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TECHNOLOGICAL TOOLS IN COMBATTING DIGITAL PIRACY AND COUNTERFEITING

Contributions prepared by the European Union Intellectual Property Office (EUIPO) and NOS Technology

1.   At the sixteenth session of the Advisory Committee on Enforcement (ACE), held from January 31 to February 2, 2024, the Committee agreed to consider, at its seventeenth session, among other topics, the "exchange of information on national experiences relating to institutional arrangements concerning IP enforcement policies and regimes, including mechanisms to resolve IP disputes in a balanced, holistic and effective manner". Within this framework, this document introduces the contributions of one non-state Member (the European Union) and one private-sector entity (NOS Technology) on their experiences developing and using technological tools to combat digital piracy and counterfeiting.

2.   The contribution by the European Union explains how blockchain technology can help address the challenges of combating trade in counterfeit goods, and how the European Union Intellectual Property Office (EUIPO) has developed an infrastructure for product authentication and supply chain information sharing to support the fight against counterfeiting.

3.   The contribution by NOS Technology presents its anti-piracy toolkit, a combination of AI, machine learning, blockchain and automation technologies to detect, confirm and respond to piracy incidents in real-time. The toolkit allows right holders to issue takedown requests, block illegal streams, and track repeat offenders, minimizing exposure and financial losses.

4.   The contributions are in the following order:

[Contributions follow]

EBSI-ELSA BLOCKCHAIN-BASED SOLUTION FOR THE AUTHENTICATION OF PRODUCTS

Contribution prepared by Claire Castel, Head of Outreach and Knowledge of Intellectual Property, European Union Intellectual Property Office, Alicante, Spain*

ABSTRACT

The contribution provides background on the challenge of combating trade in counterfeit goods, including the magnitude of the problem and its detrimental societal impact. It presents how blockchain technology can help address this challenge and how the European Union Intellectual Property Office (EUIPO) has developed an infrastructure for product authentication and supply chain information-sharing to support intellectual property (IP) rights holders, intermediaries and enforcement authorities in green laning products and combating counterfeiting. Finally, the paper presents the results and the expected follow-up activities of the infrastructure developed.

I.   ANTI-COUNTERFEITING BACKGROUND

1.   Intellectual property rights (IPRs) and their protection are fundamental to securing current and future economic prosperity in the European Union (EU) economy and in defending the creativity, innovation and entrepreneurship of citizens and small and medium-sized enterprises (SMEs) across Europe.[1] Conversely, infringements on IP, such as counterfeiting and piracy, significantly harm economic growth of the EU as well as consumers' safety. A joint study conducted by the Organization for Economic Co-operation and Development (OECD) and EUIPO showed that in 2019, counterfeit and pirated goods amounted to 2.5 per cent of world trade and up to 5.8 per cent of EU imports from third countries.[2] The overall number and variety of counterfeit products detained at EU borders has risen alarmingly and, consequently, increased the challenge for all actors involved in fighting counterfeiting and piracy, as outlined by a joint report conducted by EUIPO and the Directorate General for Taxation and Customs (DG TAXUD) and released in November 2024, showing that around 152 million fake items were detained at the EU border and in the EU internal market in 2023.[3]

2.   Buying counterfeit products is not always an intentional act. On the contrary, as noted in various studies carried out by EUIPO, many consumers are misled into buying counterfeit goods, and even more are unsure whether a product they bought is in fact genuine or not. Indeed, in 2023, 15 per cent of EU consumers, which amounts to an equivalent of 68 million citizens, were misled into buying a fake product instead of a genuine one.[4] A much larger proportion of EU citizens (39 per cent) wondered whether a product they had bought during the previous 12 months was genuine or counterfeit.[5]

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[*]   The views expressed in this document are those of the author and not necessarily those of the Secretariat or of the Member States of WIPO.

