

WHITE PAPER



QOS

QOS

| 2018.08 |

# QOS White Paper

Next-Generation Enterprise-Level Application Community



Version 0.8

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# INTRODUCTION

Since we got exposed to blockchain in 2015, we have been thinking about, researching on, and trying to integrate it with real businesses and serve the real economy. We firmly believe that new technologies and new models represented by the blockchain will once again transform the traditional economy, change the existing interest pattern, and fully release the whole society's passion towards innovation and coordination, just as how internet did two decades ago.

Our team and the partners adopt strict standards and regulations in management, boasting of a large user base, comprehensive and mature ecological resources in the industry, and substantial technological innovation competence. We decide to embrace the trend for developing the token economy and strive to create a "next-generation enterprise-level application community" where traditional enterprise behaviors would be turned into community behaviors through underlying public chains and the centralized incentive systems into community-driven incentive systems through tokens.

Demand for enterprise-level applications is growing substantially under the "mass entrepreneurship and innovation" policy and in the market where demographic dividends disappear and office costs are on a rise. However, due to huge differences in industries, market environment and business models, these applications are often characterized by complex processes, frequent data exchanges across business entities, and strict requirements for services. As far as we have researched, there is no such an all-round and effective underlying public chain deployed in real life to fit the demands for various enterprise-level applications, large-scale access to distributed files, and unified identity authentication systems.

QOS builds underlying operation systems, unified identity authentication systems, self-incentive dual-layer token protocols, a dual-mining mechanism of super nodes and transaction mining, distributed file systems, and communities that connect developers and users, which are all based on a blending of public chain and consortium chain. It supports a mega-level user-based interactive community that covers consumption, traditional finance, FinTech, new media, etc. It also allows servers of various types to publish new applications conveniently under its protocol structure, which benefits the step-by-step value maximization of community members through data trading.

We are convinced that the QOS public chain can fill the market gap that mainstream public chains such as Bitcoin and Ethereum fail to do. We shall take the lead in applying blockchain technologies to the real economy and provide commercial-level services, making them accessible to communities that are totally different from the existing ones. The QOS public chain is committed to serving as the world's most populous blockchain application community that presents rich social and economic value.

President of the Foundation:



July 20th, 2018

# 1 Meaning of QOS



QOS is the underlying operating system of the Qian Yuan Community. The word “chain” is pronounced very much alike as the Chinese character “乾” (with “Qian” as its pinyin). The notion of “Qian Yuan” is from the Book of Changes, in which it is believed that “Qian Yuan is so encompassing that it serves as the origin of any resources and that it represents all rules in the universe.” As an elaboration, Qian Yuan is the incentive for the universe. It is powerful, sustainable, and ubiquitous. Likewise, in building a next-generation enterprise-level application platform, QOS will present a universal industrial ecosystem and innovative applications. That’s why we took Q as the first letter for the community’s name.

QOS also refers to Quality of Service. We aim to provide quality, ecological, transparent, and manageable community services in building new community infrastructures.

## 2 Overall Architecture of QOS

The QOS system introduces a new blockchain architecture that aims to strike a balance between security, performance and costs, meets the growing need of blockchain technologies and a stable and scalable operation environment for an increasing number of applications, reduces overall transaction costs, fits demands of the ever-changing trading activities in the business world, and ensures stable and fair operation of the entire system with innovative incentive mechanisms. The QOS system is equipped with a Service mesh architecture, which enables developers to work in a “cloud native” way. It will help developers to focus on business implementation.

### 2.1 QOS’s Dual-Layer Chain Architecture

Bottlenecks for existing blockchain technologies under the single-chain architecture lie in performance, capacity, isolation, and scalability. Blockchain data storage takes a chained-storing approach, which makes it impossible to achieve horizontal scaling. The consensus mechanism synchronization model makes it impossible to process transactions efficiently. Besides, conflicts also exist between the existing single-chain architecture and the need to maintain highly isolated data out of business concerns.

The multi-chain approach is good for achieving scalability and isolation, when each blockchain maintains its independent value system. However, interoperability between different blockchains is required as well since the demand for value exchanges exists between different value systems.

That’s why we came up with the architecture (QOS Chain) that can practically support commercial-level scalability and privacy protection through a dual-layer blockchain architecture, related protocols and underlying interface design.



### 2.1.1 Overview

QOS is a scalable dual-layer chain system, which is divided into independent business chain and QOS basic chain that handle inter-operability between different business chain.

QOS basic chains provide services including the identity system, the consensus algorithm system, the smart contract system, the basic token and business token issuing and operation system, the file system, etc.

The business chain can be run through a Byzantine Fault Tolerance (BFT) consensus algorithm using consortium chain or private chain when each business chain can record token status in its own ledger.

QOS basic chain supports the interaction of each business chain through a relay protocol to ensure fast and safe value exchanges. QCP, a trans-chain protocol, represents QOS Constellation Protocol and is based on the queuing mechanism and Merkle Proof.

The QSC protocol is a token-issuing-and-operating protocol based on smart contracts. It also conforms to QOS public chain standards. Developers can come up with their self-run organizations on QOS based on the QSC protocol. Since they follow the unified QSC protocol, safe value exchanges could be achieved as a result.

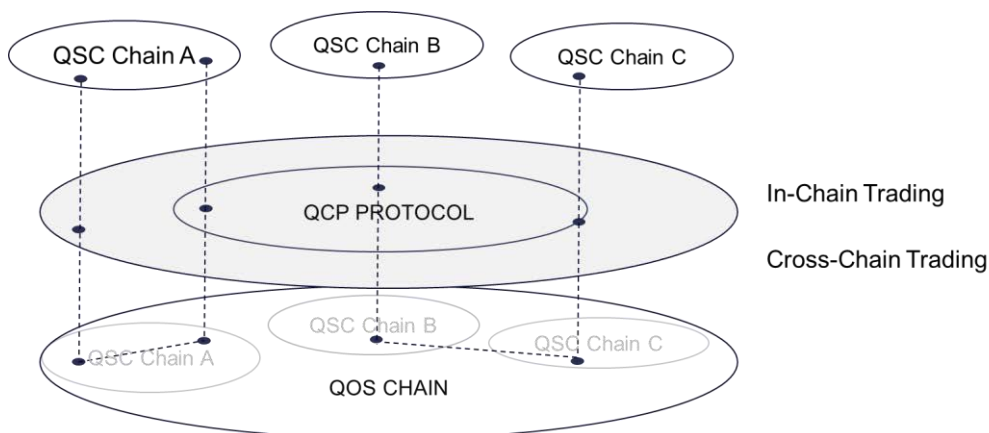


Figure 2.1 QOS Dual-Layer Chain Architecture



## 2.1.2 Dual-Chain Architecture

### 1. Introduction of its Design

The purpose of QOS is to establish underlying public chains suitable for enterprise applications and to ensure independence and interactivity of various scenarios in the industry. Therefore, we are not designing basic protocols in blockchain but instead focusing on equity records and transfers.

#### 1.1 Role-Players

There are three types of role-players in the QOS network: business participants, service providers, and QOS basic authentication verifiers.

- **Business Participants**

Business participants are a group of equity owners who enjoy consortium-chain-based services provided by service providers.

- **Service Providers**

Service providers provide equity owners with a wide range of services that are offered in the form of business chains.

- **The QOS Basic Authentication Verifiers**

QOS basic authentication verifiers pack new blocks in QOS basic chain. Each verifier must run a QOS node on a machine with high-availability and high-bandwidth.

#### 1.2 Consensus

The business chain mainly provides services in the form of consortium chains or private chains, adopting the Byzantine Fault Tolerance Consensus Algorithm (BFT).

The QOS basic chain draws on the Tendermint consensus protocol and adopts the BFT+DPOS consensus algorithm. A verifier in the basic chain must serve as a super node dedicated to submitting blocks. He uses QOS tokens for equity

authentication and incentives and avoids single-node malfunction by running the BFT algorithm.

