WHITEPAPER

THE FUTURE IS BLOCKCHAIN ERA

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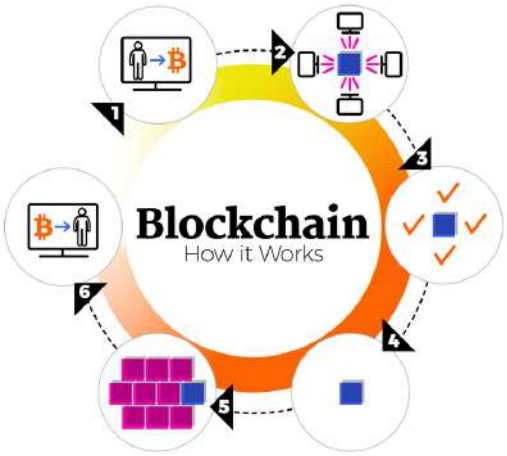
INTRODUCTION TO BLOCKCHAIN



In recent times, there's been a lot of mass traction and crazy talk that is going about the digital currency community.
Many of the leading Organizations are experimenting with Blockchain Technology. In order to understand Blockchain Technology, let's take a look about its types, uniqueness, forms and benefits so that it can help you to decide what the upcoming technology is and which is best for your Organization.

"WHAT IS BLOCKCHAIN"

Blockchain is defined as a data structure that keeps track of the transactional records with confidentiality, integrity and availability (CIA) triad. It is a sequence of records stored in the form of blocks which is distributed as one, instead of a single authority. Blockchain is a distributed ledger that is entirely open and public to everyone connected in the network. Once if the data is stored in Blockchain, it is extremely hard to tamper or pilfer it. Blockchain is an excellent and innovative invention that was invented by a person or by a group of people, referred by a pseudo name of "Satoshi Nakamoto" in 2008, to serve as the public transaction ledger of the first digital currency called as "Bitcoin".

TYPES OF BLOCKCHAIN

At present, there are three types of Blockchain networks in use . They are,

- Public Blockchain
- Private Blockchain
- Consortium Blockchain

PUBLIC BLOCKCHAIN

A Public Blockchain has absolutely no access restrictions, it is an Open Network. Public Blockchains can receive and send transactions from anybody in the world. They can also be audited by anyone. A transaction is considered as valid, only after it gets authorized by each of its constituent nodes through the chain's consensus process. As long as each node satisfies the specific conditions of the protocol, their transactions get validated and in this manner, each block is added to the chain. Public Blockchain has voluminous transmission capacity and receipt power, more than the other structures of Blockchain. Public Blockchain is the model of Bitcoin, Ethereum and litecoin.

PRIVATE BLOCKCHAIN

Private Blockchain is a permissioned one and it's a closed network. Network Administrator has to invite and specify participant and the validator. Only specific, pre-chosen entities have the ability to create new transactions on the chain. Companies that use private Blockchains can ultimately save time and money.

