

# BLOCKCHAIN TECHNOLOGY: BARRIERS, BENEFITS AND ITS APPLICATIONS ON MODERN ERA

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**Abstract:** Cryptography is a technique which uses mathematics and logical algorithms to transfer data from sender to receiver by encrypting it and decrypting it respectively so that third party do not steal it. Data and network security are properly necessary because the data must be transferred in a manner where the third party cannot access it and it must be safe between sender and receiver. As authentication is the basic principle of cryptography so the important information of the sender at other side like simply the ID, password etc is to be secured and thus the principle is fulfilled. Secure network has a different type of computer network, first public and second private, that are used in everyday jobs like digital signature, passwords, among companies' transactions. In case of private network, the data is to be secured inside a company. We very well know that network security is needed in order to properly send the data and thus cryptography is known for proper security of data in case of both wires connected and wireless too. Cryptography uses different mathematical and logical algorithms to provide data security. Now a day's, a wide variety of techniques are involved in order to have a proper transmission of data and network is secured.

**Index Terms -** Cryptography, Cipher Text, Plain Text.

## I. INTRODUCTION

Bitcoin is a digital crypto currency which is use for online transaction. Bitcoin has no physical form. Digital crypto currency bitcoin is based on the blockchain technology. Bitcoin transaction is a decentralized system of transaction. Bitcoin transaction has proof of cryptographic. Bitcoin transaction does not have third party as a mediator. Blockchain is the collection of different bitcoin transactions that have been executed till date. Blockchain can be considered as distributed database which not only works in 2-3 computers but also works in thousands of lakhs of computers. Each computer of blockchain has carried out the complete history of each and every record of it. This database is encrypted i.e. each and every detail is recorded in a very essential way. The example of blockchain is bitcoin transaction among different participant ledger. In blockchain a term is used which is node. Node is nothing but a computer which is participates in transaction of bitcoin. Nodes are helping in execute a transaction of bitcoin. Numbers of developers are working on blockchain transaction. So participant work is verify and uploads the data of transaction. In blockchain when a new block is created so copy of this new block chain is upload into every node of participate. It is just like Gmail when new E-mail came than our Google Gmail account is synced. So when a new block is created all the nodes are synced. These blocks are also called as minners.

## II. HISTORY OF BLOCKCHAIN

First time, Blockchain was introduced in 2008 when a digital coin named bitcoin was established. Bitcoin cannot be controlled by any country, government and bank. It is a digital coin. It has no physical form. A documents published in 2008, defines Bitcoin as peer-to-peer electronic cash system. This document also tells how to build a digital currency which is secure and transparent without the involvement of any Bank or central authority. The concept written above is given by a person (Who has not disclosed his/her identity till date) called 'Satoshi Nakamoto'. Bitcoin concept was introduced in 2009, January by Satoshi as an alternative to the financial system that we are currently using and centers of power [1]. Satoshi handed over maintenance of the Bitcoin code to the workers to solve Blockchain Technology. He or she left at least 50 bitcoins in a wallet (that are available till date) and became anonymous. After these searches on Blockchain has started on Google. As bitcoin's code is open source (i.e. available to all), so one can make their own coins and people had done so. People started believing that bitcoin's made with the help of block chain technology can also have other applications. Individuals, team members & Companies, raced to identify different uses or structure of blockchain. In USA (Florida) a homeless shelter has started accepting Bitcoins. China bans its banks from trading Bitcoins.

## III. BLOCKCHAIN FOUNDATION

It is almost impossible to predict the future of blockchain. Till now it is assumed that this technology is going to play vital role. Some of the researchers say it is as important as the Internet; it is directly connected to society & business. Every transaction that has been successfully executed is saved in the form of blocks in Blockchain Each & every. Transacted data is stored in a data structure that is cryptographic. By accessing the transaction we can read blockchain data and we can also submit new transactions. Public blockchains is used to allow all nodes to read blockchain data and to submit new transactions & private blockchain used to allow only one node that are already registered by an authority to read blockchain data and to submit new transactions.

