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The Legal Nature of the Intelligent Electronic Agent in Electronic Transactions: Concepts and Challenges

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Abstract: The challenges inherent in the digital environment pose significant obstacles to the protection of digital works under existing legal regimes, particularly due to the inadequacy of statutory provisions in affording sufficient and effective safeguards for authors' rights. This deficiency facilitates unauthorized exploitation of digital works without remuneration to the copyright holder, exacerbating concerns amid the evolution of piracy techniques and cyber infringements. In response, creators have increasingly resorted to technological protection measures (TPMs) as technical safeguards to secure their intellectual creations. This study illuminates the phenomenon of circumvention of technological protection measures by delineating their conditions, levels, and instruments that ensure the safeguarding of digital works embodying the author's creativity. It further examines the legal framework prohibiting such circumvention.The research concludes with the necessity of amending Ordinance No. 03-05 to incorporate comprehensive provisions regulating technological protection measures. It also advocates for substantial investment in cybersecurity to render these measures robust against piracy, and calls for activating the role of the National Office of Copyright and Related Rights in protecting digital works.

Keywords: digital work, circumvention, technological protection measures, copyright, infringement.

Introduction

The availability of intellectual creations in the digital environment has engendered both positive and negative consequences for authors and rights holders. On the positive side, authors can now independently disseminate their works in the digital space with exceptional speed, precision, and reduced costs compared to traditional paper-based publications. Conversely, the primary negative impact manifests in the formidable difficulties encountered in safeguarding these rights upon online publication. Practical realities demonstrate the ease of infringement, coupled with the inability of existing laws to guarantee comprehensive and effective protection, thereby posing substantial risks to rights holders.

This situation necessitates a dual legal and technological revolution to counter these challenges and prevent diverse forms of infringement against digital works. Such measures must operate autonomously while complementing legal protections, rooted in technical dimensions. Consequently, technological protection measures have emerged as a modern technical mechanism adopted by authors and rights holders to ensure fair and legitimate exploitation of their works. These measures rely on effective technical tools and methods (such as electronic encryption, digital signatures, and others), enabling authors to exercise full control over their digital works and restrict access solely to authorized or licensed users, thereby deterring any unlawful actions by electronic users.

The significance of this study resides the extent to which legal rules criminalizing circumvention of technological protection measures are effective, while highlighting the role of international conventions and national legislation in providing legal protection for digital works.

The study seeks To analyze methods of circumventing these measures in the digital environment, the reasons for their proliferation, and to examine the legal framework criminalizing circumvention of technological protection measures, whether under international conventions or national legislation.

To address the research topic, this study employs the descriptive-analytical legal method, involving the derivation of trends, analysis of legislative texts and doctrinal opinions, their discussion, extraction of implications, examination of pertinent judicial decisions, and derivation of desired conclusions. Concurrently, the comparative method is adopted due to its substantial value in illustrating how various legislations have addressed this issue, thereby enriching the evaluation and assessment of domestic legislation.

Given that authors' rights in the digital environment require specialized protection, the following problem may be posed: ***To what extent are technological protection measures effective in safeguarding authors' rights in the digital environment?***

To comprehensively cover the various dimensions of this topic and respond to the posed research problem, the study is divided as follows:

- Section One: The Legal Basis for the Protection of Technological Measures.
- Section Two: Legal Protection of Technological Measures Against Circumvention.

1. The Legal Basis for the Protection of Technological Measures

The protection of technological measures is grounded in a legal foundation that guarantees authors' rights to control their digital works and prevent unauthorized access or exploitation. The scope of these measures involves defining their conditions and levels, as addressed below.

