STAR
Research Journal

Available online at www.starresearchjournal.com (Star International Journal)
COMMERCE
UGC Journal No: 63023

BLOCK CHAIN TECHNOLOGY – AN OVERVIEW

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Abstract

Blockchain technology enables the creation of a decentralized environment, where transactions and data are not under the control of any third party organization. Any transaction ever completed is recorded in a public ledger in a verifiable, secure and transparent. Introduced in 2009 as the core mechanism for the Bitcoin cryptocurrency, blockchain has had many applications in domains such as finance and non-finance area. In the first part of the paper, we explore the blockchain technology. Next, potential applications of blockchain in different domains are presented. The need to learn about this emerging technology is demonstrated with pictures.

Keywords: Block Chain, Technology.

INTRODUCTION

Blockchain technology enables the creation of a decentralized environment, where the cryptographically validated transactions and data are not under the control of any third party organization. Any transaction ever completed is recorded in an immutable ledger in a verifiable, secure, transparent and permanent way. The blockchain term, originally block chain, was first coined in 2009, Satoshi Nakamoto, in the original source code for the virtual currency. Bitcoin: "Nodes collect new transactions into a block, hash them into a hash tree"; "when they solve the proof-of-work, they broadcast the block to everyone and the block is added to the block chain" (Nakamoto, 2009).

CHARACTERISTICS

A blockchain is characterized by censorship resistance, immutability and global usability, and has a global network of validators called miners, who maintain it through block rewards, named cryptotokens (Jeremy Gartner, in Shulman, 2018).

Vitalik Buterin (2017), the creator of Ethereum, states that decentralization assures fault tolerance, attack resistance and collusion resistance. Also, that blockchain is decentralized on two of the three possible axes in software decentralization:

- Politically decentralized - meaning that no one controls it;
- Architecturally decentralized - no infrastructural central point of failure exists;
- Logically centralized - there is one commonly agreed state and the system behaves like a single computer.

Anyone has the autonomy to access a blockchain, to download a copy and play a role in maintaining the blockchain, thus that computer becoming a node. The copy will be actively updated along with every copy on every other node, edits can only be made to the blockchain with general consensus among the individuals running a node (ConsenSys, 2018).

The process of adding a new block (containing thousands of transactions) to a blockchain, by hash verification procedures, is named mining. The new block is linked to the last one in blockchain. Each blockchain starts with the genesis block, containing its settings (Dhillon et al., 2017). The advantages of the blockchain technology are the following (Grech and Camilleri, 2017):

- Self-sovereignty - users identify themselves and maintain control over the storage and management of personal data;
- Trust - the technical infrastructure offers secure operations (payments or issue of certificates);
- Transparency and Provenance - to perform transactions in knowledge that each party has the capacity to enter into that transaction;
- Immutability - records are written and stored permanently, without the possibility of modification;
- Disintermediation - no need for a central controlling authority to manage transactions or keep records;
- Collaboration - ability of parties to transact directly with each other without the need for third-parties.

The main drawbacks are the high consume of hardware, energy and time needed for the mining process, also the fact that the technology is complex and difficult to understand.

BLOCKCHAIN TECHNOLOGY: HOW DOES IT WORK?

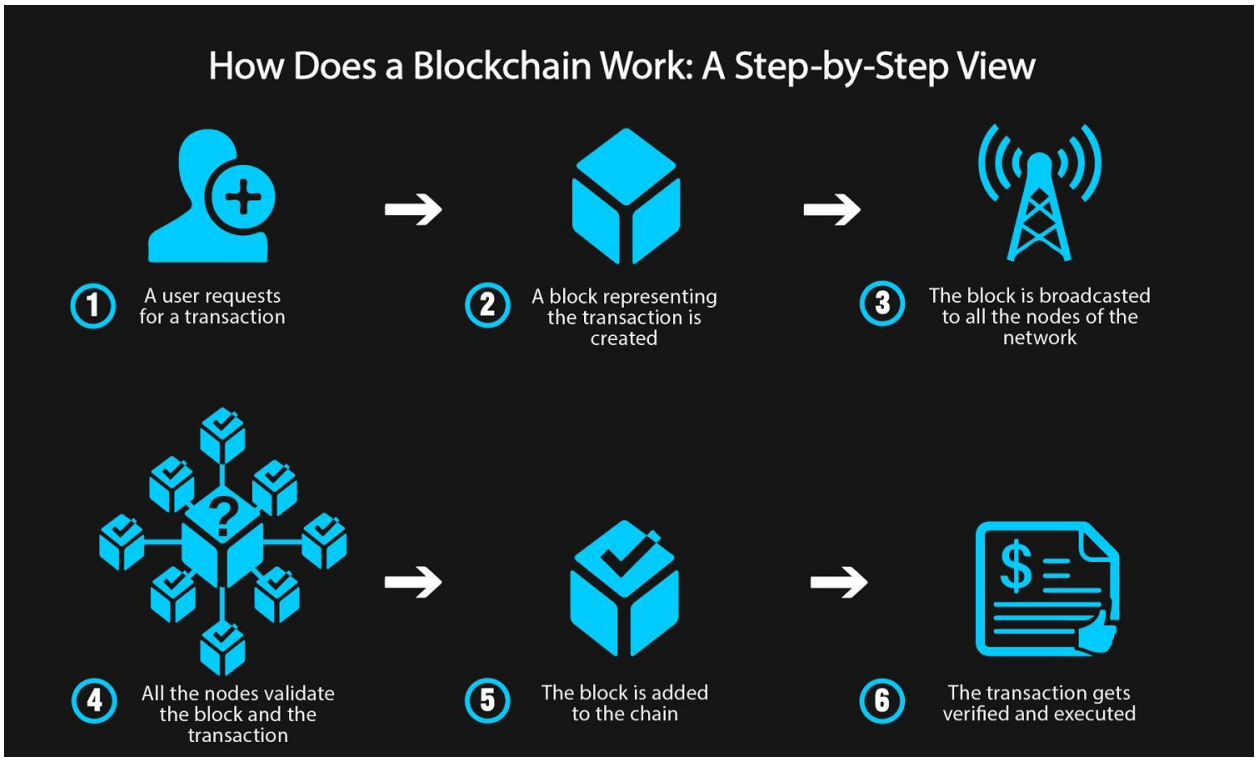
We explain the concept of the blockchain by explaining how Bitcoin works since it is intrinsically linked to the Bitcoin. However, the blockchain

