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Compare and Contrast Interledger Payment Protocol and Tendermint's Cosmos Technical Review

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1 Introduction

Increasing the number of traditional financial systems and cryptocurrencies also comes with a new problem. Transferring money between different accounts in the same financial system is easy as it uses the same interface to communicate. However, the level of complexity increases significantly when it involves transactions between different ledgers around the world. It is also called cross-ledger problem. Because of this, Interledger Payment protocol and Tendermint's Cosmos have been proposed for transferring money between different ledgers without concerning the problem of whether you are using USD, AUD, Bitcoin or other currencies. This report first summarizes these two methods shortly and then focuses on comparing the similarity and difference between them. Finally, the author gives his conclusion in this report.

2 Summary

2.1 Interledger Payment Protocol

The Interledger Payment protocol (ILP) allows users to transfer payments between different ledgers (Thomas and Schwartz, 2015). As indicated in picture 1, it is a simple process of transferring the values between Bitcoin cryptocurrency and USD currency. The connector between these two ledgers, considered as a communicator between these two ledgers, is an implementation of Interledger protocol with the purpose of exchanging

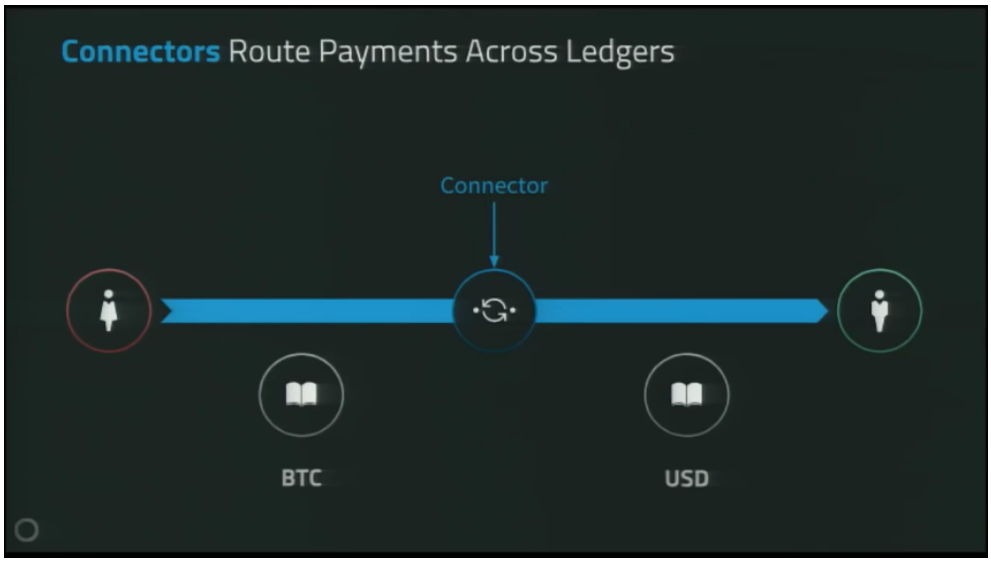

Figure 1: A simple process of ILP (cinerama, 2018)

payment as well as error packets. It is essential that the connector needs to be trusted so that payments could not be lost during the transaction. It is also indicated in Thomas and Schwartz (2015) that connectors in ILP only do the forwarding job without keeping the authoritative state of the payments.

The ILP protocol is created based on the idea of TCP/IP in Network layer. In this context, each connector could be viewed as a router in the Internet network that is responsible for forwarding packets to the destination. Unlike TCP packets that carry time-to-live field to indicate the limited number of hops it could be forwarded, the payment of ILP carries "amount" field. Each time the packet arrives at the connector, its "amount" field will be subtracted by a small value as the fee of forwarding packets between ledgers.

2.2 Tendermint's Cosmos

Cosmos is the internet of blockchains or a network of zones and hubs. According to Cisneros (2018), each zone represents a type of cryptocurrencies of the blockchains. With the help of Inter blockchain Cosmos (IBC) interface, zones can communicate with each other by sending IBC messages through a Cosmos hub. The reason for both zones and hubs could interact with one another is that they have the same foundation structure, or they are both implemented by Tendermint.

