

Creation of Smart Contract for the Blockchain based Trade Finance

Afsal A, Regi Kumar V.

Financial Engineering, Department of Mechanical Engineering, College of Engineering, Trivandrum, Kerala, India

Abstract—Trade finance includes the various financing activities in an international trade. Since the parties participating in a trade are from different countries, there are several risks associated with this area. Also it is still a largely paper based business and hence the time taken for various activities is too large and chances of errors are also high. Normally, there will be a buyer and seller with intermediaries like banks or financial institutions are present in trade finance and different activities are happening with these parties. Also there are various documents included in trade finance like letter of credit, bill of lading etc. and each of them having specific cost and risk.

Blockchain is a distributed ledger technology which is mainly used for cryptocurrencies and also for building smart contracts. The technology has established in the year 2008. Blockchain has the potential to solve the problems arises in trade finance like risk, time consumption and costs. Using blockchain, smart contracts can be built in the area of trade finance which makes it more transparent and risk-free. Each activities in trade finance can be stored to a block in blockchain and every party has the provision to look at the activities in real time which makes them more comfortable in business. Legal documents and contracts between parties can be stored in a blockchain and if anyone wants to make a change in a particular document, all the other parties have to approve it and this will reduce fraudulent activities. The provision to protect highly secure data from other parties is also available in blockchain. External attacker cannot make changes to a blockchain because if anyone tries to do that, he has to attack every parties in the contract to make a change and which is not possible since the hardware using will be having high power to protect it from frauds. Blockchain will provide high secure, transparent and cost-free solution to trade finance.

Keywords – Trade finance, Blockchain, Transparency

I. INTRODUCTION

Trade finance by banks and other financial institutions is an important part in international commerce, as it provides delivery and payment guarantee to buyers and sellers, and it helps close the trade cycle funding gap for the buyers and sellers. The development and existence of the 16 trillion international trade industry depends on the easy existence and vitality of financing mechanisms. For this reason, trade finance is often described as the energy source for international commerce. The parties in trade can be unsafe to risks in businesses and uncertainties because of several factors, including process inefficiencies, variations and flow in trade regulations and requirements across different countries, and the operational and logistical complexities that

arise when a large number of entities participate. A recent survey by the International Chamber of Commerce reports an increasing trend in litigation and fraud related to trade financing over the last few years. Recent examples of trade and receivable financing fraud include the \$1.1 billion lawsuit which results in against citi group from financing falsified receivables. The the loss of hundreds of millions of dollars to various banks in the Qingdao port metal financing.

Other pain points include:

- Payment and delivery delays due to process overheads.
- A lack of insight into the movement of goods.
- The required effort for counter party are due to diligence and contractual compliance processes.

For banks, risk and costs obstacles can be increase leading to unfavorable financing terms, especially for small businesses. Blockchain could both reduce the volume of documents and streamline the flow of documents in trade transactions, reducing transaction costs, speeding up transaction timeframes and introducing greater transparency and, with it, security for contracting parties. The application of blockchain on this industry will make it decentralized and transparent. Each of the activities can be updated among all the parties which makes it more attractive for the parties to be participating in trade. In the context of trade and trade finance, transfers of title, delivery of documents and flows of funds are all capable of being done via the blockchain, with added benefits of:

- Real time visibility of transactions
- Increased structural and documentary efficiencies and reduced transaction costs
- Reduced risk of fraud and mitigation of double spend.

Smart Contracts are built on blockchain technology. Neither “smart” in of themselves (in the sense of Artificial Intelligence or machine learning smart) nor contracts in the traditional sense, smart contracts are self-executing computerised transaction protocols that carry out a sequence of steps or transactions that are agreed before between parties and translated into code. As the blockchain technology has these much of advantages, my objective of this study is to implement the blockchain technology on trade finance by developing a smart contract using solidity remix for the trade finance industry which can be run on ethereum(which is a

platform working on blockchain technology for running smart contracts).

II. LITERATURE REVIEW

The alteration of the trade finance goes back to the Phoenicians in around 1500 be who founded maritime transport on a commercial scale and re-established long distance trade between Egypt and Mesopotamia. An example for merchants of Venice are introduced which content in the 16th century and such practices continue to be used in the present day. In mid-1990s were a watershed occasion for many industries, given the daybreak of the internet and mass telecommunication. Such technologies are slow to incorporate into their business models on banks and other long established financial institutions due to cumbersome, legacy IT infrastructure.