technology is applicable to any digital asset transaction exchanged online. Internet commerce is exclusively tied to the financial institutions serving as the trusted third party who process and mediate any electronic transaction. The role of trusted third party is to validate, safeguard and preserve transactions. A certain percentage of fraud is unavoidable in online transactions and that needs mediation by financial transactions. This results in high transaction costs.

Bitcoin uses cryptographic proof instead of the trust in the third party for two willing parties to execute an online transaction over the Internet. Each transaction is protected through a digital signature. Each transaction is sent to the "public key" of the receiver digitally signed using the "private key" of the sender. In order to spend money, owner of the cryptocurrency needs to prove the ownership of the "private key". The entity receiving the digital currency verifies the digital signature –thus ownership of corresponding "private key"--on the transaction using the "public key" of the sender. Each transaction is broadcast to every node in the Bitcoin network and is then recorded in a public ledger after verification. Every single transaction needs to be verified for validity before it is recorded in the public ledger. Verifying node needs to ensure two things before recording any transaction:

1. Spender owns the cryptocurrency—digital signature verification on the transaction.
2. Spender has sufficient cryptocurrency in his/her account: checking every transaction against spender's account ("public key") in the ledger to make sure that he/she has sufficient balance in his/her account.

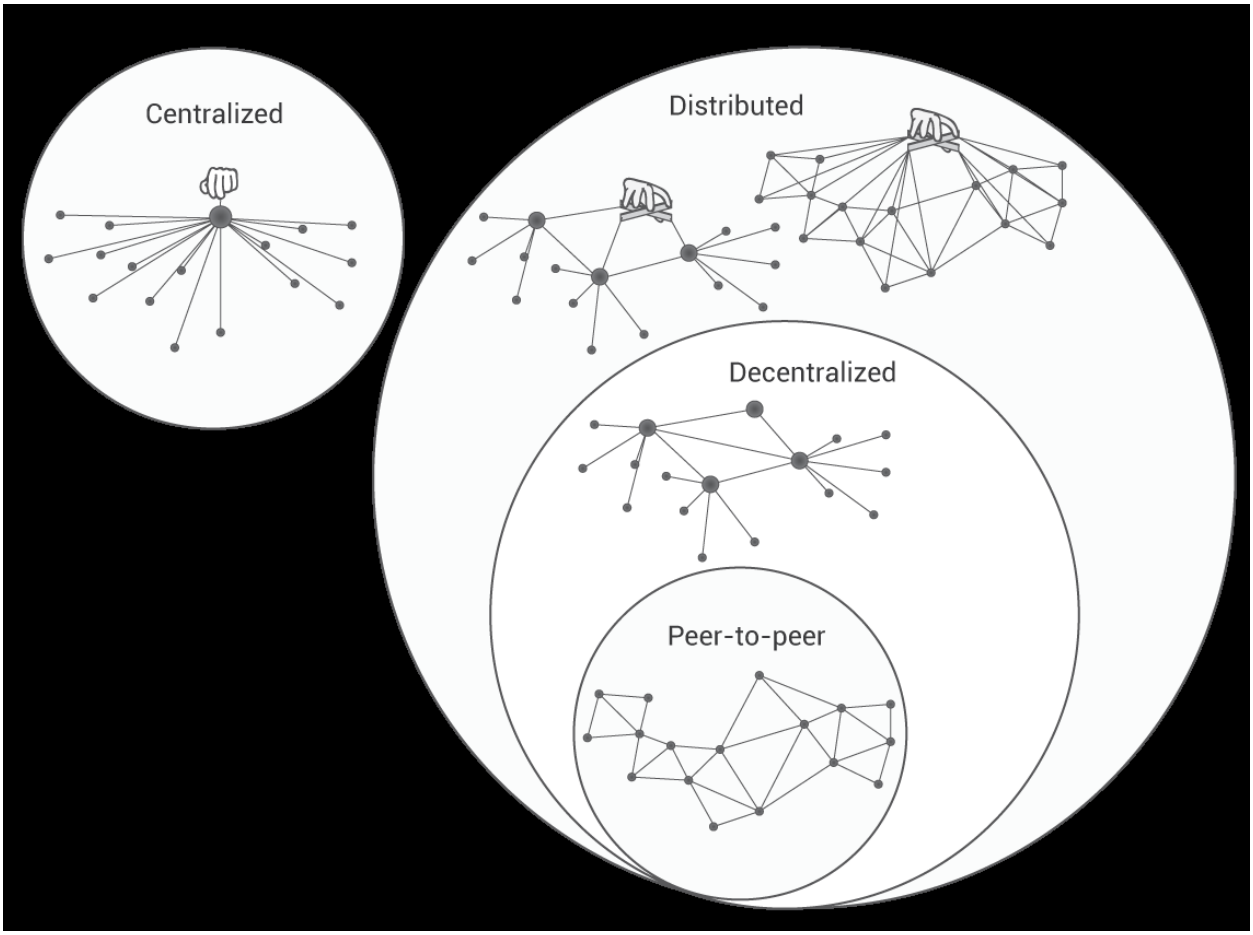
FIG 1
WORKS OF BLOCKCHAIN TECHNOLOGY A STEP BY STEP VIEW



TYPE OF BLOCKCHAIN (IN THE VIEW OF CONTROL)

In the view of controlling aspect the blockchain technology has been divided into two types. The first one is centralized blockchain method and another one is decentralized blockchain method. The decentralized method again divided into two category such as distributed ledger and peer to peer network method. That is represented as a diagram.

FIG 2
TYPE OF BLOCKCHAIN



APPLICATIONS OF BLOCKCHAIN TECHNOLOGY

BLOCKCHAIN IN FINANCE

PAYMENTS AND REMITTANCE

Transactions can occur directly between two parties on a frictionless P2P basis. The technology's application for overseas transactions has the potential to reduce risk, transaction costs and to improve speed, efficiency and transparency.

ISSUANCE, OWNERSHIP AND TRANSFER OF FINANCIAL INSTRUMENTS

Blockchain-based securities market allows traders to buy or sell stocks directly on exchanges or directly to other market participants in a P2P manner without the intermediation services provide by a broker or clearing house.

