IRISnet Whitepaper

The IRIS network is named after the Greek goddess Iris, said to be the personification of the rainbow and the faithful messenger between heaven and humanity.

Contractual relationships are a fundamental building block of human society and the importance of blockchain technology lies in providing a very efficient and cost effective way of realizing reliable contractual relationships: for the first time, trust (which is also very costly to establish) is not needed when multiple parties participate in sophisticated business interactions. It has been said that blockchain technology provides the most important elements for distributed business to take place: lifting network effect and very low transaction cost. More and more people see the potential of blockchains as the new internet of value and will gradually transform the current business models into more efficient distributed ones. Especially the token mechanism embedded in most modern blockchain emphasizes each network participant's right and will disrupt business in its current form [1].

However, blockchain technology is still in its early stages. As with any new technology, there are drawbacks. These include limited performance and undeveloped governance mechanisms. Presently, these drawbacks make it difficult for blockchains to support real-world distributed business collaboration. Consortium chains, such as Hyperledger Fabric and R3 Corda, and organisations such as the Ethereum Enterprise Alliance, have tried to address those performance and governance issues to make blockchain technology more suitable for enterprises. However, today consortium chains are dominated by huge enterprise companies. Furthermore their close-form off on-chain governance model is very inefficient. Without a token economics model and the openness and the excitement in public chains, consortium chains may be viewed as lacking vitality.

We would like to enhance the current blockchain technology and make it possible to enable thousands and millions of Small Medium Businesses ("SMBs") and even individual freelance business service providers to provide their services and enjoy the rewards in an open network. To achieve this, we have identified the following challenges and consequent opportunities for technology innovations:

Not all computation could or should be implemented as on-chain computations such as smart contracts

The Turing-complete virtual machine provided by Ethereum [2] runs Smart Contracts gives people a lot of hope of developing decentralized applications.

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However Smart contracts can only handle deterministic logic (so every node can reach an identical state after processing every transaction and block) while huge amount of existing business logic that is not deterministic and might vary at different time and under different environmental parameters. Especially these days, business systems have placed an increasing amount of reliance on computer algorithms, including Natural Language Processing ("NLP"), machine learning, and operation research algorithms, for decision optimization. In those algorithms, very often we purposely add some randomness to make the decision not to get stuck at local optimal states while trying to find a better sub-optimal result.

On the other hand, some of the real world business logics are meant to be run once off-chain and shouldn't be implemented as smart contracts this type of replicated computing. Integration and collaboration of off-chain services and resources with a distributed ledger is key to further advance the adoption of blockchain technology for more real-world use scenarios.

How to reuse the existing blockchain resources, including both public chains and consortium chains

It is infeasible to use one public chain to address all use cases. Every day there are different chains going live which focus on one aspect of problem solving such as distributed storage, asset ownership or predict market etc. According to the coinmarketcap.com, there are more than 1000 cryptocurrencies currently active on various exchanges.

While building business applications involve handling storage and also different source of data feeds. Another motivation of our work involves how to support building distributed business applications by reusing some of the existing work like storage (IPFS, SIA, Storj.io etc.), data feed (Augur, Gnosis, Oraclize etc.) and IoT (IOTA etc.) provided by those dedicated blockchains and not reinventing the wheel.

Besides, there are many (near) real-time business transactions do need more close form consortium/permission/private chains to address performance, security and business governance requirements. Our vision of distributed business infrastructure needs to have the Interoperability of many heterogeneous chains including public/consortium/permission/private chains.

Inter-chain technology is a very nature answer to the requirement. However, till today, the existing Inter-chain technologies are mainly designed to provide interoperability among existing blockchains and focus on token value transfer. The question of how to consume the resource provided in different chains still remains unanswered.

Comparing the proposed inter-chain technologies like Cosmos [3] and Polkadot [4], we find out that Cosmos provides more mature base for interoperability and

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scalability. Especially, we found the design of “many hubs and many zones” and “each zones are independent blockchains having independent governance models” from Cosmos provides a very suitable architecture for modeling the real world complexity in a SOC way. To best reuse the existing framework, we present the IRIS Network, a decentralized inter-chain network composing hub and zones with implementing a layer of service infrastructure based on Cosmos/Tendermint [5], with enhanced usage of token .

Since the IRIS network is designed on top of Cosmos/Tendermint, we will first discuss Cosmos/Tendermint, summarize the features we inherit from Cosmos/Tendermint and summarize the innovations we have created.

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