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NEGATIVE AND POSITIVE EFFECTS OF USING AN ELECTRONIC DIGITAL SIGNATURE

Daminova Barno Esanovna,
Associate Professor, Department of Algorithms and Programming Technologies, Karshi State University,
barnod@mail.ru
https://orcid.org/0009-0001-4211-6082

Razzoqov Mustafo Matniyoz o`g`li
Students of Karshi State University
mustaforazzoqov771@gmail.com

Mo`minov Bekzod Faxriddin o`g`li
Students of Karshi State University
mominovbekzod01@gmail.com

ABSTRACT

This article analyzes the role of electronic digital signature (EDS) technology in the modern process of information exchange, as well as its legal, economic, and technical aspects. The research highlights the positive impacts of EDS, such as the acceleration of document workflow, ensuring confidentiality, and the efficiency of remote services. At the same time, negative consequences associated with the use of EDS, including the risks of cyberattacks, theft of private keys, and dependence on technical infrastructure, are systematically demonstrated. The article concludes with practical recommendations for enhancing system security.

KEYWORDS

Electronic digital signature, information security, cryptography, electronic document management, cybersecurity, remote authentication, identification, digital economy.

Introduction

Annotatsiya. Ushbu maqolada elektron raqamli imzo (ERI) texnologiyasidan foydalanishning zamonaviy axborot almashinuvi jarayonidagi roli va uning huquqiy, iqtisodiy hamda texnik jihatlari tahlil qilinadi. Tadqiqot davomida ERIning ijobiy tomonlari sifatida hujjatlar aylanishining tezlashishi, konfidensiallikning ta’minlanishi va masofaviy xizmatlar samaradorligi yoritilgan. Shu bilan birga, ERIdan foydalanish bilan bog‘liq salbiy oqibatlar, jumladan, kiberhujumlar xavfi, maxfiy kalitlarning o‘g‘irlanishi va texnik infratuzilmaga bog‘liqlik kabi muammolar ilmiy asoslangan holda ko‘rsatib o‘tilgan. Maqola yakunida tizim xavfsizligini oshirish bo‘yicha amaliy tavsiyalar berilgan.

Kalit so‘zlar. Elektron raqamli imzo, axborot xavfsizligi, kriptografiya, elektron hujjat aylanishi, kiberxavfsizlik, masofaviy autentifikatsiya, identifikatsiya, raqamli iqtisodiyot.

Аннотация
В данной статье анализируется роль технологии электронной цифровой подписи (ЭЦП) в современном процессе информационного обмена, а также её правовые, экономические и технические аспекты. В ходе исследования в качестве положительных сторон ЭЦП освещены ускорение документооборота, обеспечение конфиденциальности и эффективность дистанционных услуг. Вместе с тем научно обоснованы негативные последствия, связанные с использованием ЭЦП, включая риски кибератак, кражу закрытых ключей и зависимость от технической инфраструктуры. В завершение статьи даны практические рекомендации по повышению безопасности системы.

Ключевые слова. Электронная цифровая подпись, информационная безопасность, криптография, электронный документооборот, кибербезопасность, дистанционная аутентификация, идентификация, цифровая экономика.

In the era of digital transformation, ensuring the security of information exchange has become one of the most priority tasks. An electronic digital signature (EDS) is a requisite created as a result of cryptographic transformation of data in an electronic document, which confirms the integrity of the document and the authenticity of the person who signed it. EDS is based on the principle of asymmetric cryptography (a pair of public and private keys).

1. Positive consequences (Advantages) of using EDS

EDS technology brings the following positive changes to economic and management processes:

• Legal force and identification: EDS has the same legal status as a handwritten signature and seal on a paper document. This allows you to conclude contracts remotely and use public services.

• Ensuring the integrity of the document (Integrity): If any changes are made to a signed electronic document (even if one character changes), the signature loses its validity. This protects against data forgery.

• Saving time and resources: The costs of printing documents, courier services and archiving are dramatically reduced. A legally valid document can be sent to any point in the world in a few seconds.

• Non-repudiation: The signatory cannot deny that he or she has signed a document certified with his or her private key, saying "I did not sign it", because the private key is considered to belong only to him or her.

2. Negative consequences and risks of using EDS

Like any technology, EDS has certain vulnerabilities and risks.

Theft or loss of the private key: The security of EDS depends on the confidentiality of the private key. If the device (flash card, token) where the key is stored is stolen or its password is compromised, unauthorized persons can sign documents on behalf of the signatory.