#### IV. BARRIERS & CHALLENGES OF BLOCKCHAIN IMPLEMENTATION

**Issues related to Throughput:** The issues and challenges that can occur in future in blockchain Technology is discussed in the book named 'Swan' [Swan 2015]. One of the written in that book isthroughput. The problem that we are currently facing by using Bitcoin is that it executes 3-20 transaction per second, and if we calculate the throughput then it seven transaction per second. If we compare the throughput of Blockchain Technology with VISA transaction network which is processingnearly 2000 transaction per second is quite low. Even if we compare with Twitter network which is processing 5000 transactions per second is again giving us very low throughput.

**Issues related to latency:** Latency is also one of the main issue that we are facing while using Blockchain technology. Whenever a transfer of bitcoin is made it forwards its request at the same time on internet that's why it has become a barrierand it is following universal technology standards. It takes around 10 minutes to securely execute a bitcoin transaction. In case if we are making big amount bitcoin transaction, then it will take more time to process and the chances of attack can also go to high.

**Issues related to Size and bandwidth:** In 2016, February the amount space of the Blockchain in a Network of Bitcoin was nearly 50000 Megabyte& it can increase unto 214 PB every year. Currently bitcoin is taking 1MB & to create a new block it takes 10 minute. Thus we can observe that in one block. Nearly 500 transactions can be handled. If Blockchain needs to handle more transactions then it could be a major problem.

**Issues related to scalability:** Scalability is also one of the major problems in Blockchain implementations. The scalability limits of the Blockchain are connected to the size of the data on Blockchain, the transaction processing rate, and the latency of data transmission [2]. Apart from that, consensus protocol also affects the delay between submission of transaction and confirmation.

#### V. BENEFITS OF BLOCKCHAIN TECHNOLOGY

This type of transaction changes our world transaction system day by day. It is fastly growing technology .This blockchain technology uses peer-peer network of nodes for secure and validates transaction of bitcoin. Blockchain is a data structure of participation account which can create and share among the network of computers. The block chain allow user's computer to verify of each transaction is protected by digital signature corresponding to the sending address, allow user have full control over sending and receiving bitcoin by their ownaddress. There are some benefits of block chain technology.

1. **Trustworth System:** Blockchain technology data structure allow user to verify data without involvement of third party. The Blockchain reduces the risk of a bribe transaction and unauthorized involvements. The large amount of spread data are in data structure of block ,so it highly difficult to temper with the data structure. Updating and changing of historical data is only possible if one person have large team which working immediately on the data server. This technology of blockchain can be reduces the probability of data tampering.
2. **Transparency:**This is a distributed account structure gives opportunity to user for controlling on their information of transactions. The data of blockchain is very accurate. This data is consistent because it containing data of all the members. If someone want to change any block so person have to take permission from all participant of Blockchain. So Blockchain technology is accessible to all participants. So we can say Blockchain creating a transparent system of transaction. It is also useful for a single public account also to record transactions. This technology can reduce the inconvenience and complications of multiple accounts.
3. **Faster Transaction:** Physical markets are take longer time for transaction. Not only physical market but also digital documentation takes longer time for executes transactions. Blockchain technology of transaction can be reduce transaction time to minutes. And this technology also able to do transaction every time. And this advantage makes our country developing, growing day by day. So this type of digital transaction changes our country to a smart country.
4. **Reduced transaction costs:** This type of transaction system can be reduced of transaction cost because it remove third party of mediator. By the report of Euro Banking Association (EBA)'s on **Crypto technologies, a major IT innovation and catalyst for change**, blockchain technology has ability to influence the system of transaction, or an environment of transaction. And overall it can be help in change transaction system and it reduces the transaction cost.

Blockchain technology is more trustful, transparent, fast, effective and cost-effective for bitcoin transaction. Blockchain technology fastly grows finance and banking system. It can be change the systems of Entertainment (movie and music and gamming), Healthcare (Electronic medical records), Manufacturing (Supply of products), IOT (internet of things) and for other technology also.

