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## A Novel Hybrid Sharing Economy Based Blockchain Model (Proof of Meet)

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**Abstract** — This paper is the first part of the Proof of Meet (PoM) work. This part focuses on the need for the model and its system (roughly) rather than giving technical details. In the second part, full technical details and architecture of the model will be discussed. The model focuses on consensus-based sharing (meeting) economy model. The sharing (meeting) describes the relationship between what is already somewhere and what goes there. The consensus is built on active clients (where the client can be anything capable of a change of location) on a social activity (location and action). There are two parts of clients; the first who/which go somewhere for a purpose ( $C_1$ ) and the second who/which are regularly somewhere for a purpose ( $C_2$ ).  $C_1$  is in the domain of at least two clients and  $C_2$  is in at least one. To build a decentralised blockchain with no energy-consuming, the paper proposes a consensus system, PoM, on the top of Proof of Stake (PoS) and Blockchain-Based Proof of Location (BBPL). The sharing economy model is one of the applications of the proposed blockchain model. The blockchain system called HOX is available to use very large area distributed ledger systems from a dynamic transportation system to dynamic big data. HOX is an instance of PoM application. Consequently, the proposed model provides the opportunity to record taxes, earn a fair share of labour and use blockchain actively in daily life within the legal framework.

**Keywords** — Proof of meet, proof of stake, blockchain, consensus, location-based blockchain, dynamic big data

### 1. Introduction

A blockchain is a recording system consisting mainly of data blocks and created for decentralisation based on a distributed ledger system. The system starts with a genesis block, and subsequent operations are recorded in blocks, respectively. Records cannot be deleted or changed. When a certain number of approved data is entered from the blocks, the next block is passed. The data is encrypted cryptographically with hash, and the transactions made with these decryptions are confirmed. Nodes, called miners, compete for the decryptions to make these confirmations. This contest is sometimes held in PoW system depending on the processing power of the devices and sometimes the amount of coins that have been staked in the PoS system. Therefore, it is a struggle where the equipment is stronger, or the amount of coins is higher in the race. The PoM system in this article proposes a more meeting-based structure. A system is mentioned in which the people who meet more and more and spend more time are included in the dynamics of the system. Since the idea of blockchain and decentralisation came into our lives practically, we continue to experience different entropy for a new digital adventure. While some scientists, human societies, and technology lovers are supporters of this issue, on the other hand, the efforts of ordinary people and most administrations to escape (without being distant but indifferent) continue with increasing momentum. Of course, the issue is not only finding meaning in a

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decentralised system but also in this environment where pandemic days are experienced, a safe and practical digitalisation has started Proof of Meet to find a lot of discussions. By digitalisation, the intent is to ensure that digital payment systems are fully integrated into everyday life, minimising fraud, and third-party control to even zero levels. One of the other and most important issues is the transfer time of digital assets, and the blocks swelling and getting heavier, causing more and more data occupation. For example, the Bitcoin blockchain [1] has 100 GB data records and its enamelling causes a lot of electricity to be consumed. On the other hand, although the emphasis on decentralisation has come to the fore, the power of the devices making enamel in the mining system determines the strongest in the system. The Proof of Stake concept has been introduced, and many applications have been developed for the solution of this type of problem to minimise energy consumption. Currently, Ethereum [2] system is in preparation for PoS. In today's PoS-based applications, stake power, that is, the dominance of the number of digital assets in the total digital asset, in other words, the dominant, block maker and block approvals of the system with the total number of coins in the total system have led the system to move away from decentralisation. This problem remains an obvious problem as there is a predominance. However, an attempt is made to deal with the random selection of blockers and transaction validators (used for stake) from those with the largest number of coins. Considered by the country's governments, blockchain systems constitute a corrosive pressure factor for taxation and asset tracking. The main reason is that digital assets that are not under the control of the bank cannot be registered with the daily life economy. On the other hand, how much share do social enterprises get benefits from this much developments? Of course, it is near to zero. Because payments made through digital payment systems (especially blockchain-based) continue to remain an informal economic situation for governments, as such, of course, this digital money and asset systems remain minimal to contribute to the real economy of businesses and the real economy itself. The model proposed by this study aims to minimise the informal economy that everyone in the model ecosystem will gain. The model proposes an improved system using PoS and BBPL models. On the other hand, a fairer and shared attitude will be developed with the activation of block validators and constructors in the PoS system, real labour factors and  $C_1$ - $C_2$ s rather than the number of coins.

