International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 02 | Feb 2019 www.irjet.net p-ISSN: 2395-0072

Blockchain Technology - A new Trust Machine

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Abstract - Blockchain Technology is becoming familiar day by day in every domain. It is emerging technology which considered as highly disruptive then the internet. It has gained widespread attention by developers, researchers, testers, social media, students, programmers, businesses and many more due to its potentials. Blockchain is considered as an incorruptible open and digital ledger in economic transaction. It is a new trust machine considered on internet. The paper aims in providing a brief data on Blockchain, Characteristics and features of blockchain, its pros and cons, and future of blockchain.

Key Words: Blockchain (BC), Consensus, Bitcoin, Ledger

1. INTRODUCTION

The emergence and popularity of Blockchain technology will change the way of digital transaction and management happening on internet. Blockchain is even being compared with web and internet because of its potential and power though BC is just a database for storing and recording information. Blockchain technology is far behind Bitcoin crypto-currency system and is considered to be the backbone for ensuring tamper-proof distributed and enhanced security and privacy system for various domains. It is a new and emerging trustworthy technology

1.1 Overview of Blockchain

Blockchain is a technology based on the principle of open ledger that is the transaction is open and public which means everyone can see and validate a transaction happening in a network. The data once added in the ledger cannot be modified or erased as the information is with every node in the network. This makes block chain permanent and ineditable. BC contains data that is added in chronological order. Blockchain is considered as decentralized and distributed network which is capable of recording all the transactions that are committed on its network. It removes the concept of centralized storage of data making it unique. It removes the dependency on third party thus giving the authority to end users on the network. This makes BC highly secure as a small change in the information is easily noticeable to every node on the network, making it very difficult to hack. BC removes the cost of any potential error to occur for each transaction making the transaction to occur with much higher pace with higher rate of efficiency.

1.2 History of Blockchain

The technology was originally described in 1991 and intended to timestamp digital document to avoid backdate or tempering of any records. However its true potential was realized by “Satoshi Nakamoto” who used it to create a cryptocurrency. On October 31, 2008, Satoshi Nakamoto published a paper to a cryptography forum where he outlined a way to overcome the double-spend scenario – a problem which afflict previous cryptocurrencies. He described Blockchain as a structure of chain of hashed timestamps: “Each timestamp include the previous timestamp in its hash, forming a chain, with each additional timestamp reinforcing the ones behind it” (Nakamoto, 2008). Although the approach was later précised for Bitcoin, the concept was laid as: a chain of blocks, each cryptographically linked to the previous block, using a hash digest.

1.3 Content of block in BC

The block contains data i.e. the records, the hash of block based on the information stored on the block and the hash of the previous block. The hash of the block is calculated once the data is added to the block by running a cryptographic hash algorithm like SHA-1, SHA-2, SHA-256 and so on. This hash of the block is unique and is created and called as hash output of the block. These hash output is attached to the next block as a header to the block making the next block dependent on the previous block. This way each and every block in a BC is dependent on one another forming a chain. Hash could be compared to a fingerprint as it is unique and identifies the block and the contents of the block. If there is any change in the content of the block its hash output also change. Thus hash of the block is useful to detect any change in the block and makes the block secured maintaining its confidentiality and integrity.

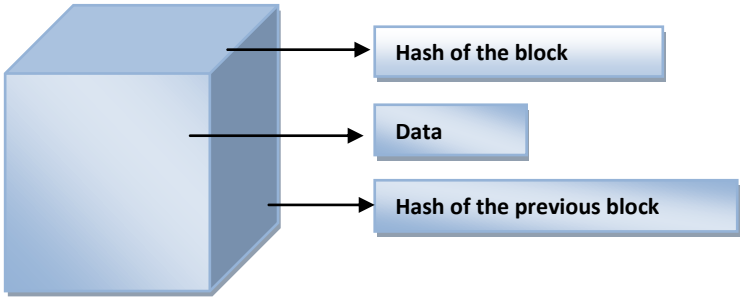


Figure 1: Block Structure

1.4 Classification of Blockchain

Blockchain can be classified under three basic categories: Public, Private and Hybrid (Semi-public)

