



TITAN WHITEPAPER

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1

TITAN Creation

originating from the sea, to the sea



Human civilization has developed for thousands of years from ancient times to the present.

Throughout the global origin of life, reproduction and spread, all closely related to a word, that is, "water". The rise of ancient civilization, such as the two river civilization, the Nile civilization and China's Yangtze River, the Yellow River, the surging river contains mankind's tireless pursuit of the world. All the rivers, eventually into the sea. If the river represents the eternal exploration of mankind, then the sea acts as a container of wisdom after human exploration.

The origin of life, the exchange of civilization and the rise of culture are all closely related to the sea. The impulse of human beings to "go to the sea by boat" civilization.

The marine civilization, which depends on the ocean for the production and exchange of goods, represents, at a deeper level, the human nature of freedom, the spirit of competitive adventure and the idea of equality and democracy.



The history of human development and business history, in the final analysis, is actually a history of the sea

TITAN, the name comes from ancient Greek mythology, when dominated the world's ancient sea god Titan, meaning giant and guard, who nowadays will lead a new round of block chain to prove a new economic storm.

TITAN birth, from the beginning to follow the spirit of the sea as a guide, adhere to the continuous innovation of technology to explore a new business model, with an open, inclusive, win-win mentality to create the ultimate value, so that everyone has the opportunity to fully enjoy the dividends of the development of human science and technology civilization.

Break the uneven distribution of wealth and subvert the solidified model of traditional economy. As human beings have now explored only 5% of the sea, TITAN mission is to rush to the deep and boundless sea of economic civilization, to show the fruits of human business civilization accumulated for thousands of years to the public in a more universal, equal and pluralistic



TITAN Creation: originating from the sea, to the sea

way, and to explore the beauty of the combination of science and technology and business with everyone.

TITAN, with the spirit of the sea, strive to become the global economy 5.0 leader. TITAN is the leader of an industrial block chain, an ecological empire on a borderless chain, opening a new era of global digital trade.



2

TITAN consensus mechanisms

carrying on a mission to break down stereotypes



2.1 Industrial problems

TITAN blockchain technology can be understood as an Internet protocol, that is, some formats and rules for transmitting and managing information in a network. Just as language communication between people, because we learn the same vocabulary and grammar, this makes communication possible. In the world of the Internet, such norms are also needed, under which information can be freely transmitted on the Internet, and information recipients can ensure that the correct information content is received.

