



BLOCKCHAIN SERVICE NETWORK - A DIGITAL EXTENSION OF THE BELT AND ROAD INITIATIVE

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Abstract:

During 2020, the Chinese government launched an initiative to create a global blockchain-based network, which would serve as a framework for the development of business applications. The project was named the blockchain service network (BSN). It is complementary to the Belt and Road initiative, as both projects aim to build global infrastructure, which would enable acceleration and increase in trade volumes, creating above all an opportunity for international partnerships for Chinese companies. The subject of the paper is the position that BSN will occupy in the international business environment. Paper has objectives to determine what advantages BSN could enable as a global network of blockchain applications and to predict the reaction of key international actors to its emergence. It is concluded that the key advantages of the initiative are cost savings, accessibility and use flexibility. On the other hand, the project will inevitably face serious issues when it comes to the acceptance at the international level. Distrust in data security and the fact that the whole project is initiated by the Chinese government can discourage potential clients.

Keywords:

blockchain, cryptocurrencies, blockchain service network, belt and road initiative, state monitoring and control.

INTRODUCTION

The Belt and Road Initiative (BRI) has been a central pillar of Chinese foreign policy since 2013. It refers to the global infrastructure development policy implemented by Chinese government, which should include investments in over 70 countries around the world [1]. Typical examples of infrastructural investments covered by this project are roads, railways, ports, bridges and tunnels, which are in the direction of belt and road development. The belt is a brief name for the "Silk Road economic belt", which represents several directions for the development of land transport connections across countries of Central Asia and the Middle East. The goal is to establish firm connections by road and rail transport between the People's Republic of China (PRC) and Europe, across Russia and Turkey. The road is a brief name for the "21st century maritime silk road", which represents several directions development maritime

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connections between PRC and South and Southeast Asia, and also the Middle East and Africa [2]. The goal is to establish permanent connections with key international ports through ports in China, Pakistan and the Malay Peninsula. Not taking into consideration political connotations of this project, the key goal of the BRI is to create a global trade network with PRC as an initiator.

During 2020, the Chinese government launched an initiative for creation of a global blockchain network, which would serve as a framework for business applications development. The project was named the blockchain service network (BSN). The Cryptography law, which established national standards for cryptographic protocols, began to apply at the beginning of 2020 as a support to the project [3]. The Chinese government, along with banks and largest information and telecommunications companies, has invested significant resources in the creation and maintenance of this network. Therefore, it can be concluded that the goal of the Chinese government is not only to take a leading role in the distribution of physical products, but also to create an infrastructure for e-business.

The construction of a global blockchain network gives the PRC an advantage over key competitors in the field of digital business transformation. The question is what will be the reaction of the competitors, but also of those countries that represent key foreign policy partners in the BRI. In terms of functioning, BSN could lead to standardization and reduce costs of key services, but it can also increase other countries' IT dependence on the infrastructure of the PRC. The subject of the paper is the position that BSN will occupy in the international business environment. The analysis of the paper subject itself is inevitably connected with the analysis of its political and economic context. Therefore, equally important objectives of the paper are to determine the advantages that BSN could enable as a global network of blockchain applications and to predict the reaction of key international actors to its emergence.

The paper is divided into four key parts. The first part will analyze the key settings of the blockchain technology. In the second part, the attitude of the Chinese government towards blockchain as well as towards cryptocurrencies will be analyzed. In the third part of the paper, the key characteristics of the BSN project will be analyzed. Finally, the fourth part will discuss its advantages and limitations.

2. FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY

Blockchain is a new technology, whose practical foundations consist of previously known achievements in the field of cryptography and mathematics, such as asymmetric cryptography, timestamping, Merkel tree, hash function and smart contracts. It is used for distributed management of large databases.

Although it is not directly mentioned in the Bitcoin white paper [4], blockchain technology has become known as technical basis of cryptocurrencies, decentralized forms of electronic money. However, today, blockchain technology is used for various forms of business applications, which could be very heterogeneous by their nature and purpose.

Blockchain is a permanent ledger of previously executed transactions. It consists of blocks in which transactions are packed. In this case, transactions do not imply just the transfer of financial resources, but also any form of business activity that changes the state of the system. The content of each block depends on the transactions that were entered in the previous blocks, so the new state of the system depends on the previous state and changes brought by new transactions. Change of the contents of a previously installed block would lead to changes in the state of the entire system in the present. Therefore, a hash record of the previous block is entered in each new block, which prevents the change of transactions history [5].

