

ttData

INTERNET OF BLOCKCHAINS

WHITEPAPER

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The ttData Platform is a decentralized multi-blockchain system designed to support all peer-to-peer digital economic activities across multiple ledgers.

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Overview

The Internet Protocol (IP)¹ was created to connect and allow communication between previously independent and relatively isolated networks. IP solved the issue of network silos by relaying datagrams across network boundaries. Its routing function enables internetworking, and essentially established the Internet we know today. ttData draws heavy inspiration from the design and goals of the traditional Internet Protocols in its ultimate vision to become the “Internet of blockchains.” By doing so, ttData will be able to also solve for the inherent weaknesses in today’s communications by leveraging decentralization and blockchain technology to secure transactions executed on the network².

Today, blockchain technology provides the most important elements for distributed business to take place: lifting network effect and very low transaction cost. Blockchain technology is regarded as the new internet of value and will gradually transform current business models into more efficient distributed ones. However, the main problem is that there are many independent blockchains, each with their own unique innovations.

Interoperability between blockchains is the main goal for ttData. Currently, assets exist on different blockchains each containing its own isolated innovations with no way to utilize innovations of one chain with the assets of another chain. Existing solutions in the industry solve the problem indirectly, such as atomic swaps that only allow two people to exchange tokens in a trustless atomic way but does not actually allow assets to move between the chains themselves.

Consideration for other limitations of current blockchain technologies include limited performance and undeveloped governance mechanisms. These drawbacks make it difficult for blockchains to support real-world distributed business collaboration. Consortium chains, such as Hyperledger Fabric³ and R3 Corda⁴, and organizations such as the Ethereum Enterprise Alliance⁵, have tried to address those performance and governance issues to make blockchain technology more suitable for enterprises. However, today’s consortium chains are dominated by huge enterprise companies. Furthermore, their close-form and governance models are usually inefficient due to competition of resources or even duplication of assets and, as a result of these various model considerations, there is usually a high technical threshold for developers.

¹ <https://www.cs.princeton.edu/courses/archive/fall06/cos561/papers/cerf74.pdf>

² <https://arxiv.org/pdf/1805.05934.pdf>

³ <https://www.hyperledger.org/projects/fabric>

⁴ <https://www.r3.com/>

⁵ <https://entethalliance.org/>

The ttData Platform is a blockchain technology platform that provides a one-stop solution for distributed services application developers. The ttData Platform will be based on the current mainstream public blockchain system, through the abstraction and encapsulation of several open common modules, providing external services in the form of SDK and API. ttData's platform is built to enhance the current blockchain technology and allow the possibility to enable any business or individual service provider to deliver their services without compromise. To achieve this, we have identified the following challenges and consequent opportunities for technology innovations:

Not all computation should be implemented on-chain

Smart contracts provided by Ethereum's Turing-complete virtual machine⁶ (EVM) can only handle deterministic logic. However, in real life, existing business logic is not deterministic and might vary from time to time under different environmental parameters. On the other hand, some of the real world business logics are meant to be run once off-chain and should not be implemented as smart contracts to prevent 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.

Ability to access rich innovations between various existing blockchain resources, including both public chains and consortium chains

It is not possible to use one public chain to address all use cases. Each day, there are different chains developed focusing on one aspect of problem solving such as distributed storage, asset ownership or market prediction etc. According to the Coinmarketcap⁷, there are more than 1000 cryptocurrencies currently active on various exchanges around the world.

Building business applications involves handling storage and different sources of data feeds. ttData supports building distributed business applications by reusing some of the existing work such as decentralized identity (Hyperledger Indy⁸, Sovrin⁹ etc.), storage (IPFS¹⁰, SIA¹¹, Storj.io¹² etc.), data feed (Augur¹³, Gnosis¹⁴, Oraclize¹⁵ etc.) and IoT (IOTA¹⁶, Hyperledger Sawtooth¹⁷, etc.) provided by those dedicated blockchains.

