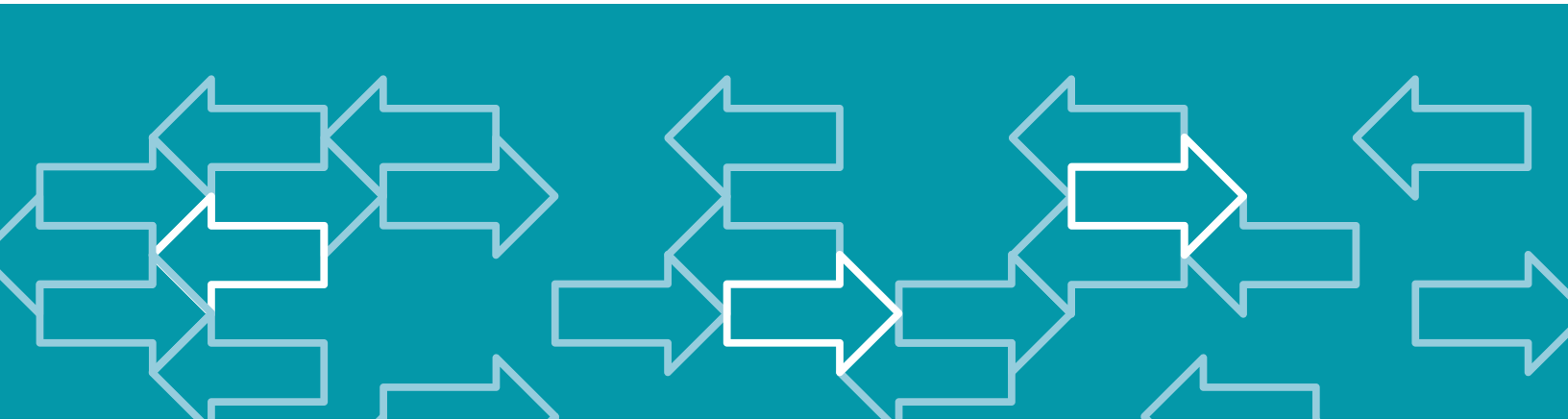**SEPTEMBER 2016**

The race to patent the blockchain

The financial services industry is making significant investments into the blockchain, a distributed ledger technology best known for enabling the digital currency bitcoin. Realizing the economic potential of blockchain technology could result in sharply lowered fund transfer times and costs while bolstering security.

Recent patent applications by several financial services firms offer insight into how those firms think blockchain technology could work, and the race to patent it could lead ultimately to the next big battle over technology standards and who owns them.

THE OPPORTUNITY

Blockchain technology is viewed, by some, as "the future for financial services infrastructure,"[1] as it combines the "peer-to-peer computing ethos of Silicon Valley with the money management of Wall Street."[2] The technology has the capability of speeding up transactions, improving the security of financial infrastructure, and cutting operations costs by $20 billion annually, according to one estimate.[3]

[1] http://www.ft.com/intl/cms/s/0/764aed26-198a-11e5-8201-cbdb03d71480.html#axzz4BTDjyfpH.

[2] http://www.ft.com/intl/cms/s/0/b83a0a74-ca8c-11e5-be0b-b7ece4e953a0.html#axzz4BTDjyfpH.

[3] Tom Simonite, "Microsoft Bets That Bitcoin-Style Blockchains Will Be Big Business." MIT Technology Review, January 22, 2016, https://www.technologyreview.com/s/545806/microsoft-bets-that-bitcoin-style-blockchains-will-be-big-business/.

The R3 CEV consortium, a joint blockchain project bringing together more than 50 of the world's leading financial institutions, noted that "distributed ledger technology has the potential to change financial services as profoundly as the Internet changed media and entertainment."[4] In short, blockchain technology, according to Goldman Sachs, could "change everything."[5] Given the economic potential, it is no surprise that the financial services industry has looked into obtaining patents to protect concepts and technologies related to blockchain—and, possibly, to assert control over the use of those concepts in new trading platforms through such patent rights.

