Blockchain Technology for Land Records and Land Deviation in India

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Abstract

Blockchain technology is used for storage of land records for long duration in India. The data stored in the blockchain is difficult to alter. Blockchain changes the model from Peer-Mediator-Peer model to Peer-Peer model. Blockchain makes data representation and data interchange easier, faster and trustworthy. Presently Blockchain is applied on small portion of lands. A new model incorporating cryptographic feature for land records and deviation using blockchain technology in India is presented.

Keywords: Bigchain database, Blockchain, Cryptography, Distributed ledger, Proof-of-Stake

1.0 Introduction

Blockchain technology is defined as a structure type that stores transaction records. Blockchain technology is implemented for maintenance of land records and land registration in India for security issues. However, Blockchain technology is not yet implemented for transferring the ownership of land records. The process is asynchronous and hence is a threat to data integrity. Peer to Peer model for land records cannot address disputes related to land pending land rights, change of land plot numbers, resurvey disputed lands, etc. Figure 1 depicts the group of computers connected using a peer-to-peer structure on the Internet. Revenue and commercial lands oldest reserve lands and various issues related to stakeholders settle long-pending land rights, resurvey disputed lands, and change land plot numbers. Many records are outdated, disputed, or unaccounted in reality [1].

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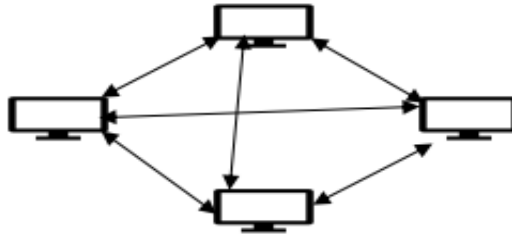*Email: ashalatha.dsce@gmail.com*

Fig. 1. Peer to peer network

Sekhari et al. [1] used a legal document for proving the ownership of land records maintained by different departments. The authors proposed a new technique for the predicament of block chain technology to handle the disputes and multiple land records [1]. Singh et al. [2] adopted block chain technology for maintaining electronic land records to provide digital security to the lands. The authors presented Indian scenario for digitization of land documents.

Thakur et al. [3] focused on management of land records in India using blockchain technology. The authors presented research challenges and land registration process in India and proposed technique using land titling methods for providing additional benefit of land security and authentication. Yadav et al. [4] proposed a mechanism for land records by using block chain technology for optimising searching land records. The authors used the Interplanetary File System for security and decentralization of land processes [4]. Amrendra et al. [5] focused on real estate transactions of land records to reduce forgery and fraudulent transactions using distributed ledger method. The authors proposed blockchain technology for real estate business using a consensus algorithm. The comparative evaluation deduced that the consensus algorithm is faster than the existing approaches [5].

2.0 Proposed Methodology

Proposed work of land records and deviation using recent technologies are presented as:

i. Proof of Stake (PoS)

Distributed consensus mechanism plays a crucial role in ensuring the network security, integrity, and performance. The proof of work mechanism has several constraints such as energy inefficiency, delay, and vulnerability to security threats. The transaction throughput is given as the number of transactions per second in a network that can be

processed. It is essential to the network performance, especially when there are many waiting transactions.

ii. Big chain database

Forking is also a big challenge in blockchain (BC) technology, and hence big chain database is proposed for greater storage capacity. Blockchain technology integrates artificial intelligence, cloud computing, and big data analytics. Variations in blockchain technology include Internet of Things, blockchain-based security, blockchain-based data management, and blockchain in 5G network. Big chain Database is a combination of Traditional distributed database and Traditional Blockchain. The Blockchain combines traditional and distributed databases in which data is transacted and recorded via a database interface.