⁶ <https://github.com/ethereum/yellowpaper>

⁷ <https://coinmarketcap.com/>

⁸ <https://www.hyperledger.org/projects/hyperledger-indy>

⁹ <https://sovrin.org/>

¹⁰ <https://ipfs.io/>

¹¹ <https://sia.tech/>

¹² <https://storj.io/>

¹³ <https://www.augur.net/>

¹⁴ <https://gnosis.io/>

¹⁵ <https://www.oraclize.it/>

¹⁶ <https://www.iota.org/>

¹⁷ <https://sawtooth.hyperledger.org/>

Use Cases

Combining public chains & consortium chains

For many business scenarios, taking a hybrid architecture of combining the good features of a public chain and a consortium chain can provide beneficial results, particularly with regards to performance, security and economic incentives.

For example, hospitals and insurance companies could form a consortium blockchain to support high performance medical insurance transactions, whilst identifying other information such as statistics regarding certain diseases as a global service, which can be invoked from other public chains. The tokens received from public chains can be awarded back to those information providers in the consortium chain, which motivate the system participants to improve and promote services. With this infrastructure provided by ttData Platform, large-scale spontaneous collaboration could be made possible while still supporting stringent performance and security requirements.

Other potential benefits could include the following:

1. Only a small amount of parametric data being exchanged on-chain, which can help enhance performance.
2. A more practical way for data usage auditing, which is often needed in the healthcare domain.

Healthcare data is highly private, involving numerous security requirements. This puts forward the challenge for healthcare data to be used for the purposes of cross-organization collaboration (such as across-hospital clinic records search for diagnosis assistance, new drug clinic test patient identification, health insurance automatic claim processing etc.). This service layer implementation can be built on top of Ethermint in attempt to connect hospitals, insurance companies and analytics service providers to provide privacy preserving healthcare data analytics capability.

This scenario demonstrates a more complicated use case service including implementing distributed analytics, and connecting service providers as well as service consumers, utilizing blockchain to provide auditable transaction ledger as well as trustworthy distributed computing foundation.

Application Forms Utilizing DID

Just as credit cards enabled millions of small merchants to go into business offering telephonic and online ordering, the ttData platform's DID modules can be designed to enable thousands

of new “merchants of trust” to begin offering digital credentials to meet any market need for trust verification: microcredit, tenancy, employment qualifications, online recommendations, news verification, etc.

For example, a patient needs to send his blood pressure data to his doctor through a wearable device that monitors this information. In order for the remote data to be deemed acceptable, the patient would also have to be verified. The patient can perform required vetting, due diligence, compliance and other tasks needed to establish confidence in making a claim about his identity trait. The documentation required for this process is typically not in digital form. The entity, a previous hospital for example, performing the vetting process takes on all liability about the claims they make. In order for the patient to have obtained his hospital issued ID, he had to meet the examination/vetting criteria for the issuance of a verifiable credential for instance. Upon completion of the vetting process, the hospital can feel confident in making attestations about the patient’s name, date of birth, address etc. The patient could be a participant in a decentralized Identity Network or a Consortium Identity Network to make the process easier and more secure for him to then transmit the blood pressure data to the doctor through the wearable, seamlessly protecting his identity.

Data and analytics e-marketplace

From studying several proposed AI+Blockchain projects, it seems that most of the projects aim to provide data exchange markets and analytics API markets. With the proposed ttData Platform, those networks could potentially be built with ease through publishing data from data services and wrapping analytics API from analytics services utilizing the ttData Platform provider SDK.

Distributed e-commerce

With the proposed ttData Platform, integration with traditional systems like ERP to obtain inventory information, or inter-chain query on trusted data sources to obtain information such as transportation and weather data, will be quite similar to the approach with which many enterprise application developers are already familiar. With those services integrated to support distributed e-commerce applications, it could be possible for distributed e-commerce applications to provide a similar user experience as centralized systems, such as Amazon.

Other

There are many other use cases that could be supported by the ttData Platform infrastructure, such as more efficient asset based security systems, distributed regulation technology such as due diligence, mutual aid marketplace etc. One of ttData project plans is also working closely with application project teams to support and enable them with needed blockchain infrastructure and allow them to focus on delivering the envisioned business value more efficiently.