



# REVIEW REPORT ON: LAND LEDGER IN BLOCK CHAIN

This paper is totally based on the study and information gather on the different Blockchain and network

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**Abstract**— Land and real estate can be recognized as one of the core assets in any country in the world. Governments spend a great deal of money identifying, defining, managing and maintaining transactional information relating to national land and property. Establishing an appropriate mechanism for making this information available to the public can be seen as one of the key indicators of a country's development. The system currently used in India to record land and property transactions is a ledger-based system where all information is stored in handwritten folios. This method is inefficient, time consuming, unsafe and complex compared to the sophisticated systems used in the world's developed countries. This research is being conducted to find safe, efficient and cost-effective solutions to concerns and other issues related to land and property transactions in India. The proposed solution includes a distributed ledger for recording land and real estate transactions, based on blockchain technology. All new transaction entries are validated by the smart contract to verify transaction validity. After performing a proper consensus mechanism, transaction records are stored in cryptographically protected blocks. Data integrity could not be violated. In addition, investors and land buyers can learn about current market trends and forecasts before purchasing or investing in land. In addition, the proposed system helps users to view land information graphically, allowing system users to view land parcels of interest without having to physically go to the actual location via a geographic information system. make it possible.

**Index Terms**—technologies,computer,innovation,domains

## I. INTRODUCTION

The Record of Rights (RoR) of the Department of Revenue & Land Reforms is accurately exploring the blessings of blockchain generation in land registration due to obvious economic control and transactions. Blockchain withinside the land registry is applied for steady switch of belongings [1]. The idea of clever contracts permits updating of the file automatically; in any other

case the possession is transferred to the client thru an software form. With the usage of blockchain and clever contracts, the knowledge approximately the possession of belongings is assured [2]. This generation constructed the consider among events in transactions because the settlement is applied and imposed automatically. It additionally makes the enterprise transactions quicker and extra organized. It guarantees the originality of land records, constructed the customer's religion withinside the government, extra handy to the customer, improves the safety of data [3]

A blockchain network is a system comprised of two or more nodes that are linked to the same computer network and share the same blockchain configuration. The blockchain setup takes the form of a file called the genesis file or genesis block, which defines the rules for the blockchain network. In any blockchain-based technology, the genesis file defines the initial block. It serves as the foundation for the insertion of more blocks to construct a chain of blocks. It determines how often new blocks may be added to the blockchain, the network's consensus method, the maximum cost of transactions, and the accounts that should be pre-funded when the network is set up [4]. This genesis file must be present on every node that wishes to join to the blockchain network. Blockchain networks enable network nodes to transact with one another, and some blockchain networks also enable the deployment of decentralised applications in the form of smart contracts.

## II. HISTORY OF BLOCKCHAIN

Given the impact that blockchain technology is having on a variety of industries, including manufacturing, education, and finance, it must rank among the most significant inventions of the twenty-first century. Many people are unaware that Blockchain has a history that extends back to the early 1990s. Numerous uses have emerged since its popularity began to soar a few years ago, all but underscoring the kind of influence it is bound to have as the

race for digital economies heats up. We'll learn about the development of the blockchain and its history in this conversation.

#### A. History of Blockchain Technology – Timeline Infographic

For blockchain lovers and hopefuls, understanding the history of blockchain is crucial. So, in order to assist our reader in understanding the history of blockchain technology and how it has developed, we have included a full history of blockchain technology guide.