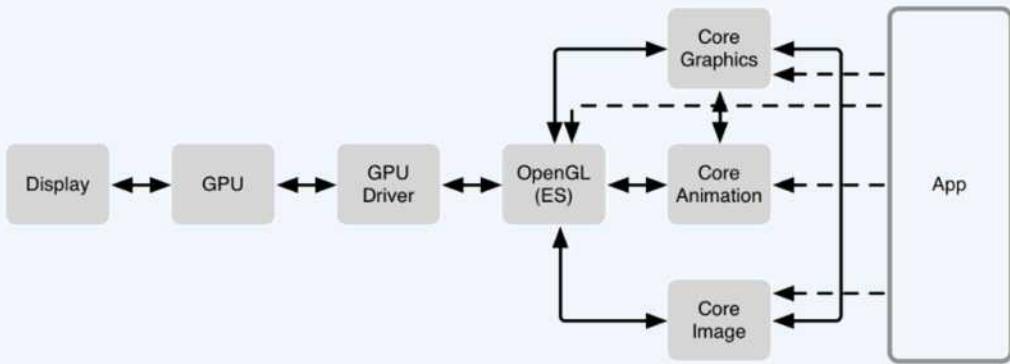
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```
+ Ethernet II, Src: CompaqIn_30:22:3d (88:ae:1d:30:22:3d), Dst: IPv6mcast
+ Internet Protocol Version 6, Src: fe80::5d51:ccc:788d:a416 (fe80::5d51:ccc:788d:a416)
+ 0110 .... = Version: 6
+ .... 0000 0000 .... .... .... .... = Traffic class: 0x00000000
+ .... .... 0000 0000 0000 0000 0000 0000 = Flowlabel: 0x00000000
+ Payload length: 32
+ Next header: ICMPv6 (0x3a)
+ Hop limit: 255
+ Source: fe80::5d51:ccc:788d:a416 (fe80::5d51:ccc:788d:a416)
+ Destination: ff02::1:ff23:1ea0 (ff02::1:ff23:1ea0)
+ Internet Control Message Protocol v6
+ Type: Neighbor Solicitation (135)
+ Code: 0
+ Checksum: 0x142d [correct]
+ Reserved: 00000000
+ Target Address: fe80::20c:dbff:fe23:1ea0 (fe80::20c:dbff:fe23:1ea0)
+ ICMPv6 Option (Source link-layer address : 88:ae:1d:30:22:3d)
+ Type: Source link-layer address (1)
+ Length: 1 (8 bytes)
+ Link-layer address: CompaqIn_30:22:3d (88:ae:1d:30:22:3d)
```

IPv6 protocol code

The seemingly simple idea has built the cornerstone of the world of the Internet and made information globalization a reality. as IP protocols have moved deep into the network domain (devices, software stacks, applications, services, engineering knowledge, business models, and even national policies), it seems daunting to consider using non- IP protocols. But, although IP protocol has been a very successful Internet protocol for the past 40 years. But as technology and time evolve, there is reason to believe that it will not be used all the time. Although replacing IP protocol with another does pose implementation challenges, it does not necessarily mean changing the application process.



Software stack

The global IPv4 agreement address is known to have dried up, and its successor, the IPv6 agreement, has been slow to develop and has affected Internet development. There is not enough pool of addresses to allow many home users and businesses to share addresses, and businesses may sometimes need to spend a lot of money on them if they want to apply for an address.

We are in an era of IoT Internet of things, AI artificial intelligence ,5 G communication, behind these emerging technologies are based on big data, driven by the Internet to build a rapidly developing society. This is an era of data explosion, data is wealth. Centralized data storage has been monopolized by today's giants, distributed storage is the next trillion-level blue sea market.



Against this backdrop, high-profile IPFS projects have emerged. Block chain characterized by five technologies: distributed account book, decentralized trust, time stamp, asymmetric encryption and intelligent contract, and IPFS protocol based on block chain technology are expected to try to change the underlying technology of the Internet and solve the development dilemma faced by the Internet. But unfortunately, the IPFS project due to various reasons, the main network line repeatedly postponed, the test network is also full of loopholes, seriously affected the previous investment IPFS mining machinery institutions and miners' investment income, the realization of difficult to become an indisputable fact. With the delay of time The earlier investors enter, the more likely they are to suffer huge economic losses.

The emergence of TITAN will build a brand-new Internet protocol at the bottom, solve many shortcomings inherent in existing IP protocols, upgrade the Internet and block chain underlying protocols. TITAN spread new ideas and technologies



to global blockchain supporters and believers, and through the value of TITAN, unite global internet and blockchain developers, business applications, and ordinary blockchain users to form a huge alliance platform and group development.



TITAN IoT Ecology



2.2 Problems with existing blockchain systems



1 Limitations of serial processing

As blockchain technology is more widely used, its linear processing pressure is increasingly faced with the risk of exceeding its design capacity, which leads to the current network performance bottleneck. The current blockchain system faces multiple tests that urgently need to improve throughput, sometimes at the expense of transaction efficiency. Bitcoin fees, for example, are rising sharply as trading volumes increase, and a large number of transactions need to wait long before they can be confirmed; ethernet often experiences massive congestion when tokens are sold. Among traditional IT architectures, modern optimization techniques such as sub-database, sub-table, or switching to distributed architecture have proved to be feasible to greatly improve system performance.



2 Data complexity and redundancy

The current situation is that a generic blockchain system needs to be used to handle different business scenarios. the disadvantages of general-purpose blockchain systems are over-complex intelligent contracts and consensus mechanisms, lack of customized solutions for specific business scenarios, and data redundancy.

3 Agreement escalation difficulties

Despite the rapid development of blockchain technology, it is still in its infancy. Significant improvements and updates will emerge in the future. these updates are critical for the evolution of the blockchain and keeping pace with the times. The diversity of stakeholders in blockchain ecosystems makes it often difficult to reach agreement in the absence of effective governance mechanisms, which also leads to the fact that many protocol upgrades are now on hold. Taking the bitcoin system as an example, the introduction of many new features in recent years has experienced long-term disputes in the community.



4 Block expansion

The more successful a blockchain system is, the higher its maintenance costs. Now running a full-node bitcoin requires more than 130 G of hard disk space, and ethernet is more than 180 G, and this situation will not improve in the long run. As more people embrace the block chain and start trading more, the storage space of the block will expand faster and maintenance costs will become higher. In this regard, we must take action to alleviate this vicious circle.

