ARTICLE BLOCKCHAIN PATENTS : CURRENT SITUATION AND OUTLOOK

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Blockchain, a technology often associated with the libertarian movement, appears in principle to be in opposition to patent monopolization [1].Today, this initially airtight opposition between the freedom of blockchain protocols and their registration by this type of industrial property right is no longer set in stone.The technologies implemented by blockchain —a distributed registry in a peer-to-peer network, consensus algorithms for validating new entries into this registry, cryptographic processes to secure transactions exchanges [2]—interests more and more certain patent applicants.

The telecommunications field shows that patents can involve innovative and decentralized technologies. Internet protocols, which have permitted the decentralization of information and communications, have, for example, been the subject of numerous patents since their origin [3].

Blockchain protocols that are aimed at decentralizing transactions could take this path.Ever stronger competition for patents is emerging for "blockchain inventions".In this respect, on February 8, 2018, Craig Steven Wright—the self-proclaimed bitcoin "inventor"—was granted one of the first European patents dealing with registries and automated management methods for smart contracts (based on blockchain) [4].

This scramble for patents prompts an analysis of the strategy of blockchain actors vis-à-vis the use of patents. This leads to the question of whether, and how, this technology is compatible with patent law.

1. Blockchain protocols under open licenses:libertarian origin

The origin of the first blockchain protocol (bitcoin) is the Austrian school of the libertarian economic movement which holds that fiduciary currency and intervention by governments are not necessary [5].Ordinarily, the intellectual property forms are rejected by libertarian authors, but they are divided regarding patents.Although some recognize the patent [6], others do not envisage the idea of a property title to inventions, including on the ground that the right to recognize inventors leads to the right to exclude individuals from the fruit of their labor or of their investment [7].

Satoshi Nakamoto's choice [8] was to publish the source codes of the bitcoin protocol—implemented by open software —under an open source MIT license.This software license, which has an open source code, allows one to use, copy, modify, merge, publish, distribute, sub-license and/or sell copies of the software, subject to inserting a copyright notice in all copies or substantial parts of the software.In case of a modification or distribution of the software, however, it does not require keeping the same license and terms similar to this license (non-copyleft) [9].

Very permissive by nature, this license ultimately offers a "*fragile freedom*" [10] to the bitcoin protocol and to its developers. It is possible to redistribute the software under a proprietary license (the new program could go from the category of open software to that of non-open software) and, moreover, it exposes the blockchain technology to the various patent monopolies. Indeed, no term of this license prohibits combining it with invention patents. In practice, this license is simple to use and particularly applies to small programs. A program that has become as important as bitcoin is no longer appropriate for this license format. Consequently, it is not certain that Satoshi Nakamoto's choosing this license will completely protect the bitcoin protocol from a monopolistic registration.

Apache 2.0 or GNU/GPL 2 licenses appear to be better adapted.Apache 2.0 licenses, used by the hyperledger private blockchain, require "contributors" to grant their patents under license if one of their innovations incorporates this blockchain's source code.Furthermore, it makes the license subject to a waiver of all infringement claims involving the disputed blockchain [11].The GNU/GPL 2 license used by the public blockchain Ethereum, is a contaminating license that requires all software under the GNU/GPL terms to be distributed under the same GNU/GPL regime (copyleft) [12].

Given this context, it is not completely surprising to see a jump in patent filings in this field.

2. Scramble for patents on blockchain protocols

As patent law has caught up with them, blockchain, distributed registries and cryptoactives are subject to more and more filings. In 2017, the total number of patent filings involving blockchain was 1,248 in the United States, Europe, China, Japan and South Korea, whereas between 2013 and 2016, the total number was respectively 27, 98, 258 and 594 [13].

Among these numerous filings by banking and financial institutions in the new technologies sector and blockchain area, only certain titles are granted only to some of them.For example, Bank of America Corporation's patent number US 9,825,931, granted on November 21, 2017, involves a system for monitoring and validating a user in the blockchain distributed network, and patent number US 9,331,856, granted to Symantec on May 3, 2016, on a system and methods for validating digital signatures, mentions in its description the blockchain functionality.



One should interpret this growing number of patent filings in correlation with these actors' strategic choices.

In an offensive strategy, the objective is to appropriate the technology by building up the biggest possible portfolio of patents in order to get a return on their investment in them, either by granting licenses or by selling patents. Another option is to appropriate the technology to slow competitors' technological progress in order to take over a market.

Whereas with a defensive strategy, the objective is to build up a portfolio of patents in order to have the resources to respond in case of infringement claims or quite simply to channel those who wish to opt for the offensive strategy. This option can be a choice to safeguard one's current innovations and future technological flexibility (areas of research for the future).

