

# The Application of Blockchain-as-a-Service (BaaS) and its Providers in China

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**Abstract**—The potential of blockchain has been recognized worldwide. It can be applied in many fields and brings a huge improvement to society. To help users to gain quick access to this new technology, IT giants introduce BaaS (Blockchain as a service). However, the study of BaaS in the context of the Chinese environment is insufficient. Therefore, this article aims to make up for this gap. This paper studies the application of blockchain in China and the benefits and challenges of BaaS. Then, 5 BaaS providers will be introduced and one of them, the 58 BaaS, will be carefully examined through SWOT analysis. The conclusion is that although the application of BaaS is promising, there are obstacles such as regulations on the way to the large-scale use. Different providers of BaaS in China focus on different areas, and 58 concentrates on a unique one. 58 BaaS has its competitive advantages compared to other providers, but it still has to deal with the challenges carefully in the application of blockchain.

**Keywords**—*blockchain as a service; application of blockchain; china*

## I. INTRODUCTION

With the extreme price fluctuations of cryptocurrencies, blockchain, the technology that backs all of them, has been increasingly well-known all over the world, and more and more people become obsessed with it. The reason why this technology attracts so much attention is that it processes several distinctive features, such as strong openness, decentralized organization and transparent information flow. These characters make people realized that blockchain technology could go far beyond cryptocurrencies and contribute to the development of societies. Among all innovations that aim to take advantage of blockchain, BaaS is a unique one. It is a new service and is run by centralized corporations. By embedding the blockchain into cloud computing system and utilizing the original cloud service infrastructure, BaaS can provide high-performance blockchain environment and convenient support for developers and thus allow other companies to enjoy the distinctive features brought by blockchain without paying heavy attention to the trivial technical details. Considering the superiority of BaaS, the future of it is promising, especially in the context of China. China is a pioneer in the process of exploring the application of blockchain, and it has advanced various policies to advocate it. For example, China has applied blockchain service in finance,

data service and entertainment industries, which leads to encouraging improvements.

In this article, we will first introduce the current state of blockchain application in China and the use of BaaS in the world through the literature review, and then discuss the advantage and disadvantage of BaaS and the suitable situation to use it. Next, this article will briefly present different BaaS providers in China and study the case of 58 BaaS. Finally, we will give our conclusion.

## II. LITERATURE REVIEW

### A. The Application of Blockchain in China

Blockchain-related industries are improving in quality and increasing in number in the same time, and Chinese enterprises have seized considerable shares in finance, entertainment, supply chain, law, energy, welfare, health, agriculture, and internet-of-things (IoT) industries [1]. For supply chain management, the efficiency of transport in shipment can be improved by the blockchain model through optimizing the business operation of the Less Container Load (LCL) [2]. To build a credible agri-food traceability system in the supply chain, RFID and blockchain can be combined to match the demand of the market for food safety [3]. There are other blockchain-based models to improve the food trade process in China as well [4]. In regard to finance, blockchain can help Chinese banking industry to transform and obtain new growth through revolutionizing the process of payment clearing and credit information system [5]. Blockchain can also contribute to the equity crowdfunding in China because it is an efficient and low-cost solution for registration and has the ability to simplifying the transaction procedure while guaranteeing the transparency of information [6]. For IoT, blockchain can bring decentralized management and thus connects billions of smart devices, leading us into the age of smart homes [7]. In the energy field, the decentralized feature of blockchain reduces the entry threshold for the carbon trading market, and the future of this integration is promising [8]. The combination of distributed photovoltaic energy with blockchain will change the current pattern of this centralized industry and bring more opportunities to it [9]. However, although the application of blockchain in energy industry can bring many benefits, the problem of security, smart meter and policy still need a careful

discuss [10]. As to the governance in China, the application of blockchain can allow greater accessibility and transparency in government information and sharing information across different groups and individuals, and finally contribute to establishing a government service with improvements in both quality and quantity [11]. Blockchain can help to address the rural wastes problem in China as well [12]. In the field of health care, blockchain can build a medical system that can accurately record the information of patients while achieving the goal of strong privacy protection and secure data storage [13]. However, the application of blockchain still encounters several challenges. The Chinese patents related to blockchain have a high number, but are still low in quality, the infrastructure of blockchain is still waiting for improvements, the potential of blockchain has not been fully released yet, and the size of the application is still relatively small [14].

### B. Status Quo of Blockchain-as-a-Service in the World

BaaS is an offering that enables companies to set and use their blockchain systems based on cloud-based solutions, and the maintenance of this platform is run by the service provider, which allows companies to enjoy the benefits brought by blockchain easily [15]. A BaaS solution usually has four components, which are illustrated in Fig. 1 [16].

