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Legal Protection of Digital Works through Technical Measures

الحماية القانونية للمصنفات الرقمية عبر التدابير التقنية

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Abstract:

The information revolution has played a vital role in facilitating the global flow and dissemination of knowledge. As intellectual works have increasingly shifted to digital formats stored on electronic media—particularly with the rise of information and communication technologies in the realm of intellectual property—numerous advantages in publishing and authorship have emerged, including accessibility and ease of distribution. However, this progress has also led to widespread unauthorized practices in the digital space, threatening authors' exclusive rights in their digital works. Accordingly, coordinated efforts at both national and international levels are essential to establish preventive technical frameworks aimed at protecting these rights and combating piracy and unlawful reproduction. Such technological measures are now considered integral safeguards that complement the legal protection provided under copyright and related rights laws.

Keywords: Digital Works, Piracy, Technological Measures.

المخلص :

ساهمت الثورة المعلوماتية بشكل كبير في تسهيل تدفق المعلومات ونشرها على نطاق عالمي. ومع التحول التدريجي للإبداعات الفكرية إلى صيغ رقمية تُخزَّن على دعائم إلكترونية، خاصة بعد دخول تكنولوجيا الإعلام والاتصال إلى مجال الملكية الفكرية، ظهرت مزايا عديدة في مجالي النشر والتأليف، أبرزها سهولة الوصول والانتشار. غير أن هذا التقدم التكنولوجي رافقته ممارسات غير مشروعة في البيئة الرقمية، باتت تُهدد حقوق المؤلفين في مصنفاتهم الرقمية، وتُعيق تمتعهم بحقوقهم الاستثنائية التي يكفلها لهم القانون نتيجة إبداعاتهم الفكرية. ومن هذا المنطلق، أصبح من الضروري توحيد الجهود على المستويين الوطني والدولي لوضع نظام وقائي ذي طابع تقني إلكتروني يُعنى بحماية حقوق المؤلفين، ويمنع عمليات النسخ غير المشروع والقرصنة الإلكترونية. وتُعد هذه الآليات التقنية بمثابة ضمانات تكميلية للحماية القانونية المقررة بموجب التشريعات الخاصة بحقوق المؤلف والحقوق المجاورة.

الكلمات المفتاحية : المصنفات الرقمية، القرصنة، التدابير التقنية.

1. INTRODUCTION

In modern times, the expression of intellectual creation has come to be identified as the digital work, which now complements traditional, tangible forms of intellectual creativity. This transformation is a direct consequence of the technological advancements that have permeated the realm of intellectual property rights, including copyright.

The electronic publication of intellectual output—facilitated by the Internet, which has enabled remarkable capabilities and greatly enhanced access to information and data among users worldwide—has led to the emergence and adoption of the concept of digital works as a new paradigm. This

concept has replaced traditional works in many respects and has enabled authors operating within the digital environment to utilize innovative tools to disseminate their works without bearing the financial burden of printing or producing physical (paper-based) copies. Instead, authors can now fix their works on digital media and distribute them through electronic publishing mechanisms.

In this context, it is equally unacceptable to infringe upon the rights of others. Therefore, legal frameworks must serve as effective and credible instruments capable of encompassing various forms of works—whether traditional or digital—in a manner that aligns with the continuous and future developments imposed by the current

technological environment¹.

Digital works, within the digital environment, are particularly vulnerable to a range of risks, including the ease of reproduction, deletion, corruption, and denial of access to websites that host such content. They are also exposed to threats such as imitation, piracy, and the unlawful exploitation of their intellectual products and innovations. These challenges necessitate the creation of a secure environment for authors to protect their digital works, including the adoption of technological protection measures, which serve as a legal precautionary guarantee for the preservation of digital creations.

This research paper seeks to underscore the importance of legal protection afforded by technological measures and to identify their effective role in curbing blatant violations of authors' rights over their digital works in the online environment. Notably, these measures themselves have become the target of infringement by violators of intellectual property rights within the digital sphere.

Accordingly, there is an urgent need for coordinated efforts at both national and international levels to adopt preventive and technological mechanisms that secure the digital space in which such works are made available.

Based on the foregoing, this paper poses the following central research question:

To what extent are technological protection measures effective in safeguarding digital works from all forms of infringement?