1.1. Instruments of Technological Measures for Protecting Digital Works

Information security represents one of the foremost barriers impeding free access to and circulation of digital works, particularly amid the exponential reliance on electronic publishing for disseminating intellectual creations. Traditional legal protections prove inadequate to address these infringements or provide the requisite safeguards, thereby enabling unauthorized third-party exploitation of digital works. Consequently, the adoption of technological instruments—combining technical and legal efficacy—became imperative to foster greater trust, reassurance, and security in the exploitation, investment, and dissemination of such works. Despite their critical importance, most comparative laws refrain from precise enumeration, contenting themselves with illustrative references to:

- Electronic encryption,
- Electronic signatures,
- Systems for identifying digital works,
- Electronic rights management information,
- Electronic copyright management systems,
- Firewalls,
- Website filtering on the Internet,
- Digital material identifiers,
- Watermarking systems.

1.2. Conditions and Levels of Protection for Technological Measures

The efficacy of this protection is contingent upon fulfilling a set of conditions that render technological measures worthy of legal safeguarding, in addition to delineating the protection levels prescribed by legislation.

1.2.1. Conditions for the Protection of Technological Measures

For technological measures to qualify for protection, a series of conditions—derived primarily from Article 11 of the WIPO Copyright Treaty (WCT)—must be satisfied:

- **First Condition**: The subject of the technological measures must be a digital work protected by copyright. This condition is crucial to prevent authors from artificially perpetuating monopolistic control beyond the legal protection term, which could deprive humanity of access to culture and knowledge. Technical identification measures are exempt from this condition, as their purpose is to protect moral rights of attribution without restricting exploitation (Soufalo, 2016/2017, p. 301).
- **Second Condition**: The measures must be employed to protect rights conferred upon the author or rights holders. This ensures that protection targets recognized rights; doctrine often views this explicit requirement as superfluous, citing its absence in some texts. Nevertheless, it excludes measures imposed by rights holders or their licensees under licensing agreements. A distinction must therefore be drawn between licensees contracting with the rights holder via a license agreement and assignees acquiring economic rights through assignment (Mrabet & Daoudi, 2023, pp. 278–279).
- **Third Condition**: The measures must be deployed by the copyright holder. This excludes measures applied by licensees under licensing contracts, who possess only personal rights to use or access the work (e.g., a cinema owner licensed to exhibit a film). Such measures imposed on licensed works do not qualify for protection under copyright law (Soufalo, 2016/2017, p. 302).
- **Fourth Condition**: The measures must be effective and functional. Effectiveness refers to the capacity to prevent unauthorized acts on the work; the value of technical measures hinges on their ability to inhibit copying and afford the rights holder control over usage. Measures that are easily circumvented forfeit legal protection, with the burden of proving effectiveness resting on the author.
- **Fifth Condition**: The objective must be to prevent acts reserved exclusively to the author by law. Technological measures employed by authors and creators serve either to control usage of the work or access thereto.

1.2.2. Levels of Protection for Technological Measures

Protection levels may be categorized into three tiers:

- **First Level**: Prohibition of acts that nullify or circumvent technological measures when accompanied by intent to access a legally protected work.
- **Second Level**: Prohibition of acts nullifying or circumventing measures, irrespective of whether the work is protected.
- **Third Level**: Prohibition of acts nullifying or circumventing measures, extended to manufacturing, selling, or trafficking devices employed for such purposes—the highest level of protection, as the prohibition encompasses not only the acts themselves but also the production, distribution, or commercial handling of circumvention tools (Baghdadi, 2020, p. 241).

2. Legal Protection of Technological Measures Against Circumvention

Technological measures constitute essential technical tools aimed at combating electronic infringements targeting digital works. However, amid rapid technological advancements, methods have emerged to nullify their efficacy, enabling circumvention for unauthorized exploitation of digital works—often with ease—thereby granting access and benefits without remuneration.

2.1. The Substance of Circumvention of Technological Measures

The deployment of technological measures has prompted the development of sophisticated countermeasures designed to nullify them, permitting illegitimate use of digital works—a practice termed circumvention, circumvention, or manipulation of technological measures. This phenomenon raises several issues, primarily concerning the precise definition of circumvention in doctrine, international conventions, and comparative national legislation.

