# BLOCKCHAIN & CRYPTOCURRENCY INDUSTRY REPORT

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Ocean Tomo, the Intellectual Capital Merchant Banc™ firm, draws upon more than three decades of experience valuing intellectual property in the most rigorous of venues – State, Federal and international courts.

Our financial, market and technical experts provide a unique understanding of the contributory value of proprietary innovation. This is the cornerstone of our business. This insight permeates every practice and client engagement.

Ocean Tomo is pleased to provide a comprehensive look at current industry trends and deal activity in a number of technology areas. As a financial advisor with a focus on technology and intellectual property (IP), Ocean Tomo has gained unique insights related to the IP driving a variety of technology areas, including:
1.0 EXECUTIVE SUMMARY

1.1 Firm Background and Qualifications

Established in 2003, Ocean Tomo, LLC, the Intellectual Capital Merchant Banc™ firm, provides Opinion, Management and Advisory services centered on intellectual property assets. Ocean Tomo provides companies with financial services related to intellectual property and intangible assets including financial expert testimony, valuation, strategy consulting, investment advisory, innovation management consulting and transaction brokerage.

Our Opinion, Management, and Advisory Services are built upon more than three decades of experience valuating Intellectual Property (IP) in the most rigorous of venues – State, Federal and international courts. Our financial, market and technical experts provide a unique understanding of the contributory value of proprietary innovation. This is the cornerstone of our business. This insight permeates every practice and client engagement.

Collectively, Ocean Tomo professionals have:

- Executed over 1000 engagements involving IP worth in excess of $10 billion;
- Successfully closed transactions where disruptive technology played a key role, with cumulative value in excess of $750 million;
- Conducted over 300 valuation engagements and 500 financial damages expert testimony engagements.
- Served as a trusted advisor involving the biggest IP transactions in history;
- Originated more successful IP monetization solutions than any other firm, including the creation of the world’s oldest and most successful live patent auction.

Ocean Tomo assists clients – corporations, law firms, governments and institutional investors – in realizing Intellectual Capital Equity® value broadly defined.

1.2 Disclosure

This report is written by and for intellectual property professionals as well as for those involved in the blockchain industry looking to enhance their knowledge of how IP can affect them. Our goal is to educate IP and blockchain professionals alike on how this new technology may change the intellectual property space, or vice-a-versa, how intellectual property may become a powerful force in the future of blockchain applications across various industries.

Ocean Tomo Investment Group is taking steps toward production of an electronic trading system compliant with all SEC regulation, as well as meeting with licensing professionals in regards to the development and promotion of the digitization of licensing IP using the blockchain. These efforts, while related to topics discussed in the report, have not affected the goals of this report stated above.

The authors of this report, while possibly holding their own personal positions in cryptocurrencies, have written this report without bias and are not attempting here to promote any virtual currency or security, nor provide investment advice.
Although a cryptographically secured chain of blocks was described in work dated as early as 1991\(^1\), the invention of blockchain in its current, most popular form, as a distributed ledger for transactions on a network, is credited to the pseudonymous Satoshi Nakamoto, the inventor(s) of Bitcoin, in 2008.

Cryptography has been around for centuries, but the cryptocurrency & blockchain community as a whole largely considers Satoshi Nakamoto’s Bitcoin as the first blockchain. A similar comparison would be to the smartphone. Even though smartphones such as the Blackberry were around since the mid-2000s and the earliest version of a smartphone can actually be traced back to IBM the mid-1990s\(^2\), most people consider the invention of the “smartphone,” in its current form and as we use the term today, to be the iPhone, introduced in 2007.

Bitcoin was designed to be a “purely peer-to-peer version of electronic cash,” completely decentralized from any trusted third party such as banks\(^3\). Although initially intended as the supporting technology behind a digital form of money, blockchain is beginning to show its potential to expand to numerous applications with real world use-cases in preexisting industries.

### 2.1 What is the Blockchain?

The blockchain is a distributed, shared, encrypted database that serves as an irreversible and incorruptible public repository of information.\(^4\) Put simply, it is a way to structure and store data. The benefit of blockchain databases over traditional methods of storing data is the ability to track information over time, whereas a typical database is just a snapshot of the information at a particular moment.\(^5\) With this expanded information set, a blockchain database can track the history of itself at any given point in time, a feature that opens information storage to a breadth of new use-cases and opportunities. The data exists in groups called “blocks” which appear in the blockchain in sequential order. Each block is a record of data, which can mean cryptocurrency transactions, information, licenses, or a slew of other possibilities. Once each block of data is completed, or “mined,” it is added to the chain and the next block of data begins to form.\(^6\)

**FIGURE 1**

How Transactions Enter the Blockchain
As new blocks are formed from numerous, verified transactions by miners, they are given a digital ID in the form of a number, known as a hash value. This hash value is used in conjunction with an input from the previous block, as well as a timestamp, ensuring that this block, its predecessor, and any future blocks will be linked in the correct order. Finally, this combined “header” begins to solve an equation using an arbitrary number called the nonce. This equation, also called a cryptographic hash function, is a mathematical algorithm for turning any set of data into a random hash number. In the Bitcoin blockchain, only blocks with hashes below a target value are accepted by the network. If a miner is to complete a block of verified transactions yet the hash value return is above their target value they must come up with a new hash value.