The global BaaS market is anticipated to grow from \$623.0 million in 2018 to \$15455 million by 2023, and there are at least 25 companies worldwide that have already built their BaaS platforms [17]. The BaaS can be applied in various fields as well. It can improve the microgrid transaction mechanism [18]. It can also exploit scattered computing resources and then create a decentralized and secure computing paradigm that features transparency, security, and privacy protection [19]. BaaS can be implemented for IoT purposes as well, contributing to the feature development of society [20]. However, one feature of BaaS is controversial. BaaS is a service that is provided by a single vendor, which means it is centralized and is contradicted to its core feature. Scholars have recognized this problem and working on it. Some think that the nature of BaaS and the participant's target should be considered first in practice [21]. Others believe that a modified BaaS paradigm can address that problem [22].



Fig. 1. The architecture of a typical BaaS.

## III. THE BENEFITS AND CHALLENGES OF BaaS

### A. Benefits of BaaS

To utilize blockchain in a company's business, it has to study technique details and do maintenance, which is demanding and push an enterprise away from exploiting efficient blockchain system. However, a BaaS provider will do all of these tedious works and help the company to reduce the cost of implementing blockchain applications. In addition,

BaaS can be applied in many aspects for a company, from finance to supply chain, which means that there are plenty of rooms for a company to drive innovations in related areas, increasing the possibility for a company to success in the future [23]. What's more, through BaaS, companies can not only save costs in the process but can save costs at the beginning of implementation. If a company wants to try blockchain all by itself, it has to make large investment for reformations at first and still has to face the chance of failure. However, with BaaS, it can try blockchain before making any sacrifice, because the provider of BaaS has already prepared hardware and software that are essential for the whole system to run steadily [24]. Lastly, most providers of BaaS can offer different consensus algorithms, dynamic joining, switching protocols and physical resource management, and this allows companies to enjoy high flexibility and adjust their blockchain system to the condition that they need [25]. In this way, they are able to control and utilize different characteristics of the blockchain and take advantage of it to create maximum profits. For example, cyber security companies may want to sacrifice a little openness in exchange for stronger information protection.

### B. The Challenges of BaaS

Although BaaS can bring many benefits to an enterprise, there are several obstacles for the large-scale employment of it. Firstly, although the number of blockchain-related regulations has significantly increased recently in China and other countries, there are still many blank spaces to fill for regulators. Meanwhile, because of the nature of blockchain, it is still challenging for the government to supervise on it, even the service is provided by a centralized organization. Secondly, realizations of application of blockchain are still in the early stage, so the demand for BaaS is not very strong currently. Thirdly, for now, BaaS is provided by several giants, because BaaS relies on their cloud system. This means that the choices of consumers are few and the BaaS between different providers are similar to each other [26]. Finally, the blockchain technology itself is still evolving, so it is relatively hard for the BaaS provider to build a stable and highly scalable platform. To be more specifically, current network environments may fail to meet the requirement of a blockchain system, the hardware, such as servers, may be insufficient to support large-scale use of such scattered system, and the different application environment needs a complicated configuration that increases the cost of capital and time [27].

### C. How to Choose the Right BaaS

From the previous discussion, it can be learned that the target customers of BaaS are those small or medium-sized companies that aim to innovate through the application of blockchain. This is a promising way for a company to reform itself and thus obtains more profits and stronger growth in the long run. However, based on the consideration of various advantages and disadvantages of BaaS, companies still need to carefully choose the right platform. For a company, it is very important to consider the following aspects [28]:

1) *Rapid provisioning*: The BaaS providers should be able to maintain or revise its blockchain network swiftly with low risk.

2) *Backend service*: Different companies have customized need for backend services. Therefore, BaaS should be able to incorporate mainstreams as companies demand.

3) *Data security*: The BaaS provider should be able to safely store and transfer customers' data, and make sure it will not be leaked out.

4) *Process control*: The control over the blockchain is essential to keep a stable data flow and protect the system away from hackers. In addition, the identity access management in such system is very important as well to guarantee the safety of data. Company has to make sure that the BaaS provider is experienced in this aspect.

#### IV. THE BaaS PROVIDERS IN CHINA

##### A. Comparison Between Different BaaS Providers

The BaaS of Baidu and Ali focus on the financial area. For Tencent platform, it allows its customer to modify the blockchain system according to their business needs. Additionally, for the server, customer can buy from Tencent's cloud or buy on the own. For Baidu, it has established its platform that can be applied to digital bills, credit system, rights and interest certification, stock exchange insurance management, financial audit, and many other fields. It has validated 5 billion worth assets based on its BaaS.

