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Block Chain Technology-An Overview

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Abstract - Blockchain is nothing more than a mere data structure with distributed multiversion concurrency control. According to blockchain technology developers, there are roughly a thousand companies in the world focusing on blockchain-related innovations at the moment. Only a small fraction of these companies are working on actual blockchain technology development. Blockchain as a technology has the potential to change the way how transactions are conducted in everyday life. In addition, the applications of Blockchain are not limited to cryptocurrencies, but the technology could be possibly applied in various environments where some forms of transactions are done. Therefore, to identify and understand the current status of research conducted on Blockchain, it is important to gather all the technical challenges and to evaluate challenges and the most problematic issues in Blockchain at the moment.

Key words : Blockchain, Cryptocurrency, Technical challenges

1. INTRODUCTION

A decentralized transaction and data management technology which was developed for bitcoin cryptocurrency management is called as blockchain. The significant features of block chain technology are security, anonymity and data integrity maintained during the transactions[1]. The goal of Blockchain technology is to create a decentralized environment where no third party is in control of the transactions and data. Block chain is a distributed data management solution which maintains all the transactions with reference to the number of nodes participating in the network by recording the data in a public ledger including the information of all the completed transactions and sharing the same to all the participating nodes in the network. Blockchain is a transparent system which maintains the anonymity of the nodes participating in the network which makes it very secure and reliable[2].

The rest of the paper is organized as follows. Section 2 introduces the background of Blockchain and Bitcoin. Section 3 and 4, we describe the usecase and challenges in Block Chain technology and Section 5,concludes the paper.

2. BITCOIN AND BLOCKCHAIN

The Bitcoin system was proposed in 2008 by Satoshi Nakamoto, that went online in January 2009 . A trading website called MtGox was started in 2010, making the exchange of bitcoins and conventional money significantly easier. The system operates as an online peer-to-peer network, anyone can join by installing a client application and connecting it to the network[3]. The unit of the currency is one bitcoin (abbreviated as BTC), and the smallest transferable amount is 10^{-8}BTC. Instead of having a bank account maintained by a central authority, each user has a Bitcoin address, that consists of a pair of public and private keys. Existing bitcoins are associated to the public key of their owner, and outgoing payments have to be signed by the owner using his private key.

Block chain eliminates double spend problem with public key cryptography concept where each agent is assigned a private key and a public key shared with all agents.public keys are cryptographically generated addresses stored in the block chain.The significant feature of block chain is public keys are never linked to real world entities.Transactions are enabled without revealing one's identity[4].

3.USECASE FOR THE CRITERIA TO BE CONSIDERED TO DECIDE ON A BLOCK CHAIN TECHNOLOGY

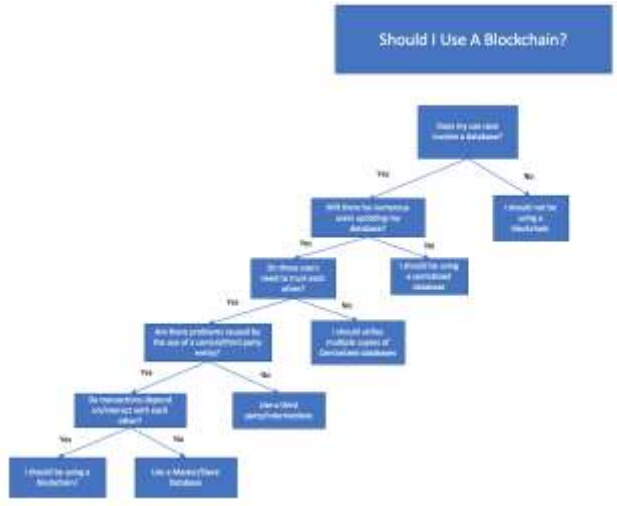

Figure 1:Use Case for Block chain decision[4]

Blockchain technology is an emerging solution for decentralized transactions and data management without the need of a trusted third party. It is an open and distributed ledger, enabling the recording of transactions among various parties in a verifiable way. To date, blockchains have been studied in several domains like healthcare and supply chain management, but there has been little work investigating its potential application in the field of intrusion detection.

