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BLOCKCHAIN TECHNOLOGY AND USECASES: OPEN SURVEY

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ABSTRACT

Blockchain is a really new technology into world like Internet. Blockchain is used in that place where third party is involved in the transaction. Basically blockchain removes third party role. Blockchain is distributed public ledger which is used to store set of transaction. Blockchain have two major part block and chain, block is containing set of previous transaction details and chain contains various security info which is used to connect block. We can add block into blockchain when participating parties agree on common agreement and this common agreement is made with help of consensus algorithms. Blockchain is used for document verification, payment transfer etc

Keywords: Blockchain, Peer to peer (P2P), Transaction, Block, Smart contract, use cases of blockchain.

I. INTRODUCTION

Blockchain has power to similar like Internet. If you heard about Internet in early 90s similarly you hear blockchain now a days. The Internet has changed the way of living, using Internet we transfer money to our friends, weather forecasting, get directions and deliver pizza to our door. Now we carry this technology in our pockets.

Next powerful technology is not Big Data, not Machine Learning, not Artificial Intelligent and not also social media, it is blockchain. To understand this technology consider we will following example:-
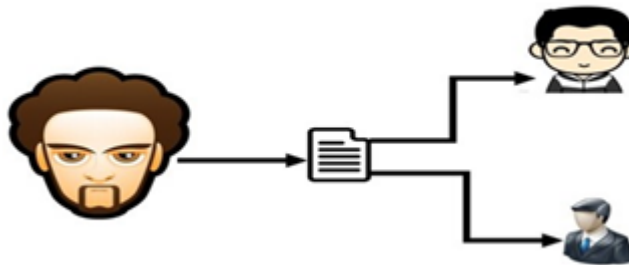

Fig 1. Traditional Network

If we were transfer 'A' to 'B' in traditional time, 'A' will share copy of document to 'B'. After transfer document to 'B', 'A' will not have any right of document. How you can trust that 'A' will not use same document again. This problem is dangerous if we consider the case of money, intellectual property and tickets.
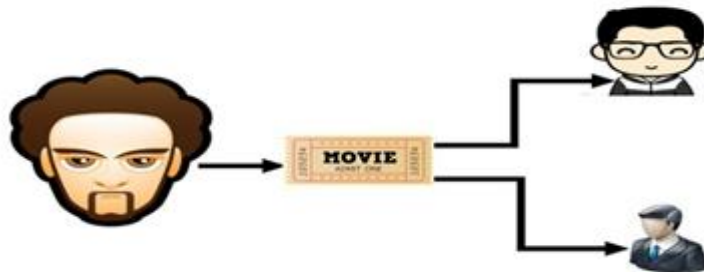

Fig 2. Traditional Network

So sending copy is a bad idea. If we consider example of tickets then if sender 'A' send copy of ticket to 'B' then only 'B' use the ticket if 'A' reuse the same ticket now the this problem is called double spending and solution of this problem is only blockchain.

People used peer to peer network transaction and collaboration between them is performed with the help of cryptography. How we can trust on P2P, which is defined white paper of Santoshi Nakamoto which was released in 2008 that is "Bit coin: A peer to peer electronic cash system". Most people understand that bitcoin and blockchain is similar but bitcoin is only single application of blockchain which is used for online currency transfer.
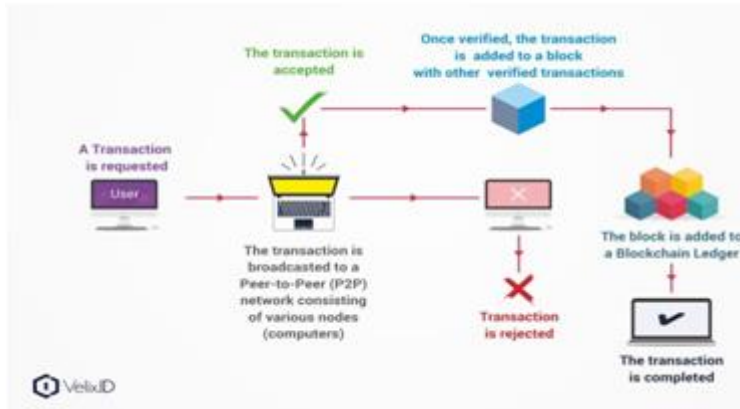

