Discussion on the Development of Mobile Payment Technology in the Era of Digital Economy- Taking Tencent as an Example

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Abstract. Mobile payment means that mobile clients use mobile phones and other electronic products to make electronic currency payments. Mobile payment effectively combines the Internet, terminal devices, and financial institutions to form a new payment system. Mobile payment can not only make monetary payments, but also pay for living expenses such as phone bills, gas, water and electricity. Mobile payment has created a new way of payment, making electronic money popular. At present, the two-dimensional code has many drawbacks, and the addition of the blockchain can reduce the shortcomings of the two-dimensional code, so that the society's trust in new things increases. Especially in the initial stage of the integration of blockchain and real industry, the most extensive demand is to increase credit, and its application scenario is to deposit certificates, which is also an important cornerstone for the development of industrial blockchain.

Keywords: Tencent; Mobile payment; Digital economy.

1. Introduction

With the rapid development of society, the trend of mobile payment technology, an emerging payment technology in the era of digital economy, has become a common practice. In 2004, e-commerce giant Alibaba launched an online payment software called Alipay. Once Alipay was launched, it changed the way people spent and brought great wealth to Alibaba. Tencent Group, one of Alibaba Group's main competitors, followed suit, launching the WeChat Pay platform in 2014. After that, Tencent relied on its huge advantages in WeChat payment to gradually attack the direction of more advantageous blockchain mobile payment, and with the continuous attack of Tencent Group in the blockchain field, blockchain technology has been developed rapidly. In recent years, Tencent has accumulated a lot of experience in blockchain technology and has begun to gradually apply it to various aspects. Then, under the east wind of the Internet era, the banner of mobile payment has been blown around, and what challenges will mobile payment technology face in the future. As an Internet giant, Tencent will not rely on WeChat payment technology and blockchain mobile payment technology to win back a game in the case of a step behind Ali.

This article will introduce the application of Tencent Group's mobile payment technology, namely WeChat Pay technology and blockchain mobile payment technology, including the underlying logic of SQL interface and credit consensus mechanism, in the context of the digital economy era. Finally, by analyzing the replacement of traditional two-dimensional code mobile payment and blockchain mobile payment, the final answer to the future development of mobile payment technology is given.

2. Tencent Group mobile payment features and applications

Tencent officially released the KIK-like application software WeChat on January 21, 2011, and as of October 26, 2014, the number of WeChat users has exceeded 600 million. As a mobile payment innovation product jointly developed by Tencent's WeChat communication software and the third-party payment platform Tenpay, WeChat Pay aims to respond to the rapid development of the e-commerce industry in recent years and simplify the user's consumption methods, including three main

mobile payment methods: public account payment, scanning two-dimensional code payment and APP payment, "public account payment" that is, users can purchase their favorite goods and complete online payment in the public account after paying attention to the business public account. "Scan two-dimensional code payment" is divided into offline scan code payment and online scan code payment, offline scan code payment means that after the user purchases goods offline, he only needs to scan the two-dimensional code provided by the merchant, and can complete the payment after confirmation of the mobile terminal, and the online scan code payment is to scan the two-dimensional code of the PC terminal, jump to the transaction page of WeChat Pay and then complete the payment according to the process. The final "APP payment" is a third-party application payment, the e-commerce platform only needs to access WeChat Pay, and users can call WeChat Pay to complete the transaction during settlement.

From the longitudinal analysis, WeChat Pay meets the transaction needs of e-commerce enterprises and consumers on mobile payment platforms. Dianping, which was a pioneer, increased its mobile e-commerce revenue by 20% after accessing WeChat Pay; The 150,000 Xiaomi phones snapped up in less than a decade, after which 1.938 million people made a successful reservation and more than 20 million people logged on to the WeChat Pay page.

Companies like Yi Xun have truly opened the door to mobile e-commerce through WeChat Pay. As of the end of October, through various channels and methods such as PC and mobile phone client ports and WeChat scanning, Yixun consumers have accumulated 350,000 orders through WeChat Payment, and the order amount has exceeded 100 million yuan. In less than three months, weChat Pay orders alone have caught up with more than 5% of Yixun's total. During the "Double 11" period, WeChat and Yixun also held "WeChat stores" in cities such as Beijing, Shanghai, Guangzhou, and Shenzhen. Users can easily purchase various products directly in WeChat. On the day of the 11th, the turnover reached 80,000 orders, accounting for 13% of the total order volume of Yixun.

From a horizontal point of view, Alipay, which is also a mobile payment platform, plays the role of transaction intermediary, which is reflected in the fact that after the customer purchases the goods, he needs to first send the payment to the Alipay account, and then Alipay notifies the seller of the shipment, and when the buyer confirms the receipt, Alipay will then call the seller. WeChat Pay is more like the user's smart wallet, the user after confirming the order will directly call the payment to the merchant through WeChat Pay, and the merchant can directly choose to ship to the customer.