Fortunately the miner need not verify a whole new set of transactions. In a cryptographic hash function, if the data inputs are even slightly different, they will produce completely different hashes and because of this, the miner can simply change the nonce to return a brand new, random hash which is hopefully under the target value. A miner in this sense, is actually computer software capable of testing billions of different hashes against the target value per second. Once a hash from a set of verified transactions is under the target value, it is sent out to and accepted by the network and miners repeat the process over again for the next block.

### 2.2 Proof of Work vs Proof of Stake Blockchains

The benefit for the miners in the system described above (called “Proof of Work”) is a cryptocurrency based reward given to the miner who solves the problem and creates the next block, thereby incentivizing network participants to continue and verify the blockchain.²

There is another way to verify a blockchain that is currently gaining popularity over this Proof of Work mining method as it is much more cost effective. This method is called “Proof of Stake” and is quite different, yet still offers a solution to achieve distributed consensus. Proof of Stake chooses the miner of a new block not based on a competition to solve an algorithm, but deterministically, depending on wealth, or stake.³ Mining power is attributed to stakeholders based on the proportion of coins held by the miners, limiting each miner to a percentage of transactions reflective of their stake. For example, if a miner owns 5% of a particular token, they cannot mine more than 5% of the blocks.⁴ In the proof of stake method, all coins are already available, not mined, and the reward for verifying new blocks is simply the transaction fees accrued from the transactions within the block.

Although there are not many Proof of Stake blockchains functioning at the moment, the energy consumption and pricing benefits are clear, and there is a general agreement in the blockchain community that Proof of Stake validation will become more prevalent than Proof of Work. Proof of Stake significantly reduces the energy consumption of validating the blockchain, allowing for a more cost efficient method of transactions. On top of this, and quite possibly more beneficial, is the potential to stabilize the value of a coin. As laid out in an article by Michael Kogan of Hackernoon, currently, cryptocurrencies can be worth X, 0.5X, 2X or even 100X at any given point in time. The analytical framework behind the pricing of a cryptocurrency does not exist. In a Proof of Stake system, a clear, unambiguous economic incentive to hold coins for the long term is created by coin holders being paid transaction fees for validating transactions. Kogan goes on to state, “the price of the coin can be analyzed based on expected future cash flows, which are generated in the form of network transaction fees”⁵ which in turn, can bring stabilization to the price.

### 2.3 Who is using the Blockchain?

Far and away the most common use of blockchain technology at this point in time is cryptocurrencies. In fact, the first blockchain in wide use, the Bitcoin blockchain, facilitates the use of the Bitcoin cryptocurrency. Cryptocurrencies are simply a digital asset used for the purchase and sale of goods, as a store of value, or for some other utility/unique benefit, much like any traditional fiat currency or gold. However, with the recent and significant rise in popularity of blockchain technology, many other use-cases and applications of the blockchain have been emerging. Below are a few examples of companies being powered by the blockchain, and how they are benefitting from it.
Ripple – Payment Processing

RippleNet (or “Ripple protocol,” “Ripple Network”) is a real-time gross settlement (RTGS) transaction protocol built by Ripple on a distributed ledger. Value is transferred via XRP, the cryptocurrency used on the Ripple network. RippleNet is unique in being a “Centralized” blockchain—while it has many of the same functions as decentralized blockchains, “the nodes it’s protecting aren’t individuals but ‘trusted’ operators registered in the Ripple network,” allowing for the same advantages of a blockchain ledger with increased speed and efficiency from a closed ecosystem. To join the network, members and users sign an agreement to adhere by rules set forth in the rulebook, creating a legal framework for working relationships on the platform. An advisory board consisting of industry leaders from Transactional Banking, Digital Services and Cash Management services provides governance to ensure the rules and standards are aligned with banks and their customers. Ripple’s offerings can be broken down into three categories: xCurrent, for banks; xRapid, for payment providers; and xVia, for businesses.

xCurrent is the first global RTGS system that allows banks to settle payments instantly and transparently. There are four components to the xCurrent solution: (1) Messenger, which facilitates communication between RippleNet banks; (2) FxTicker, which facilitates exchange between ledgers by enabling Fx rate posting; (3) Validator, which cryptographically confirms payments; and (4) IPL Ledger, a subledger of each transacting bank’s general ledger that tracks all transactions. These components and their interactions are illustrated in Figure 2.

Sia – Decentralized Storage

Sia is a decentralized cloud storage platform secured by blockchain technology that intends to compete with existing storage solutions, at both the P2P and enterprise level. Instead of renting storage from a centralized provider, peers on Sia rent storage from each other. Sia itself stores only the storage contracts formed between parties, defining the terms of their arrangement. “Hosts” on the Sia network can offer up extra space on their hard drives, whether it be on their personal laptops, external hard drives or other drives, for storage through contracts. Anyone with the right technology available to them can be a host. By forming a contract, a host agrees to store a client’s data, and to periodically submit proof of their continued storage until the contract expires. The host is compensated for every proof they submit, and penalized for missing a proof. Since these proofs are publicly verifiable (and are publicly available in the blockchain), network consensus can be used to automatically enforce storage contracts. Importantly, this means that clients do not need to personally verify storage proofs; they can simply upload their file and let the network do the rest.