In 2008 [1], Satoshi Nakamoto lays out the goal of an entirely peer-to-peer payment system in which no broker entity is required other than the payment network itself. The collection of digital ID is referred to as electronic coin, where the change of coins is handled by digitally signing a hash of the previous transaction along with the cryptographic public key of the other owner. A receiver of coins can still not verify that the previous owner of that coin did not spend it multiple times, and this is where a mining authority usually comes into play in the traditional exchange of money. There need a way for the payee to know that the previous owners did not sign any earlier transactions. For this reason, the older transaction is the one that counts. The only way to confirm the absence of a transaction is to be aware of all transactions. The transaction can be expertised with the help of trusted party which must be publicly announced [2], and it need a system for participants to agree on a single history of the order in which they were received. The solution of not changing the transaction begins with a timestamp server. By taking a set of hash items to be time stamped the data are updated automatically and widely publishing the hash, such as in a newspaper or Usenet post [2-5]. The previously updated data are also added in the every recently updated data in its hash forming a chain thus with each additional timestamp reinforcing the ones before it.

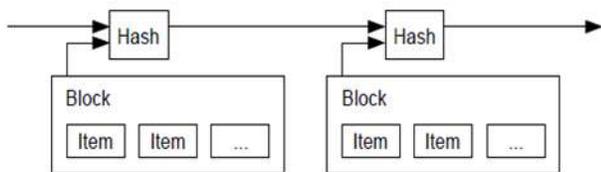


Fig: hashing of blocks in a blockchain

On a peer-to-peer data updated on server basis is a tool to need a proof-of-work system similar to Adam Back's Hashcash [7], rather than newspaper or Usenet posts. The received (and indeed anyone as it is publicly auditable) hashcash stamps can verify the received data effectively. Hashcash was invented by Adam Back in 1997. It is an asset to the potential medium to transfer assets without centralised

trusts without the risk of double spending. The possibility of fraud can be eliminated by tamper proof nature. This technology operational threat through transparency and immutability, thus significantly helping banks to decrease their operational costs when executing controls.

The blockchain technology offers potential solutions for the trade finance industry and hence implementing the blockchain technology on trade finance will make the industry more transparent and attractive for more parties.

III. CONCEPTUAL MODEL FOR TRADE FINANCE USING BLOCKCHAIN

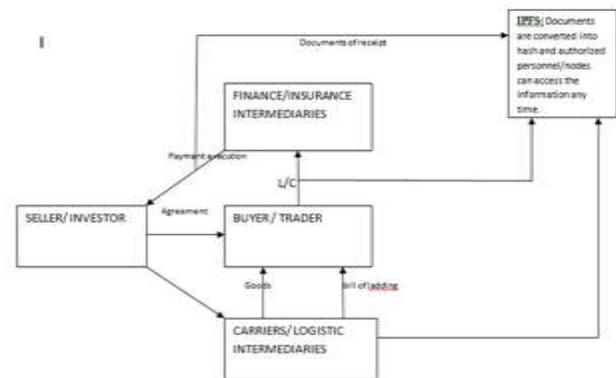


Fig: process flow in blockchain based trade finance

The parties include buyer or trader, seller or investor, carrier or logistic intermediary and financial or insurance intermediary. The role of each parties in trade will be discussed below.

A. Buyer or Trader

A buyer is the one who wants to purchase goods or may be services in exchange of value (mostly cash). But since the trade is happening between parties from different parts of the world, there is also some risks associated with this transaction. So, in order to avoid the chances of fraud, the buyer will use some legally valid instruments to protect his money. There are several instruments used by the traditional trade finance industry like documentary collections, letter of credit etc.

Funds are collected from the importer and remitted, to the exporter through the banks involved in the collection in transfer for those documents. The outline catalogue rules specify the documented data required for the exchange of title to the goods. Drafts are generally less expensive than letters of credit.

Letters of credit (LCs) are among the most secure instruments available to international traders. An LC is a commitment by a bank on behalf of the buyer that based on the terms and conditions provided payment will be made to the exporter as evaluated through the exposition of all useful data. An LC is advantageous when consistently good credit information

about a foreign buyer is not readily available, but satisfied with the creditworthiness of your buyer's foreign bank. An LC also gives protection to the buyer when no payment commitment arises until the goods have been shipped or delivered as promised.

Letter of credit is more secure than documentary collections but the problem with letter of credit is, it is expensive. But if the same letter of credit is using without a central authority like banks, the cost of it will be nothing. Actually the cost paid for letter of credit is the banks guarantee of payment to seller if the buyer goes default. But with the implementation of blockchain, this risk can be eliminated by decentralizing it and thus the cost of it will be negligible and can use the same document with more security.