In general, banks can potentially use patents to create market exclusivity over their own trading platforms or they can use them to generate additional revenue by monetizing those rights through royalties from other platforms that use the technologies. Patents also enable financial institutions to mitigate the risk of being sued as they implement the technologies.

Catherine Bessant of Bank of America said that owning patents in the blockchain space is "very important... to reserve our spot even before we know what the commercial application might be."[6] Similarly, Andy Cadel of JPMorgan Chase said patents represent his firm's "view of the future" and serve to protect the firm's investments, adding that "If we invent something and we file a patent, that means no one else can patent it. We don't want to find ourselves locked out of using our own invention." Cadel also recognized the potential cross-licensing opportunities from owning patents.[7] Finally, banks may be filing patent applications simply to test whether the technology is indeed patentable. In the event that the United States Patent and Trademark Office determines that such applications are not patentable, then the risk of being sued for developing a blockchain technology may be immaterial.

BLOCKCHAIN AND CRYPTOCURRENCY

Blockchain technology enables cryptocurrencies, which are peer-to-peer, decentralized, digital currencies capable of serving in highly secure transactions. Pseudonymous developer(s) Satoshi Nakamoto introduced Bitcoin in January 2009, offering a currency that used no paper or metal but only 31,000 lines of code and an announcement on the Internet.[8] Today, the market capitalization of bitcoin is around $10.5 billion.[9]

Major challenges for cryptocurrencies have historically been, first, how to maintain scarcity of the currency and, second, how to avoid reliance on a trusted centralized entity. Scarcity is important because a currency has no value if it is not scarce. Instances of hyperinflation bear witness to a currency's loss in value if it is available in abundance. Regarding the second challenge, the vast majority of currencies have relied on some trusted central authority to vouchsafe their values. Setting aside ideological motivations for wanting to remove it, a central authority poses a security risk to digital currencies because that authority represents a clear point of attack by hackers who wish to manipulate digital currencies.

The issue of scarcity—the key to maintaining a currency's value—was resolved by early digital currencies, which granted new "coins" to computers that solved cryptographic problems for which solutions are difficult to find but easy to verify.[10] Once the proof of work—which details the solution to the mathematical problem—had been verified by other computers, the computer that solved the problem was rewarded with some digital currency. In the same way that the mining of rare metals is costly, the "minting" of a new digital coin is also costly—albeit in terms of computing power. And that is what creates the scarcity of a digital currency: new coins cannot be created costlessly and hence cannot be debased by wanton issuance of new coins.

[4] http://r3cev.com/about/.
[5] http://www.cnbc.com/2015/12/31/blockchain-what-the-big-banks-say-about-the-tech.html.
[6] http://www.cnbc.com/2016/01/28/bank-of-america-is-going-big-on-blockchain-plans-to-file-20-patents.html.
[7] http://blogs.wsj.com/cio/2016/05/10/big-banks-stake-fintech-claims-with-patent-application-surge/.
[8] Bitcoin uses SHA-256, which is a set of cryptographic hash functions designed by the US National Security Agency.
[9] http://www.coindesk.com/data/bitcoin-market-capitalization/.
[10] Cryptographic problems represent one such type of mathematical problems. It takes a lot of computing power to decipher an encrypted message, but once the correct solution has been found, others can easily verify whether the message has been decrypted correctly.
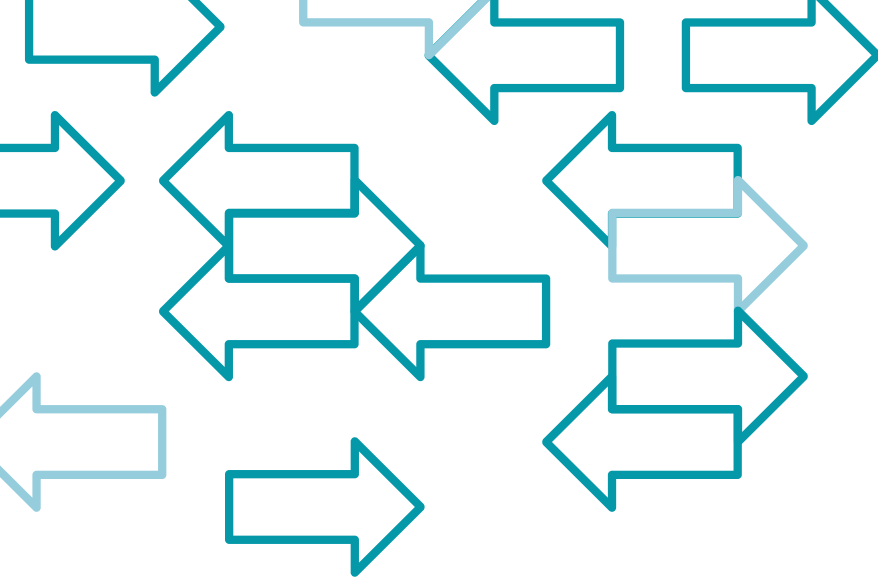
The second challenge—how to remove the need for a trusted centralized authority—was resolved by Nakamoto with the introduction of the blockchain, which is a ledger of all bitcoin transactions. A copy of the full blockchain is stored on every computer running Bitcoin software and is freely available to the public for inspection. In the event of a discrepancy between copies, the version stored on the majority of computers prevails: the larger the network, the more difficult it becomes to tamper with the ledger.