With the use of a decentralized blockchain, Sia is able to encrypt and distribute client’s files across the network. No outside company has access or control over the files, unlike traditional cloud storage systems. Sia is also able to reduce costs of storage using this method, with 1TB of data storage costing about $2 per month, compared to around $20 on competitor services such as Amazon S3. These low prices are due to a marketplace in which hosts compete for clients’ storage space. Transactions on the Sia network are completed using Siacoin, Sia’s cryptocurrency, which can also be mined and traded.
VeChain – Supply Chain, Tracking and Logistics

VeChain is an enterprise level public blockchain platform that combines physical sensors and blockchain technology to increase transparency and efficiency in the way goods are monitored and transported.²³ VeChain manufactures IoT sensor devices for multiple applications including the monitoring, tracking, and verifying of items in which sensors have been imbedded. These devices run on the VeChainThor blockchain, where they are validated and record collected data.

Use cases include:²⁴

- For automobiles, a vehicle “passport” where maintenance and repair history, insurance, registration and driver behavior are collected and maintained with a device imbedded during the manufacturing process. The data increases transparency in the insurance and used vehicle markets, as well as allows owners to take better care of their vehicles.
- For cold-chain logistics, continuous metric tracking of micro-environments throughout the item’s journey are recorded by IoT devices and documented in the ledger. This creates more reliability in transportation and transparency in diagnosing logistical problems.
- For luxury goods, the tracking of a unique product is accomplished by an imbedded chip with an assigned ID verified on the blockchain. This allows for transparency to the authenticity of premium products that are frequently faked.

Transactions on the VeChain network are completed using VEN, VeChain’s cryptocurrency. VEN is a two-coin system, providing a store of value mechanism and smart payment currency, as well as a means of managing costs using the VeChainThor protocol.²⁵

2.4 State of Blockchain

Mass adoption of blockchain technology is currently underway in nearly every industry, as companies from startups to fortune 500 corporations look for ways to adapt it for their given need. Oftentimes startups turn to ICOs (Initial Coin Offerings) for funding rather than following a traditional seed, series, IPO/acquisition format, which in itself is an adoption of blockchain technology by the creation of new cryptocoins. ICOs allow organizations to create their own coin and offer it for sale online, although unlike equity or stock in a company, they offer no ownership rights. Coins usually offer some other benefit such as the company’s product or service, or even a dividend payment, as well as simply offering the potential to appreciate in value and create profit for the coin holders. Initial Coin Offerings have become the main source of fundraising for new blockchain efforts. The figure below represents total funding for blockchain since January 2012, and gives a visual of the sheer explosion of investment in the blockchain space, particularly through ICOs.

In Q4 2017 alone, blockchain investments raised a total of $3.2 billion from ICOs, alongside another $200 million via venture capital.²⁷ This growth in popularity is further evident in the significant increase in market cap of nearly every cryptocurrency over the past year, the approval by the CFTC for bitcoin futures contracts, and the increased attention the cryptocurrency space has received by government regulators and the general media.
As of late, there have been a number of developments in the regulation of cryptocurrencies around the world, and especially in the United States. In March 2018, the SEC announced that it would require digital asset exchanges to register with the agency, and as of June 4, 2018, appointed its first “Crypto Czar,” or more formally, Senior Advisor for Digital Assets. The role has gone to Ms. Valerie Szczepanik and she will be tasked with “coordinating efforts across all SEC Divisions and Offices regarding the application of U.S. securities laws to emerging digital asset technologies and innovations, including Initial Coin Offerings (ICOs) and cryptocurrencies.” Notably, Szczepanik is a seasoned attorney, practicing patent law in the 1980s, working as a clerk in district and appellate courts in the District of Columbia and serving as Special Assistant United States Attorney in the Eastern District of New York before joining the SEC in 1997. Szczepanik’s extensive background in IP could bode well for IP assets and asset-holders in the space moving forward.

The SEC has taken the stance that cryptocurrencies are securities, at least the tokens and digital assets used in ICOs. The agency makes this determination according to the Howey Test, which defines a security as an investment of money in a common enterprise, in which the investor expects profits primarily from others’ efforts. When it comes to cryptocurrencies which aim to replace fiat currencies, such as Bitcoin, SEC Chairman Jay Clayton has said, “that type of currency is not a security.” The Commission has made it clear they will not be bending any rules in order to define what is or is not a security regarding cryptocurrencies. Although the space is still in the early stages of regulation, it can be seen as an inevitability. As Clayton said, “if it’s a security, we’re regulating it.”
3.0 BLOCKCHAIN & IP

3.1 Patent Landscape

As a relatively new space, blockchain patents are low in numbers, but growing, with a total of 3,974 related, active patent filings (grants and applications) worldwide as of June 2018. Most firms holding blockchain related patents are in the banking, finance, and tech industries, although this could change with the expected adoption of blockchain by many other sectors. The number of blockchain-related patents has been growing dramatically, and patent applications have increased by nearly 700% in the past three years. According to Thomson Reuters’ Practical Law editor Alex Batteson, “companies are moving fast in order to protect their ideas in new areas of technological development – long before the technology actually goes to market.” This allows companies to attract investment through their potential to capitalize on intellectual property as well as the right to exclude other emerging competitors from the market going forward. The radical increase in blockchain patent applications and grants is shown in the figure below.

![Blockchain Patent Applications and Grants](image)

Not only will these patents bridge industries, but geographies as well. The World Intellectual Property Organization (WIPO), supported by data from Thomson Reuters, showed that the US and China are the clear leaders in blockchain patents, with China growing significantly in 2017, accounting for over half of all blockchain patent applications. Below is a figure showing the blockchain patents and patent applications by jurisdiction.