Due to the way of organizing members, blockchain systems are divided into permissionless blockchains and permissioned blockchains. They differ in the possibility of system access and the roles that a user can perform. Permissionless blockchains have open access. This means that interested users can execute transactions or participate in their validation and block installation [6]. Because of the availability of all roles, these blockchain systems are often referred to public. Permissioned blockchains are characterized by a clear division of roles among the participants. In this case, users who validate transactions and install blocks are known and predetermined [7]. The systems may differ from each other in terms of the capabilities of other users. In some systems, membership is open, so all previously registered users can send and receive transactions. In other systems, all users must receive a special invitation to participate. Depending on whether the invitation system is managed by a single entity or an organized group, terms like private or consortium blockchains appear in the literature.



According to the basic idea, blockchain should have enabled the formation of ledger in a situation without trusted authority. Then a large number of participants, who do not know each other and do not trust to each other, decide which transactions are true by reaching a consensus. While this corresponds to the principles on which cryptocurrencies are functioning, the great transparency of the system could bring anarchy to business applications from other fields. Therefore, the development of private blockchain systems has been more important for the advancement of this technology in the last few years than the creation of new cryptocurrencies.

The functioning of private blockchain systems is in contrast to the original principles of decentralization and equality of participants. Moreover, under certain circumstances, they open the possibility for political control (regardless of who is the executor of that control) over the entire business application, which was desirable to be avoided.

3. THE ADOPTION OF BLOCKCHAIN IN PRC

The attitude of the PRC towards blockchain technology is complex and multidimensional. Complexity is reflected in contradictory data regarding the use of cryptocurrencies, which can be found in the professional and academic literature. On the one hand, there are claims that Chinese miners make up about 65% of the total computer resources invested in Bitcoin mining, while Russian and American miners have only a 7% share [8]. Such large mining capacities required not only high financial investments, but also coordinated action. Numerous authors emphasize that such a high concentration of miners in one country could be a threat to the stability of Bitcoin as the largest cryptocurrency, which would affect the entire market [9]. The concern proved to be partially justified, when in mid-May 2021, a large number of Chinese investors sold their cryptocurrencies to bring down the entire market by about 50% [10]. On the other hand, there is a sharp critical attitude of the Chinese authorities towards cryptocurrencies. During 2017, the initial coin offerings (ICO), i.e. the auction sales of new cryptocurrencies, were banned. Two years later, the existing crypto exchanges were closed and the establishment of new ones was prohibited on the territory of the PRC. Finally, in May 2021, financial institutions were prohibited from offering users any service denominated in cryptocurrencies, such as savings programs, clearing and settlement of transactions in cryptocurrencies and others [11].

The last ban also led to the mentioned disturbance on the market. Despite institutional bans, individual users are not prevented from mining or owning cryptocurrencies. These activities are not supported and users are advised not to engage in them, but they are not legally prohibited.

Multidimensionality is reflected in the different attitude towards the technology itself and to cryptocurrencies, as the most well-known form of its use. While the possibilities of using cryptocurrencies are institutionally limited, the development of business applications based on blockchain is stimulated. At the end of 2019, the government publicly invited companies to start investing in the development of their own applications, emphasizing that the PRC must seize the opportunity to become a world leader in the development of blockchain technology. At the end of the same year, the Shenzhen Stock Exchange developed the Blockchain 50 Index, which includes the 50 most important companies that do business with some form of blockchain technology [12]. In April 2020, an initiative was launched to create a BSN, which will serve as a framework for the development of business applications.

The Chinese government's determination to take a leading position in the development of blockchain technology has not received nearly as much attention as those actions taken in the field of 5G network expansions and development of artificial intelligence. The fact that the PRC has far greater coverage of 5G base stations than the United States of America (USA), not only in absolute terms but also per capita, and that mobile phones capable of using 5G technology are immeasurably more affordable in the PRC, are often highlighted as a key point of technological inferiority of the USA [13]. The consequence of the pronounced rivalry between the two powers in the domain of 5G technology is the ban on the sale of Huawei equipment in the USA from May 2019. As it has been identified as a key partner of the Chinese authorities in this process, the governments of the USA and some Western European countries have proclaimed Huawei to be a threat to data security [14].

Regarding the artificial intelligence development, the authors generally agree that, unlike other segments of ICT, the volume of investments does not necessarily mean a certain advantage. However, the volume of investments is at the same time the only measurable indicator of researches. The PRC shows dominance in this category as well, albeit with a slightly smaller difference compared to the rest of the competitors [15].