Nakamoto dealt with the need to ensure that no one tampered with the ledger—for instance, by, say, spending the same bitcoin twice—by turning the addition of new transactions to the ledger into a competition whereby the first computer to solve a given cryptographic puzzle gets to add a new block of data to the ledger (hence the term blockchain). That block is a record of the new transactions and includes the proof of work—the solution to the cryptographic problem. The cryptographic problem is based on previous blocks, which enables verification of the integrity of the blockchain.

WHY THE BLOCKCHAIN MATTERS TO BANKS

The blockchain can guarantee the provenance of every transaction—a service currently provided for banks by a cumbersome and bureaucratic set of back-office systems. With blockchain architecture, there is no need for a central clearinghouse or financial institution to act as a third party to financial transactions, because trust in the system is created by a type of cryptography. Moreover, according to Blythe Masters of Digital Asset Holdings, "one master prime record can eliminate the need for reconciliation, which is a very costly process for financial institutions, while improving compliance, security and privacy."[11]

The economic impact is that a cryptocurrency carries a very low transaction cost and, theoretically, offers a cheaper electronic payment method.

The following summarizes the resulting and not unexpected flurry of activity around cryptocurrency.

- Citi and Bank of New York Mellon have created Citicoin and BK Coins, respectively, for internal testing of blockchain technology.
- UBS is working on a cryptocurrency called utility settlement coin and relying on an Ethereum-developed technology as well as on Clearmatics, a blockchain stock exchange-technology specialist.
- RBS intends to pilot some form of payment service based on the blockchain.
- American Express took part in the $12-million funding round of Abra, the world's first digital-cash, peer-to-peer money transfer network.
- Circle, in a relationship with Barclays, is now able to move sterling across the blockchain.
- UBS pioneered the "utility settlement coin," which effectively uses blockchain technology to create different coins that are convertible into existing currencies deposited at central banks. In essence, it is a way of putting dollars, euros, and pounds on the blockchain. The bank has partnered with Deutsche Bank, Santander, and BNY Mellon, among others, and hopes to launch by 2018.[12]
- The Australian Securities Exchange bought a minority stake in blockchain developer Digital Assets Holdings for $10.4 million, hoping to use blockchain technology to benefit public companies.
- Nasdaq launched Linq, a blockchain-powered system to help private companies keep track of their share ownerships.

[11] http://www.ft.com/cms/s/0/7498c8ba-d4e0-11e5-829b-8564e7528e54.html.
[12] http://www.ft.com/cms/s/0/be30b74c-6a01-11e6-ae5b-a7cc5dd5a28c.html.

