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**WIPO Blockchain Whitepaper**

**Executive Summary**

# **I. BACKGROUND**

Blockchain is one of the frontier technologies associated with the concept of the Fourth Industrial Revolution, which is significantly affecting the way businesses operate while revolutionizing numerous innovation ecosystems.

Given that blockchain technologies affect every industry and have been extensively used in the intellectual property (IP) community, the Member States of the World Intellectual Property Organization (WIPO) established the Blockchain Task Force under the Committee on WIPO Standards (CWS). Its mandate is to develop reference models for using blockchain in the field of IP and to propose for a new WIPO Standard supporting potential applications of blockchain technology within IP ecosystems.

This whitepaper aims to explore potential applications and opportunities presented by blockchain to the existing IP ecosystems. It also identifies the challenges and issues that should be addressed to determine the feasibility and cost-efficiency of introducing such technologies in IP ecosystems.

# **II. KEY FEATURES AND APPLICATIONS OF BLOCKCHAIN**

Blockchain can be defined as a distributed database storing a permanent and tamper-proof ledger of data. The key features of said technology are: decentralization, distributed ledgers, consensus mechanisms, immutability of records and encryption. When applied in real-world applications, blockchain potentially enables users to maintain and control the use of their own data such as personal data, contents and transactions by ensuring that this information cannot be altered, copied, or otherwise manipulated due to the immutability that blockchain provides.

Key applications of blockchain include digital identity, timestamping, fraud prevention, tokenization, traceability and smart contracts. Depending on the strategic interests of the stakeholders involved, blockchain can gradually variate from a purely decentralized and open (permissionless) system - where ledgers are distributed amongst participating parties or nodes who validate the transactions that are added via a decentralized consensus model, such as Bitcoin or Ethereum - to a centralized (permissioned) system where the ledger is centrally managed by a specific entity; or distributed among a limited number of participants, and governed by a specific entity or a few concerned parties. In terms of access to the network, blockchain-based solutions can be public i.e., anyone can make use of the blockchain applications or private i.e., only certain entities can make use of them.

During the next few years, the combination and convergence of frontier technologies such as blockchain, biotechnology, big data, Internet of Things (IoT) and Artificial Intelligence (AI) will likely have a direct impact on most industries as well as an extensive impact on the technical processes of the national and international governance systems which regulate those industries. Blockchain thus has transformative effects not only on the primary commercial and innovation processes of IP users and their business models in many industrial and creative sectors; blockchain is simultaneously also transforming the governance processes and systems themselves through which Member States regulate and incentivize those primary innovative, creative and commercial processes in their jurisdictions. One directly affected category of these governance systems are the existing IP ecosystems. In the former sense, enterprises are already beginning to deploy blockchain-inspired solutions and business models either by themselves or in association with others; and in the latter sense, governments and international organizations have been exploring the implications and use cases of blockchain in their public services. As a matter of fact, blockchain platforms such as Bitcoin, Ethereum and Hyperledger are being used by consortia and industry alliances in several business sectors. The initiatives of these consortia and alliances aim to overcome known technology-related problems, such as the lack of interoperability among the existing implementations in the market, legal uncertainty and its complexity, and to facilitate its widespread use. In the meantime, national governments and international organizations are leading projects to facilitate its adoption not only in the private sector, but also in the public sector to increase the level of efficiency of public services for the benefit of societies in general.

# **III. POTENTIAL APPLICATIONS OF BLOCKCHAIN IN IP ECOSYSTEMS**

According to the activities which were conducted for this whitepaper, including surveys, there are numerous potential blockchain use cases within the existing IP ecosystems. However, before introducing any blockchain-based applications, a deeper analysis should be made on whether that technology is the most suitable among the various digital technologies and which blockchain solutions are the most appropriate, taking into account potential benefits and challenges of the respective solutions, and their cost-effectiveness. The potential applications provided in this document should be perceived without any prejudice regarding whether or not blockchain is the most appropriate solution in those cases.

IP broadly refers to the legal rights which result from intellectual activity in the industrial, scientific, literary and artistic fields. It is traditionally divided into two branches, “industrial property” and “copyright[[1]](#footnote-1). This whitepaper explores potential applications of blockchain mainly in the two traditional branches while some potential use cases for protection and access to digital data and IP right enforcement.

To explain the blockchain potential use cased in IP ecosystems, this whitepaper describes the IP ecosystems can be defined as a network of various actors (e.g. creators, inventors, enterprises, organizations, IP Offices and enforcement authorities) that interact with each other in collaborative and competitive ways in the IP environment, using resources to generate, protect, manage and/or commercialize intellectual assets. These interactions can be modelled into an IP value chain with for four phases of Generation, Protection, Management and Commercialization.

## INDUSTRIAL PROPERTY RIGHTS

In relation to industrial property rights, blockchain technologies might be of great help from the generation of an intangible asset to the commercialization of IP rights.

