Blockinsure – Streamlining auto insurance claim process using Blockchain technology

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Abstract – **Like Bankers, Insurance companies do need to streamline their payments of premiums and claims. Most of the insurance industry's administration is subjected to paperwork and thereby making it more prone to human errors. Furthermore, the insurance industry is facing serious threats from fraud ranging from small claims fraud by individuals to a very serious organized fraud. Therefore, the auto insurance industry needs a transparent, immutable and effectual technology. The Blockchain technology provides the insurance industry a significant digital transformation and secures every transaction with the decentralized and distributed ledger which do not allow retroactive manipulations on the registered transactions. Hence, the blockchain technology significantly reduces the overall time, administration, processing costs and help them streamline their business processes. With blockchain technology, the auto insurance industry can eliminate errors, detect fraudulent activity and simplify the claims process.**

Keywords – **Blockchain, Smart Contracts, Insurance, Hyperledger, Claims.**

I. INTRODUCTION

The scope for the use of blockchain technology is ever growing as it can deliver substantial value to the insurance industry by facilitating a transparent, responsive and irrefutable claims management by enabling smart contracts between the insurers and customers. The smart contract empowers the insurance company to automate the claims process by triggering the payments automatically when certain conditions are achieved and validated. Every claim will be validated amongst the network of insurers by achieving a consensus. A claim is paid only when it is attributed as valid among the peers. Each validated claim is considered as a block and is added to the blockchain.

The key features of Blockchain are visibility and immutability. Every transaction written to Blockchain is visible to every other validating peer node in the fabric. Once committed, the blocks are near-impossible to alter or delete, as it would require an attacker to generate proof-of-work for all further blocks in the Blockchain, for the altered block to be successfully accepted by the fabric. This is not possible in polynomial time. Mutual consensus verification protocols allow a network to agree on updates to the database collectively, with a certainty that the overall dataset remains correct at all times without the need for a central governing authority [3].

II. RELATED WORK

The use of blockchain technology in insurance is a well-researched topic. In [3], the authors describe in detail, what benefits Blockchain technology offer to insurers. The advantages of decentralization that Blockchain brings with it are explored in detail. The uses of Blockchain in a variety of fields like financial services, commercial applications and digital identity are explored in [9]. The uses of Blockchain technology and smart contracts [13] in the auto insurance world is explored in [10] and [12]. A peer-to-peer insurance model using smart contracts is explored in [11].

Hyperledger Fabric, an open-source blockchain protocol for business-to-business and business-to-customer transactions is described in [14]. Hyperledger Fabric differs from traditional Blockchain networks like Bitcoin [17], by managing the admission of participants in its core. Rather than assuming a single Blockchain network, Hyperledger is built on the idea that there will be multiple Blockchain networks which need to interact with each other, as shown in Fig 1. Hyperledger is designed with an industry-focus [14], which makes it suitable for use in cases like auto-insurance. Therefore, we are choosing Hyperledger fabric, as the fabric for our solution.

III. BLOCKCHAIN FOR AUTO INSURANCE

We first briefly explore the different steps involved in an auto insurance claim process. We then explore the possibilities of how insurance fraud can happen. We then detail how Blockchain technology can be used to streamline the process and prevent insurance fraud. In case of an automobile accident, the parties involved exchange identity and insurance information with each other. Each party then files a claim with their

respective insurance company. The insurance company then has an authorized surveyor, typically a trusted third-party body-shop, to inspect the vehicle's extent of damage. The insurance company then decides whether to authorize the repair, or total the vehicle, based on the estimated cost of repair. If a repair was authorized, the third-party vendor coordinates with the customer to repair the vehicle.
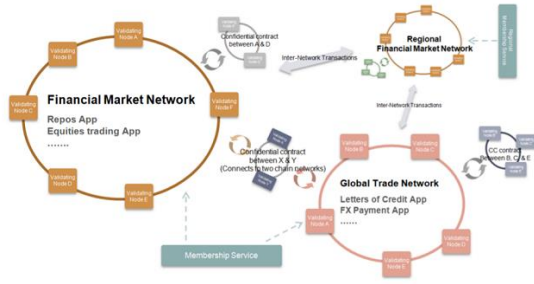

Fig 1: Hyperledger - multiple blockchain networks [14]

With Blockchain technology several steps which involve information exchange between the entities involved in the claim resolution process can be automated. After an incident, the customer can directly take the vehicle to a third-party vendor. The vendor evaluates the damage and uploads the details on the blockchain. Claims are auto-initiated, policy coverage is automatically validated, and the repair is auto-approved. Once repaired, the repair details are posted on the blockchain, and the vehicle is returned to the customer. This greatly reduces the amount of time spent exchanging and verifying information between the entities involved in the claims process.