[1]   Further information on IP protection in Europe can be found on the EUIPO website https://euipo.europa.eu/ohimportal/en

[2]   OECD and EUIPO (2021), *Global Trade in Fakes: A Worrying Threat*, available at: https://euipo.europa.eu/ohimportal/en/news/-/action/view/5031024

[3]   https://www.euipo.europa.eu/en/publications/eu-enforcement-of-intellectual-property-rights-2024

[4]   EUIPO (2023), *European Citizens and Intellectual Property: Perception, Awareness and Behaviour*, available at: https://www.euipo.europa.eu/en/publications/ip-perception-study-2023

[5]   Ibid.

3.   As outlined in the previous EUIPO contribution,[6] the negative effects of counterfeiting are not limited to economic loss, as they also expose consumers to health and safety risks.[7] Counterfeit products not only damage legitimate businesses, they also contribute to serious criminal activities that undermine society, as highlighted in 2024 by a joint report produced by EUIPO and the European Union Agency for Law Enforcement Cooperation (EUROPOL).[8] This is why the EU must remain at the forefront in the fight against counterfeits and why EUIPO has a key role to play in the overall EU IP rights enforcement strategy.

4.   Numerous existing technologies, procedures and tools[9] already contribute to the control of supply chains and the fight against counterfeiting, such as track-and-trace systems, radio-frequency identification, near-field communication or two-factors serialization authentication, customs controls, as well as the EUIPO IP Enforcement Portal (IPEP).[10] However, these various systems are often disjointed, and this isolation is used by criminal networks to their advantage.

5.   To tackle the challenges posed by criminal threats in this respect, IP crime forms part of the European Multidisciplinary Platform Against Criminal Threats (EMPACT) priorities 2022–2025. Main actors involved in fighting IP crime must work together more closely and develop new approaches to address these growing challenges and carry out specific activities as highlighted at the EU level by the Recommendation on measures to combat counterfeiting and enhance the enforcement of IPRs[11] and as part of the EUIPO Strategic Plan 2030.[12]

6.   Given the limited resources of enforcement officers, technologies such as blockchain could prove to be game-changing tools in combating trade in counterfeit products. A potential solution to these challenges is to make use of the decentralized and synchronized blockchain technology that can deliver and create a secure and collectively shared record of authenticity. This should allow the tracking and tracing of authentic products through the entire supply chain and empower all players involved to focus efforts on fake goods, thus tackling counterfeiting more effectively.

7.   The goal is to use blockchain for an authentication infrastructure, where any interested party (producers, consumers, transport services, etc.) can easily check the authenticity of a product and alert right holders when an infringing product is detected.

8.   Since 2018, EUIPO has led the way in applying such technologies to tackle trade in counterfeits through the Blockathon project.[13] This project came about by first organizing a

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[6]   EUIPO (2023), footnote 4 above.
[7]   EUIPO and OECD (2022), *Dangerous Fakes: Trade in Counterfeit Goods that Pose Health, Safety and Environmental Risks*, available at: https://euipo.europa.eu/ohimportal/en/web/observatory/report-on-dangerous-fakes
[8]   EUIPO and EUROPOL (2024), "*Uncovering the Ecosystem of Intellectual Property Crime: A Focus on Enablers"*, available at: https://www.euipo.europa.eu/en/news/joint-euipo-europol-report-exposes-far-reaching-consequences-of-ip-crime-in-europe
[9]   The EUIPO has developed a web-based technology watch tool to compare the various anti-counterfeiting methods and types available according to purpose, main technical and business characteristics and adoption times, available at: https://euipo.europa.eu/anti-counterfeiting-and-anti-piracy-technology-guide/
[10]   https://euipo.europa.eu/ohimportal/en/web/observatory/ip-enforcement-portal-home-page
[11]   ECC (2024)1739: *"Commission Recommendation on measures to combat counterfeiting and enhance the enforcement of intellectual property rights*", available at: https://single-market-economy.ec.europa.eu/publications/commission-recommendation-measures-combat-counterfeiting-and-enhance-enforcement-intellectual_en
[12]   Strategic Plan available at: https://www.euipo.europa.eu/en/about-us/governance/strategic-plan/sp2030
[13]   For an overview of the project up to 2022, see EUIPO (2019), *New Technological Opportunities for Intellectual Property Rights Protection And Enforcement: Blockathon – Fighting Counterfeits Through Blockchain Technology* (pages 8 to 11 of document WIPO/ACE/14/6), available at: https://www.wipo.int/edocs/mdocs/enforcement/en/wipo_ace_14/wipo_ace_14_6.pdf#page=8. and EUIPO (2022), *New Technological Opportunities for Protecting and Enforcing Intellectual Property Rights – Update on Fighting Fakes through Blockchain Technology*

hackathon-type competition to test the feasibility of the idea. Later, a stakeholder forum was created and a final blockchain authentication platform developed and released in 2024.[14]

