

# Inter-Stellar : Blockchain for Inter-Bank Settlement System

Araf Mustavi <sup>1</sup>

## Abstract

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## Keywords

Block Chain — Fin Tech — Banking Industry — Clearance and Settlement

<sup>1</sup> Department of CSE, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

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## Introduction

Inter-bank settlement system is the most significant innovation that has simplified the financial exchanges throughout the banks. It has created a zone of comfort for the customers by removing the tendency of opening account in several banks for faster cash withdrawal. Two different banks' client can perform money transaction without any hassle for this system's existence. Though this system creates a comfort zone for the customers, but from banks point of view, this exposes them into a certain degree of risks. Lethargy in the clearance activity, central bank's authoritative permission, rules and book keeping formalities makes the process a cumbersome one for the banks. Though central bank has eased up this process of settlement to a certain degree, but achieving real time transaction clearance for the banks can fasten up the process and reduce risks.

## 1. History of Inter Bank Settlement

In many cases, early banks produced notes for their customers and they did not redeem claims on each other. They offered fund transfers only across their own accounts, refusing to accept notes issued by other banks. By the start of the fourteenth century in Venice, account holders at the same bank could transfer funds by book-entry. But the fact that a number of merchants held accounts at several Venetian banks. The banks themselves did not offer a convenient facility to transfer claims between each other.

Clearing arrangements first developed as banks began accepting claims on each other. Prior to this, there was considerable diversity in the form of clearing and settlement arrangements, and we see a variety of innovations designed to reduce the costs associated with inter-bank settlement. It evolved as banks looked for ways to reduce both the direct costs of doing this, and the amount of the asset they needed to hold in order to effect settlement. The achievement of greater efficiencies in clearing and settlement was similar to the evolution of money itself.

In the twentieth century, modern central banks perform a number of different functions. But inter-bank settlement ultimately occurs in state-backed central bank money and monetary systems across the world converged into this. So they require a central bank. A key characteristic of central banks is their ability to act as lender of last resort by expanding their liabilities. In many payment systems, obligations are settled directly in central bank money.

## 2. Problem Statement

A peer to peer inter bank settlement system is required to reduce the risks for the payee bank, receive the payments from the payer bank in the fastest possible time and perform this settlement without any fixed time frame of a workday.

## 3. Proposed Solution

A blockchain backed inter-bank settlement system that will help the banks to discharge the irrevocable and unconditional obligation of the payer bank to the payee bank in respect of money transfer.

## 4. Inter-Stellar Actors

We propose our system, The **Inter-Stellar**, which is a private blockchain that is a peer-to-peer settlement system for the banks of Bangladesh. There are some Actor in our system and before we dive in the details of the execution we want to start by explaining the system's actors

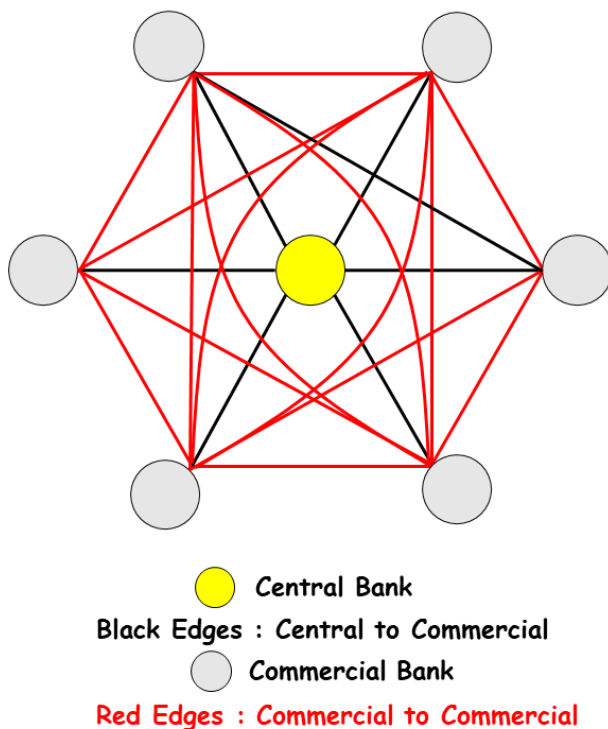


Figure 1. Actors and Interactions

### Actors

#### Central Bank

- The actor who issues Bank Notes within a Geo-graphical region
- Regulates the rules and operations of settlements for the commercial banks

- Stores the physical currency on account of the banks
- Has the authority to issue Settle-token that will be backed by the money each bank has deposited in central bank's vault
- Can look into the transaction records of the commercial banks

#### Commercial Banks

- The actor who deals with people, receives cheques and clears the payment on the basis of cheque claim
- Before paying the amount as per cheque of other bank, they check validity of customer's claim and vice versa.
- They receive the claims on other bank through Settle-Token
- Settle-token to fiat currency conversion is done by the central bank

## 5. System Component and Workflow

The system functionality and the interaction of the actors are described as an ongoing order as per below.