### 1.3 Cross-Chain Protocol

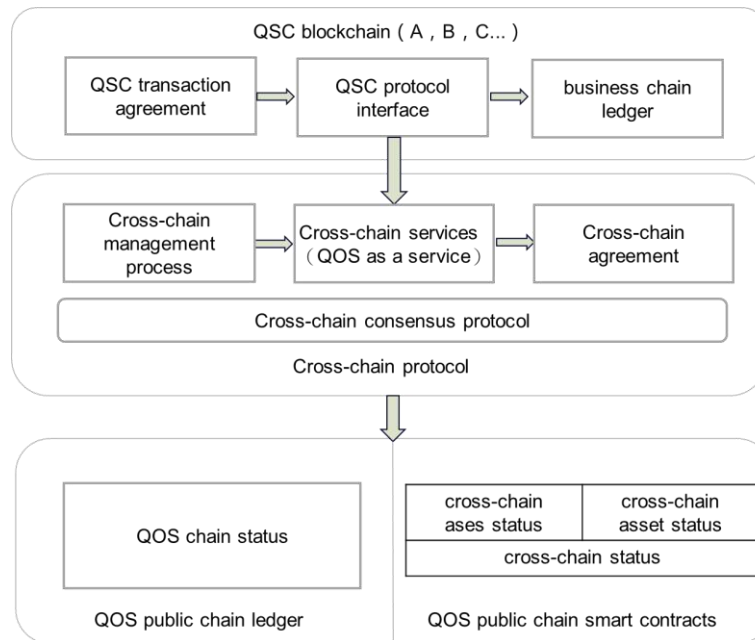


Figure 2.2 The QOS Dual-Chain Communications Mechanism

- **The QOS Basic Chain**

The QOS basic chain is run in the form of a relay protocol, which carries a multi-asset distributed ledger. Its status information includes the QOS basic chain status and token status of each business chain.

The QOS basic chain supports the deployment of public-chain smart contracts based on the QSC protocol. It also includes special contracts (consensus contracts, verifier contracts, cross-chain contracts, etc.) to support cross-chain consensus transactions, and cross-chain management contracts to support upgrading of the cross-chain protocol. The cross-chain contracts are packaged as gRPC services to simplify cross-chain transactions in business chain calls.

- **Business chain**

Independent blockchains as they are, business chains are accessible to QCP protocol communications through QOS basic chains.

- Cross-chain Trading

Cross-chain trading is achieved by adding two FIFO queues to a business chain. The queues guarantee authenticity of data by adopting Merkle Proof.

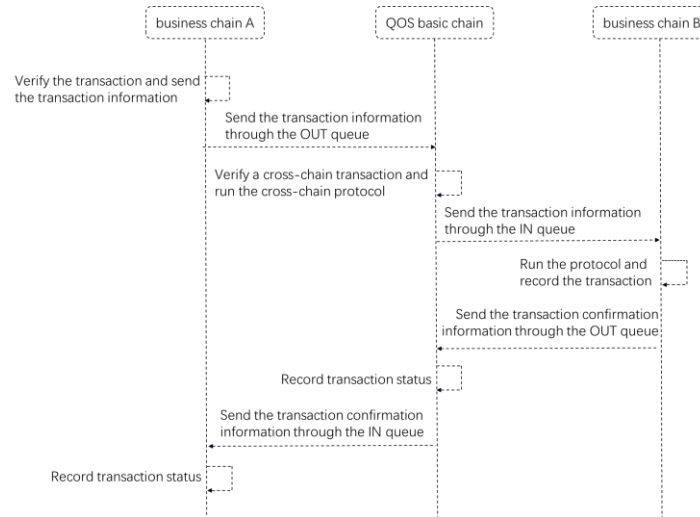


Figure 2.3 Sequence Diagram During QOS Cross-chain Interaction

## 2.2 The QOS Dual-Layer Token System

The primary coin QOS is used in the QOS public chain, which also produces derivative coins through smart contracts. There can be only one type of primary coin and many types of derivative coins. Derivative coins fit the QSC protocol standards.

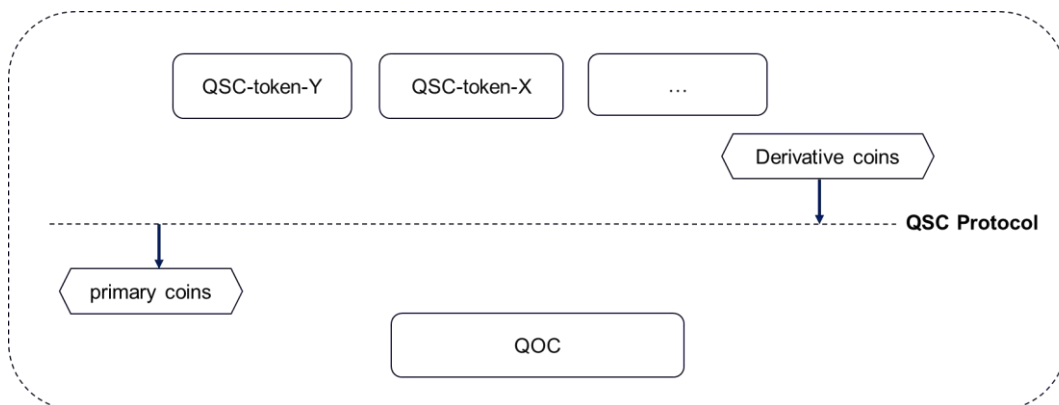


Figure 2.4 Diagram of QOS's Dual-layer Tokens

Codes for derivative coins:

```
struct token{amount uint,id uint}
```

QSC Standards:

```
contract QSCInterface {
    string public constant name = "Token Name";
    string public constant symbol = "SYM";
    uint8 public constant decimals = 0;
    function totalSupply() public constant returns (uint);
    function balanceOf(address tokenOwner) public constant returns
    (uint balance);
    function allowance(address tokenOwner, address spender) public
    constant returns (uint remaining);
    function transfer(address to, uint tokens) public returns (bool
    success);
    function approve(address spender, uint tokens) public returns (bool
    success);
    function transferFrom(address from, address to, uint tokens) public
    returns (bool success);
    function frozenAmount(address tokenOwner) public returns (uint
    frozentokens);
    function frozen(address tokenOwner, uint tokens) public returns
    (bool success);
    function unfrozen(address tokenOwner, uint tokens) public returns
    (bool success);
    event Transfer(address indexed from, address indexed to, uint
    tokens);
    event Approval(address indexed tokenOwner, address indexed
    spender, uint tokens);
    event Frozen(address indexed tokenOwner, uint tokens);

    //option. the contract owner use this function to pause the contract
    function pause() public returns (bool success);
    //base on QCP protocol, implement info exchange between chains
    function qcpExchange() public returns (bool success);
}
```

Explanation on QSC standards:

Type	Name	Explanation
Static variables	name	Full names of tokens.
	symbol	Symbols of tokens, for instance QOS and ETH.
	decimals	Decimals
Functions	totalSupply	Total supply of tokens
	balanceOf	Get access to balance in a specific place.
	transfer	Use the “transfer” function to transfer one’s tokens to a certain place. Value represents number of the transfers.
	approve	Allow a “spender” account to transfer tokens in quantity of the “value” from one’s own account. The transfer can repeat for several times.
	transferFrom	This function is used together with the “approve” function. The the latter function approves a certain transaction, the “transferFrom” function will be used to transfer tokens.
	allowance	Number of tokens when one goes back to the “spender”.
	frozen	To get a certain amount of tokens frozen.
	unfrozen	To get a certain amount of tokens unfrozen.
frozenAmount	Get access to total amount of tokens that are frozen in a certain account.	

	pause	Pause any action about the protocol. The owner could use this function in special occasions to get rid of bugs and stop losses.
	qcpExchange	Achieve cross-chain information interaction based on QCP protocol.
Events	Transfer	Trigger the event "Transfer" when tokens are successfully transferred.
	Approval	Trigger the event "Approval" when the function is activated.
	Frozen	Trigger the event "Frozen" when the function is activated.

The QSC protocol is compatible with the ERC20 standards, which means that QSC token technology could be applied in places where ERC20 tokens circulate. In this way, QSC tokens enjoys better liquidity.

