SWTC

Commercial infrastructure on the blockchain

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I Abstract

1.1 Backgound

Since Satoshi Nakamoto introduced bitcoin in its "A Peer-to-Peer Electronic Cash System", Bitcoin, the decentralized solution for this blockchain 1.0 technology, has generated tremendous repercussions around the world. People talk about the technical possibilities of total deregulation and decentralization, and are obsessed with the vision of “absolute decentralization”. However, returning to the essence of technology, Bitcoin is a highly coupled chain of applications and underlying technologies. Its technical scalability cannot support many applications that really want to use a decentralized solution. Although all kinds of rainbow coins have tried, they have no commercial success. The POW consensus results in a throughput of 6-7 transactions per second that is still far from commercial applications.

To this end, Ethereum put forward the vision of building a blockchain public infrastructure, commonly known as “smartphones”. It is hoped that by constructing a public underlying blockchain and supporting the application scenario to establish a DAPP on top of it, it is convenient to implement the application scenario. At the same time, it revolutionized the idea of "code is the law" of smart contracts. However, due to the inherent defects of its technical design, the performance of Ethereum cannot support the landing of real scenes. The Erc20-based Token generates an extremely compatible ICO that has become the largest application in Ethereum.

On the other hand, Ripple is taking a mode of adding blockchains to traditional application scenarios. It provides a new technology implementation for cross-border payment and redemption by issuing XRP. Compared with Bitcoin and Ethereum, Ripple has become a financial technology implementation of a traditional financial institution, rather than a public chain for application scenarios. Its application scenario is also limited to the field of cross-border payment.

1.2 The vision and mission

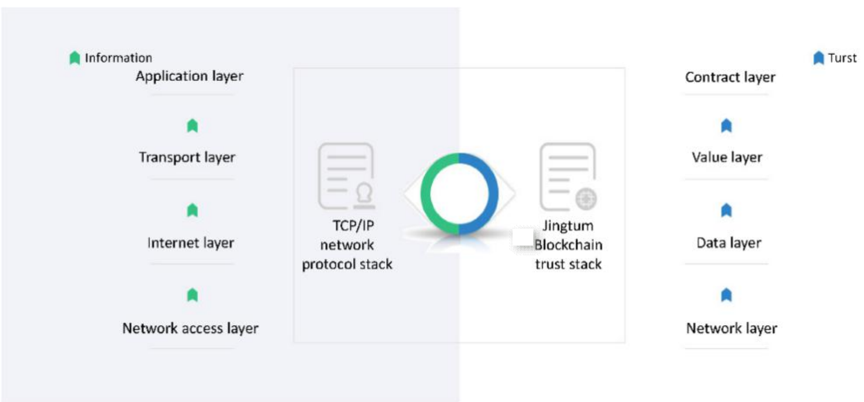
In 2011, Bitcoin was first introduced, and SWTC's entrepreneurial team studied Bitcoin's underlying technology “blockchain” as an emerging technology for changing the way human society is organized in the future. In 2014, the SWTC public chain was put into operation.

As a ground-breakable commercial public chain that has been successfully operated for 4 years and has a running height of 10 million blocks (as of June 2018) with a performance of 5000 TPS, the goal and vision of SWTC design is to provide a true and credible commercial blockchain environment. The SWTC public chain is also positioned as a decentralized trading platform that accommodates a variety of digital assets in the same time.

Blockchain is the future value sharing network

Classical Internet has greatly improved the convenience of people information sharing, but in the case of two strange opponents who need to share value, they must rely on third parties for arbitration and intermediary, and pay the corresponding costs.

For the first time, the blockchain makes it possible for multiple parties to trust the same data source together, and allows multiple parties to pass digital assets to each other without worrying about the “double consumption” problem, which greatly reduces the cost of multi-party mutual trust and further promotes the relationship between multiple parties to share value with low cost. Its function for value sharing is similar to TCP/IP, which



corresponds to the classical Internet of knowledge sharing.

Blockchain=Distributed Technology + token

Distributed technologies, including distributed ledgers, distributed storage, etc., are blockchain technologies that provide non-tamperable and multi-party trusted technical support, and they perform how blockchain adjusts and improves productivity. The token based on blockchain technology is to adjust all the relationships between natural people, institutions, objects (through the Internet of Things and sensors) linked into the blockchain. This includes the valuation of fuel and computing resources by the underlying public chain, as well as the processing medium for a series of relationships such as incentives, penalties, contribution measurement, and community building of various parties involved in economic activities. Token is an important way for blockchain technology to improve production relations.

Therefore, the SWTC public chain adopts a distributed technology based on the concept of effective decentralization, and designs a natively supported SWTC (System Working Token China) token. In the SWTC public chain, SWTC is the underlying fuel and general token, while the SWTC public chain also supports the access to real-world assets through the banking system and the corresponding distribution of multi-digital assets.

Effective decentralization vs absolute decentralization

As the spreader of blockchain technology and the first successful application of blockchain technology, Bitcoin's pursuit of “absolute decentralization” has become the standard of the blockchain world. However, in real application scenarios, such as finance, philanthropy, food safety, transaction matching, etc., the services provided by the centralized node (including government supervision, financial KYC, real name of charity, proof of origin of anti-counterfeiting, etc.) are part of the entire closed loop and indispensable. An absolutely decentralized blockchain can only serve a limited underground economic scenario. When more application scenarios are combined with blockchains, the application layer still needs to consider a variety of cooperation with real-world centralization organizations.

From the beginning, SWTC has been adhering to the philosophy of "effective decentralization" and has maintained cooperation with regulators in various technical designs, thus making real business applications more convenient.

SWTC public chain community prosperity is the core goal of public chain operation

The SWTC public chain is open to all large corporations, SMEs, entrepreneurial teams and individuals, and these will be the backbone of the SWTC community. According to the characteristics of the SWTC public chain, all public chain-based applications will have the same SWTC wallet underlying technology and technically support the mutual sending of transactions and token. As a result, every new application scenario, newly-launched business, and newly joined individuals will be able to share value with users in existing communities.

The prosperity of the community lies in the possibility of facilitating the interaction of community members through the SWTC public chain (through the SWTC wallet), establishing rules (through smart contracts), issuing token (through the gateway), and mutual diversion. The prosperous SWTC community will be the core goal of SWTC's public chain operations and will continue to propose and optimize various measures to achieve this goal.

1.3 Technical advantages

Maturity: SWTC public chain is a mature blockchain that has been developed and the main net is online

The bottom layer of SWTC public chain has been developed and deployed, rather than staying at the conceptual level. The design concept outlined in the technical architecture section has been implemented and effectively supports the underlying business applications. The SWTC public chain has been on the line for 4 years and currently reaches a block height of more than 10 million.

The consensus mechanism of the SWTC public chain adopts the BFT optimization scheme--RBFT, which adopts a layered design in the architecture design to support the gateway system and smart contracts. Currently supporting tens of thousands of levels of transaction concurrency, the 10-second transaction finally confirms the speed, which facilitates the quick execution and confirmation of the transaction. At the same time support the national secret. The laboratory performance of the SWTC public chain reaches 5000 TPS.

The blockchain technology comparison between SWTC public chain and other mainstream blockchains technologies is as follows:

	BTC	ETH	Hyperledger	Pipple/Stellar	SWTC
Consensus mechanism	POW	POW	Dip type	Consensus	RBFT
Multi-asset	×	Contract	Contract	Native support	Native support
Asset exchange	×	Contract	Contract	Native support	Native support

Smart contract	×	√	√	×	√
System performance	Weak	Weak	Good	Fair	Good
Number of nodes	Very much	A few	No public chain	Fair	fair

Gateway wallet system supports the issuance of tokens

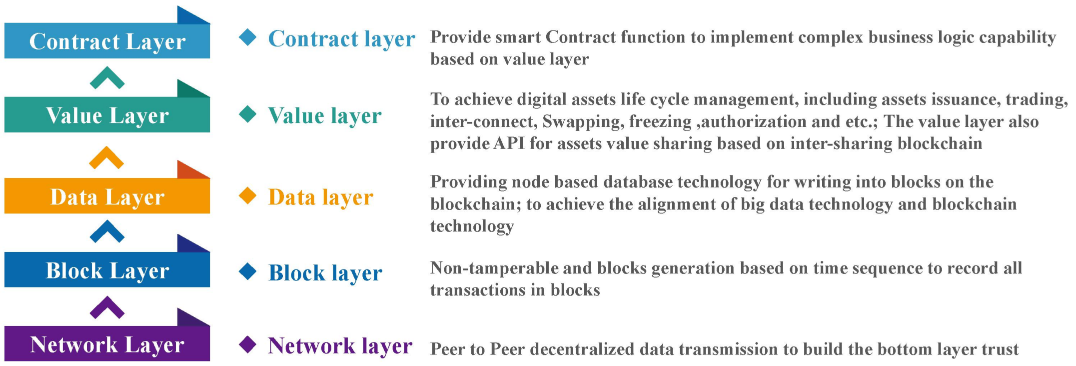
The SWTC public chain's gateway system supports the application of the public chain in the case of credit rating. It should be noted that all the certificates issued on the SWTC public chain are natively supported by the SWTC wallet, and the exchange between any two certificates is also supported by the SWTC underlying, without the need for smart contracts. This greatly provides the efficiency of the system operation, and is an example of SWTC's design of the blockchain as a value sharing network.

Security: Effectively prevent "DAO" events from happening through a layered architecture

The blockchain trust stack of the SWTC public chain passes through five levels: network layer, block layer, data layer, value layer and contract layer. Implement business scenarios at different levels of the blockchain. The maturity of the development of blockchain is also a multi-level development maturity, not a single mature path. The blockchain itself is based on a layered design, and the maturity of each level is different. The corresponding blockchain products can be launched according to the maturity of each level.

