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# Dimension Blockchain

Whitepaper

2019

Enterprise-grade Blockchain  
Network Service



Dimension

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# I Philosophy

The structure of a blockchain allows for movement of money to be traceable and at the same time protects the financial privacy of its users. It builds an efficient and reliable value interchange system and accelerates the Internet to become a hub for social trust and value transmission creating what is known as the 'Internet of Value'.

We at Dimension believe that blockchain technology provides a new kind of social trust mechanism and lays the foundation for the future digital economy. The widespread adoption of this technology would provide a new direction for the future of private and public services.

## 1.1 Motivation

While seeking adoption we realized that blockchain technology services are subject to several restrictions. The need for high scalability has risen exponentially whilst the protection of digital privacy is not yet fully secure. The technology for a distributed file system remains at its infancy and the efficiency of the current consensus mechanisms require improvements.

There is a lack of a standard for governance, a bottleneck in cross-chain interoperability and a failure in the adaption of different consensus algorithms that would be specialized in different services and conditions.

- As blockchain technology has a variety of infrastructure, it consists of challenges such as deep academic knowledge, difficulty of implementation and the lack of an economically viable commercial solution. Commercial users fail to fully understand the technology and finding the perfect solution for their business can be challenging. In the absence of a consistent and sustainable business model most attempts in blockchain adoption still remain in a conceptual stage.
- Blockchain needs to adapt with multifarious business needs and satisfy the need for the high efficiency for the sharing of data, and the high data security standards among different enterprise networks. This requires a standard in blockchain solutions that provides more versatility.
- As data on a blockchain is irreversible, the file size of the blockchain would only increase with time. With the increasing demand for higher data capacity on a blockchain the problem would become apparent when corporate data begins to be stored on the blockchain as such files tend to grow exponentially in size within a short period of time.

Companies would also struggle with migrating off-chain data to the user distributed blockchain network. The current blockchain infrastructure requires the use of distributed data storage nodes, though there needs to be exploration into better and more efficient file storage solutions.

- Many of the current blockchain solutions fail to focus on targeting issues regarding

business and commercial usage of their platforms. This, in turn, causes their intended use cases to lack adoption and they are unable to expand their usage in businesses and industries.

Such projects also experience obstacles in adapting to the rapid development of business systems. When it comes to corporate collaboration, an intercompany notification mechanism shows particular demand but very few blockchain platforms support this functionality.

## **1.2 Overview**

The community is a crucial part of a blockchain project. The community members provide important guidance and suggestions on technology, government and sustainability. The KOLs (key opinion leaders), as active leaders in the community, also forward their thoughts on various issues such as how to structure a better blockchain network with actual business adoption.

The core leadership of our community comes from different industries and fields. We have a global partner from a well-known blockchain venture capital institution, a global community leader of a top 10 blockchain project, a former Wall Street private equity firm executive, a fintech security consultant, a data scientist in financial and IT firms and a systems architect in large-scale commercial platforms.

The name of Dimension, from a broad perspective, is several abstract concepts interconnected, from a philosophical point of view it refers to the angle of thought.

The project implies a continuous evolution of blockchain technology from multiple angles. It will start from a commercial application level then upgrade its value to provide more functionality allowing it to achieve a multi-dimensional interconnection between technology, business, consumers and investors. Dimension is committed to building a blockchain distributed service network.

## **1.3 Vision**

Distributed commerce based on blockchain technology has rising real-world adoption. It features multi-party equality, intelligent collaboration, value sharing and transparency.

By combining it with a blockchain that is open, decentralized, immutable, consistent and anonymous, the distributed commerce can implement the data free flow in heterogeneous and multi-sourced network architecture. The value of data sharing can be improved through restructuring the relationships of production. This will form a multi-dimensional connection among nodes and chains, eventually building a highly complex shared network.

Distributed commerce can have a big impact. Such as adoption in energy management, e-commerce marketplaces and sharing economies. In the distributed commerce model, each

participant can cooperate on an open and transparent basis, earning revenue by their contributions.

Dimension will support cross-chain data sharing by implementing a decentralized storage system, a hybrid consensus mechanism, dynamic node, privacy protection, encryption algorithm and other technologies. This will support a cross-consensus engine that can be quickly adapted, a cross-chain interconnection interface and a rapid deployment release chain. Dimension is committed to interconnecting the business value in blockchain networks and building the next generation of enterprise-grade blockchain network services.