In Generation phase, blockchain applications can help with proof of generation and record keeping of IP assets, by proving the date and ownership of preparatory documentation that may lead to the filing of an application for a patent, utility model or any other industrial property right.

For registration in Protection phase, permissioned-blockchain solutions would allow for a centrally managed ledger facilitating append-only transactions and the sharing of immutable IP data. Blockchain could also be used to provide tamper-proof and solid evidence during the lifecycle of the application, including examination, opposition and cancellation stages”.

In Management and Commercialization phases, the introduction of blockchain solutions in the administration of IP registries might also allow right holders to streamline numerous management activities needed to raise the value of their IP rights portfolio. To start with, registered rights might be autonomously managed by their owners with a consequent efficiency increase. The IP right holder may also use smart contracts for the licensing and assignment of registered IP rights. Tokenization can also help the right holder to securitize their IP assets or to use them as collaterals.

It has been argued that the highest benefits from blockchain solutions would be obtained if interoperability were facilitated. The use of interoperable blockchain systems could facilitate the collaboration among IP offices, and streamline the administration of international IP systems.

## COPYRIGHT AND RELATED RIGHTS

Original creative works are protected without the need for registration or formal requirements. However, in some instances, rights holders may voluntarily register the works in copyright registries as a proof of authorship and/or ownership, the date of generation to justify protection and to facilitate management and economic exploitation of their copyright.

Blockchain technologies may also facilitate the automation of processes and systems used by Collective Management Organization (CMOs), and information access by potential users. This latter example could be also implemented via the use of Non-Fungible Tokens (NFTs). Further, smart contract solutions may facilitate additional patterns for negotiating licenses either individually or collectively by CMOs or other entities. Blockchain solutions facilitate user access to both digital content and identification of the actors involved in the process that goes from its generation to where it is accessible to the public. The use of blockchain may facilitate the calculation of royalties to collect from users and how these royalties have to be distributed among the different right holders

Finally, similar to industrial property rights, copyright and related rights can be tokenized and used as bonds to finance artistic projects. In practice the application of smart contract and blockchain solutions in this context creates a technical continuum between licensing, other contractual practices and technological protection measures for original literary and artistic works on the one hand and for other non-original digital content on the other.

## PROTECTION AND ACCESS TO DIGITAL DATA

Blockchain technologies can provide efficient solutions to protect data. Having in mind the uncertainties that exist in relation to its protection under the current IP rights regimes, tokenization could provide solutions to ensure that data sets and their owners are clearly identified and kept confidential, and only authorized users can make use of proprietary data. For instance, where reasonable measures to maintain secrecy of data have been taken and other requirements fulfilled, the adoption of these measures along with the use of smart contracts would allow holders of undisclosed information to claim protection of that data as trade secrets in case of unlawful appropriation.

## IP RIGHT ENFORCEMENT

An essential challenge for participants in IP ecosystems is the enforcement of their IP rights before judicial courts, administrative bodies, custom authorities or institutions providing alternative dispute resolution (ADR) services. The use of smart contracts may reduce litigation in so far as performance of the obligations takes place while the contract can be automatically terminated once the software detects that a condition is either met or not met anymore.

In case of disputes, blockchain solutions can help to secure evidence in relation to ownership and time of content generation. In case of disputes concerning licenses on digital assets, it may also provide evidence on unauthorized use by third parties, thereby enabling blockchain solutions to be more easily introduced in ADR institutions. Lastly, blockchain applications may considerably impact the prevention of counterfeiting and piracy.

# **IV. CONSIDERATIONS**

There are certain considerations that need to be weighed by participants in IP ecosystems in the decision-making process: (a) whether or not to transition to blockchain-based solutions with other frontier technologies in their digital transformation; (b) what applications provide added-value to the existing solutions; and (c) what kind of blockchain is the most suitable. These considerations are mainly related to a lack of interoperability from three different perspectives in the fields where the interaction among solutions is expected: technical standards, blockchain governance and regulatory frameworks. Another relevant consideration refers to the collaboration and capacity building that IP Offices and other IP stakeholders may need in their adoption of blockchain within IP ecosystems.

## TECHNICAL STANDARDS

Interoperability may be defined as the ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged. For the technology to deploy its full potential, interoperability between trusted ledgers using blockchain solutions implemented by participants in the IP ecosystem needs to be ensured.

The first pillar of interoperability is the development of common technical standards at different layers such as infrastructure, data and transaction layers. Due to the complexity of the field and its diverse applications, the development and adoption of standards would be a complex process. At present, standardization initiatives for specific sectors rely on market-defined solutions, such as the Hyperledger toolset under the umbrella of the Linux Foundation or the Ethereum Foundation that introduces standards to the Ethereum community through the Ethereum Improvement Proposals. In the meantime, some technical specifications developed by international standardization bodies like the International Standards Organisation (ISO) and the International Telecommunications Union (ITU) are gaining traction for terminologies, security and other areas.

