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Universidad Nacional de Catamarca - Facultad de Humanidades
Instituto de Investigación en Teorías del Arte y Estética
Revista Rigel – ISSN 2525-1945.

Electronic Arbitration in international Investment contract disputes: Between procedural Efficiency Requirements and cybersecurity challenges.

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Received: 30/06/2026 Accepted: 20/07/2026 Published: 30/08/2026

Abstract:

In light of the profound digital transformation of the global economy, international investment disputes are increasingly being resolved through e-arbitration and online dispute resolution (ODR) mechanisms. While this shift offers significant advantages in terms of procedural efficiency and cost-effectiveness, it also raises complex legal and technical questions that challenge the traditional foundations of international arbitration.

This study examines the legal validity of e-arbitration agreements within the framework of the UNCITRAL Model Law and the New York Convention, with a particular focus on addressing the requirements of "writing" and "signature" in a paperless digital environment. Furthermore, the research explores the procedural challenges associated with virtual hearings, determining the "place of arbitration" in a borderless digital space, and the implications of these for the principle of "fair trial."

A significant portion of the analysis is devoted to the role of cybersecurity and emerging data integrity in protecting high-risk investment disputes from cyber espionage and unauthorized access. By analyzing recent judicial trends and international protocols, such as the ICCA-NYC Bar-CPR Protocol on Cybersecurity, this study assesses the compatibility of electronic arbitration awards with current international enforcement systems. The paper concludes by offering practical recommendations for legal practitioners and investors to integrate "cyber resilience" and "digital procedural clarity" into international investment contracts, ensuring a balance between technological innovation and legal certainty.

Keywords: Electronic arbitration, investment disputes, online dispute resolution, cybersecurity, fair trial, international investment law, New York Convention, International Centre for Settlement of Investment Disputes (ICSID).

Introduction

International investment contracts are the lifeblood of cross-border capital and technology flows. However, their complex nature—often involving sovereign states and ambitious foreign investors—makes them susceptible to intricate disputes requiring swift, efficient, and confidential dispute resolution mechanisms. International arbitration emerges as a key option for resolving these disputes outside the complexities of national courts.

With the astonishing pace of digital transformation sweeping the legal and economic landscape, traditional arbitration—with its paper-based procedures and costly in-person hearings—is no longer sufficient to meet the demands of modern investment. This has led to the emergence of e-arbitration as a sophisticated procedural model conducted entirely in cyberspace.

This study derives its theoretical and practical significance from addressing the intersection of three highly sensitive concepts: international investment contracts, virtual arbitration, and the cyber environment. The importance lies in highlighting the extent to which modern digital tools (such as electronic signatures, virtual sessions, and cloud document management) can reduce investment costs and disputes and streamline procedures, while simultaneously exploring how to reconcile this technological flexibility with the protection of established legal guarantees of procedural justice. This is especially crucial given the increasing risks in international investment disputes, where the data and deliberations of electronic arbitration bodies have become prime targets for cyberattacks and espionage. This has made cybersecurity and data integrity essential for the validity and enforceability of arbitration proceedings under international treaties such as the 1958 New York Convention.

• The study's central question is:

"To what extent does the current legal and procedural framework for electronic arbitration meet the requirements for resolving international investment contract disputes, and does it possess sufficient elements to guarantee the validity and binding nature of its awards in light of cybersecurity risks and national enforcement obstacles?" This study aims to achieve the following objectives:

- Establishing the contractual and legal framework for electronic arbitration agreements and the admissibility of digital documents in investment contracts.

- Identifying the procedural and security challenges arising from holding virtual hearings and exchanging evidence via the cloud, and how to address cyber threats.

- Analyzing the mechanisms for enforcing electronic arbitration awards and assessing their compatibility with the 1958 New York Convention and the 1965 Washington Convention (ICSID).

- Providing practical recommendations to legislators and arbitration institutions to strengthen the legislative and regulatory environment for virtual arbitration.

To comprehensively address all aspects of the topic, the study adopts a critical analytical approach by analyzing legal texts, international agreements (such as UNCITRAL, the New York Convention, and the Washington Convention), and recent protocols.