The advantage of using Blockchain technology is that, since a new claim is added to the Blockchain when the customer takes the car to a third-party vendor, the problem of duplicate-claim fraud is mitigated. This is because, when a second claim is tried to be added to the Blockchain, there will be no consensus as the chain would have already changed, when the previous claim was committed to the Blockchain.

IV. DESIGN

In our solution, the different entities involved in the claim process form the nodes in a trusted Blockchain. Consensus must be achieved among these nodes for a block to be added to the Blockchain. These entities include, regulators – in charge of filing claims, Insurance companies – who manage insurance policies, Identity verification – entities who manage identity verification for customers, Vehicle inspection

– entities who examine the vehicle for extent of damage, Settlement authority – who handle the disbursement of money to the third-party vendor who conducts repairs on the damaged automobile, or to the customer or financial institution in the case of a vehicle being totaled.
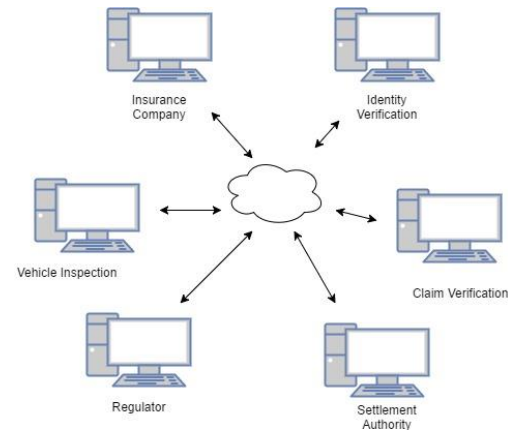

Fig 2: Simplified auto insurance blockchain network

Fig 2 shows the different entities involved in the claims process being a part of the Blockchain validating network. In a real-world system, the network would include multiple insurance companies, vendors, etc., such that any claim filed by any regulator would be visible to all the validating peers.

The structure of a claim is shown in Fig 3. Each claim consists of a vehicle VIN number, the license plate number, accident date, the insurance policy ID and the estimated loss amount. The life cycle for each insurance claim is as below:

1. The claim is created by the regulator – this can be an automated system or a human administrator. The created claim is added to the Blockchain.

2. The claim is now forwarded to Identity verification, where the identity of the claimant is verified. The claim is now updated with information that indicates that the identity of the claimant is verified. This is added to the Blockchain.

3. The claim now moves to vehicle inspection, where damages to the vehicle are examined. The claim is now updated with the estimated amount of damage and the Blockchain updated.

4. The claim then moves to claim verification, where the policy coverage is examined and the repair authorized. Duplicate claims are rejected by now, if there are other claims for the same vehicle and incident are in progress. If not, the authorization of repairs is updated in the claim and added to the Blockchain.

5. The claim now moves to the settlement authority, which handles disbursement of money. The finalized claim is added to the Blockchain, thereby preserving all claims history for the vehicle.

```
Claim {

        VIN number,

        License Plate Number,

        Accident Date,

        Policy ID,

        Amount

}
```

Fig 3: Structure of a claim

V. IMPLEMENTATION

We are using Hyperledger Fabric for the Blockchain network. Specifically, we are using the IBM Bluemix Blockchain, which is a managed service for the Hyperledger fabric. This service enables the creation of blockchain business networks with ownership and control distributed across different organizations [15].

For managing the claims process, a web application running on Node.js is made available to validating peers. The Blockchain Chaincode, deployed on the fabric is implemented in Go language. Chaincode is software defining an asset or assets, and the transaction instructions for modifying the asset(s). In other words, it's the business logic [16].

VI. CONCLUSION

As we demonstrated, the use of Blockchain in the auto insurance industry can significantly streamline the process of claim handing. By enforcing identity management and declining duplicate claims, Blockchain technology significantly mitigates the possibility of insurance fraud. Also, using a trusted Blockchain network like the Hyperledger fabric ensures that the attacker cannot introduce misbehaving nodes and attempt to introduce a race in block committing, which may lead to a double claim. This further enhances fraud resistance. There are other obvious advantages in using Blockchain technology, which include immutability, accountability and compliance.

Given all these advantages, it seems only inevitable, that Blockchain technology will become an essential part of the auto-insurance industry in the years to come.

VII. FUTURE ENHANCEMENTS

The current version of our implementation requires the transfer of claims manually between the decision-making entities in the claim handling process. A fully automated solution, where the claim is transferred automatically between entities once each step is complete, can be implemented.

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