## 2. Proof of Meet (PoM): HOX Instance

Amoretti et al. [3] proposed a reliable LBS system. They focused on the network, which has mobile nodes connected to the Internet via the Wi-Fi or cellular network interface and can exchange information with neighbouring nodes through short-range communication technologies such as Bluetooth. It is a node that asks its proving neighbours to collect location information. A Witness for a Prover the node that provides the Prover with the proof of position. The following flow provides the fictive system in the PoM system:

$C_1$ s meet in one place (at least two  $C_1$ s) and on mobile (they match with a Bluetooth type function via the app, but since Bluetooth will drain the battery of the mobile device, location-based distance in Wi-Fi can be controlled in a certain time interval.). Wi-Fi or cellular network unit is activated, indicating that the  $C_1$ s that meet are there, and position information is obtained. The information that they are in the place is confirmed by  $C_2$  with  $C_1$ 's mobile fingerprint feature. Then, the total time spent at the venue is processed on the application, and  $C_2$  sends the data to be validated to the blockchain for approval after the approval of the meeting with fingerprints and payment by included in the tax payment system.

PoM (Restricted to HOX) aims to the blockchain as follows:

1. Constructing a position and meet system to protect existing execution from deception. The system where trysters (clients who/which meet) are rewarded with coins both in today's payment system and on the blockchain. Benefits from rewards are provided in the following ways:
  - a. Clients who/which meet the most. (minting method (mm))
  - b. Clients who/which meet with the most clients (for  $C_1$  clients). (mm)
  - c. Having the longest meeting period. (mm)
  - d. To be included in the tax payment through the application by paying with a PayPal or similar system at a discount in the shopping area. (taxed method (tm))

- e. By approving the start and end of the meeting of  $C_2$  (on the commercial basis), gains customer loyalty and intensity and the payments are recorded in tax. (mm+tm)
2. The creation of blocks includes information such as a meeting id, start-end time, id of the clients in the meeting (clients in group  $C_1$ ), id of  $C_2$  (also coded with the Wi-Fi mac address). With this feature, location, time and stakeholders are included in the system pool.
  3. In the model, a customised PoM is used to store proofs of meet. Two parts of proof validators and block validators play a role equally weighted:  $C_1$  and  $C_2$ . The ones with the highest power are randomly selected from one set at a time. (mm)
  4. The consensus algorithm for public blockchain (PoM) that depend on a validator's stake power ( $P_1(c_i)$ ) in the network is calculated as follows for  $C_1$ :  
The stake power of  $c_i$  which is a client in  $C_1$  is denoted by  $P_1(c_i)$ .

$SC_1(c_i)$ : The staked coin amount of  $c_i$ .

$TC_1(c_i)$ : The staked time period (seconds) of coins of  $c_i$ .

$CMN(c_i)$ : The total number of clients  $c_i$  meets up to the present time.

$MMN(c_i)$ : The total number of meetings of  $c_i$  up to the present time.

$TMN(c_i)$ : The total time spent (seconds) from all meetings of  $c_i$  up to the present time.

$$P_1(c_i) = w_1SC_1(c_i) + w_2TC_1(c_i) + w_3CMN(c_i) + w_4MMN(c_i) + w_5TMN(c_i)$$

$$\sum_{h=1}^5 w_h = 1 \text{ where } 0.1 < w_h < 1.$$

5. The consensus algorithm for public blockchain (PoM) that depend on a validator's stake power  $P_2(c_i)$  in the network are calculated for  $C_2$  as follows:  
The stake power of  $c_i$  which is a client in  $C_2$  is denoted by  $P_2(c_i)$ .

$SC_2(c_i)$ : The staked coin amount of  $c_i$ .

$TC_2(c_i)$ : The staked time period (seconds) of coins of  $c_i$ .

$CHN(c_i)$ : The total number of clients  $c_i$  hosted to the present time.

$THN(c_i)$ : The total time spent (seconds) from all hosts up to the present time.