The “DAO” incident that occurred in 2016 is an example of a disaster in which the technology has not been fully tested and has taken too much commercial capital. Hackers found smart vulnerability and caused huge losses.

To this end, the SWTC public chain's multi-layer architecture can set up a firewall between the value layer and the contract layer. Even if there is a loophole in the business logic of the contract layer, the value of the large amount can still rely on the control of the value layer to prevent the loss.



Efficient: Improved BFT consensus algorithm effectively improves transaction confirmation speed

Due to the decentralization of the blockchain, a transaction requires that most nodes in the blockchain network confirm that they are valid or invalid before they can be packed into the block. This process is called the consensus of different nodes. The POW adopted by Bitcoin is commonly known as mining consensus, guaranteeing consensus and coping with the high cost of block generation and the algorithm that always recognizes the longest chain. The price is that a bitcoin transaction requires at least six blocks for an hour to be confirmed, and technically it is not final confirmation.

Due to the introduction of the Ethereum smart contract, the consensus has become a key technology for smart contract confirmation. Since the Ethereum smart contract execution adopts the synchronous mode, using the transaction trigger or automatically triggering the contract call, when the contract is executed, the consensus mechanism of the blockchain must wait for the contract to be executed, and return the result before continuing the operation. The SWTC public chain uses the improved BFT-RBFT to make a consensus on the transaction. At the same time, the consensus on the contract is handled by calling the smart contract asynchronously. Through the use of these two technologies, each transaction is finalized and obtained within 10 seconds. This is a guarantee of true commercial using. Thus completing a consensus on the current block.

	BTC	ETH	SWTC public chain
Transaction confirmation time	10min	15s	10s

Open: The public chain provides best scalability with the offer of Jingtum-lib, API and SDK interfaces

The SWTC public chain provides complete jingtum-lib, API and SDK interfaces, enabling third-party organizations to quickly access the SWTC public chain. After access, you can access the transaction records on the chain, and you can also provide various services accordingly.

Ⅱ Technology Architecture

2.1 Characteristics of commercial public chains

Reliable performance

TPS：In order to implement the application of the business scenario, the TPS of the blockchain should meet certain standards. Performance metrics have always been the advantage of a centralized solution, but the underlying blockchain needs to be technologically innovative. Improve TPS without sacrificing decentralization. Possible technologies include fragmentation, asynchronous processing of smart contracts, selection of consensus algorithms, etc.

Concurrency: In a commercial scenario, multiple simultaneous users should be allowed to log in and use without performance latency issues.

Final confirmation of the transaction

In the business environment, the confirmation of each transaction can no longer be modified. Originally not tampering is the advantage of blockchain over centralization solutions. However, due to the POW consensus algorithm, a bitcoin needs to go through six blocks to obtain a probability confirmation, which means that a transaction can be confirmed after an hour. This is unacceptable in most commercial scenarios. Therefore, the problem that the commercial blockchain should solve is that the final confirmation is completed when a transaction is accepted by the consensus algorithm and written into the block.

KYC、Regulatory and Privacy protection

Although Bitcoin appears as a completely anonymous aspect of “absolute decentralization,” in the commercial environment, regulators, project operators, and users want their transactions to be under legal and regulatory protection. In this case, the completion of the corresponding KYC, especially in the financial industry, is an essential step. On the other hand, a mature blockchain also needs to protect the privacy of users to the greatest possible extent, avoiding the traditional centralization and making the user data itself a controllable and monetizable asset of the user. The design of commercial public chains should strike a balance between the two.

Further, a public chain is like an infrastructure. The operators in different application scenarios should be able to choose whether to share their user data with other application scenario operators when accessing, and obtain good services in both cases.

Native support for digital asset issuance

We believe that digital assets will inevitably become the most revolutionary application scenario on blockchain technology. Through the incentive and punishment mechanism of the certificate, the distributed technology of blockchain and smart contracts will be able to reshape the way of human society production. Therefore, the public support of the public chain for the issuance of digital assets (referring to the underlying support, rather than through smart contracts) is an important feature of the public chain.

On the other hand, the risks of the token will need to be managed through technology and operations, such as possible credit pledges, issuance review mechanisms, and so on.

Cross-chain function

Based on the previous article, digital assets that are issued and traded on different blockchain platforms will have the need for cross-platform transactions and settlements. Therefore, supporting the cross-chain function will become the standard configuration of the underlying technology of blockchain public chain in the near future.

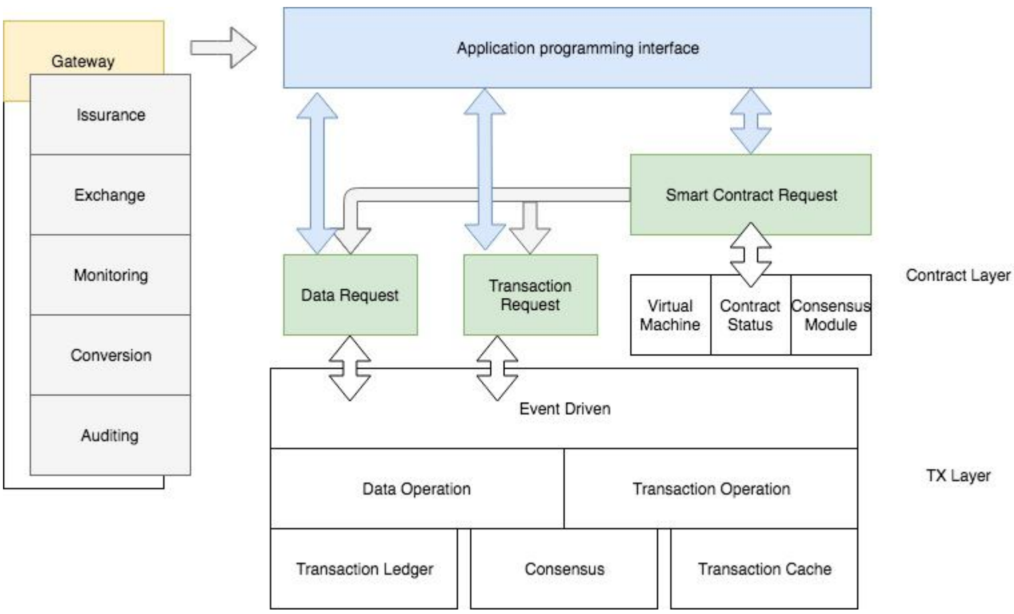
2.2 SWTC Chain design goals

The focus of SWTC public chain technology is a general-purpose blockchain platform for applications. The Foundation is developing the SWTC blockchain which is designed to be a stable and user-friendly platform for Enterprises and users. Thus, enterprises may easily access SWTC Chain and enjoy the benefits of blockchain technology, without fully delving into the details of the underlying technology. Further, on the SWTC Chain, companies have a flexible choice whether or not to share their customers. Each new application built on the SWTC Chain will attract new customers to the ecosystem, and at the same time, applications are exposed to a larger pool of existing customers. Such an ecosystem will lead to a virtuous cycle realizing "all for one and one for all"

2.3 The architecture of the SWTC Chain

A design goal of the SWTC Chain is to avoid the shortcomings in current blockchain technology. Unlike Bitcoin, the SWTC Chain integrates smart contract originally. Unlike Ethereum, the underlying blockchain adopts a more reasonable multi-layer method, which separates the execution of the smart contract from the transactions; this would avoid the problem of contracts affecting the whole system, and allowing more flexible implementation of smart contracts.

The SWTC public chain technology architecture is as follows:



The architecture of SWTC Chain is as follows:

1. Instead of using POW, which results in wastage of resources, SWTC Chain reaches consensus by RBFT; besides, it has high-speed parallel processing capability and supports mass users.
2. SWTC Chain is multi-layered, the bottom layer is called TX Layer, which is responsible for handling the most basic transactions. The layer above, called the Contract Layer, deals with contracts. The elements of the contract (code, state, storage, transaction) are separated: the transaction part is transferred to the TX Layer and executed; the other parts are executed in the Contract Layer. This architecture separates the execution of the contract from the resulting transactions, hence allowing the contract and transaction to match the corresponding protocols by their respective characteristics, achieving maximum efficiency and security.
3. To address the increasing needs for supporting data of blockchain applications, the SWTC Chain provides BLHR (block level hash record) data support, which enables users to save data signatures to the blockchain easily.
4. In order to improve the processing power of the whole system, sharding is introduced to the consensus node, so that not all nodes are required to do the same thing. Instead, for each transaction, a node is selected automatically and randomly to process the transaction. On the one hand, this method effectively takes advantage of the processing power of many nodes, thus maintaining sufficient fault tolerance. On the other hand, this significantly reduces the information flow between networks and improves the overall efficiency of the network.
5. When a contract is created, the user can identify the number of consensus nodes and the conditions for it. A user can flexibly keep the balance be-tween the cost and reliability, on the other hand, the Contract Layer could be more efficient with more contracts be handled. By this abstraction, the security of the contract system will not be affected.

6. The execution speed of the smart contract is decoupled from the ledger close speed of the TX Layer. The change in contract status depends on the consensus rate of the contract nodes.

2.4 Data processing

Blockchain is tamper-proof. All blocks are linked together to become a single chain by historical correlation - once a data is recorded, it cannot be tampered with. Direct modification of the data results in invalidation of subsequent blocks. Thus, this feature is widely used in areas of data security, identification and so on.

