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A SURVEY OF HOW SECURE THE BLOCKCHAIN TECHNOLOGY COMPARED TO OTHER TRANSACTION TECHNOLOGY AND OTHER INVESTMENT PLAN

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ABSTRACT

Blockchain technology is an advanced database mechanism that allows transparent information sharing within a business network. A blockchain is a database that stores data in blocks in which it is linked together in a form of a chain. These blockchains use cryptography to store data in blocks. Different types of information are used for storing information on a block chain but the most commonly used transaction has been a ledger."In another words, the digital ledger is like a Google spreadsheet shared among a number of computers in a network, in which, the transactional records are stored based on actual purchases. In the network of several people included anybody can see the data, but they can't corrupt it". This paper we are proceeding with how secure the blockchain technology is, and the investment type based on this technology.

Key words: Blockchain, Cryptography, Digital Ledger

[1] Introduction:

In today's world people have various sources of income in various fields, At the same time they also search for various means of investment. In today's digital world there are various means of investment plans that has taken various forms and still it is been upgrading day by day. In this people find more challenging is, **"the investment must give good returns and also it must be secure".** Nothing wrong in people's mind set, their money should be invested in such a way that it should be protected in all means. So, to overcome this problem , in this paper we say how effective it is to invest in Bitcoin and technically how secure that kind of the investment would be. In this paper we have included what is cryptography and how the cryptocurrency works.

[2] Asset Management:

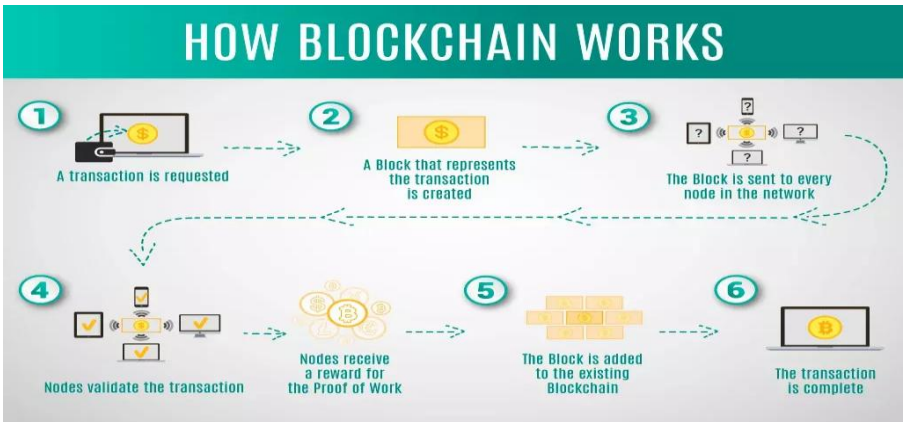
One of the biggest applications of blockchain is the asset management. Block chain also play a big part in the financial world and it is no different in asset management.

What are Blockchain?

- Blockchain is a new data structure that is secure, Cryptography-based and it is distributed across a network.
- The technology supports crypto currencies such as bitcoin.
- This helps transfer of any data or digital asset.a

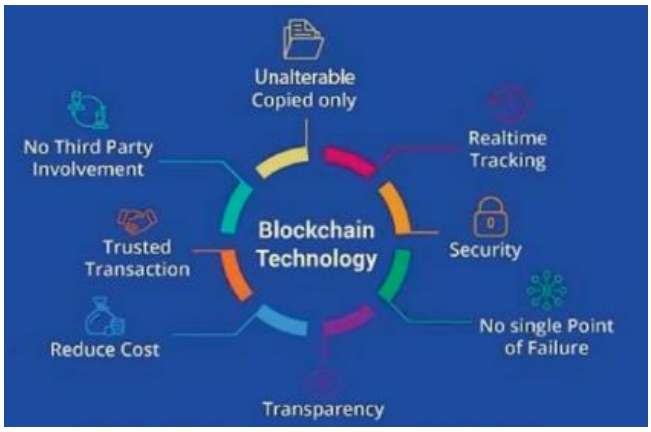
How it operates?

1. The technology allows transaction to be simultaneously anonymous and secure, peer to peer instant and friction less.
2. It does this kind of transaction by a large global network code and cryptography distributing trust from powerful intermediaries.
3. This enables a tamper proof public ledger of every transaction that ever happened on the network.
4. The "current" part of the block chain is a block, which is used to record some or all of the recent transactions. Once the transaction is completed, the transaction enters into the block chain as permanent database.
5. Once a block gets is complete, a new block is generated. These blocks are linked to each other in proper linear, chronological order with every block containing a hash of the previous block.



