and take-down provisions are of little value for two reasons. First, as soon as infringing material is taken down pursuant to their notifications, users post it again; second, because infringing postings can be downloaded by the public at large, by the time the infringements have been removed, innumerable copies of their copyrighted music have been disseminated without payment to the owners.”).

¹⁰⁴ *Lenz v. Universal Music Corp.*, 801 F.3d 1126 (9th Cir. 2015). The panel held that the DCMA requires copyright holders to consider fair use before sending a takedown notification, and that failure to do so raises a triable issue as to whether the copyright holder formed a subjective good faith belief that the use was not authorized by law. *Id.* at 1130.

¹⁰⁵ *Id.*

¹⁰⁶ Jeff C. Dodd, Jonathan D. Reichman & Susanna P. Lichter, *Copyright in the United States*, CHI. BAR ASSOC. (Oct. 29, 2018), <https://www.lexology.com/library/detail.aspx?g=45b57c94-9e9c-4593-82bf-c51afe3b7ce2>.

¹⁰⁷ Pietz, *supra* note 98, at 7; see, e.g., Appellants’ Brief at 1, *UMG Recordings, Inc. v. Veoh Networks, Inc.*, No. 09-56777, 2010 WL 3706518 (9th Cir. June 17, 2010). “Because websites. . . are dynamic and changing day-to-day or hour-to-hour as users upload more material, the task of identifying and sending notifications requesting the removal of copyrighted works would create an unending game of ‘Whack-A-Mole.’”

¹⁰⁸ Twiford, *supra* note 89.

¹⁰⁹ *Mavrix Photographs, LLC v. LiveJournal, Inc.*, 873 F.3d 1045, (9th Cir. 2017) (defendant, a social media platform, posted the subject photographs after a team of volunteer moderators, led by an employee of the defendant, reviewed and approved them.).

photograph's metadata seemingly remains a mandatory concession of standard internet-use.

In addition to the aforementioned infringement deterrent methods, the photographer remains able to enforce their copyright through litigation – but only if they establish constructive notice of registration.¹¹⁰ “Traditional federal litigation is so prohibitively expensive that, for many copyright owners, relief from the courts is not a practical solution.”¹¹¹ This sentiment is directly applicable to photographers producing substantial quantities of work that must register and then independently track usage throughout the expanse of the internet. Though, the registration requirement has not been interpreted consistently throughout the federal circuit courts.¹¹² Circuits that follow the “registration” approach require the plaintiff to actually have a copyright certificate issued (or a formal rejection) from the Copyright Office.¹¹³ Whereas circuits that adhere to the “application” approach dispute the filing requirement, holding that evidence of having completed and filed an application is sufficient to initiate a claim for infringement.¹¹⁴ The United States Supreme Court has granted a writ of certiorari to *Fourth Estate Public Benefit Corp. v. Wall-Street.com, LLC* to determine whether registration occurs when an owner files an application to register the work or once the Register of Copyrights actually registers the copyright.¹¹⁵ Should the Court hold in favor of the application approach, the modern photographer would benefit immensely from an economic perspective;¹¹⁶ however, if the court determines otherwise, the benefits associated with integrating blockchain-based technology via image rights management platforms may provide renewed incentive to register content at the outset of creation.

¹¹⁰ 17 U.S.C. § 411(a) (2018); *see also* Rogers v. Koons, 960 F.2d 301, 308 (2nd Cir. 1992); *see also* Pietz, *supra* note 98, at 7 (stating “according to the American Intellectual Property Law Association’s annual survey in 2015, the median litigation cost to take a copyright infringement case where ‘less than 1 million’ is at stake through to the close of discovery was \$250,000. Given that kind of potential expense, suing average people and small businesses one at a time, who likely “cannot pay anywhere near the amounts awarded,” even if they were found liable, is something most content owners see as futile.”).

¹¹¹ *Id.*

¹¹² Jake Wharton, *Supreme Court to Resolve Copyright Registration Circuit Split*, IPWATCHDOG (June 28, 2018), <https://www.ipwatchdog.com/2018/06/28/supreme-court-resolve-copyright-registration-circuit-split/id=98878/>.

¹¹³ *Id.* “Obtaining a copyright registration can take months unless the applicant pays a nonrefundable \$800 fee for expedited handling when there is “compelling need,” such as prospective litigation.”