II.   THE ANTI-COUNTERFEITING BLOCKATHON INFRASTRUCTURE PROJECT

A.   HISTORY OF THE PROJECT

9.   From a series of workshops in 2017 to a 48-hour Blockathon in 2018,[15] EUIPO conducted various activities over the last four years to investigate the benefits of blockchain technology for IPR enforcement. In 2019 and 2020, EUIPO held in-depth meetings with the Blockathon 2018 winner and created the Blockathon Forum[16] to define the use case[17] and undertake a pilot study, which proved the feasibility of the idea and led to the development of an Anti-Counterfeiting Blockathon Infrastructure[18] to drive the idea forward. Subsequently, a proof of concept was showcased in 2023 with four IP rights holders, two transport and logistic operators and the Dutch customs authorities.[19] The EBSI-ELSA name has been changed to AUTHENTIC view along with the tagline "Creating transparency in the supply chain".

B.   PROJECT INFRASTRUCTURE

10.   In June 2024, the architecture was released, with the following set of downloadable tools and temporary services:

(a) A manual service issuing trademark credentials: as a digital signature, providing IP representatives with blockchain-based credentials of their trademark, verifiable at any time by any third party. This service was later replaced by a global automatic tool (an electronic wallet) built under the EUIPO IP Register in Blockchain.[20]

(b) The authentication module, a generator of digital labels containing the product information and the blockchain-based trademark credentials, allowing IP representatives to link their trademark, product and company information in a single, self-verifiable document which can be linked to physical products.

(c) The non-fungible token (NFT) viewer: a serialization scanning tool that automatically verifies the information contained in the digital labels produced with the authentication module, providing any party holding a product with authenticity checks.

(pages X to Y of document WIPO/ACE/15/10, available at:
https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=580571). The present contribution updated the 2019 and 2022 EUIPO reports.

[14]   All EUIPO infrastructure available at https://www.euipo.europa.eu/en/observatory/enforcement/blockathon
[15]   https://euipo.europa.eu/ohimportal/en/web/observatory/blockathon-2018
[16]   https://euipo.europa.eu/ohimportal/en/web/observatory/blockathon
[17]   https://euipo.europa.eu/tunnel-web/secure/webdav/guest/document_library/observatory/documents/Blockathon/Blockathon-Forum_Blockchain-Use-Case.pdf
[18]   https://euipo.europa.eu/tunnel-web/secure/webdav/guest/document_library/contentPdfs/Strategic_Plan_2025/project_cards/SD1_Anti-counterfeiting_Blockathon_Infrastructure_PC_en.pdf
[19]   An overview of the Proof of Concept results is available at:
https://www.euipo.europa.eu/de/news/observatory/euipo-unveils-ebsi-elsa-a-ground-breaking-step-in-global-supply-chain-product-authentication
[20]   See https://euipo.europa.eu/ohimportal/en/news/-/action/view/8662923

(d) The logistic module: a peer-to-peer network allowing parties in the supply chain to share digital information to track shipment and products from the manufacturing site to the end destination. This includes allowing customs authorities in charge of EU border control to better assess shipments and fast-track their clearance.

C. INFRASTRUCTURE USE CASE

11. The record on the blockchain is a unique and immutable token. As goods pass from one party to another, the token is exchanged between digital wallets. The combination of a unique product identity and the continuous transfer of the digital identity between wallets creates proof that the goods are genuine. Throughout the journey of a product, customs and other enforcement authorities can access information, such as authentic shipping records, which can support risk assessment.