Fig 3. Blockchain Transaction

P2P, distributed ledger which is secured with the help of cryptographic technology, combined when immutable, update only an consensus or agreement among the peer that type technique is blockchain. A blockchain is combination of two words block and chain. Block is defining set of transaction and chain is lock which is secure link with other block. A previous block always connects with other block if is not starting block.
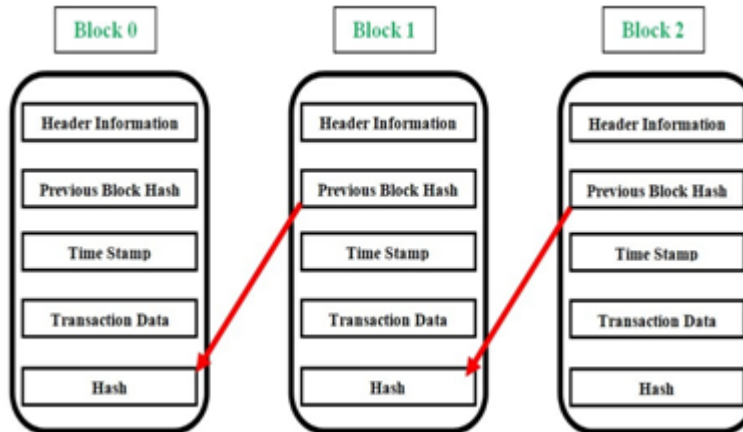

Fig 4. Block

Block of blockchain commonly contains header information, hash of previous block, time stamp, nonce transaction counter, transaction and other attributes.

II.   ELEMENTS

Blockchain is basically combination of different types of elements. If any of its elements not perform properly it totally affects the blockchain. In blockchain contain following elements:-

- Address
- Transaction,
- Block,
- P2P Network, and
- Script.

A.   Address

Address is used in blockchain to uniquely identify, sender and receiver both. Addresses are normally public key or derived from public key.
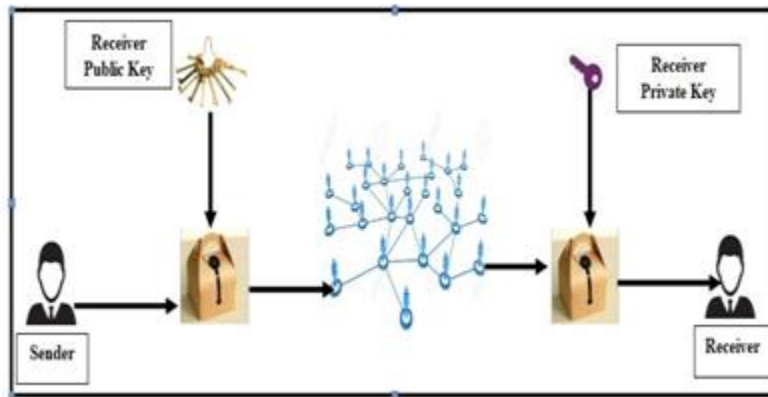

Fig 5. Identification & Authentication

Public keys are used for addressing purpose but private key are used for authentication.

Fig 6. Address generation in blockchain

B.   Transaction

Transaction is backbone of blockchain because it represents a transfer of data from one address to other. Exchange of values between two parties is called transactions. In blockchain transactions are added into block when consensus is performed between parties.
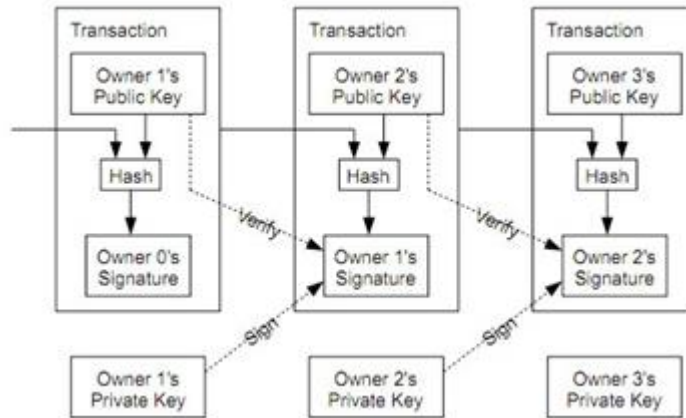
Fig 7. Block connection

C. Block
 A block is combinations of transaction previous block hash pointer, timestamp and nonce.

D. P2P Network
In P2P network all nodes send and receive messages.

E. Script
Transaction script is set of commands which are used by nodes to transfer transaction data node address to another address.