In summary, WeChat Pay conforms to the era of digital economy, people's demand for e-commerce companies such as Dianping and Yixun does not increase the background of the times, different from the previous online shopping of platforms such as Dianping and Yixun can only be carried out on the computer, and the operation process is more complicated, for the elderly and children there are certain thresholds and other issues, weChat Pay provides mobile payment platform, anytime and anywhere can complete all the processes from purchasing goods to placing orders and payments, eliminating the limitations of online payment in time and space. The simple process of WeChat Pay reduces the learning cost of users and expands the customer market mass point. Thus, increasing the daily transaction volume and transaction share of e-commerce companies such as Dianping and Yixun. Relative to Alipay, WeChat Pay is still catching up because of problems such as single functions and poor security. However, weChat's operation method is more convenient, and it is more convenient in small transactions, so the audience is larger and has good market potential.

3. Status of payment technology solutions

3.1 Problems with the underlying technology of wechat Pay

In the traditional mobile payment, the most widely used way is QR code scanning payment. This method of payment has many significant advantages, but the security risks under the QR codes cannot be ignored. These hidden dangers mainly are that QR codes technology threshold is low and production cost of QR codes is low, resulting in the QR code will exist malware and phishing website phenomenon. And the government's monitoring of QR code has technical difficulties because these

problems need to be checked by manual means. Monitoring means are weak and simple in QR code production, resulting in criminals can avoid government monitoring means [1].

3.2 Blockchain advantages

Blockchain is characterized by decentralization, high transparency, shared trust mechanism, traceability, and data is difficult to tamper. Therefore, the combination of blockchain and mobile payment can further improve payment security. The combination process is as follows. First, the use of blockchain technology can ensure that the QR code information is not tampered with. In the process of coding and decoding, the regional chain technology is combined, and then the Ethereum block platform is applied to generate a unique identifier for the QR code [2].

Then QR code security identification technology based on the technology of block chain adopts distributed billing. So, each block is closely linked up and become safe books, which can effectively eliminate the phenomenon that QR code information is tampered with. And this action did not increase the burden of the server at the same time. Compared with the third-party security verification, this way is more decentralized and can make the QR code efficient, safe and quick method to run [3].

Furthermore, with the development of blockchain technology and its deep combination with the mobile payment industry and cryptography, both parties of the transaction can directly conduct transactions and keep accounts together under the relationship of lack of trust, which will be a new modern mobile payment transaction method.

Combined with the QR code + blockchain technology after completion, it is further improved on the original basis, with the characteristics of traceability to the QR code of crime, ensuring the authenticity and uniqueness of QR code, low degree of blockchain attack, and high difficulty. Through the blockchain technology, the QR code can be "fixed" to prove the authenticity and uniqueness of the payment, transfer, website and other information links carried by the QR code [4].

Finally, advanced blockchain technology has self-testing capabilities. Once the blockchain operating system is started, the blockchain operating system checks every ten minutes all the data formed during that time [5].

4. Tencent's layout and challenges in terms of new payment technology

Wechat official announced that Tencent Wechat Pay and UnionPay started to cooperate in payment, service to promote deeper connectivity.

On the one hand, Wechat Pay and UnionPay App have officially realized the mutual recognition and scanning of offline barcode, and users can complete payment by scanning the Wechat collection code through the UnionPay App in provincial capitals.

On the other hand, the UnionPay App fully supports the top-up services of Q coin, QQ Music and Tencent Video. Wechat mini apps gradually support UnionPay, which operate the first online projects including Wechat reading, Tencent video, Maoyan, Jingdong, Bubugao, Luckin and another mini apps scene. These projects have been launched on September 22 A/B testing [6].

Thus, in the layout of the mobile payment, Tencent began too pervasive. These Internet giants use ecological payment tool enter into each other's scene, which means that the protracted mobile payment war upgrade to the giant monopoly. This stage will reach to connectivity, break the barriers and open competition [7].

From the perspective of the development of the payment industry, "interconnection" is mainly carried out around barcode payment. This is also the layout of Tencent new technology application direction. These directions will lead to a variety of achievements include promoting the interconnection of barcode payment, studying and formulating the technical standard of barcode payment interconnection, unifying the coding rules of barcode payment, building the technical system of barcode payment interconnection, breaking through the service barrier of barcode payment, and realizing the mutual recognition and scanning of barcode logos of different apps and merchants. In

other words, both the B end (merchant end) and the C end (client end) can be used in one code without switching between different ends [8].

