

# Core Issues of Copyright Law in the Digital Environment: The Promise of Blockchain

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## Abstract

Blockchain technology is spreading rapidly and has become reputable due to its variety of potential deployment options and applications for enhancing security and trust. This article considers blockchain deployment and different legal aspects of blockchain technology, including implications for the copyright sphere. It covers how certain challenges currently being faced in the digital world, including copyright issues, could be overcome through the use of blockchain. The deployment of blockchain plays a critical role in copyright protection and decreases the potential for online piracy by controlling copying of digital content and offering a secure market for digital products. This article also describes two recent global phenomena—smart contracts and cryptocurrency—and reviews extant issues and questions that are needed to be resolved for successful deployment of blockchain technology. These include storage of copyrighted data, the legal situation of online intermediaries, the balance between the nature of blockchain and the nature of copyright law, and a proposal of a blockchain copyright management system that could solve copyright issues in the digital environment.

**Keywords:** copyright, blockchain, smart contracts, digital environment, law, issues.

## INTRODUCTION

This article focuses on blockchain technology, specifically as it relates to copyright ownership. It states current challenges, issues, questions, legal problems, and even preparations being made at the national level to accommodate copyright protection via blockchain technology. In other words, we have researched copyright protection in the digital world based on blockchain technology. The article reviews what this new technology is and highlights important key points. It explains that online applications for blockchain are based on two different models, public/permissionless and private/permissioned, and describes the differences.

Blockchain is open-source-based and has begun to revolutionize data transactions among individuals and businesses [1]. It is a type of distributed ledger; transactional data are recorded in a block, and every block is linked to the previous block. It is designed with a cryptographic mechanism which ensures that none of the recorded data will change. This

can be used to increase the security of a peer-to-peer network, making it more trustworthy for network participants even in a network with no central authority. Data security is based on the principle of decentralization, with important issues including transparency, immutability, disintermediation, and redundancy. Blockchain technology became much more well-known as a result of the popularity of the cryptocurrency bitcoin, which has been implemented based on a distributed ledger [1].

This paper reviews the situation of copyrighted works and examines related problems that the application of blockchain has or has not been able to solve. In some cases, this technology has not completely solved a problem but does provide a better option [2]. Other cases include issues that national governments such as Russia have been working on [3]. In this research paper we consider whether storage of copyrighted content is better with or without blockchain. Shifting from individual users to legal systems, because blockchain records are immutable, it means that balance is needed between immutable data and copyright law, including the legal status of the authors and users of copyrighted works, the bans on bitcoin in some countries, the consideration of informal facts for determination of ownership, and the time stamping service provided by blockchain. Overall, there are significant legal problems associated with blockchain. On the other hand, despite issues and problems that may take time to resolve, blockchain has phenomenal benefits for users. They can have greater trust in their transactions when they are saved in blocks, and they can use copyrighted works, pay with cryptocurrencies and use smart contracts for legal work. In order to provide better understanding of all of the concepts above, this article is divided into main three parts:

- 1) Core issues of copyright law in the digital environment: Piracy, difficulties for authors to get compensated fairly, and the lack of transparency about the legal status of copyrighted works
- 2) How block chain may fix the above issues: transparent information about copyright ownership, control over digital copies, automatic payment, and simplified licensing
- 3) Challenges for blockchain deployment: Storage of metadata and digital content, disputes over copyright and blockchain immutability, network effect issues, legal issues.