5 Inefficient point-to-point communication

Existing blockchains communicate mainly through broadcast networks, and support for P2P networks is inefficient and insecure. For example, if some kind of data is only for one user group, then the data should only be propagated in a limited number of nodes, not broadcast to all nodes.



6 Cross-chain communications requiring breakthrough

There have been some attempts to deal with related business logic between blockchain systems in the field of existing blockchain technology, but the cross-chain interaction of data has been a difficult technical problem in the industry. Existing cross-chain communication includes centralized implementation schemes and HTLC based schemes. The centralized scheme deviates from the essence of the block chain, and faces the problems of credit difficulty, single point failure, single point performance bottleneck and so on, so the application scenario is relatively limited. A HTLC-based scheme can only play a role in dealing with some specific application modes, such as asset exchange, while the scheme has strict requirements for the protocol and consensus mechanism of the two chains involved in communication, and realizes the scheme Complex. No matter which implementation scheme, there are two core issues of protocol differential adaptation and data standard interactive format definition among blockchain systems.



2.3 PoST Consensus Mechanism and PoS Equity Proof

The core technology of block chain is consensus mechanism. The commonly used consensus mechanisms at present are PoW (Proof-Of-Work, workload proof), PoS (Proof-Of-Stake, proof of interest), DPoS (Deleted-Proof-Stake, proof of delegation interest), PoC (Proof-of-Contribution, proof of contribution).

Many digital currencies based on GPU and FPGA mining, such as ETH、GRIN, have always been difficult to become the choice of the mainstream because of the high price, and the digital currency of the PoS mode can not bear the heavy responsibility of anchoring real world assets, and it is difficult to introduce more funds into the digital currency field. So blockchain 5.0 hopes that miners and new entrants will get digital money through hard disk mining, the purpose of which is to let more new users get digital money through lower barriers to participate in mining, and thus enter the digital money market. A major problem in PoW is the power consumption.



This means that bitcoin emits 2000 tons of carbon dioxide a year, which is irreversible and can not be ignored for the environment, climate and sustainable development of human civilization in the future. from another metaphorical point of view, the bitcoin P2P network is basically a distributed super ai that is turning all the energy (i.e., matter) of the universe into bitcoin. Bitcoin's PoW consensus mechanism has no tricks. SHA-256 algorithm has no alternative to brute force cracking. And that means that the cooling fan needs CPU be switched to superheat and superheat without stopping. A carrier processor.



In the era of blockchain 5.0, the consensus is developing towards not wasting resources, giving due consideration to security, improving throughput and concurrency.

There are two kinds of proof in the TITAN, PoST super spatiotemporal proof (IPFS upgrade) PoS equity proof, to reflect the immediate state of the miners and the value they have created.

PoST super spatiotemporal proof is an upgraded version of the consensus mechanism adopted by the Filecoin project, using this amount of data as proof of the magnitude of the computational power. IPFS team develops the project in a highly modular way, building blocks. The protocol lab team was created in 2015 and has been working on these three modules for 17 years IPLD、LibP2P、Multiformats serving the IPFS floor.

From IPFS genealogical diagram, you can intuitively find that the seemingly complex protocol architecture, in fact, each layer of implementation is bound under the corresponding module, reasonable order.



Mutiformats is a collection of hash encryption algorithms and self-description methods (from the value can know how the value is generated), it has six mainstream encryption methods, such as SHA1\SHA256\SHA512\Blake3B, to encrypt and describe nodeID and the generation of fingerprint data.

The diagram shows a central box containing a list of components under the heading 'Mutiformats' and a detailed description of its purpose. To the right, three numbered circles explain its features: 1. It's a collection of hash algorithms and self-description methods. 2. It includes mainstream encryption methods like SHA1, SHA256, SHA512, and Blake3B. 3. It's used for encrypting and describing nodeID and generating fingerprint data.

► Mutiformats

multiformats - self describing values
protocol agility, interop, avoid lock in

multihash - cryptographic hashes
multiaddr - network addresses
multibase - base encodings
multicodec - serialization codecs
multistream - stream wire protocols
multikey - cryptographic keys and artifacts

① Mutiformats是一系列hash加密算法和自描述方式的集合

② 它具有SHA1\SHA256\SHA512\Blake3B等加密方式

③ 用以加密和描述nodeID以及指纹数据的生成。

libp2p is a modular, point-to-point network library. With powerful browser support, it can work entirely on browsers, or through protocols such as WebSockets and WebRTC, and is considered to be the core of IPFS core. With Quic and Tor transport protocols, GO、JavaScript and Rust languages, various transport layer protocols, as well as complex network



devices, it can help developers quickly build an available network layer, fast and cost-effective, which is why IPFS technology is widely used in many blocks why the chain project is favored.



PoS, in the PoW mechanism, because it often costs a lot of electricity and time to find eligible nonce, in order for each Block to be generated faster, the PoS mechanism removes the search process and then uses the following faster algorithms:

$$H(H(B_{prev}), A, t) \leq \text{balance}(A)m$$