2.1.1. Definition of Circumvention of Technological Measures

Doctrine defines circumvention of technological measures as: "nullifying the effect of technological measures created by rights holders to protect their works in the digital environment, circumventing them, or altering necessary rights management information through the introduction of countermeasures that infringe authors' rights and endanger their interests by enabling third parties to access and exploit digital works without financial compensation" (Zayed Muqabala, 2013, p. 260).

Most legislation avoids explicit definitions; however, the U.S. legislator (under Section 1201 of the Digital Millennium Copyright Act) defines it as: "descrambling a scrambled work, decrypting an encrypted work, or avoiding, bypassing, removing, deactivating, or impairing a technological measure without the authority of the copyright owner" (Digital Millennium Copyright Act, 1998, § 1201).

The UK legislator defines it as: "circumvention of protection measures applied to computer programs" (Copyright, Designs and Patents Act 1988, § 296).

These definitions converge on the notion that circumvention encompasses any attempt to nullify or bypass technical measures designed to protect digital copyright, including countermeasures that jeopardize authors' interests and negate legal safeguards for their works, with the core principle being the prohibition of unauthorized access or exploitation.

2.1.2. Forms of Circumvention of Technological Measures

Comparative national legislation enumerates diverse forms and methods of circumvention (e.g., Jordanian Copyright Protection Law Article 54; Egyptian Intellectual Property Rights Protection Law Article 181). Key examples include:

- Designing computer programs intended for circumvention, disabling, or nullification.
- Distributing, importing, copying, publishing, broadcasting, or transmitting works with knowledge that circumvention elements have been removed or altered.
- Unlawfully disabling or impairing any technical protection or electronic rights management information.
- Circumventing effective technological measures or nullifying or disabling any thereof.
- Manufacturing, importing, offering for sale or rental, possessing for commercial purposes, or distributing devices, products, components, or services primarily designed, produced, or used for circumvention.
- Loading or storing unlicensed copies of computer programs, applications, or databases without authorization from the author or rights holder.
- Manufacturing, assembling, modifying, importing, exporting, selling, renting, or distributing tangible or intangible systems or means primarily used for decrypting encrypted satellite signals without authorization.
- Intentionally receiving or distributing encrypted satellite signals known to have been decrypted without authorization.

2.2. Legal Protection Against Circumvention of Technological Measures

With the widespread dissemination of digital works, circumvention poses an escalating threat to authors' rights, necessitating comprehensive legal protection encompassing international frameworks, administrative measures, and criminal sanctions to deter violators.

2.2.1. International Protection

International conventions and treaties mandate legal protection for technological measures. The WIPO Copyright Treaty (Article 11) and WIPO Performances and Phonograms Treaty (Article 18) obligate Contracting Parties to provide adequate legal protection and effective remedies against circumvention of effective technological measures used by authors in exercising their rights (WIPO Copyright Treaty, 1996, ratified by Algeria via Presidential Decree No. 13-123, 2013).

The EU Information Society Directive (2001/29/EC, Article 6) requires Member States to protect technological measures employed by rights holders to prevent or restrict unauthorized acts on protected works (Directive 2001/29/EC, 2001, Article 6).

2.2.2. Institutional Protection

In France, the legislator established an independent public authority tasked with regulating technological measures, known as the Authority for the Regulation of Technological Measures (ARMT), pursuant to Decree No. 2007-510 of April 4, 2007 (Décret n° 2007-510, 2007). This authority was abolished in 2009 and replaced by the High Authority for the Dissemination of Works and Protection of Rights on the Internet (HADOPI), under Law No. 2009-669 of June 12, 2009 (Loi n° 2009-669, 2009). HADOPI was responsible for monitoring technological protection measures, overseeing their scope of application, and proposing amendments to legislation and regulations (Décret n° 2010-872, 2010). HADOPI was subsequently abolished and succeeded by the Regulatory Authority for Audiovisual and Digital Communication (Arcom), established by Law No. 2021-1382 of October 25, 2021 (Loi n° 2021-1382, 2021).

