

# Research on Electronic Forensics Based on Blockchain Technology

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**Abstract:** The development of high technology, for public life to provide a justification at the same time, also encouraged the spirit of cybercrime, to become more and more rampant. In network crime, electronic data is usually used as the main evidence to determine the facts of the crime and plays an important role in the smooth trial of the case. But because electronic data on dependent, concealment, easy destructive strong science and technology, the forensics work is now in trouble. The mature use of blockchain technology can avoid existing problems to a certain extent, which is helpful to the smooth progress of electronic forensics. This paper on electronic evidence how to more effectively, combined with research blockchain technology, improve the efficiency of electronic evidence collection work.

**Keywords:** Blockchain; Electronic forensics; Significance; Existence problem; Countermeasures

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## 1. Introduction

In 2008, the concept of blockchain was formally proposed. Since then, it has developed rapidly and has been applied to various fields. In recent years, blockchain technology has gradually appeared in the perspective of people, the world is at the forefront of technology and industrial development, and countries also spent a lot of energy exploring this field. It can be said that the development of blockchain technology has had a huge impact on traditional industrial forms and power modes, and the degree of information technology has been significantly strengthened. Although domestic blockchain technology starts late, development prospects are more optimistic. This paper combines blockchain and electronic forensics, explores its application in this field, and hopes to provide a reference for the innovation of electronic forensics methods.

## **2. The significance of electronic forensics under the application of blockchain technology**

### **2.1. Change the current situation of extracting more electronic data and accepting less trust**

Compared with conventional forensics, the extraction of electronic data is more difficult. Electronic data extraction requires a certain professional skills and specific forensics process, only certain professional skills, and use the appropriate means of evidence collection, to realize comprehensive extraction of electronic data. One careless or improper operation can easily cause electronic data not to be adopted. Based on the decentralized characteristics of blockchain technology, a credit system is constructed based on technology, and the standardization part of forensics work is constantly promoted to the direction of program automatic implementation. This will greatly alleviate the burden of evidence collection, freeing it from tedious procedural and repetitive work, and making it more involved in evidence collection that must be determined by manual judgment<sup>[1]</sup>. Traditionally, because the identity authentication and notarization of electronic data are artificial, its neutrality is difficult to guarantee. Using blockchain does not tamper with the performance to ensure the safety of the data source is reliable, forensics process can confirm blockchain the integrity and authenticity of the data, with no other evidence for validation. It also meets the judicial interpretation of evidence of blockchain “technology from the” rules of<sup>[2]</sup>.

### **2.2. Improve the efficiency of criminal proceedings**

Electronic evidence has been regulated in various judicial interpretations and departmental regulations, but in the process of criminal proceedings, there are no specific legal provisions to clarify its adoption standards. Blockchain-based electronic forensics enhances its ability to prove from the root so that judges can obtain legal electronic data in a timely and effective manner, and realize the review and judgment of evidence, which can greatly reduce the trial cycle of cases and greatly improve the efficiency of trials<sup>[3]</sup>. The reward and smart contract of blockchain makes the whole process of the case from the beginning of the investigation to the review and prosecution become more standardized. Through the server IP to track crime, seizure and extract relevant equipment electronic data, and then precisely lock the suspect, thus improving working efficiency, ensuring the legitimacy and effectiveness of the electronic data submitted, reduce the cost of the trial<sup>[4]</sup>.

### **2.3. Truly Implement “Trace Law Enforcement”**

In criminal proceedings, investigation and collection of evidence is the most critical step in criminal proceedings, which is the basis for determining the facts and circumstances of a crime. If the investigation and collection of evidence are not detailed enough, it is likely to cause the evidence material to be illegal or illegal, so that the facts are not clear and the evidence is conclusive, so that the collected electronic data is not recognized, not to mention accurate qualitative and appropriate punishment<sup>[5]</sup>. At the time of investigation, using the block will be collected the forensics process chain technology and electronic data were collected on the chain, which can not only guarantee the authenticity of electronic evidence, and safeguard and supervision. In the criminal procedure, because all the execution data come from the blockchain, and the blockchain monitoring is continuous, it can prevent the defense lawyer from questioning the tampering of the video clips and reduce the trust cost between different subjects<sup>[6]</sup>.

### **3. The current situation of electronic forensics under the application of blockchain technology**

#### **3.1. The electronic forensics procedure based on blockchain technology in the investigation process is not clear**

The criminal litigation of blockchain is much less than that of civil litigation, which is mainly due to the large number of evidence in criminal litigation, the carrier and existence form it relies on are also diverse, and a considerable part of it is physical. Compared with civil litigation, the collection process of electronic evidence in investigation is more cumbersome, and it must be detected and analyzed. Therefore, in order to make electronic forensics based on blockchain technology can be better applied to investigation and evidence collection, it is necessary to standardize the forensics process based on blockchain technology. However, there is no clear standard in actual operation <sup>[7]</sup>.

#### **3.2. The data flow between the public inspection and the law is not smooth**

At present, due to the restriction of the internal network of the public security system, the electronic data transmission in most places is still in the form of burning on the optical disk. First, physical transmission is not convenient, which costs manpower, material resources and financial resources. Second, it cannot prevent the transmission of malicious modification and the destruction of the disk. If the electronic data is tampered with, its authenticity cannot be determined. In the process, criminal courts often have to business cooperation and information sharing, although there have been some places to use modern technology to build information-sharing platforms and systems, however, because the information is not clear and not in time, the working efficiency is very difficult to get promoted, and the information transmission and the exchange cost is increasing <sup>[8]</sup>.