The typical usage of this feature would be to keep some information in the metadata of the transaction. Once a transaction is executed and stored in the blockchain, this included metadata is also permanently recorded in it. However, there are several shortcomings with this method:

1. Execution needs transactions. On one hand, some amount of transaction data must be sent, on the other hand, the transaction requires a digital signature. Therefore, the data record must correspond to a user account or wallet, and the corresponding private key information needs to be accessed.
2. The stored macro information is dispersed in every transaction, and every transaction must be traversed to search for it.
3. The process of data storage must be performed correctly by transaction confirmation.

According to this, Jingtum Chain supports BLHR (block, level, hash, record). Users may submit information that needs to be saved directly to the block. Each block has a single location to hold that information. If a user's information is historically correlated, he needs to provide a description of this correlation by himself - the block does not need to understand his application logic and merely needs to record the storage request. When each block is closed, the system automatically records all the BLHR information into the block.

2.5 RBFT Consensus algorithm

Traditional consensus mechanisms require trust and cryptographic signatures between third parties to complete. In a distributed system, there is no such trust because the identity of any and all members of the network is in a state of mutual unknown. In an ideal distributed system, the consensus mechanism can be summarized as correctness, consistency, and practicability.

By CAP Theorem, in a distributed system, consistency, availability and partition tolerance cannot be obtained at the same time. Therefore, it is essential for the whole system to choose a proper consensus for specific applications. The common consensuses for blockchain-based systems are POW, PBFT, POS, etc.

Proof Of Work（POW）

Bitcoin and other similar coins use “mining” to ensure that each node selects the same blockchain. Their approach is to make the generation of each block very expensive, meanwhile, the protocol guarantees that all nodes agree to choose the longest chain, so even when the blockchain has forks, the system can still converge to the longest fork and abandon the shorter ones quickly. In the long run, the blockchain is unique.

Proof Of Stake （POS）

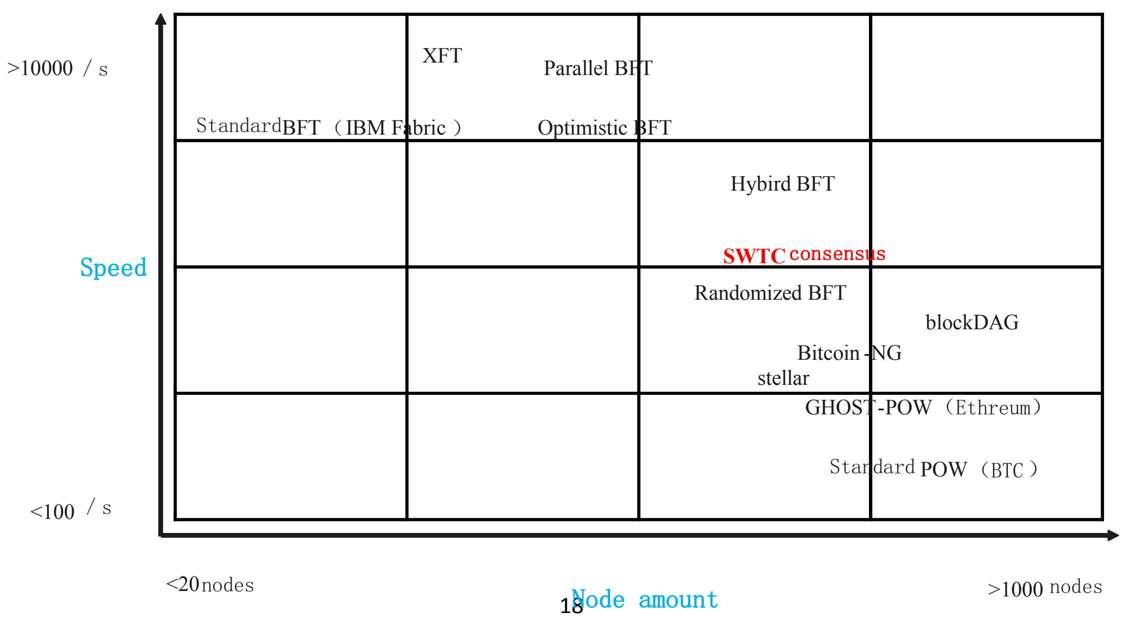
Consider POW's high energy consumption and other shortcomings, POS has attracted more and more attention as an alternative solution. Peercoin was the first cryptocurrency to use it, which approach is that each node verifies the transactions in the system by the proportion of shares held by each node. Because everyone is a stakeholder in the system, the normal rational participants should maintain the system operation. The exact details of each implementation of POS are different.

PBFT

Multiple nodes consensus method is adopted to ensure that each block is voted by everyone. The problem of Byzantine Generals is mathematically solved. Theoretically, 1/3 fault-tolerant rate in the system can be guaranteed.

SWTC Public chain consensus algorithm—RBFT

The SWTC public chain technology uses a proprietary BFT consensus algorithm for proprietary intellectual property. Under this mechanism of PBFT, there is a concept called view. In a view, a node (replica) will be the primary node, and the rest of the nodes are called backups. The primary node is responsible for ordering the requests from the client and then sending them to the backup nodes in order. This primary node of PBFT has more rights than other nodes, and if it has a problem, it will cause a relatively large delay in the system. In RBFT, this point has been improved. Referring to the mechanism of election in RAFT, voting is adopted, and there is no need to



snatch the accounting right to ensure the fairness of the rights of each node.

Subject to the real environment of commercial use, the objective physical environment and subjective commercial willingness and goals are constrained: The SWTC public chain refers to the external field early evaluation (identification module, supervision sandbox module) and network real-time monitoring (risk probability model evaluation), which can theoretically guarantee the fault tolerance rate of 1/25 in the system.

Consensus node

The consensus protocol of SWTC Chain adopts randomized BFT. However, SWTC Chain selects the validating nodes by POA (proof of Application). The core of SWTC Chain contains several validating nodes that maintain the underlying validating network for the system. This network opens for public application access. DAPPs on SWTC Chain refer to the applications based on SWTC Chain for specific users. These applications can directly access to the public SWTC Chain through the API provided by the SWTC Chain. These applications can maintain a validating node.

Such a node may implement two functions:

a) It is involved in the consensus of public nodes in the network on the SWTC Chain. It allows applications to connect to the network of the SWTC Chain. If the application itself deploys a private chain, this node can convert the user's private token to SWTC tokens.
b) If an application only uses API to access the blockchain, there is no need to deploy a single authentication node.

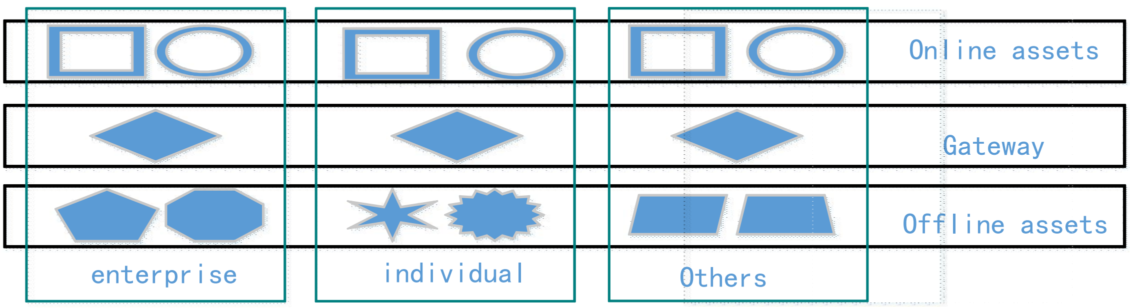
When a user's private chain is connected to SWTC Chain, usually, a gateway is required to implement the issuance and conversion of the user's token.

2.6 Gateway and usercoin

Support for digital asset issuance and trading

The SWTC Chain supports not only the SWTC, but also unique "usercoins" which may be generated by a user. A usercoin can be regarded as a user-defined token of digital asset, and its issuance is initiated by a qualified third party, which is required to pass a compliance and risk assessment of the SWTC Chain. After that, the third party is eligible to issue its usercoin on the SWTC Chain. The usercoin is issued through the gateway. The issuer is responsible for its conversion. Once the usercoin has issued - it can be paid, circulated and transferred freely within the ecosystem on the SWTC Chain, similar to SWTC tokens, without further intervention by the issuer. However, the con-version of usercoin must be done by the gateway.

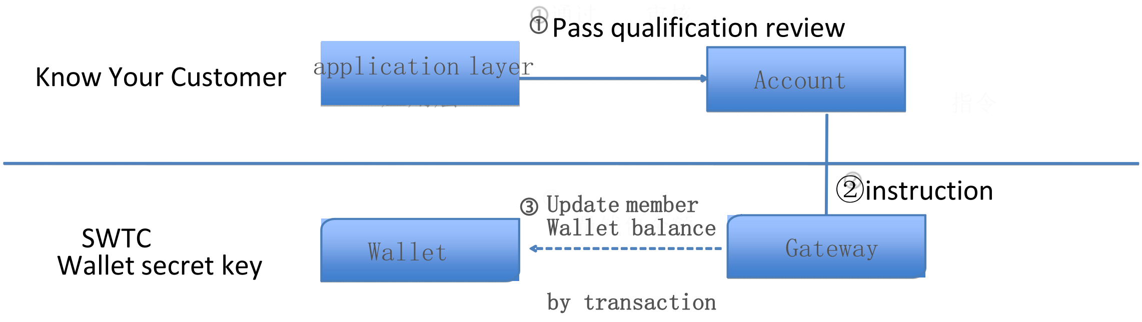
The SWTC gateway is the interface for a third party's assets on the SWTC Chain. The assets of that third party may enter the network on the SWTC Chain through the gateway, and the corresponding usercoins are issued. If users wish to convert their assets, this is also done through the gateway.