To answer the research question and achieve the study's objectives, the article is divided into three integrated sections:

• Section One: The Legal and Contractual Framework for Electronic Arbitration.

• Section Two: Procedural Challenges and Cybersecurity Guarantees in Electronic Arbitration. • Third topic: Enforcement of electronic arbitration awards in international investment contract disputes.

Section One: The Legal and Contractual Framework of Electronic Arbitration

Arbitration, as a specialized judicial system based on the will of the parties, derives its legitimacy from the arbitration agreement. In light of the digital transformation, fundamental questions have arisen regarding the extent to which traditional legal concepts (such as writing and signature) can encompass the electronic environment, particularly in the field of international investment contracts, which are characterized by their complexity and the requirement of stringent legal safeguards.

Accordingly, this section aims to establish the legal nature of the electronic arbitration agreement while highlighting the issues related to the admissibility of digital documentation.

Requirement One: The Legal Nature of the Electronic Arbitration Agreement

The arbitration agreement is the cornerstone upon which the jurisdiction of the arbitral tribunal is based, thereby superseding the jurisdiction of national courts. The agreement's importance is amplified in international investment contracts, given the parties involved (which are often states or public entities on one side and foreign investors on the other).(Dr. Ahmed Sharaf El-Din; 2018, p. 45)

Sous-Section 1: Definition and Forms of Arbitration Agreements in Investment Contracts

An arbitration agreement is a commitment by which the parties agree to refer any disputes that have arisen or may arise between them concerning a specific legal relationship (contractual or non-contractual) to arbitration. In international investment contracts, this agreement takes one of the following forms:

1. Arbitration Clause: This is a clause included in the original investment contract before a dispute arises, stipulating that any future dispute will be resolved through arbitration.

2. Submission Agreement: This is a separate agreement concluded between the investor and the state after a dispute has already occurred, outlining its framework and referring it to arbitration.

3. Arbitration without Private Agreement: This is the most recent form of arbitration agreement, where the host state expresses its general consent to arbitration through bilateral investment treaties (BITs) or national investment legislation. The foreign investor's acceptance of this invitation (by filing a claim or electronic notification) constitutes a valid conclusion of the arbitration agreement.(Jean Paulsson, 2, pp. 232-257)

- Sous-Section Two: Writing and Electronic Signature as a Formal Requirement in Arbitration Agreements:

The vast majority of international laws and conventions—most notably the 1958 New York Convention (Article II)—require that arbitration agreements be in writing.

With the emergence of electronic arbitration, the challenge arose of reconciling the "formality of traditional writing" with the "virtual environment." Modern legislation (such as the UNCITRAL

Model Law on International Commercial Arbitration as amended in 2006) has settled on the concept of functional equivalence, which stipulates that the requirement of writing is met when the dispute is recorded or documented by any electronic means that allows for access to and retrieval of data (such as email and electronic data interchange, EDI).(.Julian D.M. Lew, Loukas A. Mistelis, & Stefan M. Kröll 2003, p. 168)

The second requirement: The legal validity of written documents and electronic signatures in international investment contracts:

The enforceability of electronic arbitration agreements in investment disputes depends on the extent to which electronic documents and digital signatures, which prove the authorization of their owners, are recognized as legally valid.

- Section One: The requirement of a written document under international agreements and laws:

International jurisprudence and legal practice have witnessed a significant evolution towards moving beyond the narrow, purely material understanding of the requirement of a written document:

- The New York Convention (1958): Article 2/2 stipulates that a written document includes "an arbitration clause in a contract or arbitration agreement signed by the parties or contained in exchanged letters or telegrams." Although electronic means are not explicitly mentioned due to their historical context, the modern interpretation of this article by the United Nations expands its scope to include modern digital means. (United Nations General Assembly Recommendation (2006) on the Interpretation of Article (2/2) of the 1958 New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards).

- UNCITRAL Model Laws (1985–2006): Recent amendments have adopted two options for the concept of writing. The first option eliminates the need for a physical signature, relying instead on the possibility of storage and retrieval. The second option allows an agreement to be considered written even if it is oral or made through positive conduct, provided it is recorded electronically.