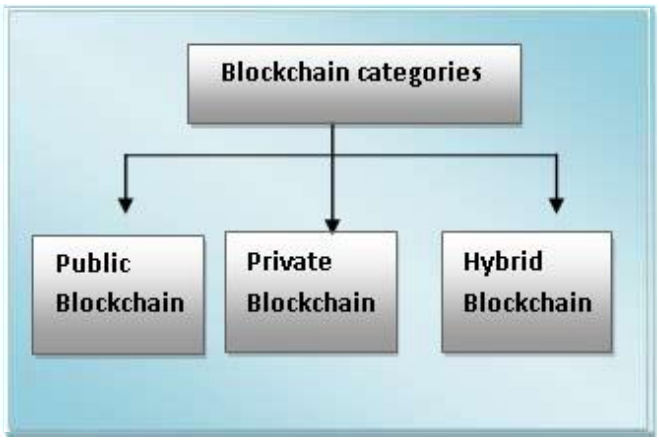


Figure 2: Blockchain Categories

1. Public Blockchain :

Public BC is public in nature that is open to all. It provides an open platform to people from different organization and background to join a network and do transaction. This means Public Blockchain does not have a single owner and is visible to all. Every node in a network can participate in the transaction and have full right to read, write and audit the transaction at any time. It works on decentralization. These blocks are also called as 'Permission-less Blockchain'.

2. Private Blockchain :

Private Blockchain is also called as 'Permissioned Blockchain'. These BC is private that means its access is restricted among the people of single organization or a group of organization under certain consensus. It facilitates private sharing and exchange of information among the participants. Private BC uses privileges to read and write to the BC.

3. Hybrid Blockchain :

Hybrid Blockchain is also called as 'consortium Blockchain'. These BC are public to certain group of networks under certain consensus. It is even considered as partially private blockchain.

1.5 Characteristics and features of Blockchain

Blockchain Technology can be used in variety of different domains ranging from banking to medical, education to business and so on for keeping and tracking the records. It can be applied to any industry in which assets are managed and stored and where transaction occurs.

Following section discuss the key characteristics and features of Blockchain.

1. Transparent and trustworthy

   Blockchain is an open ledger that is available to every node on the network and every node can open and audit the information on the block which makes it transparent. Any change in information is noticeable making BC trustworthy.

2. Consensus

   Every block on the BC is validated and verified by certain rules provided to every node on the network via a consensus model. Every participant on the network should agree to follow these rules. This is consensus. If any participant violates these rules then the transaction is considered as invalid.

3. Digital cryptocurrency and Distributed and Decentralised system

   BC works on an element called Bitcoin or Ethereum like any other currency for trading. These are digital cryptocurrency which is used on an internet. Every participant independently validates information on the block without central authority thus making BC as distributed digital ledger. BC works on the principle of distributed and open ledger where information is shared to the participants of the network.

4. Authenticity

   The data in the Blockchain is complete, consistent, accurate, and timely thus maintaining it authentic.

5. Secure and cryptographically sealed

   Data in the BC is encrypted by performing cryptographic algorithm using public and private key mechanism. A hash of data is created for every block in BC thus sealing and securing data in BC.

6. Efficient and reliable

   As the data in the BC is present with every participant in a network and is recorded in chronological order which make BC efficient and reliable.