$DHN(c_i)$ : The total discount amount as % up to the present time.

$$P_2(c_i) = k_1SC_2(c_i) + k_2TC_2(c_i) + k_3CHN(c_i) + k_4THN(c_i) + k_5DHN(c_i)$$

$$\sum_{h=1}^5 k_h = 1 \text{ where } 0.1 < k_h < 1.$$

**Remark 2.1.** In the system, the coin is mined, and discounts are earned dependent on the number of people met and the duration of the meeting. With these contributions, clients also become validators of the system, that is, they also get block rewards at the rate of  $P_1$  and  $P_2$ .

**Remark 2.2.** A  $C_1$  and a  $C_2$  cannot meet at the venue of  $C_2$ . A  $C_1$  and a  $C_2$  can only meet in a place they do not own.

**Remark 2.3.** The application can register the amount paid with the payment system it will provide. Thus, a fraud about discount can be prevented easily.

**Remark 2.4.** If a  $C_2$  tries to mislead the system for discounts to gain more stake power, it is thrown out of the system and loses all staked coins. If the  $C_2$  client goes this way; naturally, the client would have deceived the tax system.

### 3. Dynamic Big Data Equipped with Location (DBDL)

Of course, when PoM is used for transportation systems, it should be an advantage to have less time spent at the destination. In this sense, the PoM system can be adapted to a reward increasing system for the shorter time interval with a reward rate change process. Due to the difficulty of having more than two  $C_1$ s at the meeting, another hybrid structure can be used by using the system in [3]. Thus, witness and neighbourhood

features can be used since there is one client in  $C_1$  and  $C_2$ . For more complex data systems, especially dynamic data (transactional data) including the transportation process, require considering time dimension and location data. Such data sets and their analysis relates to financial (orders, invoices, payments), work (plans, activity records), and logistics (deliveries, storage records, travel records). Events between clients, clients' spatial, quantitative and qualitative data changes are subject to non-static evaluations for data analysis. With a blockchain record of these non-static processes, it is possible to reward the employees of the company and improve the quality of the work done by equipping the business development processes of the companies with quality control techniques. It can contribute to the development of not only companies but also companies that do business within the framework of quality control systems. PoM can be a decentralised and fair approach to business development in terms of strategy determination, labour-earning rate and incentive rewards, especially in business lines where use and evaluation of temporal (time-wise) and spatial changes in data sets is essential.

**Remark 3.1.** Ethereum system charges a fee for the mint rewards that customers received from their staking, meeting and confirmation. To prevent this, an integration on Quorum Blockchain [4] can be provided easily. Positively, Quorum has a PoM-compliant structure with the Raft consensus protocol running on the blockchain.

**Remark 3.2.** PoM, Avalanche [5] and Quorum integration can be achieved easily without requiring a new blockchain construction. Besides, by integrating with the RaidaTech [6] infrastructure, all transactions can be zero fees.

#### 4. Conclusion

It is well known that within the framework of blockchain studies and discussions, a negative argument against the state and banking systems is set out, and an attempt is made to create a mental conflict environment. A hybrid model that can be called a middle ground is introduced with PoM. Because the hybrid space of the current legal payment systems with the applications in PoM will ensure that the coins become a legal payment instrument within the system. Although the services offered by PoM are not a direct payment instrument, the services provide DeFi advantages in blockchain and payment agent in terms of being included in the registered tax system. The system needs to be developed in terms of both scalability and data size management and undergoes a good testing process. With the Proof of Meet system, many applications that include dynamic data can be solved decentrally and fairly such as workloads, data tracking, job-worker rewards, location data frauds and tax auditing. However, many projects related to technical details in the project in the frame of logic, cryptographic, mathematics and computer science can be revealed. DAG-based transaction equipment with homotopy type theory will surely open new gates for novel structures to extend blockchain with ontology-based logic tensor vector.

#### References

- [1] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, <https://bitcoin.org/bitcoin.pdf> (2008) 1-9.
- [2] G. Wood, *Ethereum: A Secure Decentralised Generalised Transaction Ledger*, Ethereum Project Yellow Paper 151 (2014) 1-32.
- [3] M. Amoretti, G. Brambilla, F. Medioli, F. Zanichelli, *Blockchain-Based Proof of Location*, IEEE International Conference on Software Quality, Reliability and Security Companion (QRS-C) (2018).
- [4] <https://www.goquorum.com>, 14.08.2020.
- [5] <https://www.avalabs.org>, 14.08.2020.
- [6] <https://raidatech.com>, 14.08.2020.