For instance, the exchange between two types of QSC tokens --- X-token and Y-token --- takes two steps:

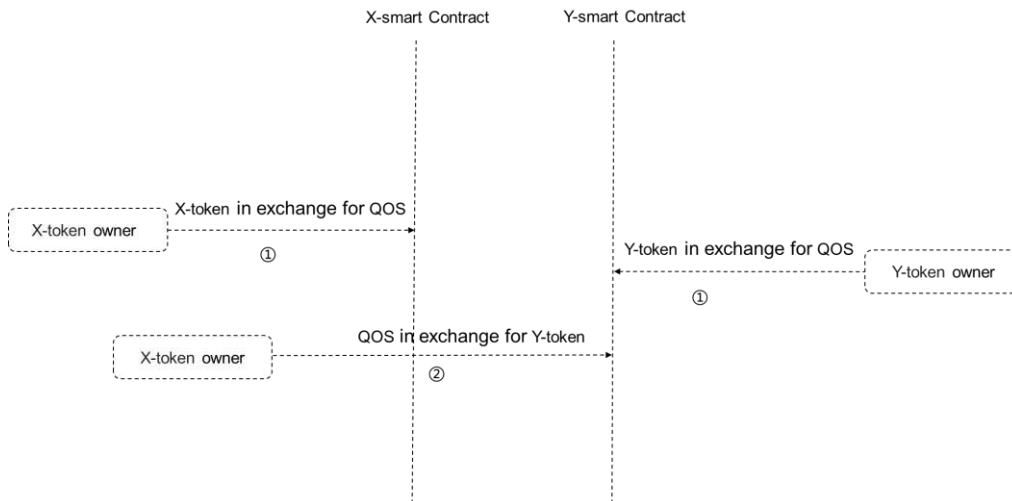


Figure 2.5 Exchange Process of QSC Protocol Tokens

In the QOS public chain, for an X-token to be exchanged into a token that's not used in the QOS public chain, such as Ethereum, the transaction takes three steps:

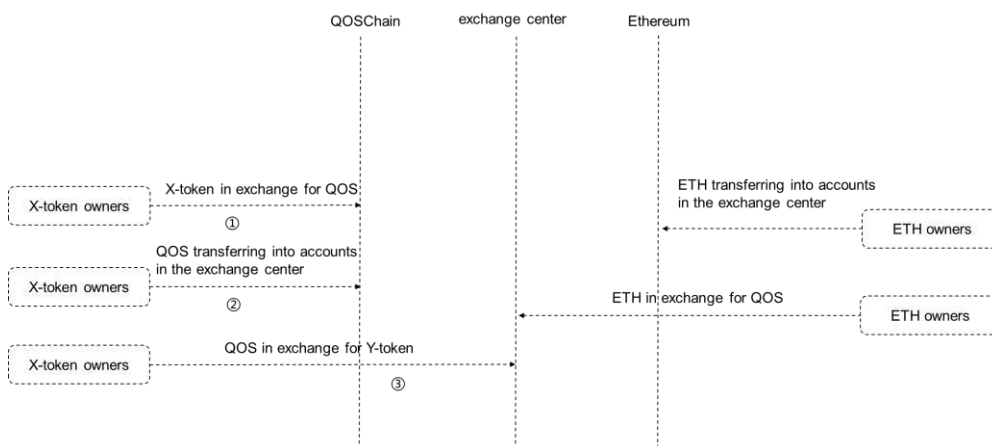


Figure 2.6 Transaction Process of QSC Protocol Tokens to Tokens Outside of the QOS Public Chain



The number of QOS public chain tokens is 10 billion, of which 49% are generated in the issuing of ERC20 tokens in the genesis block during the QOS public chain initialization, and 51% are mined by the super nodes on the QOS public chain. The coinage speed is halved every time cycle, and the coinage can be completed in 7 time cycles. Coinage speed for the sixth and the seventh time cycles is the same and the threshold for each block generation is preset to be 3 seconds.

The total amount of QOS coins produced by mining in T time  $\approx \frac{10\text{billion} * 51\%}{2^\mu}$

$\mu = \text{take the integer for } \left( \frac{\text{current time} - \text{initial time in QOS Chain}}{T} \right)$

When T is 4 years, the QOS coins could be dug out in around 28 years.

Table 2.1 The QOS Mining Mechanism

Time	1 <sup>st</sup> 4 years	2 <sup>nd</sup> 4 years	3 <sup>rd</sup> 4 years	4 <sup>th</sup> 4 years	5 <sup>th</sup> 4 years	6 <sup>th</sup> 4 years	7 <sup>th</sup> 4 years
Number of new QOS coinages (unit: 10 billion)	25.5	12.75	6.375	3.1875	1.59375	0.796875	0.796875
Number of New block reward QOS	60.64	30.32	15.16	7.58	3.79	1.895	1.895

## 2.3 The QOS Dual-layer Mining Mechanism

Echoing the dual-layer token model, the QOS ecosystem establishes a dual-layer mining mechanism that enables 21 super nodes to compete in mining under the QOS public chain. In each scenario, it is advocated that “value exchange is mining”. It could also be interpreted as “trading is mining” and “getting loans means mining”.

See 4.3 for the QOS economic model.

## 2.4 Developer Community Ecosystem

The QOS developer community, initiated by the QOS Foundation, bridges the gap between innovation and business applications for developers. The community is a gathering place for QOS developers and an open source community where anyone can make his contribution. The purpose of the community is to create a well-developed, free and democratic public chain ecological platform. The open source project initiated by the QOS Foundation is trusted to GitHub. Each open source project publishes a task list called TODO. Developers can choose project contribution codes and get relevant incentives as they wish.

QOS enjoys a well-developed ecosystem:

1. A user enjoys scenario-based services based on the QOS main chain wallet.
2. VIP partners join the accounting system and get qualified in mining.
3. A developer issues encrypted digital currencies based on the QSC protocol, and achieves cross-chain trading through the QCP protocol.
4. A developer initiates a project based on a certain QSC token to create an self-run organization.
5. A developer develops new projects based on community ecosystem.

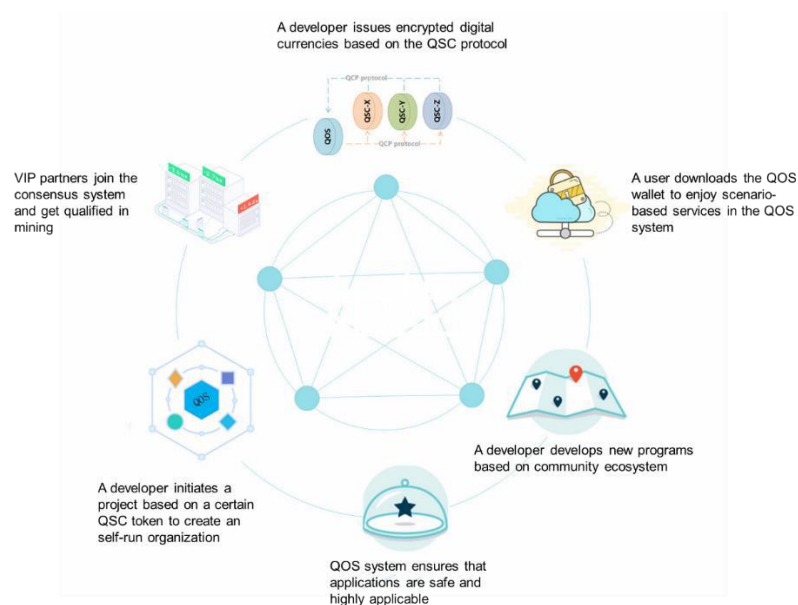


Figure 2.7 QOS Developers Community

## 3 QOS Technological Infrastructure

By introducing a new blockchain architecture, QOS hopes to strike a balance between security, performance and cost, address the growing demand for blockchain technology and a stable and scalable operating environment, and reduce overall transaction costs to meet the changing needs of business transactions.

### 3.1 The Consensus System

#### 3.1.1 Technical Difficulties

- **Performance and Costs**

As blockchain has evolved to its present form, the performance of transactions has become a prominent problem, especially public chains, which provide basic services, will face a large number of applications, complex smart contracts and users. Meanwhile, various business models and application scenarios in the modern society put forward more demands on reducing and allocating transaction costs. High transaction costs and simplistic transaction-fee models hinder blockchain-based applications and the development of the chain itself.

Therefore, though the high performance and low costs of transactions are not the ultimate goal of blockchain technology, they are in high demand.

- **Stability and Scalability**

Smart contracts need smooth operation so that they can provide services. As the number of contract users increases, the capacity of contracts also need to be expanded. At the same time, stability and scalability should also include the correction of errors in contracts and the expansion of contract functions to continuously improve the stability of contracts and expand the services that contracts provide. Therefore, smart contracts not only need various technical means such as expanded operation, but also require maintenance functions such as contract upgrading.