Support for KYC and anonymous transactions

Another role of the banking system is to provide a barrier between the application scenario operator and the underlying SWTC blockchain. Operators can choose whether they need to share customer information with other applications. Therefore, under the overall technical framework, the operator will complete the user KYC work and map it to the SWTC wallet public addresses on the SWTC public chain. Its mapping relationship is saved in the application layer.

Under this architecture, user privacy is still anonymous and protected at the blockchain level for users. Similar anonymous transactions can be made if needed. But when regulations and laws are needed, investigations can be made through the gateway supervision against money laundering or under other financial and legal



regulations.

2.7 Smart contract

Due to the introduction of the Ethereum smart contract, the consensus has become a key technology for smart contract confirmation. Since Ethereum smart contract execution uses a synchronous approach, using transaction triggers or automatically triggering contract calls, When the contract is executed, the consensus mechanism of the blockchain must wait for the contract to be executed and after returning the result, it can continue to operate. Thus completing a consensus on the current block.

To this end, the SWTC public chain's smart contract implementation uses three mechanisms: hierarchical, asynchronous, and fast execution. The purpose is to ensure the efficiency of the consensus implementation of smart contracts and thus to ensure the commercial viability of the SWTC public chain.

Hierarchy and smart contract

The implementation of the smart contract system on the SWTC public chain is as follows:

1. The TX-driven approach is adopted. Transactions initiate the contract deployment and contract function call. If a user's balance needs to be modified during the execution, a transaction will be initiated and sent to the TX Layer. All these transactions will be executed and validated in TX Layer, and recorded in the underlying blockchain.

2. Transactions in the TX layer are not affected by contracts.

3. Transactions between TX layer and Contract Layer store the code status of contracts. The status of contract refers to the call and parameters of the corresponding contract function. The TX Layer status hashing ensures the consistency of information.

4. The execution of the Contract Layer is performed by multiple contract nodes, which carries out consensus in a deterministic way.

5. Each contract node uses VM to execute codes.

6. The contract node preserves the storage of the contract execution.

Based on this hierarchical design, the SWTC public chain is further optimized by using asynchronous contract calls. Based on this concept, the SWTC public chain implements fast call and return of contracts, and allow users to perform smart contracts with sharding. Not all nodes are required to do the same thing, which improves the processing capability of the whole system.

Asynchronous call of smart contract

The current execution of Smart Contract is synchronous. the contract call is triggered by transaction or automatically. During the execution of the contract, the consensus mechanism of the blockchain must wait to complete the current block until all contracts processed and callbacks are returned.

This method of execution for smart contracts has the following shortcomings:

1. The speed of contract execution seriously affects the generation time of the block: Since the block consensus depends on the contract execution results, each node must reach a consensus about the consistency of the contract results. Therefore, the speed of the contract execution directly affects the subsequent operation, and any delay in contract execution would also delay the block generation time.
2. The speed of contract execution severely affects contract concurrency supported by the blockchain:

   If the generation frequency of the blockchain is fixed, in the same period, the execution speed of a contract will directly affect the execution of the other contracts in the same block. In extreme cases, a malicious contract may cause the system unavailable to other contracts, and the number of concurrent processing contracts could be greatly reduced.

3. The ability of fault tolerance is limited during the execution of contracts:

   Because of the synchronous execution mode, during the execution of con-tracts, a variety of error situations should be taken into account, and the fast processing of all kinds of time-sensitive operation should be realized. For example, the timeout situation of a variety of operations should be processed accordingly.

Some of the existing solutions, such as Ethereum, adopts a "gas" method, estimating computational demands of every contract, thus controlling the total amount of computation supported by the current block according to the gas limit, thus ensuring finishing of consensus punctually. The total number of execution supported by the system is restricted by the gas limit. As the contract gets more and more complex, the number of contracts supported by the whole system is decreasing - in addition, the Ethereum consensus time is limited, and the gas limit does not significantly increase.

According to the problems in the existing Smart Contracts executions, SWTC public chain provides a block-crossing asynchronous call contract system, whose block consensus does not depend on the contract execution results. It can improve the executions concurrency of contracts and the number of contracts supported by blocks, i.e. improving the capability of fault tolerance.

SWTC public chain's asynchronous call contract system includes the following units:

1. The distributed system validating unit:

   It consists of one or more service nodes and several validating nodes that receives the transaction request set TX submitted by users, including the contract call request TX and the payment request TX.

2. The distributed contract execution unit:

The local or remote distributed system execution unit communicates with the distributed system validating unit through a predefined protocol, to obtain the information required by the contract execution, and return the results to validating node when the execution of the contract is done.

3. The contract execution cache unit:

It receives the contract calls from the validating node, sends them to the distributed contract execution unit, receives the contract execution results, and returns the execution state of the current contract to the validating node, in order to realize the asynchronous contract call.

The system is implemented as follows:

1. The service node receives the transaction request TX submitted by the user. Each verification node collects the above TX and aggregates them into a set of transaction requests {TX}i；

2. The contract call request contained in {TX}i is sent to the contract execution cache unit. The contract execution cache unit returns the current contract execution status immediately after receiving the above request;

3. After all the verification nodes receive {TX}i, {TX}i completes the consensus on all verification nodes. Block i is generated. The verification node verifies the {TX}i after the consensus, and the verified state is written into the block i; At the same time, each verification node creates a query contract TXq and adds it to the transaction request set {TX}(i+k) of the block (i+k);

4. When performing 1~2, the contract execution cache unit sends the contract call request to the distributed contract execution unit by means of asynchronous call and background processing. After the execution is completed, the contract execution cache unit obtains the final result of the contract execution and waits for processing;

5. The block (i+k) processing cycle begins, and the contract call request contained in {TX}(i+k) is sent to the contract execution cache unit. The contract execution cache unit immediately returns the current contract execution status at the same time, the verification node extracts the contract related information from the query contract TXq and issues a query request to the contract execution cache unit. The contract execution cache unit returns the execution result of the contract call request of the block i to the verification node, and updates the query contract TXq;

6. After all the verification nodes receive {TX}(i+k), the updated query contract TXq and {TX}(i+k) are combined to form a new set. After all the verification nodes

complete the consensus, the block (i+k) is generated, the verification node verifies the consensus TX, and the verified state is written into the block (i+k).

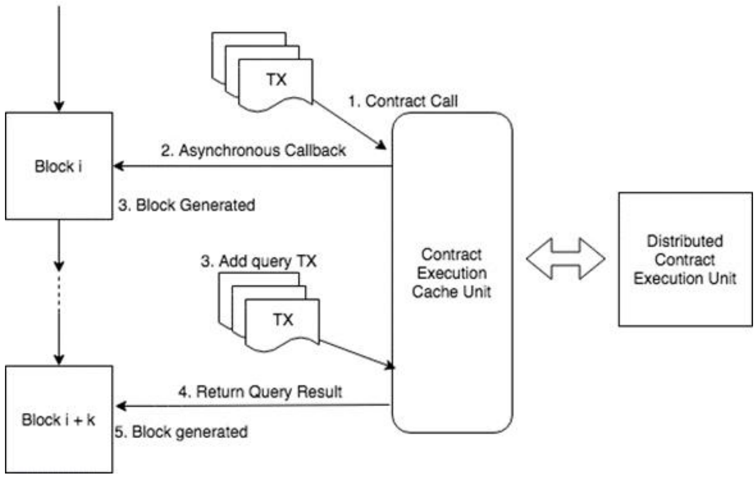
The blockchain system of SWTC public chain uses asynchronous calls as its back-ground core technology. Compared with the existing Smart Contract execution technologies, it has the following advantages:

1. It isolates the contract execution from the system consensus unit, the execution of contracts can be remote, so that the execution of contracts no longer holds the resources of the system consensus;

2. It decouples the contract execution unit and the system consensus unit, to makes the contract execution module and consensus module relatively independent, and is pluggable.

3. It sets up the contract execution cache unit between the consensus validating unit and contract execution unit, adopts the asynchronous execution mode in the whole execution of the contract creatively, implements the contract call and cross-blocks execution (between $block_i$ and $block_{i+k}$), with the consensus among validating nodes. This asynchronous contract execution mode improves the executions concurrency of contracts, avoids waiting for the execution results of the contract during the consensus process, greatly increases the number of contracts supported by the block.

4. It improves the fault tolerance of the whole system. On the one hand, the system can set up an appropriate timeout handling mechanism to deal with the delay of the contract; on the other hand, the user could configure appropriate K value in the contract call to make the long execution contract to be handled appropriately.



Fast smart contract transactions

The existing Blockchain-based distributed transactions are restricted by the consensus protocol, the generation time and the size of blocks. Blockchain-based transaction speeds are usually measured in seconds or even minutes. Here are some other shortcomings:

1. The transaction requests could be delayed in the distributed system, i.e., the transmission delay between the single node initiation and propagation of the whole network.

2. The consensus process could be delayed. The update of data must be written to the ledger after the completion of consensus, this writing is intermittent, the update is done in each validating cycle, and the update of data requested by users must be responded and returned after the update cycle.

3. The existing smart contracts are not only affected by the two points above, but also by the delay in contract execution.

Some of the existing solutions, such as lightning network and tunnels on Bitcoin to speed up the processing of trade request, either their protocols are complicated, or the non-Byzantine fault tolerance is adopted. Hence, the extensive application of these solutions is limited.

SWTC public blockchain implements a fast smart contract transaction system. Based on the asynchronous calls of contract, it divides the contract nodes into two kinds: normal transaction contract node and fast transaction contract node. The former one communicates with the validating nodes by a predefined protocol, then accesses required information in contract execution, and returns the results to the validating node after the execution of the contract is completed; the latter performs fast transaction request and returns results to the smart contract access server.