12. From the transporter's perspective, the shipping information is stored on the blockchain. While the solution focuses on the product level, a container can also be tokenized and connected to the goods contained using algorithms. This prevents the need to open a sealed container to check the authenticity of the contained goods each time a container moves between parties in the supply chain. Furthermore, tokenized goods with proven authenticity could be allowed a swift passage through customs checks.

13. From the enforcement perspective, the blockchain can generate automatic alerts about the integrity of the goods if an anomaly is detected while the goods pass between parties in the supply chain. Authorized applications can monitor for such events and send notifications to right holders and enforcement authorities. Optionally, the blockchain may record customs actions to keep parties in the supply chain updated on the status of a shipment.

14. From an end-user perspective, the solution offers the possibility of enhancing the information held on the blockchain, by adding records manually or automatically through sensors. For a retailer or a consumer, this means taking advantage of such records to identify information such as the production facility, supply chain movements and provenance of raw materials.

15. Finally, this infrastructure, through use of additional application programming interfaces (APIs) or defined data, will incidentally provide the following complementary functionalities:

(a) By using defined data on the digital twin (digital version of the physical item) and creating dedicated alerts on their systems, right holders could also leverage the infrastructure to build additional services, such as product recall or market deviation use cases (e.g. where pharmaceutical products have expired or products are reshipped to countries with higher demand).

(b) Right holders and consumers could benefit from additional business-to-consumers (B2C) opportunities in the field of post-sale purchase of product sub-components, or the use of the authenticity certificate to resell in secondary market. Since the right holder defines what type of data is included in the digital twin, it could also lead to a targeted loyalty program based on product specifications.

(c) As part of a wider solution throughout the European Blockchain Services Infrastructure,[21] consumers could benefit from a single wallet at EU level capable of storing all their NFTs and other digital certificates in one location.

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[21]   https://ec.europa.eu/digital-building-blocks/wikis/display/ebsi

III. CONCLUSION

16.   Additional upgrades to the system were carried out together with specific pilots in the last quarter of 2024 with two brands, one logistics operator and two customs authorities to demonstrate the fitness of the infrastructure in a real environment.

17.   As modus operandi the infrastructure will use a blockchain production grade version of the European Blockchain Service Infrastructure (EBSI) under the management of EUROPEUM,[22] an ad-hoc European Digital Infrastructure Consortium[23] created in May 2024 by 10 EU Member States. The issuance of such verifiable credentials is linked to the EUIPO IP Register on Blockchain. The infrastructure will also be impacted by upcoming EU regulations and international projects, such as:

   (a) Digital identity for legal and natural persons under the revision of the European Digital Identity Regulation 2.0,[24] as the project identifies IP right holders through blockchain-based digital and verifiable credentials;

   (b) The upcoming Regulation establishing the Union Customs Code and the EU Customs Authority,[25] as the project provides supply and logistics chain information-sharing between IP right holders, intermediaries and custom authorities;

   (c) Digital Product Passport, since the project provides additional information on project identification;[26]

   (d) The WIPO Global Identifier Project could serve in the future to support the issuance of verifiable credentials of trademark holders in a global manner, effectively;

   (e) The United Nations Economic Commission for Europe (UNECE) United Nations Transparency Protocol data structure, as natural collaboration and synergies can be sought in relation to information-sharing and anti-tampering capabilities.[27]

18.   In 2025, the infrastructure together with the results from the pilots will be presented and following the release of a new branding, its adoption by IP right holders, transport and logistics operators and customs authorities will be sought with the support of EUIPO.

[End of contribution]

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[22]   All EUROPEUM information, including statutes and latest information, available at: https://ec.europa.eu/digital-building-blocks/sites/display/EBSI/The+EUROPEUM-EDICs+latest+updates
[23]   Regulation baseline available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202401432
[24]   Regulation 910/2014 on electronic identification and trust services for electronic transactions in the internal market, 2024 consolidated version available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02014R0910-20241018
[25]   Regulation 2023/0156 repealing Regulations 2013/952 and 2012/007. Under Council 1st reading. Procedure and text available at: https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2023/0156(COD)&l=en
[26]   Regulation 2024/1781 establishing a framework for the setting of eco-design requirements for sustainable products, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1781
[27]   UNTP information available at: https://uncefact.github.io/spec-untp/

