Secure Communication Scheme of Mobile Communication Terminal Based on Blockchain Technology

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Abstract: In recent years, mobile communication technology has developed by leaps and bounds. With the passage of time, its privacy issues for people have gradually been exposed, and the security of mobile communication technology has become a topic of public concern. This article mainly studies whether Blockchain technology has reliable security for mobile communication. For the issues that everyone is concerned about, this article uses the method of combining blockchain technology and mobile communication technology to first encrypt mobile communication information, and then encrypts the information stored in the mobile system, so that the two technologies are completely consistent.In the 4 groups of experiments, when the blockchain is the same, its initial output effect always starts from 0. With the increase of time, the output efficiency also increases gradually. The fourth group is more obvious, and then the other groups gradually slow down . Unlike the other blockchains mentioned above, it is found through experiments that the blockchain technology described in this article can solve the trust problem well, and has the advantages of timely, accurate and systematic data for the blockchain. Mobile communication technology has been able to Better to present more secure technology. This can not only make the communication information safe, but also better protect privacy, and make the blockchain better serve the public.

1. Introduction

Many scholars are now studying blockchain, which also allows some companies to use blockchain to further process their products. The company's self-built blockchain system greatly guarantees the security of the products developed by the original company. However, the system

used by some companies in the source code does not meet the needs of the company's continued development, which is very unfavorable for the new generation of companies. The company's privacy cannot be guaranteed, and its security is bound to be weaker than other systems, mainly because they cannot be supported by the corresponding blockchain technology. For now, directly adopting other corresponding public resource systems such as Bitcoin is bound to face many problems such as insufficient efficiency, too little storage space for data volume or too much energy consumption during work.

In TSPBB, different types of participating nodes usually need to add different traceable information to meet the authenticity of the data, so it is appropriate to use distributed storage to construct traceable information, and at the same time need to meet the tracking data Accuracy. At this time, you need to use blockchain technology to achieve the combination of data and security. Therefore, the use of blockchain to store traceability records can prevent changes in traceability records and prevent traced information from changing again. In the corresponding structured information system, the information stored by the node is specific and cannot be modified. When users need to receive specific information in a timely and effective manner, they first need to understand and understand where the information nodes are stored. This way of receiving and transmitting information that users know in advance can significantly improve work efficiency. Secondly, the principle of on-time efficiency of blockchain can also be well reflected [1].

Pieter H believes that information security is related to the protection of digital assets, such as digital content, personal health records, and state secrets. These assets can be handled by a party that has the right to access and control the asset or an unauthorized party[2]. Kearney WD mainly studied the appropriateness and potential impact of discussing the steady state of risk in the context of information security, and carried out the theory. Design / methodology / methodology – The discussion is mainly based on literature surveys, supplemented by illustrative empirical examples. Findings – The steady state of risk in information security is a topic that has not been explored. The principles, assumptions and methods of the risk dynamic balance framework provide new insights and knowledge for the interpretation and prediction of conflicting human behaviors in information security[3]. Yermack D believed that blockchain represents a novel application of the old problems of encryption technology and information technology in the retention of financial records, which may lead to profound changes in corporate governance. Many major players in the financial industry have begun investing in this new technology, and the stock exchange has proposed the use of blockchain as a new method of trading company stocks and tracking their ownership[4]. Yermack D believes that blockchain represents a novel application of the old problems of encryption technology and information technology in the retention of financial records, which may lead to profound changes in corporate governance[5]. Mengelkamp E studied the growing amount of renewable energy in energy systems, which requires new market methods to price and allocate volatile and decentralized power generation[6].

The article uses blockchain to build a fair SSE scheme, the specific scheme is as follows:

(1) This article builds an information platform to guide the implementation of the blockchain. Blockchain research can easily and quickly prevent information leakage. It may be like building a chip during the user's use. The advantage of this chip is that part of it connects to the center of the communication platform, and the other part can receive external information at the same time. The guidance has paved the way for the spread of blockchain information.

(2) During the implementation of the blockchain, wireless technology was artificially installed, that is, wireless terminals. The advantage of this wireless technology is that it can effectively and conveniently receive and identify foreign information. The same wireless technology needs the support of foreign services. It is conceivable that the support of this foreign technology will of course consume a large part of resources and consume Many, the final results are not necessarily

good.