- **Consistency and Security**

It is necessary to ensure the consistency of the data on public chains which provide basic services to ensure the security of data by guarding against various threats and ensuring that the recorded data is tampering-proof. Particular attention needs to be paid to the security of the blockchain. Threats include not only malicious attacks coming from outside, but also errors or malfunctions caused by legitimate participants and the risk of the chain itself being controlled by a few participants.

### **3.1.2 Solutions**

#### **1. Performance and Costs**

Security and performance, to some extent, are mutually exclusive, because for security purposes, a large amount of verification calculations and repeated interactive communication may be required. Therefore, to achieve a balance between security and performance, the QOS system has introduced a dual-chain architecture. The upper-level consortium blockchain, or private blockchain, is used for supporting business, and is capable of handling a large amount of heterogeneous operation concurrently, with a goal of providing quality services. The bottom-layer public blockchain aims to ensure data security and transaction verification to guard against tampering.

The dual-chain architecture reduces the overall cost of use, provides users free access (most of the state changes in the upper-level application do not lead to direct payments to miners), and charges the service provider (smart contract issuer). The contract issuer has two choices: the issuer decides not to charge users; or the issuer develops a customized payment model in a smart contract to realize a diverse application model.

#### **2. Stability and Scalability**

In order to provide stability and scalability to smart contracts, the container technology, and corresponding management and monitoring technologies are used to provide real-time data analysis so as to provide stable and scalable

operating environment. Contract upgrading is allowed to ensure the stable operation and function expansion of contracts.

### **3. Consistency and Security**

The consistency and security of the data on a blockchain depend on the consensus algorithms. Consensus algorithms are described as follows.

#### **3.1.3 Potential flaws of Blockchain**

- **POW**

This algorithm wastes too much resources, which causes transaction costs on the chain to grow. The computing power-based consensus algorithm is directly affected by related resources. In fact, it is difficult to limit and avoid excessive concentration of resources.

- **POS**

Though the algorithm avoids waste to some extent, it has a bottleneck in performance since nodes across the entire network are still required to confirm a block. In particular, the algorithm has many disadvantages and can not avoid various classic attack.

- **DPOS**

Since this algorithm has optimized the method for block confirmation, the algorithm has improved the performance. But the algorithm is still vulnerable to attacks. In fact, this defect will for sure be exploited repeatedly by hackers:

- > Nothing at Stake Problem
- > Long-Range Attack
- > Bribe Attack
- > Coin Age Accumulation Attack
- > Precomputing Attack

For the above-mentioned reasons, the basic consensus algorithm is designed on the basis of DPOS.

### 3.1.4 The Design of the Consensus Algorithm of QOS Public Chain

Previous blockchain projects show that the number of pre-selected consensus nodes (consensus participants) should not be too small (about 11), or too many (more than 31) lest resources be wasted. Therefore, a compromise was made and 21 super nodes have been selected, responsible for achieving consensus and creating blocks.

In a consensus cycle, all super nodes have a fair (not equal) opportunity to create blocks. All super nodes should remain 100% online during this period. Anyone offline during this period will lose the right to vote and the opportunity of being elected. In the event that a super node's operations are considered abnormal during the cycle, it may be stripped of the right to vote or get elected, and may even be voted out by the other effective super nodes.

The consensus algorithm also needs to solve the above-mentioned problems.

- **Nothing at Stake Problem**

The consensus algorithm will explicitly prohibit multiple votes to avoid "Nothing at Stake Problem". Super nodes detected to have voted multiple times will be considered as failed nodes and lose the right to vote or get elected in this consensus cycle.

- **Long-Range Attack**

Limit the number of fork nodes accepted to ensure the consistency of a blockchain.

- **Bribe Attack**

The free access for users avoids "bribery attacks."

- **Coin Age Accumulation Attack**

In order to guarantee fairness, "time" (a non-accumulative resource), as one of the calculation parameters, has been introduced. But it is highly likely to incur "coin age accumulation attack". Therefore, the measurement parameter introduced should not be "time". Instead, "time effectiveness" has been introduced in the consensus algorithm as one of the calculation parameters. "Time effectiveness" is valid for the effective time and becomes invalid when the effective time is over. This practice will dramatically reduce the risk and loss of possible attacks.

- **Precomputing Attack**

In order to reduce the predicting power of precomputing attacks, the total volume of the transactions of all nodes is introduced as a calculation parameter. Since the total volume parameter is the sum of the individual transaction volume reported by each consensus node in the consensus period, it is difficult for a malicious node to manipulate the entire network even if it forges its reported transaction volume.

To summarize, in a customized POS consensus algorithm based on DPOS, two important parameters - "time effectiveness" and "transaction volume"- are introduced in the consensus. "Time effectiveness" means that a right is not effective indefinitely, thereby reducing the possibility of evil nodes. "Transaction volume" costs rule-abiding nodes nothing, but potential evil nodes dearly. "Transaction volume" will act as an implicit "punishment" to constrain potential perpetrators.

### **3.1.5 The Validation of Transactions and the Creation of Blocks**

Transactions are packaged to create a block which is submitted to super nodes, elected in the consensus cycle, for validation.

The threshold for creating each block is preset to be 3 seconds. Under normal circumstances, a transaction has to be validated by more than 2/3 of the stake-



holding super nodes before it is included in the chain. In the case of 21 super nodes, before being included in the chain, a transaction has to be validated by at least 15 super nodes. In a normal transaction system, a user-friendly experience requires feedback in seconds. The transaction validation can be carried out concurrently, so the average time it takes a transaction to be included in the block can be within 1 second. Under abnormal circumstances (the malfunctions of the software, system, hardware or network, or common malicious attacks), before being included in the chain, a transaction must be validated by at least 15 super nodes, so the average time it takes a transaction to be included in the block can be within 15 seconds (15 times the time it takes a super node to validate the transaction). At the same time, since the DPOS is the delegated proof of stake, transactions are validated by elected super representatives. Under proper circumstances, the number of super nodes to be elected is preset to be 7, so under abnormal circumstances, in theory, the average time it takes super nodes to validate transactions is less than 7 seconds.

The monitoring system monitors the various modules or subsystems in the chain to ensure stable services throughout the chain. At the same time, the system strictly monitors the abnormality in super nodes or transaction validation. In the event of an abnormality, alarm information will be first sent to the relevant user and the responsible person. If the abnormality meets the preset conditions, according to the preset conditions, either the abnormal super node will temporarily be denied the right to vote or get elected, or all valid super nodes will be notified to initiate a round of voting to determine whether the abnormal super node should be fired.

### 3.2 Wallet System

Since the QOS public chain adopts a dual-chain structure, it needs to support commercial-level scalability and privacy. Therefore, the digital wallet of QOS public chain which is based on BIP32 and BIP44 protocols adopts a highly flexible wallet system.

The BIP32 protocol works as follows:

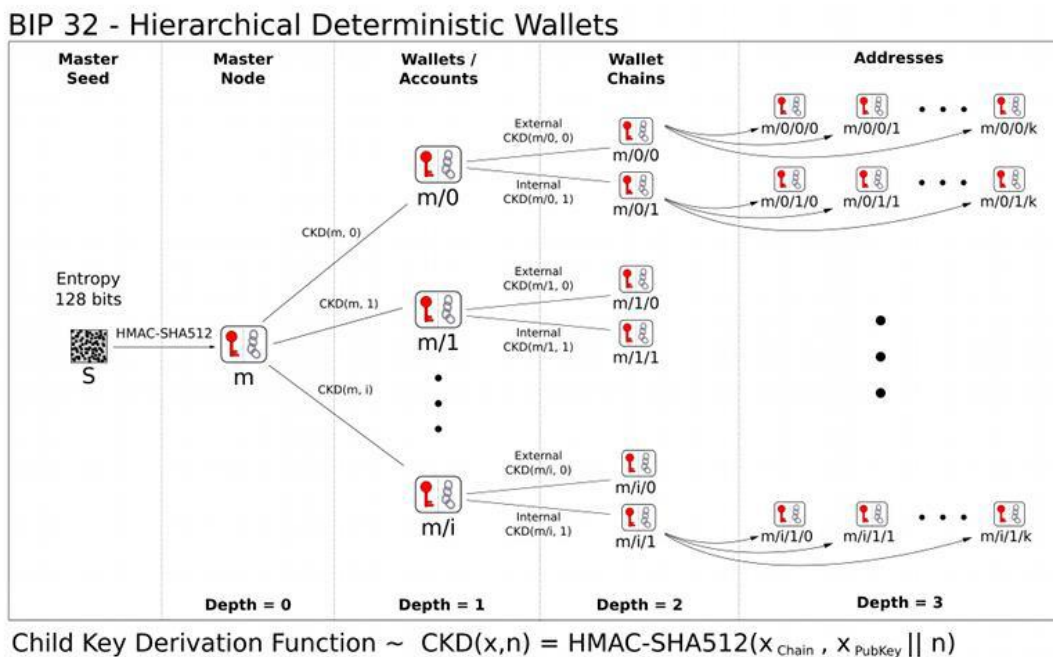


Figure 3.1 A Schematic Picture of the BIP32 Protocol

The wallet of QOS public chain will become an open-source project for QOS. When a user applies for a public chain wallet, the wallet app generates a true random number. The mnemonic seeds for generating a HD Wallet are set by the user. The true random number and mnemonic seeds can be used, based on the BIP32 and BIP44 protocols, to generate an address for use on the QOS public chain. The user's address will be registered on the QOS public chain as a unique identity of the user.