## II Dimension

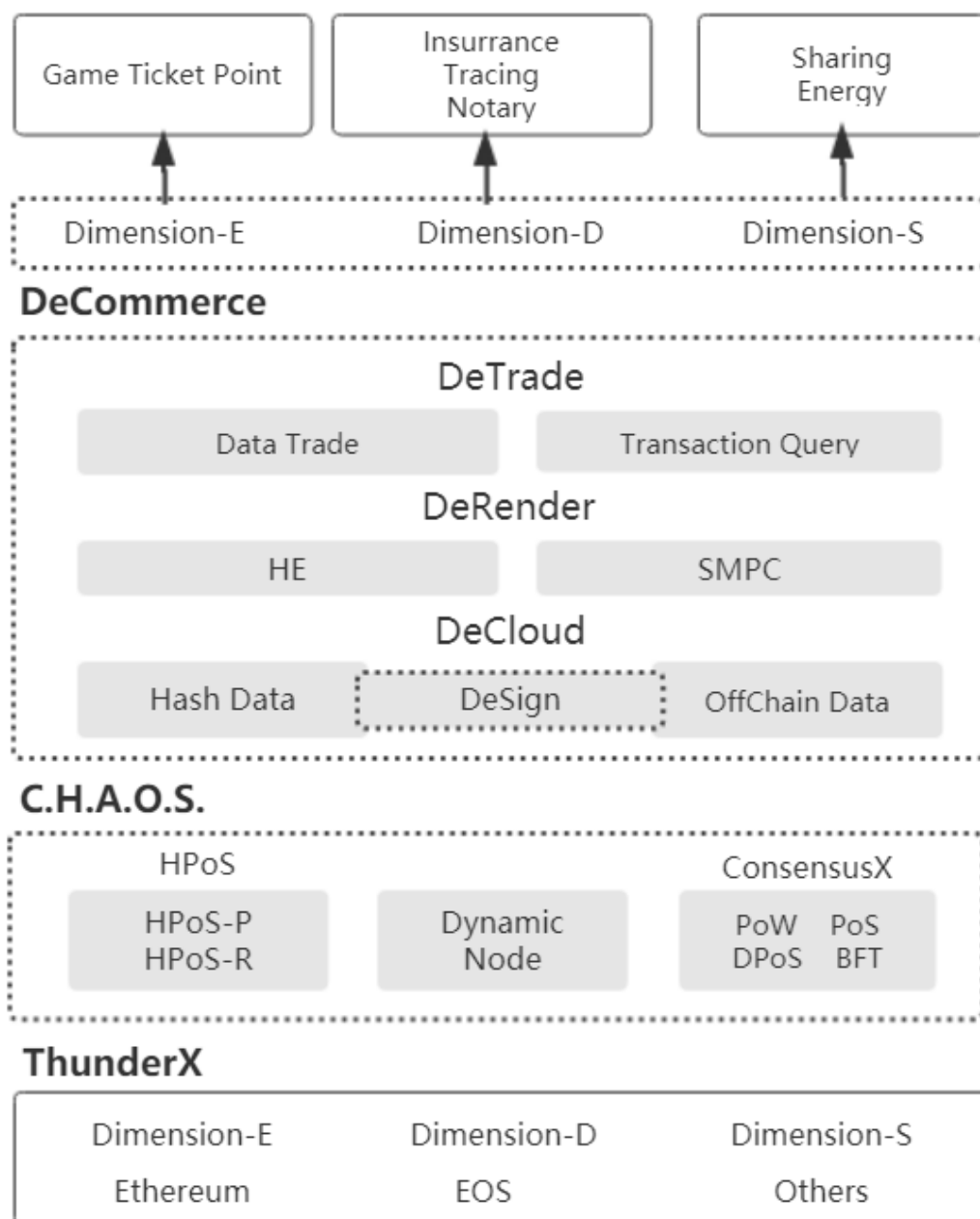


Figure 1. Dimension Architecture

## **2.1 Economy**

Dimension is dedicated to its blockchain governance design, an important engine that drives the project and the community. The Tokenomic model will have both the repurchase model and the adjustable re-offering mechanism. This can achieve a long-term balance of the project's equity value and at the same time it can stimulate project iteration and community development in a very important way.

### **2.1.1 Token Repurchase**

Dimension's token repurchase process will reduce the total circulating supply. When the circulating supply goes down, the token value goes up. Dimension Foundation will execute token repurchase & burn programs each year, through revenues from ecosystem projects such as digital exchange service charge and technology licensing fee. The token burning record will be broadcasted to the network once it's done.

The users can check the record through the Dimension's blockchain explorer ensuring a transparent and supervised process.

### **2.1.2 Token Re-Offering**

As the ecosystem grows the number of community members, developers and protocol participants will grow as well. For a stable and smooth project growth, an adjustable incentive mechanism is needed for keeping all participants interested and participated. The participants can receive risk-free incentives through Dimension's token re-offering mechanism. The annual token re-offering amount is three percent of the total circulating supply, and the distribution of re-offering mechanism is as follows:

Rewards for Nodes: 1%

Rewards for Developers: 1.6%

Rewards for Governance: 0.4%

## **2.2 Technology**

Dimension's proposed cross-consensus operating system is known as the Cross-Hybrid Automated Operating System (C.H.A.O.S.). It includes three core modules: HPoS, Dynamic Node and ConsensusX. C.H.A.O.S. adopts the benefits of the multi-consensus algorithm, enhances the scalability and adaptivity of the network with the dynamic node, and supports the pluggability and changeability of cross consensus network operations.

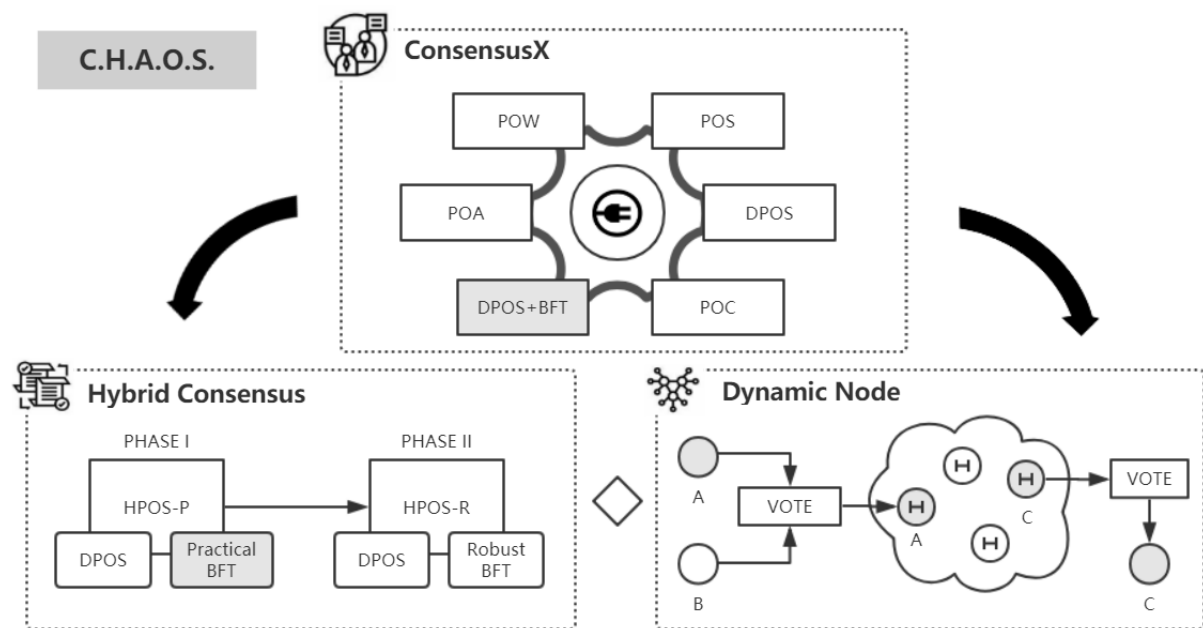


Figure 2. C.H.A.O.S. Framework

## 2.2.1 HPoS

While analyzing the existing mainstream consensus one single consensus may be convenient and easy to implement, but there are still many disadvantages in the efficiency and security of block generation. A new type of consensus mechanism, Hybrid Proof of Stake (HPoS) is proposed.