But as the payments industry has become an antitrust pioneer, the big fintech firms are in the winner-takes-all category, which raises implicit concerns about monopolizing markets and making innovation less efficient. From this perspective, the Internet interconnection of mobile payment requires the Internet giants to open their scenes and traffic respectively [9]. Payment is only the "barriers" tool in the competition, which illustrates that it is a closed ecological service and data and information are not possible to share. These big financial companies also include tencent and "interconnectivity" hit the tencent's monopoly position of payment thus reducing the possibility of tencent profits through the monopoly position. So, the challenge for Tencent is how to maximize profits between huge investments and falling profits.

4.1 Tencent's research and layout on blockchain payment

Tencent's layout on blockchain payment is based on its strong blockchain foundation. Before the application of technology, we will first introduce the basic situation of Tencent blockchain. Firstly, the underlying platform -TrustSQL is the cornerstone of technology. The second layer is the platform service layer (Trust Platform), which has four strategic directions: digital assets, verification, shared ledger, and sharing economy. The top layer is the Trust Application layer, which provides a variety of specific blockchain Application scenarios and industry solutions [10].

Tencent's main research on blockchain is the application of SQL interface and trust consensus mechanism. The first tech is its SQL interface. SQL (Structured Query Language) is a programming Language for specific purposes, which is widely used in relational database management system. So, this system derived the design idea of building efficient and usable SQL execution engine on the basis of traditional blockchain [11]. For the basic situation of SQL, the external interface of Tencent blockchain TrustSQL includes two layers: the SQL interface of the basic platform and the CGI interface of the application platform [12].

The TrustSQL application platform interface includes two application scenarios: digital assets and information sharing. The interface design follows the following idea: The trust consensus mechanism brings better security and trust elements to Tencent's mid-level blockchain mobile payment architecture. In the initial stage of the integration of blockchain and industrial entities, the most extensive demand is to increase credit, and its application scenario is certificate storage, which is also an important cornerstone for the development of industrial blockchain. The core of depository is to enhance the credibility of the data, which can provide the dual guarantee of "depository" and "certificate" for the relevant data and strengthen the credibility of the data. The expectations of the market are the effective pre-prevention and post-accountability for this system.

Tencent block chain combined with intelligent contracts, identity authentication and privacy protection technology, which transform traditional inefficient cooperative mode among enterprises. Through the preset rules, intelligent coordination and information sharing is improving, which simplify the process of cooperation, improve the efficiency of collaboration, strengthen mutual trust cooperation and realize "information Internet" to the Internet "trust".

Tencent relies on open-source community and tencent cloud computing platform so that the company further enlarge the application scenario of blockchain and reduce the barriers of chain blocks. Services wisdom industry and blockchain of distributed business infrastructure would provide one-stop TBaaS block chain service platform and improve the efficiency of individuals and businesses to deploy block chain.

Tencent's underlying technology in the expansion and application of mobile payment and QR codes is mainly landed in jd. com's supply chain. Tencent provides underlying technical support, while Jingdong effectively integrates two-dimensional codes and blockchain technology, effectively opens up the anti-counterfeiting, traceability and full traceability information between suppliers, sellers, logistics, governments and testing agencies, integrates and traces the information of the procurement process, production process, circulation process and marketing process of commodity

raw materials, and truly realizes the whole process of authenticity traceability across brands, channel providers, retailers, consumers, and fine to one thing and one code (or one batch and one code), and comprehensively displays it to consumers through multiple network channels This significantly improves the user trust experience, and also provides a strong security guarantee for the whole process of information management in the enterprise supply chain, and maximizes the benefits of enterprises and consumers. Therefore, this can be seen as the physical performance of Tencent's application scenarios in its blockchain QR code [5].

Regarding the trust consensus mechanism, Tencent has also used it to make a lot of attempts, among which the more successful is the ride code project, due to the traceability of blockchain technology, information cannot be tampered with and other characteristics, and the invoice logic coincides, the use of this technology can effectively avoid fake invoices, improve the invoice supervision process. Blockchain electronic invoices not only have the various characteristics of blockchain technology, but also connect every invoice stakeholder, can trace the source, authenticity and entry of invoices and other information, to solve the invoice circulation process of a ticket over-reporting, false reporting, true and false difficult to verify and other problems. It also offers the benefits of reducing costs, streamlining processes, and ensuring data security and privacy.

Blockchain has been greatly used in practice, and has been widely supported by all sectors of society, making the "trust consensus mechanism" a good development. Blockchain electronic invoice in accordance with the work deployment of the State Administration of Taxation, Shenzhen Municipal Taxation Bureau to undertake the pilot, Tencent blockchain to provide the underlying technology, is a new type of electronic invoice application of "blockchain + invoice" ecosystem. Blockchain electronic invoice solves the pain point of ticketing for ride codes. Since May 8, 2018, the code brushing service jointly launched by Tencent, Shenzhen Metro and MTR (Shenzhen) was officially launched, and as of November 2018, all gates on all lines of Shenzhen Metro support code brushing service, with the number of users exceeding 11 million, and the average daily passenger flow of the ride code exceeded one million.