THE INCENTIVE TO PATENT

On October 30, 2014, Goldman Sachs filed a patent application entitled "Cryptographic Currency for Securities Settlement," which has been dubbed SETLcoin. The application concerns a securities settlement system that would use a distributed ledger based on blockchain technology as well as cryptographic protocols to accomplish secure and almost instantaneous settlement of securities trades.[13] The system is intended for use in the settlement of securities trades involving the trading of stocks, bonds, and other assets. SETLcoin appears to be its own cryptocurrency that describes a particular exchangeable security and that is independent of Bitcoin.[14] According to Goldman Sachs, SETLcoin is intended to be a new virtual currency with "the potential to redefine transactions."[15]

The Goldman Sachs application reads, "settlements are nearly instantaneous because cryptographic currency transactions are independently and extemporaneously generated, verified, and executed within the network, without the risks associated with traditional clearing houses that can delay settlements for several days." However, the system allows for the possible introduction of an "authoritative source" such as the US Securities and Exchange Commission.

The Goldman Sachs application also offers a virtual multi-asset wallet representing traditional securities and cash accounts for individuals, investors, or traders. The digital wallet has the technology to generate, control, and store SETLcoins for the purpose of exchanging assets such as stocks, bonds, and cash or cash equivalents through peer-to-peer networks.[16] The application says that each participant would possess a digital wallet capable of proposing a transaction that would modify the public ledger to reflect the change in ownership of an asset acquired from or exchanged with another participant's wallet.

Bank of America also has been notably active in seeking patents in blockchain technology; back in 2013, it was among the first to openly claim that cryptocurrencies had "clear potential for growth."[17] Bank of America filed in 2014 for 11 blockchain-related patents and in 2015 for an additional 20 patents related to some of the uses of Bitcoin technology.[18]

Bank of America's patent applications differ from the SETLcoin application as they appear to address the managing of cryptocurrencies. For example, Bank of America's patent application entitled "System and Method for Wire Transfers Using Cryptocurrency" seeks to patent the concept of using a cryptocurrency in a transparent intermediate step for accomplishing legal-tender transfers; the process being funds are transferred to a cryptocurrency exchange to then be converted to a cryptocurrency and then sent to another exchange before finally being converted into another currency.[19] Another Bank of America application, entitled "Cryptocurrency Real-Time Conversion System," describes a secure cryptocurrency storage system that can be implemented at the enterprise level and thereby reducing the dependency on third-party exchanges.[20] And a third application, entitled "Online Banking Digital Wallet Management," is directed to digital wallet management where multiple digital wallets can be aggregated onto a single system or device.[21]

As financial services organizations ramp up their blockchain technology development, patent applications may proliferate. Our search found at least 72 US patent applications related to the cryptocurrency and blockchain space submitted between 2012 and 2015 (figure 1).

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[13] US Patent Application Publication No. 20150332395.

[14] SETLcoin was constructed with the help of Circle Internet Financial Limited, a start-up company in which Goldman Sachs, along with China-based IDG Capital Partners, invested $50 million. Circle was the first company to receive a New York State Department of Financial Services BitLicense, thereby allowing it to offer digital currency services in New York State.

[15] http://www.the-blockchain.com/2015/12/03/goldman-sachs-says-blockchain-can-revolutionize-everything-and-takes-out-patent/.

[16] http://www.nasdaq.com/article/goldman-to-launch-its-own-cryptocurrency-files-patent-cm549907.

[17] http://www.coindesk.com/bank-of-america-bitcoin-growth/.

[18] http://www.americanbanker.com/news/bank-technology/crypto-colonizing-b-of-as-blockchain-patent-strategy-1079136-1.html.

[19] US Patent Application Number 20150262173.

[20] US Patent Application Number 20150363772.

[21] US Patent Application Number 20150254638.

FIGURE 1: FINTECH RELATED APPLICATIONS IN CRYPTOCURRENCY AND BLOCKCHAIN[22]