HPoS has the advantages of Delegation Proof of Stake (DPoS), giving it both a high speed of validation and high network security. The tertiary advantages of this besides speed and security being that the energy consumption of the entire and the network operation cost are both minimized.

At the same time, the nodes use the Byzantine BFT algorithm BFT reach a mutual consensus. Any malicious node will be disqualified and given a specific deduction in contribution plus an economic penalty.

The consensus node will then pack the result and the certificate into the block, and other nodes only have to verify the certificate to determine the legitimacy of the block, which can efficiently reduce the time of the block verification and improve the performance.

HPoS enhances the performance and the robustness in a blockchain system, which provides a powerful and economic network infrastructure for enterprise applications.

HPoS will be implemented in two phases, HPoS-P and HPoS-R:

In the first phase, HPoS-P, a PBTF-based consensus mechanism that uses permission voting system and majority rules of delegation will be implemented. It also supports Byzantine Fault

Tolerance and supervisory nodes participation; this means better access control, higher performance and lower energy consumption. HPoS-P can effectively support Dimension to provide a vigorous and stable blockchain network service.

The PBFT-based system does not solve the stability problem caused by node failure in some specific scenarios. If a single failed node submits a series of requests, the problematic program or it's duplicates may have a serious impact on HPoS-P's availability.

In the second phase, the upgraded hybrid consensus design, HPoS-R, will be implemented based on Robust Byzantine Fault Tolerance (RBFT), which further improves the robustness and simplicity of the system.

It will shift the focus of structuring an optimal mounting system that maximizes performance to building a system which uses RBFT to provide adequate and predictable performance (10K+TPS) and support a wide range of scenarios for enterprise services.

Consensus	Peak Throughput	Faulty Client
PBFT	60982	0
Query/Update Protocol	21873	0
A Hybrid Quorum Protocol	6983	N/A
Zyzyva Speculative BFT	56287	0
RBFT	<b>38873</b>	<b>38873</b>

*Table 1. BFT-based consensus comparison*

## 2.2.2 Dynamic Node

In the existing blockchain platforms, if there's a new node joining then the old node has to wait and re-modify after the downtime, then the network will be back online after the network reboots. This process is unacceptable for most business scenarios; thus, how to ensure a high availability, scalability and performance is the greatest challenge to commercial blockchain networks.

The quantity adjustment of nodes in Dimension Network is implemented by the Dynamic Node mechanism. The Dynamic Node is a validating mechanism based on structuring on-chain authorized delegation and mutual validating voting protocols among consensus nodes.

The quantity adjustment proposal requires two-thirds of the votes from existing nodes. The Dimension network will then maintain the entire accounting task after the new adjustment. This dynamic adjustment not only improves the flexibility of the blockchain system, but it also ensures smoother operation of the network, reducing costs and avoiding potential risks.



## 2.2.3 ConsensusX

When a consensus algorithm has to be changed during blockchain operation, in order to adopt to different business scenarios the ConsensusX can immediately switch the original algorithm into others.

In the case that DPoS was chosen, the Dynamic Node mechanism could also help with the node's quantity adjustment. This fast and easy pluggability greatly reduces the risk of false algorithm selection in the early stage, providing an efficient, flexible and low-cost blockchain solution for enterprises.

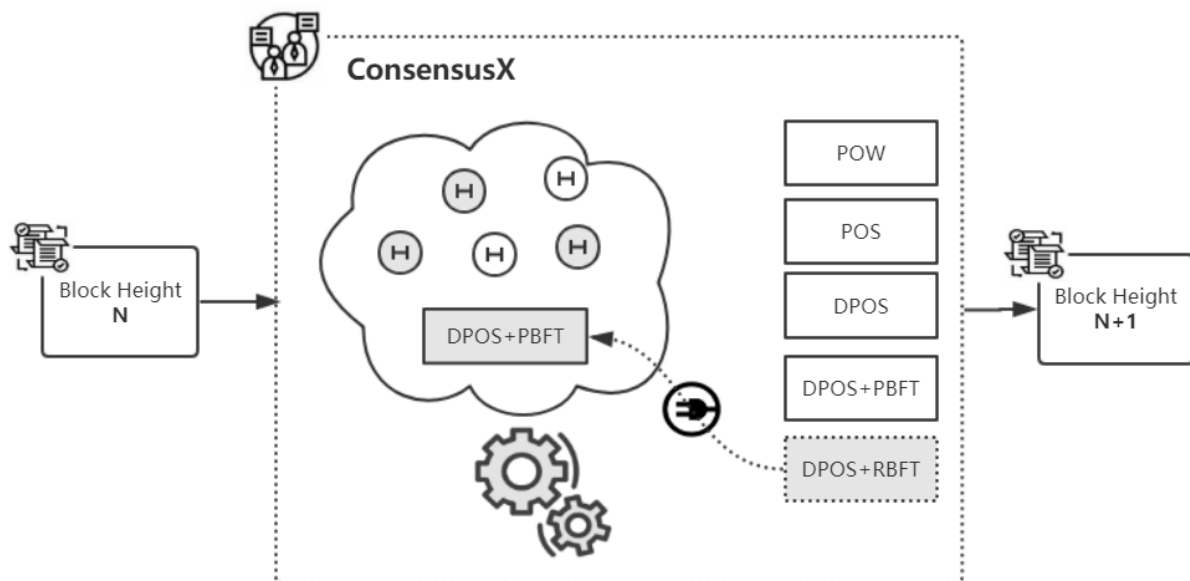


Figure 3. ConsensusX Diagram

## 2.3 Application

DeCommerce, a decentralized commercial framework, focuses on providing enterprise-grade decentralized network services, including the data storage system – DeCloud, the computing framework – DeRender, and the data trading framework – DeTrade. Which provides multi-party collaborative participation for business users and ensures the privacy and security of data and transactions.