##### B. 1991-2008: Early Years of Blockchain Technology

Why did the blockchain develop? In 1991, Stuart Haber and W. Scott Stornetta conceived of what many today refer to as blockchain. Their initial project was creating a chain of blocks that was cryptographically secure such that document timestamps could not be altered. The system was modified in 1992 to include Merkle trees, which increased performance and allowed for the accumulation of more documents on a single block. However, because to the efforts of a single person or group going by the name of Satoshi Nakamoto, Blockchain History begins to gain significance in 2008. Blockchain technology is credited to Satoshi Nakamoto as its creator. There isn't much information available about Nakamoto, who is thought to have worked on Bitcoin, the first use of the digital ledger technology. In 2008, Nakamoto conceived of the initial blockchain, from which the technology developed and found use in a variety of applications outside of cryptocurrencies. In 2009, Satoshi Nakamoto published the first whitepaper on the subject. He described in the whitepaper how the technology was perfectly suited to increase digital trust given the decentralisation component, which meant nobody was in charge of it. Since Satoshi Nakamoto left the scene and gave control of the development of Bitcoin to other core developers, the technology of digital ledgers has developed, giving rise to new applications that make up the blockchain's history. Frequently asked: When was blockchain invented? As we can see, blockchain technology was created in 1991.

### III. BLOCKCHAIN STRUCTURE

A peer-to-peer distributed ledger that is secure and used to record transactions among multiple computers is what Blockchain is, expressed simply. The only way to change the ledger's contents is to add a new block that is connected to an existing block. It can also be thought of as an internet-based peer-to-peer network. Blockchain, in layman's or business terms, is a platform that enables individuals to conduct transactions of any kind without the need for a central or reliable arbitrator. Everyone has access to the constructed database's contents because it is transparently shared across network users. Peer-to-peer networks and a time stamping server are used to manage the database on their own. Each block in a blockchain is set up so that it refers to the information in the block before it. Batches of transactions that have been endorsed by network participants are stored in the blocks that make up a blockchain. A cryptographic hash of a previous block in the chain is included with each block.

##### A. Evolution of Blockchain: Phase 1- Transactions

Blockchain 1.0: Bitcoin Emergence, 2008–2013 The majority of people think that Bitcoin and Blockchain are interchangeable terms. That is untrue, as one is the fundamental technology that

underlies most apps, among them cryptocurrency. As the first implementation of Blockchain technology, Bitcoin was created in 2008. It was described in full as an electronic peer-to-peer system by Satoshi Nakamoto in his whitepaper. Nakamoto created the first block, known as the "genesis block," from which subsequent blocks were mined and connected to create one of the longest chains of blocks carrying various types of data and transactions. Numerous applications have emerged since the advent of Bitcoin, a blockchain-based application, all of which aim to take advantage of the capabilities and guiding principles of the digital ledger technology. As a result, there is a vast number of uses for blockchain technology that have emerged over the course of history.

##### B. Evolution of Blockchain: Phase 2- Contracts

Blockchain 2.0: Ethereum Development from 2013 to 2015 As one of the original contributors to the Bitcoin codebase and in a world where innovation is the norm, Vitalik Buterin is among a growing number of developers who believe that Bitcoin has not yet fully utilised the potential of blockchain technology. Because of the limits of Bitcoin, Buterin began developing what he thought would be a flexible blockchain that could serve a variety of purposes in addition to serving as a peer-to-peer network. A crucial turning point in the history of the blockchain came when Ethereum was introduced as a brand-new public blockchain in 2013 with more features than Bitcoin. By introducing a feature that enables individuals to record other assets in addition to contracts, such as slogans, Buterin created Ethereum apart from the Bitcoin Blockchain. With the addition of the new feature, Ethereum's capabilities were increased from those of a cryptocurrency to those of a platform for the creation of decentralised apps. The Ethereum blockchain, which was formally introduced in 2015, has developed into one of the most significant uses of blockchain technology thanks to its capacity to enable smart contracts that can be used for a variety of tasks. The blockchain technology for Ethereum has also been successful in attracting a vibrant developer community, which has helped it build a true ecosystem. Due to its capacity to handle smart contracts and decentralised apps, the Ethereum blockchain conducts the most daily transactions. The bitcoin market cap of the company has also dramatically increased.