¹¹⁴ *Id.* “These courts view the registration as a formality that will result in either a registration or rejection of the application, either of which will allow the litigant to proceed.”

¹¹⁵ *Fourth Estate Public Ben. Corp. v. Wall-Street.com, LLC*, 856 F.3d 1338 (11th Cir. 2017). Fourth Estate Public Benefit Corporation (“Fourth Estate”) is a news organization that produces online journalism, licensing articles to other websites, including Wall-Street.com, while it retains the copyright. *Id.* at 3. Fourth Estate filed an action for copyright infringement alleging Wall-Street.com failed to remove all of its content before cancelling their account, pursuant to the pair’s licensing agreement. *Id.*

¹¹⁶ Matthew J. Astle, *Help! I’ve Been Infringed and I Can’t Sue!: New Approaches to Copyright Registration*, 41 U. MEM. L. REV. 449 (2011), https://heinonline.org/HOL/Page?collection=journals&handle=hein.journals/umem41&id=456&men_tab=srchresults.

IV. PROPOSAL

According to the former Register of Copyrights, Maria Pallante,

“. . . Congress introduces bills, directs studies, conducts hearings, and discusses copyright policy on a fairly regular basis, and it has done so for two centuries. But revision of the comprehensive sort is an entirely different matter. It requires a clear and forward-thinking set of goals and a sustained commitment from Congress. As [Register] Solberg observed in 1926, there comes a time when the ‘subject ought to be dealt with as a whole, and not by further or temporizing amendments.’”¹¹⁷

As the relationship between the world of digital content and copyright becomes more convoluted, we may finally be approaching a breaking point where the subject must be dealt with. This section will discuss how the integration of blockchain technology can assist with modernizing the copyright registration process in order to provide effective content management that will allow the copyright owner to better utilize the associated legislation.

A. Image Rights Management Platforms

“Blockchain technology is an important concept that will be the basis for many new solutions,”¹¹⁸ such as remedying the copyright owner’s burden to establish traceable ownership.¹¹⁹ According to Bruce Pon, CEO of image rights management platform ascribe.io,¹²⁰ the root of the problem that the technology will solve is “how to adjust a method for tracking and transacting media or content to keep pace with digital content’s lightning fast distribution speed over the internet.”¹²¹ Blockchain

¹¹⁷ Maria A. Pallante, *The Next Great Copyright Act*, 36 COLUM. J.L. & ARTS 315, 319 (2013), https://www.copyright.gov/docs/next_great_copyright_act.pdf; Thorvald Solberg, *Copyright Law Reform*, 35 YALE L.J. 48, 62 (1926), <https://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=3112&context=ylj>.

¹¹⁸ Yaga et al., *supra* note 46, at 9.

¹¹⁹ Jessie Williams, *Is Blockchain-Powered Copyright Protection Possible?*, BITCOIN MAGAZINE (Aug. 9, 2016), <https://bitcoinmagazine.com/articles/is-blockchain-powered-copyright-protection-possible-1470758430/>. “One application for blockchains that I expect to see is a registry of ownership. It can be very difficult to trace the ownership chain for copyrighted works (especially with multiple authors, e.g. sound + video + text). Traceable ownership is a problem that blockchains are especially well suited for.”

¹²⁰ See generally, ASCRIBE, <https://www.ascribe.io/faq/> (explaining that Ascribe is an image rights management platform for individuals engaged in creative media to claim attribution and transfer rights. “When a creator registers a work on ascribe, a unique, cryptographic ID is generated and then stored on the blockchain. The blockchain is a secure database where transactions can be recorded and never deleted. The cryptographic ID is a composite of the digital artwork and the artist’s identity, creating a permanent and unbreakable link between the artist and their work.” At publication time, ascribe is no longer active; the platform’s codebase has been fully opened sourced and released via the webpage, <https://www.ascribe.io/>).