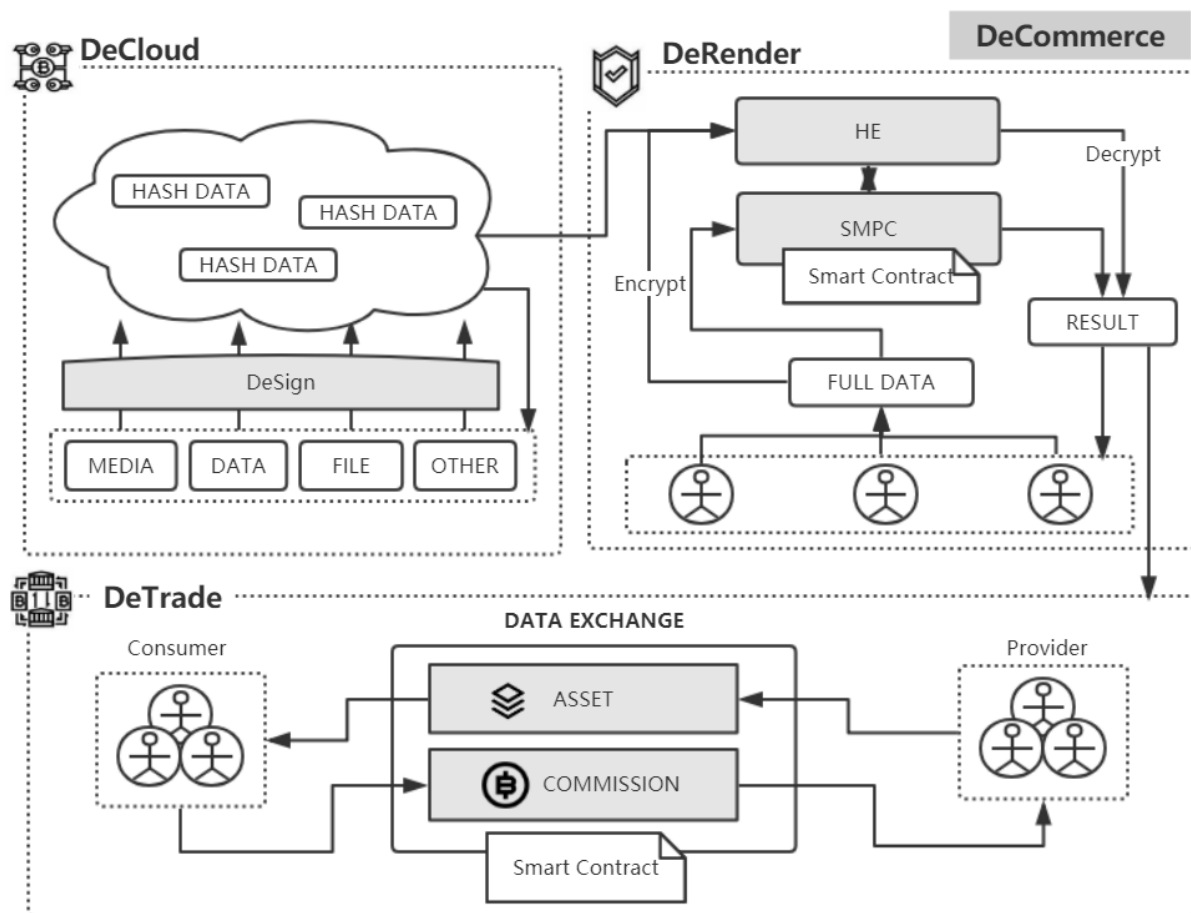


Figure 4. DeCommerce Framework

### 2.3.1 DeCloud

The decentralized storage system, DeCloud, includes the DHT (distributed hash table) and builds a faster and safer block storage system with a higher throughput of block search. DeCloud is implemented based on an innovative blockchain storage protocol – DeSign.

The Packaged data will be heterogeneously processed by DeIPLD and then uploaded to the DeCloud. Then it's network will undertake the logic of storage system and P2P (peer to peer) retrieval, facilitating the data interchange and interoperability among different systems. By using a node-based network, DeCloud provides the enterprise better data storage and

sharing services without altering the data rights and ownerships.

### **2.3.2 DeSign**

DeSign is an optimized BitTorrent's P2P data exchange and storage protocol. It obtains data blocks from other files and computes the hash values. As long as the hash values of the data blocks are matching, the data contents of those blocks will be the same.

The DeSign is far more efficient than BitTorrent since it has a complete incentive mechanism to encourage data sharing. The credit value of a node will drop if it only does data receiving and not sending. Once the node's credit value goes down to a certain point, the node will be ignored by others and kicked out in the end.

### **2.3.3 DeRender**

The decentralized computing framework, DeRender, implements a true privacy calculation by overlaying homomorphic encryption (HE) and secure multi-party computing (SMPC) in order to ensure the privacy of the input data and computational logic.

Meanwhile, verifiable computation also improves the performance of transaction processing and increases transaction throughput accordingly. The DeRender is scalable, verifiable and privacy-secured. It provides a basic computing framework for data sharing transactions and meets full demand for data privacy and security protection in enterprise-level services.

Homomorphic encryption is a method of performing calculations without prior decryption of encrypted data. Dimension adopts the homomorphic encryption technology to encrypt the data and persist it on DeCloud. It then performs complex processing on the specified encrypted data extraction through the smart contract.

Only the final result data is decrypted and fed back as plain-text. For the data consumer, the user can verify the authenticity and accuracy of the result data through the verification algorithm.

Secure Multi-Party Computation (SMPC) allows multiple users to hold partial data individually, complete the calculation of the full data collaboratively and require each user not to know other user's data unless authorized to do so.

The data holders can share the data privately into DeRender, the decentralized computing framework, and at the same time authorize DeCloud to access the new data source. When a new computing requirement is initiated, the collaborative computing network, DeRender, will confirm the calculation request, pass the execution code to multiple parties and give the final result data back for confirmation.

The whole process then transmits through a privacy protocol and this implements the collaborative data calculation of each computing node with privacy protection.

## **2.3.4 DeTrade**

DeTrade is a decentralized data trading framework which establishes a trusted-data asset trading environment without having the risk of data being arbitrarily copied.

This protects data owners' legitimate rights and interests whilst also promoting the integration of data elements. DeTrade will provide a complete secured privacy strategy for enterprise-level data transaction services that meet the needs of different business scenarios.

DeTrade provides two types of data trading models. The first type is raw data trading. When the data receiver proposes a data request, the message will broadcast to the entire network through DeTrade. Then the data source queries the offline database by itself and, if there is matching data the peer-to-peer data transaction is performed through the smart contract. The second type is data query trading, that is, the data receiver does not care about the data itself, but only needs the data feedback to compute the result and return the result set to the receiver according to the smart contract execution code.

DeTrade is structured on big data and service nodes. It can extend its functionality to perform data mining, such as data trend analysis, business intelligence analysis, data intelligence forecasting and network-wide computing power trading, maximizing DeTrade's performance as a data service network.