(3) The final result of the blockchain can allow users to experience convenient and effective office services. In fact, the purpose of this shielding system is to block external signals. For most users, the signals that this mobile terminal can block are far more obvious than other ordinary shielding systems. Relatively speaking, other shielding systems are more likely to miss some signals.

2. Blockchain

2.1. Work Flow of Blockchain

At present, as a relatively front-end technology, blockchain is far more practical and complex in data structure than other technologies of the same generation,cloud computing and artificial intelligence.If the investment market or government support alone, and there is no industrial application demand as support, enterprises are very Difficult to survive, of course, there will not be a big explosion of talent demand[7]. So I think that after 3-5 years, there may be an outbreak, or it may continue to go flat, and there will not be a fanatical outbreak like before, because the times are different, especially in the current global economic situation that has not been encountered for a hundred years[8]. Affected by the epidemic situation, there is also a Sino-US trade war, the world economy has undergone a large-scale adjustment, and the blockchain industry may continue to be cold for a while.A certain item after the transaction information is verified, it is automatically added to the existing blockchain to permanently save the transaction information. Unless it can simultaneously control more than 50% of the nodes in the network, it cannot be achieved by modifying the transaction information stored in a single node Modify the complete transaction information to improve the reliability and stability of the transaction information[9].

The working process of blockchain is as follows.

(1) The user who generates the transaction randomly generates a private key. This system generates a public key through an encryption algorithm. This is equivalent to keeping your more private information. Other than irrelevant information can be placed in another block, but we need to compare this more private information for identity verification. Even if it passes. Of course it will take time, but it can be ignored[10].

(2) When processing information between adjacent information, the integrity of the information needs to be considered, and the information needs to have acceptable characteristics, which is also equivalent to a special identification of information technology, and ultimately in order to achieve information exchange and rapid information deal with. This is more conducive to the spread of information.

(3) The transaction content can also be regarded as a blockchain within a specific block.

(4) A specific block in the blockchain can be further divided into a small amount of time, this amount of time is marked, moved to the public blockchain and identified by other attached blockchains [11] . If this specific authentication is established, it indicates that the algorithm is feasible. If this specific authentication cannot be generated, it indicates that the algorithm is vulnerable.

(5) All nodes continue to mine the next block.The data layer is used to store the encrypted communication information summary of the mobile intelligent terminal device and the storage location of the communication specific information in the edge computing device and the cloud. Save the information verified by the node in the block [12]. A chain structure is formed between blocks in chronological order. The communication process of mobile intelligent terminal based on blockchain is shown in Figure 1.
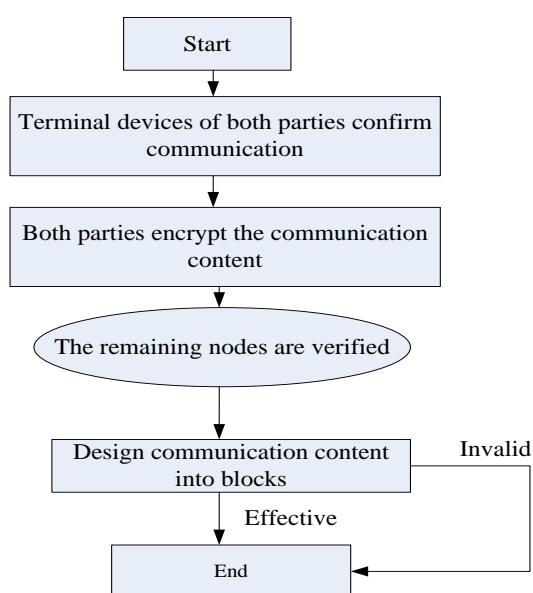
Figure 1. Blockchain-based mobile smart terminal communication process

2.2. Formulas that Maybe Used in Blockchain Applications

Several formulas have emerged in the long-term evolution of the blockchain. The first is the formula developed on the data chain. For data, its practicality is sought after by small and medium-sized enterprises. It has the advantages of timely data collection and convenient data mining. Its emergence solves the shortcoming that the blockchain cannot be replaced in the database. Generally speaking, if the source of the blockchain comes from the outside, that is, from the external technical support provided by the adjacent service industry, if you want to call it into the blockchain suitable for the development of the company, it usually only takes a few days time. But at present, only using data on-chain to map out the entire blockchain will attract scholars and all parties' guesses. The most obvious one is that this is just the surface and cannot be expressed as a blockchain as a whole, lacking the unique connotation of the blockchain [13].