At the same time, it offers protection against "patent trolls" by ensuring they do not possess blockchain patents.Patent trolls are entities that acquire a maximum number of patents for a purely economic goal—threatening infringement claims to force the other party to conclude licensing agreements.

Protection against patent trolls is undoubtedly a concern for actors in the field, because although their activities have slowed down somewhat in the United States, they are seeking a growth driver in Europe. This downturn notably follows a reversal in assessing the patentability of inventions implemented by computer, often improperly called "software patents" [14]. As this assessment has always been more severe in Europe than in the United States, the great increase in the number of patent filings will not necessarily be accompanied by an explosion in the number of patents granted that have permitted the development of patent trolls.

3. Pre-requisite question of patentability

Blockchain protocols are implemented by a significant number of software programs.For them to be patentable, the condition of "*new inventions involving an inventive activity which may have an industrial application*" must be satisfied in France (as in most European countries) [15].Nevertheless, computer programs as such cannot be protected by patent law [16].

However, technical processes producing technical effects may be patented when they are implemented by computers [17].

The requirement of a technical effect going beyond mere computer automation of a purely technical process has until now prevented certain excesses noted in the United States.Furthermore, this is the reason why the U.S. Supreme Court decided to raise the threshold of patentability of these types of inventions, specifically with the *Alice Corp. v. CLS Bank International* decision [18].

In theory, given the current case law of the European Patent Office (EPO), for example, a blockchain software program could, therefore, be protected by a patent if it implements functionalities that are sufficiently technical and which have a real technical effect allowing one to distinguish it from the current state of the art. If the aforementioned conditions are not satisfied, the "blockchain patents" could be rejected.

As an illustration of the difficulties encountered in getting a patent involving blockchain, we cite Mastercard's patent application EP 3 200 167 "Information Transaction Infrastructure" involving an infrastructure allowing quick reimbursements via a different public address than the one used in the initial transaction [19]. The examination procedure is still taking place. To refuse the grant, the opinion of the EPO's examiner indicates that the invention does not satisfy the condition of an inventive activity [20]. According to him, the invention is related to only simple data exchanges by computer between two users. In addition, he considers that the underlying administrative model mentioned in this patent application is not patentable and cannot impart an inventive activity [21]. In summary, the examiner considers that it is impossible to identify a sufficient technical effect.

The examiner of the U.S. Patent and Trademark Office (USPTO) has for the time being not taken a position on the patentability of U.S. application 2017/0221022 related to the same Mastercard invention. It would be useful to know how this application turns out with the USPTO's application of the *Alice* decision. We note that third parties are interested in this patent application. On September 15, 2015, a party called "Candy King" (probably an alias) made "observations" against the granting of this patent. In effect, the USPTO offers the possibility to third parties to make such observations. In practice, this possibility is rarely used, which proves this community's particular interest in blockchain patents.

In the final analysis, there are noteworthy difficulties in patenting a blockchain software program.Obtaining patents in this field, however, even in Europe, is not impossible, as attested by the recent granting of patent EP 3 257 191 to NCHAIN (see Craig Steven Wright's patent mentioned above in the introduction).

For example, it is not impossible that patents on cryptographic processes, "backEnd" infrastructures of blockchain protocols, will be granted, subject to satisfying the specified conditions.

Once the threshold of patentability is reached, there will then be the question of the use that can be made of patents on blockchain.

4. Analysis and outlook on the future of "blockchain patents"



Patents on blockchain are already a reality. There will then be a question of their exploitation (judicial or not) in the near future.

Actors in the field will therefore have to make strategic choices that may culminate in a certain number of scenarios we will explore below.

a. Pivotal issues related to distributed protocols

With regard to the principle of patents' territoriality, a number of issues will arise as to its overlapping with the decentralized nature of blockchains [22].

A patent is effective only for a given territory. There is no patent that offers "worldwide" protection. There is often confusion with applications referred to as international patents filed under the Patent Cooperation Treaty (PCT) allowing centralized management of patent applications that in the end are examined by the national patent offices [23].

Similarly, there still is not a single patent, so to speak, covering the territory of the European Union.For the time being, the plan to put into place such a patent (the patent with unitary effect) and the Unified Patent Court (UPC) has been put on hold by Brexit [24].This plan could tend to solve the problem, but it will not completely resolve it with respect to a blockchain implemented in Europe and Asia at the same time, for example.

In reality, each patent covers a given territory although blockchain, by definition, may be deployed over all territories where users and servers implementing the underlying processes are localized.

Therefore, the issue arises as to whether a patent with effects on a given territory may be enforced against a blockchain implemented over several territories and not only on the territory where the patent produces effects. The possibility that a patentholder has several patents cannot be a solution considered because infringement will be assessed independently in each territory [25].