# III SideChains

## 3.1 Dimension-E

Dimension-E solves the problem of data monopoly in the gaming industry by using the three-tier structure system: universal account system, virtual asset trading system and virtual asset monetization system. It ensures the security and transparency of transactions and solves game companies' problems of a lack of new business models, providing additional value to the virtual assets and helping developers, content providers, distributors, players and other related parties reach a win-win situation.

The game account system is the most basic service for players when entering the platform. The universal account system will use the game's SDK to store game data on the blockchain. Players can anchor the universal account system to save their information, which ensures the system security and improves account privacy. A player's account now becomes privately owned instead of owned by any organization.

On the one hand, the player's game experience is enhanced. On the other hand, the player can bind any virtual gaming assets with the distributed platform through the universal account. By holding the private key and certificate, players can conveniently manage or transfer their assets to the exchange or the platform.

Dimension-E coordinates with multiple gaming companies to build an external virtual trading platform allowing players to open shops on it to sell virtual assets.

The platform will satisfy players demands for game equipment and assets without excessive interference to the original in-game economy system. It uses smart contracts to transfer different assets among different games.

The transaction records are transparent, immutable and easy to check. The platform will greatly improve players gaming experience whilst protecting their interests and gradually establishing a universal game economy.

With the continuous growth of the ecosystem the platform will entire the third phase of development, namely the monetization of virtual assets. By joining the Dimension-E platform, whether it is in the game industry or others, companies can issue tokens on the platform to monetize their digital assets such as reward points or intellectual properties.

Dimension-E is suitable for businesses that require virtual assets, such as industries with loyalty programs, tickets, digital games, animations and more.

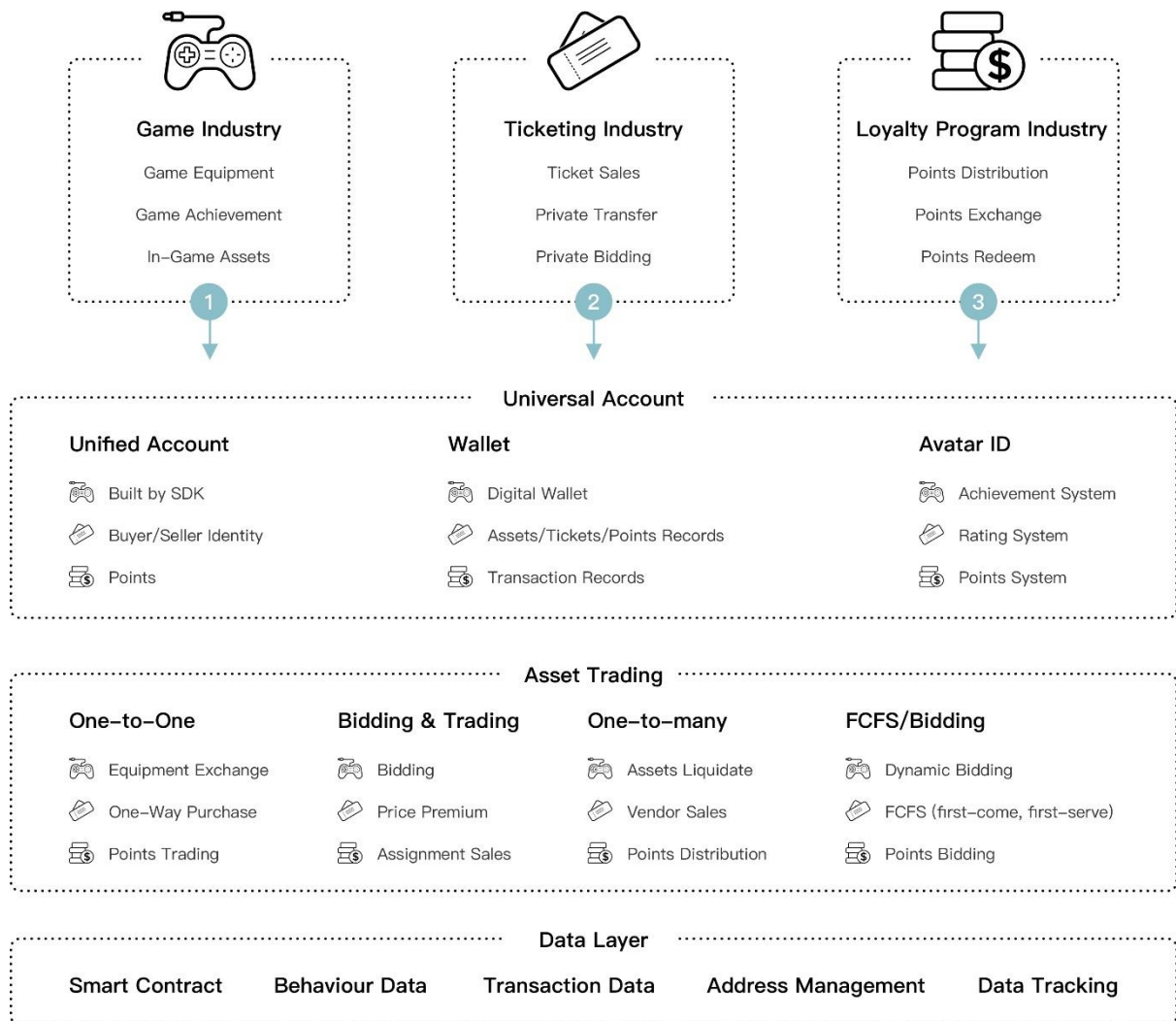


Figure 6. Dimension-E Architecture

## 3.2 Dimension-D

The most prominent feature of the Internet is the high efficiency and low cost of information processing. Anyone can easily publish, transmit and access various information through the Internet without any restriction on time and place.

How to efficiently determine the authenticity and reliability of the interactive information, as well as ensure the immutability of electronic documents has always been a huge challenge to the Internet.

Dimension-D adopts blockchain technology to implement the notary system and store the data on-chain. It transforms the arbitrary length of input data into a fixed-length output through the hash algorithm and then performs a length verification algorithm from the original key. Dimension-D eliminates the possibility of data and documents being forged and altered from the source end, using a distributed storage system to process data on-chain providing ease of access.