## **ISSUES OF COPYRIGHT LAW IN THE DIGITAL ENVIRONMENT**

### **The legal status of copyrighted works and lack of transparency**

One large problem in the digital world that creates a lot of risk for copyright owners and creates frustrating situations is the lack of transparency with regard to ownership or a central database of copyright owners that includes music, imagery and other copyrightable works. Information about copyright ownership is currently distributed across different databases and even companies. On the other hand, there are users who cannot use digital content the way that they want to because it is either time- or cost-prohibitive to do so. Because there is no special legal power for some copyrighted works, the users have to avoid using them. This weakness of transparency with regard to copyright ownership and other owners' rights puts authors and users in opposition, with the result that neither can benefit from the author's work. Another unresolved issue is the inappropriate existing databases for transaction and sharing data, which increase the challenges and problems for both authors and users. Interest has been increasing in blockchain as a potential tool for addressing these issues because of characteristics such as standardization and network influences of copyright issues. This transparency we have been discussing takes place in the context of copyright law, which protects copyrighted works on the internet. Copyright ownership also places requirements on other parties, or third parties, because they need formal certification and approval related to copyright ownership. Though technological progress has intensified all of these problems in copyright law, we cannot halt or prevent such development. Rather, we need the correct technology and implementation to address new issues.

### **Piracy**

It is clear that copyright owners cannot be adequately protected on the internet by the existing laws alone [4]. There are two features of copyrighted works on the internet that make protection difficult. The first is the near-zero cost of sharing a work [4]. The second is lossy replication, which opens the door to "bootleg" digital copies becoming an alternative to paying for perfect, legal copies [5]. Additionally, there is no real impediment to or consequence for infractions, for instance, increasing or decreasing expenses for reproduction and the quality of copies in media. On the other hand, owners have to invest resources to control digital copying and dissuade criminal intent. There is no technological barrier to controlling the accessibility of digital works. Currently, however, users in any location with an internet connection are able to transfer data immediately and so cheaply that sharing and distribution of illegal and inexpensive copies is commonplace. As the current uncontrolled status of works published on the internet shows, there is inadequate policing of internet issues because copyright holders do not know about infraction. Addressing this problem will require massive legal action [6-9]. Existing digital rights management (DRM) tools reduce piracy but are not 100% trustable because they are not an exclusive path and

solution. DRM is a mixed benefit for digital works because it creates transaction costs for the copyright owner and distributor. Another problem is that not all copyright owners accept and utilize DRM for their work. DRM also divides users through many things such as languages, and region. Furthermore, it makes users' software vulnerable. Until DRM is based on coding, it will cause problems for copyright owners because it cannot be trusted to meet owners' expectation. Finally, DRM forbids individuals from doing many things that would infringe on copyrights, but it cannot grant permissions to copyright owners. Therefore, because DRM is not a complete solution and can create its own issues, a more impressive and efficient technology is needed.

### **Difficulties for authors to get compensated fairly**

Any author who licenses their work has to go through many difficulties and different jurisdictions, such as payment processing systems that do not make it easy to collect licensing fees. Most of the time, to simplify and accelerate licensing fee payment, two parties are assumed: users and the owner. Some works are not appropriate for commercialization, and the copyright holder would like to grant royalty-free licensing rather than a traditional license. Open-source licenses are royalty-free and are frequently applied to software distribution. Part of the rules and regulations for open-source licenses is that licenses must not require any fees. Accordingly, open-source software is free of licensing fees. Open source licensing has focused on distribution of copyrighted works. Where a license does require a fee, payment through traditional financial systems can be unsuitable. Electronic payments are easier and cheaper, but not every country is prepared to handle electronic payments. There are monetary policies in place for electronic payments, including national rules, regulations, restrictions, and currency control. Looking at online business models, they are founded on processing user data because the most important thing for these kinds of businesses is personal data. It is easy to secure these data through standardization of data sharing agreements. Authors do not currently have tools for sharing their copyrighted work that have all of the characteristics that they want. They need something faster, cost-effective, and easily available with global reach. Without these characteristics, it is very difficult for authors to get fair recompense for their online works. An additional problem is that of intermediaries, such as Spotify and Youtube, that have inserted them between artists and their audiences. Because they do sharing and advertising for artists for fees, the revenue for the artist will decrease by a small amount.