To answer this question, the research is structured into two main sections:

Section I: Manifestations of Infringement on Digital Works

Section II: Technological Mechanisms for the Protection of Digital Works

2. Manifestations of Infringement on Digital Works

Before addressing the various forms of infringement on digital works, it is essential first to examine the concept of these digital works and to understand the position of Algerian law regarding them. Subsequently, the discussion will proceed directly to

highlighting the manifestations of infringements committed against works in the digital environment.

2.1 The Concept of Digital Works:

There may be no fundamental difference between a digital work and a traditional work except in the medium through which this intellectual output is expressed. To distinguish between the two, it is necessary first to examine the concept of the digital work from a doctrinal perspective, followed by a direct reference to its definition under legislative provisions.

2.1.1 Doctrinal Definition of the Digital Work

A digital work is defined as an intellectual and creative work that is produced, presented, or stored within an information technology environment, and is processed or transmitted in a digital format through electronic means².

"It is legally defined as a technological means by which information is converted from a perceptible (tangible) form into an imperceptible (intangible) form, represented and processed through numbers in accordance with the binary numeral system (0 and 1)."³

From the preceding definitions, it is clearly established that digital works are intellectual creations embodied in electronic media, and are therefore handled electronically, as they are inherently part of information technology. This distinguishes them from traditional works, which may be expressed in physical form—such as paper-based copies—whereas digital works are expressed within a digital environment or virtual space.

2.1.2 Legislative Definition of Digital Works

The Algerian legislator did not define digital works within the framework of Ordinance No. 03-05 related to Copyright and Neighboring Rights⁴.

"By way of example but not limited to, Article 5 of the Ordinance provides protection for computer programs, while Article 4 addresses the protection of databases. In contrast, the French legislator implicitly tackled the concept of digital works under Article L112-1 of the French

Intellectual Property Code, which stipulates that: 'The provisions of the present law protect the rights of authors over all intellectual creations, regardless of their type, form of expression, or significance, considering them as original intellectual works expressed in a digital manner'⁵.

2.1.3 Types of Digital Works:

The types of digital works are divided into two categories: those specific to the computer environment and those specific to the Internet environment:⁶

2.1.3.1 Works Related to the Computer Environment:

Digital works within the computer environment include the following:

***Computer Programs:** Computer programs are considered the first and most important category of information and information technology works that have received significant attention regarding the necessity of legal recognition and protection. Software constitutes the intangible entity of a computer system; without it, the physical components of hardware and media serve no purpose⁷. They consist of a set of innovative ideas presented as data and instructions in any form that lead to specific results, assisting the user in operating the software.

***Databases:** These refer to all digitally stored texts, images, and sounds, in which intellectual and material effort has been invested in their collection and organization, such as encyclopedias, data repositories, and digital archives⁸. It is considered one of the computer-related works, consisting of a collection of data or other materials, regardless of their form, provided that the selection and arrangement of their contents reflect intellectual innovation. It is worth noting that the Algerian legislator has specifically granted protection to such works, as previously addressed, on the condition that they embody the element of originality .

2.1.3.2 Works Related to the Internet

***Domain Names and Addresses:** A domain name, website name, or domain is essentially an Internet address. Just as a telephone has a specific number and a postal address has a unique mailbox number and country code,

the Internet similarly has a distinctive address⁹. In other words, domain names are all electronic addresses, referred to in English as unique and distinctive addresses composed of letters, alphabetical characters, or numbers, through which one can access a specific website on the Internet, such as the World Intellectual Property Organization's domain name: <http://www.wipo.int>¹⁰.

***Multimedia Works:** The Algerian legislator, within Executive Decree No. 98-257 concerning the conditions and methods for evaluating and exploiting Internet services, has recognized multimedia works¹¹. A web page is considered a multimedia page composed of texts, graphics, images, or linked images connected through hyperlinks known as hypertext. It is therefore a work that combines multiple creative elements, intended to present information in the form of text, sound, or images, and can be accessed using a visual or auditory reading device¹².