Therefore, data on-chain is only the primary application of blockchain. The mid-level application is business on-chain, which uses smart contracts to replace traditional centralized business systems. Instead of using smart contracts to replace business systems, the data generated is naturally born on the chain without the need to go on the chain. This is called the on-chain of core business and key data. But smart contracts are currently controversial, and the most controversial is their security. Code is law is ideal, code is bug is reality. Smart contracts at this stage cannot support the weight of digital assets. Therefore, many public chains have begun to turn to wallets that support matching transactions. After all, eliminating decentralized exchanges will bring greater benefits than developing more secure smart contracts [14].

The advanced application of blockchain does not actually have the concept of on-chain and off-chain, just like online and offline. In the era of PC Internet, there is a distinction between wired and offline, and in the era of mobile Internet, online and offline are integrated [15]. E-commerce in the PC era is called new retail in the mobile era, and it is a product of the combination of software and physical. Advanced blockchain applications are not divided between on-chain and off-chain. The advanced blockchain application itself is combined with hardware, and all devices are nodes of the blockchain, so there is no concept of on-chain and off-chain at all.

But the problems faced by advanced applications are also more prominent, namely how to ensure that the device is trusted. The hacker's equipment can also become a node of the blockchain. Who

will guarantee the security of the blockchain? Therefore, the application of blockchain has a long way to go. But this does not affect our determination to make blockchain applications [16].

Now, I have summarized 2 minimalist formulas for blockchain applications:

1) Token economy

$$Dapp = \text{Wallet} + \text{Smart Contract} + \text{Oracle} \tag{1}$$

2) Payment scenarios

$$Dapp = Wallett + \text{Browser} \tag{2}$$

The above formula shows that no matter what the payment method is, the fluctuation caused by the payment wallet is indispensable. It can also be said that the wallet is regarded as an intermediate link in the blockchain industry, and the continuous development of the blockchain has a constant impact on the wallet. For wallets, the digital assets currently stored are in the blockchain, which can be regarded as a sign of identity in a certain sense. The orientation of the blockchain confirms the link between the blockchain and the wallet [17]. As we all know, after becoming a virtual terminal, the convenience of the wallet is much higher than the convenience brought to us by ordinary objects. Users can not only get the corresponding convenient experience but also the corresponding benefits during the use process, and their many online activities can be very Nice presentation.

We can see from this that developers are actually constantly innovating on the blockchain when developing payment methods, but this innovation relies more on the continuous combination of entities and corpses, allowing users to get more benefits At the same time, a more cutting-edge data structure such as blockchain is derived, which is easy to make, easy to understand, and convenient. A large amount of data shows that the concepts of DAPP and wallet have a continuous development trend toward blockchain, which is a trend of blockchain gradually becoming popular.

2.3. The Necessity of Blockchain Technology

In the past few years, Bitcoin has followed a very rapid trend from the beginning of zero attention to the price of a swift advancement, which has increased hundreds of thousands of times. This is thanks to the support of blockchain technology, which has been unanimously praised by domestic and foreign experts for its many advantages such as distributed, non-tamperable, traceable, transparent. The technical characteristics of blockchain have made it an infrastructure in the digital age [18].

Faced with such opportunities for change, many more projects are ready to be implemented based on blockchain technology in order to obtain more economic benefits. However, the reality is always cruel, many projects have lost money, and the project has been aborted. Although the blockchain restructures the way of social credit, it will change the existing business model. But blockchain is not a panacea, not all projects need blockchain, nor all data need to be on the chain.What kind of projects need blockchain. What kind of scenarios need to use blockchain technology to bring more changes? Here are two formulas for you to judge whether the project needs to use blockchain technology. Avoid blockchain for the sake of blockchain, which will cause trouble for the project [19]. The following is a common processing flow.

Under normal circumstances, the ledger is usually locked in a drawer, and your own ledger will not be shown to others casually. The blockchain ledger is special. Not only is it not locked, but it is also published as much as possible, so that all participants can participate in bookkeeping. Every transaction for everyone must be sent to others. Everyone has a small account book, and after receiving the transaction information of other people, it will be recorded in their own small account book. In this way, everyone's small account book is exactly the same, and all transactions of