4.CHALLENGES IN BLOCK CHAIN TECHNOLOGY:

Despite the technical capabilities of Block chain technology being superior to other more conventional platforms the block chain should have the adequate presence of three factors such as demand,competition and technical knowhow. According to blockchain technology developers, there are roughly a thousand companies in the world focusing on blockchain-related innovations at the moment. Only a small fraction of these companies are working on actual blockchain technology development. At this point, it is still uncertain whether the knowledge and the understanding on this technology will spread enough to attract sufficient numbers of customers, entrepreneurs and developers to reach the critical mass of a stable mainstream ecosystem[6].Further factors such as regulatory changes can affect the attraction in a significant manner.

Blockchain technology has also some technical challenges and limitations that have been identified. The seven technical challenges and limitations for the adaptation of Blockchain technology in the future[7]:

- **Throughput**: The potential throughput of issues in the Bitcoin network is currently maximized to 7tps (transactions per second). Other transaction processing networks are VISA (2,000tps) and Twitter (5,000tps). When the frequency of transactions in Blockchain increases to similar levels, the throughput of the Blockchain network needs to be improved.

- **Latency**: To create sufficient security for a Bitcoin transaction block, it takes currently roughly 10 minutes to complete one transaction. To achieve efficiency in security, more time has to be spent on a block, because it has to outweigh the cost of double spending attacks.

- **Size and bandwidth**:. The Bitcoin community assumes that the size of one block is 1MB, and a block is created every ten minutes. Therefore, there is a limitation in the number of transactions that can be handled (on average 500 transaction in one block. If the Blockchain needs to control more transactions, the size and bandwidth issues have to be solved.

- **Security**: The current Blockchain has a possibility of a 51% attack. In a 51% attack a single entity would have full control of the majority of the network's mining hash-rate and would be able to manipulate Blockchain. To overcome this issue, more research on security is necessary.

- **Wasted resources**: Mining Bitcoin wastes huge amounts of energy ($15million/day). The waste in Bitcoin is caused by the Proof-of-Work effort. There are some alternatives in industry fields, such as proof-of-stake.

- **Usability**: The Bitcoin API for developing services is difficult to use. There is a need to develop a more developer-friendly API for Blockchain. This could resemble REST APIs.

Versioning, hard forks, multiple chains: A small chain that consists of a small number of nodes has a higher possibility of a 51% attack. Another issue emerges when chains are split for administrative or versioning purposes.

- Scalability issues pertaining to the blockchain that might lead to centralization, which is casting a shadow over the future of the cryptocurrency.

- Processing power and time required to perform encryption for all the objects involved in a blockchain-based ecosystem. IoT ecosystems are very diverse. In contrast to generic computing networks, IoT networks are comprised of devices that have very different computing capabilities, and not all of them will be capable of running the same encryption algorithms at the desired speed.

- Storage too will be a hurdle. Blockchain eliminates the need for a central server to store transactions and device IDs, but the ledger has to be stored on the nodes themselves. And the ledger will increase in size as time passes. That is beyond the capabilities of a wide range of smart devices such as sensors, which have very low storage capacity.

- Lack of skills: few people understand how blockchain technology really works and when you add IoT to the mix that number will shrink drastically.

- Legal and compliance issues: It's a new territory in all aspects without any legal or compliance code to follow, which is a serious problem for manufacturers and service providers. This challenge alone will scare off many businesses from using blockchain technology.

5. CONCLUSION

Blockchain as a technology has the potential to change the way how transactions are conducted in everyday life. In addition, the applications of Blockchain are not limited to cryptocurrencies, but the technology could be possibly applied in various environments where some forms of transactions are done. The research on the possibilities of Blockchain in applications is certainly an interesting area for future research, but at the moment Blockchain suffers from technical limitations and challenges[8].Though blockchain development projects are emerging, research in blockchain

is in its infancy. The essence of blockchain lies in its ability to support trustworthy transactions via networked computation in place of human monitor and control.It would be quite exciting for researchers to participate in realization of blockchain impacts, and inevitably, we will see more business research in blockchain in the next few years.

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