2.2 Infringements on Digital Works

Despite the ease of accessing and exchanging information in the digital space, the digital environment is not free from risks of infringement upon digital works and the violation of their authors' rights. This reality necessitates the establishment of effective protection against all forms of unauthorized use and infringement of copyright, as well as any act that undermines the author's ownership. Such infringements in the digital environment can be examined under two main forms, which will be addressed in the following discussion

2.2.1 Direct Infringement on Digital Works

For any infringement upon a digital work to constitute a criminal offense under the law, such a work must first be granted legal protection—meaning that it must fulfill all the conditions qualifying it for such protection. Direct infringement upon digital works may take the following forms:

***Electronic Piracy:** The term "piracy" refers to the reproduction of various computer programs, which involves imitating a specific program by creating or producing copies that resemble the original, such that when

marketed, they appear identical to the authentic version¹³. The forms of unauthorized copying, downloading, and distribution of compact discs have become increasingly varied, to the extent that the term 'piracy' can now be applied to any act aimed at seizing system contents in a short time and at a lower cost¹⁴.

***Violation of the Integrity of a Digital Work:** The provisions of Ordinance No. 03-05, which regulates copyright and related rights, establish the author's right to require respect for the integrity of their work and to object to any modification, distortion, or corruption thereof, where such acts would harm the author's reputation, honor, or legitimate interests¹⁵.

***Unauthorized Disclosure of a Digital Work:** The Algerian legislator considers the unauthorized disclosure of a digital work to constitute an act of infringement punishable as the offense of counterfeiting, under Articles 151 and 152 of the Copyright and Related Rights Law. Referring to Articles 22 and 23 of Ordinance No. 03-05, it is established that the author alone—either under their real name or a pseudonym—has the exclusive right to disclose the work or to transfer this right to another party, provided that such disclosure is not carried out by others without the author's express consent. Otherwise, such an act is deemed a clear violation of the author's right.

***Unauthorized Reproduction:** Article 151 of the aforementioned law, in its second paragraph, stipulates that reproduction constitutes one of the forms of the crime of counterfeiting punishable by law, provided that the reproduction involves multiple counterfeit copies rather than a single copy. The act of reproducing a work without any legal authorization and without the knowledge of the right holder constitutes, in itself, the commission of the offense¹⁶.

***Violation of the Right of Communication to the Public:** This form constitutes the material element of the offense of counterfeiting a work. It involves a person, without legal justification, communicating the work to the public through any

information system, and without obtaining the author's prior written consent¹⁷.

2.2.2 Indirect Infringement on the Work

This is the second form of infringement, which encompasses a set of acts that the Algerian legislator has deemed equivalent to counterfeiting. These include the importation or exportation of copies of the digital work, as well as their sale, rental, or placement into circulation¹⁸.

Importation refers to bringing an item into the country, whereas exportation denotes transferring the item abroad to a counterfeiter with the intention of selling or trafficking it. Similarly, the sale of counterfeit copies of a work or performance aims to achieve the same objective¹⁹.

As for the rental of a counterfeit work fixed on a tangible medium to another person—the lessee—it is for the purpose of enjoyment for a specified period. The act of placing the counterfeit work or performance into circulation entails giving it to another person for use, whether for consideration or free of charge²⁰.

3. Technological Measures for the Protection of Digital Works

Both national legislations at the domestic level and international legal instruments—particularly the World Intellectual Property Organization (WIPO) Copyright Treaty and the related rights agreements—strive not only to establish an effective legal framework that ensures adequate protection for digital creations, but also go further by calling for the adoption of technological mechanisms aimed at curbing infringements affecting digital intellectual output. These mechanisms shall constitute the focus of our discussion in this section.

3.1 The Nature of Technological Measures for the Protection of Digital Works

Before addressing the technological means that must be implemented to protect digital works and enable their secure use by their owners, it is necessary first to define the concept of these measures, followed by an identification of their characteristics. This will be discussed in the following sections.

3.1.1 The Concept of Technological

Measures

Technical measures refer to any technology, device, or combination thereof, which, within the scope of their operation, aim to prevent or restrict unauthorized acts by the right holder's work that infringe upon their rights²¹. The resort to technical measures has become essential today for the protection of intellectual production in the digital environment. Legal protection provided by domestic and international legislation alone is no longer sufficient. Indeed, international treaties have clearly called for the necessity of adopting technical measures by entities managing information on the Internet. Moreover, they have stipulated the imposition of sanctions for the misuse of such technical protection measures, pursuant to Article 11 of the WIPO Copyright Treaty and Article 18 of the WIPO Performances and Phonograms Treaty regarding obligations related to technological measures²².