everyone are recorded, which is the blockchain. The important thing is repeated again, the blockchain is to share the ledger, one for each person, everyone keeps the account, all the transaction records of everyone are recorded in this account. The decentralized nature of the blockchain conflicts with the central bank's centralized management requirements. The payment service provided by the central bank cannot leave the centralized account arrangement and needs to be built on a centralized system, which conflicts with the decentralized nature of the blockchain. Therefore, it is currently not recommended to transform traditional payment systems based on blockchain. Blockchain technology is expected to further unlock the potential of the building decoration industry. The decentralization, distribution, fairness and transparency of blockchain technology, anti-counterfeiting and anti-tampering, transaction traceability, security, automatic contract execution, low cost and high efficiency will help many companies. From the perspective of technology implementation, the decision flow chart of the blockchain technology that needs to be adopted is shown in Figure 2.
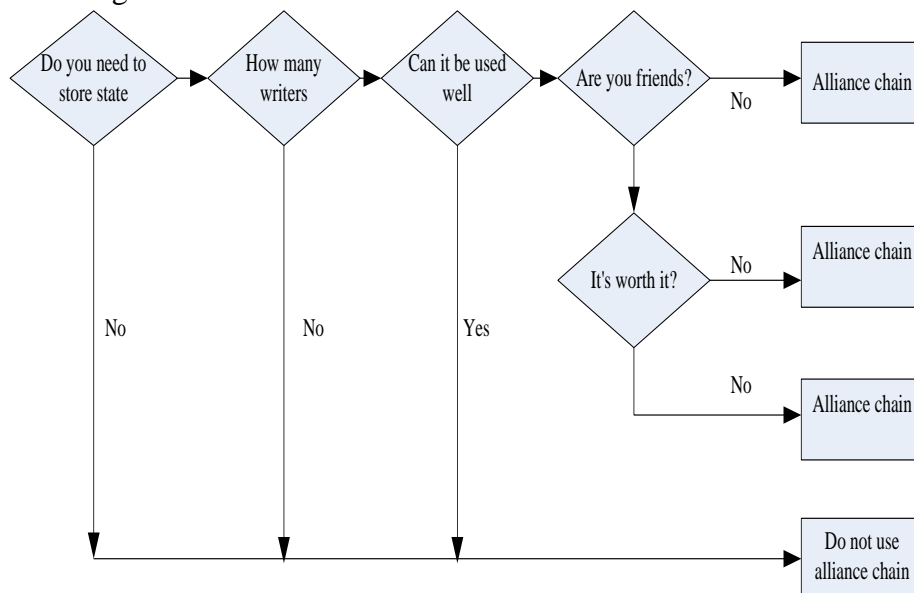

Figure 2. Decision flow chart of blockchain technology

Internet technology has now entered the golden age. No matter medicine, production, manufacturing or other people's livelihood industries are inseparable from the development of the Internet, it can be said that we are in the golden age of the Internet and are also accepting the many conveniences brought by the Internet Nowadays, mastering the core of the Internet is equivalent to mastering the development prospects of the Internet. It is only a matter of time before entering other industries. Relatively speaking, blockchain has played a huge role in this process. Its data-based theory, including convenient and real-time data, provides a strong guarantee for production and life [20]. The decision process that requires blockchain technology is shown in Figure 3.
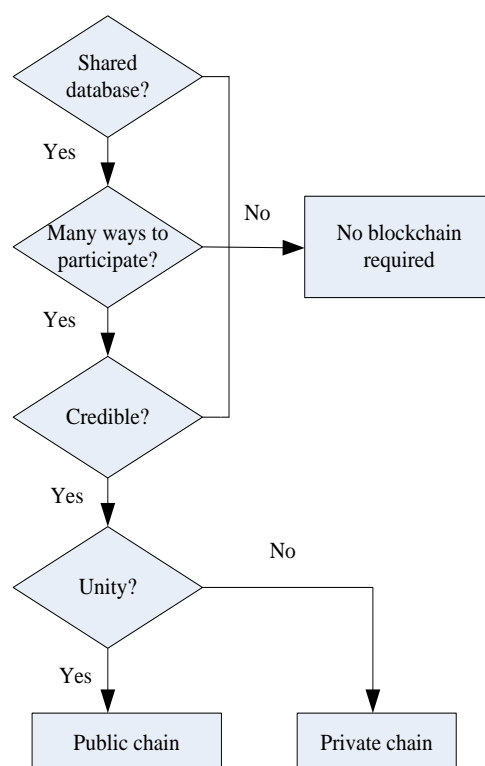
Figure 3. Blockchain technology decision process

The adoption of blockchain technology is ultimately to achieve commercial value. If it does not bring commercial value, the result is predictable and not far away. The two pictures above give a preliminary judgment method, whether to use blockchain technology, when it is judged that blockchain technology is not needed, then naturally there is no need to consider more. When judging that blockchain technology can be used, one must also understand how much economic value it can bring. The adoption of blockchain technology can bring substantial business value to the project, which is fundamental. From this point of view, blockchain also has a high commercial value [21].