The issue is not related only to blockchain because it exists in other fields, much as with telecommunications. It can be resolved either by ensuring that the patent covers a particular mechanism of blockchain, implemented by a single actor, that it is possible to localize (a server when it is localizable, for example) or in the chosen categorization of the act of infringement. The offer to implement a patented process, for example and under certain conditions, is an act of infringement in many national legislations [26].

The manner in which the patent is drafted and the identification of an infringer are certainly key elements in the steps to protect inventions on blockchain.

For example, to protect a blockchain, it may appear to be wise for the applicant to specifically protect inventions on algorithms to validate transactions in order to cover entities providing the means for implementing blockchain, like mining farms that can sometimes be localized.

Another difficulty is the proof of the infringement of patents on blockchain.In effect, as regards infringement of patents on the technical functionalities of software, their implementation must be detected.One must also be able to demonstrate this in a court by accessing the elements necessary to prove that the implementation of the relevant blockchain requires the implementation of the technical process to which the given blockchain is subject.For this, access to the source code and a description of it is necessary to determine all of its functionalities.

If a public blockchain is involved, with the specifications provided to the public, the proof of the infringement may be found in the technical documentation provided. Whereas, with a private blockchain, it will be necessary to use the means for obtaining judicial proof, such as a seizure in France [27].

b. Prospective regimes of "blockchain patents"

Various directions can be taken depending on how courts, industrial property offices and legislatures view patents on blockchain. In this respect, one can identify four possible paths, from the most "libertarian" to the most "monopolistic" for the future of the "blockchain patents" regime:

- A halt to patentability:certain legislation or case law could force the industrial property offices to have a restrictive policy for granting "blockchain patents".For example, the threshold was raised for patentability in the United States following the excesses of patent trolls to put an end to the great increase in the number of patents in the field of inventions implemented by computer.We nonetheless note that patents are still granted in this field, including for blockchain.

- Philanthropic patents:much like patents on the connection technology "universal serial bus" (USB) or Bluetooth, blockchain patents, once granted, could quite simply be provided free of charge to companies and developers. This option allows open development of the technology, provided that the actors decide to use such an offer and to file patents regularly and in great numbers based on the technology [28].



- "Patent pools":by this route, the applicants could open patents to licensing to any third parties for fees. This involves not preventing the development of the technology but making it subject to the payment of fees to compensate inventors. This is the choice made by actors in the telecommunications field.

- "Patent thickets" [29]:some proprietors would have many patents granted whose exclusive exploitation they would keep for themselves or subject to a payment of high fees. In this situation, innovation would be curbed by these proprietors.

Blockchain protocols are initially considered to be "*common*" [30] and, as a general rule, not patentable. Although it is too early for the time being to conclude that a reversal has occurred in favor of proprietorship, it must be noted that certain actors use the patent system.

The great increase in the number of patent filings does not necessarily mean that a patent bubble is emerging, following the example of the United States with the development of the Internet. The threshold for patentability is in effect being raised in the major patent offices.

It is now up to the actors in the blockchain field and the authorities to take on the subject to think about ways in which to use it constructively so as to create an equilibrium between development of the technology and fair compensation for its contributors.

A. Barbet-Massin, A. Khatab, "*Les 'Brevets Blockchain': Etat des Lieux et Perspectives*" [Blockchain Patents:Current Situation and Outlook], *Expertises des Systèmes d'Informations* [Expert Reports on Information Systems], May 2018, no. 435, pp. 176-179.

[1] Patents are titles granted for a given geographic zone, by the offices of each country, for a term of twenty years.In France:Intellectual Property Code, Articles L. 611-1 and L. 611-2.

[2] For a definition, see:IT vocabulary, list of terms, expressions and definitions adopted, *JO* no. 0121, May 23, 2017, text no. 20.

[3] See in particular the patent of Paul Baran (US 4'438'511) who, with Donald Davies, invented communications on data networks with packets.

[4] EP 3 257 191.

[5] Government intervention tends to provoke exacerbated economic cycles and resulting inflation.For this school of thought, it would be advisable to eliminate the fractional-reserve banking system and to return to the gold standard to avoid a general disequilibrium and a recession of corporations (BCE, *Systèmes de Monnaie Virtuelle* [Systems of Virtual Currency], 2012, pp. 22-23, and S. Caré, *Les Libertariens aux Etats-Unis:Sociologie d'un Mouvement Asocial* [Libertarians in the United States:Sociology of an Asocial Movement], Presses Universitaires de Rennes, coll."Res publica", 2010, p.10).

[6] A. Rand, The Fountainhead, 1943.

[7] B. Lemennicier, "*Propriété Intellectuelle et Protection des Idées: la Bataille du XIXè Siècle*" [Intellectual Property and Protection of Ideas:the Battle of the 19th Century, in "*Aux Sources du Modèle Libéral Français*" [At the Origin of the French Free-Market Model], A. Madelin (dir.), *Perrin*, 1997. See also: T. Jefferson, "*Lettre à Isaac McPherson*" [Letter to Isaac McPherson], Aug. 13, 1813, https://founders.archives.gov/documents/Jefferson/... (viewed on Apr. 5, 2018).