The wallet of QOS public chain does not keep the user's private key. At the beginning of the project, the true random number and the mnemonic seeds are

kept by the user. When performing transaction signature, the wallet obtains the real random number and the mnemonic seeds through the encrypted channel, and calculates the private key to complete transaction signature.

The QOS public chain wallet is used on the QSC service chain. The wallet, according to the BIP44 protocol, generates an address on the service chain and the

The QOS public chain wallet will release a hardware wallet in due course to address the security issue concerning the storage of private keys. The overall structure of the QOS public chain wallet is shown below.

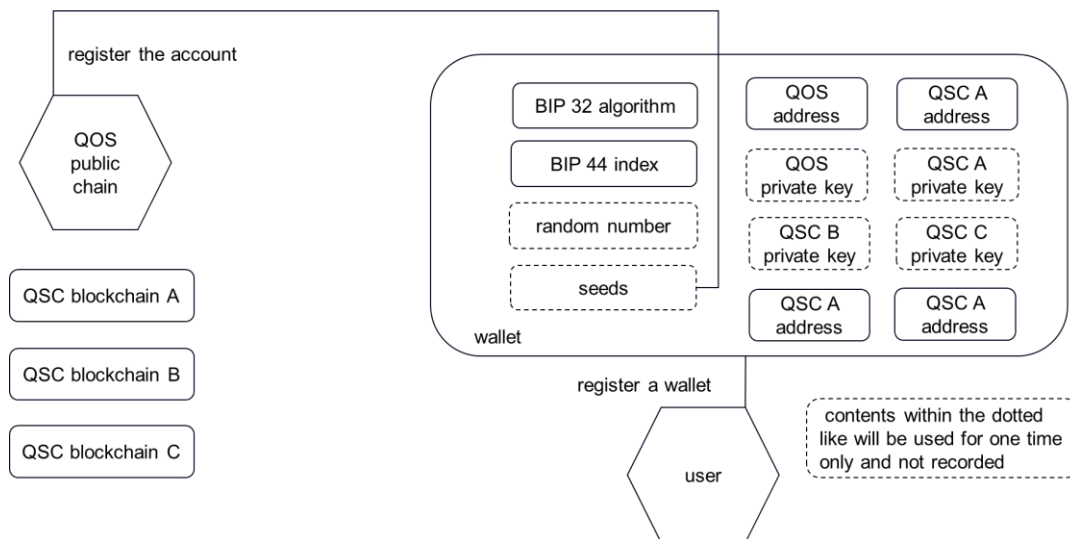


Figure 3.2 Overall Structure of QOS Public Chain Wallet

### 3.3 Unified Identity

The identity of a person is usually based on the person’s biological features and government-acknowledged identification data. As more social and economic activities move from offline to online, online fraud where perpetrators use virtual identities to deceive others has become increasingly prevalent. The unified identity of users on various online platforms has increasingly become the focal point of industries.

QOS holds that identity is not just an identifier, but carries wide connotations. In the QOS community, identity contains multiple meanings including:

1. A unique identifier in a certain scenario, such as passports needed to travel abroad, ID cards in China, and IDs in a certain online community. These identifiers are often difficult to get unified across scenarios due to technical, political and commercial reasons.
2. Region, race, religion, and belief. For instance, blockchain brings together people with a shared dream of building a distributed and decentralized community.
3. Social roles and positioning, such as employees and employers, father and son, and colleagues. A certain relation with others has made a citizen who he/she is.
4. Capabilities. Economic status, spending power and physical conditions are part of one's identity, for example, the Olympic championship is a glorious identity of the title holder.
5. Credit, undoubtedly one of important identities of a citizen and reflected in the history of his/her borrowing and agreement honoring.
6. Interests. A community glued together by the same interests tends to be long-lasting and dynamic. Individuals tend to have a stronger sense of belonging to the community. Thus, one's interests are one's unique identity.

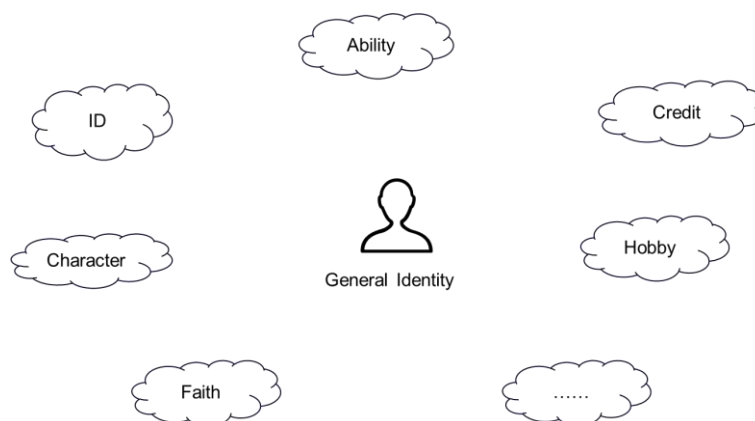


Figure 3.3 General Identity

QOS defines the above-mentioned characteristics of a citizen as general identity. Beyond nation, language and the Internet, general identity becomes the unique identifier of each individual.

As a general community for corporate operation, QOS enables countless scenario providers, data service providers, wallet providers, exchanges, etc. to provide services through a unified underlying platform to citizens in the community. QOS is expected to become a trillion-dollar community economy which is governed by its own citizens, and where a citizen's identity is unified and the identity information of the citizens is comprehensive, accurate, and controllable.

### 3.4 IPFS File System

The QOS public chain plans to build IPFS nodes as the infrastructure for data storage and distribution, so that all data in the QOS public chain flows, avoiding data silos. The storage, location and movement of information will be redesigned. The storage function of all devices in the QOS public chain will be put under centralized management. From this perspective, QOS is a network operating system in which there is only a small boot system in the terminal node. When booted, the system downloads all data from the network, and at the same time guarantees that the terminal node can fast download and access data.

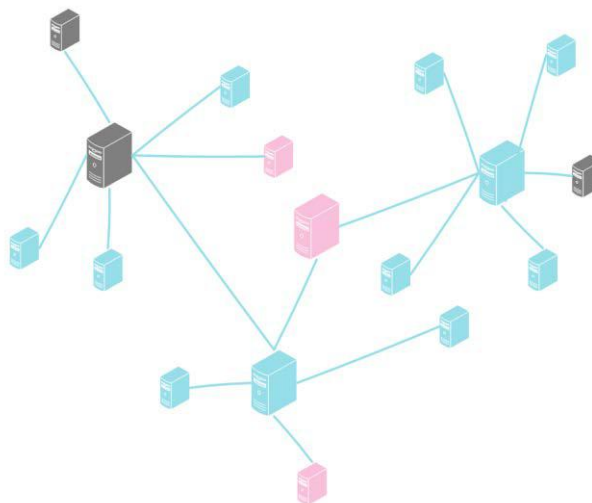


Figure 3.4 File System of QOS Public Chain

### 3.5 The Blockchain Explorer of QOS Public Chain

QOS public chain provides developers with APIs in the form of community services, enabling them to view the information on the operation of the chain. Meanwhile, QOS operation team will develop a block explorer for the public chain through using these APIs. The explorer, whose address is qoschain.info, enables ordinary users to browse the information on transaction status in the QOS public chain and sub-chains. The architecture of the QOS developer API and block explorer is shown below:

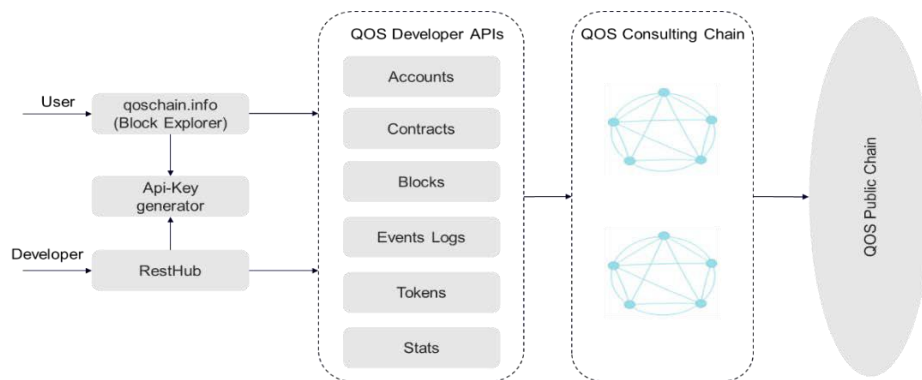


Figure 3.5 The Block Explorer of QOS Public Chain

### 3.6 QOS as a Service

Based on the container cloud and resource scheduling technologies, QOS has developed the Service mesh architecture, enabling developers to work as cloud natives, and making it easier for developers to focus on their work. The QOS service mesh architecture is loosely coupled to the application code, and, in the form of the "data plane" of the network proxies and the "control plane" used to interact with these proxies, solves the problem arising from program running. The architecture supports the heterogeneity of the system and is not confined to one language or protocol. The architecture of QOS as a Service is shown below:



Figure 3.6 QOS as a Service

### 3.7 Summary

QOS public chain uses a two-level architecture to guarantee the expansion of performance and capacity. Meanwhile, QOS public chain has cross-chain protocols, separating the business chain and the underlying public chain. QOS public chain makes it easier for developers to develop their own distributed blockchain applications while improving transaction performance. The secure and decentralized asset trust enables users to conduct decentralized transactions using their wallets.

The design of QOS public chain system is a result of practical experience and symbolizes the blockchain community. The ecosystem provided by the QOS public chain and the QSC protocol is part of a scalable blockchain community, and offers developers a complete set of blockchain scenarios.



## **4 QOS Vision as a Public Chain: Next Generation Enterprise-level Application Community**

QOS public chain acts as the next generation enterprise-level application community, it is an ecosystem that embodies a series of scenario providers in consumption, payment, finance, media, daily services, social media etc. APIs will be opened to the community with continuous newly added applications. We encourage the community to perfect the public chain wallet, the decentralized exchange, data service and the relevant technology infrastructure as well as relevant industry contents, together we would perfect our ecosystem step by step.

### **4.1 The User Community**

The building and daily operation of QOS community will be carried out in an organized fashion, with the contribution of its citizens in the community, QOS public chain will be applied to its strategic partner first- the Qianbao Nebula.

Qianbao Nebula will be able to connect the first enterprise level application account system within QOS community with its digital assets and digital redeem points, including Qianbaocard, Duduapp, Cardwise, Qianbao Parking, etc. Within the Qianbao Nebula system, all enterprise-level scenarios will be able to form their unified identity on QOS public chain, and integrate with the existing points system, and to publish their very own digital assets in accordance with QSC agreement.

Qianbaocard application now witness 400,000 active businesses on it, reaching over 50million consumers. Duduapp's cumulative registered users are more than 12.58 million, while there are over 5million users with Cardwise and there are over 10million car owners using the service of Qianbao Parking. All these users will be able to create their unified digital identity on QOS public chain using the Qianbao Nebula service. At the same time, Qianbao Nebula will be

opened to all the distributed applications who wish to join QOS public chain, and maintain their unified digital identity on it.

Qianbao Nebula will be able to transform users various rights among each application scenario into digital assets after the user complete the unification of their digital assets. During which process, we would help each scenario to develop the ways of self-designed transformation between one's interests and digital assets, encouraging each scenario to give full play to one's advantage based on one's understanding of service for users and issue digital assets creatively. Qianbao Nebula itself will set the example on how to issue digital assets itself and create interaction between different scenarios. By the diversification of the digital assets, businesses are able to increase their ability to win consumers over; and each user will acquire the habit of using digital assets all the same time enjoying the various rights that come with it.

While we are issuing enterprise level scenario digital assets, on the basis of Qianbao Nebula, the QOS community will further develop and promote itself with a series of new media channels, such as check in online everyday, invite friends over to build the community, and airdrop to ensure that each user in the QOS community owns high ranking digital assets. After our users become familiar with using digital assets, we would then promote high end digital assets circulation to create a robust community atmosphere. Citizens in the QOS community enjoy full autonomy and civil rights, by cultivating their enthusiasm through applying the digital assets sharing system, we would form and establish a community with a consensus and with its unified strength, we would realize the shared economy whereas attracting people to join the QOS ecosystem.

QOS is an interactive community based on the mixed underlying operating system of public chain and consortium blockchain. It is characterized with unified identity authentication system, self-motivated two token protocol, the dual mining mechanism of super-nodes plus mining by transactions, DFS (Distributed File System), binding developers and users into one interactive community. QOS ecosystem has partnered with well-established corporations including payment company, commercial banks, Internet finance, new media

firms, and all of them could provide cooperation scenarios. Over 400,000 local businesses among 300 cities together with over 1,000 parking lots trading scenarios will be set up on QOS platform, which will result in over 6billion CNY transaction flow each month. The total transactions will hit 30million, with over 50million users on the platform together with a over 2billion CNY monthly borrowing needs. QOS will continue to incubates and includes other service providers such as travel service, take outs, express delivery, and social network into its system.

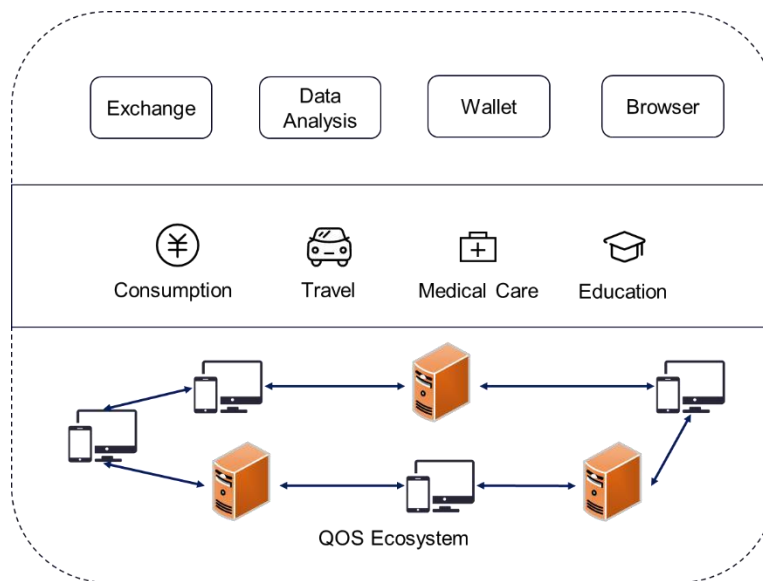


Figure 4.1 QOS Ecosystem Demonstration

## 4.2 QOS Ecosystem Business Scenarios

### 4.2.1 Consumption (Providers in the ecosystem include: Qianbao card, Qianbao Parking)

Over 85% of retail transaction in China happens offline, which equals to a 33trillion CNY worth of trading market. However, those transaction data are scattered around in the operating system of small and medium sized merchants, in one’s personal bank accounts, and in the hands of third party service providers. This attributes to two main issues, on the one hand citizen’s

identity information would not be restored and used, also one's privacy is posed to invasion as the data dealer is always trying to steal the data.

The popularity of the various cryptocurrencies reveals public recognition of blockchain technology, but the essence of cryptocurrency is payment. However, most of the existing cryptos only function and apply online whereas their corresponding offline scenarios are rare, leaving no agency able to integrate them. Given the users holding several cryptos in hand, it is of great urgency for the blue oceans to solve the issue on how to combine cryptos with the vast offline payment system.