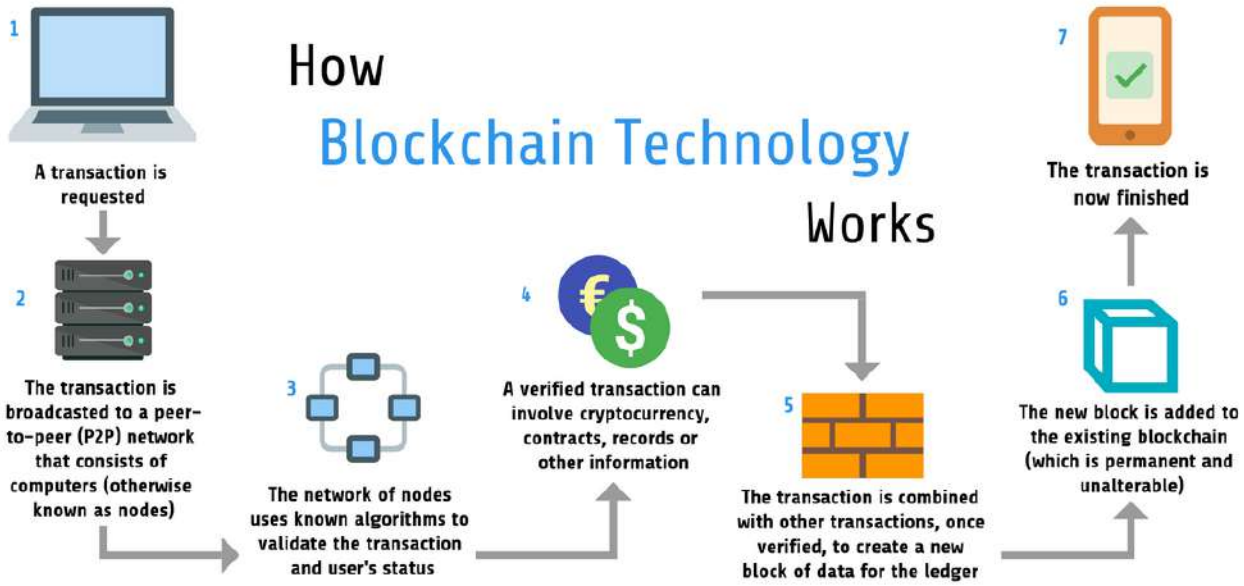
CONSORTIUM BLOCKCHAIN

Consortium Blockchain is a part public, a part private and it's a "split work" at the level of the consensus process". Consortium Blockchain is also permissioned one but instead of a single authority controlling it, a number of organizations might each operate a node on such a network. A pre-selected group of nodes control the consensus process, but other nodes may be allowed to participate in creating new transactions and reviewing it.

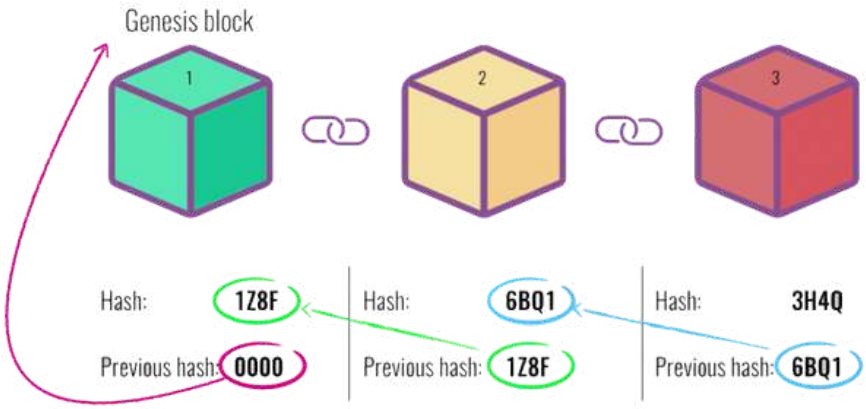
STRUCTURE OF BLOCK CHAIN TYPES

HOW DOES THE BLOCKCHAIN WORKS

A Blockchain is a chain of blocks that contain data or information. Each and every block in the Blockchain stores some transactional information along with the hash of its previous block. A hash is a unique mathematical function that has some secret information about a specific block. The connection of blocks through unique hash values, makes the Blockchain to be a more secure one. The nodes of Blockchain validates each and every transaction that happens in it. These nodes are called “miners”.

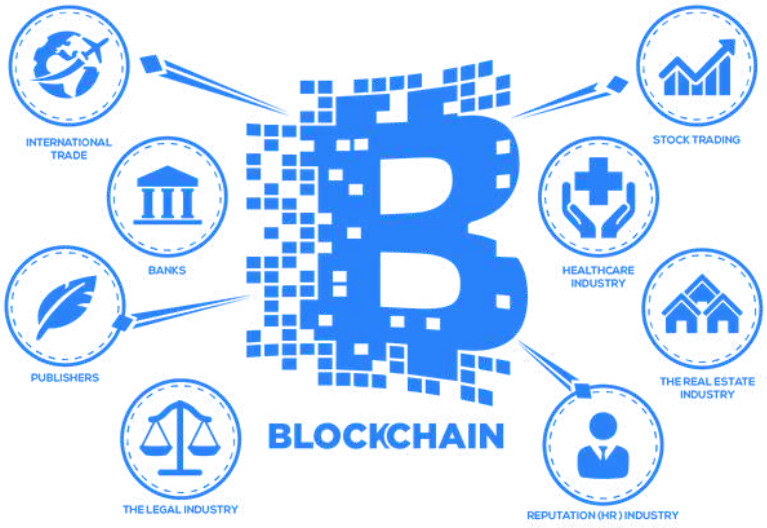


A transaction is considered as a valid one, only if it matches the hash of its previous block. Only after it’s authenticated, it gets added to the chain. If the hacker tries to modify the data in the block or hack the network, the hash value attached to that block also gets modified and thus the breach in the Chain network will be detected, as the tampered hash will not match with the genuine one.