¹²¹ David Hollerith, *What Could Blockchain Technology Mean for Photography?*, NASDAQ (June 13, 2017), <https://www.nasdaq.com/article/what-could-blockchain-technology-mean-for-photography-cm802750>.

allows for every transaction to be transparent and secure because every part of the platform keeps a record.¹²² A photographer can upload a digital image to the blockchain which will then produce a permanent record of the date of creation and ownership of the work.¹²³ There are several companies currently exploring the ways blockchain can positively impact the copyright system, including Binded.com (“Binded”),¹²⁴ which is specifically tailored to photography. According to Binded, the platform seeks to make creativity “the world’s greatest asset,” which can be achieved by offering a streamlined experience for the modern copyright owner.¹²⁵ To refresh, once a photographer releases the shutter and the image is recorded in a tangible medium, the individual owns the copyright, but the copyright must be registered with the United States Copyright Office prior to initiating a claim for infringement.¹²⁶ Image rights management (“IRM”) platforms strive to serve as an intermediate step in the standard registration process, though some platforms also offer assistance with filing applications for federal registration.¹²⁷

In practice, the process follows as such: the photographer would create an account and upload their image to the platform, from there the photo is added to the

¹²² Evgeny Tchegotarev, *Here’s How Blockchain Will Disrupt Photo Stock Companies*, MEDIUM (Nov. 10, 2017), <https://medium.com/@tchegotarev/heres-how-the-blockchain-will-disrupt-photo-stock-companies-bb842383371a>.

¹²³ Gregory Gerstenzang, *A Primer on Blockchain and Cryptocurrencies*, MICH. LAWYERS WEEKLY (June 7, 2018), <https://masslawyersweekly.com/2018/06/07a-primer-on-blockchain-and-cryptocurrencies/>.

¹²⁴ Nathan Lands, *Why Was Binded Founded? Why We’re Dedicating Our Lives to Democratizing Copyright.*, BINDED, <https://help.binded.com/about-binded/purpose/why-was-binded-founded> (last visited July 22, 2018). “Issues holding copyright back: (1) The U.S. Copyright Office is severely antiquated and have no technical competence; (2) There is no useful copyright databased; and (3) Most people don’t have access to copyright protection tools.” *See generally* KODAK, <https://www.kodak.com/US/en/corp/company/default.htm> (last visited July 22, 2018) (discussing Kodak’s image rights management platform KODAKOne, “though Kodak has mostly been known for its historic role in photography, the company has served imaging needs of numerous industries since the early 1900s. Kodak’s current portfolio is based on deep technological expertise developed over the years in materials science, deposition and digital imaging science. Using this expertise, the company that delivered the first roll film and the first digital camera is now delivering leading solutions for today’s business customers.” Kodak, is also seeking to assist photographers with copyright protection online through the use of blockchain and cryptocurrency. The company recently released KODAKCoin on May 21, 2018 alongside plans for a blockchain-based platform, known as KodakOne, which is anticipated in late 2018.); *see also* *The KODAKCoin Tokens & KODAKOne Platform Marketplace*, KODAKONE, <https://kodakone.com/kodakcoin.html> (last visited July 25, 2018) (Explaining that KODAKCoin is a platform-specific type of cryptocurrency, “with KODAKCoin tokens, payments will happen instantaneously and there will be no need for currency conversions between different countries.”).

¹²⁵ *About*, BINDED, <https://binded.com/about> (last visited July 22, 2018) (the website states that “copyright is an essential part of our world economy, yet no one has built a modern technology company to make copyright useful on the web. As the job landscape changes with the rise of automation, this problem will only continue to grow. Creativity is one of the few things that cannot be replaced by modern technology and in the future, it will be even more important that people can make a living using their creativity. Today it’s incredibly difficult to identify the copyright owner of a file on the web. Binded will change that.”); *see also* Nicholas Rosslee, *Get Yourself Binded.com – Copyright Made Simple For Photographers*, ADAMS & ADAMS IP, <https://adamsadamsip.com/get-yourself-binded/> (last visited July 24, 2018).

¹²⁶ 17 U.S.C. § 106.

¹²⁷ BINDED, *supra* note 125.