Therefore the first application scenario of QOS community is offline consumption, as our partner in payment service also realized that the tradition centralized exchange is prone to potential data lost, privacy invasion, thus they are proactively promoting merchants, users and scenarios acceptance of transformation towards blockchain empowered model. The first partner in the ecosystem is Qianbaocard, it is a shopping platform that targets the local markets, it will provide the POS machine, QR code for payment, promotion services for the local small and medium sized businesses. It also provides the quick pass and IOU services for consumers. Covering over 300 cities now, it is now boasts of over 400,000 businesses providing services ranging from foods, entertainment, exercise and fitness, life services, beauty and supermarkets, with a over 6billion CNY transaction flow, over 30million transactions with over 10million users each month.

Another payment service provider in our ecosystem is Qianbao Parking, taking car parking service as the entry point, it provides service for car-owners, parking lots, advertiser (local small and medium sized businesses). With the integrated hardware and software parking lot management system, they would provide the car-owners with non-inductive-payment and target the ads to potential clients. This project is now available and fully covered 23 cities, in 1,000 operating parking lots with over 300,000 parking space, serving over 10million car owners.

#### **4.2.2 Credit Financing (Providers in the ecosystem include: Changzhi Bank, PinjamanGo)**

The process of credit financing comes down to the recognition of user's identity then the pricing on it. The traditional financing is indeed the liquidation of resources such as (plates, data, low-cost capital) which breeds much money brokers, leaving the vast small and medium sized enterprises and those people without credit record extreme high interest rates, while basically they are not able to enjoy due service. The recent years have witnessed the high speed development of Internet finance, and we have seen the past disadvantaged group is eager for new forms of financing. The market for loaning is still vast in China, number of social financing stock reached 156trillion CNY including 2.2trillion CNY of Internet finance. We believe that blockchain technology will transform the traditional financial services in multiple fronts.

1. Blockchain technology guarantees use of funds and transaction consistency, whereas in traditional finance the signed loan contract alone is not able to track the use of funds when the borrower received the loan and they may embezzle funds on other purposes. This will pose potential threat to the accommodator. Therefore the traditional finance do not provide an effective solution on use of funds and consistency of transaction, instead they settle for solution on borrower's load repayment capacity, collateral and repayment willingness. This partially reveals the use of funds is uncontrollable. However, in this era with blockchain, smart contract and cryptocurrency, we are able to monitor the use of funds effectively by shared digital signature system, which requires signatures from all the involved parties before settle with cryptocurrency. The borrower do not have the sole control after he received the cryptos, effectively prevent against any misappropriation.

2. Information on one's identity is thorough, safe and controllable, and in blockchain technology era, the credit and loan industry will evolve towards a P2P credit and loan time, the traditional finance service providers will turn to credit information

providers. People with borrowing needs and lending needs could be able to carry out credit and loan as well as investment based on the professional credit data services.

Based on above mentioned viewpoints, QOS attaches great importance to the development of finance markets, and achieved the intention of cooperation with various financial institutions since we built this community. Together we would push forward the evolvement of Fin tech towards the next generation.

- **Commercial Banks**

Commercial banks are the main force in China's credit financing. Individual credit report issued by Credit Information Center of People's Bank of China is the most authoritative proof of citizen's credibility in the pre-blockchain era. The joining of commercial bank at the early stage of community building will greatly promotes the establishment of citizen's credit system. Changzhi Bank is a local joint-stock bank that embraces emerging industries, and it will be an important credit financing service provider at the early days of QOS community.

- **Oversea market**

While operated in the local area, the QOS team has set its sights on the global market with the open spirit of the blockchains and established strategic cooperation with PinjamanGo, which is the most powerful credit company in Indonesia.

Indonesia, a total population of 254 million, stays in a using cash society, which young labor (low-middle class) accounts for 67% of the total population, and the overall income level is low (just about 2,000 RMB). Residents generally have consumption in advance habits, and the annual compound growth rate of consumer credit reached 30%.

PinjamanGo is a technology finance company invested by Indonesian largest consortium Jinguang Group. Its business scale ranks second in Indonesia. It adopts fully automated credit approval method and has provided credit services to more than 400,000 users.

### **4.2.3 Media (Providers in the ecosystem include: Duduapp, Shanghai Star. V Data Technology Co., Ltd and others)**

User contribute to the community by effective browsing, commenting, forwarding information and stay active on the media platform, which process signals their unique taste and interests. So at the beginning of establishing the platform there should be corresponding service providers for that. QOS has chosen powerful partners in both new media and traditional radio and television media for business implementation

QOS's new media partner Duduapp is the largest new media service provider in third-tier and fourth-tier cities in China, providing attracting fans, editing contents and operation solutions for local new media; Membership, stores, Merchandise management systems, Finance, Advertising, and other value-added services such as game realization. Supporting the localization team through the regional operation center, Duduapp has established a new media matrix in 800 cities across the country, serving more than 100,000 merchants, and more than 6 million trading users. Unlike most blockchain projects that are used in the field of Internet advertising in the media direction, the QOS community will be used in the field of television broadcast media because there are two flaws in the Internet advertising business model: the first is the value of user identity on this Internet advertising platform is narrowed down inappropriately; the cash realizable value by analyzing user's browsing history is not large enough. Second, radio and television boast numerous users with great influence as a powerful terminal play an important part in people's life and in advertisement marketing channel. However, its underdeveloped infrastructure leaves this business mode out of the development plan.

QOS's partner in the field of TV media, Star. V built a leading domestic data service platform with TV screen as the entrance and integrated three screens (television screen, mobile phone screen, computer screen) into one. The platform now has access to and gathered family viewing behavior data and DPI Internet flow data from over 20 provincial level network operators, covering over 70million users. We provide data gathering and analysis service for 15

broadcast television network operators such as Beijing, Tianjin, Shanghai, Chongqing etc. Our branch media company has gained digital tv advertisement agency qualification in 37 cities across China, with service coverage in 23 provinces and over 500 cities. We are the largest in scale, the most extensive in coverage digital tv ad network.

#### **4.2.4 Data service (Providers in the ecosystem include: Minivision Technology, etc.)**

Millions of users are engaged in consumption, finance, and social activities in the QOS community, accumulating a large amount of valuable user data. QOS plans to incubate and introduce a group of professional data service providers to help community citizens avoid data privacy violations. Then, generate data reports according to different scenarios, so that community citizens can more effectively realize the value of data.

The first professional data service provider in the QOS community is Minivision Technology. Minivision Technology is an AI company based on machine learning technology. The company has built an open and comprehensive artificial intelligence platform, continuously provided service for various scenarios, and it is the first to present the face as a unique ID and provides users with comprehensive data analysis for various industries.

Up to now, Minivision Technology has the data label reserve of hundreds of millions of natural persons and the number of annual interface calls exceeds 1 billion. The number of accumulated services clients is more than 1400 customers, such as Alibaba, Didi, SF, Jingdong, Zhongan Insurance and Vipshop.

### **4.3 QOS Economic Model**

QOS will build a dual token mechanism with QOS the public blockchain token and QSC the protocol token. QOS is a public blockchain token and a value exchange medium and a transaction fee payment tool. Whereas QSC smart



contract is aligned with QOS public chain standard, it is based on smart contract coin offering and operating agreement. QSC as the protocol token will be issued by each scenario operator based on their own systematic needs. QSC holders will be the ultimate owners enjoying the rights and interests of each scenario, with gain sharing rights within the scenario.

Corresponding to the dual token mechanism, QOS public chain will establish the dual layer mining mechanism. The 21 super nodes on the underlying public chain will compete for mining, and we encourage each scenario to exchange value, namely do the mining. Specifically it can be mining by transaction or mining by borrowing or lending capital.

1. Public chain super nodes mining mechanism, initiator of each transaction should spend a certain QOS token as for miner transaction fees, the amount of which will depend on transaction amount, complexity, promptness of paying transaction fees, and the platform will provide a reference value.

2. Details on specific application scenario mechanism of value exchange by mining. Take scenario of consumption for example, the service provider issue QSC1 token as their scenario interests representative, and in this specific scenario the value exchange lies in consumption, therefore it is mining by consumption. Both payer and payee would receive the corresponding QSC1 as mining rewards, that is each side receive half of the QCS1 spent as transaction fees. Settlement period of mining is calculated by day, while the exchange rate between QSC1 and QOS will depend on the average exchange rate within the settlement period. For each transaction payer will spend a certain amount of QOS as commission, which will be divided into two parts, 80% of which will be allocated to QSC1 holder and the rest 20% will be used to QSC1 community development and operation, the settlement period for this part is by day also.