While the Chinese government states that artificial intelligence will help shape the national economy by balancing supply and demand, Western authors do not fail to express the view that its primary purpose will be to monitor and control population [16]. These reactions represent radical attitudes, which were not typical for situations in which technological progress came from a single country of origin. At the same time, the motives for the development of the 5G network and artificial intelligence are not questioned in any other country, even in those countries that have a history of monitoring own citizens. Given the harsh rhetoric related to 5G technology and artificial intelligence, it is surprising the lack of reaction to the plans that the PRC has with blockchain technology.

4. BSN FRAMEWORK

Blockchain-as-a-service (BaaS) is an approach to improving efficiency in the development and management of blockchain applications. Service providers facilitate the implementation of blockchain applications by renting cloud computing services or customizing their own platform to client's needs. However, the solutions that emerge are usually vendor locked. Depending on the service provider, clients are either tied to its cloud or its blockchain platform. In addition, the client must have their own programming team with specific knowledge in the field of blockchain [17].

BSN is a Chinese government initiative to create a global core network for the development of heterogeneous business applications. Chinese State Information Center, China mobile, China Union Pay and Red Date Tech, which is responsible for the technical development, are the initiators. The technical basis is the FISCO BCOS open source protocol. The project was supported by well-known companies in the field of software development, hardware suppliers, finance and telecommunications, such as Huawei, Baidu, Tencent, Ant Group, Beyondsoft, Digital China, WeBank, Shenzhen Securities Communications and others. So far, a number of public blockchain systems have been integrated, the most famous of which are Ethereum, NEO, EOS, Tezos, IRISnet and Nervos. In addition, key private blockchain systems have been integrated: Hyperledger Fabric, ConsesSys' Quorum and Corda R3 [18].

The goal of BSN is to facilitate the development of blockchain applications for medium, small and micro enterprises, through the public provision of required services.

Businesses that access BSN do not need to lease server space or cloud computing services, which further lowers operational costs. Although the initiative is primarily intended for private and consortium blockchain applications, it will be possible to connect public blockchain with it, as has already been done on the example of several cryptocurrencies. In this sense, BSN represents a more comprehensive concept than standard BaaS solutions.

The project is based on a network of public nodes located in cities. This means that network nodes will not be owned by individual entities, but will be tied to a data center located in different cities. The plan is that at the full capacity the network has about 200 nodes located in the largest Chinese cities, but also in other world metropolis. At the time of writing, over 120 public city nodes are already connected in PRC, as well as 8 located abroad, including Tokyo, Sydney and Paris [19]. Public city nodes will be portals through which interested companies will enter the network.

They will make available services that are stored in a massive computer cloud, will control access, process transactions and store data [20]. The network is designed so that interested clients contact those nodes that are closest to them and buy services directly from them.

The key benefits of the initiative are cost savings, accessibility and flexibility. BSN enables medium, small and micro enterprises, and even individuals, to develop their own business applications with significant resource savings. Common tools and pre-built application patterns and templates shorten the development time, reduce the total amount of work required to run applications, and simplify maintenance. Thanks to them, the process of launching simple applications and their maintenance can be performed by developers without specific knowledge in the field of blockchain. It is estimated that the enterprises' costs related to specific blockchain activities will be reduced by as much as 80%. On the other hand, the existence of common online services and the recognizability of templates and patterns will make switching between applications easier. If cryptocurrencies are taken as an example of a business application, then BSN would enable faster transfer of values between different systems, with minimal transaction costs. A pictorial explanation was given by the CEO of CyberVein, who says that if cryptocurrencies can be viewed as individual wells, BSN then represents a network of pipes that makes a water supply system complete [21]. However, this is a simplified explanation, because a similar project already exists.



It is the Cosmos project, which is a blockchain system for exchanging digital assets between cryptocurrencies. BSN is a more complex system, because in addition to enabling the interoperability of existing platforms, it creates conditions for the quick and easy development of new ones.

5. POTENTIALS AND LIMITATIONS OF BSN

The comprehensiveness of the services that BSN will offer goes beyond the BaaS concept in terms of what commercial platforms have offered so far. The question that arises is why there was no reaction of key competitors in the technology race. The European Union (EU) is preparing to establish its own blockchain infrastructure called the European blockchain services infrastructure (EBSI). However, there is a fundamental difference in the purposes of these two networks. While BSN is conceived as a global network for the development of various business applications, EBSI has a primary purpose in the EU internal market [22]. The EBSI should be used to verify diplomas, provide notary services and verify the "European identity" of persons without the intervention of central authorities.

In other words, EBSI should take over part of the services provided by public institutions, unlike BSN, which is intended for commercial projects. There is no similar initiative in the USA.