## **HOW BLOCKCHAIN MAY FIX THE ABOVE ISSUES**

### **Transparent Information about copyright ownership**

Information about copyright ownership can be made more visible and accessible by utilizing emerging blockchain technology. One characteristic of blockchain is time stamping, which is responsible for providing data. A timestamp encodes a block of data with the date and time. This provides necessary information in business world because it allows two

parties to have confidence in a document created on a certain date and time. Time stamping is an electronic trust service that provides security by creating a key for the block in an electronic transaction in the digital market. Blockchain could also be applied to timestamp public databases. It provides the opportunity for everyone to confidently determine the specific times of certain events. Block chain is also very useful in other spheres, such as authorship and resolving disputes.

One characteristic of block chain is the presence of hash functions, which support the security and immutability of blockchain. To better understand the meaning of hashing, we need to review hash functions. A hashing function generates a string of characters, or hash, that is stored in the frame of the original data as a unique digital fingerprint, also referred to as the message digest. Copyrighted works have a unique digest. Similarity in digests will occur whenever we have similar or identical initial data. One epsilon diversity in the initial data creates a different hash. That is why hashes can be used to identify different copyrighted works. According to blockchain technology, if a transaction is associated with a copyrighted work, a hash that belongs to the work will be included in the transaction. As a result, the transaction can be verified based on blockchain protocol. The transaction is timestamped, and the contents of the transaction, which exist in the block, will be encoded. None of the information in the block can be forged because if any changes happen they will be recorded in the block chain based on their timing, so every ownership record about a copyrighted work will stay in the blockchain database, accessible to anyone who is interested.

Now we can see how it would be beneficial to deploy this technology to replace other mechanisms for recording copyright ownership, such as registration in the copyright systems of national governments or collective societies. However, an alternative to (non-blockchain) conventional systems is also needed for sharing copyrighted works with a third party. This need can be met via another feature called ID technology. Youtube has been using this technology as a rights management system. The blockchain fingerprint that we discussed earlier shows itself as an ID. This ID is connected to the relevant reference material that users want to download. User videos are scanned, then the fingerprint is identified and matched. The partner's match policy will be applied for the user if it is needed. The question then becomes, what is the difference between blockchain and conventional infrastructures? We can surely see that the potential for reliability and scalability that comes from a digital fingerprint makes a huge difference between the two infrastructures, but if we consider online intermediaries, we see that its infrastructure is based on the policy of the online platform. Also, because the conventional infrastructure is based on the principle of centralization, the conditions of use and user agreements may change. By contrast, blockchain presents a new idea and solution, proposing the principle of decentralization. It eliminates dependency on the provider, and code will be replaced with conditions of use. However, there is a key point here, which is that it takes time for changes to a system to become acceptable for the majority of users. This means that over time, this new technology will become more and more authentic and trustworthy. Blockchain

technology will demonstrate the advantages of its principle to users over time. Now we can mention an additional blockchain feature: registration. When data are registered based on blockchain, the data are accessible by users. That is why every record relevant to copyright cannot be eliminated by any company or organization and will stay in the database. The content of a blockchain is not changeable, so nobody can abuse the data. This increases its reliability for its users, and also allows for utilizing those data in court as evidence. This flexibility of blockchain technology can be used in the case of copyright law and represents a new kind of evidence created by innovation.

### **Control over digital copies**

In the digital world, the quality of copies of a copyrighted work can vary. Blockchain provides the means to solve this problem via the cryptographic hash function of each digital copy of a copyrighted work. Since it is optimized to create a hash that has never been generated, there will be no any class or any probability of class. It means that even one epsilon difference between copies trigger the creation of a different hash. Hence, every hash function has unique identifiers for one by one copy work. More simply, it is like the generation of new hashes assigns every copy a special serial number. The functionality of blockchain also creates opportunities for imposing conditions on licensed copies, such as modification rights, limited public access rights, open source licenses for each copy and individualizing each digital copy for tracking.