##### C. Evolution of Blockchain: Phase 3- Applications

Blockchain 3.0 in 2018: The Future Ethereum and Bitcoin are just the beginning of the blockchain's history and evolution. Several projects have emerged in recent years that all make use of the potential of blockchain technology. In addition to developing new features utilising blockchain technologies, additional initiatives have worked to fix some of the shortcomings of Bitcoin and Ethereum. NEO, described as the first open-source, decentralised, and blockchain platform developed in China, is one of the new blockchain applications. The nation continues to be engaged in blockchain technology despite the ban on cryptocurrency. With the support of Jack Ma, the CEO of Alibaba, NEO positions itself as the Chinese Ethereum and aspires to rival Baidu's influence in the nation. IOTA was created as a result of some engineers leveraging blockchain technology in the race to hasten the development of the Internet of Things. The cryptocurrency platform aims to offer no transaction costs and distinctive verification procedures, and it is tailored for the Internet of Things ecosystem. Additionally, it tackles some of the scaling problems with Blockchain 1.0 Bitcoin. Other second-generation

blockchain systems, in addition to IOTA and NEO, are also making waves in the market. As a bid to address some of the security and scalability challenges related to the early blockchain applications, the Monero Zcash and Dash blockchains were created. The three blockchain platforms, collectively known as privacy altcoins, aim to offer extremely high levels of transaction security and privacy. The blockchain history previously covered involves open blockchain networks, in which anybody can view a network's contents. However, as technology has advanced, many businesses have begun integrating it within to improve operational effectiveness.

#### IV. HISTORY OF BLOCKCHAIN TECHNOLOGY: A DETAILED GUIDE

Given the impact that blockchain technology is having on a variety of industries, including manufacturing, education, and finance, it must rank among the most significant inventions of the twenty-first century. Many people are unaware that Blockchain has a history that extends back to the early 1990s. Numerous uses have emerged since its popularity began to soar a few years ago, all but underscoring the kind of influence it is bound to have as the race for digital economies heats up. We'll learn about the development of the blockchain and its history in this conversation.

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#### VI. BLOCK-CHAIN NETWORK

A smart contract is a self-executing software that represents an agreement between 2 parties [5]. It is an if-then system in that it executes a transaction if and only if the pre-programmed condition

is met. The smart contracts run on a Blockchain and as a result they inherit some of the features of Blockchain. This allows the parties to enter into an agreement without the need to establish trust first. Just like other Blockchain transactions, once a smart contract is recorded on the Blockchain ledger then it cannot be changed. This also means that other nodes in the network have access to the smart contract code and can interact with it as well. Since public blockchains have a high degree of user anonymity, if a user takes advantage of a vulnerability in the code of the smart contract, they can use the smart contract to their advantage without being physically identified. Data in public blockchains is also accessible to all the participants of the blockchain network and so it is not an ideal solution for storing sensitive data. Systems that handle private data such as banking systems, can therefore not be deployed on public blockchains as there is need for users to know who they are dealing with and having the privacy of their data protected.

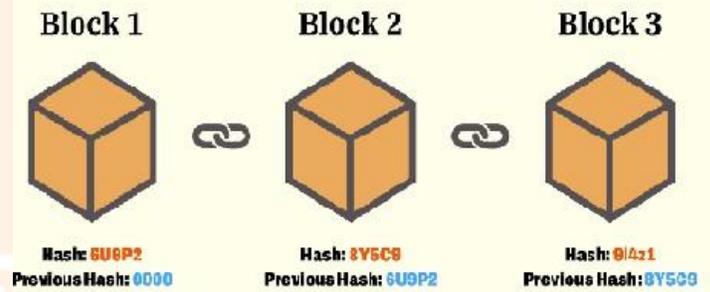


Fig. 1. Blockchain.

##### A. Blockchain Architecture

A blockchain network operates on top of a traditional computer network such as the internet and cannot function without it. This is because the blockchain protocol does not propose a new method of connecting different devices but uses the internet protocol (IP) for all the transactions between different nodes. Therefore it is impossible for the nodes to communicate without a common network. Instead of trying to integrate blockchain into the traditional Open Systems Interconnection (OSI) networking model, a different model with 6 layers has been proposed for blockchain networks [6] as shown in Figure 1.