WHY BLOCKCHAIN IS NEEDED

Now a days, Blockchain is acquiring mass attention in a short span of time. Major companies are adopting Blockchain technology due to its unique features and also they don't want to miss out the upcoming revolution in the field of Information Technology. Financial transactions takes milliseconds to execute, clear and settle the cash on the ledger. Blockchain steals the mass attraction due to its efficient data sharing and decentralized storage. Blockchain provides an immutable data backup. Transaction histories are becoming more transparent through the use of Blockchain technology.



Blockchain provides enhanced security as transactions are validated and are becoming tamper-proof data security. There is more improvised traceability in Supply chain management (exchange of goods gets recorded in Blockchain). It replaces the traditional paper-heavy process, time consuming and avoids the possibility for human error occurrence. It eliminates the necessity of a third party or a middle man trust dependencies (Trust the data on the block).

TOP BLOCKCHAIN PLATFORMS FOR ORGANIZATION

1. BITCOIN:

Bitcoin is a Blockchain technology that is based on Cryptocurrency (e-cash or digital currency), which is a decentralized peer-to-peer network in nature, without any interference of intermediate third-parties like Bank or a single administrator.
Official website: https://bitcoin.org/en/
Latest Version: 0.17.1

2. ETHEREUM:

Ethereum is an open source public Blockchain which is a decentralized computing platform that runs 'Smart contracts functionality' and 'Cryptocurrency trading' securely, without the need of a third-party.
Official website: https://www.ethereum.org
Latest Version: 0.10.0

3. HYPERLEDGER:

Hyperledger is a multi-project open source collaborative effort that was introduced by "The Linux Foundation" which is developed primarily for the collaborative development of Blockchain based distributive ledgers and an advance cross-industry collaboration. It does not support Bitcoins or any other cryptocurrencies.
Official website: https://hyperledger.org/
Latest Version: 1.2.0

4. CORDA

The consortium's joint efforts have created an open source distributive ledger platform called Corda. It is mainly introduced to manage complex transactions and also to restrict the access to transaction data. Corda offers confidentiality and provides encryption of the client data.
Official website: https://www.corda.net/
Latest Version: 3.3

5. OPENCHAIN

Openchain is an open source distributed ledger technology that well suits for the organizations to mitigate issues and for managing digital assets in a secured and robust manner. Each transactions are linked to the chain and at the same time, they are submitted to the network.
Official website: https://www.openchain.org/
Latest Version: 0.7

6. MULTICHAIN:

Multichain is a private Blockchain that is created between or within organizations to build and implement Blockchain applications with speed. It is supposed to perform multiple number of transactions per second. It majorly suits for financial sectors to maintain, process and secure data.
Official website: https://www.multichain.com
Latest Version: 1.0.4

7.RIPPLE:

Ripple is a Blockchain that is a peer-to-peer cryptocurrency that connects financial institutions, payment providers and digital asset exchanges via internet in a fast and secure way. It's a distributed open Internet protocol (XRP). It provides exchange and transfer of money for the users with cryptographically signed transaction.
Official website: https://ripple.com/
Latest Version: 1.1.1

BLOCKCHAIN AS OF NOW

As per the Google search data results, it says that Blockchain technology will grow in the upcoming years and people who are all around the globe are getting more conscious and aware about various technologies like Blockchain, Bitcoin, Data mining and AI (Artificial Intelligence). For example:

- The Russian government is experimenting on Blockchain technology for document storage.
- Microsoft partners and Bank of America are showing intense penchant on Blockchain to transform trade finance.
- Abu Dhabi securities exchange, announces Blockchain on E-voting services.
- ICICI bank executes India's first banking transactions on Blockchain partnership with emirates NBD.
- ANZ, US Bank and Wells Fargo are building distributive ledger platform for correspondent bank using Blockchain.
- Walmart and IBM experimenting Blockchain technology for supply chain monitoring systems. These are maintained by Walmart and are stationed on IBM cloud.
- Blockchain related jobs increased thrice from 2017 to 2018.