### **Automatic Payment**

Cryptocurrency is an exclusive creation of blockchain technology that has been accelerating global payments relative to conventional payment systems such as bank accounts or electronic money [9] . These cryptocurrencies, such as bitcoin or Ether, play a role in the financial system wherever internet is available as a payment system for digital content. Payments through blockchain using cryptocurrency do not depend on intermediaries such as companies or collective societies. Thus, cryptocurrency presents a solution for authors. Other solutions include smart contracts, instantaneous payments, licenses that expire after a certain amount of time, royalties, and creating conditions for composers and stakeholders. Some people are working on additional solutions based on blockchain, for example, peer tracks, which is a service for artists that provides instantaneous payment and ownership for their works. The service is based on a smart contract, and owners are able to directly see their revenue.

### **Simplified licensing**

License agreements are governed by copyright law and are not easy for every author to navigate. Not everyone is familiar by copyright law, and complicating the matter, laws vary nationally. There are international agreements such as Berne or Wipo copyright that try to adjust national laws, but they do not globally integrate them in a consistent manner [9] .

Diversity in terminology also generates problems. The existing costs for transactions and distribution across borders include help from local legal counsel, choosing a pre-existing template for their work, and addressing copyright infringement. Royalty-free license agreements have limitations and are hardly acceptable for those who want to commercialize their work. Blockchain presents solutions to these licensing problems, such as cryptocurrency, secure transactions, instant payments, eliminating intermediaries, and smart contracts, as we described above.

## CHALLENGES

### Storage of metadata and digital content

One question related to blockchain is where copyrighted works are stored. To answer this question, we need to look at the size of blockchain. For bitcoin, the transaction data (metadata) alone is almost 130GB, not an enormous file, but the size of the block chain is doubling in size every year [10]. The code of bitcoin blocks is 1MB in size per block. There are some limitations to data storage directly in a blockchain, so blockchain is facing with the challenge of storage of content. This becomes more apparent for a large network of users. In the case of copyrighted works, this forces a decision about whether to keep the copyrighted works out the blockchain, and if so, how to be sure the blockchain stays connected to the copyrighted work. Off-chain data storage generates issues and challenges for blockchain solutions. If we take a technical view of the architectural relevance to data storage and the legal significance of blockchain, it provides a centralized mechanism to store digital content that is connected to the right management database. The blockchain administrator can use copyrighted works as a production, see the rules of online intermediaries, and address copyright infringement, but the unchangeable nature of data in a blockchain creates problems for some applications [11].

### Disputes over copyright and blockchain immutability

In this section, two parts are considered, copyright law and the mechanism of blockchain. If blockchain is applied to copyright management, the principle of copyright law based on national sovereignty must be considered. Because copyright laws are changeable, blockchain has to adapt itself, which is not easy because data in a blockchain are unchangeable and stays constant. To address this and other issues, this paper points at the implementation of blockchain, which offers two solutions. The first is the creation of super user accounts for government authorities. This modification is possible in blockchain databases. The second is pursuing specific users. The first problem, on first glance, is that blockchain became so powerful and attractive because it is impossible to manipulate data. If super users have the power to modify data, it becomes less attractive and would no longer differ from traditional databases. The second problem is that it has to use old infrastructure and tools that are time-consuming and inefficient. Because governments have sponsored copyright management systems based on blockchain but are not in favour of public blockchains, Internet Protocol (IP) is

included, so it is vital to manage minds from copyright owners and users, and they have to accept that only blockchain provides immutability of data, not off-chain storage.

