

# TENDER MANAGEMENT SYSTEM USING BLOCKCHAIN

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**Abstract:** For many years, tender management has been an offline service and were handled by humans. There will be many expenses to operate an offline tender office, there needs to be proper infrastructure, office staff etc. Tender office means the location of the office of tender agent where the proposers will submit their bid for a tender. All these years people have to go the tender office and submit their tender which is a tedious process. Then came online tender management system which will make the process easier and less expensive when compare to an offline tender office. As these tenders are very important and contains confidential information storing them online is very risky. So we are proposing a tender management system using blockchain technology.

**Keywords:** blockchain.

## Introduction:

Tender refers to an invitation to bid for a project. Tendering usually refers to the process where governments and financial institutions invite bids for large projects that must be submitted within a finite deadline. It can also refer to the acceptance of a formal offer. So tenders are very important and have to be handled properly. An online tender management system tries

to solve the problem of an offline tender office where they are requested to submit their bids, here the information can be tampered and the data manipulation can be done. To overcome this online tender management system were developed. We cannot say that online tender management system are safe anymore as there are lot of cyber-attacks going on. To solve this problem we are building tender management system using blockchain technology. Blockchain technology is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a blockchain network. Using this technology we can make sure that the transactions are not duplicated and the data is not tampered.

Important concepts used in this tender management system using blockchain are as follows.

**Blockchain:** Blockchain is shared immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An asset can be tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding). -Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved. As it is an immutable record of transactions all the network participants have access to the

distributed ledger. With this shared ledger transactions are recorded only once, eliminating the duplication of effort that's typical of traditional business networks. No participant can change or tamper with a transaction after it's been recorded to a shared ledger. If a transaction record includes an error, a new transaction must be added to reverse the error, and both the transactions are then visible. It also supports the concept of smart contracts to speed up the transactions, a set of rules called a smart contract is stored on the blockchain and executed automatically. A smart contract can define conditions for corporate bond transfers, include terms for travel insurance to be paid and much more. As each transaction occurs, it is recorded as a block of data. Those transactions show the movement of an asset that can be tangible or intangible. The block can record the information of your choice: Who, what, when, where, how much and even the condition such as temperature of a food shipment. Each block is connected to the ones before and after it. These blocks form a chain of data as an asset moves from place to place or ownership changes hands. The blocks confirm the exact time and sequence of transactions, and the blocks link securely together to prevent any block from being altered or a block being inserted between two existing blocks. Blockchain has a lot of benefits; they are as follows:

**Trust:** With blockchain, as a member of a members-only network, you can rest assured that you are receiving accurate and timely data, and that your confidential blockchain records will be shared only with network members to whom you have specifically granted access.

**Security:** Consensus on data accuracy is required from all network members, and all validated transactions are immutable because they are recorded permanently. No one, not even a system administrator, can delete a transaction.

**Smart contract:** smart contracts are simple programs stored on a blockchain that run

when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met.

**How smart contracts work:** Smart contracts work by the following simple if/when.. then.. statements that are written into code on a blockchain. A network of computers executes the actions when predetermined conditions have been met and verified. These actions could include releasing funds to the appropriate parties, registering a vehicle, sending notifications, or issuing a ticket. The blockchain is then updated when the transaction is completed. That means the transaction cannot be changed, and only parties who have been granted permission can see the results. Within a smart contract, there can be as many stipulations as needed to satisfy the participants that the task will be completed satisfactorily. To establish the terms, participants must determine how transactions and their data are represented on the blockchain, agree on the if/when..then.. rules that govern those transactions, explore all possible exceptions, and define a framework for resolving disputes. Smart contracts have a lot of benefits and they are as follows:

**Speed, efficiency and accuracy:** Once a condition is met, the contract is executed immediately, because smart contracts are digital and automated, there's no paperwork to process and no time spent reconciling errors that often result from manually filling in documents.

**Trust and transparency:** Because there's no third party involved, and because encrypted records of transactions are shared across participants, there's no need to question whether information has been altered for personal benefit.

**Security:** Blockchain transaction records are encrypted, which makes them very hard to hack. Moreover, because each record is connected to the previous and subsequent

records on a distributed ledger, hackers would have to alter the entire chain to change a single record.

**Savings:** Smart contracts remove the need for intermediaries to handle transactions and, by extension, their associated time delays and fees.