It is useful to note that many of the patents being issued are for improvements in blockchain processing operations or new uses of blockchain technology, as the original blockchain codes are open source.
3.2 Patent Insights

The predictive power of patents in markets is often overlooked or underappreciated. Since the 1970s, intangible assets, like patents and other intellectual property, have grown from roughly 17% of the S&P 500 market value, to over 80% by 2015.\textsuperscript{41} As the representation of intellectual property as a portion of value has increased, so has its influence on market and firm performance. A diversified index called the OT300 Patent Index (OTPAT), tracked for a decade a portfolio of 300 companies that own the most valuable patents relative to their book value. The OT300 Patent Index has outperformed the S&P 500 by over 3,000 basis points as of January 2018.\textsuperscript{44}

Patents add value to a company through quality intangible assets which can provide streams of revenue. However, they can also offer forecasts as to who will be successful in the marketplace, in any industry, or even which industries will be first to adopt new technologies. Taking comprehensive data of all worldwide, blockchain patents, their assignees, their strengths, and more, we can make a number of predictions about the blockchain industry.

Figure 6 shows the top 10 blockchain patent holders by organization, along with their blockchain related patent counts. These are the early adopters of blockchain patents, and they comprise some of the major players in the tech and finance industries. We can expect to see these companies and their competitors in each of these industries continue their development of blockchain IP in the near to mid-term as the technology becomes more commonplace. The sooner organizations can obtain a strong blockchain patent portfolio for their given use-case, the more opportunities they will have to capitalize the patented technologies through application, licensing, and sale.
It’s logical that the finance and tech industries are well represented, as blockchain’s first and most established use-case was centered around a new technology to support financial transactions. It is also notable that financial applications have been, and are expected to be, the first widely adopted use of blockchain. Already, nearly every major U.S. bank has begun their own blockchain initiatives, along with numerous startups looking to enter the fintech space using blockchain. The figure below shows just how dominant financial applications have been up to this point in the patent application process.

Payment Protocols lead the pack, accounting for 23% of all blockchain patent applications, which is unsurprising given the amount of cryptocurrencies and payment applications that have been developed in recent years. However, Payment Protocols are not the only patent classification applicable to the finance industry. Encryption, Digital Security, and certainly Finance are all important features of a financial blockchain application, which together account for nearly 60% of all applications and grants. In order for financial firms and startups to successfully utilize the blockchain, it is imperative they cover all their patentable bases, including the encryption of the data, computing processes, accessing of memory storage, and many more subject matters.

Further, when examining strictly the “Encryption” classification of blockchain related patents, we find that nearly all the major assignees are tech-centric organizations. This would seem standard given several other patent classifications. You would expect LED patents to be owned by lighting companies, or pharmaceutical class patents to be held by pharmaceutical organizations, but there is a wide range of technologies supporting blockchain. A company would need to not only have rights to their specific use case of the blockchain, but the security, verification, and systems supporting it.

Given the importance of security in banking, financial firms looking to implement blockchain into their processes will need to broaden their intellectual property from a financial or payment protocol focus to one that incorporates a variety of technologies to support their services, either through internal development or acquisitions and licensing.
This analysis may seem particular to the financial industry, however it is analogous to nearly every industry looking to adopt blockchain. Organizations must build a quality IP portfolio in order to defend themselves and their products, develop new products and services, and simply stay relevant during the “blockchain-ization” of the global economy. Organizations that do not risk the distressing costs of litigation, poor bargaining positions while licensing or, in extreme scenarios, complete obsolescence in the industry. As more patents are filed each day, the pressure rises for firms to begin the process of building not only a defensive portfolio, but ideally a valuable one.

**FIGURE 9**
Blockchain Patents by Expiration Date

It is typical for patents to expire 20 years after their filing date, and because of the substantial increase in applications over the past few years, most blockchain patents will not expire until the mid to late 2030s, as shown in the figure above. This is significant to any organization looking to utilize blockchain technology, as they will need to hastily develop or acquire patents to avoid the potential of suffering from lengthy and expensive licensing agreements, litigation, or worse yet and potentially more costly, exclusion from the market.

For an organization to succeed using blockchain, whether that be via a blockchain supported product, or the licensing of blockchain related patents, it is equally as important to ensure the quality of the IP as it is to ensure its successful filing. In fact, whether a patent is presumed valid or simply issued gives no guarantee that it will remain that way. According to Stephen Kunin, former Deputy Commissioner for Patent Examination Policy at the USPTO, “Patent examination is an imperfect process that results in the issuance of patents that should have not issued. This is evidenced by the fact that in concluded IPR [Inter Partes Review] proceedings, only 10% of challenged patents had all original patent claims confirmed, and empirical studies have reported that 43% to 50% of all litigated patents are held invalid.”