#### VII. APPLICATION OF BLOCHAIN IN LAND LEDGER

Application of Blockchain Technology in Land Records The Blockchain with inside the land registry is used for stable switch of land property. The obvious nature of Blockchain allows to song the modifications made in land documents. Advent of Blockchain generation with inside the land registry is gambling a totally useful function on this growing era. It is supporting in uplifting the poor, and marginalized phase of the society in combating unlawful authorization of land [10,11]. The modern machine for land registration is complete of duplicity and inefficiencies, because of which the land statistics aren't protected, and residents are the only the ones need to endure the maximum of it. Similarly, there are lots of folks that face one of these crisis [12]. With the assist of Blockchain, all the statistics are preserved all of the time, are effortlessly accessible, none can ever doubt the originality of the statistics, statistics are fed with inside the machine permanently. Therefore, no person can ever control it, and the statistics may be visible with the aid of using any player anytime [13].

## VIII. CONCEPT OF SMART CONTRACT

The smart contract concept is being pursued for verification or proof of this blockchain technology in the land registry. A smart contract is the legal proof of ownership and contains the history of the property. The buyer of the purchased property is confident that it is a non-duplicate original and that the seller is the rightful owner of the property, eliminating the possibility of later disputes [14,15]. Using smart contracts speeds up the land ownership process by automatically updating records. Figure 3 clearly shows the application of blockchain technology in maintaining the land registry. If the parties involved in buying a property have all the right data at the right time, decisions can be made faster and the whole process smoother and more transparent. The use of blockchain and smart contracts ensures certainty of property ownership. This technology builds trust between parties as transactions take the form of transparent contracts. It makes business faster and more organized [16]. This improves data security and ensures the uniqueness of the land register [17]. Figure 4 clearly illustrates the role of blockchain technology in Land Records. A major advantage of using public blockchain technology is that the blockchain cannot be changed. In this way, it helps instill a certain level of trust in both buyers and sellers. In a hybrid blockchain land registration process, only a limited number of entities are part of the blockchain [18]. If the current land registry system is replaced with the use of the hybrid blockchain used by the current stakeholders in the real estate transfer chain, not only land accountants, but also notaries, bailiffs and other officials will be dispatched. Parties can also have all roles Certificate to be registered in the Land Register [19]

## IX. EXISTING PROBLEM WITH LAND REGISTRY IN INDIA

India has land disputes at all levels of the courts, involving disputes over 2.5 million hectares of land involving 7.7 million people, accounting for 66% of all pending cases in India [ twenty four]. The average dependency spans an average of 20 years from company to final negotiation decision. Credibility in land registries is therefore a major issue in this country. , agents, lawyers, drafters of documents. This process has a significant impact on the efficiency of transferring land title from one party to another. Because it takes about 30 days to transfer all ownership and there is a risk of data loss or tampering. Another problem is that there is no effective land registry management system up to now [25,26]. Currently in India, the transmission of records and the collection of these data is called land records. These are common identifiers and include multiple documents such as records of rights (RORs), deeds of sale, and personal records [27,28]. Due to lack of maintenance and communication, data is outdated and proper transaction details are not recorded. A proposed solution to the problem of collecting land records and maintaining the transactions required for land ownership is blockchain [29-31]. Blockchain is a secure medium in which operations and information are transmitted without intrusion by other parties. The World Economic Forum has published a report estimating that 10% of global GDP will depend on blockchain technology by 2027 [32-35]. Figure 10 shows India's existing land administration.

Since blockchains facilitate transactions between two parties without a trusted third party, they use consensus mechanisms to verify the transactions. A consensus mechanism is defined by [8] as the method used to agree on the correct state of the network in a distributed system. There are various consensus mechanisms that have been proposed but the most widely used are the Proof-of-work (PoW), Proof-of-Stake (PoS).