**Polygon:** polygon, formerly known as matic network, is a scaling solution that aims to provide multiple tools to improve the speed and reduce the cost and complexities of transactions on blockchain networks. At the centre of polygon's vision is Ethereum, a platform that is home to range of decentralized applications, ones where you can join virtual worlds, play games, buy art, and participate in a range of financial services. However, this activity on its blockchain has rendered Ethereum almost unusable, as the cost of transmission is rising and traffic is becoming clogged. Polygon bills itself as a layer-2 network, meaning it acts as an addon layer to Ethereum that does not seek to change the original blockchain layer. Like its geometric namesake. Polygon has many sides, shapes, and uses and promises a simpler framework for building interconnected networks. Polygon wants to help Ethereum expand in size, security, efficiency and usefulness and seeks to spur developers to bring enticing products to market all the quicker. Key features of polygon include:

**Speed:** The Polygon Network uses a high-throughput blockchain with consensus provided by a group of Block Producers selected by stakeholders at each checkpoint. A Proof of Stake layer is used to validate blocks and periodically post proofs of Block Producers to the Ethereum mainnet. This enables rapid block confirmation rates of about 2 seconds while preserving a high amount of decentralization, resulting in excellent throughput for the network.

**Scalability:** Polygon Network achieves a hypothetical transaction speed of fewer

than 2 seconds on a single sidechain. Using multiple sidechains helps the network to handle millions of transactions per second. This mechanism (already demonstrated in the first Matic sidechain) allows the Polygon network to scale easily.

**Security:** Polygon's smart contracts rely on Ethereum's security. To safeguard the network, it employs three critical security models. It uses Ethereum's staking management contracts and a group of incentivized validators running Heimdall and Bor nodes. Developers can also implement both models (Hybrid) into their dApp. Polygon supports many services you can use to test, compile, debug, and deploy decentralized applications onto the Polygon Network.

### **Implementation:**

The proposed system uses blockchain technology for the tender management system, which promotes decentralization which means all the stake holders can see the transactions that are happening through the system. Blockchain is used to eliminate the third party which acts the tender operator and has a centralized data base which is completely controlled by the third party. Therefore use of blockchain eliminates the third party to make the system more secure and efficient. The systems smart contract is deployed on the polygon Mumbai testnet for the development process, once the system is ready for production it can be later deployed on the polygon mainnet. The system has basic function which will be easy to use to new users as well. The system main functionality is to bid for a tender which will be added by the contractor(owner). The system is trustless as there is no involvement of the third party. To make sure that there are no duplicate bids the system will not allow a user to bid for a tender twice, therefor making sure that there are no duplicates. On the successful bidding for a tender the details about the bid are stored on the blockchain, the transaction

record will be added on the blockchain as its public blockchain based therefore any one can see the transaction taking place on the system making the system completely decentralized.

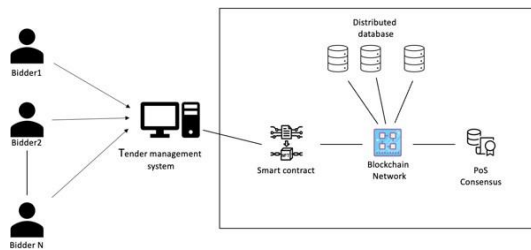


Figure 1 Architecture design diagram

### Result and discussion:

In this paper, we have discussed about the tender management system which uses the concept of blockchain. The smart contract built for this system is deployed on polygon Mumbai testnet for the development purpose which can be later deployed to the mainnet for the production purpose. The smart contract takes care of all the aspects of this tender management system from the owners perspective only the owner is allowed to add the new tender on which the users can bid. The users are allowed to bid for a tender only once which is taken care by the smart contract, the smart contract will reject the request for a duplicate request to bid for a tender to which the user had already submitted their bid.

### Conclusion and Future work:

Therefore, the tender management system using blockchain provides decentralization and tamper proof data. As a tender management system needs it the most. It eliminates third party therefore only the contractor and the bidder take part in the process. The bidders can bid on the tenders they wish to bid and they need not worry

about the data being manipulated. This Tender management system using blockchain can be developed further by separating the data storage area and using the blockchain only for the purpose of verification and other security reasons. By developing more functionalities the system will be able to replace the current tender management system.

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