### Registration and Participation

- A commercial banks have to deposit a certain amount of money in the deposit of Central Bank
- Central Bank grants permission of participation for the commercial bank
- This participation permission is granted with a time limit subjected to extension further.

### Settle-Token Issuance

- The Central Bank issues settle token, backed by the amount each bank has deposited
- This settle-tokens are stable coins and their values are tagged with the value of BDT

### Customer Claim

- When the customers submit a cheque on a bank's desk (Let's say Bank A) with another bank's name (Let's say Bank B) on it, bank A checks the validity of cheque by contacting Bank B
- Valid cheque's request is honoured by bank A
- With the amount being paid by the cheque receiver Bank B on behalf of Bank A, the Bank B issues claim on Bank A

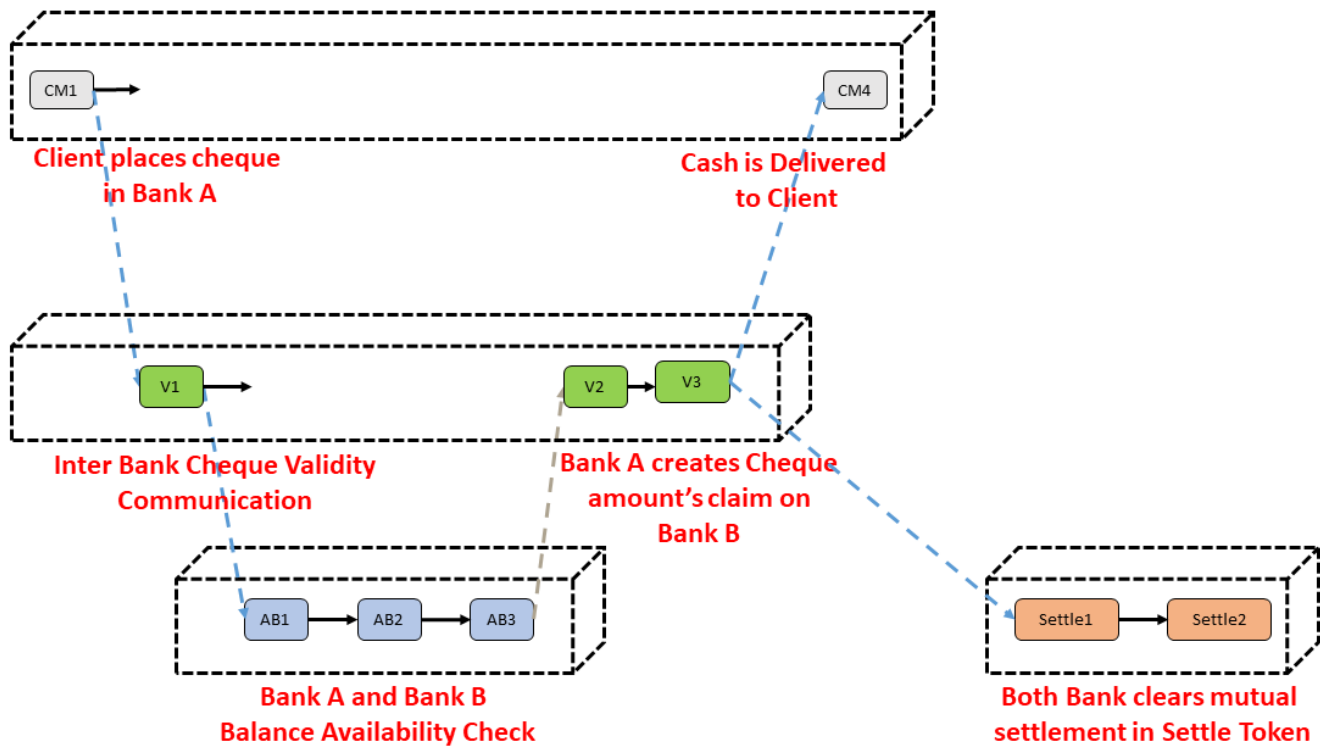


Figure 2. State updates in vaults

### Claims and Settlements

- Bank B is bound to pay the amount within that working day by using Settle-Token as a payment method
- Bank A uses the Settle token to convert it further into fiat currency.
- If not paid by the predefined time frame ,Bank B will be charged 5% extra for each additional day