Not only can there be digital cash on the blockchain, but also smart contracts. With smart contracts, all kinds of assets can be digitalized using blockchain to achieve decentralized transactions and circulation. This is what Ethereum does. Ethereum has become a coin-making platform, and various assets can have corresponding coins. Most Western Europe is actually asset securitization through Ethereum. The blockchain promotes a new trust mechanism through measures such as openness and transparency of data, non-tampering, and collective maintenance.It not only helps data flow and configure more reasonably, but its corresponding technical architecture and unique solutions also provide digital transformation and upgrades. All walks of life have brought innovation and inspiration. Like the Industrial Internet, "co-creation with partners" is also the best path for the development of industrial blockchain. At the industrial ecological level, the first domestic blockchain accelerator will be launched. By integrating global blockchain industrial resources, linking technology, Outstanding blockchain enterprises in services and application scenarios rely on ecology to jointly promote independent innovation of blockchain technology, help technology applications land in industry scenarios, and jointly build an industrial prosperity ecosystem.

3. Blockchain Algorithm Pattern Simulation

3.1. The Mode of Blockchain Algorithm

As we all know, the existing consensus algorithm is not perfect. Taking bitcoin as an example, the pow consensus algorithm is used in bitcoin. The pow algorithm faces serious efficiency problems, and bitcoin is limited by the consensus algorithm and block capacity. It can only process about 3,000 transactions per minute (for example, 7) Transactions per secon.This is actually inseparable from the volume of the transaction. The relatively slow speed makes the congestion of the Bitcoin network a common phenomenon. The bottleneck of Bitcoin's efficiency lies in the verification based on the longest chain serial signature. Because in the one-dimensional chain structure, the blocks are generated in strict chronological order, so the next block can only be generated after the previous block is broadcast, and all nodes need to be authenticated together, which is a long process. In order to solve this problem, DAG can be introduced to reduce the sequence requirements of the block generation process, which is conducive to the parallelism of the block generation process, that is, more than two blocks can be generated at the same time. Distributed ledger technology, all network participants can access the distributed ledger and its immutable transactions. With this shared ledger, transactions are recorded only once, eliminating the repetitive work common in traditional business networks. Once the recorded transaction cannot be changed in the shared ledger, no participant can modify or tamper with the transaction. If the transaction record contains errors, you must add a new transaction to undo the error, and then both transactions are visible. In order to speed up the transaction speed of smart contracts, a set of rules called smart contracts are stored on the blockchain and automatically executed. Smart contracts can define the conditions for the transfer of corporate bonds, including the terms of travel insurance paid.This paper uses matlab software to simulate the relevant data to confirm the stability of the blockchain algorithm.

3.2. How to Increase the Operation Rate

In order to solve the problem of operation speed, we can introduce a graph structure DAG to reduce the sequence requirements of the block generation process, which is beneficial to the parallelism of the block generation process, that is, there may be two or more blocks generated together. Improving parallelism will greatly increase the calculation speed and break the bottleneck of the efficiency of the consensus algorithm, but it will also bring some adverse effects, such as redundant or wrong blocks, which need to be sorted and verified in general. Therefore, the key to the DAG-based consensus algorithm lies in the relationship between the node and the final selection of the correct block. In practice:

1) The inefficiency of blockchain data verification limits the application of blockchain in a distributed environment. Important reasons for implementation and promotion. Aiming at different application backgrounds of blockchain data communication, this paper designs different blockchain data communication algorithms while losing efficiency and considering communication reliability and service fairness. The blockchain data transmission provides a routing decision plan.

2) There are a large number of mobile intelligent terminals in the blockchain network. Due to its mobility and the particularity of the wireless network, the impact of node failure on the communication performance of the blockchain cannot be ignored. Aiming at the special situation of node failure, a blockchain communication algorithm considering node failure is proposed. The algorithm helps to reconstruct the topology of the transmission network in the event of node failure, and minimizes the communication performance impact when the node fails.

3) The communication model and communication strategy constructed in this paper are

geographically dispersed, with distributed storage requirements to provide enterprises with efficient and reliable data transmission solutions.