A common determination of patent quality is its strength. A patents strength takes into account a number of factors including the age of the patent, references, citations, prior litigation, and jurisdiction; often, some of these factors go overlooked. Citations, for example, are a powerful tool in the assessment of high quality patents. A patent citation is a document cited by an applicant, third party or a patent office examiner because its content relates to a patent application. Any publicly available document can be cited including an existing patent publication, journal article, internet publication, conference abstract or oral disclosure. There are two kinds of citations: forward citations and backward citations. A backward citation would be given to a patent application during the application process, when the patent examiner notices a reference to an existing source or “prior art.” Forward citations work in the opposite direction, given to a patent when the patent itself is cited by a more recent source. Forward citations in particular are often given the most weight or are the most significant factor in a number of patent ranking tool calculations. They can be seen as a proxy for industry-wide R&D investment in a technology area, and with more investment, there are generally more products. More products leads to a higher chance of infringement, and infringement drives value through the purchase or litigation of patents. The stronger the patent, the more likely it is to hold up in court, and the more valuable it is when it comes time to license or sell. The table below shows the pool of blockchain related patents and their associated patent strength percentiles.
As you can see, it is quite rare for a patent to record a strength in the upper third of the range, however these are the patents that will likely be of immense value in protection, litigation, and licensing/sale. Below we provide an analysis on some of the strongest, oldest, and most cited patents in the pool to illustrate what makes blockchain patents valuable.

Strongest Blockchain Patents

In the blockchain patent pool of nearly 4,000 patents, there are four tied for the strongest, with a patent strength rating in the 93rd percentile.

- U.S. Patent No. 8,180,051 (the ‘051 Patent)
- U.S. Patent No. 8,265,272 (the ‘272 Patent)
- U.S. Patent No. 7,975,147 (the ‘147 Patent)
- U.S. Patent No. 7,844,053 (the ‘053 Patent)

The ‘051 Patent is titled “Methods and apparatus for securing communications of a user operated device” and is owned by Cisco Technology, Inc. It contains 28 claims and 25 forward citations, 5 times the average for similar patents. The ‘051 Patent has never been litigated. The ‘272 Patent is owned by Red Hat, Inc. and titled "Method and an apparatus to generate pseudo random bits for a cryptographic key." It has only 20 claims, but over 50 forward and backward citations, putting it at 1.4 and 2.7 times the averages for forward and backward citations respectively. This coupled with the expected expiration not until 2030 propels this patent to the front of the group. Like the ‘272, the ‘147 Patent expires in 2030, and shows excellent citations numbers with 3.6 and 5.3 times the averages, and 41 claims. It's titled “Electronic device network supporting enciphering and deciphering and update generation in electronic devices” and the assignee is QUALCOMM, Inc. Last is the ‘053 Patent, titled “Microprocessor apparatus and method for performing block cipher cryptographic functions.” The ‘053 Patent expires in 2026, and boasts 24 forward and 105 backward citations.

All four of these top blockchain patents have common characteristics: they are high in citations, forwards and back, they have a lengthy expected life before their expiration, and they have plenty of claims. The claims listed in each draw upon previous technologies, yet offer ground on which future patents can stand on, all while specifically detailing the unique, patentable technology. All of these features contribute to a strong, valuable patent, and to be able to capture them in reference to a new technology such as blockchain would result in an extremely high-quality IP asset. Additional keys to developing a quality blockchain IP portfolio are also discussed further in the sections to follow.
Oldest Blockchain Related Patents

The oldest blockchain related patents from the pool are U.S. Patent 6,324,656 and 6,282,546. Both patents are owned by Cisco and were filed on June 30, 1998. The ’656 Patent is titled, “System and method for rules-driven multi-phase network vulnerability assessment,” and the ’546 “System and method for real-time insertion of data into a multi-dimensional database for network intrusion detection and vulnerability assessment.” Despite their expirations on June 30, 2018, the ’656 and ’546 Patents remain relatively strong among blockchain patents, both scoring in the 91st percentile. This continued strength is partly due to the patents’ impressive amount of forward citations. The ’656 boasts 464, while the ’546 has 469. This places each at 5th and 3rd in total forward citations in the pool, respectively.

Most Cited Blockchain Related Patent

The patent most cited in the blockchain patent pool is U.S. Patent 6,301,668, a “Method and system for adaptive network security using network vulnerability assessment.” The assignee is Cisco, and it records 709 forward citations. The patent was filed in 1998 and expires in December 2018. This patent contains 116 claims. Claim 1 of the ’668 Patent reads:

“A method for adaptive network security comprising: directing, by a device coupled to a network, a request onto the network; assessing a response to the request to discover network information associated with determining at least one potential network vulnerability; and prioritizing a plurality of analysis tasks based upon the network information, the plurality of analysis tasks to be performed on network data traffic which is monitored in order to identify attacks upon the network.”

3.3 Blockchain IP Portfolios, Litigation, and Strategies

Often garnering allusions to the dot-com bubble and the influx of legal battles involved, blockchain looks to be the next arena for patent litigation. Companies are rushing to file patents, develop technology, and expand their blockchain efforts to prepare for this increasingly popular technology.14

Threats

In making strides toward the adoption of blockchain there will be a number of threats to businesses. Often companies will face litigation from competitors, or possibly Non-Practicing Entities (“NPEs” or “patent trolls”), as they adopt new technologies. The same assumption can be made with blockchain— as more organizations begin to implement and patent it, there will be more litigation of intellectual property associated with it. There is already evidence of organizations and NPEs gearing up for lawsuits regarding blockchain patents. Nick Spanos, founder and CEO of Blockchain Technologies, which has patented a blockchain based election voting system, has said a patent war “is inevitable” and that “legal battles will ensue.”15 Even though blockchain based patent infringement litigation has been almost nonexistent, experts say lawsuits are almost certain, and “the wave of patent litigation is on the horizon.”16