H is still a hash function t a UTC timestamp B_{prev} referring to the balance of an account A by the previous block (A) that still represents a number that is considered defined.

To the left of the equation, the only parameter that can be continuously adjusted is t , the right of the equation is m a certain fixed real number. therefore, the greater the balance (a), the greater the probability of finding a reasonable t . There are generally limits to the range of t in the network, such as the time stamp that can be tried can not exceed the standard time stamp for 1 hour, that is, a node can try 7200 times to find a qualified t , can be abandoned if it can not be found. As a result, the more balance an account has in the PoS, the easier it is to discover the next block at the same computational power.

The retrieval and distribution based on PoS mechanism proves that under the premise of PoST consensus, the PoS mechanism is adopted as the consensus mechanism of distribution, which perfectly avoids the direct contradiction between equipment efficiency and resource allocation, and greatly improves the mining mode in the era of block chain 5.0.



PoS algorithm operates by stakeholders (stakeholders), i.e. holders of certificates, miners vote, through the election process to select TITAN super nodes (TITAN Super Node), and then blocks of super nodes will be determined randomly scattered (pseudo-randomly), in the specified time TITAN the super node can choose whether to block out. The TITAN is based on the principle of PoS longest chain (longest-chain rule), which means that the chain with the largest number of miners will grow faster than the others in the same time, that is, if there are two chains, the chain that grows faster will eventually grow to the longest chain. Traditional PoS algorithms, like PoW, follow the principle of the longest chain, under which all the remaining nodes are left as long as anyone produces a reasonable longest chain at a time will switch to this chain. The advantage of PoS over PoC is that its efficiency in reaching consensus has been greatly improved, while the irreversible guarantees offered are similar. Efficiency is greatly improved because it is no longer agreed by the whole network, but by the elected producers, which is more important for the application, because users can not bear to wait for a long



time for similar high-frequency scenarios and small cases. TITAN choose PoS, tend to choose speed and efficiency. Certificate of Distribution PoDT (Proof-of-Distribution) is a new type of proof. This is a scheme which reduces the difficulty of implementation properly, without constructing complex mechanism to prevent attack difficult problem, and only need to prove the frequency and usage of data distribution, can be combined with mining system to form a complete scheme.





Also as a storage consensus cPoC, cPoC conditional capacity has proved to have its own advantages, that is, mining more energy-efficient, more economical, more environmentally friendly. Using hard disk mining based on PoC consensus mechanism, compared with traditional ASIC mining machine, it has the characteristics of high preservation and recovery of hard disk equipment, low demand for energy consumption of power resources and low noise, so as to reduce the mining cost of miners, controllable energy consumption and considerable income; reduce the threshold of mining participation. Since hard disk devices are inherently resistant to ASIC, they impact on the pain points of traditional consensus-based mechanisms PoW centralized, monopolized computing power and are lighter and lighter Economic, greener blockchain spirit optimises decentralization and trusted value return, providing more possibilities and feasibility for the "national mining" vision-but from another point of view, the treasure stored PoC the ecology, the hash value of the mine, can not be used by any entity. That



is, on the IPFS side, the process by which miners store data, by initiating a challenge, to let miners prove the true storage of data, is to PoST the storage proof mechanism. Consumers store valuable data while mining, rather than meaningless random data, like PoC.

As a result, we can use the world's huge free hard disk storage space to establish a blockchain-based data storage, retrieval, exchange, sharing environment, and then provide data sources for big data, AI, privacy computing, multi-party computing and so on.

For one thing, when the storage market develops with a good incentive cycle system, such as I hand over a valuable File to miners for storage, miners can not only get economic incentives, but also get commission for authorized downloads during my exchange and sharing of data. On the other hand, it provides efficient data storage, retrieval, exchange and sharing solutions for the whole data storage market.



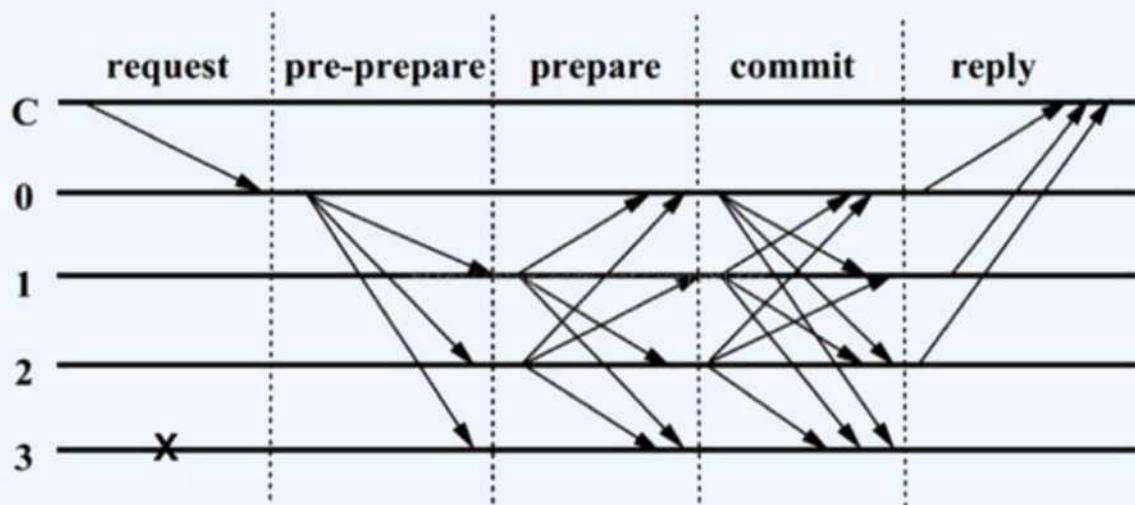
TITAN believe that the future block chain must be based on landing applications, for value services, if only innovation does not do the application is only a passing cloud, PoST storage proof mechanism under the mining dividend these will be verified.



2.4 Optimal selection of fault-tolerant mechanism

1 Byzantine Fault-tolerant Algorithm

The guarantee of PBFT algorithm consistency is mainly divided into three stages based on the byzantine general problem: pre-approval (pre-prepare), preparation (prepare) and confirmation (commit). The process is shown below:





Let's first explain the meaning of the above symbols:

C represents the client;

0,1,2,3 denotes four nodes;

Here the primary node ,1,2,3 is the slave node ;(Note that the other nodes here can also be the primary node, and if 0 error occurs, it can only be monitored by the server. If the server can not complete the request of the client in a period of time, it will trigger the view replacement protocol, change the other nodes to the main node)3 as the fault node;

Below, let's go through the PBFT steps with the image above:

The Request: requester C send the request to the primary node, where is the 0 node;

Pre-Prepare: node 0 upon receipt of a C request and spread to 123;

Prepare: 123 node is recorded and broadcast again after receiving ,>023,2-013,3 because the downtime is not broadcast ; (this step is to prevent the main node from sending different requests to different slave nodes);



Commit: 0123 node in the Prepare stage, if received more than a certain number ($2F$, in practical use, F is the number of tolerable Byzantine nodes) of the same request, then into the Commit stage, broadcast the request;

Reply: 0123 node in the Commit phase, if one of them received more than a certain number of ($2F+1$) of the same request, then feedback on the C;

On the basis of the above process, consistency is possible to solve in the case of $N \geq 3F+1$, N as the total computing technique, and F as the total number of computers with problems.

Here's an example PBFT(a practical Byzantine fault-tolerant algorithm).

We assume that $N=4$, $FN=1$, i.e., there are four nodes, one of which is bad. we also use the figure above, that is, node 3 is the fault node.

1 C the requester sends the request to the 0 node, assuming that the request is "1";



2 After receiving the C request, node 0 broadcasts the request content "1" to node 123;

3 After nodes 1,2,3 receive the content "1", broadcast again, node 1->023, node 2-013, node 3 can not broadcast because of downtime;

4 Node 0,1,2 will receive three request content "1", each more than two, so node 0,1,2 will broadcast the request content "1" separately;

5 At this point, if a node (either of 0,1,2) receives 3, 1) commit message, that is, feedback on the C.

2 PoS Staking Consensus

PoS algorithm is similar to property stored in a bank, and this model will allocate interest to you according to the amount and time you hold digital currency.

Simply put, it is a system that gives you interest based on the amount and time you hold money. under the equity proof PoS



mode, there is a noun called coin age, each coin produces 1 coin age per day, such as you hold 100 coins, a total of 30 days, then, at this time your coin age is 3000, and at this time, if you find a PoS block, your coin age will be emptied to 0. For every 365-year-old you are emptied, you will receive interest on 0.05 coins from the block (assuming interest is understood as 5% per annum), so in this case $\text{interest} = 3000 * 5\% / 365 = 0.41$ coins, which is good for users: holding money has interest.

However, once the interest in a coin is used to sign a block, the coin age will be cleared to zero, so it must wait at least 30 days to sign another block. at the same time, in order to prevent very old or very large nodes from controlling the block chain, the maximum probability of finding the next block reaches its maximum after 90 days. this process protects the network and gradually generates new tokens over time without consuming a lot of computing power.

A simple PoS or Byzantine fault tolerance has its own requirements.



The evidence algorithm allows the verifier to "vote" on a block by sending one or more types of signature messages and specifies two rules:

Final condition - determine when given hash can be identified as the final rule.

Reduction conditions – rules that determine when a validator can be considered to have unquestioned misconduct (e.g. voting multiple conflict blocks at the same time). If the verifier triggers one of these rules, its entire deposit will be deleted.

To illustrate the different forms that reduction conditions can take, we will give examples of two reduction conditions (in the following , "2/3 of all confirmers "is a shorthand of "2/3 of all confirmers deposited in coin weighted "), and for other scores and percentages). in these examples , " PREPARE" and "COMMIT" should be understood as simply referring to two types of messages that the verifier can send.

1 the validator is cut if the MESSAGES contains messages in the same view form [" COMMIT",HASH1,view] and ["], but



different HASH1 and HASH2 signed by the same validator.

2 if the MESSAGES contains a message in the form of ["COMMIT",HASH,view1], unless view1=-1, or for some specific view2 there is a message in the form of ["], where the view2view1=view1, is signed by 2/3 of all validators, then the submitted validator is cut.

There are two important requirements for a set of suitable reduction conditions:

Responsible security – if conflicting HASH1 and HASH2 (i.e., different HASH1 and not descendants of the other) are finalized, at least one third of the verifier must have violated some reduction conditions.

Specious life - unless at least one-third of all validators violate some reduction conditions, there is

A set of messages that a verifier can generate, and finally determine some value. If we have a set of cut conditions that satisfy both attributes, then we can motivate participants to send messages and start benefiting from the end of the economy.



2.5 TITAN motivation mechanism

The blockchain industry is still in its quite early stage, and the existing landing applications are mainly divided into the following two directions: the new business model that is very matched with the blockchain technology, and the transformation of the existing centralized business to realize the blockchain enabling.

The market is too eager for blockchain applications to land, and wants to achieve all the technical features of blockchain in one step. The status quo is that the underlying decentralized public chain can not be common to all industries, and the smart contract is too simple to support complex business scenarios.

Lack of underlying platform, imperfect performance and insufficient compatibility lead to the development of the application layer of block chain is still early. Most of the business scenarios combined with the block chain are still in the exploration period. The characteristics of the natural adaptation block chain in the financial field make payment liquidation have