1) Proof of Work The fundamental mechanism that determines the difficulty and rules for the work miners execute on proof-of-work blockchains is known as proof-of-work. Mining is the "work" in and of itself. It is the addition of valid blocks to the chain. This is significant because the length of the chain assists the network in following the proper split of the blockchain. The more "work" done, the longer the chain, and the higher the block number, the more confident the network may be in its current condition.

2) Proof of stake Proof-of-stake is a cryptocurrency consensus technique that is used to process transactions and add new blocks to a blockchain. A consensus mechanism is a way for verifying and securing entries in a distributed database. The database in the case of bitcoin is termed a blockchain, hence the consensus method secures the blockchain.

PoS techniques need validators to store and stake tokens for the right of collecting transaction fees, whereas PoW mechanisms require miners to solve cryptographic problems.

Proof-of-stake (POS) is considered as less dangerous in terms of the possibility for a network attack since it organises compensation in such a manner that an attack is less attractive.

## A. Blockchain types of networks

Blockchain networks are usually divided into two types: public and private networks, based on who may publish data to the blockchain [17] [20]. A new technique based on both read and write access has been presented [21]. This concept divides blockchains into private and public blockchains depending on who can write data to them, as well as open and closed blockchains based on who can access the data in the blockchain. As a result, private blockchain networks are further classified into two types.

1) Public Blockchains These are blockchains that allow anybody to read data from the blockchain and write data to the blockchain. By definition, public blockchain networks are open and permissionless in the sense that anybody may join the network and begin transacting without requiring consent from another node. The data stored in such blockchains is likewise publicly accessible, and viewing the data does not need membership in the network. All nodes in public blockchains are equal and may all validate blockchain transactions through mining. Bitcoin and Ethereum are two examples of cryptocurrencies. Such blockchains enable user anonymity since users are not required to give identity before joining the network, and their blockchain addresses cannot be traced back to their real-world identities.

2) Private Blockchains Private blockchains restrict access to the data held in the blockchain by requiring that users be authorised first before they can read or write data to the blockchain. Private blockchains can be divided into two categories depending on who has access to the data in the blockchain. Both types, however, ensure that the privacy of the data is preserved whilst the identity of the participants is known.

a) Private and Open Blockchains In this blockchain, only a few authorised users have permission to write to the

blockchain but anyone can read the data once it has been written to the blockchain. This type of blockchain is permissioned as the users have to be first identified and verified before they can write to the blockchain. A potential application area for this type of blockchain network is a government releasing its financial records. Only a few authorised government officials can add data to the blockchain but everyone will be able to view the records. Private blockchains rely on trust to verify the transactions since they do not have the anonymity of public blockchains [23]. In private blockchains the identity of the user posting the data is known and that lack of anonymity acts as a disincentive to act in a malicious manner.

b) Private and Closed Blockchains In this type of blockchain network, users have to be authorised to write data on the network and only a few authorised users are able to access data on the network. Private blockchains usually come with tools for verifying a user's identity [21]. Once a user's identity has been verified then it is possible to restrict the type of data that they have access to which means that in a private and closed blockchain it is possible to have different user privileges. A potential application area for this type of blockchain is in the submission of tax returns. The users in the form of companies and individuals are first identified before they are given access to write to the blockchain and a few users are authorised to read that data.

D. Ethereum Ethereum is an open-source, Blockchain-based peer-to-peer software platform that allows users to develop and deploy decentralized applications [24]. The entire Ethereum system is supported by a global network of nodes. Nodes are volunteers who fully enforce all the consensus rules of the system by participating in the validation of transactions and they receive rewards in return in the form of ether cryptocurrency. The nodes can transact on the Ethereum blockchain network by sending and receiving the ether cryptocurrency as well as by mining transaction blocks before they are added to the blockchain. Nodes can also build and deploy smart contracts to the network as well as call functions contained in the smart contracts that have already been deployed to the network. Ethereum has three types of networks namely the main Ethereum network, Ethereum test networks as well as private blockchain networks

### B. VisaNet

Visa's payment products include credit, debit, commercial, prepaid, mobile, and money transfer services, which are utilised by financial institutions in over 200 countries. It is designed to bring the most recent developments in a more mobile world, such as mobile payments, money transfer, and top-up services.