(platform-specific) blockchain and is assigned a permanent digital fingerprint.¹²⁸ The photographer would then receive a certificate of confirmation similar to a standard copyright registration.¹²⁹ Arguably the most significant benefit for the photographer is that these platforms also offer (or are in the process of developing) ongoing monitoring of the recorded images, in an effort to detect infringement online in real-time.¹³⁰ Imminent detection would be achieved through the use of web crawlers¹³¹ that would traverse the internet, searching for the registered photos (identified via their digital fingerprint).¹³² This process would provide effective tracking and identification of images shared across the web, including those posted to social media platforms, and create a transparent record (available for review upon login to the platform account) to determine whether the photos have been properly acquired.¹³³

B. Critics of Image Rights Methodology

Critics of the IRM platforms note that the underlying issue, the copyright owner's ability to remove and/or act on infringing content, still requires legal intervention, and worry that they will forego federal registration in favor of registration on the blockchain.¹³⁴ Additional concern surrounds potential recovery settlement amounts because per the statute, the photographer would be entitled to a larger financial award (on the basis of infringement) than would likely be agreed upon during third party licensing negotiations.¹³⁵ However, many photographers do not have the financial means to pursue litigation; the DMCA's notice and takedown procedures provide an economically feasible alternative for those who either cannot afford or are simply not interested, in pursuing litigation. The ISP's expeditious removal of the infringing content remains contingent upon the photographer's timely

¹²⁸ *Id.*

¹²⁹ *Id.*

¹³⁰ *Monitoring*, BINDED, <https://help.binded.com/features/monitoring> (last visited July 22, 2018); see also, Greg Scoble, *What Photographers Need to Know About Blockchain*, PHOTO DIST. NEWS (Jan. 15, 2018), <https://www.pdnonline.com/business-marketing/legal/copyright/photographers-need-know-blockchain/> (Image Rights' platform CEO, Joe Naylor explaining "If the company discovers and infringing use of that image, [as recorded on the blockchain] it inscribes that data on the blockchain as well – with the date of the infringement." Naylor says this helps photographers, since the statute of limitations for pursuing a copyright claim is three years from the date of the infringement." . . . It has also helped the company to prove that a specific copyright application covers a given image.).

¹³¹ *Web Crawler*, MERRIAM WEBSTER, <https://www.merriamwebster.com/dictionary/web%20crawler> (last visited July 25, 2018) (For the purposes of this comment, a web crawler is defined as a computer program that automatically and systematically searches web pages for certain keywords.).

¹³² Hillary Grigonis, *Kodak One Uses Blockchain and Web Crawlers to Spot Stolen Images*, DIG. TRENDS (May 10, 2018), <https://www.digitaltrends.com/photography/kodakone-creates-photo-registry-blockchain-ces2018/> (Noting that Kodak plans to differentiate the assigned IP addresses to distinguish licensed images, so as to prevent the web crawlers from incorrectly flagging purchased images.).

¹³³ *Id.*

¹³⁴ Hollerith, *supra* note 121.

¹³⁵ Leslie Burns, *Blockchain Copyright Services: Seductive But Unwise*, BURNS THE ATTORNEY: LESLIE BURNS (Jan. 10, 2018), <http://www.burnstheattorney.com/2018/01/10/blockchain-copyright-services-seductive-but-unwise/>.

detection, and with limited resources to allocate to traversing the internet, the photographer may never detect the infringement.¹³⁶

C. Blockchain and the Copyright Office

IRM platforms within the blockchain ecosystem are an effective response to, what has become, an insurmountable burden to the copyright owner to monitor unauthorized use of their work across the internet. These platforms are offering invaluable assistance to copyright owners, however, the integration of blockchain technology is not a substitute for the current statutory procedures. Rather it serves to assist the photographer in effectively utilizing them.¹³⁷ In an effort to bring the Copyright Office (the “Office”) current within modern technological climate and eliminate the redundancy of registering works with two separate entities, the Office could act as the central node of the blockchain, with the technology being integrated into the registration process. The concept would likely function best as a permissioned (quasi-governmental) ecosystem,¹³⁸ where the Copyright Office would sanction certain nodes, for example, the image rights management platforms, to manage the blockchain as intermediaries. In a permissioned system the nodes would be able to by-pass the proof of work requirement, however, they would still require a consensus model prior to the addition of images to the blockchain.¹³⁹ In practice, the photographer would create an account through the IRM platform where they would complete and submit their copyright application; the other statutory requirements would remain unaltered. The nodes would then communicate and verify whether the requirements for registration have been met. If so, the work would be registered

¹³⁶ As a photographer myself, I have set-up analytics for my name in an effort to consciously monitor where my images appear online. The analytics yield results for only a fraction of the publications, in contrast to my PR liaison who consistently forwards articles including both my photographs and name, which never populated in my reports.