entered a high-speed development period, while social, traceability and so on are still in the market start-up period. With the rapid development of the underlying platform, a large number of vertical industry applications will quickly pass the trough and usher in high-speed development.

1 A decentralized approach to building trust

Blockchains provide a trust solution based on decentralization in many non-strong central value exchange networks, and thus derive many new business models that are different from classical internet, such as cross-border payment, supply chain finance, storage, traceability, etc. All scenarios are based on their business scenarios and business logic with a natural high degree of matching with blockchain technology, requiring self-confident, efficient, decentralized cross-master collaboration, data traceability and non-tampering.

$$\int \frac{dx}{\cos^2 x} = \int \sec^2 x dx = \operatorname{tg} x + C$$

$$\int \frac{dx}{\sin^2 x} = \int \csc^2 x dx = -\operatorname{ctg} x + C$$



We analyze PoW, DPoS and other models in the process of exploring the incentive mechanism. in combination with lagrange mean value theorem, we find the preview premise of TTC closed-loop ecological incentive model.

$$f(b) - f(a) = f'(\xi)(b - a)$$

2 Centralized business transformation

In some of the existing business scenarios, the centralization business works well, and the use of blockchains does not provide some of the worse infrastructure before revamping, it provides another enabling, i.e., the economic incentive mechanism of the pass certificate.

The TITAN network, TTC as a pass card in the TITAN blockchain system, can be used as an economic incentive mechanism to measure the behavior, information, value, data and so on in the original scene. TTC can circulate quickly, have a clear price, and there will be the potential for appreciation, which will form a strong incentive for users.



At present, most of the applications that can land are block-chain-based non-tampering, smart contracts, incentives, workload to prove that one or more of the technical characteristics to solve the specific pain point of the business, can achieve multiple technology superposition is among the best, but how to understand these technical characteristics and can be well integrated with the business is also the biggest difficulty encountered by many projects at present.





2.6 A primary approach to TITAN systems

2.6.1 Performance enhancement

TITAN core principle is to use mature and efficient technology to solve practical technical problems. we focus more on how to provide a reliable configuration that can run business applications stably than the concept of "optimizing" blockchain.

Here are some ideas that have been explored today:

most of the blockchain sharding (sharding) schemes are by dividing a separate consensus into a xu sub-consensus. Basically, the consensus as a whole is separated into sub-cognition groups that are more vulnerable to attack. one can also complicate routing paths by increasing randomness, but this also limits the specialization of mining nodes.

As more pools use specialized accounting systems to replace PoW mining nodes, the number of these nodes decreases dramatically. These pools can ensure mining efficiency and instant broadcast of transactions, slow down the bifurcation of



the block chain, but also ensure the stability of the system. Drawing on the experience of the IT industry, the mine has abandoned official software, instead pooling computing power through load balancing and running smart contracts in parallel, and deploying nodes globally to improve broadcast efficiency. However, the efficiency of the mine pool is limited by the technical differences used in the mine pool, and by the equivalent design of each node and the protocol itself. So upgrade a node doesn't bring the whole network up.

TITAN logic is:

The nodes in the TITAN are classified according to different functions, so that the nodes running on the cluster to provide standard services open source, and through PoS to achieve consensus on the main chain. the commissioned mining node can protect the side chain to the maximum extent and also share the strong consensus of the main chain. this method increases the pressure of each node, but the efficiency will be improved with



the addition of more side chains because the commissioned mining nodes can run on the cluster. the side chains are independent of each other, so each additional side chain increases the efficiency of the whole system, and the efficiency of each side chain is also improved by parallel processing.

2.6.2 Resource isolation

Protect the smart contract from unnecessary interference and maintain its stable operation on the block chain, TITAN abandoned the "one chain governance all" scheme and designed a public chain that can guarantee the normal operation of each contract.

For historical reasons, the existing blockchain governance structure is usually not well defined at the beginning, resulting in more prominent problems when there are functional updates or Bug leading to system errors. Bitcoin, for example, stagnated for two years on scalability issues and eventually opted for a fork;



differences between the etheric community and foundations over Dao accidents led to the birth of ETC.

TITAN vision is to achieve computing platforms like AWS, no business will be disturbed by other business, such as futures market transactions will not be disturbed by black friday traffic. however, this seemingly impossible interference is common in the blockchain world. so we believe that it is the initial design of the blockchain that hinders the application of blockchain technology in real-world scenarios.



3

TITAN technology architecture