Jingdong and Ali pay more attention to the anti-counterfeiting traceability field. Ali's platform is based on its experience in the Tmall that pervades counterfeit goods. After introducing the blockchain, this problem has been mitigated. Now, Ali's BaaS can do far more than identifying counterfeit goods, and it is capable of dealing with supply chain finance and intellectual property protection. For Jingdong, it allows customers to incorporate their blockchain system with Jingdong BaaS to create a system that can accomplish more complicated tasks and seize more opportunities [29].

The BaaS provided by 58, focus more on the daily environment, which is closer to ordinary consumers. Currently, this is the sole platform in China that focus on this area. Therefore, it will be studied as a case in the following section.

##### B. A Case Study of 58 BaaS

58 BaaS differentiates itself by focusing on life service, which is based on this company's experience in this area. It gives several examples to illustrate how its BaaS address long-standing problems and bring huge improvements. For instance, in the job market, its BaaS can solve contract dispute, the leakage of applicants' privacy, low-efficiency background investigation and fake CV. In the real estate and second-hand market, its BaaS can help to mitigate the problem of information asymmetry, bring benefits to both buyers and sellers [30]. In the next part, a SWOT analysis will be applied to this platform to make a more thorough investigation.

The strength of 58 BaaS lies in the fact that it concentrates on the life service area, which is neglected by many other competitors and allows 58 to develop its competitive advantage. Meanwhile, 58 is a giant in the life service area, and this means

that it has abundant experience in this field, and is capable of helping its customer to apply the blockchain system in life service-related aspects. In addition, 58 BaaS allows its customer to apply the Ethereum system, which is a famous blockchain around world and has been recognized as one of the most promising open blockchains. The embrace to Ethereum of 58 enables its customer to make their blockchain globalized and thus have more opportunities. However, 58 also has weaknesses. Baidu, Tencent, and Ali all have their cloud system. Therefore, they can build their BaaS directly on their cloud systems, and save more costs. However, 58 does not have their cloud system, so they have to build their BaaS from bare ground, which will definitely increase the investment, and transfer its cost to consumers. Meanwhile, the core business of 58 has been threatened in recent years [31]. This means that 58 may lack resources to help BaaS service line to develop. The good news is that the application of blockchain is still in the early stage, and 58 has come into the field about just right time, so it is competing in a blue ocean. Relying on its competitive advantage in the life service field, it is not hard for it to domain the BaaS in particular market segmentation, let alone 58 has plenty of time to improve its system. In a more macro sense, the Chinese government supports the exploration in blockchain, thus, there might be other business opportunities for 58 to exploit. The threat hides in the future of blockchain. Currently, the large-scale application of blockchain still faces many challenges and uncertainties, and this implies that 58 BaaS may not be profitable in the short-term. Also, since 58 is a pioneer in this area, it must bear more unknown risks. For example, Ethereum itself is still immature, there may exist latent bugs that can lead to the failure of 58 BaaS.

TABLE I. 58 BaaS CASE

| SWOT analysis of 58 BaaS |  |
|--------------------------|--|
| Strength                 | Process distinctive advantage  |
| Weakness                 | Do not have a cloud system and thus increase cost<br>Core business negatively impact BaaS service line |
| Opportunity              | Support of government policy<br>Enter the industry at an early stage                                   |
| Threat                   | Uncertainty of the future development of blockchain  |

<sup>a</sup> (source: compiled by author)

#### V. Conclusion

Blockchain has proved that it can contribute to the development of societies based on its unique features. With scholars' research, it is clear that blockchain can be applied in multiple fields in China, covering supply chain, finance, IoT, energy, governance, and health care. After recognizing the potential of blockchain, more and more companies develop their BaaS systems to support those companies that wish to innovate through the adoption of blockchain but lack the ability to establish their blockchain system. The benefit of BaaS is that it allows users to adopt blockchain in a low cost and easy way. Also, BaaS can be applied in many situations and has strong control over the system. However, the challenges of BaaS exist. The regulations and supervisions on BaaS are insufficient, the demand is relatively weak, platforms are provided by several

giants that are hard to distinguish from each other, and the maintenances of BaaS is difficult. Based on these benefits and challenges, users need to evaluate whether the BaaS provider offers rapid provisioning and backend service, and its strength of data security and process control. In China, there are five major BaaS providers. Baidu and Tencent focus on financial area, Jingdong and Ali concentrate on anti-counterfeiting traceability field, and 58 pays attention to the life service area. After the study of 58, it can be concluded that it has developed its competitive advantage, but 58 cannot compete with its rivals in cost. It grabs the opportunity of blockchain by entering at the early stage, however, this also means that it must tolerate the high risk of blockchains.

As for the future studies in BaaS, we suggest that scholars can analyze the influence brought by the application of BaaS on a specific company, referencing to experts in the business field to consider the practical and detailed needs in an industry.

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