- Hash Record: Any digital data, such as electronic data, electronic files, contracts, pictures, or works, generate a unique and fixed size of digital data which can be computed into a unique hash value known as a digital fingerprint. The content of the original data can't be figured out by knowing hash values. If there's any change with the original data, a new and unpredictable hash value will be regenerated.
- E-Signature: By using asymmetric encryption technology to encrypt the data with a private key signature, the sender securely sends the data to the blockchain network. The proof of the data source is undeniable and the transmission process is immutable.
- Block Production: The data and certificate sent to the blockchain network will be packaged into blocks after a consensus is reached, then synchronized with every node in the network for distributed storage.
- Certificate Issuance: When a user needs to prove ownership of his stored data, he can contact the corresponding credibility agency to issue a certificate.

Dimension-D is suitable for business that requires data verification, such as notary public, insurance, trust, charity, and others.

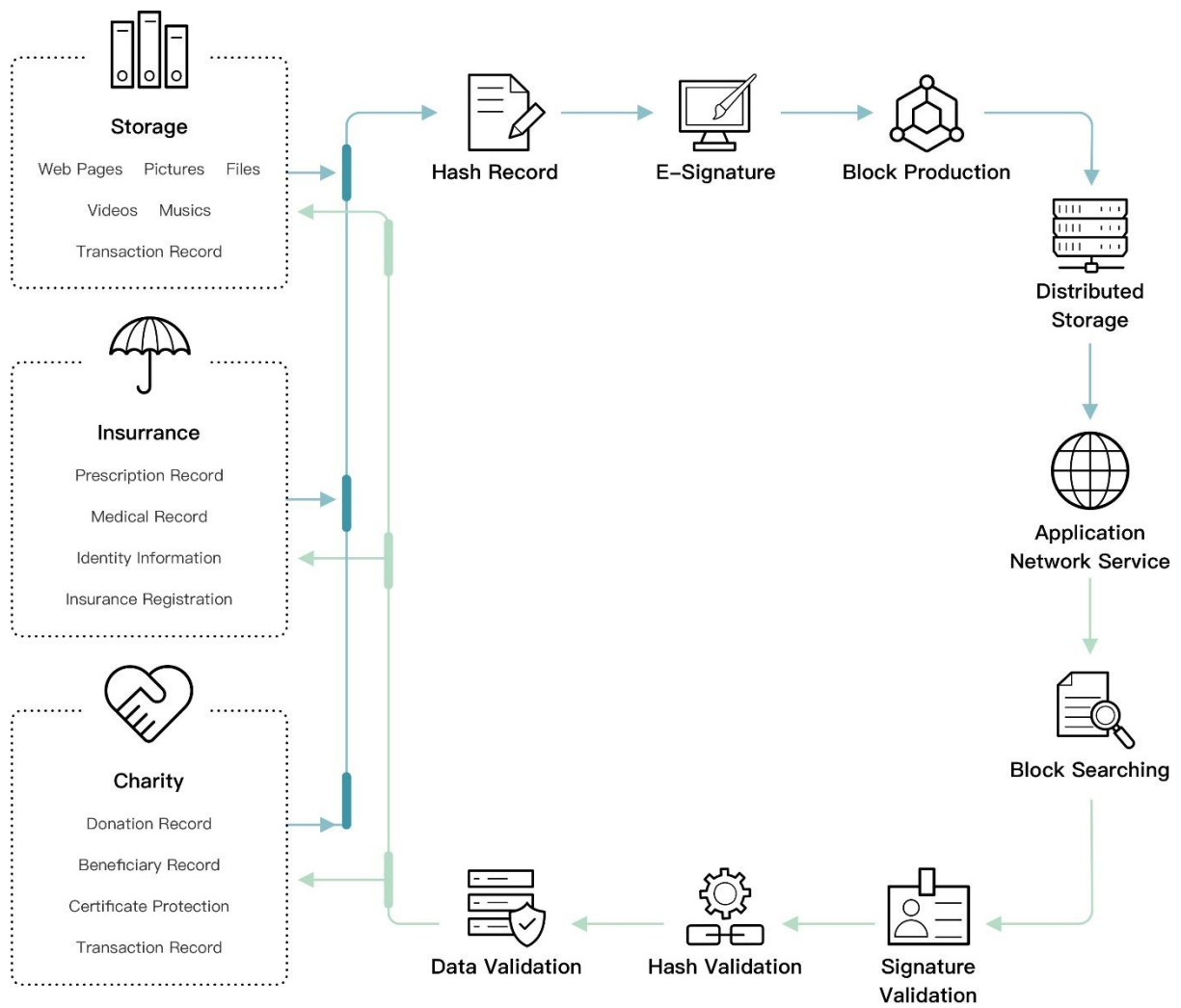


Figure 7. Dimension-D Architecture



### 3.3 Dimension-S

Conventional enterprises are facing pressures to be more innovative with their business models. They need to learn how to gain competitive advantages from emerging technologies and opportunities. For example, the sharing and collaborative economic model can be a good business solution for most enterprises.

Other than this, more data is generated by mobile devices than ever before, meaning human behaviors and mobile usages are becoming closer than ever. But the data ownership and rights have never been attributed, evaluated, quantified and used. The user as the data producer has never benefitted from ownership of the data. The value of the data is always fragmented and never really forms an effective interworking mechanism.

Dimension-S will map and segment real-world assets into digital assets by providing a trading system to help enterprises promote data sharing and trading, improving business profitability and economic efficiency.

- Mapping tangible assets onto blockchain: Dimension-S is a sidechain based on the characteristics of the real-world economy, supporting a variety of industrial applications and building a secure, decentralized, high concurrency blockchain network.
- Establish a trading platform: Dimension-S will solve the data value problem by realizing users' data rights and data trading through a decentralized trading platform, which removes middleman restriction, promotes data circulation and implements a better sharing economy model.
- Expanding the scope of data trading diversity through homomorphic encryption technology, Dimension-S will expand its data trading diversity, from data ownership to data rights and controls. It can further collect behavior data from users and support the development of the sharing economy business model, which will maximize the sharing benefits of the blockchain ecosystem in long run.

Dimension-S is suitable for businesses that require mapping real-world assets onto the blockchain for trading and storage purpose, especially for industries in the sharing and green energy economies.