A blockchain is a pool of blocks stored inside a block depending on the type of blockchain. The bitcoin database is called the blockchain, a ledger of transactions stored on all nodes of the distributed bitcoin network. Blockchain is used for tracking digital assets of land records. The Big chain database uses a document-oriented database. Genesis block means block 0, the first block upon which additional blocks in a Block chain are added. A Block chain consists of a series of so-called blocks to store information related to transactions on a BC network. BC was initially started by miners who created new blocks on the chain through a process called mining. Every block has its unique Nonce and Hash in a BC and references the previous block's hash in the chain. NONCE means "Number only used once" in crypto currency mining is a number added to a hashed or encrypted block in a blockchain. Nonces are random or pseudo-random numbers that authentication protocols attached to the communication [6].

iii. The Role of Digital Signatures in Blockchain

Digital signatures are a significant building block in blockchains implemented to verify the authentication of transactions. The submitted transactions must prove authenticity for every node. All the network nodes have to confirm whether the presented transaction conditions are working in the correct state or not [7].

iv. Creation of digital signature scheme in block chain

   A. Verifying the message with private key using signing method: A digital signature is created using one way hashing of electronic data. The digital signature process uses private key encryption technique for confidentiality.

B. Verifying the message with a public key is provided in two steps. The first step includes generations of hash messages. The final stage comprises a signature decryption scheme [8].

v. Digital signatures scheme

The digital signature scheme is used in Bitcoin technology as Elliptic Curve Algorithm. The elliptic curve group uses a limited group of points to operate in one direction, but it is challenging to serve in the other direction. ECC is used as a cryptographic key algorithm in blockchain Technology because it can save approximately 90% of the resources used by a similar RSA system [9].

Fig. 2 represents the secure hash algorithm (SHA2) and its working structure. The signature is included in the message for the verification process using the sender's public key. Hashing allows everyone on the blockchain to agree on the current wait state. Here digital signature provides a way to ensure that all the digital transactions are made by the authorized landowners only. The purpose of using digital signatures in the blockchain is to store and transfer information [10].
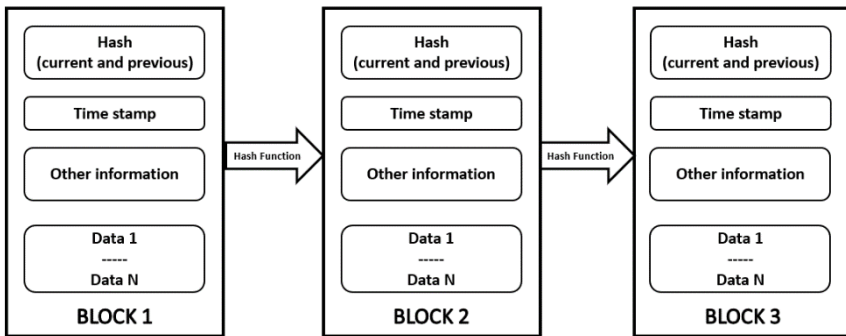
Fig. 2. SHA approach

3.0 Comparison Analysis

Comparative analysis of various threats and security issues related to blockchain technology is presented. Table 1 depicts the challenges and limitations of blockchain technology.

Table 1. Challenges and limitations

Throughput	Resource wastage
Usability problem	Latency issue
Limited size	Limitation of bandwidth
Security threats	Fork problem

Table 2 presents the comparative analysis for different consensus algorithms used in blackchain technology, namely, Proof-of-Work, Proof-of-Stake, Delegated PoS, Proof-of-Importance, Practical Byzantine Fault Tolerance, and Proof-of-elapsed time [11]. Different issues considered in blockchain for various consensus algorithms include the type of blockchain and node identity type. Other issues considered are energy-saving type, tolerated power of advisory, transaction finality, and scalability issues [12].

Table 2. Comparison algorithms

Sl. No	Consensus algorithm	Block chain type	Energy saving	Power	Currency	Transaction	Scalability
1.	PoW	No permission	less	Computing	Bitcoin / ethereum	Probabilistic	High
2.	PoS		Partial	Stake	Cardano	Probabilistic	High
3.	DPoS		Partial	Validators	Bitshares	Probabilistic	High
4.	PoI		Partial	Unknown	NEM	Probabilistic	High
5.	PBFT	With permission	More	Faulty	Hyper ledger fabric	Immediate	Low
6.	PoET	No permission	More	Unknown	Coin desk	Probabilistic	High

4.0 Conclusion

The real estate market is required to generate revenue in stamp duties in India leading to misuse of the land documents and forgery by third parties. Digitizing land transactions using blockchain technology has become a trend for convenient and safe transactions in the era of digitization. This paper presented review of technologies used for storing and maintenance of land records and land deviation strategies and their applicability in Indian context using blockchain techniques.

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