Another potential threat to companies looking to expand into blockchain is Alice-based Section 101 rejections. Since the 2014 decision in Alice Corp. Pty. Ltd. v. CLS Bank Int’l, courts have often invalidated software and “computer-implemented inventions” at an early stage.17 Alice builds on U.S. Patent Law Section 101 of Title 35 in stating that “merely requiring generic computer implementation fails to transform that abstract idea into a patent-eligible invention.”18 New uses of blockchains may face rejections if the new uses only require a network of standard computers performing standard computer functions without significantly more.19
IP Protection

The importance of IP protection going forward for this technology cannot be overstated. Although much of the core blockchain technology is open source, companies can expect to see patents covering a particular use case intertwined with blockchain technologies to solve a particular problem within specific industries.\(^{a0}\)

Blockchain litigation may be years away, but the time to begin defending positions is now. Patent filings have grown at an exponential rate with over 740 blockchain patent publications worldwide in just September 2017, a 300% increase since January 2016. Experts don’t expect that type of growth to slow down any time soon, some believing it will “be sustained for several years and that we’ll be looking at thousands of patents in a couple years.”\(^{a1}\)

While protecting themselves against litigation from competitors or trolls, organizations must also be aware of tactics to avoid issues with the Alice ruling. Some of these tactics would be including in the claims security aspects like encryption, hashing, or digital signatures, networking aspects like consensus protocols, or smart contract protocols, and focusing on any distributed ledger features instead of transaction features.\(^{a2}\) Luckily for companies looking to implement the blockchain, there are strategies to defend against most threats and protect themselves in this expanding technological space.

Strategies

There are a number of core strategies that can be utilized by firms implementing or developing blockchain technology to their benefit. One of these strategies is a patent licensing strategy, in which a firm with rights or ownership of some of the patents necessary to implement blockchain for their particular use would go to market looking to license the remaining patents needed. It is a low risk strategy that can be used by most firms, however there is potential for this strategy to become expensive in the long run, as firms pile on royalty and up front licensing payments. Another strategy would be to build a defensive portfolio of patents. Either through the development of original patents internally, or the acquisition of third party portfolios, firms can construct a quality portfolio of patents that would allow them not only to benefit from the implementation of such technology into their own business, but from the licensing and enforcement through litigation of the patent rights to other firms looking to do the same. This strategy, while costly in the near term, can have a significant impact on firm profitability going forward. Even non-practicing entities, sometimes called patent trolls, are able to benefit from this strategy by simply purchasing and litigating certain patents against other players in the market.

To that end, and in order to simplify the process of acquiring patent rights, Ocean Tomo has created a bid-ask market. The Ocean Tomo Bid-Ask Market is a platform to purchase or sell patents and patent applications globally.\(^{a3}\) Through this platform and its brokerage services, Ocean Tomo has successfully closed hundreds of transactions with cumulative value well over $750 million.\(^{a4}\) Recently, Ocean Tomo listed its first blockchain patents on the platform. Information on these patents is provided below as an example of current blockchain patent offerings on the market today.

The five patents included in the sale comprise one family and cover systems and methods for the securing and encryption of digital content. More specifically, these patents cover securely locking encrypted digital media to a particular user, computer or other computing device. The following patents are included in the portfolio:

- 7,421,741 - Securing digital content system and method (Filed: 4/19/2006)
- 7,979,697 - Securing digital content system and method (Filed: 7/29/2008)
- 8,402,558 - Securing digital content system and method (Filed: 6/10/2011)
- 8,930,697 - Securing digital content system and method (Filed: 2/7/2013)
- 9,191,376 - Securing digital content system and method (Filed: 11/25/2014)

The 7,421,741 and the 7,979,697 patents both score in the 90-100th percentile of patents based on patent strength, which is a function of claims, term, and citations as compared to similar patents. The ‘741 Patent has 34 forward citations, and the ‘697 Patent has 8, which is 6.8 and 1.6 times the average of 5 for comparable patents, respectively. These patents have been cited by notable companies in the blockchain and technology space such as Samsung, Microsoft, Twitter, and Toshiba.\(^{a5}\) For more information regarding this particular portfolio, please contact Dean Becker at dbecker@oti.com.
4.0 CURRENT IP BLOCKCHAIN EFFORTS

Intellectual Property based firms have been increasing their involvement with blockchain based companies and technologies significantly over the past few years. We see the incorporation of this technology into numerous industries as a watershed moment, which could lead to significant increases in opportunities for valuation, litigation, and licensing of new patents and intellectual property. Below we discuss organizations and efforts supporting the development of blockchain within the world of Intellectual Property, as well as the role blockchain IP already plays in the IP marketplace.

4.1 Loci

Loci is a patent search database aimed at making the invention process, from idea to patent to discoverability, more efficient. LociSearch is a blockchain powered context-based search tool that connect inventors, patent attorneys, corporate analyst and others with inventors and their ideas. Inventors provide verifiable information on the Loci blockchain, offering immutable proof of IP rights globally, while users can search this database to efficiently find relevant patent data.

Loci’s InnVenn is a document search tool that provides novelty analysis, a process usually done by the inventor or patent attorneys, with increased efficiency and transparency. InnVenn also helps investors stake their claims by acting as a blockchain-integrated public disclosure platform, establishing an immutable data point with a time stamp of the invention’s public disclosure. This disclosure begins a 12-month grace period for filing of a patent, and effectively streamlines the process of obtaining protection on an idea.