3.3.Collation of Relevant Data

Can be regarded as the most basic DAG consensus algorithm. The only difference between it and the longest chain consensus algorithm is the introduction of DAG graph structure. The blocks are connected by the most basic parent-child nodes, and follow the longest chain algorithm. According to the time relationship of the blocks, when the chain length is the same, the earlier block is selected. The change curve of blockchain efficiency value with the change curve is shown in Table 2.

Table 1. Blockchain efficiency value change curve

Serial number Time	0	2	4	6	8	10
1	0	20	40	60	88	120
2	0	30	55	78	99	150
3	0	44	59	96	110	166
4	0	51	63	112	126	178

4. Analysis of Results

4.1. Processing and Analysis of Sample Data

As shown in Table 2, the differences of several algorithms are listed: proof-of-work consensus mechanism, proof-of-stake consensus mechanism, authorized proof-of-stake consensus mechanism, and practical fault tolerance mechanism.

Table 2. Comparison of four consensus algorithms

Consensus mechanism	Advantage	Disadvantages
Pow	Completely decentralized, free access to nodes	High resource consumption
Pos	Consensus time is shorter	Need to dig continuously
DPos	Low energy consumption	High degree of centralization
PBFT	Good fault tolerance	Low communication efficiency

The explanation of output efficiency is shown in Figure 4. As can be seen from the figure, with the increase of time, the four output efficiencies are also increasing, but the efficiency of Experiment 1 and Experiment 2 is a positive function of growth, and The increase rate of Experiment 3 and Experiment 4 is obviously faster than the previous two groups. It can be seen that the starting point is the same. If it is under different catalytic effects, the final output rate results are also different. The path taken is different, and the final result will change accordingly. The speed of efficiency increase in Experiment 4 is the most obvious, and is also the most comparable with other data. This increase is more reflected in the increase in thinking. Only this block can join the DAG.
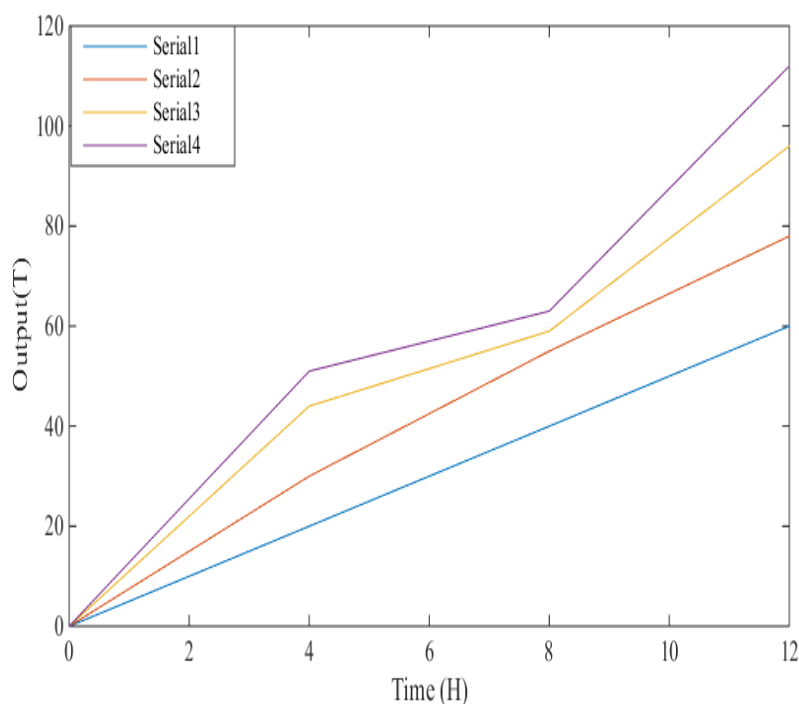
Figure 4. Conversion curve with time

The lower the coverage area represented by the node, the closer the correlation. This is equivalent to the principle of similarity. Comparing similar blockchains will always produce the same points. In short, the blockchain algorithm is not only reflected in the blockchain, but also in the continuous enrichment and continuous strengthening of the algorithm. This is a good embodiment and the weakest link. Its dependence has also become more and more obvious. Compared with most network systems, the powerful vitality that the blockchain can express is not only the current, but also the continuous calculation and enrichment of future data.