Many Global Organizations are spending millions of money for Blockchain technology. By the end of 2020, it is predicted that Blockchain will grow up to 42% in the field of Information technology.

BLOCKCHAIN APPLICATION HAVE BEEN ROOTED IN

Blockchain is one of the most powerful upcoming technology that is the base for Bitcoin. The Blockchain technology has led various business, industries, major organizations and startups across the globe to explore technology's potential and to make revolutionary developments in their specific fields.
The following are some of the fields that have implemented Blockchain technology:

1. SMART CONTRACTS

Business deals exist between organizations in order to exchange services or products. These have now become digital as well as self-executable in nature, hence they are called as "Smart contracts". It is similar to paper-based contracts but not prone to any human errors and modifications.
Example: Ethereum, a best known Blockchain technology is used to create health based digital contracts (**smart contracts**) in health insurance field to maintain the consistency in drug supply chain.

2. GOVERNMENT ELECTIONS

Government can introduce Blockchain technology in elections to eradicate the chances of frauds like fake voting through anti-social elements. Traditional voting method relies more on human process.
Example: "DemocracyEarth" is a Blockchain technology that aims to create a peer-to-peer protocol for government voting system. People who were in power are accountable for their actions because of the transparency nature of Blockchain technology. This will eliminate the frauds and allow transparency and security (privacy for voters).

3. IDENTITY MANAGEMENT

Blockchain technology is used as a solution for Online Identity solution. In Blockchain, User's identity can be proven to be authentic with the help of distributive ledger function in Blockchain. Distributive ledger uses public and private key encryption techniques to recognize and pinpoint user.
Example: "SelfKey", "Civic", "TheKey" are the Blockchain functions used to manage the identity of an individual user securely by having a multilevel authentication function or biometric function.

4. COPYRIGHTS AND OWNERSHIP

Copyright claims are one of the major functions for any organization to claim the ownership of the products or services they create and offer. Blockchain helps the corporates and other organizations to create a tamper proof evidence (digital signature), which will be helpful in maintaining the authenticity of their copyright products and services.
Example: "Authorship" is a concept of Blockchain technology which uses a digital signature (token system) to identify owner information of the product like the author, publisher and translator of a book and also to provide equality in their shares

5. BANKING AND FINANCE SECTOR

Banking and Finance sector play a major role in country's economy. It is a bitter fact that banking and all other finance sector companies were targeted by hackers and it's prone to lot of cyber threats. From data tampering to complete data breach, banks get affected every day. Blockchain introduces a technology called **SALT** (Secured Automated Lending Technology) which will be very much helpful for any financial organization in reducing bank frauds

Example: "WeTrust" and **"ETHLend"** are a couple of financial platforms that are also based on the Blockchain. These technologies enable **peer-to-peer lending**, saving accounts, insurance etc

6. ENERGY AND POWER PRODUCTION SECTOR

Blockchain technology helps the Power plant sectors to provide the power services directly to consumers (Electricity from solar and wind energy). It provides more transparency in their operations. This is the concept of peer-to-peer trading of electricity, without the requirement of an intermediate authority.

Power production sectors have a major role in the economy of any Country's Government. Also, now a days it becomes easier for hackers to take control of the power production systems because most countries provide power supply systems with internet. Hence, it becomes vulnerable.

Example: "PowerLedger" is an another concept of decentralized energy trading approach that aims to trade surplus energy to the citizens, mainly at the apartment-level to eliminate the need of power plant companies and decentralize the energy sector. A Lithuanian startup introduces Blockchain technology called **"Wepower"** to invest in green energy projects together with the trade of renewable powers at a larger scale.

"Grid+" is a concept of Blockchain that works with Artificial Intelligence to analyze energy consumption patterns and to buy energy accordingly.