[3] Structure and Design of Blockchain

A blockchain is a distributed, immutable, and decentralized ledger at its core that consists of a chain of blocks and each block contains a set of data. Using cryptographic techniques the blocks are linked together and form a chronological chain of information. The structure of a blockchain is designed in a way that ensure the security of data through its consensus mechanism which has a network of nodes that agree on the validity of transactions before adding them to the blockchain.



Blocks:

A block in a blockchain is a combination of three main components:

1. The **heade**r contains a metadata which has a timestamp that has a random number used in the mining process and the previous block's hash.

2. The **data section** contains the main and actual information like transactions and smart contracts which are stored in the block.

3. **The hash** is a unique cryptographic value that works as a representative of the entire block which is used for verification purposes.

Block Time:

It is the time taken to generate a new block in a blockchain. Different blockchains have different block times, this may vary from a few seconds to minutes or in hours. This is depends upon the transaction number. Shorter block times can give faster transaction confirmations but the result has higher chances of conflicts. The longer block times may increase the timing for transaction confirmations but reduce the chances of conflicts.

Hard Forks:

A hard fork refers to a permanent divergence in the blockchain's history that results in two separate chains. It can happen due to a fundamental change in the protocol of a blockchain and all nodes do not agree on the update. Hard forks can create new cryptocurrencies or the splitting of existing ones and it requires consensus among the network participants to resolve.

Decentralization:

Decentralization is the key feature of blockchain technology. In a decentralized blockchain, there is no single central authority to control the network. In decentralization, the decision-making power is collectively based on validation and agree on the transactions to be added to the blockchain and distributed among a network of nodes . This decentralized nature of blockchain technology helps to promote transparency, trust, and security. It makes to reduce the risk to rely on a single point of failure and minimizes the risks of data manipulation.

Finality:

Finality refers to the irreversible confirmation of transactions in a blockchain. When a transaction is added to a block and when the block is confirmed by the network, it becomes immutable and cannot be reversed. This feature ensures the integrity of the data and prevents double spending, providing a high level of security and trust in Blockchain Types & Sustainability

Openness:

Openness in blockchain technology makes the blockchain accessible to anyone who intends to participate in the network. This implies that it is open for all and anyone can join the network, validate transactions, and can add new blocks to the blockchain, so long as they know the consensus rules. Openness promotes inclusivity, transparency, and innovation, as it allows for participation from various stakeholders.

[4] How these features enhance investment security:

Cryptographic security and immutability make it very difficult for hackers to alter transactions or steal funds. The transparent nature of the blockchain allows investors to track their investments and verify transactions, increasing trust and accountability. The decentralized nature of the blockchain eliminates the risk of a single point of failure or control, making it more resistant to attacks and manipulation.

How Does Blockchain Technology Work?

The advancements of Blockchain are still in process to develop and emerge. It have the potential to be revolutionary in the future.

Blockchain is a combination of three leading technologies:

1. Cryptographic keys
2. A peer-to-peer network containing a shared ledger
3. A means of computing, to store the transactions and records of the network

Let's take a example bitcoin which is based on blockchain.

Is Bitcoin based on blockchain?

Bitcoin is built upon blockchain technology, It works as the underlying system for recording and verifying transactions in a secure and transparent manner.

[5] Bitcoin:

Bitcoin is a form of digital currency that uses blockchain technology to support transactions between users on a decentralized network. It is a part of mining process, that helps people for transaction through validation. Bitcoin makes us to invest in a way that a asset can become volatile. There may several risks involved in Bitcoin investments, but it still places a unique role in investment.

Bitcoin works through the collaboration of computers, each of which acts as a node in the peer-to-peer bitcoin network. Each of this node maintains an independent copy of a public distributed ledger. This ledger is responsible for all transactions within the system called a blockchain, and it does not include any central oversight. These transactions are validated through cryptography. This makes anyone impossible to crack other person data. One cannot spend on other person's bitcoin without other person's knowledge since the owner keeps sensitive data secret.

Cryptography keys consist of two keys – **Private key and Public key**. These keys help in performing successful transactions between two parties. Each individual has these two keys, using these keys they produce a secure digital identity reference. This secured identity is the most important aspect of Blockchain technology. In the world of cryptocurrency, this identity is referred in the term of 'digital signature' and is used for authorizing and controlling transactions.

The digital signature is merged with the peer-to-peer network. This digital signature can be merged with a peer – to – peer network and this is used by a huge number of individuals. These individuals acts as a authorities and uses this digital signature. This is done reach a consensus on transactions among other issues. When they authorize a deal, it is certified by a mathematical verification, which results in a successful secured transaction between the two network-connected parties. So

on the whole, Blockchain users employ cryptography keys to perform different types of digital interactions over the peer-to-peer network.