III.   FEATURE OF BLOCKCHAIN

Distributed consensus is used in blockchain to common agreement between all parties without involvement of central authorities.
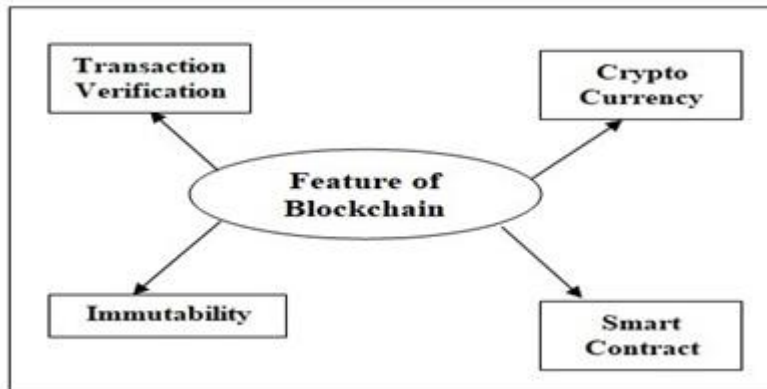

Fig 8. Feature of blockchain

A. Transaction Verification
Any transaction before adding information block, first it will be verified with the help of previous transaction set which are present into block after verification it will be added into the block.
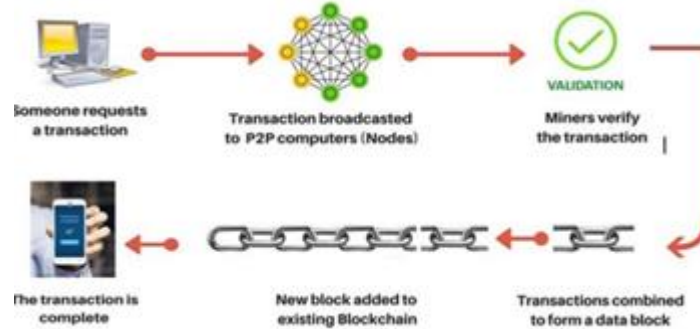
Fig 9. Transaction Verification Cycle

B. Cryptocurrency

A cryptocurrency is given to miners to incentive for verify the transaction and invest resources for secure blockchain.

C. Immutable

A block added into blockchain is immutable. There is less possibility of update any transaction into block because to change into block the majority of nodes have to agree for it.

D. Smart Contract

Blockchain provide set of automated programs which reside under blockchain and run function when business logic needed. It controls all action of users with help of blockchain.

Fig 10. Smart Contract

Smart contracts can:
- Work as 'multi-signature' accounts, so that funds are released only when parties agree.
- It manages agreements between parties.
- Store data about an application.
- Provide support to other contracts (similar to how a software payroll works).

IV.   COMPONENTS

Features such as flexibility, reusability, fast development of networks create endless new and thrilling areas for blockchain.
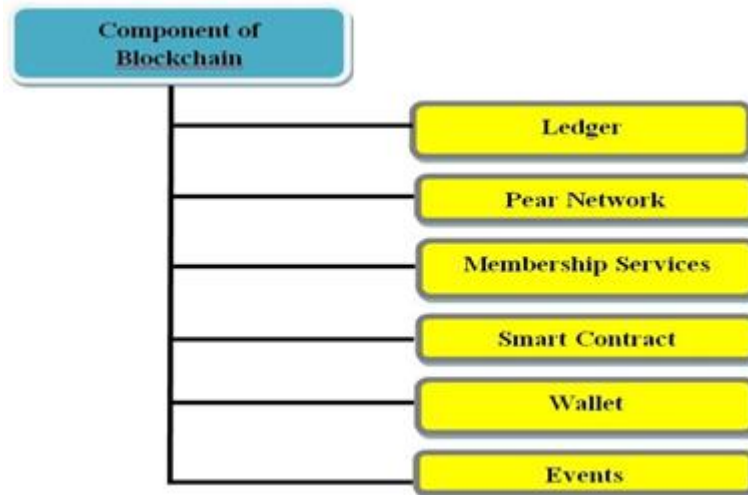
Fig 11. Component of blockchain

1) Ledger:
Distributed immutable record set is called ledger.
- Centralized Ledger
- Distributed Ledger

2) Peer Network:
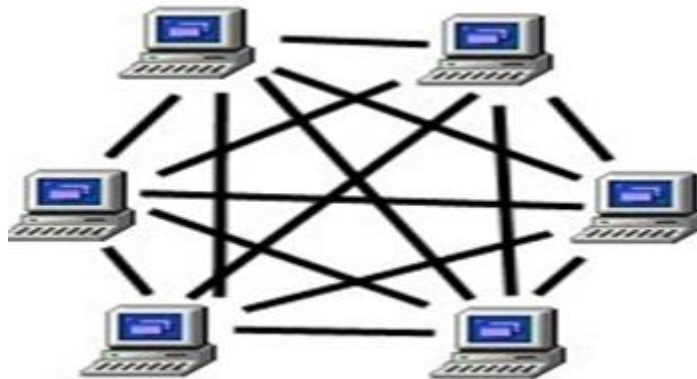A network used for storing and updating the ledger.