#### **3.3. Blockchain technology is still in the development stage**

Although blockchain technology has obvious advantages and broad application prospects, it is still in the process of development and improvement, and many aspects need to be improved and optimized. There exist in blockchain technology in actual use performance, storage, and many problems, such as privacy to in-depth study is the important direction of current blockchain technology. Secondly, the slow standardization process of blockchain, weak blockchain regulation, and lack of professionals are also the main reasons hindering the development of blockchain <sup>[9]</sup>.

### **4. Countermeasures of electronic forensics under the application of blockchain technology**

#### **4.1. Clarify the electronic forensics procedure based on blockchain technology**

##### **(1) Preparation stage of forensics**

In the process of electronic evidence collection, it is necessary to analyze the specific circumstances of the case in detail, and do relevant evidence collection work, including the formulation of evidence collection programs, the formulation of relevant legal documents, and the allocation of resources. It is necessary to fully understand the electronic data related to the case, such as operating system information, network topology structure, server equipment, etc., to ensure that the forensics process is legal and effective.

##### **(2) Site protection and investigation phase**

The scene of the crime includes the real scene and the virtual scene. The emphasis in the case of an entity, to protect the scene of the entity and are critical to the investigation record, can appear in the process of some electronic material evidence, documentary evidence, and so on are all electronic data correlation evidence, which can help improve that of electronic data <sup>[10]</sup>. In the physical scene involving cybercrime, it is necessary to collect online and offline evidence. When forensics personnel arrive at the scene, be carried out immediately to all relevant to the case closed, do people, machines, and items separately. Pay attention to the security protection of the target computer, ensure the normal operation of the computer, and protect the U disk, mobile hard disk, printer, recorder, digital camera, and other related electronic equipment, please be sure to prevent the electronic data failure caused by changing the system Settings, damage to the hardware, loss of information or virus infection. For prospecting work recording, video and other measures should be taken, to do a good job of investigation records.

### (3) Electronic data acquisition stage

The acquisition of electronic data is divided into two parts: static data acquisition and dynamic data acquisition. Because electronic data are easily damaged, so in the case offline from the hardware device, is determined by the auditors, or please the professionals come to test the hardware, the other input and output devices disconnect, to ensure that at the time of forensics, would not damage the inside of the electronic data. If the electronic data involved is obvious and does not need to be queried, you can directly extract, if involved in the electronic data, still need to carry out more inquiries; You need to store a backup that has the potential to have the original electronic data media, carefully use safe read-only interfaces, and to record the whole process and by the third party present witness, to ensure the objectivity and authenticity of the electronic evidence <sup>[11]</sup>.

### (4) Electronic data fixation and preservation stage

This link is mainly to fix and store the collected electronic data with blockchain, which can best show the technical characteristics of blockchain. Upload the data to multiple nodes in distributed storage. Since the electronic data presented in electronic forensics and investigation activities cannot be accessed at the same time, the data must be processed by the relevant equipment and then signed into the blockchain <sup>[12]</sup>.

## 4.2. Further improve the review rules

### (1) Legality review

Electronic data obtained through blockchain technology is not necessarily legitimate. It is still necessary to closely review the legality of evidence collection subjects and evidence collection procedures in accordance with the relevant provisions of the Criminal Procedure Law, to avoid illegal evidence as the basis for a final case.

### (2) Authenticity review

On the technical level, the authenticity review of blockchain evidence has its style, which is the link that should be focused on in the “three characteristics” review. Based on blockchain, the existing electronic data mainly includes native data and transformable data generated off-chain based on blockchain. For the two types of electronic data, there are also differences in their identification standards <sup>[13]</sup>.

### (3) Relevance review

The key to the relevance review of blockchain evidence is whether it can be listed as the basis for the final case, that is, whether the relationship between it and the facts to be proved can have a certain degree of proof effect on the criminal case. The original data has the characteristics corresponding to the confirmed facts,

and it is also an important basis for determining the case. When processing the transformed data, it is usually necessary to check whether the case can be proved independently or in combination with other data. If its hash value matches the corresponding hash value on the blockchain, it can be determined that the information has not been tampered with. As long as the original data is related to the facts to be proved, the electronic data is equally relevant to the facts to be proved.

### **4.3. Accelerate the process of blockchain standardization**

With the continuous deepening of the standardization construction of blockchain in China, the standardization of blockchain will help to promote the wide application of blockchain in the field of forensic identification and provide strong support for China's judicial practice. In October 2021, the "Outline of the National Standardization Development" issued by the Central Committee of the Communist Party of China and The State Council clearly stated that the integrated development of standardization and science and technology should be promoted <sup>[14]</sup>. In this regard, the relevant departments can carry out the following work:

First, through in-depth research on the pilot work of blockchain standardization in various regions, they can be standardized and tested. Correctly handle the promotion of various important indicators, strengthen the demonstration effect of typical cases, and accelerate the research and development and improvement of the industry.

Second, to promote the interaction between the conversion technology and standards, improve the quality of the standard, build and perfect the mechanism of conversion between the two, the scientific and technological achievements into the standardization system of cash value, increase the intensity of incentive of technology progress, make the whole society to participate in standardization work give full play to the initiative of.

Third, participate in the standardization of global blockchain, carry out international communication and cooperation on this basis, learn excellent experiences and programs modestly, improve domestic standards in a timely manner, and promote our standards to the world, so that our country's status in the world continues to improve <sup>[15]</sup>.

## **5. Conclusion**

Above all, blockchain technology application of electronic evidence from the technical or legal more feasibility, to a large extent, reversing the electronic data extraction, pursuing more, or less criminal lawsuit efficiency and letting investigators "in evidence law enforcement" has a role in promoting. This paper combines blockchain technology in the application of the public security system, from the perspective of reconnaissance technology of blockchain under the application of electronic evidence explored, hopes to find problems in time, inter alia, to further improve the electronic data rate, so as to further perfect the public security information construction.

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