4.2. Research on Blockchain Link

The project blocks are connected by the basic connection method (father and child blocks), and the correct transaction is selected according to the random query and the color confidence value based on the two coloring of the DAG graph. Each node is initially colorless, each node randomly queries other nodes around it, and counts the colors (red or blue) of the surrounding nodes. After querying K times, it chooses the color with the largest color statistics as its own color. And add 1 to the confidence value of the changed color. After the introduction of the DAG graph, each node in it will update the confidence value of the ancestor transaction (plus 1) while changing the color, and update the priority transaction submitted by the ancestor. If all ancestor transactions (parent nodes, or nodes above the parent node) in the transaction are priority, the transaction is strong priority, the system randomly selects a node to query a transaction, and if it returns a strong priority transaction, the number of votes Plus 1. When the number of votes for the transaction reaches a certain threshold, or the transaction passes a certain number of successful queries, the transaction is determined to be correct. The judgment effect is shown in Figure 5.
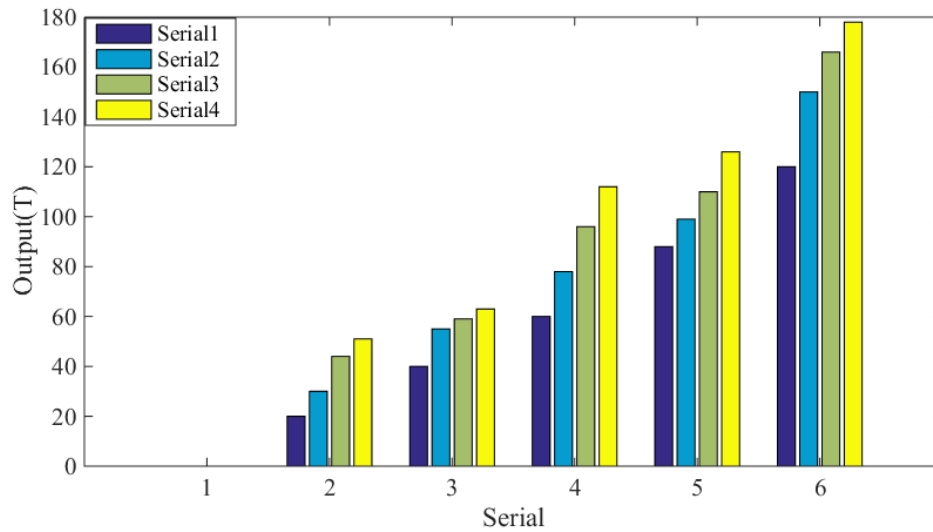
Figure 5. Data judgment effect

The characteristics of distributed consensus and distributed storage on the blockchain make it impossible for both parties to communicate to hide communication messages by modifying the carrier content like most steganography algorithms in the past. The payment address is calculated by a hash algorithm using a public key that can be selected by the user. Such "freedom" makes it possible for the sender to hide hidden messages in the transaction address. In addition, although the consensus mechanism restricts communication parties from modifying block hidden messages, it also restricts attackers' attempts to modify communication content, that is, transactions submitted by communication parties, which improves the security and reliability of communication. The security effect is shown in Figure 6.
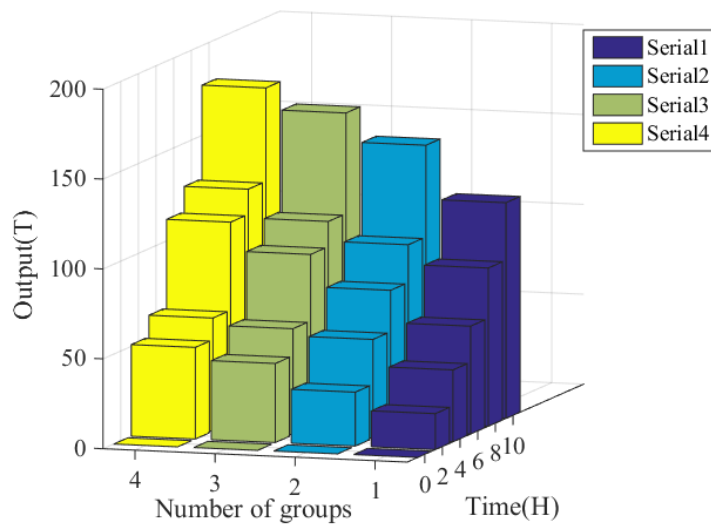