- The Washington Convention (1965 ICSID): Concerning the settlement of investment disputes between states and nationals of other states, it requires written consent without specifying a particular form for the document, thus opening the door wide to the acceptance of digital means.

Section Two: Electronic Signature as a Guarantee of Consent:

An electronic signature constitutes the legal and technological tool for linking an electronic document to its signatory and proving their consent to the content of the arbitration agreement. (Khaled Mamdouh Ibrahim, p. 112).

1. Definition and Classification: An electronic signature is not simply a copy of a handwritten signature, but rather electronic data embedded in or linked to an electronic document used to identify the signatory (such as a PKI-based digital signature).

2. Security Standards and Legal Validity: For an electronic signature to have full legal validity before arbitration bodies and national courts, it must meet two main conditions:

a. Identification: The ability to clearly identify the signatory.

b. Control and Integrity: The signature must have been made under the exclusive control of the signatory at the time of signing and must allow for the detection of any subsequent amendments to the contract or arbitration agreement.(Essam El-Din El-Qasabi, p. 89.)

Section Two: Procedural Challenges and Cybersecurity Guarantees in Electronic Arbitration

While the contractual framework grants electronic arbitration its legitimacy, its practical success in resolving international investment disputes hinges on its ability to manage procedures effectively and flexibly, without compromising fundamental guarantees of justice or exposing highly sensitive investment data to cyber risks.

Requirement One: Managing Disputes and Procedural Guarantees in a Virtual Environment

The nature of investment disputes—with their inherent technical complexity and the sheer volume of evidence—necessitates the use of digital platforms for managing disputes. This requires a balance between procedural flexibility and respect for the rights of the defense.

Subsection One: Virtual Hearings and the Rights of the Defense:

Hearings conducted via videoconferencing have become a common alternative to traditional in-person hearings.

1. Guaranteeing the Principle of Adversarial and the Right to a Defense:

The principles of justice require that each party be able to present their case with dignity and equality (Article 18 of the UNCITRAL Model Law on Arbitration). In a virtual environment, the challenge arises regarding the ability of technology to ensure that witnesses and experts can be questioned effectively and that they are not coached off-camera.

2. The Authority of the Arbitral Tribunal to Impose Virtual Hearings:

International arbitration jurisprudence has established that the arbitral tribunal's authority in administering the proceedings grants it the right to hear the parties virtually, even if one party objects, provided that this fulfills the general principle of facilitating justice and not hindering the resolution of the dispute. (Supreme Court of New South Wales: Capic v Ford Motor Company [2020] FCA 486 (Decision on virtual hearings).

Section Two: Evidence Management and Electronic Exchange of Memoranda:

Investment cases rely heavily on thousands of supporting documents (such as financing plans, engineering reports, and feasibility studies).

1. Submitting Evidence via Digital Platforms (cloud-based file sharing):

Parties to arbitration are required to submit their evidence via a secure cloud platform provided by arbitration centers (such as the ICSID Documents System or ICC Case Connect).

2. Procedural Validity of Electronic Rectification:

Modern arbitration rules (such as the ICC Rules 2021, Article 26) recognize the right of the arbitration panel to conduct any hearing or review of evidence using digital means, provided that the parties are notified in advance and procedural parity is ensured. (Brandon Malone, "Cybersecurity in international Arbitration", ICCA Reports, No: 6, 2020, p. 31).

The second requirement: Cybersecurity and protecting the confidentiality of investment data:

Confidentiality is one of the most important advantages that motivates investors and countries to resort to arbitration. However, the shift of proceedings to the digital realm makes this data vulnerable to cyberattacks and industrial espionage.

Section 1: Hacking and cyber threats in investment disputes.

Investment disputes involve highly sensitive international and commercial secrets (such as data on natural resources, national financial strategies, and intellectual property rights).

1- Digital hacking incidents:

The international arena witnessed a hacking incident involving the website of the arbitration panel in the well-known investment dispute between China and the Philippines during the dispute proceedings. This highlighted the fragility of some virtual infrastructures and served as a warning regarding the protection of the confidentiality of deliberations.