## 6. Architecture and Implementation

We plan to implement the system using R3 Corda . Public blockchain networks can't support private transactions. The settlements are confidential contracts that are of utmost importance for the banks. R3 Corda was designed in response to this as a peer-to-peer, scalable and secure foundation for offering industrial blockchain solutions. Within private network of banks, the verifiable identity of a participant is a primary requirement. R3 Corda supports memberships based on permission . Our system is bound by data protection regulations that mandate maintaining data of various participants and their respective access to various data points. R3 Corda supports such permission-based membership. All the transaction data is stored in R3 Corda's node information.

The information update as per state change is:

- The states are shared truth between involved parties
- All the information of claim and clearance are stored in the states

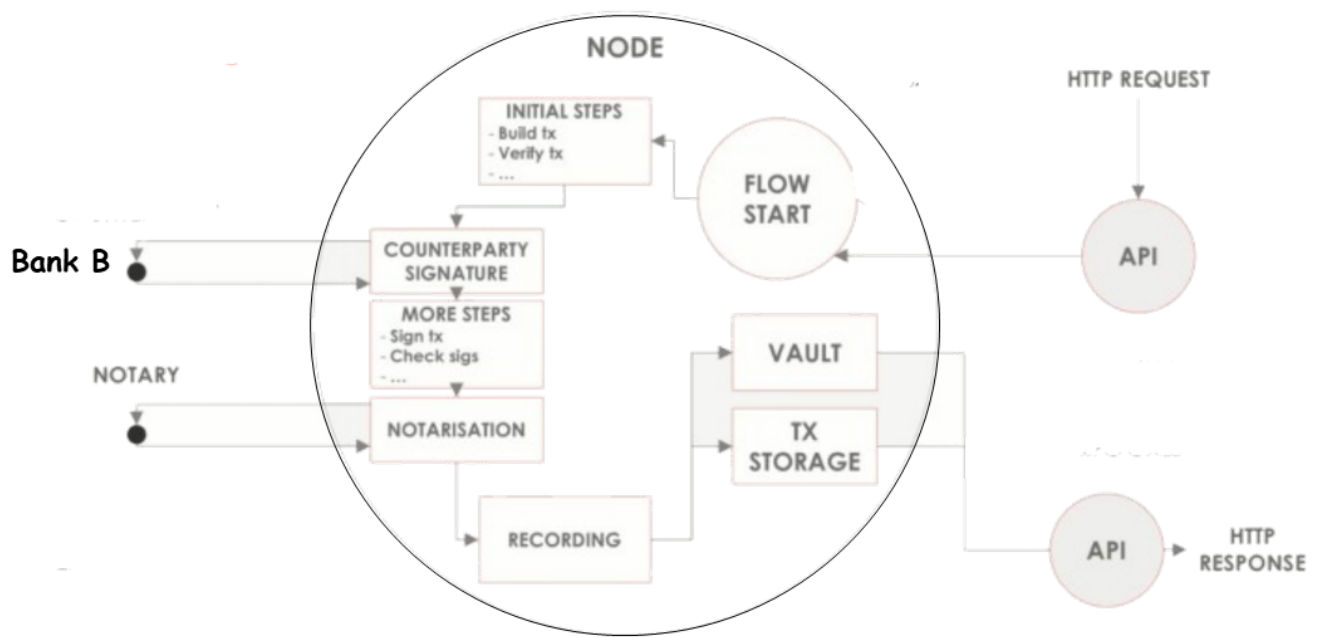
- Each transaction invokes CorDapps and are stored as states,the states are only shared between two participant's vault
- With each condition of the CorDapps being met,the states move forward as a reference of previous ones

Our proposed solution requires permission-based membership, private peer-to-peer settlement and real time transaction clearing. maintaining data and access to various data points of the participants. Fabric supports such permission-based membership.

## 7. Market Size

Inter-Bank Settlement system is one of the crucial system that handles a transactions of million dollars every day throughout the world. In Bangladesh context,the average transaction is daily 100crore Tk .So the market size and transaction volume is significantly large to handle.

But this huge market has to face a significant amount of delay in settling the claims. A peer-to-peer connecting network that has central bank as an authoritative role to inspect the traffic will speed up the process with transparency.



Node Information for Bank A

Figure 3. Node Structure