The implementation of fast smart contract call is as followings:

1. Fast transaction initialization

   Two or more users who want to use smart contract make the agreement and create a smart contract, initiate a fast smart contract initialization re-quest transaction, smart contract access server propagate the transaction to validating nodes, and create a transactions group. Then validating nodes start to make the consensus, and send this transactions group to all the contract nodes after the consensus process finished. According to the predefined PBFT protocol, a Fast Smart Contract Transaction Node (FSCTN) will be selected by the distributed randomized algorithm.

2. Fast transaction implementation

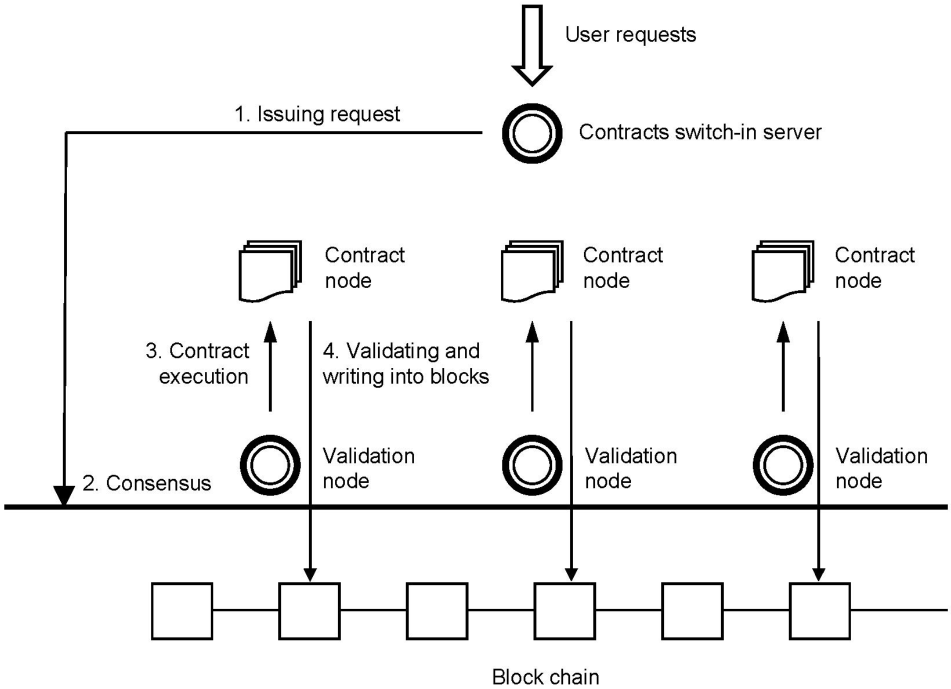
   A user initiates a fast transaction execution request, smart contract access server forwards the request directly to FSCTN, the node will execute the request, and return the transaction result to smart contract access server. At the same time, the server will record the transaction status, and store the transaction history since last confirmation. The transaction message with FSCNT could be asymmetrically encrypted or symmetrically encrypted in order to hide the transaction information except for the user and the current FSCNT. A user can query the smart contract access server for the transaction status and history.

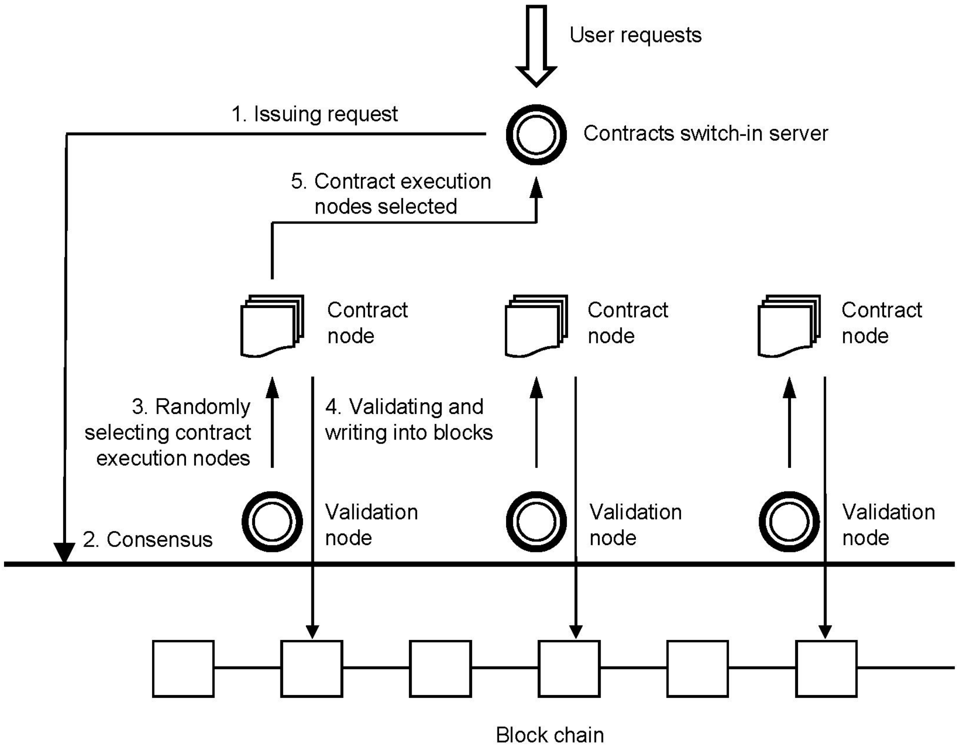
3. Decentralized Confirmation of fast transactions

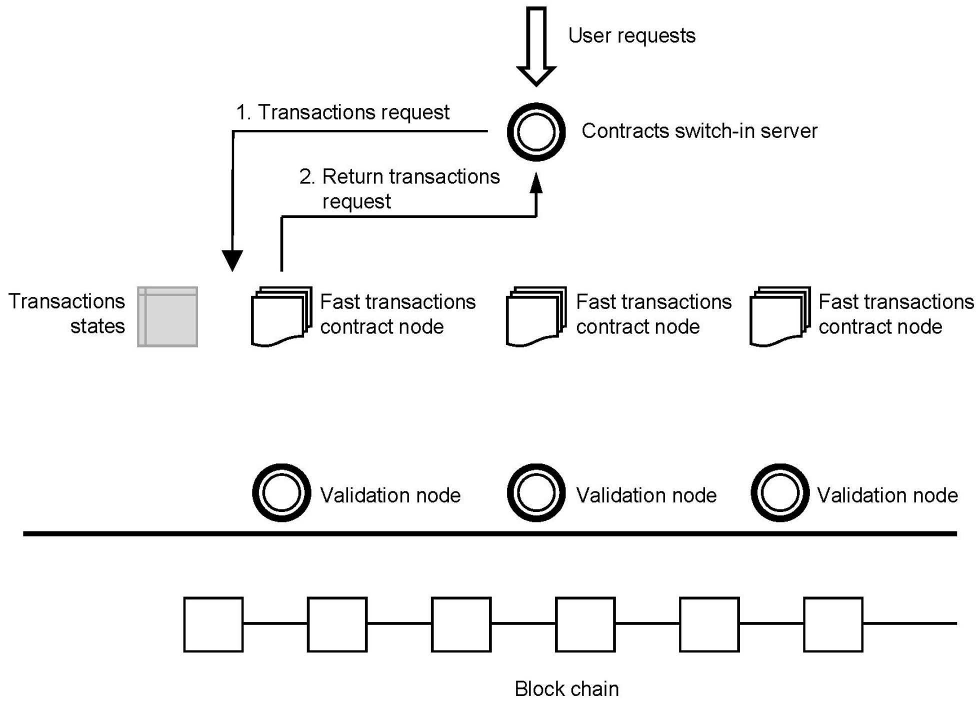
   User could query the unconfirmed transactions with a multi-signature confirm transaction, periodically (e.g., 10 min, 1 day, or 1 week), non-periodically. The confirmation transaction is combined with unconfirmed smart contract transactions history, which changes the state since last confirmation and generates a state-exchange transaction. Smart contract access server sends the state-exchange trans-action to validating node, then validating node will do the consensus with all the transactions, and then send smart contract transactions to correspond contract node. The finished execution result will be confirmed by the validating nodes, and written into the blocks with other transactions. Then the execution result will return to the user, realize Byzantine Fault Tolerance since the validating nodes achieve the consensus based on transaction history.