Arcom is entrusted with numerous functions under Article L331-12 of the French Intellectual Property Code, including:

- Encouraging the development of legitimate offers and monitoring lawful and unlawful use of works and protected objects under copyright, neighboring rights, or audiovisual exploitation rights (as referred to in Article L333-10) on electronic communications networks providing public online communication services.
- Exercising regulatory and supervisory functions in the field of technological measures for the protection and identification of protected works and objects (Code de la propriété intellectuelle, art. L331-12).

In contrast to the French approach, the Algerian legislator has not designated a specific authority responsible for regulating and supervising technological measures. Instead, protection of copyright and related rights is entrusted to specialized bodies, while combating cybercrime falls under the National Authority for the Prevention and Combating of Crimes Related to Information and Communication Technologies.

2.2.3. Criminal Protection

A core issue in this domain is that the Algerian legislator did not explicitly criminalize circumvention of technological measures in Ordinance No. 03-05 on Copyright and Related Rights. Nevertheless, Algeria has ratified the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty (previously mentioned), both of which enshrine the legislative orientation toward criminal protection of technological measures. As ratified international instruments, these treaties impose binding obligations on Algeria and constitute enforceable domestic law, allowing Algerian judges to apply them directly in disputes.

Circumvention of technological measures is nonetheless treated as an information-related offense under Law No. 09-04 (as amended), specifically Article 394 bis 2, which imposes imprisonment from two months to three years and a fine from 1,000,000 to 5,000,000 Algerian dinars on anyone who intentionally or fraudulently:

- Designs, publishes, markets, supplies, assembles, or trades in data transmitted, processed, or stored via digital systems that may facilitate the commission of offenses under this section.
- Possesses, publishes, uses, or discloses by any means data obtained through such offenses.

Furthermore, Article 394 bis 6 of the same law authorizes the seizure of devices, programs, and tools used in the offense, the closure of websites implicated in such crimes, and, where the offense is committed with the knowledge of the premises owner, the closure of the place of exploitation, without prejudice to the rights of good-faith third parties.

Algerian legislation also penalizes decryption under Article 68 of Law No. 15-04, imposing imprisonment from three months to three years and/or a fine from 100,000 to 5,000,000 Algerian dinars on anyone who possesses, uses, or discloses data for creating a qualified electronic signature belonging to another person.

Upon closer examination, this provision penalizes possession, use, or disclosure of data for qualified electronic signatures. By converse implication, unqualified electronic signatures do not afford similar protection against interference with creation data (such as encryption keys or symbols). Additionally, Article 17 of Law No. 15-03 on the Modernization of Justice punishes with imprisonment from one to five years any person who unlawfully uses personal elements related to the creation of an electronic signature belonging to another (Loi n° 15-03, 2015).

Conclusion

In conclusion, advanced technology plays a vital role in generating numerous positive and beneficial effects for authors in the field of literary and artistic property rights. However, it has simultaneously produced adverse outcomes, most notably the inability of rights holders to exercise effective control over digital works, the escalation of electronic piracy targeting them, and the inadequacy of traditional legal protection mechanisms—whether at the national level (legal, judicial, and institutional safeguards) or internationally (conventions and specialized organizations). These shortcomings have reinforced the need for modern technical protective mechanisms that enable tracking of unlawful uses and restrict unauthorized access.

Although Algeria has ratified the WIPO Copyright Treaty and WIPO Performances and Phonograms Treaty, both of which mandate protection of technological measures, domestic legislation continues to exhibit deficiencies in this area—whether in Ordinance No. 03-05 concerning technological measures or in scattered provisions within laws on cybercrimes related to information and communication technologies, as well as the Penal Code.