Figure 6. Security effect picture

4.3. Sample Processing of Blockchain

Whether time synchronization is required during the sender's single transmission. For a complete one-way sending process, ensure that the transactions received by the receiver are arranged in the

order of hidden text content. The assignment of the time identifier t depends on the clock of the transaction submitter (sender), so in this orderly submission process, the transactions can be arranged in order according to the sender's clock, so as to ensure that the receiver does not understand the hidden message Bothered. The application of blockchain greatly reduces this risk, and makes privacy well protected. This covert cover effect is shown in Figure 7.
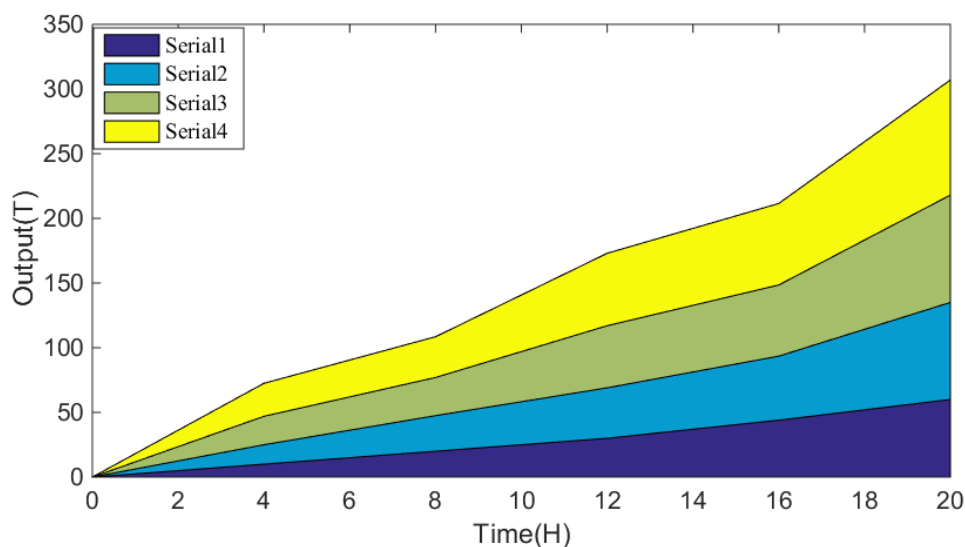

Figure 7. Covert cover effect

The emergence of blockchain technology makes it possible, it can be used to create a completely transparent, trusted and secure trading platform. It can be seen that traditional transactions achieve trust through intermediaries, and the establishment of blockchain transaction trust is achieved through a large number of calculations and multi-node confirmation to reach a consensus of trust. Multiple nodes store transaction records together to achieve account transparency. The blockchain replaces the third intermediary agency by consuming storage resources, computing resources, and network communication resources. Today, with the rapid development of electronic products, by updating the hardware configuration of the nodes in the blockchain, the storage and computing capabilities of the nodes can be improved. To verify the correctness between nodes by transmitting block data involves a specific communication algorithm. Therefore, the efficiency of block data communication is a key issue in the field of block chain research.

5. Conclusion

In this paper, the security of the blockchain security system requires that the communication behavior should not be noticed by the attacker, so as to ensure the communication security of both parties. The improved system encrypts embedded messages using a symmetric encryption algorithm with indistinguishability of hidden words under an adaptive selective hidden word attack. The purpose is to prevent attackers from distinguishing transactions with embedded messages from ordinary transactions. This section first makes assumptions about the parties involved in the security analysis. Later, the definition of "indistinguishability of transactions" was introduced to prove the improvement of the security of the system. Has a good implementation.

Does the two way communication process require clock synchronization. One of the improvements in this paper is to enrich the one-way communication process by embedding new messages to allow continuous communication. If you do not consider the specific implementation of the improved system in this article, both parties of the communication need a common system time

for judging the transaction submission time of themselves and the other party to determine the order of sending messages. However, the improved system adds two parameters at the beginning of the data segment, and the message start identifier used for this transaction is defined as the message start identifier of the other party's reply message, so the communication sequence has been determined.

To complete the transaction verification of the blockchain, it is necessary to quickly and efficiently send block data from one source node to multiple destination nodes. A multi-connection concurrent communication tree is used to transmit data from the source node to a large number of destination nodes. In the blockchain network, according to the physical topology of the network, it is abstracted as a tree to complete the blockchain transaction verification task, which can achieve node load balancing and effectively improve data forwarding efficiency. Therefore, the research focus is on the communication tree construction algorithm.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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