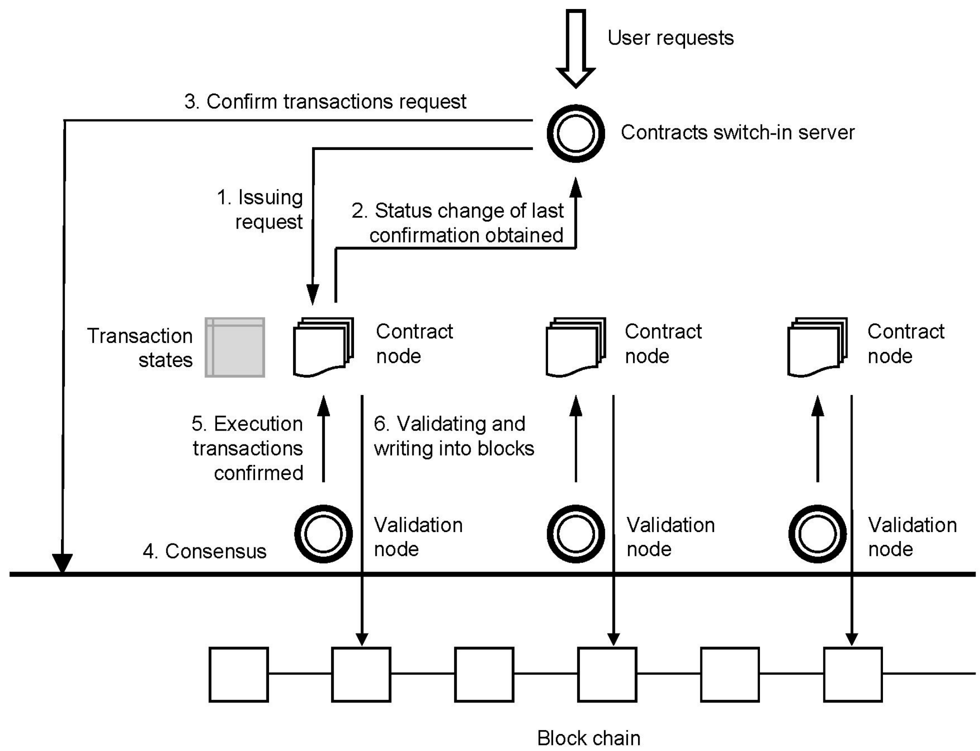
When the user repeats step (2) and selects the next fast trading contract node, the transaction history of the original fast trading contract node will be cleared.

So, SWTC public blockchain is divided into independent Contract layer and the underlying TX layer. Fast transactions are initiated in the Contract layer and are executed in it, their fast execution results are returned to the underlying layer, TX Layer, and then be validated and written to the blockchain periodically or non-periodically. Clearly, the transaction execution is not affected by the closing time of the block, the block size, and the distributed network communication. SWTC public blockchain has the inherent advantages of distributed blockchain, overcomes the delay phenomenon existing in the transaction process and communication, consensus and contract execution process of the current blockchain transactions. As a result, it realizes rapid support for trading in near real time, maintains the Byzantine fault tolerance in the trading system, as well as hide and encrypt the transaction details, and maintain the consistency and integrity.


User requests
1. Issuing request
Contracts switch-in server
Contract node
Contract node
Contract node
3. Contract execution
4. Validating and writing into blocks
Validation node
Validation node
Validation node
2. Consensus
Block chain


User requests
1. Issuing request
Contracts switch-in server
5. Contract execution nodes selected
Contract node
Contract node
Contract node
3. Randomly selecting contract execution nodes
4. Validating and writing into blocks
Validation node
Validation node
Validation node
2. Consensus
Block chain


User requests
1. Transactions request
Contracts switch-in server
2. Return transactions request
Transactions states
Fast transactions contract node
Fast transactions contract node
Fast transactions contract node
Validation node
Validation node
Validation node
Block chain


User requests
3. Confirm transactions request
Contracts switch-in server
1. Issuing request
2. Status change of last confirmation obtained
Transaction states
Contract node
Contract node
Contract node
5. Execution transactions confirmed
6. Validating and writing into blocks
4. Consensus
Validation node
Validation node
Validation node
Block chain

2.8 Sharding

The fast smart contract transaction can be regarded as a particular case of sharding. From a more general concept, the selection of the execution nodes of smart contract is an implementation of sharding technique.

In addition to the fast transactions described above, if the information synchronization between multiple smart contract nodes is implemented by predefined protocols, i.e., BFT, then a BFT consensus can be reached among them. Of course, if this consensus is adopted, the processing efficiency of the smart contract will be reduced, but it is still a significant improvement compared with the usual situation that all nodes deal with a contract at the same.

2.9 Cross-chain technology

This section will introduce the details of the SWTC blockchain and Ethereum collaboration. And how do they implement atomic exchanges between tokens from these blockchains.

Assume that in the SWTC network, there is a user who wants to use the token J on the SWTC public chain to exchange Ethereum's pass token T. The specified format for price, quantity, and recipient address: Order: J->T, p, v, T2.

This request is submitted to Smart Contract SC1 with appropriate authorization and submitted to the Order Book.

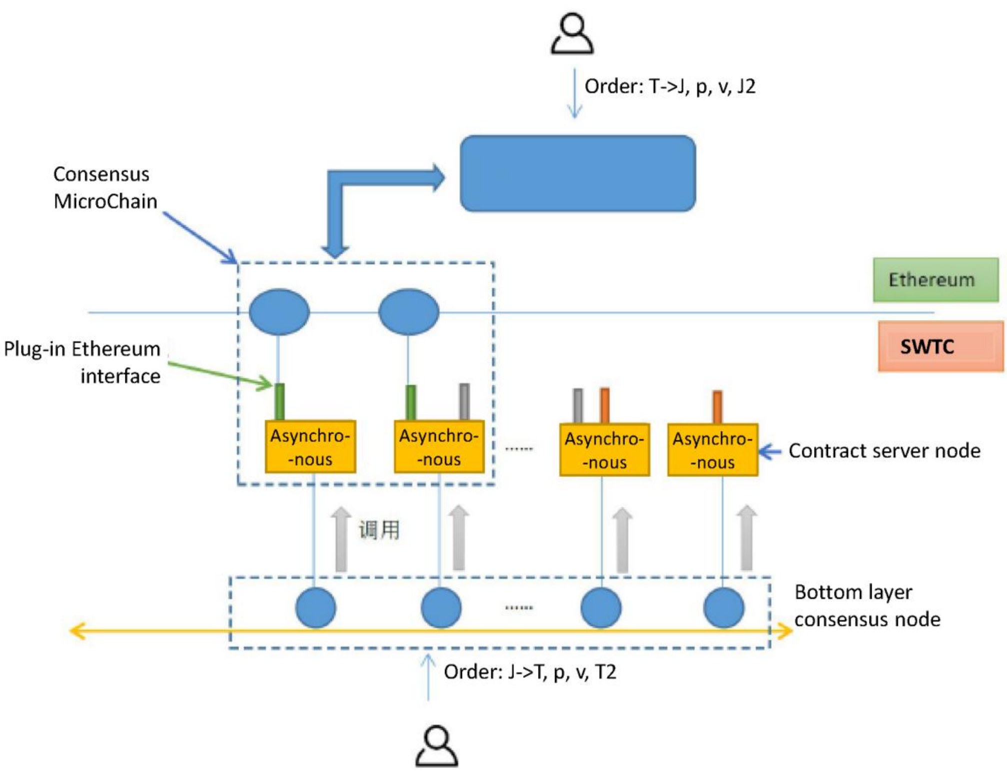
A user in Ethereum wants to sell token T to obtain token J from the SWTC network. The parameters are as follows: Order: T->J, p, v, J2.

The order is submitted for deployment to Ethereum, Smart Contract SC2 with appropriate authorization.

SWTC public chain asynchronous contract server has pluggable stubs connected to the Ethereum public chain. These servers will use an optimized consensus algorithm to form a consensus MicroChain. These contract servers will monitor Ethereum's activities and add orders to the order book.

The verification node in the SWTC public chain system will find the matching transaction（T < - > J）.It will generate a proposal {（J1-> Js，int（Js-> J2），（T1-> Ts，int（Ts-> T2））， Js is the address of SC2 and Ts is the address of SC1. Int() is the intent transaction to be executed.

J1> Js will be traded on the SWTC public chain network, and T1->Ts will be traded on the Ethereum network. The MicroChain will ensure that the two transactions have occurred and can be verified, which can be done by the nature of the asynchronous call. It is usually necessary to wait for the block to confirm the time period, which can be defined by the user. Each contract has to wait to ensure that the transactions on both sides are completed, and then each will complete the Ts->T2 or Js->J2 transaction. This is done in a deterministic way. At the same time, for any reason, if the system is unable to match the transaction, the contract will refund the original user. The illustration is as follows：



2.10 Main performance indicators

By using the above technologies, the technical performance of the SWTC public chain can achieve the following indicators:

- Nearly 10,000 TPS (concurrent laboratory test)
- 4 million concurrent users
- Usually a block of 10 seconds, the limit state can be achieved in seconds

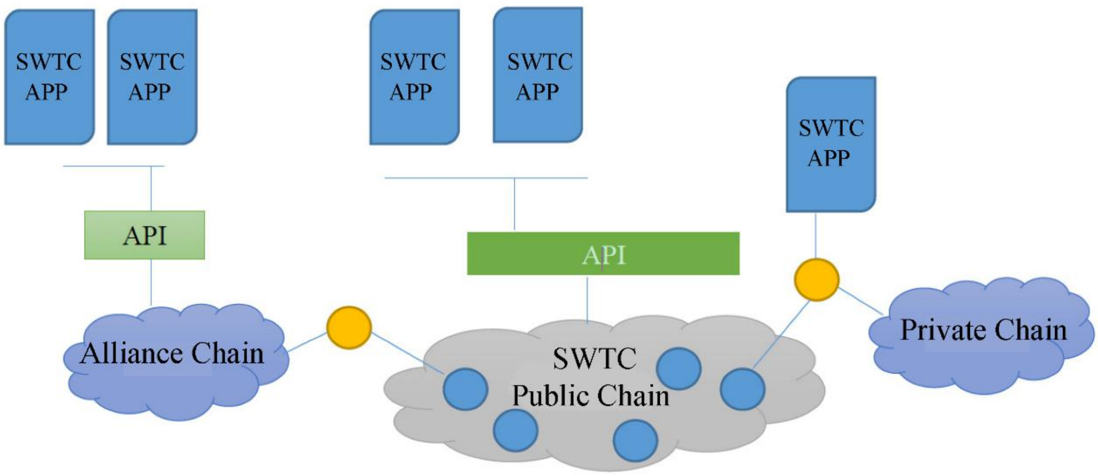
Ⅲ SWTC public chain ecosystem

3.1 SWTC public and MicroChain

As the blockchain technology is gradually accepted by the society, it has begun to show the technical realization of social governance, internal management, information sharing and value sharing among enterprise alliances, and different types of blockchains have emerged. In addition to the Public Chain, similar consortium blockchain and private blockchain will have their own application scenarios.