Filer	2012	2013	2014	2015	Total
21, Inc				1	1
American Express Travel Related Services Company, Inc.				2	2
Bank of America Corporation			11	20	31
Bitreserve, Ltd.				1	1
Blockchain Technologies Corporation			1		1
Blog Band, LLC				1	1
Case Wallet, Inc.				1	1
Chainid, LLC			1		1
Cinsay, Inc.				1	1
Ebay Inc.			2		2
ENT Technologies, Inc.				1	1
Goldman Sachs & Co.			1		1
Hoverkey Ltd.				1	1
IDM Global, Inc.				1	1
IEX Group, Inc.				1	1
Individual filer			7	6	13
International Business Machines Corporation				1	1
JP Morgan Chase		2			2
Leetcoin Inc.				1	1
Mace Engineering Group Pty. Ltd.			1		1
Manifold Technology, Inc.				1	1
Mastercard International Incorporated		1	3	1	5
Modernity Financial Holdings, Ltd.			1		1
Moni Limited				1	1
NCR Corporation			1		1
Ox Labs Inc.				2	2
Paypal Holdings, Inc.			2		2
Raise Marketplace Inc.				1	1
RevUp Render, Inc.				1	1
Sequitur Labs Inc.				1	1
Slide Network Inc.			1		1
Soceana LLC			1		1
SS8 Networks, Inc.			1		1
Stellenbosch University			1	1	2
The Filing Cabinet, LLC.			2	1	3
Verisign, Inc.				1	1
Visa International Service Association				1	1
Wells Fargo Bank, N.A.	1				1
Grand total	**1**	**3**	**37**	**51**	**92**

Source: US Patent Office Application Fulltext Search, Wall Street Journal blog at http://blogs.wsj.com/cio/2016/05/10/big-banks-stake-fintech-claims-with-patent-application-surge/.

[22] Patents were identified using a keyword search for "cryptocurrency," "crypto-currency," or "blockchain" in the US Patent Office Full-text patent application database Patents were reviewed to further narrow the applications to fintech related patents. Supplemental patents were identified using information found in the Wall Street Journal at http://blogs.wsj.com/cio/2016/05/10/big-banks-stake-fintech-claims-with-patent-application-surge/.

IS THE BLOCKCHAIN EVEN PATENTABLE?

It is likely that patent applications will proliferate, but the immediate question is whether they can overcome the hurdles presented in a 2014 US Supreme Court decision: *Alice Corp. v. CLS Bank International,* 573 U.S. __, 134 S. Ct. 2347 (2014).[23] The Supreme Court unanimously held that claims to a computer-implemented technique of mitigating "settlement risk" in financial transactions were ineligible for patenting. The Court clarified that a claim directed to an abstract idea is not eligible for patent protection when it "merely requires generic computer implementation" or "attempt[s] to limit the use of [the idea] to a particular technological environment."[24]

Subsequently, district courts have relied on *Alice* to invalidate patents that previously would have been litigated. The blockchain patent applications may likely be considered software patents, and under *Alice*, software patents that take an old idea and "apply it on a computer" or "apply it through the Internet" will be ineligible. Accordingly, a patent application that takes existing blockchain technology and comes up with a new use may be rejected.[25] As an example, in August 2013, JPMorgan Chase filed an application for an electronic mobile-payment system with similarities to Bitcoin; however, all 175 claims were either canceled or rejected. By contrast, an application that improves the technological functioning or processes of a computer itself—such as improving efficiency or security—may be eligible. It is our understanding, that the US Court of Appeals for the Federal Circuit is attempting to draw the line for computer-implemented inventions.[26]

The blockchain technology has created a whole new playing field, and the game could yet be very hard-fought. It remains to be seen whether this becomes a winner-takes-all race and how the issue of standards for the technology will be managed. But in the face of a disruptive technology, banks will be keen to protect their innovations. **A**

[23] Alice Corporation Pty. Ltd. v. CLS Bank International, et al, 573 US __, 134 S.Ct. 2347 (2014).

[24] Ibid.

[25] https://letstalkbitcoin.com/jpmorgan-chase-building-bitcoin-killer#.UqbbfWQlnPg.

[26] The Federal Circuit has favorably ruled on computer-implemented software-type inventions in DDR Holdings v. Hotels.com, 773 F.3D 1245; Enfish LLC v. Microsoft Corp., 2016 WL 2756255 (Fed. Cir. May 12, 2016); (3) Rapid Litigation Management Ltd. v. CellzDirect, Inc., 2016 WL 3606624 (Fed. Cir. 2016); and (4) Bascom Global v. AT&T Mobility, No. 2015-1763 (June 27, 2016).

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