WHY ADVANCED TECHNOLOGY IS ESSENTIAL TO COMBAT INTELLECTUAL PROPERTY INFRINGEMENTS IN REAL TIME

Contribution prepared by Mr. Pedro Bravo, Head of Content Protection, NOS Technology, Lisbon, Portugal[*]

ABSTRACT

In the digital age, it is vital for rights holders to protect themselves against modern methods of piracy. Piracy is a sophisticated, global problem and unauthorized content can appear on streaming platforms, torrent networks, and dark web forums within seconds of release. The growth of the Internet and rapid advance of technology has made it easier to make copies of protected works that are often indistinguishable from the originals and to disseminate them quickly, resulting in costly infringements and causing irreparable damage to right holders. The anti-piracy toolkit developed by NOS Technology leverages AI, generative AI, machine learning, blockchain and automation to detect, confirm and respond to piracy incidents in real time, allowing rights holders to identify and eliminate infringements across jurisdictions and ensuring protection even where enforcement regimes are not robust. The automated enforcement feature can issue takedown requests, block illegal streams and track repeat offenders, minimizing exposure and financial losses. Such tools are critical for securing the future of innovation, creativity and fair play in the digital economy.

I.   INTRODUCTION

1.   In today's digital age, intellectual property (IP) is one of the most valuable assets for businesses, creators and organizations. IP fuels industries and drives innovation, from movies, TV shows and music to publishing, games, software and live sports events. However, this value also makes IP a prime target for piracy, costing companies billions in lost revenue annually and eroding consumer trust. Access to the Internet has made it easier to make copies of protected works that are often indistinguishable from the originals and to disseminate them rapidly, resulting in costly infringements.

II.   THE CHALLENGE

2.   Traditional methods of detecting and addressing piracy are no longer sufficient. The scale, speed and sophistication of today's piracy have outpaced manual monitoring and enforcement. Pirates now operate in global networks, using encrypted platforms, decentralized systems and emerging technologies to evade detection.

3.   IP is the backbone of innovation, creativity and industry growth in an increasingly digital world. IP assets can create billions of dollars in value, ranging from movies and music to software and live broadcasts. However, this digital boom has also made IP assets more vulnerable to illegal exploitation than ever before.

4.   Modern piracy is a sophisticated, global operation. Unauthorized content can appear on streaming platforms, torrent networks and dark web forums within seconds of release.

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Traditional methods of IP rights enforcement may not be effective against the speed, reach and complexity levels of modern piracy methods. Without real-time intervention, pirated content can spread globally within seconds, causing irreparable damage. Such damage can take many forms. For example, digital piracy costs businesses over 50 billion United States dollars annually,[28] slashing revenues and undermining profitability. Every infringement is a blow to those who work tirelessly to create valuable content and discourages innovation and creativity. Piracy also dilutes brand reputation, creating negative experiences for consumers who access low-quality or counterfeit product versions. It is therefore critical to use real-time technology to combat intellectual property infringements.

III. THE SOLUTION

5. This is where cutting-edge tools such as the anti-piracy toolkit developed by NOS Technology, in collaboration with a close technology partner, come into play. These solutions harness AI, generative AI, machine learning, blockchain and automation to detect, confirm and respond to piracy incidents in real time, protecting IP at every stage.

A. ANTI-PIRACY TOOLKIT BY NOS TECHNOLOGY: HOW IT WORKS

6. The tool is a combination of technology and open-source intelligence (OSINT) gathered by automated agents. It allows real-time detection with high accuracy (more than 99 per cent) and provides all the network details in a graph,[29] utilizing the following:

a) Smart web crawling – with the capability of reinforcing learning for efficient crawling.

b) Image and video recognition – logos, watermarks, scoreboards and publicity (advertisements) are detected to confirm and score the infringement.

c) Natural language processing – identification of context, services, channels and technology, making it possible to "simulate" a human analyst and thereby improve results with less investment (time, resources and cost).

d) Piracy detection score – using a hybrid approach with supervised and unsupervised machine learning models.

e) Active learning – on case classification for continuous learning.