### Network effect issues

The presence of a huge number of rights owners and users of copyright management systems feed the potential of blockchain. Users and their works create a network, where the product depends on the number of uses. In other words, increasing usage makes a network more valuable as a result of that system becoming more attractive for users. One example is a telephone network, for which as the number of users increases, the value of phone service will increase. It is the same for a copyright management system; the more users, the more valuable the system becomes for both rights owners and users. This poses the question—if blockchain is based on a copyright management system, does it bring enough people into the system? That is one of the challenges for sufficient implementation of blockchain, but the example of copyright management based on a centralized database is not the right example and is not effective. Because it is centralized, there is a vision of where both parties are able to place and use their work, and the expectation would be to look at this database as an alternative for open source commons licenses. This sounded unavoidable in Russia, which mistakenly but acutely became efficient for three years but still has problems with government authority and the idea that government should be responsible for the administration of the database and the ministry of every possibility (e.g. culture, industry and commerce). Despite these existing issues, rights owners and potential users have a real interest in a centralized database. Government administration imposes a limitation on the potential target audience, raises concerns about giving up rights, and could potentially waste time. Rather than creating an easy system that can be used globally, Russia is working on this database but still has not found a practical implementation. It could be disappointing, but creating copyright management based on blockchain provides a place for copyrighted works and users who like eliminating the intermediary, and it solves the problem of the publisher.

### Legal Issues

Blockchain can be used for finding solutions for existing problems in networks and applies to different kinds of applications and cryptocurrencies, one of which is smart contracts. These days, blockchain is a well-known subject around the world. There are so many positive and negative statements about blockchain, its rules and regulations, its mechanism, its applications, and its cryptocurrency and how it could be risky and is even prohibited in some countries [12]. Blockchain technology is one of the key elements for legalization of cryptocurrency, and the computing power in blockchain, which determines verification of transactions, provides the power of bitcoin that has solved so many problems and raises so many question. It is able to exchange real money and cryptocurrency, so cryptocurrency plays a main role in the ecosystem of blockchain. There are still many

advantages of blockchain, and rules and regulations and prohibitions for cryptocurrency transactions in some countries are being discussed around the world. On the other hand, cryptocurrencies create a shadow zone for companies and users and have a negative impact on the blockchain network [13]. Potential benefits of blockchain, such as simplifying licensing, are not available for massive users because of the lack of relevant legal preparation to adjust for blockchain's position and situation, as we have mentioned. This includes prohibitions in some countries that have problems related to cryptocurrency transactions, which suppresses the development of blockchain projects. Another suppressor is people who do not have a good understanding of smart contracts from a legal viewpoint [14]. They do not know that this contract is made of code and automatically places both parties under commitment, and also is an agreement which has been completed by both parties in the form of computer code. A smart contract has special characteristics in law; it stays constant, but because blockchain is new technology, when one question is resolved, another issue or question arises. New issues include provision for traditional rules of contract law, such as cancellation, correction, and alternatives. Additionally, a smart contract made of code presents potential concerns about hackers and defective code. There is no certain answer for this issue, but the International Organization for Standardization (ISO) is still working on it [15]. They are surveying and analysing both technical and legal aspects. Here, we state three kinds of corrections that are needed.

### 1) Legal protection of users

In a blockchain-based copyright management system, legal protection of users is based on records. In a situation where someone is using copyrighted works on blockchain, the copyright owner may assert their rights to prevent infringement. It is not possible to adapt a blockchain-based copyright management system, so if those users cannot solve their problem to avoid infringement, they will encounter the legal system. Copyright protection must remain balanced so as not to be used as a pretext for abuse. So we can explain that this protection is only for users of blockchain-based copyright management systems, which have been controlled and supported by some governments and enjoy legitimate exemptions to preserve the balance of protection and financially compensate rights holders.

### 2) Blockchain platform operators and user storage

The characteristics of blockchain records support the application of exemptions, which are current law. This creates a conflict with the immutability principle but addresses needs for deletion and blocking access to relevant content, all of which has been shown in its functioning

### 3) The legal status of the records in a blockchain system

A copyright management system is not just about storing information on copyright ownership, it also creates a situation of powerful deduction of authorship and copyright ownership that can be affected by court decisions, so when ownership concerns are raised by authorities, such information should be available on blockchain [16]. This indicates another situation found in copyright law called formal criteria. Traditionally,

copyrights are created based on formal criteria, so the creation of new technology will alter old copyrights. This will increase the expectations of copyright law for the blockchain, because with the development of new technology, legal issues will come out as a core problem. Apart from these problems, a copyright management system based on blockchain will be more innovative than existing databases. This is not just for copyright data but for all information that needs to be built based on blockchain technology.