The main chain of TITAN is a distributed ledger with a TITAS architecture. TITAN make information and trust in the system better distributed and distributed among stakeholders through the coordination of data. Encrypt the internal incentive layer of the economy so that different stakeholders and users can ensure the effective operation of the ecology based on economic incentives. Through the integration of digital assets, ecological integration into the digital commodity economy. At the same time by the TITAN improved intelligent contract programming language, and database virtual machine. By optimizing the optimal computing power of the whole network, the TITAN common chain has obtained extremely high scalability and extremely fast processing speed, and is currently being tested. The real available TPS in the environment is +200,000. the gas consumption is extremely low in the TITAN blockchain ecology, and the underlying architecture is superior to all the public chains in the industry and is more suitable for commercial applications.

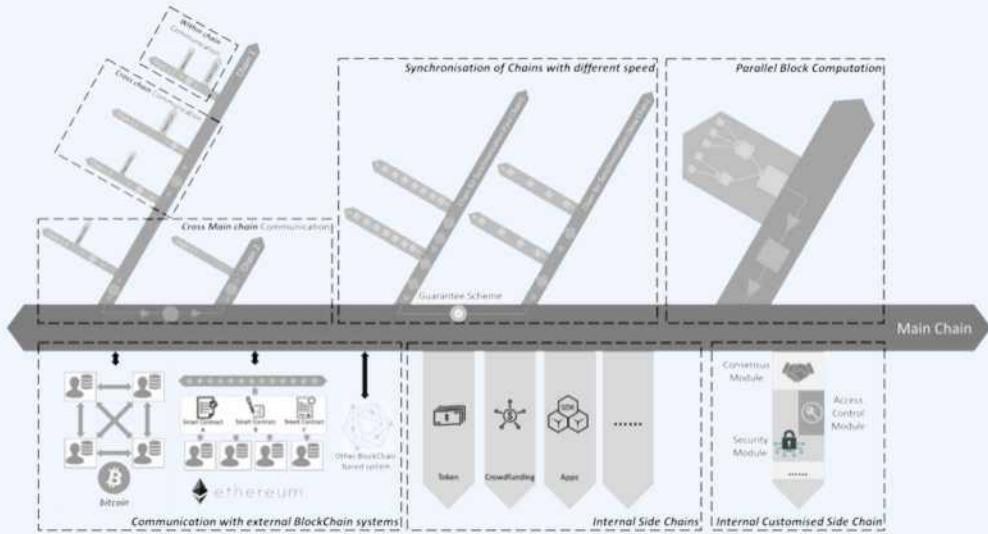


A New and Ecologically Intelligent Contract Architecture

TITAN using a distributed ledger with a TTC architecture and a virtual machine with database functionality, anyone can write databases and publish smart contracts and DApp, so they can set rules for data ownership, data transaction formats, and data value conversion in their own projects.



TITAN technology architecture



TITAN system architecture

For example, in an experimental project, multiple laboratories may be required to work together, and each laboratory may have the experimental data used are shared in the same database, and the number of pass cards available to the contributors is established, and the data users need to pay pass cards, and the analysis results obtained by the data users can be re-shared to obtain pass cards. When the collaborators make mutual agreement for the economic value of the card, the card can be used as the carrier of the data value. Only when the right person really uses the data itself, and defines the rules of storage carrier and transfer, the data value can be truly reflected.



A peer-to-peer network topology

Equivalent to subverting the distribution relationship represented by the HTTP. TITAN the upgraded network topology has the characteristics of content addressability, a unique hash identity through file content, which saves the cost of space overhead to some extent.

Core network

LibT2T based on libp2p optimization can support arbitrary transport layer protocols. NAT technology enables devices in the TITAN network layer to share the same external network IP, so that the devices and firmware inside the network can achieve higher information interaction rate and credibility.

The generation of peer-to-peer identity information and routing rules are formulated by protocol generation. The essence Hash this is to build a distributed and loose table, which is abbreviated THT, every person who joins this THT network must generate their own identity information.



TITAN technology architecture



TITAN key logic of the underlying architecture is implemented using smart contracts, core data is also written to block chains using smart contracts, and content data is stored in internal nodes.

Upper layer of the block chain is the TITAN Node node, which is used to run decentralized crawler, call external services, and perform complex operations and other functions. TITAN



Node direct and blockchain connection, call smart contract to complete key operations and data writing and verification. For example, TITAN Node can connect with "original" services, complete high-precision proof of existence and electronic forensics and other functions and ensure its legal effectiveness. TITAN Node will also provide Restful API for all clients to call and provide distributed data caching, indexing and other functions Accelerate client access.

The upper layer of the TITAN Node is the client that the user directly uses, including the Android of the TITAN and the iOS mobile phone client, the PC browser plug-in and so on. With the exception of TITAN clients, any institution or individual (the public number App、 the three parties, the platform website and the internal system of the enterprise, etc.) can join the TITAN ecosystem to the TITAN Node.

3.1 TITAN consensus mechanisms

3.1.1 Original PoST Hypertime Proof PoS Equity Proof

Titan chain adopts PoST super spatiotemporal proof PoS equity proof consensus mechanism to creatively combine the two while taking into account the overall performance and consensus efficiency. TITAN chain fixation produces a new block every 0.5 seconds, with 0.3 TITAN pass-certification TTC. in each block. The latest version of the TITAN chain main network has proved that the trading capacity of the TITAN chain reaches the mean value of 1,000,000 TPS and the peak value of 7,500,000 TPS. when the side chain synchronously.

The TITAN PoST hyperspace-time proof is an upgraded version of the consensus mechanism adopted by the Filecoin project, using this amount of data as proof of the calculation force size. TITAN by introducing a nonlinear proof function, a small part of active time and idle time are defined on a given block, thus solving some major defects in the current pile-core.



model. idle time is defined as the age ratio that begins to decrease consensus distribution without supporting consensus distribution anymore. This quantified idle time is unique to each equity because it reduces the probability of satisfying proof and affects availability through consensus the proportion of the maturing equity of.

The retrieval and distribution proof based on PoS equity proof mechanism TTC under the premise of PoST consensus, the PoS mechanism is used as the consensus mechanism of distribution. in this set of systems, all participants become administrators and participants of the TITAN chain, perfectly avoiding the direct contradiction between equipment efficiency and resource allocation, and greatly improving the mining mode of the block chain 5.0 era. The TITAN PoS equity certification mechanism does not need to consume electricity to operate, but to obtain the right to package blocks by mortgage TTC. When a transaction occurs, the system rewards the nodes of the packaged blocks and the validation blocks, A source of reward is an additional or unlocked TTC.