[8] Satoshi Nakamoto is the alias used by the Bitcoin's inventor, who still remains anonymous. He claims to be a "cypherpunk", or a group fighting for the protection of privacy by using cipher (encryption). This community drew its inspiration from the "cyberpunk" literary movement of the 1970s/1980s, mixing science fiction and digital technology.

[9] https://opensource.org/licenses/MIT (viewed on Mar. 29, 2018).

[10] See the classification of open software through the criterion "*freedom*" allowing one to identify the types of licenses in relation to their effects: M. Clément Fontaine, "*Les Oeuvres Libres*" [Open Works], dissertation under the direction of M. Vivant, Montpellier, 2006, used by the CSPLA (CPLA opinion 2007-1, "*La Mise à Disposition Ouverte des Oeuvres de l'Esprit*" [Open Availability of Works of the Mind], Jun. 26, 2007) and the Syntex and the FNILL ["*Guide Open Source —Réflexions sur la Construction et le Pilotage d'un Projet Open Source*" (Open Source Guide—Thoughts About the Building and Steering of an Open Source Project)].

[11] http://www.apache.org/licenses/LICENSE-2.0 (viewed on Mar. 30, 2018).

[12] https://www.gnu.org/licenses/old-licenses/gpl-2.0.... (viewed on Mar. 30, 2018).

[13] https://www.coindesk.com/global-blockchain-patent-... (viewed on Mar. 30, 2018).



[14] See decisions: U.S. Supreme Court, *Ebay v. Mercexchange*, May 15, 2006, no. 05-130, and U.S. Supreme Court, *Alice Corp. v. CLS Bank International*, Jun. 19, 2014, no. 13-298.

[15] French Intellectual Property Code, Art. L. 611-10, 1°.

[16] French Intellectual Property Code, Art. L. 611-10, 2°, c).

[17] See:Paris Court of Appeal, Jun. 15, 1981, *Annales de la Propriété Industrielle* [Annals of Industrial Property], 1982, p. 26, Paris Civil Court, Jun. 10, 2005:PIBD 2005, no. 815, III, p.541 and CBE, Guidelines for Examination in the European Patent Office, G-I, 2.

[18] The Supreme Court had ruled that the relevant concept—involving a method and a fiduciary filing system whose purpose was an escrow in order to reduce financial risk—was a commercial relationship known in the business sector which constituted a non-patentable abstract idea (U.S. Supreme Court, *Alice Corp. v. CLS Bank International*, no. 13–298, 2014). Confronted with previously very elastic terms, such as transformation of a physical element or use of a machine in the process involving software, the notion of "technicality" was chosen (B. Warusfel, "*La Brevetabilité des Méthodes Commerciales:L'Office Européen des Brevets Résiste Toujours*" [Patentability of Commercial Methods:the European Patent Office Continues to Resist], *Propriétés Intellectuelles*, no. 1, Oct. 2001, p. 81).

[19] EP 3 200 167 (A1).

[20] European search opinion, no. 16 153 519.0 - EP 3 200 167 (A1).

[21] T641/00; T154/04 (JO 2008, 46).

[22] Article 4 bis of the Paris Convention for the Protection of Industrial Property, Mar. 20, 1883.

[23]http://www.wipo.int/pct/fr/faqs/faqs.html (viewed on Apr. 13, 2018).

[24] http://www.consilium.europa.eu/en/documents-public... (viewed on Mar. 29, 2018).

[25] In Europe, the issue of jurisdiction to rule on infringement in a foreign country can arise for a national court pursuant to the provisions of Regulation 44/2011 (domicile of the defendant or co-defendant, place of harm). The issue of the governing law does not arise in accordance with the principle of territoriality, already mentioned.

[26] In France: French Intellectual Property Code, Art. L. 613-3 b), see also Article 25 b on the Unified Patent Court (not yet entered into force).

[27] French Intellectual Property Code, Art. L. 615-5.

[28] The right to a patent arises from the filing and not from the invention's creation.Unlike copyright, this is not a requisite formality.(French Intellectual Property Code, Art. L. 611-1).

[29] Expression defined by C. Shapiro as a "*dense network of intellectual property rights which overlap*", in *Innovation Policy and the Economy*, A.B. Jaffe, J. Lernet and S. Stern (dir.), vol. 1, MIT Press, 2001, pp.119 et seq.

[30] E. Ostrom, "*La Gouvernance des Biens Communs: Pour une Nouvelle Approche des Ressources Naturelles* [Governance of Common Property:for a New Approach to Natural Resources], Editions de Boeck, 2010.