### Previous actions, problems and issues

Before the emergence of blockchain, copyright in the digital world was suffering from the lack of a central database for digital information including rights owners and users and copyrighted works [16]. This deficiency caused many problems in this area, such as an absence of explicit data because of appearance, different kinds of databases, not a unit database, and unavailability of data because of the time and cost of obtaining it. To control users and usage and copyrighted work on the internet to preserve the quality of their work, each author had to face a series of jurisdiction and legal processes for payment and licencing, which in some cases required agreement between two parties, users and rights owner. The problem also extends to copyright law, because global laws on copyrighted works are needed. There are national and international laws for copyrights, but they need to be consistent; currently, in some cases they conflict. There was also a low level of reliability between two parties to make contracts in any area because of uncertainty about date and time or tracking any correction of time. Another problem in the digital world has been the ambiguity of the quality of copyrighted work that is not recognizable and global methods of payment, which had been conducted in traditional ways such as making a bank account or e-money account. In contrast, blockchain faces its own problem with data storage which has a solution for now but needs to be further surveyed and investigated [17]. Other questions relate to problems caused by the immutability of blockchain code, which means is not possible to change the details of a transaction after the fact. In the copyright sphere, there are possibilities of changes in rights owners and of situations in which the real owner of a copyrighted work is not clear because of the passage of time and legal issues or copyright law in a certain country. One of the problems that we looked at is blockchain, which is based on a management system created from a network. The system depends on the network, which means that the production of digital works will depend on usage. Volume of usage determines the attractiveness of the network and it makes it more valuable, and vice versa. The last issue that this paper points out is legal issues, which arise from rules and regulations and laws in different countries that conflict and change over time and are not associated with the role played by blockchain technology in the country. Blockchain is a key to solving so many problems in the digital world but its implementation is prohibited in some countries [18].

## CONCLUSION

According to the problems described above, this research significantly exposed that the blockchain is a new technology that could resolve many problems in internet communications and especially in the digital world, such as increasing the availability, accessibility and reliability of data on copyright ownership and making every transaction transparent and traceable. These improvements would have significant impacts on businesses, users, authors, and international law. They would increase the value of digital content where copyright owners, payments, reduced transaction costs, licensing, copyright users, and smart contracts are all connected and serve for increasing the quality of human life and the trustworthiness of the internet and digital world. A quantitative method with comparative research design is used to produce this research paper in order;

- To investigate the effectiveness and efficiency of blockchain technology in the digital world and especially the copyright area,
- To analyze the strengths and weaknesses of blockchain as a key digital technology
- To understand what solutions blockchain as a new technology proposes for problems and issues in the digital world
- To discover differences between conventional methods and the new methods made possible by blockchain for addressing copyright ownership and handling copyrighted works.

With a quantitative method with a comparative research design, two situations compared such as conventional methods for addressing copyright ownership and copyrighted works and those created by the emergence of blockchain. The data collected are secondary data, and the hypothesis is that the presence of blockchain technology is going to open new and amazing doors to deploy and solve problems in the digital world by offering more security, efficiency, and transparency, lower transaction costs, etc. Blockchain does have its own problems for which time and research are needed to find ways for blockchain-based systems to be creative, flawless, and efficient in every usage.

Blockchain has high potential for changing transparency, traceability, and royalty payments; simplifying licenses; enabling smart contracts and cryptocurrency; increasing security; and decreasing the cost of transactions. Despite all of these benefits, there are issues that will take time to resolve. Preparing to use this technology and in some cases accepting this new technology within the country also causes problems; however, increasing the awareness of all of blockchain's advantages and working on solutions to the remaining issues will encourage everyone to accept this technology.

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