CLEARING AND SETTLEMENT LATENCY

On the blockchain, the entire lifecycle of a trade, including its execution, clearing and settlement can occur at trade level, lowering post-trade latency and reducing counterparty exposures.

BLOCKCHAIN IN HEALTH CARE

COST CONTAINMENT

The block chain can be filtered to identify and alert about specific activity on the chain, monitoring, using patterns, can include data that represents a doctor, consumer, drugs, procedures, all can to tokenized and added to the chain. Building a rule base using best practices, ICD codes, medical procedures and other costs can be monitored and audited using blockchain.

SMART CONTRACTS

Smart contracts would automatically pay providers when conditions of service are established such as:

- Validation that a service was received by a registered Medicaid patient
- Service was provided by a properly registered doctor & provider
- Neither party is on a known list of past participants in any fraud

BLOCKCHAIN IN GOVERNMENT

ASSET REGISTRATION

A blockchain framework enables government agencies to increase the accuracy and efficiency of

publicly held records by linking ownership of an asset to a single, shared ledger without disrupting existing registry data.

IDENTITY SERVICES

Blockchain enables government agencies to create a single, trustworthy collection of digital identity documents. These documents make it easier for government officials to reconcile data conflicts and provide citizens with control over their own identity

FRAUD PREVENTION AND COMPLIANCE

Blockchain creates a shared and trusted ledger that sequentially appends cryptographically secure data. The ledger is only accessible to trusted parties, giving government administrators the assurance that they're working with data that's up-to-date, accurate and nearly impossible to manipulate.

SUPPLY CHAIN

Blockchain makes the precise location of an object and its accompanying digitized documentation part of a traceable permanent record giving government full visibility of the supply chain.

CONCLUSION

To conclude, Blockchain is the technology backbone of Bitcoin. The distributed ledger functionality coupled with security of BlockChain, makes it very attractive technology to solve the current Financial as well as non-financial business problems. There is enormous interest in BlockChain based business applications and hence numerous Start-ups working on them. The large Financial institutions like Visa, Mastercard, Banks, NASDAQ, etc., are investing in exploring application of current business models on BlockChain. In fact, some of them are searching for the new business models in the world of BlockChain.

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