B. Seller or Investor

The seller is a person who sells the goods or service to a buyer in exchange of cash or any asset. The same letter of credit discussed above is also for the sake of seller. In any case if the buyer goes default, the buyer's bank is obliged to pay the seller. Letter of credit is an instrument for ensuring guarantee of payment and goods for both the seller and buyer. But by implementing the blockchain technology, there needs no third party for ensuring guarantee because every stage of the transaction can be seen in real time and without the agreement of all parties participating in the trade, one stage of a transaction cannot be completed and thereby can't go to further transactions. This provides risk free nature of transactions for the trade finance industry.

C. Carriers or Logistic intermediaries

The carriers are intermediary's acts between buyers and sellers. In international and also in domestic trade, the transfer of goods from one place to another requires effort and the parties helps with these activities are called carriers. They will collect the goods from seller and transfer it through ships or other vehicles to the seller. Carriers will give a bill of lading to the buyer. A bill of lading is a valuable and lawful document between a shipper and a carrier that carries details of the type, quantity and destination of the goods being carried. It also serves as a shipment receipt when the carrier delivers the goods at the predetermined destination and the document must present the shipped goods that are delivered and an authorized representative from the carrier, the shipper and receiver must sign it.

D. Finance/ Insurance intermediaries

There should be a financial intermediary in order to give the payment once the transaction is complete. Like in the traditional trade finance industry, here a bank is not needed to guarantee the payment but just one intermediary who collects the buyers money for the seller. And since transactions are on real time, the intermediary can transfer the assets to buyer and seller when it completes. And the chances of going default in a blockchain based application is nearly zero. When the carrier supplies goods to the buyer and give them the bill of

lading and then that transaction is uploaded to blockchain. After that transaction will complete, the financial intermediary will execute the payment which the seller needed to get. After the receival of payment from the finance intermediary, the seller will have to upload a receipt of cash document so that all the parties can know and verify the transaction is complete.

There are mainly three documents used in the workflow model of trade finance using blockchain given above. As already discussed they are Letter of credit, Bill of lading and document of cash receipt. When preparing a smart contract in ethereum, it's difficult to incorporate documents on it which will cause the size of blockchain so large and it further increases when new and new blocks are added upon it. New contracts are written on new blocks and the hash of new block created depends on the previous one. And if one look at the concept of blockchain, it can be understood that the previous blocks are the base for new block and as the number of blocks increases, storage size also increases. Inorder to overcome this issues of storage and size, the documents are converted into a hash using IPFS.

IPFS

A. An associated data base protocol to make the web faster, safer, and more open. Here explains how IPFS works

- All the file and all the blocks within it are given a unique fingerprint called a 'cryptographic hash'.
- IPFS removes identity across the network and tracks version history for every file.
- Each network node keeps only content it is focused in, and some indexing information that helps figure out who is storing what.
- When inspecting up the files, asking the network to find nodes containing the stored content behind a unique hash.
- Each file can be found by readable names using a demoralized naming system called IPNS.

B. After converting the files using IPFS, the hashes of the files can be used in smart contract and by this hash, the permissioned authorities can access the documents and can verify it. After building the smart contract, it can be deployed into the blockchain.

IV. SMART CONTRACT FOR TRADE FINANCE

The processes in the traditional trade finance industry is analyzed and a workflow for the new blockchain based trade finance is developed. Based on that model, a smart contract is built using solidity that use case highlights the ability of the blockchain platform to gearing chaincode to implement any complex workflow with a mutual document repository, involuntary settlement and recording of all transaction history on a single system. Many simple user have been built for interacting demonstration and to allow hands done execution of review and approval actions with the transaction current through multiple stages. UIs can be provided for:

- Buyer to motivate an LC application when a purchase has been agreed to done.
- All parties review the LC, process the application and attach the approved LC document.
- The carrier to upload the bill of lading which includes the detail of shipment.
- The clearer to process settlements at the appropriate time in the transaction.

Access to the transaction details and the associated documents is restricted to the counterparties involved. A full updated transaction history is obtainable to all counterparties and with all associated documents securely stored and encrypted.

V.CONCLUSION

The implementation of blockchain in trade finance will provide a transparent, more secure and less cost solution. By automating the existing method using a smart contract, the processes will be more easier and real time visibility of the activities can be obtained by every parties. This makes the trader's and investor's more attracted to international trade. One of the major problem faced by today's trade industry is the lack of transparency and therefore the chances of frauds. The blockchain will find a solution for this. Also the cost for intermediaries in transactions are very high nowadays. Specially in the case of international trade, it will cost several millions and which causes the SME's less attracted to the

trade. But by using blockchain, the intermediary cost can be reduced to a large extent and thereby the trade finance will become a nearly cost free transaction

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