Fig 12. Network Topology

3) Membership Services:
Membership services works with user related constraints like authentication, authorization and identity management.

4) Smart Contract:
Smart contract is set of program which used to perform automated task in blockchain.

5) Wallet:
Wallet is used user authentication or authorization purpose and stores the coin

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6) Events:
Event is similar like trigger into blockchain to perform automated tasks.

V.   USECASES

Blockchain is such a powerful technology, which provides power to whole world with it different use cases. There are various platforms which help us to implement different use cases of blockchain. Its use case solves the real world problems, which we previously thought was very challenging and complex task.
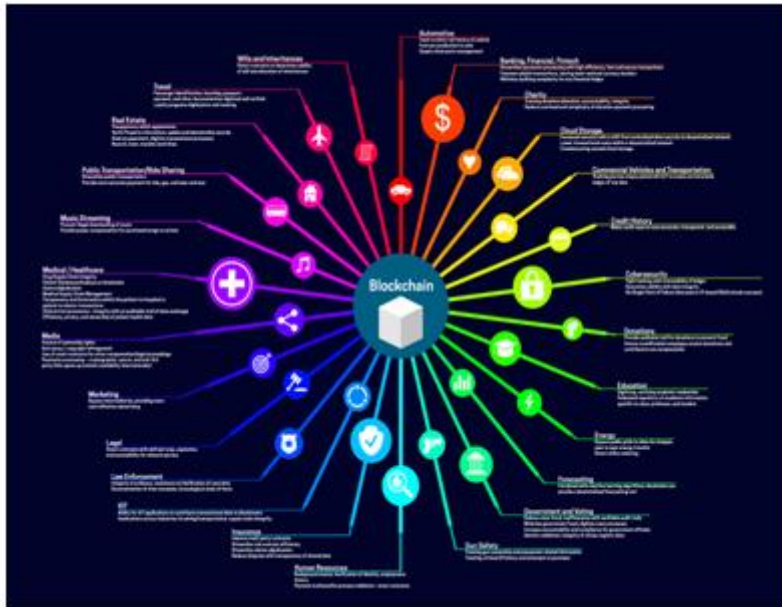

Fig 13. Use cases of blockchain

Blockchain is such a powerful technology, which provides power to whole world with it different use cases.
- Smart Contracts & Dapps
- Decentralized Government
- Blockchain in Banking
- Blockchain in Healthcare
- Blockchain in Real Estate

1) Smart Contracts & Dapps
It is very important part of blockchain use case which have smart contract written into coding format and joined with blockchain to run blockchain easily. The code containing relevant information related to work which is performed by blockchain, code are also containing rules, condition for blockchain in step by step manner to complete desirable task.

2) Decentralized Government
Basically if we watch the government document storing policy, it is centralized. Means if anybody perform editing the document very easily then no one can prove the cheating performed because of centralized system. Consider if document is present with more than one parties then cheating is not easily done.

3) Blockchain in Banking
Similar like other area of government system which needs to update with help of blockchain, banking is most needful area of government organization. Consider example 'A' want to transfer money by its credit card in

shopping, so only bank have power to approve transaction because system is centralized. If we use blockchain technology then data of user is decentralized, so that is no requirement to take permission of bank.

    4) Blockchain in Health

In the area of health blockchain is used to keep the health report of patient and present record to the copy of its report to various doctors for the best possible treatments. Blockchain keep all medical history of patient in single technology and present record in various places at a same time.

    5) Blockchain in Real Estate

In real estate the blockchain is used to remove the fraud and provide document authenticity.

VI.   CONCLUSION

Features such as transaction verification, crypto currency, smart contract and immutability of records create endless new and thrilling areas for blockchain. In future, this wide range where blockchain can be applied would take an integral place in our life. But still, blockchain needs to fulfill the constraints brought by dominating factors such as scalability issues, privacy, security, cost of production and power consumption. In this survey paper, we described the brief overview of blockchain, their applications and the factors influencing the blockchain design.

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