¹³⁷ Scoblete, *supra* note 130 (quoting Image Rights’ CEO Joe Naylor, “. . . a blockchain record is in no way a substitute for copyright registration. ‘we are only using it now to overcome objections and defensive arguments when we pursue an infringement claim.’”).

¹³⁸ Telephone Interview with Amir Azaran, Partner, Loeb & Loeb, LLP (Aug. 10, 2018); *see also* Yaga et al., *supra* note 46, at 36 (explaining the concept of permissioned blockchains, stating that they, “defy the original conception of the Bitcoin blockchain where everyone can read and write to the blockchain, and the ledger is transparent/public. . . . Permissioned blockchains can be set up so anyone can read them, but only selected members can record transactions on them. This type of blockchain would provide full insight into the internal interactions of the organization by anyone who has an interest, but the public at large would not be able to interfere with the data. . . .”); *see e.g., id.* at 37 (for example, “suppose a number of banks want to keep a private, distributed ledger available to only the participating banks. This would provide the ability to record transactions from each bank in a way that is visible to the participants, but not the public. . . . There are a few interesting considerations when using a private blockchain with few participants, such as the ability to overcome its immutability. If there was some major disaster or exception situation, the banks could coordinate to roll back the blockchain and write a different transaction.”); *see also id.* at 33-34 (discussing “forking” (changes to the blockchain system)); *see also id.* at 41-42 (discussing Ethereum Classic post DAO hard fork.).

¹³⁹ Telephone Interview with Amir Azaran, Partner, Loeb & Loeb, LLP (Aug. 10, 2018); *see* Yaga et al., *supra* note 46, at 23. “There is no central authority determining which node publishes the next block on the blockchain. Each node maintains a copy and of the blockchain and may propose a new block to the other mining nodes.” *See also id.* at 26-32 (discussing consensus models).

with the Copyright Office and added to the blockchain simultaneously. The benefit to the copyright owner is obvious: they would register their work once and receive the protective benefits of the integrated entities – the ability to manage and review use of their content online via the IRM platform’s user-friendly dashboard, and the ability to timely file notice and takedown requests or initiate other measures such as licensing or litigation. But for the blockchain ecosystem to work effectively, there must be some type of incentive for the nodes as well.¹⁴⁰ Therefore, in an effort to minimize the direct cost to copyright registrants, the nodes’ financial incentive would be associated with the detection of infringement – similar to the current operational model employed by the IMR platforms. The nodes would receive a percentage of the recovery amount, determined by case-specific factors such as content value, extent of the infringing use, and selected remedy action – removal, licensing, or litigation.

V. CONCLUSION

Technological advances have inevitably eviscerated the photographer’s ability to protect their work online, and legislative alterations,¹⁴¹ while progressive, have not adequately addressed the copyright owner’s insurmountable burden of detection. The integration of blockchain technology into the copyright registration process will create a permanent record of authorship that will travel with the work, and remain intact despite both individual attempts at circumvention, and systematic data removal experienced during the trajectory of standard internet use.¹⁴² Combined with real-time detection, photographers will be able to timely file the requisite takedown requests, propose licensing agreements, or initiate litigation - all means of protecting their copyright online as initially intended by the DMCA. The integration of blockchain-based technology into the copyright registration process will return the photographer’s autonomy in the digital age.

¹⁴⁰ Telephone Interview with Amir Azaran, Partner, Loeb & Loeb, LLP (Aug. 10, 2018). *See also* Yaga et al., *supra* note 46, at 9

[Blockchain] also enabled the issuance of new currency in a fair fashion to those users (sometimes called *miners* or *minters*) maintaining the blockchain that, among other factors, enabled lower transaction costs for using the system. The payment of the mining nodes enabled distributed administration of the system without the need to organize those maintaining the system. By using a distributed blockchain and consensus-based maintenance, a self-policing mechanism was created that ensured that only valid transactions were added to the blockchain.

¹⁴¹ *Mavrix Photographs, LLC v. LiveJournal, Inc.*, 873 F.3d 1045 (9th Cir. 2017).

¹⁴² Scoble, *supra* note 130. “It may not be immediately intuitive, but having an immutable record can be very valuable for photographers as well. For one thing, you can securely link and store metadata information with your image – information like copyright registration and usage rights – in the blockchain.”