4.2 Existing challenges and development strategies

In the mobile payment of Tencent blockchain, the main challenge is cross-border payment. As of now, in addition to Bitcoin itself, the application of blockchain technology that really actually operates in the market and forms a business model has not yet emerged. The reason is that in addition to the bottlenecks from the technology itself (for example, the Bitcoin blockchain can only process about 7 transactions per second, and the efficiency cannot meet the needs of large-scale financial transactions for the time being) and the risks still need to be tested in time, there are also the following problems that need to be explored and solved by market participants.

First, legal and regulatory uncertainty. In today's financial industry, the practice of blockchain will bring new challenges to the incomplete laws and regulations. Since it is still in the trial-and-error period of the new field, relevant market participants such as the central bank, regulatory authorities, legislative authorities and financial institutions must find the most appropriate legal scale and policy universality in the subsequent continuous testing, and establish an appropriate and effective legal framework according to the actual situation in the application field. At the same time, due to the widespread experiment and application of blockchain technology in the world, the supervision between countries is particularly important so the formulation of common and accepted standards should be put on the agenda.

Second, the field of standardization is still blank. Although the Ministry of Industry and Information Technology "China blockchain Technology and application development White Paper" put forward the urgency of the development of China's blockchain standard, and the development of China's blockchain plan. In addition to the continuous promotion of domestic standardization rules, it is also necessary to actively participate in the formulation of international unified standards.

Third, a trading system of trust and cooperation should be established between different industries. From technology research and development to application practice, the blockchain industry

represents the intersection and comprehensive application of many disciplines. On the other hand, this diversification also increases the complexity of cooperation, thus increasing the uncertainty of the transaction. The continuous rise and application of blockchain technology and the expansion of its influence among industries require the joint efforts of blockchain technology enterprises, financial market participants and regulatory authorities. These stakeholders must strengthen cooperation and establish an effective communication mechanism, which is the premise of continuously promoting the successful application of blockchain technology.

5. Problems and challenges of mobile payment technology

This chapter will start from the architecture of the mobile payment system, and study the security problems at each level based on the contactless layer, the control layer and the network layer, as well as the corresponding security defense and enhancement measures at each level.

The security threats of non-contact layer mainly include terminal security and communication security. Endpoint security threats are mainly in the reader mode. Attackers copy, tamper with, and destroy data stored in NFC mobile phone tags through various illegal means. Existing solutions are mainly used to encrypt or sign labels. In addition, because NFC uses wireless communication technology, there are various classic wireless communication attack methods in NFC, such as passive monitoring, denial of service attack (interference attack), man in the middle attack, replay attack, message insertion and tampering, etc. The existing solution is mainly to create an encrypted secure channel, such as through the Duffy Herman key exchange protocol.

The security of the control layer mainly involves the security of the hardware and operating system of the control layer. The former mainly refers to the security algorithm module, which provides various encryption algorithms and digital certificates for mobile phones, and provides data isolation protection for secure transactions. If a module is attacked by a network, there may be risks such as availability loss, certificate or key loss, and privacy data leakage.

The last one is network layer security. In mobile payment systems, remote payment needs to access the Internet through the network layer and complete payment transactions. In near-field payment, in addition to NFC, network layer is often required to complete other related transactions. In mobile payment system, typical network layer communication technologies include Wi Fi, GSM, 4G, etc. The security of the Wi Fi system is vulnerable to threats, such as wireless interference attacks, violent key cracking, and forged APs. GSM protects the security of user data through authentication and encryption to prevent unauthorized users from accessing network resources. The main weaknesses of GSM include man in the middle attack caused by one-way authentication, encryption algorithm vulnerability, SIM card cloning, replay attack, wireless interference attack, transmission channel threat, etc. The security structure of 4G communication technology is based on the security characteristics of GSM, forming a perfect security guarantee system, and further improving the security of new business features. However, in practical applications, 4G authentication still needs to be improved in key agreement and data encryption algorithms. The existing measures are mainly aimed at the security of the application layer.

6. Conclusion

This article introduces the current situation and shortcomings of WeChat Pay, and studies Tencent's progress and future development direction in blockchain payment from the perspective of technology and market layout, and finally compares WeChat Pay and blockchain payment. Afterwards, this article found that blockchain payment has irreplaceable strong security functions of WeChat Pay and the ability to break the monopoly of financial giants. Accroding the findings of this paper, it recommends that more small companies should join the blockchain payment system, which can better stimulate economic vitality and accelerate the construction of payment systems.

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