The CWS has a consolidated tradition in acting as a collaborative international forum for discussing and reaching an agreement on IP standards. In accordance with the decision of the Member States, the work of CWS Blockchain Task Force would merit developing a new WIPO Standard supporting the potential applications of blockchain technologies within IP ecosystems. In particular, it would be useful for the participation in such a forum to include, in addition to the primary representatives of the Member States and IP Offices, also observers from other international organizations, the private sector and other stakeholder groups, in particular entities that are currently working on blockchain projects. It is critical to synchronize and streamline all the efforts to facilitate the adoption of said technology and to avoid fragmentation by working in a cohesive manner.

## GOVERNANCE

In order for a blockchain to be successful, the governance framework needs to balance the interests of all stakeholders. These include founders, network validators (nodes), users of the blockchain, application developers and regulatory authorities. Depending on the particular purpose of a blockchain network,its founders may choose a type of blockchain such as public or private but should consider the network governance ensuring that all stakeholders can express their views and defend their interests where possible. The blockchain governance should be established before launching the blockchain solutions and must be considered and agreed on at the designing stage taking into account the existing relevant IP ecosystem governance processes. However, it needs to be flexible enough to admit changes in order to incorporate technical development in the system or to adapt to new stakeholder needs. Stakeholders in the blockchain-enabled IP ecosystems will likely come from different countries and regions and thus multi-jurisdictional regulations should be considered at the designing stage, to avoid any regulatory breach.

Finally, the analysis of the governance structure of existing blockchain consortia and ongoing projects in the field of IP may be very useful for identifying common practices as well as for developing reference models and guiding principles related to the establishment of governance frameworks.

## REGULATORY FRAMEWORK

Currently, there is a high degree of legal uncertainty about several blockchain aspects and whether legal systems are fully adapted to this technology. While the entity administering a blockchain network may be located in a single State, stakeholders may come from different jurisdictions. This is particularly the case in IP ecosystems, where most of its actors tend to act at an international level. These concerns should be considered while deciding the feasibility of employing a blockchain solution and conducting its risk assessment from a legal standpoint.

Competent authorities face three main challenges when performing basic legal and regulatory functions, depending on the nature of the blockchain itself. Such challenges are ascertaining liability, determining the applicable law for blockchain activities, and carrying out regulatory monitoring or enforcing rules. The first challenge is decentralization itself. The absence of a central authority in the blockchain environment is concerning, as this may entail that there is no responsible entity for legal compliance and ultimate accountability for the exchanged data. The second issue is the pseudonymity or anonymity provided by blockchain-based platforms to users and miners. This makes it difficult to know who uses the platform and to what end. The third essential characteristic of blockchain which poses as a challenge, is its multi-jurisdictional dimension. This is usually the case when participants in a blockchain are established in different jurisdictions. When the blockchain is connected to legal orders with different approaches to regulatory issues, it might be difficult to design a governance framework that accommodates all those approaches. This is particularly true in relation to personal data protection issues.

The international communities have not neglected the challenge that legal uncertainty entails. It is generally agreed that blockchain-based innovation should rely upon an easily understandable, predictable and relevant legal framework. With this mindset, works have already commenced at national, regional and international levels so as to accommodate the legal framework to the special features of blockchain applications.

## COLLABORATION AND CAPACITY BUILDING

IP Offices and other institutions should evaluate their capabilities, capacities and organizational maturity to assess their readiness for blockchain. The introduction of blockchain technologies to IP ecosystems might require public IP authorities to develop new legal and accounting policies using smart contracts and autonomous to allow the management of their clients’ IP assets. IP Offices and other stakeholders would need to collaborate to explore and determine impact and implications of blockchain to IP ecosystems.

Capacity building and education pose a great challenge for blockchain implementation in IP ecosystems. Efforts to help individuals and entities in exploring and using blockchain-based systems would be futile if they are not accompanied by the rest of participants in IP ecosystems.

In this regard, it would be necessary that all participants within IP ecosystems share their experience, knowledge and blockchain solutions or even cooperate in pilot projects, in order for all stakeholders, including those from developing countries, to learn and benefit from them. This will likely require to explore potential blockchain use cases within the IP space and to envisage collaborations on pilot projects. For example, a pilot project of a blockchain-based reference implementation on verifiable digital identifiers of individuals and entities could streamline data processing across various systems, thus benefiting all actors in IP ecosystems. Such collaborations may result in the development of a new WIPO standard to ensure interoperability among related blockchain-based applications.

1. Intellectual property shall include rights relating to: literary, artistic and scientific works; performances of performing artists, phonograms and broadcasts; inventions in all fields of human endeavor; scientific discoveries; industrial designs; trademarks, service marks and commercial names and designations; protection against unfair competition, and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields. See WIPO INTELLECTUAL PROPERTY HANDBOOK, <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_489.pdf> [↑](#footnote-ref-1)