Application of Blockchain in Clearing and Settlement: A Case Study of NSE

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Abstract- **The secondary market is the market where previously issued financial instruments, such as bonds and stocks are bought and sold. It is where investors sell/buy to/from other investors. Transfer of security in secondary market includes execution, clearing and settlement processes. Execution is done in stock exchanges. Determination of obligation of securities is called clearing and all the processes that follow clearing upto the exchange of fund and securities are settlement. Clearing and settlement process in India (case of NSE) is using National Securities Clearing Corporation (NSCCL) for its working. The settlement time taken for completion of settlement is two working days from the trading day. The work develops a model of clearing and settlement(in NSE) using blockchain. The model minimizes the settlement time from two days to a few minutes. The proposed model has distributed ledger which uses smart contract in its working and easily transfers data throughout all the members present in network. All participants in network holds the same copy of ledger and addition of a new transaction to network has to be accepted by all members in network. The fast transfer of information between different entities reduces the settlement time.**

Keywords- **Blockchain, Clearing and settlement, NSCCL, Depository, Clearing bank.**

I. INTRODUCTION

First trading of an asset occurs in the primary market. Then it happens in secondary market with the help of stock exchanges. The post-trade events occurring in stock exchanges include clearing and settlement activity. These two processes take place with the help of National Securities Clearing Corporation (NSCCL), clearing banks and depositories. Clearing is the process of determination of obligation of seller and buyer, which are determined using clearing banks and depositories. Settlement is the exchange of securities and funds with the help of clearing banks and depositories. In the NSE, clearing is occurring on the first day after trading process and settlement is occurring on the second day after trading. The amount of time taken in the present case can cause delay in exchange of funds and securities.

Use of blockchain to the exiting model present can make all the transaction information to be held with each of the member involved in the clearing and settlement activity. The information availability from the trading process avoids the need for information transfer to all the members with steps which are given in the following section.

A. Literature Review

Methods used for the building of blocks in blockchain play a critical part in its functioning. Blocks created should not be having same number as this can make the entire blockchain in vain. Prime numbering method proposed is beneficial as it provides unique numbering scheme [1]. KYC model developed using blockchain also gives a model of how blockchain can be applied to the financial sector [2]. The blockchain provides benefits to its users with the help of distributed edger technology, consensus and mining technique. Application of blockchain into financial market is clearly described. It also gives an idea on permission less network, consensus and existing ledger technology[3]. The central counter party (CCP) plays a major role in trade settlement. The cross border payments that are possible with blockchain are explained with flow diagram [4]. Trust and sharing economy are the major reasons why blockchain use is preferred among financial industry[5].

B. Proposed Algorithm

Information in distributed ledger:

Details of NSCCL
Details of clearing member
Details of clearing bank
Details of depositories

Fig. 1: Information in distributed ledger

A ledger which is distributed to all the nodes (computers which are acting on behalf of each member) will be having in it the details of NSCCL, clearing member, clearing banks and depositories. The ledger is having private and public parts of data. After trading details are given to each member, updating of details of ledger is done. Change in details of any ledger present in network will cause all the ledger to have this change to be made in them. This fast transfer of details to each ledger avoids separate need for clearing and settlement steps to be done by the NSCCL.

C. Role of Each Member

Clearing Member:

Trading day
Company/individual name
Residence
SEBI reg. no.

Fig. 2: Details in clearing member

These are the details that are present in the clearing member part of the ledger. Any adding of new information will be transferred to all ledgers. But these details will be used by each member when their need comes. Deposit maintained by clearing member comes under the private part of information kept by the ledger.

Depository:

Security with buyer and seller
Pay-in time
Date
Buyer and seller demat account information

Fig. 3: Details of depository

Security which is present in buyer and seller is the private part in this member. All other details will be accessible by all.

Clearing Bank:

Pay-in fund
Pay-in time

Fig. 4: Details of clearing bank

Primary requirement is an account to be opened in any of the 13 clearing banks that are present with the NSE.

D. Working of the New Model

Transferring of trade details to the NSCCL is the first step for the clearing and settlement process to occur. These details will be written to the ledger. The change in one ledger cause change to all the ledgers which are present with all members in network.

First when a transaction is present, it will be changed to document. Then private and public keys are generated. Applying of private key to the document will create digital signature. This will be transferred and verification of genuine private key receiving is done using the public key. These are the basic interaction steps that happen in any blockchain based working process.

The above steps are followed when an interaction is taking place between NSCCL and clearing member, clearing member and clearing bank, clearing bank and depository. The details are added to ledger when a new transaction occurs. These addition occurs with the approval of all the members in network.

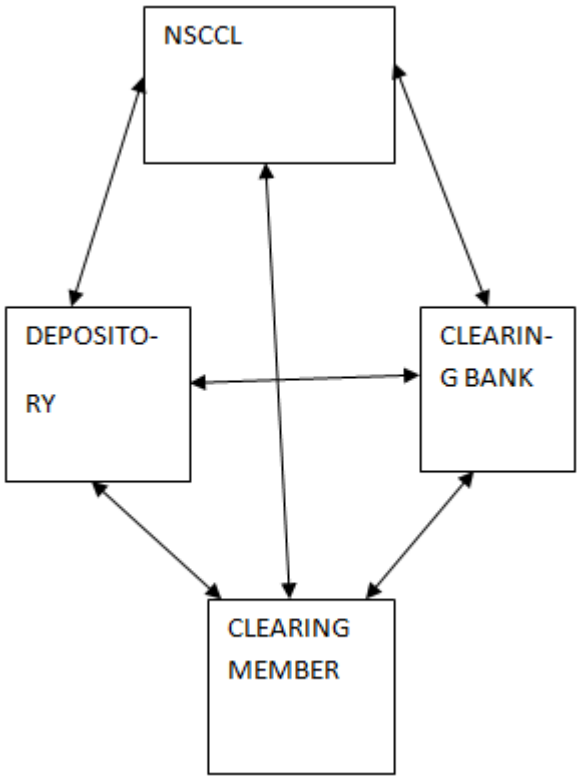

Fig. 5: interaction model

In this model, all the members present in the network is having a ledger. The details which are present in the ledger are described above. Each member in network (node) is only performing specific function of entity in NSE.

II. CONCLUSIONS

The use of blockchain can avoid the need for intermediaries and this can reduce the settlement time taken to a few minutes. Every member present in network can see all the changes made to the network. Addition a new member to network requires the permission from all other members present in the network. This creates transparency in the transaction process. Other benefits that the newly introduced model provides are minimization of transaction costs, risk containment mechanism and higher liquidity among members in the network. Automation procedure adopted can reduce any barriers in transaction and thus increases efficiency of the entire clearing and settlement procedure in NSE.

Limitation and Future Scope

The implementation of this model can cost high amount initially. But during its working stage it does not cause much amount and provides many advantages. The model can be further expanded by connecting different stock exchange details.

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