Cyberattacks and viruses: There is a risk of obtaining user keys and passwords through "phishing" or Trojan viruses.

Dependence on technical infrastructure: EDS requires constant electricity, internet connection and special software (e.g. E-SIGNATURE) to operate. Technical failures in the system can disrupt important document flow.

Legal and social problems: Due to the low level of digital literacy of users, entrusting their keys to other persons (e.g. accountants or relatives) leads to legal disputes.

1. Legal problems: The clash of law and digital reality

Legal problems in the field of EDS mainly concern issues of liability and international mutual recognition.

Cross-border legal non-recognition: Many countries have their own national EDS standards. A signature issued by a certification center in one country may not have legal force in another. This creates a major legal obstacle to the digital signing of international contracts.

Attribution: If an EDS key is stolen and an illegal transaction is signed using it, it is extremely difficult to prove in court that "it wasn't me." Many current laws contain a norm that "the key owner is fully responsible for the security of his key," which can make the victim (the person whose key was stolen) guilty.

The problem of storing and archiving evidence: A paper document lasts for 50 years. A document signed with EDS may lose its "legal proof" power after a certain period of time (when the certificate expires or the cryptographic algorithm becomes obsolete). This is a big problem for archival work and long-term litigation.

The regulatory framework lags behind technology: New threats such as signature forgery using quantum computers or AI have not yet been reflected in the legislation.

2. Social Issues: Digital Disruption and Trust Crisis

From a social perspective, EDS is not equally accessible or understandable to all segments of society.

Digital Divide: EDS technology requires high technological literacy. For the elderly, residents of remote areas, or people with technical disabilities, EDS can become a "barrier" to accessing public services, rather than a helper.

Psychological Mistrust: People have trusted "manual signatures and seals" for centuries. Trusting a "flash drive" or "code" in the virtual world has not yet been fully developed as a social skill. This causes resistance among the population to digital reforms.

Low cyber-hygiene culture: One of the social issues is that people entrust their EDS keys to others (for example, an accountant, a relative, or a company director). This paves the way for abuse of trust and mass fraud in social relationships.

Loss of Privacy: The use of EDS systems means that every action leaves a "digital trail". This raises social concerns about the state or large corporations monitoring every step of an individual (when, where, what they signed).

3. Interaction of Problems (Structural View)

Type of problem	Main cause	Consequence
Legal	Lack of a single global standar	Bureaucracy in international trade and risk of invalidation of contracts.
Legal	Violation of the "presumption of innocence"	When a key is stolen, the victim becomes the culprit.
Social	Low digital literacy	A certain part of society is disconnected from public services.
Social	Excessive centralization	ncreased control over personal data and restrictions on freedom.

4. New Approaches to Solutions

To overcome these problems, the world scientific community proposes the following directions:
Hybrid systems: Mandatory biometric authentication along with EDS (to clarify legal liability).
Cloud EDS (Cloud Sign): The user does not carry the key with him, it is stored on a specially protected state server. This reduces the risk of loss or theft of the key.
Blockchain technology: Elimination of dependence on central certification centers and the possibility of corruption or errors in them by placing EDS certificates on the blockchain.
Legal "Digital Guardianship": Creation of special legal institutions for persons with low literacy that would regulate the use of their digital signatures.
The transition to a fully digital society is impossible without solving legal and social problems in the field of EDS. Technological development must always be balanced with the principles of "Human Rights" and "Social Justice".

3. Comparative analysis: Positive and Negative aspects.

Criterion	Positive side	Negative/Risk side
Speed	Instant signing and sending	Process interruption in case of technical failure
Security	Protection with mathematical algorithms	Key theft as a result of cyberattack
Economy	Reduced transaction costs	Infrastructure maintenance costs
Reliability	Clear identification of authorship	Human factor (carelessly giving out passwords)

4. Recommendations for reducing risks

The following measures should be taken to minimize the negative consequences of EDS:
1. Transition to cloud EDS technology: Store keys not on physical devices, but on secure servers and access them through two-step authentication (SMS code, biometrics).
2. Cyber hygiene: Increase the culture among users not to give out their personal key to strangers.
3. Improve the legal framework: Clearly define responsibility for giving out the EDS key to others.

Conclusion

Electronic digital signature is the "digital passport" of modern society. Its positive effects (efficiency, speed, transparency) significantly outweigh its negative aspects. However, understanding technical

risks and applying mechanisms for protecting against them is the only way to ensure the stability of the digital system.

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