3.1.2 Characteristics of Technological Measures for the Protection of Digital Works

Protection through technical measures possesses a set of characteristics, which can be summarized as follows:²³

- *Technical measures enjoy legal protection and are legally recognized; they have been adopted by comparative national legislations such as the French legislation, as well as international legislations including the WIPO treaties and Article 6 of the European Copyright Directive on technical measures.

- *Technical measures provide self-protection to the work.

- *They constitute measures that offer protection parallel to the legal protection of digital works.

3.2 Types of Technological Measures for Digital Works

Technical means and measures are diverse and include those classified as measures for protecting websites, which will be addressed first, followed by protection measures for the work itself, which will be discussed second.

3.2.1 Technological Measures for the Protection of Websites

These measures can be studied in two parts:

the first relates to electronic encryption, which will be presented first, followed directly by the firewall technology, which will be addressed second.

- *Electronic Encryption:** Electronic encryption is defined as a technological measure aimed at protecting digital works from piracy by using codes, signals, numbers, and letters that render the data encrypted and unintelligible to others, thereby preventing unauthorized use of the work except by those who decrypt it based on authorization from the rights holders²⁴. The encryption key may be public, in which case it functions as a digital signature computer used to verify the authenticity and reliability of the source of the information and the contents of the envelope, as well as to validate the digital signature applied to the written information and its contents. If any alteration is made to either, the verification process conducted by the digital signature system will detect the error²⁵. As addressed by the Algerian legislator in the law on electronic signature and authentication, Article 02, Paragraph 09, the private encryption key is defined as a sequence of numbers held exclusively by the signatory, used to generate the electronic signature. This key is linked to the corresponding public encryption key²⁶.

Encryption is considered one of the most effective technical mechanisms for preventing infringements on works and protecting them within the digital environment. It also significantly reduces acts of piracy, counterfeiting, and the unauthorized use of such works.

- *Firewall:** This mechanism refers to software and hardware tools that connect a user's internal networks and information systems to the Internet. Its primary purpose is to protect data and files from unauthorized access by activating specific programs on the computer, which in turn regulate the flow of information and determine what is permitted to pass through. This technology acts as a gatekeeper on behalf of the network against potential threats from the Internet²⁷.

3.2.2 Technological Measures for the Protection of the Work Itself

These measures consist of three technical means: first, electronic watermarking; second, electronic signature; and third, digital fingerprinting:

***Electronic Watermarking:** The watermarking system refers to a technique that allows for the identification of all information related to a digital work. This technology is based on embedding a mark or code within the digital work that enables the identification of the work itself as well as its rights holders. Any modifications made by the user, or any unauthorized exploitation, are automatically recorded²⁸.

The watermarking technology operates by permanently linking information to the work, adding data related to the work onto copies of digital works either imperceptibly or visibly. This mechanism is widely applied in the field of cinematographic works, where film copies are watermarked with information such as the screening location, license number, start date of the screening, and other relevant details²⁹.

***Electronic Signature:** The Algerian legislator defined electronic signature in Article 2, paragraph 001 of Law No. 15-04, as electronic data that is attached to, associated with, or logically linked to other electronic data, used as a means of authentication³⁰. In most cases, it is used in the field of commercial contracts, where the electronic signature alone suffices without the need for authentication by any other party, as it is originally issued by a recognized authority³¹.

***Electronic Fingerprint:** The electronic fingerprint refers to a digital fingerprint generated through computer programs that rely on mathematical functions or calculations applied to a message, producing a fingerprint in the form of a short string³².

The electronic fingerprint constitutes a precautionary technical measure aimed at securing the digital environment where authors present their works and creations. It serves to instill confidence among rights holders, protect their productions, and combat the risks of piracy, counterfeiting, and unauthorized exploitation.

These technical mechanisms, in themselves,

represent legal guarantees of a technical nature, which require every author to comply with them within the digital environment as a preventive measure. This ensures the legitimate enjoyment of rights by authors over their works on the one hand, and on the other hand, it does not stifle digital intellectual creativity. This is particularly important as cyber risks and crimes have become concomitant with any technological advancement, given that even these technical measures have become vulnerable to violations by cyber piracy.

4. RESULTS AND DISCUSSION

Technical protection measures constitute legal safeguards of a technical nature, obligating authors to comply with them within the digital environment.

These measures aim to ensure the legitimate enjoyment of authors' rights over digital works.

Such precautionary procedures contribute to preserving the freedom of digital intellectual creativity without impeding its development. With the increasing risks and cybercrimes associated with technological advancements, these technical measures themselves have become vulnerable to violations by electronic piracy.

