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How Blockchain entered our lives, why is it important and hard to crack?

Introduction

Today, computer-aided systems have become increasingly complex due to growing data security requirements and the development of sophisticated attack methods. The demand for a decentralized, peer-to-peer money transaction method has led to the emergence of Blockchain technology. Although blockchain technology is presented as a new concept, its origins date back to 2008. In 2008, a mysterious person named Satoshi Nakamoto, with a work titled "Bitcoin: A Peer-to-Peer Electronic Cash System," offered a logical answer to the questions above: Blockchain technology. This study will examine the answers to questions such as how Blockchain entered our lives, why it is essential, and how hard it is to crack.

The Origin and Evolution of Blockchain

Nakamoto's goal in proposing blockchain technology was to create a payment system that would enable trustless electronic transactions, and he achieved this goal with Bitcoin. The subsequent significant development came with the emergence of Ethereum in 2015, which introduced smart contracts. Ultimately, because each block contains a hash linked to the previous block, it expanded the horizons of Blockchain by providing a programmable infrastructure not only for financial transactions but for all kinds of digital agreements and assets.

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Core Technological Principles of Blockchain

Several essential concepts and terminologies are used to understand the structure of Blockchain. The first term is decentralization, which can be defined as the act or process of distributing some of the power of a central government, organization, etc., to smaller parts or organizations throughout the country (Decentralization). In this context, this term is used due to the phenomenon of decentralization in peer-to-peer money transactions, which is one of the significant purposes of Blockchain. The second term is cryptographic hashing, which is one of the most secure methods for encrypting data. There are various types of hashing methods, such as SHA-256 and SHA-1. The best feature of Hashing methods, which makes it more special compared to other types of cryptographic techniques like RSA, DES, and AES, is that it is a one-way encryption method. Although the encryption process is straightforward and does not require significant processing power, it is challenging to reverse and crack. The third term is Distributed Ledger, which involves multiple copies of the ledger being kept across thousands of computers in the network. For instance, if I want to delete data from a system, it won't be done solely based on one computer's demand. This occurs because every computer is connected, which provides transparency to Blockchain users. The fourth term is Smart Contracts, which came with Ethereum, where predetermined conditions are met (for example, when an item ships), the smart contract automatically sends payment to the seller. This is one of the most crucial reasons why people choose to use Blockchain technologies. The fifth and last term is Bitcoin mining event, which came with the emergence of Bitcoin, in which the state of miners use hardware and software to generate a cryptographic number that is equal to or less than a number set by the Bitcoin network's difficulty algorithm ("How Does Bitcoin Mining Work?"). This event requires sufficient processing power. Mostly, depending on the GPU (Graphic Processing Unit).

The Technology's Importance and Social Impact

The socioeconomic impact of blockchain technology's emergence is an inevitable reality. This importance manifests itself in four key areas: greater trust, enhanced security, better traceability, increased efficiency, and automated transactions (IBM). To begin with, its decentralized operation, independent of any single institution, makes this system secure. Furthermore, each block contains the hash of the previous block, improving traceability. Moreover, the breadth of protocols makes automated transfers easier. To begin with, its decentralized operation, independent of any single institution, makes this system secure.

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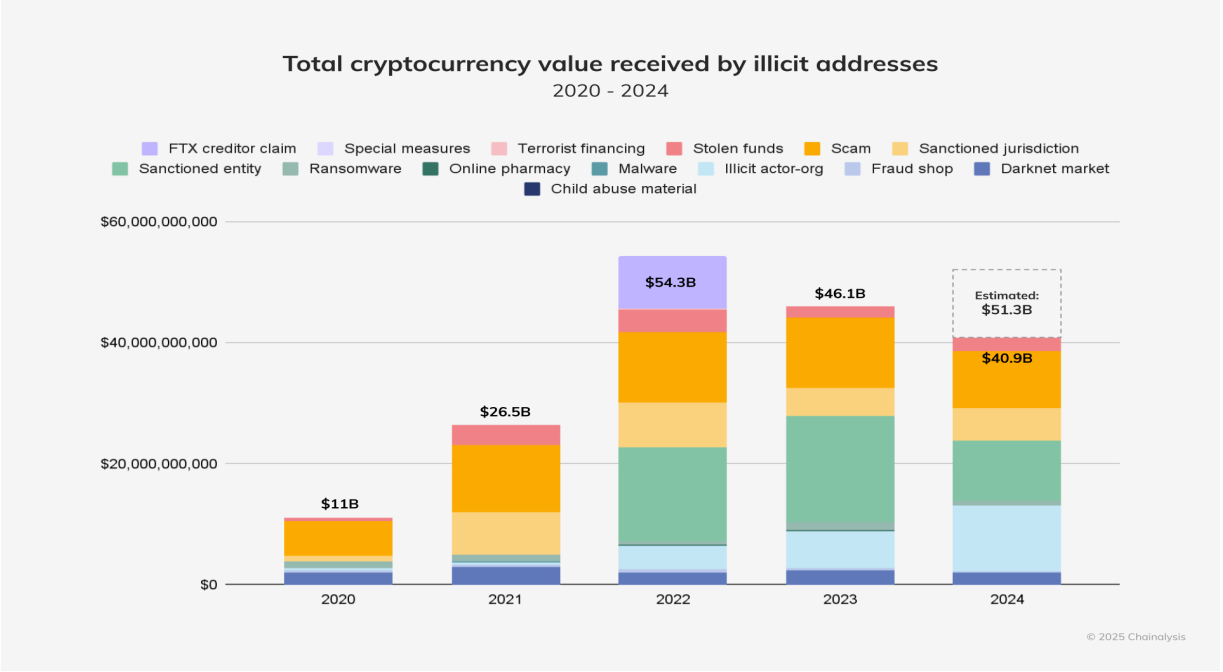

Fig. 1: Total cryptocurrency value received by illicit addresses from 2020 to 2024 (Chainalysis Team)

Ethical Dilemmas and Legal Challenges

While blockchain technology is notable for its anonymity, this also raises significant ethical concerns. Some advocate for government monitoring of this data, while others advocate for it to remain anonymous. Examining the data in Figure 1, it's clear that blockchain technology is being utilized for unethical purposes. Furthermore, the government's inability to implement taxation policies in this context is also noteworthy. In addition to these, Blockchain technology, which has led to the popularization of situations such as bitcoin mining, can negatively impact the country's economy and lead to ethical concerns regarding ecological imbalance. I believe what should be most noticeable is its potential to lead to a digital divide. In the future, people without access to these technologies may not be able to make even a simple money transfer.

An example of this is mobile banking. In our modern society, people who simply have difficulty accessing technological devices still can't make even a simple money transfer. I believe this is equally true for blockchain technologies.

Why is Blockchain Hard to Crack?

The primary reason why Blockchain technology is considered reliable is its hashing cryptography technique. While this encryption method is easy to encrypt, decrypting and reversing it is more difficult than encrypting. The mathematical complexity of the hashing technique makes it a unique approach. Furthermore, the fact that every block is interconnected (hence the concept of the chain) means that whenever something changes in

one block, the block linked to it also changes. This is called a Distributed Consensus mechanism. This is why Blockchain technology is so difficult to crack.

Conclusion

Blockchain technology is not only a peer-to-peer transaction method, but also a decentralized ledger system. It's a system that has led to the redefinition of all financial transfer methods. This system will become even more popular in the future, as cryptographic hash techniques, distributed consensus, and other features make this system highly resistant to manipulation.

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