The consortium blockchain is suitable for scenarios involving large-scale enterprise nodes involving confidential data interaction and large value exchange. The private blockchain is suitable for sharing information and internal incentives between different nodes within a transnational enterprise. Analogous to the development of the Internet, the consortium blockchain and the private blockchain are similar to the LAN and the intranet, and to some extent there is still the possibility of interacting with the public chain (similar to the Internet).

It is simple to serve an application to build consortium or private blockchain with SWTC technical architecture. At the same time, SWTC will serve as the underlying raw fuel currency and cross-chain service settlement unit within its consortium blockchain and private blockchain. Through the gateway technology and other cross-chain technologies, the SWTC public blockchain and the consortium blockchain, industry blockchain, special application scenario chain and private chain of different organizations can be technically linked. At this point, the logically connected chain can be regarded as a MicroChain of the SWTC public chain. Technically homogeneous, information interaction and value sharing can be easily accomplished (through SWTC as an intermediary). Logically, the MicroChain has a large autonomy, can determine the access mode on the chain, and can issue user access based on SWTC wallet and



gateway technology.

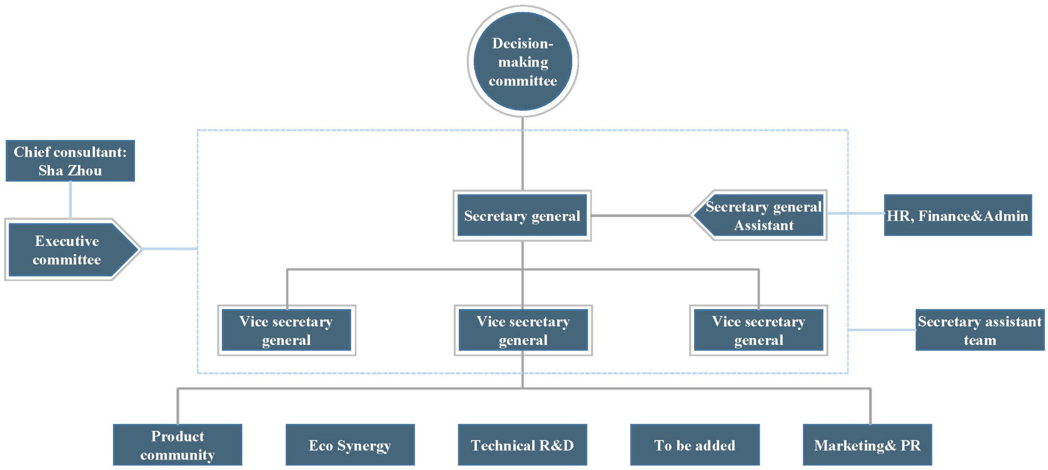
When multiple organizational consortium blockchain, industry blockchain, and MicroChains of special application scenarios use SWTC technology and access the SWTC public chain, they will form a larger ecosystem. In the ecosystem, information exchange and value transfer can be carried out between different MicroChains, between MicroChains and SWTC public chains. The SWTC public chain will provide cross-link transaction matching, confirmation and settlement, and SWTC will become a commonly accepted settlement unit in all ecosystems, and undertake the functions of value conversion, storage and transaction within the community.

3.2 SWTC Foundation

The SWTC Foundation (hereinafter referred to as the “Foundation”) is a non-profit organization of the global SWTC blockchain ecosystem. The Foundation is committed to the development and construction of the SWTC blockchain ecosystem and the promotion of transparency, and promotes the safe and harmonious development of the SWTC blockchain ecological society. The SWTC Foundation manages the community on behalf of all SWTC holders, with a core mission of prospering the community. The SWTC Foundation includes committees and executive committees.

SWTC Foundation Management Structure

The SWTC Foundation Management Structure includes operational processes and rules for day-to-day work and special situations.



- **Decision committee：**

The decision committee functions include hiring and dismissing the secretary-general and the heads of various functional committees, making important decisions, holding emergency meetings, etc. The members of the decision committee are appointed for a term of two years.

After the expiration of the decision committee, the community will vote for 50 community representatives by a weight of SWTC numbers and holding period, and select the core members of the seven decision committees. The selected core staff will make important and urgent decisions on behalf of the SWTC community and will need to accept credit investigations and public pay during their tenure.

- **Action Committee：**

The Action Committee consists of an Action Committee consisting of the Secretary-General, the Deputy Secretary-General, the Assistant Secretary-General and the Assistant Group of Secretaries. The Secretary-General and the Deputy Secretary-General are elected by the Decision Committee and are responsible for the day-to-day operation and management of the SWTC community, the coordination of the work of the subordinate committees, and the decision committee meetings. The Secretary-General and the Deputy Secretary-General regularly report to the decision committee on progress.

- **Product Community Council:**

The product committee council is responsible for the overall design of the community, as well as the introduction of relevant partners, etc.

- **Technical Committee:**

The technical committee consists of core developers responsible for the underlying technology development and review, product development and auditing. In addition, the technical committee holds weekly project tracking meetings to communicate needs and project progress. Technical committee members need to understand community dynamics and hotspots, communicate with SWTC holders in the community, and hold technical exchanges from time to time.

- **External Ecological Collaboration Committee:**

The external ecological collaboration committee is responsible for product community promotion and business cooperation.

- **Financial Personnel Administration Committee：**

The Financial Personnel Administration Committee is responsible for the use and review of project fundraising, developer compensation management, daily operating expenses and audits.

- **Market and Public Relationship committee：**

The goal of the market and public relationship committee is to serve the community, to promotes SWTC products and services, and to promote open source projects. The committee is responsible for the publication of all community announcements and cooperation with the media.

SWTC Foundation's risk assessment and decision making mechanism

The SWTC Foundation requires annual safety assessments for the sustainability of blockchain projects in order to develop and improve risk management systems. The assessment includes project quality, project schedule, project application, such as smart contract and simple contract application, threat identification analysis, management measures assessment analysis, risk definition, disposal and other stages.

The Foundation will rank events according to the characteristics, degree of impact, the scope of the impact, amount of tokens affected, and the probability of occurrence, then make decisions based on priorities. For high-priority events, organize relevant committees of the Foundation to make decisions as soon as possible. Event types are mainly divided into management class transactions and technical class transactions.

For the general management of the Foundation, the members of the Foundation will hold a meeting to discuss and ultimately decide jointly by the Finance and Personnel Management Committee and the Decision Committee.

The technical issues of the SWTC community and the use of funds raised are decided by the decision committee and the action committee. The decision-making committee has the power to decide, and the action committee's opinions will be used as a reference.

Decisions on emergencies (e.g. events that affect the entire community, software security, system upgrades, etc.) are reviewed by the technical committee and submitted to the decision-making committee through the Secretary-General. The decision-making committee adopts a privileged mechanism to implement the decision in the community. The Foundation will use a voting mechanism to avoid disagreements. If there is a disagreement, the weight will be calculated based on the number of SWTCs held by the members and holding period.

Application deployment on the SWTC main net

Contact@SWTC.top

SWTC Foundation information distribution channel

www.SWTC.top

3.3 SWTC Developer community

The SWTC public chain adheres to an open attitude and will gradually open source and encourage excellent technology developers to use it. The SWTC developer community welcomes all technology enthusiasts interested in blockchain technology to participate with incentives

3.4 SWTC public chain realized cross-chain technology-Jing-chang

As an important part of the SWTC ecosystem, Jing Chang developed a digital asset decentralized cross-chain switching technology based on the SWTC public chain. And use this as the implementation of SWTC public chain cross-chain technology.

The current phase solution of Jing-chang's cross-chain technology is based on the SWTC public chain. It automatically monitors and automatically maps the pass (tokens) of all other blockchain underlying systems to the SWTC public chain. Due to the unique order book function on the SWTC chain, the chain transactions are compared to other decentralized exchanges. The Jing-chang cross-chain technology ensures that the customer's pending orders, matches, and transactions are completed directly on the chain. Jing-chang cross-chain switching technology has the following four advantages:

1. **Security:** The platform does not touch or save the user's key. The user's wallet key is saved only by the user, the platform will not touch, and it cannot be saved. In this way, the platform cannot use the user pass (token), and even if the trading platform is attacked, because the user's pass (token) assets are in the blockchain, the attacker cannot obtain the user's key, so it is always safe. ;

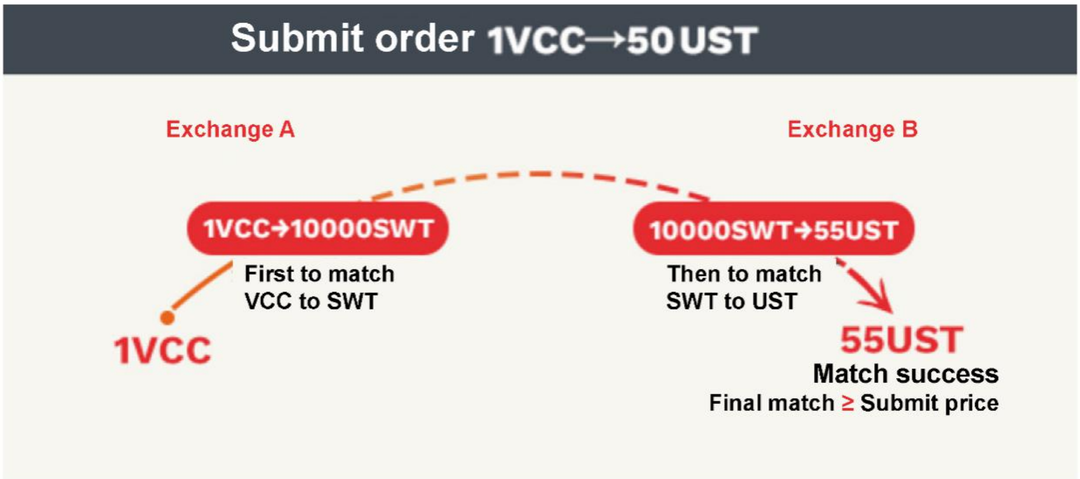
2. **Trustworthy:** Since the user's pending order transaction is completely peer-to-peer on the chain, all the behaviors can be queried in the blockchain network, which is authentic and reliable; It can avoid the risk of false transaction that traditional centralized mechanism will potentially use to control prices.