2- The obligation of confidentiality in the age of artificial intelligence:

The risk extends to the leakage of memoranda and evidence via generative artificial intelligence tools or unencrypted cloud storage platforms, necessitating high levels of data encryption. (Brandon Malone, "Cybersecurity in international Arbitration", ICCA Reports, No: 6, 2020, p. 31).

Section Two: International Frameworks and Protocols for Cybersecurity:

To avoid regulatory gaps, arbitration institutions have unanimously adopted crucial protocols to protect data integrity:

1- ICCA-NYC Bar-CPR Cybersecurity Protocol:

This protocol requires arbitration bodies and parties to determine the level of information security risk at the outset of the dispute, establish appropriate end-to-end encryption procedures, and use secure software for communication and document storage.

2- Seoul Protocol on Virtual Arbitration (2020):

This protocol establishes the technical and organizational rules for digital communication, including ensuring the integrity of broadcasts, providing alternative communication lines, and securing virtual rooms to prevent unauthorized access. 3- The remaining challenge during the recognition and enforcement phase:

Any serious breach of cybersecurity leading to the leakage of confidential data or violating the principle of equal opportunity may be used as grounds for invalidating or refusing to enforce an electronic arbitration award, pursuant to paragraph (1/b) or (2/b - public policy) of Article V of the 1958 New York Convention.(Husam Al-Din Al-Ahmadi, (2023), p. 77).

Section Three: Enforcement of Electronic Arbitration Awards in International Investment Contract Disputes.

The enforcement phase of an arbitration award is the true practical test of the procedural effectiveness of electronic arbitration. No matter how smoothly the virtual proceedings may run, the crucial factor remains the ability of the resulting award to be enforceable against the host state of the investment or the investor, and to overcome the obstacles of recognition and enforcement before national courts.

First Requirement: The Compatibility of Electronic Awards with International Investment Agreements (Enforcement Agreements):

Awardings issued in a virtual environment raise questions about their compliance with the formal and substantive requirements stipulated in international treaties governing the enforcement of arbitration awards.

Section One: The Compatibility of Electronic Awards with the 1958 New York Convention:

Article IV (1/a) of the 1958 New York Convention requires the party seeking enforcement to submit "the original duly authenticated award or a copy thereof that meets the requirements for its validity."

1- Functional Equivalence of the Original Document:

In electronic arbitration, the award is issued as a digital document signed electronically (such as an encrypted PDF file signed with a valid digital certificate). Modern jurisprudence has established that a digital document, dated and signed electronically, fulfills the "original" requirement [the requirement of depositing and presenting the original judgment] under the concept of functional equivalence, provided that the integrity of its content can be verified and it has not been altered since its issuance.

2- Authentication and Consular Affairs in the Digital Environment:

Modern laws have circumvented the complexities of traditional authentication by adopting the "e-Apostille" system, in accordance with the Hague Convention, thus granting digital judgments official status and direct enforcement.

Section Two: The Specificity of Enforcing Investment Judgments under the Washington Convention (ICSID 1965):

Judgments issued by the International Centre for Settlement of Investment Disputes (ICSID) are characterized by a unique enforcement system independent of national courts.

1. Binding Force and Direct Enforcement (Articles 53 and 54):

All States Parties to the Convention are obligated to recognize and enforce the award issued by the Centre as if it were a final judgment issued by their national courts, without subjection to review by domestic courts or exceptions based on domestic "public policy."

2. Electronic Issuance of Judgments:

The ICSID has adopted an advanced arbitration rule (2022 Amendments - Article 60) that eliminates the need for paper copies. The award is sent electronically to the parties to the dispute via the Centre's approved digital platform immediately upon electronic signature by the panel members. The date of digital transmission is considered the official date of issuance and enforcement of the award. (ICSID Administrative and financial regulations (2022 Amendments), Rule 60: "Issuance of the Award and Electronic Transmittal" ICSID secretariat, Washington D.C., p. 42à.

The second requirement: Practical obstacles and modern trends in national laws.

Despite international developments, national enforcement practices continue to encounter procedural obstacles inherited from traditional legal thought.

Section 1: The argument of public policy and equal opportunity as an obstacle to enforcement.

The most common reason cited by states for refusing to enforce electronic arbitral awards under Article 5(2)(b) of the New York Convention is the "public policy" argument.