FIGURE 11
InnVenn Prior Art Search vs. Patent Agent
The InnVenn System runs with LocI’s native Cryptocurrency, LOCIcoin, creating a means for exchange of ideas between inventors and investors; inventors use LOCIcoins to stake their claims and put them on the marketplace, while investors search for and invest in ideas found on the platform, transacting in LOCIcoins.66

4.2 IPwe

IPwe is a blockchain enabled patent registry and ratings database currently containing basic information on 80% of the world’s patents.69 Integrated with the registry is Zuse, a patent analytics platform that leverages AI, predictive analytics, and data management. The system exists to enhance the patent ecosystem, giving patent owners exposure to potential buyers and licensees, and companies seeking new technology an easier way to find the technology they need to grow.

Zuse is exclusively licensed by IPwe for use with their platform.70 The system identifies relevant prior art by analyzing the limitations of the claim under consideration, the text, link structure of the citation work, and patent classification. Zuse further renders a single “Q Score” for patents, designed to measure the overall relative quality of a patent in a collection. By accurately identifying patent owners on the IPwe database, and providing a relative analysis of the quality of patents, IPwe envisions a more efficient patent ecosystem for all parties involved.

4.3 KodakCoin

On January 9, 2018, Kodak announced the launch of KodakOne and KodakCoin, an image rights management platform and cryptocurrency that use blockchain to create a ledger of rights ownership for photographers.73 Kodak licensed their name to WENN Digital, who will own and operate the KodakOne platform. WENN Digital’s proprietary big data/AI enabled image recognition platform continuously monitors and protects IP of the images online, while the KodakCoin native cryptocurrency enables artists and users to exchange image rights and ownership, creating a full circle platform for the enforcement, management, and sale of image rights.74
Ocean Tomo moderated a panel including the Chief Executive of KodakOne at the Licensing Executives Society International (LESI) 2018 Annual Conference discussing “Emerging Developments at the Intersection of IP, Blockchain and Cryptocurrency”. This presentation included the CTO of IPC Group (see below) and was sponsored by the newly formed Blockchain Subcommittee of the LESI High Tech Committee. The workshop discussed opportunities and risk surrounding blockchain, as well as patent and copyright cryptocurrency offers and the use of blockchain to record licensing transactions.

4.4 IPC Group

Intellectual Property Coin Group, Inc. (“IPCG’, “IPC Group”) is an Ethereum based blockchain platform and related cryptocurrency designed to facilitate IP based transactions, primarily the sale and license of patents. The Mission of the Company is to “promote low cost and efficient use of technology for public good”. The company presents two offers:

- IP Coins (“IPC”) or tokens are a proprietary cryptocurrency loaned to patent owners, providing liquidity to purchase and license further patent rights from third parties.
- Unit License Right Smart Contracts (“ULR”) represent a blockchain ledger allowing patent owners to more efficiently license their IP rights creating greater transparency, a secondary market opportunity, a clear audit trail and accounting value recognition.

The Company will issue / lend IPCs to patent owners secured by the borrowers underlying patents. These patent-backed loans will be funded at the then-current IPC market price, in an amount not to exceed 25% of the appraised dollar value of the patent collateral and at a term not more than 5 years. IPC loans are expected to bear an average interest rate of LIBOR plus 7% and may be paid back in IPCs or an approved cryptocurrency based on market pricing at the time of repayment. Combined principle and interest payment in IPC’s provides for a reduced interest rate (expected to average UIBOR plus 3.5%). One-third of interest paid net of any currency exchange costs will be distributed quarterly on a prorate basis to all holders of IPCs. The balance of interest proceeds will be used to fund the Company’s operations. IPCs used in principle repayment will be returned to inventory as Treasury Tokens and may be loaned again; principle payments in non-IPC’s will be used to purchase IPC’s from the market returned to inventory as Treasury Tokens.

Example: BigCo owns 10,000 patents across the U.S., Asia and Europe. Management announced a new product and requires patent protection against competitors but has limited budget to acquire the desired rights. The Chief IP Officer has identified 500 patents to use as collateral which are appraised by an independent accountant to be worth $40 million. IPC Group will loan to BigCo $10 million in IPC’s for five years. BigCo can then use the IPC’s to purchase or license-in the required patents.

As a market, IP Coin lending benefits from a network effect. The more patent owners which borrow and hold IPCs, the more efficient the purchase or sale of patents using IPC’s becomes. Patent owners can use ULR Smart Contracts to more efficiently make available (as Licensor) rights to use select groupings of patents, patent applications and related know-how. Estimating the likely future demand for a given technology, Licensors will offer a defined number of ULR contracts to the market at a predetermined price. Blockchain technology and standard contracts allow the patent owner to quickly present this opportunity. Interested buyers (as Licensee) can then purchase the number of contracts they require. As defined units of value, the buyer can book their purchase on their balance sheet as an asset, expensing them as they are consumed. Importantly, the blockchain ledger transforms traditional market practice by allowing the ULR buyer to resell any excess contracts into the market (at a profit or discount) creating a true seconding market for patent licenses. The Company will earn a commission for each new issued ULR Smart Contract, with a reduced commission for ULR’s purchased using IPCs. One-third of commissions paid will be distributed quarterly on a prorate basis to all holders of IPCs.