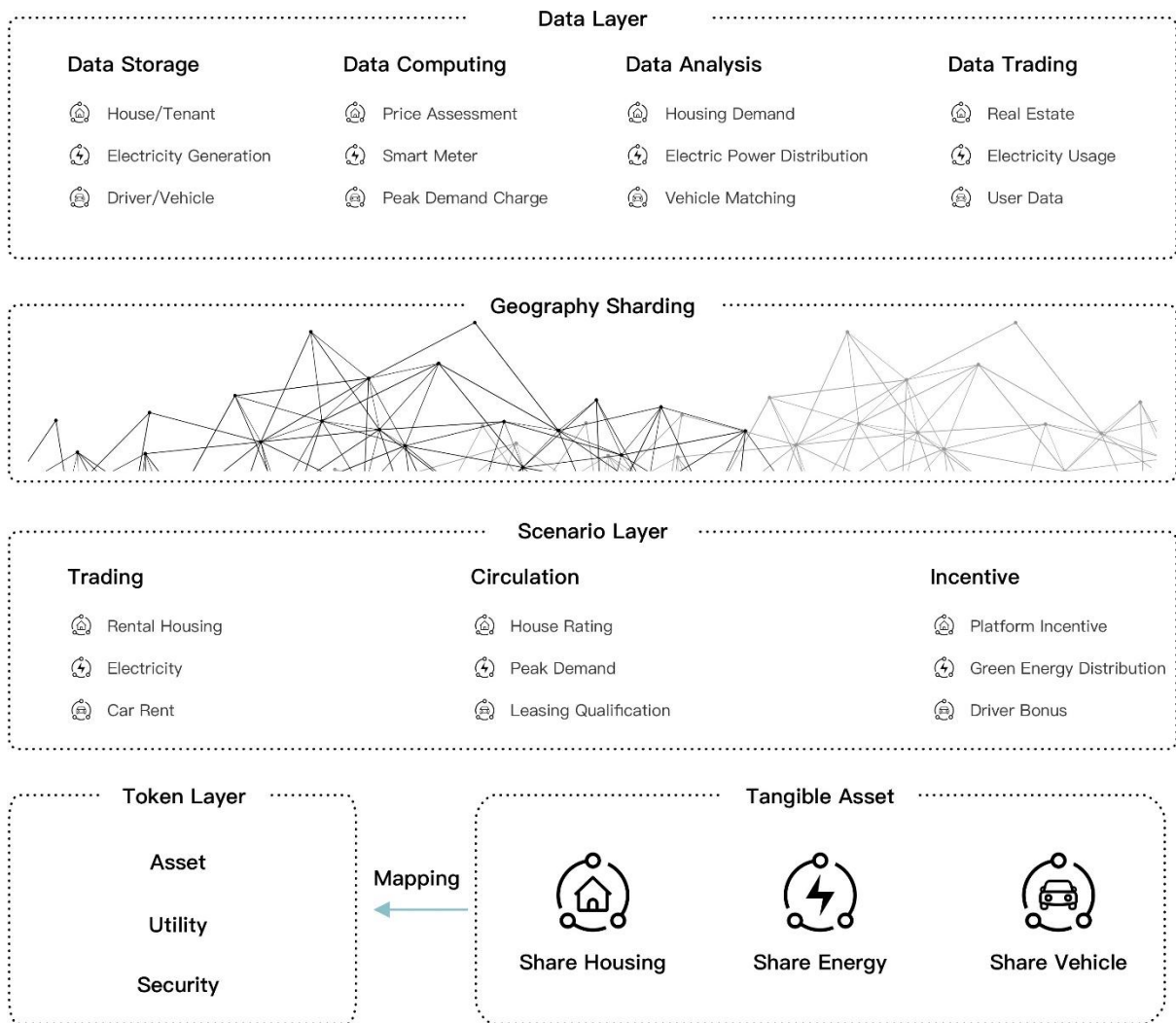


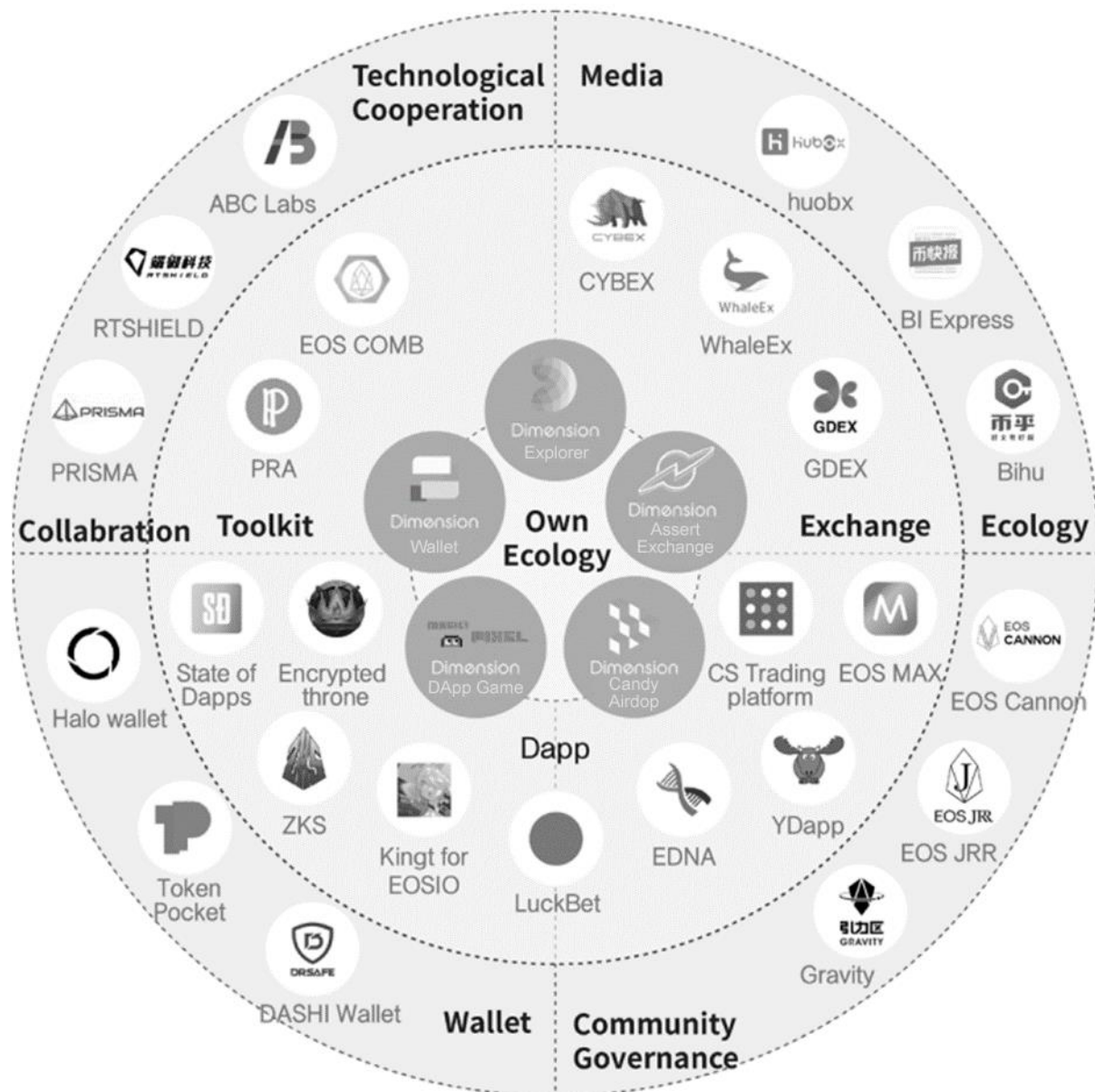
Figure 8. Dimension-S Architecture

# IV Governance

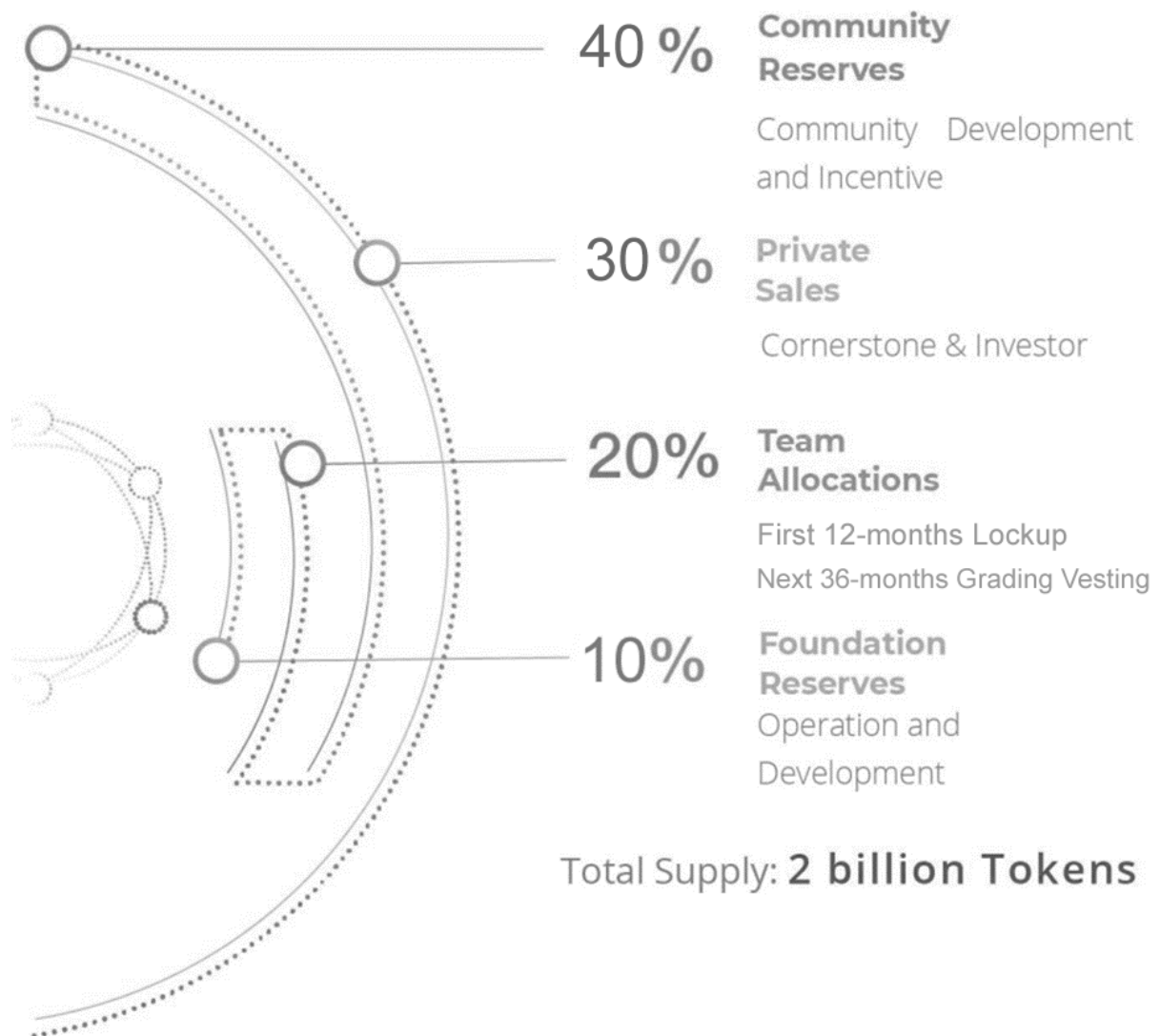
## 4.1 Roadmap









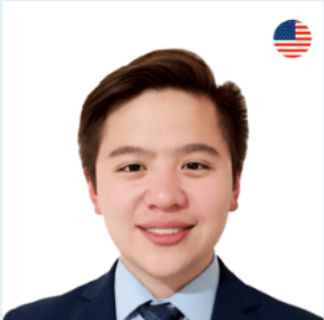
## 4.2 Ecosystem



## 4.3 Distribution



## 4.4 Team

 <p><b>Fernando Liu</b> Chief Executive Officer</p>	 <p><b>Randall Foster</b> Director of Global R&amp;D</p>	 <p><b>Aditi Saxena</b> Data Scientist</p>
 <p><b>Edwin Liu</b> Marketing Director</p>	 <p><b>Oliver Church</b> Director of Fintech Security</p>	 <p><b>Martyna Basara</b> Strategic Partnership Manager</p>
 <p><b>Melvin Adams</b> Director of Community Management</p>		

## 4.5 Investors & Consultants



**Jon Carnes**

Investment Director  
of Eos Holdings LLC  
(A private equity  
investment fund  
founded in 2004)



**ZENG Liang**

Internet Entrepreneur  
Angel Investor  
  
Ex-Microsoft and Baidu  
Executive



**Alvin Chan**

CEO & Founder of  
Magic Oranges &  
JRR EOS  
  
Guest lecturer of  
Fudan University