7. Immutable and irreversible

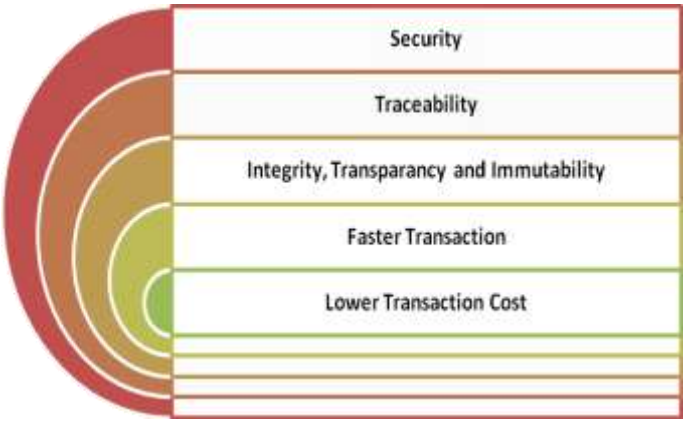
   Once the data is added to the BC, and the participants agreed on the transaction the data cannot be altered or modified thus making Blockchain irreversible.

1.6 Pros and Cons of Blockchain

Blockchain as an emerging technology is providing organization with huge convenience but on the other hand if a technology has its pros, it has its cons too. As said by Johan Cruyff - “Every disadvantage has its advantage”

Following are the advantages and disadvantages of Blockchain.

Pros of Blockchain



1. Security

   Blockchain is a very secure technology as data in Blockchain is saved in an encrypted format by performing cryptographic algorithm on it. Every block added to the BC has unique identity which makes BC secure.

2. Traceability

   Each and every ledger in network has the data record added to the block following certain consensus. This makes data to track easily and its durability is maintained.

3. Integrity, Transparency and Immutability

   Each and every transaction added to the Blockchain is viewable to every node in the network. This makes data on BC transparent and immutable which maintain its integrity.

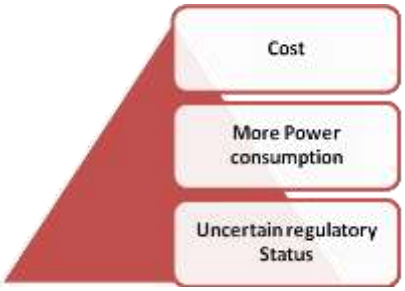
4. Faster Transaction

   Traditional system such as banking system can takes few days to settle a transaction but Blockchain other hand reduce this transaction speed to few minutes or seconds making the process much faster.

5. Low Transaction Cost

   Blockchain eliminates the need of third party involvement in any transaction which helps to reduce the transaction cost.

Cons of Blockchain



1. Cost

Blockchain consist of huge network consisting of various nodes participating in a transaction. Each node in the Blockchain has the data updated in it causing large amount of storage space thus increasing the cost.

2. More Power Consumption

Every time a new node is added to the Blockchain it communicates with each and every other node in the network making more power utilisation.

3. Uncertain regulatory Status

Modern currencies are created day by day and are regulated by the government bodies, Blockchain and bitcoin remains a hurdle in widespread adoption in pre existing financial institutes if government rules and regulation remains uncertain.

2. FUTURE OF BLOCKCHAIN

Despite its growing demand and interest in cryptocurrencies and its underlying Blockchain technology, its success is not up to the mark. Blockchain has highlighted how data is going to rule over internet and how it is going to be distributed among various users maintaining its security, consistency, immutability and its integrity. In coming years most government bodies will adopt virtual currencies causing Blockchain as more demanded technology. Virtual currencies are more efficient and reduce transaction time as eliminating third party involvement then traditional flat systems. Cryptocurrency will become every day payment media. Sooner or later all the transaction on the world trade will be conducted by using Blockchain technology. Blockchain technology can also be used for voting system as data cannot be tempered or manipulated. It is very difficult to make it work on a real platform. A Swiss company Agora is working on it.

3. CONCLUSIONS

Blockchain has identified itself to be suitable for a developing nation where trust is the prime concern. The distributed ledger functionality of Blockchain makes it very interesting technology to solve current financial as well as non financial business problems.

This paper presented a comprehensive review of the Blockchain by highlighting the concept of Blockchain, its features and characteristics along with future adoption.

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