According to visanet.com, it can handle more than 65,000 transaction messages per second, and its synchronised, cutting-edge data centres are linked to the rest of the world via 1,600 secure network endpoints interconnected by 1.2 million miles of fibre optic lines.

What are the advantages of VisaNet?

The company makes the following claim:

Reliable — near 100

Scalable — processing 80 billion transactions annually

Network	TPS   transaction per second	Confirmation Time ( Added to Chain )
Bitcoin Network	4-7	10 min
Ethereum Network	15-25	6 min
Cosmos Network	10,000	2-3 min
Solana Network (Fastest)	2825	0.5 Sec
New ETH 2.0 Network	20,000 - 100,000	NA
Traditional Network		
Visa Network	1700	NA
Mastercard	5000	NA

Fig. 2. Blockchain Networks Vs VISA Mastercard Network.

Flexible — domestic processing in 100 plus countries

### C. Disadvantages of VisaNet

One disadvantage of utilising VisaNet for consumers is that both the merchant's and the consumer's banks must be VisaNet members for a transaction to be executed. Accepting a Visa card payment, or any comparable card, comes at a cost to the seller. There is also the risk of fraud and liability for disputed card payments, with chargebacks causing businesses problems. Furthermore, VisaNet, is a centralised system controlled by Visa, and any system with a single operator gives that organisation authority.

### D. Banks using blockchain in 2018

Overall there are 200 banks and financial institutions in 2018 that are using, or are about to integrate, blockchain technology. The following provide an example of some of the first adopters from around the world.

### E. Identify the Headings F. Figures and Tables

#### CONCLUSION

Blockchain within the land registry has been an important element of contemporary world. Once the land switch assignment completes, the facts mechanically updates and stored on that blockchain platform, and this method is the most secure and tamper-loose mode of the working system. No it is easy to extrade the felony proper of the possession, and no person can harm the statistics asset; others can not make a extrade in that transaction and possession. The records of beyond transfers of possession makes use of to assist in verifying the modern-day felony proprietor of the land. There isn't anyt any want for authority within the Blockchain, that's a large gain in contemporary world. There isn't anyt any requirement of intermediary or authority and is virtually known as as Decentralized ledger. The time period blockchain has been gaining recognition due to success, inclusive of Bitcoin, Ethereum, and Hyperledger fabric. The use and implementation of Blockchain within the land registry and its help in retaining the land information are pretty transparent. Blockchain facilitates to make the method of land registry transparent, trustworthy and extra accessible. It could be very beneficial within the land registry wherein this utility allows us to realize how, when, wherein, which, etc. approximately the land title. It additionally empowers us to realize

if there were any sports in a selected land. It indicates each file of the land registered. This utility will certainly take us toward improvement and smooth accessibility to existence now no longer best for us however additionally for the destiny generation. The benefits of adopting blockchain over traditional clearing and payment systems can be boiled down to a few basic concepts. From the standpoint of banks and financial institutions, the case for continuing to utilise VisaNet is based on a "better the devil you know" mentality and prevalent conservatism in the financial industry.

However, the disadvantages of employing them for both customers and banks are as follows:

- Both are centralised and transactions go through intermediaries, which results in higher costs for both banks and customers
- There are often high fees for merchants with VisaNet
- Transaction information can be altered
- Fraud is more likely and chargebacks on card use negatively affect merchants
- Transactions can take days to clear with SWIFT, i.e. it's slow

Blockchain technology, on the other hand, promises to eliminate all of the above. The only current issue with blockchain is that it has not yet been widely adopted; however, as we can see, this situation is changing: while bank acceptance of blockchain is slow, there is a real sense that more of them are now taking it more seriously and exploring its possibilities, albeit cautiously.

Each blockchain network is distinct and distinct in its own way. The sort of network to be employed is entirely dependent on the individual and the demands of the organisation.

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