B. BENEFITS OF REAL-TIME DETECTION

7. Real-time detection of piracy can offer several benefits to right holders.

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[28] A 2019 report by the United States Chamber of Commerce's Global Innovation Policy Center and NERA Economic Consulting, entitled "Impacts of Digital Piracy on the U.S. Economy", highlights significant economic losses as a result of digital video piracy, with estimates ranging from 29.2 billion to 71 billion United States dollars annually for the United States economy alone. On a global scale, losses in the film and television industries from digital piracy range between 40 billion and 97 billion United States dollars annually, depending on replacement rate assumptions. See https://www.uschamber.com/technology/data-privacy/impacts-of-digital-piracy-on-the-u-s-economy.

[29] NOS Technology uses graph database software to help map pirate networks using data collected through analysis and investigation on the web, open source tools, social media, purchase tests, etc.

a) Minimized revenue losses and exposure: real-time detection ensures that unauthorized streaming, downloading and distribution are intercepted before they significantly impact revenues, which enables organizations to identify and stop infringements as they happen and minimize exposure and financial losses.

b) Safeguarding brand integrity: rapid detection and takedown reinforce the brand's commitment to quality and exclusivity.

c) Enhanced operational efficiency: automated solutions reduce dependency on manual interventions, allowing businesses to focus on innovation rather than constantly dealing with piracy threats.

d) Compliance and accuracy: many industries face stringent IP protection laws. This tool enables seamless compliance by documenting infringements and facilitating swift legal action. It employs advanced algorithms to distinguish between legitimate and pirated content, reducing false positives and ensuring precise enforcement.

e) Global reach and comprehensive coverage: the tool monitors open and hidden digital ecosystems, including streaming services (paid, free or shared), social platforms, messaging groups (Telegram, WhatsApp), peer-to-peer (P2P) networks and the dark web. It operates across global jurisdictions, including hard-to-monitor regions and the dark web, ensuring protection in regions where copyright enforcement is traditionally weak.

f) Automated enforcement: The tool automatically issues takedown requests, blocks illegal streams[30] and tracks repeat offenders, saving time and resources.

g) Scalability and proactivity: the tool is capable of monitoring thousands of platforms, networks and users simultaneously. Predictive analytics ensure that piracy can be prevented before it takes place.

C.   REAL-WORLD IMPACT

8.   Companies or law enforcement agencies investigating IP crimes that invest in anti-piracy technology have seen measurable results:

a) A significant reduction in revenue losses owing to piracy.

b) Improved enforcement outcomes, with pirated content removed faster and more effectively.

c) Strengthened relationships with stakeholders, including content creators and distribution partners.

d) Improved results and sustained evidence with more clarity, a broader scope and a reduced time frame.

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[30]   Administrative and Legal procedures in Portugal allow IP rights owners to request takedowns in real time or permanently by Domain or IP. The anti-piracy tool detects, validates, and sends an order to a blocking gateway that connects through API to the ISP.

D.   THE VALUE OF REAL-TIME IP RIGHTS ENFORCEMENT

a) Protection of revenue streams: every pirated stream or download represents lost revenue. Real-time technology helps to maintain value by stopping infringements quickly.

b) Safeguards creative efforts: creators and businesses can focus on innovation rather than fighting piracy, ensuring sustained growth and consumer trust.

c) Promotes fair play: enforcing IP rights promptly ensures that legitimate market players are rewarded for their work, fostering a healthier, more equitable digital economy.

d) Boosts consumer confidence: businesses strengthen relationships with their audiences and consumers by ensuring that only high-quality, authorized content is available.

IV.   CONCLUSION

9.   Real-time anti-piracy tools are the future of IP rights enforcement. Such tools can protect the future of innovation and creativity, allowing businesses to secure their assets, creators to retain control of their work, and consumers to enjoy content as intended. Using the right technology today will ensure a sustainable, fair and innovative future for everyone. In a world where seconds matter, real-time detection and confirmation of IP rights infringements empower businesses, enabling them to regain control of their content, reputation and revenue streams.

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