What is the next bitcoin like investment?

The next evolution of cryptocurrency that was designed like Bitcoin was Ethereum. It added more functionality of Bitcoin by adding some extra functionalities. Ethereum uses decentralized tokens and applications in addition to currency, while Bitcoin is used to only trade virtual currency in a decentralized and public way.

[6] Other Types of Investment

Before going for the next level of Bitcoin we discuss some other investment beyond cryptocurrencies based on Block Chain. Some of the investment plan is as follows.Here we discuss some of the other type of investment which has its own level risk, potential returns and suitability. We also see the advantages and disadvantages of the other investment plans.

Stocks: - Purchasing stocks means owning a small share of a company, granting you partial ownership. Let's discuss some of the advantages and disadvantages of stick market.

Pros of Stock Investment:

It has High Potential Returns, where the investors see a notable amount of returns as the business grow and evolve. This makes a rapid expansion in companies with strong performance. It has Dividend Income which is nothing but addition to the capital appreciation(if at all the stock price gets increased), the shareholders are also benefited with the dividends. This enables them to earn passive income while holding onto their shares. It has Liquidity which means in addition to dividend it also offers investors significant flexibility of stocks can be easily bought and sold on stock exchanges. It has certain Ownership and Voting Rights which depends upon the type of stock they own, the shareholders have the ability to join in the company decision according to their voting rights.

Cons of Stock Investment:

Volatility and Risk are involved in stock that is due to certain factors stock values can fluctuate. The factors include market trends, economic changes, or negative news about companies, potentially resulting in financial losses.It requires much Knowledge and Time to mange a successful stock because it requires thorough research, close monitoring of markets, and a good grasp of trends. At the end it can be time consuming.There is no guaranteed in returns in stocks.

Bonds: -Lending money to governments or corporations in exchange for regular interest payments. These investments carry low to moderate risk and offer steady returns, generally lower than stocks.

Pros of Bonds:

It is a steady income in it which offer consistent interest payments and this makes the investors suitable, who is looking for a reliable income source.Capital Preservation is ensured in these Bonds in which it must have a set maturity date. In this the original principal is repaid to the investor. Bonds help diversification of an investment portfolio by balancing the risk of stocks with the stability of fixed-income securities.

Cons of Bonds:

Bonds usually offer lower returns compared to stocks, especially when it takes a long term. If involves a risk of which if interest rates go up, the value of existing bonds can go down. Inflation can be a risk which can reduce the real value of the interest payments you receive.

Mutual Funds: -Mutual funds involve combining funds from multiple investors to invest in a variety of assets, including stocks and bonds.

Pros of Mutual Funds:

Fund managers with expertise handle mutual funds and this makes the investors to make the decisions based on thorough research and market trends. Mutual funds are simple to invest in because it requires only a small initial amount. They are suitable for investors who prefer a hands-off approach.

Cons of Mutual Funds:

The additional costs charged by mutual funds can lower the total returns earned by investors over time. Since the fund manager handles portfolio management, the investors do not have control over individual investment decisions When a fund manager sells assets in the portfolio, it may trigger capital gains taxes, which the investor must pay even if they haven't sold their own shares.

Fixed Deposit:

A Fixed Deposit (FD) is a financial instrument offered by banks and non-banking financial companies (NBFCs), allowing individuals to invest a lump sum amount for a predetermined period at a fixed interest rate. This investment option is known for its safety and predictability, making it a popular choice among conservative investors

Pros of Fixed Deposits:-

FDs are considered low-risk investments, making any investor to be suitable for individuals who seek to preserve their capital while earning a fixed return. The interest rate on an FD is fixed at the time of investment this provides certainty about the returns at maturity. Senior citizens may avail higher interest rates and tax exemptions on interest income up to a certain limit.

Cons of Fixed Deposits:-

Since the FD's keep pace with inflation and it offers fixed returns this ultimately lead to a decrease in the real value of returns over time. Unlike equities or mutual funds, FDs do not offer the potential for capital appreciation, limiting the growth of the investment.

Venture Capital / Private Equity: -

Venture Capital (VC) and **Private Equity (PE)** are types of investment where funds are invested in private companies (not listed on the stock exchange) with high growth potential.**VC** typically invests in startups and early-stage companies.**PE** invests in more established private companies and often helps improve or restructure them before selling for profit.