3. **Sharing:** sharing market depth and sharing market traffic. Since all users' pending orders, matches, and transactions are conducted on the SWTC public chain, all trading users (including different trading platforms) using Jing-chang well-cross-chain technology can share the market depth and traffic of the entire chain.

4. **Intelligence:** Realize multiple exchanges, multi-pass, multi-party automatic matching transactions. Examples: Pending order 1VCC is sold at 50UST; there is no suitable price in the existing A-exchange VCC/UST transaction; the system will automatically match the transaction pairs on the chain and automatically complete the two transactions in accordance with the trading conditions. (That is to say, the transaction price is sold at the highest price that can be traded at the moment.)：

a. Selling 1VCC on the A exchange to obtain 10000SWT;

b. Selling 10000SWT on B Exchange to get 55UST；



c. The last original pending order transaction price is selling 1VCC to get 55UST.

In addition, in view of the inefficiency of previous decentralized exchange transactions, Jing Chang Technology can provide a processing speed of not less than 2000tps based on the SWTC public chain, which can fully satisfy the user's smooth trading experience. And all trading processes cannot be tampered with in the chain, truly safe, fair and transparent. Enterprises that are interested in operating exchanges are welcome to contact us to provide a safe, fair and equitable exchange environment for users to jointly promote the popularization and application of digital asset value interconnection technology.

Ⅳ SWTC release and application

4.1 SWTC release scale

SWTC as a native digital certificate for the SWTC public chain（“Gas”）,the total amount of issuance is fixed at 600 billion，The specific circulation quantity is gradually released according to the SWTC public chain ecological application and trading demand, and the current circulation is about 105.6 billion (105,620,057,001). The rest of the SWTC is currently locked and will only be released following the lock release process.

Among them, 494,379,942,999 SWTs are used as enterprise chains, and they are used as reserve fuels for the application chain. The growth of future users (individuals, enterprises, and the Internet of Things, etc.), the need for community prosperity, and other ecological growth conditions, currently stored in three cold wallet addresses:

Wallet number	Wallet address	Locked position
1	jhASywztR3zWgaHmP7aY6vW22FFj46Rsnh	240,000,001,000
2	jabT6rzpAwhWqJ8bLwmuLeqnHWZahjP7AN	135,000,000,999
3	jMiw4jTNX6rR54RX4oz7eVrGvcJVsFDX5i	119,379,941,000

The SWTC Foundation has been committed to promoting the ecological prosperity of the public chain, promoting corporate, application and personal chain attitudes, providing reliable services and appropriate liquidity to support the access and trading of digital assets. In the future release of the SWTC fuel token, the SWTC Foundation will gradually release it according to actual needs and through community consensus:

1) Support enterprises on chain, application on chain and personal on chain, and promise to provide the necessary and sufficient liquidity to support the deployment service in a proper manner.
2) The SWTC Foundation release will continue to uphold and strengthen the principles of openness, transparency and community sharing.

3) At the appropriate time in the future, the above-mentioned cold wallet release SWTC will develop a smart contract-based linear release and locking mechanism based on common practices and practices in the industry.

Wallet balances can be queried at http://state.jingtum.com

4.2 SWTC application scenario

The SWTC public chain acts as the bottom layer of the blockchain. The original SWTC pass is designed as the Gas consumed by the operation on the public chain. Users will consume a very small amount of SWTC when trading through the SWTC public chain. The purpose is to prevent dust attacks on the network. In addition, through the deepening of the SWTC application scenario and the prosperity of the community, SWTC's application scenarios will continue to expand, including but not limited to the following:

Value-added services

Through the SWTC public chain, to provide a variety of services can be reimbursed in SWTC；

Incentive means

Application scenarios and operational projects on the SWTC public chain can mobilize community resources to provide corresponding services by providing SWTC incentives.；

Credit pledge

SWTC can be used as a means of credit pledge in various trading activities on the SWTC public chain. Through business logic design, it will be pledged to ensure that multiple parties will breach the contract and lose trust, thus promoting the SWTC public chain community to become a credible environment for good currency to expel weak currency.

Cross-chain cross-certificate unit

Communication equivalence between multiple MicroChains on the SWTC public chain or different passes in different application scenarios. When value exchange occurs between different MicroChains and different application scenarios, SWTC can provide settlement services in the background.

V SWTC team core members

Diwangtian Jing Chairman of the SWTC Foundation CEO of Jingtum Technology Founder of SWTC Public Chain

His former name is Sha Zhou, Silicon Valley's first technology financial investor, frontier technologist, top leader in the field of crypto currency. Founder of Outpost Capitals; in 1996 he joined the Silicon Valley high-tech industry and worked for HP, Alteron, NetScreen and Juniper; in 2012 he started the Financial Weekly and founded a series of high-tech companies. He has 200,000 international technology circle senior community fans in the field of international science and technology finance. The earliest technology financial investor in Silicon Valley, cutting-edge technologist, and the top leader in the field of cryptographic digital currency. In Silicon Valley, with the development of international blockchain technology and the trend of crypto currency, he has a leading opinion.

Xiaohu Chen Chief scientist

Silicon Valley's well-known expert in artificial intelligence + blockchain research. Bachelor's degree from Zhejiang University, Master's degree from University of California, Riverside. Co-founder of a 3D scanner company in Silicon Valley, proficient in Internet hardware, software and algorithms. The main advocate of the SWTC public chain philosophy, the pioneer of effective decentralization theory research.

From 2002 to 2003, Ricoh's digital camera division, software engineer, designed and implemented image analysis processing for multi-user and cross-platform, automatic upload and transfer systems. Design and implement automatic processing of hypermedia information and automatic generation of geographic information.

From 2003 to 2015, NextEngine technical director, the founding member of the company, has undergone many changes and re-starting the company. Technology accumulation spans software design, architecture, algorithm implementation, system kernel, network security, database, embedded systems, mobile development and many other aspects.

Since 2012, he has been involved in the development of the Bitcoin 1T ASIC mining machine and the development and management of the mining pool software. Since 2013, it has been transferred to the research and development of the underlying technology of the blockchain. In 2015, he was the full-time well-known Jing-chang US CEO.

In 2017, in the Silicon Valley high-tech circle, he was first proposed that “blockchain technology is a key step in the evolution of AI life body”, which has a great impact on the Silicon Valley technology entrepreneurship circle.

Xinyue Yang　Chief architect

From August 2005 to June 2010, senior programmer/research scientist at IMTT, Colorado, USA. From June 2010 to May 2012, Wal-Mart's program analyst. From October 2013 to January 2017, Nike Technology Leader and Senior Web Developer. Contacting blockchain technology since 2012. First proposed diversion loose coupling and layering concept to a substantial increase in the block chain efficiency. Achieve high performance of 5,000 transactions per second on the blockchain. A number of blockchain related patents are pending.

From April 2015 to present (full-time after part-time job), chief architect of Jingtum Technology Co., Ltd. Responsible for the core technology design and development of the Jingtum project; responsible for building a big data system; responsible for the research and development of the underlying blockchain technology of the SWTC public chain. Fully master the core technology and application of the frontier of the blockchain. Fully responsible for the blockchain anti-counterfeiting project

Jianxin Yang　Director of the Technical Committee

Master of Computer Science in Tsinghua University，one of the earliest experts in block chain development in China，Blockchain underlying architect，rich practical experience in blockchain industry and crypto currency and the leader in industry technology development.

SWTC public chain underlying platform domestic leader，leading the development of the first commercial public chain in China，developing API, SDK and other related standard interfaces；developed blockchain enterprise-level wallets, supply chain finance and other projects；the pioneer of the domestic smart contract first landed.

Since 2015, he has been involved in the development and design of the underlying technology of the SWTC public chain. The main task is to coordinate domestic and foreign participation in the implementation of SWTC public chain and alliance chain private chain system project functions, and participate in other applications from Silicon Valley. Participated in the research and development of the internal blockchain project of China's first Fortune 500 state-owned listed companies, mainly including corporate welfare exchange projects, B-end enterprise-level wallets, supply chain finance, and national grid core business trusted identity authentication programs.

Responsible for and involved in the design and implementation of the well-sourced asset data trading platform, responsible for and participate in the design and implementation of application projects such as Financing and Jingtum APP, prepare SWTC public chain API and SDK and other related standards. The main work and research direction is the application of blockchain technology and blockchain industry.

At the same time, he has developed more than ten major technological innovative products in China's blockchain industry, the only decentralized asset wallet in China, and the first blockchain score. He developed the first decentralized payment instrument currency in the blockchain industry at the end of 2017.

At the same time, he trained and coached domestic enterprise development teams to develop more than 20 public, alliance, private, and cloud blockchain. He coached the invention and implementation of more than 50 blockchain applications.