Example: BigCo now determines that a portfolio of patents represents non-strategic technology which is needed by others in a related industry. BigCo. estimates the demand for this technology to by 3 million units of production over the next 2 years and creates a ULR Smart Contract offering each unit for $0.50. LittleCo. anticipates making 10,000 products using this technology and purchases the same number of units, recording on its books a $5,000 asset. Over the next two years, LittleCo makes only 8,000 products reselling the unused ULR Smart Contracts to a third party at $0.75 a unit, making a profit due to the limited remaining supply.
Future efforts of the Company may include facilitation or creation of a market to trade ULRs. IPC Group, Inc. anticipates presenting for sale a limited number of IP Coins or tokens through an SEC Regulation A+ Initial Coin Offering ("Reg A+ ICO" or "ICO"). The Company plans on proceeding under Tier 2 of this Regulation.

4.5 Blockchain Purchases and Licenses

Sales and/or licensing agreements of blockchain companies, patents or licenses are few and far between at this point in time. Most companies are still figuring how to adopt blockchain, and if they already know how to do that, they are probably looking into developing their own applications or filing their own patents to do so. We are still in the early stages of development of blockchain application IP. That being said, there have been a few instances of the licensing or purchase of blockchain related IP, and numerous sales of blockchain related tangible assets such as mining equipment. Below are a few licensing agreements explained.

Longfin – Meridian Agreement

On December 11, 2017 Longfin (LFIN) paid 2.5 million shares to acquire Ziddu.com, Ziddu Warehouse Coins (WC) powered by blockchain technology (with ERC20 Token Standard), and all the associated IP from Meridian Enterprises. The shares were worth $12,500,000 after the company's IPO, which occurred two days later. The deal included not only blockchain IP and know-how, but tangible assets as well, and all of Ziddu's respective content. As such, it's hard to divide the $12.5 million in what was specifically a valuation of the blockchain intellectual property, but naturally one can assume there is value behind the technology itself as the entire deal centered around a blockchain driven application, which in itself is partly a result of the IP.

Dragon Coin Network – Wecast Services Agreement

A Technical License Agreement was entered into between Guangxi Dragon Coin Network Technology, a limited company incorporated in China, and Wecast Services Group, a company registered in Hong Kong, on October 17, 2017. Pursuant to the agreement, Wecast granted Dragon Coin Network the non-exclusive, permanent right to use trading platform technologies and to operate the offering of real-asset-based digital assets, as well as the securitization of such assets. In consideration for such, Dragon Coin Network paid Wecast 17.9% of its existing total equity of Courage Investment Group Limited, its parent company listed in Hong Kong, which was roughly HKD 151,482,585 as of the agreement, or around $20 million. Again, we see an instance of equity being paid in exchange for a license, and at a seemingly steep price too. This will become less common as major players get involved, and the licensed technology will become clearer as the patenting process is completed.

Microelectonics Technology – Classic Capital Inc. Agreement

Effective May 5, 2014, Microelectonics Technology and Classic Capital Inc. entered an Asset/Intellectual Property Purchase Agreement. The agreement stated that Classic Capital would sell to Microelectonics all IP assets listed in the agreement, which related mostly to bitcoin mining, as well as advanced caching and network security. In addition, Microelectonics would receive a perpetual and exclusive commercial license to Classic Capital’s mining pool software source code. In return, Microelectonics would pay $250,000 on the effective date. Clearly this agreement was valued much lower than the other two, and we can presume this is attributable to the fact that it is simply mining technology. Additionally, the agreement dates back to 2014, four years prior to the writing of this report and seemingly ages ago in the world of blockchain. Although an extensive amount of bitcoin mining equipment and know-how for such a price back in 2014 would undoubtedly have been extremely profitable for Microelectonics, one may struggle comparing this agreement to those in the market today due to its time frame, and the revelations that have come since.
With the current influx of investment in blockchain technology, growing popularity across a wide variety of industries, and recent upsurge of blockchain and decentralized ledger intellectual property, the space is poised for significant growth in the years to come. Many have likened the blockchain revolution to the early days of the internet, poised to be the very next iteration of disruptive technology. There are many firms looking to be on the forefront of adopting blockchain, from Startups to Fortune 500 giants, and with the right investments in intellectual property, as well as smart partnerships, these organizations can position themselves for success in the promising new world of blockchain.
ABOVE THE AUTHORS

Trevor D. Krajewski

Trevor D. Krajewski is an Analyst working in the Expert Testimony group for Ocean Tomo at the firm’s Chicago headquarters. Ocean Tomo’s Expert Testimony Practice area quantifies economic damages arising from Intellectual Property disputes and provides general litigation support to its clients. Trevor has been involved in the valuation of damages regarding virtually all damage elements, including lost profits, reasonable royalties, unjust enrichment, price erosion and suppression, accelerated market entry, corrective advertising, and future lost profits.

Trevor became interested in blockchain in 2016 through his own independent research, attendance of industry conferences, and friends involved in the space. Prior to joining Ocean Tomo, Trevor interned at Charles River Associates, a global consulting firm that offers economic, financial, and strategic expertise to major law firms, corporations, accounting firms, and governments, where he was responsible for largely similar work conducted at Ocean Tomo.

Trevor holds a BA in Finance from Indiana University’s Kelley School of Business.

Evan T. Mair

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Evan became interested in blockchain in 2016 while interning with Sapient Global Markets, a technology consulting firm. There, he was responsible for managing a development project in digital transformation for a large multi-national bank. Prior to Sapient, Evan interned at ShoreView Industries, a mid-market private equity firm, where he was responsible for reviewing potential investments and monitoring portfolio companies.

Evan holds a BBA in Finance and Business Economics from the University of Southern California.
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