Recommendations

In light of these findings, the following recommendations are proposed:

- Reexamine the policy for protecting copyright and related rights in the digital environment by amending Ordinance No. 03-05 to explicitly regulate technological measures as an effective mechanism against rising electronic piracy, in compliance with the WIPO treaties, and to support and protect intellectual production.
- Develop legal and regulatory tools, enhance technical capabilities through adaptation and improvement of available means, and align them with international standards for the protection of intellectual effort.
- Advance the technical development of technological measures to deter circumvention.
- Update national legislation to encompass all modern methods of circumvention of technological measures and strengthen penal provisions to ensure deterrence, including fines, imprisonment, and legal pursuit of violators.
- Establish a specialized national authority responsible for regulating and supervising technological measures, tasked with overseeing their use for the protection and identification of protected works and objects, thereby preventing abuse by authors—particularly in relation to private copying rights.

References

[1] Baghdadi, D. (2020). *Protection of intellectual property rights on the Internet* (Doctoral dissertation, Mouloud Mammeri University of Tizi Ouzou, Faculty of Law and Political Science).

[2] Intellectual Property Code (France), Article L331-12. https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000043983456

[3] Copyright, Designs and Patents Act 1988, § 296 (United Kingdom). https://www.legislation.gov.uk/ukpga/1988/48/section/296

[4] Decree No. 2007-510 of April 4, 2007 concerning the Authority for the Regulation of Technical Measures established by Article L331-17 of the Intellectual Property Code, *Official Journal of the French Republic*, No. 81, April 5, 2007.

[5] Decree No. 2010-872 of July 26, 2010 concerning the procedure before the Rights Protection Commission of the High Authority for the Dissemination of Works and the Protection of Rights on the Internet, *Official Journal of the French Republic*, No. 171, July 27, 2010.

[6] Digital Millennium Copyright Act, 17 U.S.C. §1201 (1998). https://www.copyright.gov/legislation/dmca.pdf

[7] Directive 2001/29/EC of the European Parliament and of the Council of May 22, 2001 on the harmonization of certain aspects of copyright and related rights in the information society, *Official Journal of the European Communities*, L167, June 22, 2001, pp. 10–19. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0029

[8] Law No. 2009-669 of June 12, 2009 promoting the dissemination and protection of creation on the Internet, *Official Journal of the French Republic*, No. 135, June 13, 2009.

[9] Law No. 2021-1382 of October 25, 2021 relating to the regulation and protection of access to cultural works in the digital age, *Official Journal of the French Republic*, No. 250, October 26, 2021.

[10] Mrabet, H., & Daoudi, M. (2023). Technical protection of copyright in electronic publishing. *Journal of Research in Law and Political Sciences*, 8(3), 278–279.

[11] Ordinance No. 03-05 of July 19, 2003 relating to copyright and related rights (as amended), Algeria.

[12] Presidential Decree No. 13-123 of April 3, 2013 ratifying the WIPO Copyright Treaty, *Official Gazette of the People's Democratic Republic of Algeria*, No. 27, May 22, 2013.

[13] Saleh Abdelkarim, A. K. (2013). Technological protection measures and their role in protecting digital works: A comparative analytical study. *Al-Haq Journal*, (17), 123.

[14] Soufalo, A. (2017). *Protection of intellectual property in the digital environment* (Doctoral dissertation, University of Algiers 1 Benyoucef Benkhedda, Faculty of Law).

[15] WIPO Copyright Treaty, December 20, 1996 (ratified by Algeria by Presidential Decree No. 13-123 of April 3, 2013, *Official Gazette*, No. 27, May 22, 2013). https://www.wipo.int/treaties/en/ip/wct/

[16] Zayed Muqabala, N. (2013). Protection of electronic publishing rights under Jordanian law: A comparative study. In *Proceedings of the First International Conference: Libraries and Information Centers in a Changing Digital Environment*. Jordanian Library and Information Association in cooperation with Al-Balqa Applied University.