3. CONCLUSION

Based on the foregoing discussion, it can be concluded that despite the conveniences offered by the digital environment in the realm of copyright, neighboring rights, and intellectual property rights in general, the information revolution has led to the widespread dissemination of digital works and facilitated the ease and cost-effectiveness of their publication and acquisition. However, this has been accompanied by a significant increase in the volume of infringements committed against these works. In other words, the digital space, despite its advantages, is not without risks.

Protection is provided both by the domestic legislator and through international legislation. In parallel with national laws, efforts have been concerted at both levels to develop complementary solutions to the legal protection established under copyright and

neighboring rights laws, embodied in the form of technical measures of an electronic nature aimed at protecting intellectual creations in the digital environment. It is worth noting that these technical measures themselves are afforded legal protection if challenged.

Given that the subject of this research paper focused on technical mechanisms and their role as preventive and precautionary tools in protecting digital works prior to the establishment and activation of legal protection — whether criminal or civil at the national level — we have reached several conclusions followed by key recommendations:

***Results:**

Legal protection of digital works fundamentally calls for adherence to technical measures as a preventive tool to deter infringements, given the multifaceted risks inherent in the digital environment, which are often difficult to combat. These digital measures, as discussed, serve to secure the digital space that acts as a vessel for such intellectual creations.

***Recommendations:**

It is necessary to enact independent legal provisions specifically dedicated to digital works. Their current classification within literary works may not ensure the desired level of protection, especially given the modern development of cybercrimes which are increasingly complex to counter.

Domestic legislation should incorporate provisions of the WIPO treaties related to copyright, performance, and phonogram protection, which affirm the legal protection of digital works and technical measures.

International and national efforts must be coordinated to ensure that domestic laws provide flexible yet strict legal protection for authors' rights in the digital environment.

Increasing awareness about adopting precautionary technical measures to mitigate risks in the digital environment is essential. Compliance with these measures should be mandatory, failing which the right to claim the legally established protection may be forfeited.

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¹⁶ See Article 151, Paragraph 2

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¹⁸ Abderrahmane Khalfi "Legal Protection of Digital Works – A Study in Algerian and Comparative Legislation, Journal of Law and Politics, No. 02, 2014, p. 15.

¹⁹ Farah Al-Hussein, *ibid.*, pp. 54–55.

²⁰ *Ibid.*, p. 55.

²¹ Nour Al-Hussein Ali Moussa Al-Fahdawi, "On the Legal Nature of Technical Protection Measures for Digital Works: A Comparative Analytical Legal Study," Journal of Studies on the Effectiveness of the Legal Norm, Vol. 05, No. 01, 2021, p. 146.

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²⁴ Hamza Marrabet & Mansour Dawoudi, "Encryption as a Mechanism to Protect Digital Works from Electronic Piracy," Journal of Law and Political Sciences, University of Khenchela, Vol. 10, No. 01, 2023, p. 50

²⁵ Aboubakr Mohamed Al-Housh, *ibid.*, p. 114.

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²⁷ Nour Al-Hussein Ali Moussa Al-Fahdawi, "On the Legal Nature of Technical Protection Measures for Digital Works: A Comparative Analytical Legal Study," *ibid.*, p. 158.

²⁸ Lacheheb Nadia Leila, *ibid.*, p. 1847.

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⁷ Osama Abdel Salam Al-Sayed: Digital Economy, Ghaida Publishing and Distribution, Jordan, 1st Ed., 2019, p. 156.

⁸ Abu Bakr Muhammad Al-Housh, *ibid.*, p. 111.

⁹ Abu Bakr Muhammad Al-Housh, *ibid.*, p. 110.

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¹¹ Dated August 26, 1998.

¹² Mansour Dawood & Zayed Bin Issa, *ibid.*, p. 132.

¹³ Farah Al-Hussein, *ibid.*, p. 51.

¹⁴ Taha Issani, Infringement of Digital Works and Mechanisms for Their Protection, Master's Thesis, Intellectual Property Specialization, Faculty of Law, University of Algiers 1, 2012–2013, p. 62.

²⁹ Al-Hussein Ali Moussa Al-Fahdawi, "On the Legal Nature of Technical Protection Measures for Digital Works: A Comparative Analytical Legal Study," *ibid*, p. 159.

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