Tendermint is a software that aims to be one of the effective consensus mechanisms that could solve the problem of Byzantine generals. In other words, Tendermint helps users build their blockchain application easier by separating the concepts of network layer and consensus from the application layer. Users only need to implement the logic of their application without worrying about anything else. Unlike Bitcoin cryptocurrency, Tendermint is said to be fork accountability.

One of the main features in Cosmos is the fast performance of each transaction, to

achieve that Cosmos divides the group of stakers into two groups which are validators and delegators. The first group is responsible for the main network communication. It plays an important role in validating newly created block and synchronize with each other. Because It has to do a large amount of work as well as synchronize with its peers, it is usually limited in number in order to increase the performance (Wieth, 2018). The second group, delegators, has the responsibility for voting and supporting. They have the right to vote for their validator, receive the rewards and if their validator attempts to fork, they will also get "punished".

3 Compare and Contrast

3.1 Similarity

Besides the fact that both Interledger Payment protocol and Tendermint's Cosmos have the same purpose that they address the cross-ledger problem, both of them also rely on the idea of Byzantine fault tolerance (BFT).

Thomas and Schwartz (2015) mentions that ILP also has a concept of validators which is the same as Tendermin's Cosmos. However, it depends on the decisions of banks whether they want to select an existing network of validators developed based on BFT consensus mechanism or they could build their own ILP validators which is more suitable for a complex application structure.

Moreover, to be one of the blockchains in cosmos ecosystem, each blockchain zone has to be implemented based on Tendermint core. Since they have the same foundation structure, they can communicate with each other easily. This enables Tendermint's Cosmos to be scalable horizontally which is also one of the main features of ILP.

3.2 Difference

3.2.1 Membership and weighting

As mentioned earlier, in cosmos there are groups of delegators and validators having different responsibilities. Membership is the role of a validator, it means who is going to become a validator among stakers in the cosmos system. It depends on the amount of stake they commit as well as the votes they receive from their supporters which are delegators. In cosmos, validators' weightings are flexible due to the fact that the higher the amount of stake they have, the higher the weighting they can have in the system. However, it is different in the case of Interledger Payment protocol, the connectors between ledgers cannot change their membership as well as their weighting the network. Each connector has the same role and the same level of importance in forwarding payments Brian Kelly (2016).

3.2.2 Target of Confirmation

Tendermint's cosmos and Interledger Payment protocol are said to be different in the target proving the confirmation of the transferred packets (Brian Kelly, 2016). In the case of Cosmos, the set of validators in each blockchain zone is responsible for confirming the received packets, but not receiving users. Regarding ILP, after receiving packets at the destination, it is the responsibility of the receiver that the information must be confirmed, and the confirmation is sent back to the sender at the other end.

3.2.3 Keeping authority of states

As mentioned in section 2.1, connectors of ILP play the important role of a communicator that forwards payments between ledgers and also relay error messages during the transactions. It does not have the responsibility to keep the authority of states, but this does not mean that they are stateless. Based on the design, connectors may keep some values about their current state. This is different in the case of Cosmos, validators of zones and hubs have the right to verify and decide whether the newly proposed block is approved or not and they are responsible for keeping the authority of states of each transaction (Kwon, 2014).

3.2.4 Stake

According to Brian Kelly (2016), "stake" is not specified in ILP. However, in cosmos system, the use of stake is essential as both delegators and validators of Tendermint's cosmos need to put their stake in the system in order to join the network and get the rewards. Just like the concept in Proof of Work (PoW) in Bitcoin, the more powerful system you have in mining, the faster solution you can obtain by solving puzzles (Kiayias et al., 2017). In Proof of Stake, depending on the amount of stake they put, one of them will have a chance to get the rewards after creating a new block.

4 Conclusions

Even though both Interledger Payment protocol (ILP) and Tendermint's cosmos are both used for the purpose of transferring values between ledgers and they are different in many aspects, each of them has their own advantages satisfying users demand. Also, they could be considered as a complement of each other. For example, validators of Cosmos could play a role of notary in ILP. Instead of using as an interface for creating zones, ILP could also be used for the purpose of communicating between zones in the network.

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