A possible explanation for the lack of reaction is the uncertainty in the final form and scope of application of blockchain technology. For 10 years, cryptocurrencies have remained the only recognizable form of application of blockchain technology. In contrast, it was emphasized that the primary use of BSN should be for closed business systems and not for cryptocurrencies. Furthermore, as a significant number of cryptocurrencies have emerged on a wave of anarchism and resistance to the traditional financial system, BSN is probably not an attractive partner for most of them. Although there are indisputable potentials for the application of blockchain in other areas, ranging from public services, through supply chains and automated production, all the way to transport, it cannot be said that there has been a significant shift in any activity. The situation in which blockchain would become the industry standard in any field is years away. Gartner's vice president for market research, Avivah Litan, believes that this will not happen before 2028 [23]. In such circumstances, it is possible that key rivals of the PRC do not want to waste resources on technologies whose future they are not sure about.

The fact that the PRC is far ahead of the competition in other areas of the technological researches gives the opportunity to run the initiative of the global blockchain network independently.

BSN comes at the right moment for national interests of the PRC. The network is complementary to the BRI, as both projects aim to build a global infrastructure that will accelerate and increase trade, creating opportunities for international partnerships for Chinese companies. Both projects should enable the shaping of the specific position of the PRC in the international framework and can serve as a foreign policy tool. Many analysts agree that the realization of the BRI has been misunderstood from the very beginning as it will not be based on purely material investments. They believe that technological advances such as blockchain will actually be a basic building block of future trade infrastructure and in that context will replace concrete [24]. BSN could have a greater reach than the BRI in terms of creating business infrastructure, because the business processes it will host will be intended for (probably for the most part) local and national relations, as opposed to physical investments that primarily target international trade relations.

It has already been emphasized that cost saving is considered a key advantage. A survey conducted for the BSN white paper shows that the average annual price of leasing and maintaining infrastructure for a consortium blockchain is over \$ 15,000 (100,000 Yuans). The same set of services supported by BSN would cost less than \$ 500 annually (up to 3,000 Yuans) [20]. However, the essential advantage lies not only in lower costs for those clients who use the blockchain application, but also in increasing the availability and bringing the blockchain closer to a wider circle of potential clients. Lowering the technical requirements and the needed level of developers' skills creates conditions for blockchain business solutions to be widely used in companies that previously could not afford it. This can facilitate dispersion of blockchain platforms and accelerate the emergence of new ones, and ultimately act as a catalyst for a complete technological transformation. In this sense, BSN has the potential to make blockchain the industry standard.

However, a large number of analysts are skeptical about the future of BSN. They cite the fact that the project was initiated by the Chinese government as a key problem. One problem is that over-reliance on Chinese information infrastructure can lead other countries to a state of economic and technological dependence. The other is that Chinese state-owned companies provide



the infrastructure base, rent server space and provide all software tools, including the cryptographic solutions. A large number of the professionals does not have full confidence in Chinese cryptographic standards and believes that the SM2 and SM3 protocols, that would be used, could provide the system owner with an option for access to confident files. Therefore, it is not unrealistic to expect that they can also have access to monitor all business applications. The PRC was previously accused of industrial espionage, while in this case it could have a complete insight, without hacker attacks. Although there is a possibility that these allegations are true, exactly the same arguments could be applied against the use of the Internet as a business infrastructure.

6. CONCLUSION

In the best case scenario, BSN will accelerate the expansion of blockchain-based business applications. Using of familiar tools, patterns, and templates will not only enable interoperability between applications, but will also lead to a process of standardization. With a reduction in average costs, the accessibility and understanding of blockchain applications will increase, which will ultimately create the conditions for mass application in various public and business functions. In not so-good scenario, BSN will lead to polarization when it comes to the development of blockchain applications. Political factors and distrust in security of information could deter most business clients from using offered services. Companies from countries that are considered to be partners in the BRI are likely to focus on using the infrastructure offered by BSN, while companies from Western Europe and the USA would use one or more separate platforms.

A key limitation of the paper is the uncertainty of the entire project at the time of writing. Although BSN is already operational, it is not even close to its full commercial capacity, because the network of public city nodes has not been established yet. The number of business applications is at a negligible level, so it is not possible to determine the ability of the network to cope with the information load, nor the positive effects of interoperability. In addition, there is a lack of reliable literature that would allow complete understanding of the concept. The white paper was published only in Chinese, while the English version is a translation of the original text, which is considered not to have been done most accurately. The technical characteristics of the project are not fully clarified either, and important details regarding cryptographic solutions are still unknown.

Undoubtedly, clarifying of perplexities will contribute to a better understanding of the project and an increase in the feeling of security.

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