The scenario operation platform is able to reserve some proportion of QSC1 on team motivation, and cover operation fees, but the reserved part should be unlocked together with the value exchange in the system.

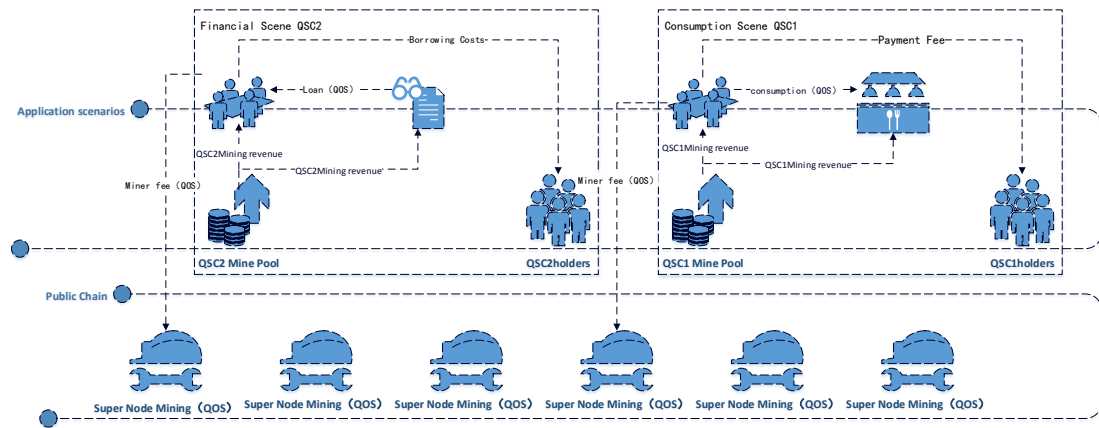


Figure 4.2 QOS Dual Token Mechanism

QOS promotes mining by value exchange, and it can be tangible like buying or selling products, service consumption, financial load or the intangible page view or attention degree. So long as there is a buyer, advertisement agency or other institutions or individuals who is willing to pay for user’s attention and browsing a certain content, QOS will deem that value exchange and that is a act of mining.

At the early stage QOS will cooperate with token exchange to provide a digital assets management service for our community users, it would be a two step procedure.

1. User conversion. Before QOS main net is up, we use ERC 20 token to ensure all users in the community enjoy digital asset service at ease. We will lead our hundreds of thousands QOS users to the exchange, create a complete digital capital wallet system then convert the traditional community user to blockchain based QOS community user.

2. User activation. Cooperate with all scenario service provider to do QOS airdrop. We plan to carry out a series of digital marketing to QOS community members by designated sign in activity, inviting friends over, consumption and money management to help cultivate the habit of using digital assets.

After QOS main net is up we will adopt mining by transaction, mining by borrowing or lending capital to bring feedback to the community.

## 5 Team and Token Release Plan

### 5.1 Roadmap

Table 5.1 Roadmap

2018Q2	Project Preparation
2018Q3	ICO Completed; Release Whitepaper; Sign with Strategic Partners; Core Community Building
2018Q4	Release Public Chain Testing Environment and QOS Wallet; Set up QOS Ecosystem Foundation
2019Q1	Develop Public Chain Supporting Services Tools; Investment and Cooperation in the Continued Application Scenario
2019Q2	Release Public Chain Production Environment

### 5.2 QOS Public Chain Token Release Plan

QOS public chain token is set at 10billion, 51% of which will be created through mining.

The detailed allocation plan is as below:

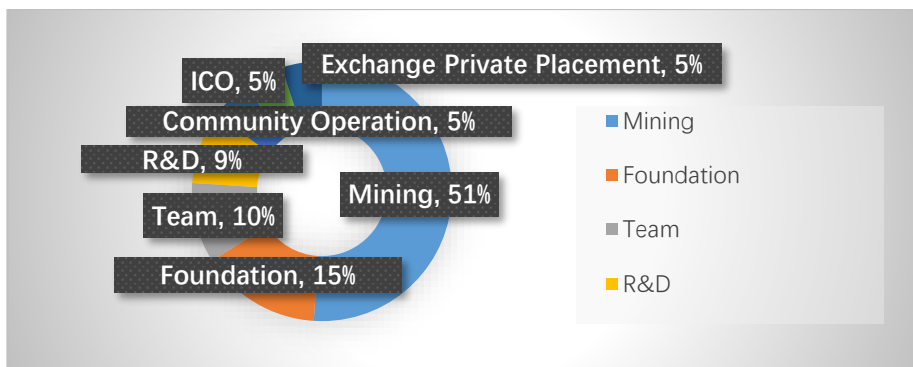


Chart 5.1 QOS Public Chain Token Release Plan

QOS hold by the team will be in lock position for 12 month before unlocking in a monthly equal proportion in the following two years.

QOS plans to raise 50,000 ETH, with 25,000 from ICO and the rest from exchange private placement. Timetable for ETH raising is as follows:

Figure 5.2 QOS Public Chain Token Raising Timetable

Round	Quota	Deadline	Price ETH:QOS
Fundraising	50,000ETH	2018.8.4	1:20000

QOS community will set up its foundation in Singapore, as the main governing body of the community, it will be fully responsible for QOS R&D management, business scenario application and compliance audit work, as well as promoting QOS brand.

### 5.3 Core Team



**Zhe Zhang**

**President of Foundation**

Former VP of Homa Appliances Co., Ltd (stock code: 002668), now GM of strategic development department, Operation Head of blockchain business. Partner of Qianbao Investment Management, responsible for strategic and investment business of listed companies.

CEO of Sino-century Investment, with 16 years of experience in capital market and VC investment. Led the investment on well-known enterprises such as AMARSOFT (stock code: 300380), Wind, Tongfudun



**Ning He**

Science and technology commentator, founder of bido. io. Channel partners of 50 global exchanges such as cobinhood, cowin tiger and bitz. He has participated in consulting and investing in nearly 20 projects such as expread, cfun and esic. Partner of Qingcheng venture capital super node.



**Jie Li**

Former Homa Appliances Co., Ltd (stock code: 002668) architect lead, participated in legal digital currency prototype design in People's Bank of China. Worked for Alibaba for six years as senior developers and architect. With 13 years of experience in framework development, excel at Internet system architecture and technology management.



**Haijing Zhou**

Security expert, acted as core member and participated in China's first CC EAL4 certified security chip. Led Qianbao group payment and settlement association on major research topics of digital currency and several blockchain finance projects. Holds a bachelor degree, master degree and Ph.D. of Tsinghua University department of automation.



**Yup Luan**

Former market director of Qianbaocard, former head of Tencent video market brand, responsible for total brand of Tencent video. Used to work for iQIYI marketing department, China Radio and TV Press. Started as a professional reporter, she is well experienced in Internet marketing, brand building. She holds a master degree from Communication University of China.

## 5.4 Consultants and Partners

### 5.4.1 Consultants



**Guodong Zhao**

**President of Homa Appliances Co., Ltd**

**Founder of Qianbao Finance**

A founding entrepreneur in China's third party payment industry

Managing director of Payment and Clearing Association of China

EMBA of PBC School of Finance, Tsinghua University

Internet Finance Association of PBC School of Finance, Tsinghua University Board Member



**Jian Zhang**

**Founder of FCoin**

**Partner of Singer Capital**

Pioneer of blockchain industry, leading figure of token economy

Author of Blockchain: Defining the Future of Finance and Economic

## 5.4.2 Partners

### Scenario Ecosystem



### Finance Service



### Technical Services



### Exchange



## 5.5 Contact Information

### Official website

<https://www.qoschain.io>

### Contact email

[contact@qoschain.io](mailto:contact@qoschain.io)

### Facebook

<https://facebook.com/QOS.Foundation>

### Twitter

[https://twitter.com/QOS\\_Foundation](https://twitter.com/QOS_Foundation)

### Telegram

[https://t.me/QOSOfficial\\_EN](https://t.me/QOSOfficial_EN)  
[https://t.me/QOSOfficial\\_CN](https://t.me/QOSOfficial_CN)

### Sinaweibo

<https://weibo.com/u/6310001987>

### WeChat group

Scan QR code or add QOS-Official assistant to join our WeChat group