7. SUPPLY CHAIN MANAGEMENT

Supply chain industry is facing a lot of struggles like:

- Time and electricity consumption
- Fuel cost rise
- Transportation
- To supply products efficiently to retailers and consumers with a minimal cost.

Blockchain offers a promising fix to these problems. Over production of products and wasting of valuable resources like water and electricity can be avoided by the implementation of smart contract concept (products would be manufactured only when a certain number of demand is attained). It is possible to lock the cash into a legally signed agreement based deal, where the production will start only when a particular number has been reached.

Example: "VeChain" and **"ShipChain"** are the two Blockchain projects that are going on the Supply Chain industry meant for bringing remarkable change in future.

8. HEALTH CARE INDUSTRY

Besides banking sectors, one must admit that health care industries are also getting affected by cyber threats and attacks on everyday basis. In health sector, there are high chances of data forgery, loss, and tampering of medical records through some cyberattacks. Blockchain in health care industry provides two major advantages. First, it builds a trust relationship between the consumer and the industry. Second, it eliminates the cyber threats posed on medical data records. Medical data records can become more secure and tamper free with the help of Blockchain.

Example: Estonia Government has signed the deal with GuardTime (Enterprise Blockchain) to provide Blockchain services, to protect the medical data of the citizens.

9. CRYPTOCURRENCY EXCHANGES

It is hard for Organizations to believe and spend in the concept of decentralization due to the fear that cryptocurrency may be stolen from centralized exchanges.

Example: Many **DEXs** like **Catalyst, NEX** are improving and paving new platforms for cryptocurrency based data-driven technologies and for integrating the payment services.

10. HUMAN RESOURCE MANAGEMEMNT

Recruiting the right people for your business is the most important part of your organization as it makes a great impact on the revenue growth and profit margin of the organization. Blockchain technology helps to maintain and manage the Human Resource in a more efficient and in an accurate manner. Personal Data is stored in an easily accessible tamper-proof ledger that can save time consumption. It will recruit a candidate who is more efficient and to order all the extraneous process that are related to the HR, like granting an employee bank account, loans, Provident funds and medical benefits.

Example: A concept of Blockchain called **"ChronoBank"** is created that aims to help the HR professionals in recruiting the perfect and well suited healthy candidates as they want.

11. BLOCKCHAIN AS A SERVICE

Many technologies are rising in today's business world and are driving the Information Technology field ahead. Blockchain Technology is one such kind. Many organizations are implementing Blockchain Technology to make themselves as the pioneers in the field for that Software.

Example: Blockchain concepts such as **"Stratis"** and **"Ardor"** have been created to offer end-to-end solutions for the software development. It makes the testing and deployment on Blockchain in a simplified manner.

12. SOCIAL MEDIA AND COMMUNICATION

Communication security plays a pivotal role in the fast growing tech world. The privacy of an individual has become a prey to many attacks and threats. Blockchain builds trust and safeguards the privacy of an individual. Implementing the Blockchain in communication sector will ensure the feasibility for a 'Secured Encrypted Communication Channels' over Social Networks.

Example: Blockchain concept is commonly adopted in some of the popular messaging platforms like, **Telegram, KIK, Slack, Crypviser** and the **Mercury Protocol.** These are some (Ethereum based Blockchain) platforms that offer the users with a secure end-to-end encryption functionality during communication.

ROLE OF BLOCKCHAIN IN CYBERSECURITY

Blockchain has a remarkable role in the field of Cybersecurity and it has more scope in future by eliminating much of the human participation from the data storage. Adopting Blockchain in cybersecurity helps to mitigate the risks caused by human error which is the major reason for security breach.

PROTECTED USER AUTHENTICATION

Centralized data structure, simple authentication mechanism and weak logins are the major threats for conventional systems. Blockchain brings a decentralized public key infrastructure for authenticating end devices and individual users. Blockchain provides each device with a unique SSL certificate instead of password that makes it impossible for hackers to implement fake certificates.

ENCRYPTED COMMUNICATION CHANNEL

Major organizations are concerned about their internal communication security over chats, mails and messaging. For this, Blockchain provides with an improvised Public Key Infrastructure to provide an End-to-End secure encrypted communication channel and helps in protecting the privacy of an individual.