## VI. APPLICATION OF BLOCKCHAIN TECHNOLOGY

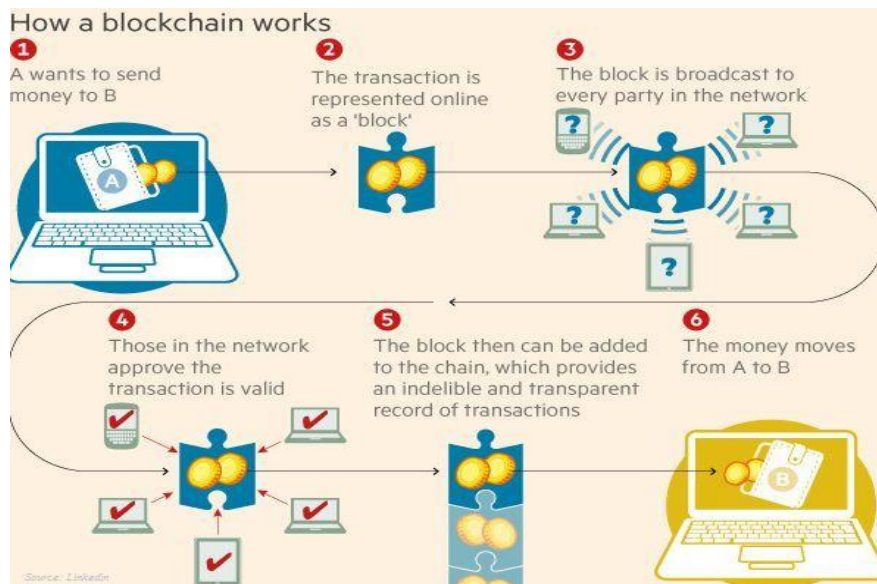


Figure 1:- How BLOCKCHAIN works

Blockchain is a smart device which can handle large amount of transaction .Blockchain mechanism can be able to bring everyone to the highest degree of accountability. Therefore, we can solve the problem of manipulation. Crypto currencies will take the power from the government to control the value of currencies and hand it to people [4]. It will allow middleman-free way to exchange asset. It will allow the removal of intermediaries that are involved in record keeping and transfer of money. It provides durability, reliability, and longevity with decentralized network. The data that are entered in blockchain based systems are immutable which can able to prevent fraud through manipulating transactions and the history of data. So, all the transactions can be investigated easily.

## VII. CONSENSUS MECHANISM

This mechanism is a fault-tolerant mechanism that is used in blockchains and computer systems to achieve the necessary agreement on a single data value or a single state of the network among distributed processes or multi-agent systems. It is useful in keeping records, and many other things.

*BREAKING DOWN Consensus Mechanism (Cryptocurrency)*

In a centralized system, consider a database having information about social security number in a particular country, an administrator have the access to update or maintain database. So in case of any modification or updates whether addition/updating /deletion of names of particular person who has applied for Social Security Number - is done by central authority which is the in-charge of managing all records that are unique.

But in case of Public block chains there is no single authority to control all operation rather this technology works in decentralized manner, where self-regulating systems work on a global scale.It involves contributions of many participants who work on authentication & verification process of transactions that are executing on the blockchain & on the block mining activities.

In a rapid and dynamic changing status of the Blockchain, these publicly shared accounts needs reliable, efficient, fair, and secure and real time mechanism to guarantee that every transactions executing on the network are unique and every stakeholder or participants are agree on a consensus on the status of the account. This important task is managed by the consensus mechanism, consensus are the set of rules that decides by the contribution of different participant.

There are different types of consensus mechanism algorithms that works on different principles like Proof of work (POW), Proof of stake (POS), Proof of Capacity (POC) etc.

## VIII. CONCLUSION

Blockchain is a distributed database which providing decentralized transaction and data management. Modern Blockchain implementations have to ensure throughput, privacy, size and bandwidth, security performance, usability, scalability and data integrity. However, these quality attributes set up a lot of challenges that need to be addressed. The results indicate that the Blockchain implementations need to be improved in terms of scalability, latency, throughput, authentication, privacy, security, etc. Blockchain is a fault tolerant i.e. if any computer in its system gets damaged but also it works in a proper way. Blockchain database is a public ledger in which to record any information related to any conciliation, it requires a concord from many of its co-partners or partners. Blockchain hacking is very difficult because to do this, a hacker needs to hacked all of its computers at a single time and that's why blockchain is known to be a secured technology. Therefore, we provide an overview of quality recommendations, its foundation, challenges and barriers, benefits and applications of blockchain technology.

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