1- The argument of violation of the right to a defense:

The losing party (often the host state) may claim that conducting the proceedings virtually or delivering evidence via the cloud prevented them from fully presenting their defense, or that technical interruptions in the broadcast violated the principle of adversarial proceedings.

2- Modern judicial trends:

Enforcement courts in countries with advanced arbitration practices (such as France and Singapore) have established that the argument of violation of the right to a defense due to the use of technology requires proof of "serious and direct procedural harm" that affected the outcome of the award, and is not admissible based solely on a formal objection to the virtual medium. Swiss Federal Supreme Court, Decision 4A_634/2014, Rendering and Enforcement of Arbitral Award, May 21, 2015, p. 12.

Section Two: Trends in National Legislation Towards Digital Enforcement.

Many countries have begun updating their procedural and arbitration laws to facilitate the enforcement of electronic awards:

1- Elimination of the Paper Document:

Advanced international legislation (such as the Swiss Arbitration Code (amended 2021) and the UAE Arbitration Law No. 6 of 2018) has adopted explicit provisions equating electronically signed awards with paper awards, and permitting the electronic submission of enforcement orders (exequatur) through national court platforms.

2- Flexible National Judicial Oversight:

National courts have moved towards reducing procedural grounds for annulment and focusing on the substantive content and the validity of the digital signature issued by the arbitral tribunal to ensure it is not forged. (Redfern, Alan, & Hunter, Martin, 2015, p. 540).

Conclusion

In conclusion, this study, which addressed "Electronic Arbitration in International Investment Contract Disputes," demonstrates that the digitalization of justice is no longer merely a theoretical or intellectual topic treated as a future research proposal. Rather, it has become an inevitable necessity and a practical reality imposed by the nature of contemporary international trade. The research has proven that electronic arbitration possesses the legal and technical capabilities that make it an effective means of resolving investment disputes, provided there is a flexible legal framework and a secure technological environment. The study reached the following conclusions:

- Evolution of Formal Concepts: International jurisprudence and courts, guided by the UNCITRAL Model Laws, have successfully moved beyond the narrow, material interpretation of the "writing and signature" requirements by adopting the principle of functional equivalence. These principal grants authenticated electronic documents and signatures the same legal weight as paper documents.

- Expansion of Arbitral Tribunal Powers: International practice has established the authority to grant arbitral tribunals the power to conduct virtual hearings and accept digital evidence, provided that the principles of due process and equal opportunity between the investor and the host state are guaranteed. - Cybersecurity as a Determinant of Legitimacy: Cyber threats and confidentiality risks pose the greatest obstacle to electronic arbitration. Any serious breach of data confidentiality or procedural integrity could render an arbitral award invalid or unenforceable, based on Article 5 of the 1958 New York Convention.

In light of these findings, the following recommendations can be made:

- Updating National Arbitration Legislation: This involves urging national laws to explicitly stipulate the validity of arbitration agreements and the management of disputes via digital means, in order to avoid any rigid, materialistic judicial interpretations during the enforcement phase.

- Mandatory adoption of cybersecurity protocols: This involves including information security protocols (such as the ICCA-NYC Bar-CPR and Seoul Protocols) as an integral part of Procedural Order No. 1 in all investment cases.

- Upgrading the infrastructure of arbitration centers: This entails establishing fully secure digital platforms for storing investment case documents, encrypting communications between the disputing parties and the arbitration panel, and providing ongoing training for arbitration personnel on addressing modern digital threats.

- Adoption of an international explanatory treaty: This involves recommending the issuance of an additional protocol to the 1958 New York Convention that explicitly recognizes the legal force of electronic arbitration awards and documents and establishes internationally recognized minimum standards for digital security.

Declarations

Ethics Approval and Consent to Participate: Not applicable.

Consent for Publication: Not applicable.

Funding: The author received no financial support for the research, authorship, or publication of this article.

Conflict of Interest: The author declares no conflict of interest.

Data Availability: No datasets were generated or analyzed during this study.

Author's Contribution: The author is solely responsible for the conception, research, analysis, drafting, and revision of the manuscript.

Use of Artificial Intelligence: No generative artificial intelligence tools were used in the preparation of this manuscript.

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