SHIELD TO DOS & DDOS THREATS

A DoS and DDoS attack is that of denying the service to the users of the targeted resource such as server, website or an organization, with a single or a group of compromised systems by Hackers. This mainly occurs due to the existing Domain Name System (DNS). Blockchain provides an excellent solution by decentralizing the DNS and distributing the contents to multiple number of nodes, thus making it hard and impossible for the Hackers to crash or compromise the system.

FLAWLESS DNS SYSTEM

Most probably Hackers target the organization's DNS to perform intrusion and malicious activities that knocks down the DNS service providers. Blockchain implementation stores these DNS entries and record information in a distributive chain of ledger (block). It improves the security widely by eliminating that one single target that can be compromised.

PROS OF BLOCKCHAIN TECHNOLOGY

- The Decentralized nature makes Blockchain to be more transparent and immune against the fraud or malfunction that happens in the centralized authorities like Bank and Government.
- Blockchain technology is highly secure, the block encryption in the chain makes it difficult for hackers to interfere or tamper the data on the block.
- Blockchain provides high quality of data. Each data is complete, in time, consistent and accurate.
- Blockchain provides solid evidence for the transaction. Blockchain validates each and every transaction and eliminates the chances of human error. It converts into a block and gets added to the Blockchain.
- Users are empowered to control all of their information and transactions.
- User can trust the transactions which will be executed exactly as per the protocol based commands. It provides process integrity.
- Tracking of goods, their origin, quantity and it simplifies the process of copyrights issues, product productions and payment services.
- Blockchain facilitates peer-to-peer global transfer of money in a faster and in a more secure manner.
- Blockchain eliminates the trust dependency of Centralized network and Third-party interference.
- Blockchain greatly reduces the transaction fees.

CONS OF BLOCKCHAIN TECHNOLOGY

- Blockchain consumes large amount of energy when compared to the end result. Giant mining farms burn a lot of electricity during the creation of each Block.
- There is no correlating, no cooperative and no mutual assistance. Blockchain is only an instant one.
- Mining does not provide network full security because if miners gets corrupted and combined, they can rewrite and alter Blockchain records.
- Expanding and Updating nature of the block makes the Blockchain a weaker one
- Blockchain is not immortal. The country authority Government or Commercial Corporate Organization can prevent indestructibility such as from cutting off communication or electricity and makes it to hijack or seize server farms.
- Too much transparency nature of Blockchain in financial sectors is a possible drawback, though it is an advantage in other fields.
- Blockchain life span is limited under current chances. In Ethereum network case, it had accumulated 200 GB+ history data in the Blockchain in its two and half years of usage.
- Blockchain is open and public (everyone can see anything). There is no real anonymity in Blockchain, it gives a pseudo anonymity.
- Blockchain miners seek high rewards for completing transactions in a supply and demand case.
- Digital currencies that are based on Blockchain technologies aren't of a fixed value. It is volatile in nature. E.g. No one can assure the rise and fall of Bitcoin value.
- Government controls the modern money in each and every part of the world. This becomes a major obstacle for cryptocurrencies to get approved by the pre-existing financial institutions.

CONCLUSION

Other than these fields, Blockchain technology has begun to rise and prove its potential and powerful features in many different platforms and industries. Many organizations have already begun to implement Blockchain Technology in their business and where some others are finding the best and possible ways to start with. Blockchain will bring a sense of freedom and equality through its distributive and decentralized power. It creates a multiple platform for individuals, small organizations and even for the upcoming startups to compete with the big sharks and major corporate powers, whom have their dominance and influence in the field. However, Block chain and Bitcoin are most important words in today's technology. If internet changed the way we transfer info, Blockchain changed the way we transfer values. The advent of Blockchain is a priceless asset to the cybersecurity field and for many organizations. They have proven their prosperity by their roaring potentiality over other security systems and are a great revolution in various organizations and so it is a must for the information security professionals to be cognitive and coherent with daily happenings in the area of Blockchain. Once Blockchain is implemented and recognized worldwide, it will transform and simplify the activities of our day to day life in many lucrative ways.

"Blockchain may be a new name to the Tech world but it will last for sure."

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