Pros of Venture Capital / Private Equity:-

Successful investments can generate very high profits, especially if the company grows or is acquired. Business Growth Support: - VC/PE investors often provide business guidance, expertise, and industry connections along with funding.

Cons of Venture Capital / Private Equity:-

Many startups and private companies fail, leading to a complete loss of investment. These opportunities are mostly available to institutional investors or high-net-worth individuals. This does not provide any kind of security on the investment.

[7] How Blockchain Technology is Secure

At the core of blockchain's security is its architecture. Blockchain is Decentralized where there is no single point of failure, since data is distributed across thousands of nodes worldwide. It is Immutable since the data written in the blockchain, cannot be changed without network consensus. This helps in preventing fraud and tampering. It is Transparent since all the participants can verify transactions publicly. It is Consesus since it require Algorithm like proof of work or proof of stake. It uses Cryptographic and uses advanced encryption to secure data and user identies. It does not require any middle men , this reduces the human error or manipulation.

[8] Conclusion

Since there are fewer intermediaries it leads to lower transaction costs. Anyone with an internet connection can participate without any barriers to enter. It is completely automated which reduces human error fraud and this makes even the complex transaction to speed up. Crypto market works 24/7 that is it is open around the clock, unlike stock markets which is not open all the time. This includes new financial products like DeFi, NFTs. These does not exist in traditional markets. Hence it is concluded that among the recent invest plan based on computer technology, Block chain provides a most secure and trustable investment plan.

[9] References:

[1] Bitcoin: A Peer-to-Peer Electronic Cash System by Satoshi Nakamoto satoshin@gmx.com.

[2] Blockchain - KPMG technology risk insights by Bryan McGowan Principal Technology Risk Management T: 816-802-5856 E: bmcgowan@kpmg.com, Brian Consolvo Managing Director Technology Risk Management T: 757-646-6378 E: bconsolvo@kpmg.com, Ahmed Saleh Director Technology Risk Management T: 402-661-8713 E: amsaleh@kpmg.com.

[3] S. Nakamoto, Bitcoin: a peer-to-peer electronic cash system, Available online: htt ps://bitcoin.org/bitcoin.pdf, 2008. (Accessed 19 July 2021).

[4] W. Diffie, M. Hellman, New directions in cryptography, IEEE Trans. Inf. Theor. 22 (6) (1976) 644–654, https://doi.org/10.1109/TIT.1976.1055638.

[3] M. Castro, B. Liskov, Practical Byzantine fault tolerance, in: Proceedings of the 3rd Symposium on Operating Systems Design and Implementation (OSDI'99); 22–25 Feb 1999; New Orleans, LA, USA, USENIX Association, Vancouver, BC, Canada, 1999, pp. 173–186.

[4] D. Yaga, P. Mell, N. Roby, K. Scarfone, Blockchain technology overview, NIST Interagency/Internal Report (NISTIR), https://doi.org/10.6028/NIST.IR.8202, 2018.

[5] V. Buterin, Ethereum white paper, GitHub Repository 1 (2013) 22–23.

[6] Z.B. Zheng, S.A. Xie, H.N. Dai, et al., An overview of blockchain technology: architecture, consensus, and future trends, in: 2017 IEEE international congress on big data (BigData congress); 25–30 Jun 2017; Honolulu, HI, USA, IEEE, Piscataway, NJ, USA, 2017, pp. 557–564, https://doi.org/10.1109/BigDataCongress.2017.85.

[7] T.T. Kuo, H.E. Kim, L. Ohno-Machado, Blockchain distributed ledger technologies for biomedical and health care applications, J. Am. Med. Inf. Assoc. 24 (6) (2017) 1211–1220, https://doi.org/10.1093/jamia/ocx068.

[8] G. Zyskind, O. Nathan, A.S. Pentland, Decentralizing privacy: using blockchain to protect personal data, in: 2015 IEEE Security and Privacy Workshops; 21–22 May 2015; San Jose, CA, USA, IEEE, Piscataway, NJ, USA, 2015, pp. 180–184, https:// doi.org/10.1109/spw.2015.27.

[9] A. Azaria, A. Ekblaw, T. Vieira, et al., Medrec: using blockchain for medical data access and permission management, in: 2016 IEEE 2nd International Conference on Open and Big Data (OBD); 22–24 Aug 2016; Vienna, Austria, IEEE, Piscataway, NJ, USA, 2016, pp. 25–30, https://doi.org/10.1109/obd.2016.11.

[10] D.B. Resnik, Compensation for research-related injuries, ethical and legal issues, J. Leg. Med. 27 (3) (2006) 263–287, https://doi.org/10.1080/ 01947640600870866