PoST super spatio-temporal proof mechanism PoS equity proof mechanism solve the problems of low transaction efficiency and low security in the blockchain industry at present. at the same time, combined with zero knowledge proof technology, TITAN solve the "impossible triangle" problem of blockchain that needs to be solved urgently in the industry as far as possible.

3.1.2 Selection of Consensus Mechanism

Proof of interest must use some method to define the next legal block in any block chain, and selection based on account balance will lead to centralization, for example, a single richest member may have a long-term advantage. To this end, TITAN designed the original PoST PoS method to select the next legal block.

In PoST, we consider two different "spendable" resources: one is CPU work (i.e., as described in previous workload proofs) and the other is "space-time ": filling a specified amount of storage in a specified time period (during which time can not be



used for any other purpose); we consider space-time to be a "correct" "space-based simulation of work (which is a measure of power over time), which, like work, can be directly converted to cost. We build a variant of PoST; workload proof based on incompressible workload proof (PoW) and we can reduce the workload proof itself required storage space. we present two simple candidate constructs based on standard "hashing primitives" PoW and storing part of a single hash output. our protocols and proofs are very different from the techniques used in existing spatial proofs and are easy to implement. (We note that, despite its extremely simple structure, proving its security is not easy.)

Different parameter systems. compared to the existing PoS constructs, we consider the time between the initialization and proof phases to be weeks rather than minutes (for example, this enables an encrypted currency in which the "miner" can completely power off within weeks). time). can be considered as a complement to the existing PoS constructs for different parametric regimes. on the one hand, the proof phase of our



PoST protocol is less efficient (it requires access to the entire storage, so proof may take a few minutes rather than seconds, as in the case of agitating-based constructs. That means it's not very good for two validations A short time. on the other hand – unlike the existing PoS structure – the computational difficulty of our initialization phase can be adjusted independently of the amount of space, so it can be used to demonstrate a reasonable storage size for long periods (e.g. weeks or months). within this parameter range, a few minutes of proof is reasonable.





Units and symbols

Our basic units of measure are CPU throughput, space, and time. These can correspond to units of any real world (e.g., 230 hash calculations per minute, 1 GB and 1 minute, respectively). We define the remaining units according to the basic concepts:

- **Work:** CPU_xtime; CPU workload units consumed (e.g., 230 hash calculations).
- **Spacetime:** spacetime; space units "reserved" in one time unit (and can not be used in any other space during that time period).

In our definition, especially when talking about the behavior of a rational opponent, we want to measure the total cost of the reference, independent of the type of resources consumed. To do this, we need to specify the conversion rate between working time and spacetime:

Actual cost we define the y as per space-time cost ratio at actual prices. That is, in the real world, the cost of a space-time unit is as high as y work unit (the value of the y may vary over



time and depends on the relative actual cost of storage space and processing capacity).

We define the corresponding cost function, that is, the actual cost of the PoST is the standardized cost in the work unit: the actual cost of using y space-time units and x work units is $c = y \cdot a + x$.

PoST scheme consists of two stages, each of which is the interaction protocol between the proband $P=(P_{init}, P_{exec})$ and the proband verifier $V=(V_{init}, V_{exec})$. (We remove init and exec subscripts from the context for simplicity. both parties have access to the random prophetic machine H (work).

Both parties receive a id string $id \in \{0,1\}^*$ as input during the initialization phase. at the end of this phase, the certifier and verifier output state strings ($\sigma P \in \{0,1\}^*$ and $\sigma V \sigma P \in \{0,1\}^*$)

$$(\sigma P, \sigma V) \leftarrow DPH \text{ (work)} \text{ init } (id), VH \text{ (work)} \text{ init } (id) E$$



Both parties receive ID and their corresponding states from the initialization phase during the execution phase. at the end of... at this stage, the verifier accepts or rejects ($\text{outV} \in \{0,1\}$, where 1 is interpreted as "accepted"). The proof does not output:

$$(\cdot, \text{outV}) \leftarrow \text{DPH}(\text{work}) \text{ exec } (\text{id}, \sigma P), \text{ VH}(\text{work}) \text{ exec}(\text{id}, \sigma V) E$$

The execution phase can be repeated many times without having to rerun the initialization phase. This is critical because the initialization phase requires work and the execution phase is very energy efficient. As a result, although the implementation of a single PoST has no advantage over workload proof, the amortization work performed per execution can be arbitrarily reduced.

Honest initialization work (w) performs the same expected work in initialization. this should be "reconcilable" to ensure that the storage output is still a reasonable choice, rather than recalculating changes in the spati spatio-temporal work cost ratio result in initialization.



If the cost of the initialization phase is too low, the adversary can generate the certifier cheaply than the honest one by deleting all data after initialization and then re-running the initialization before the proof phase. in this case, the adversary will not store any data between stages and therefore will not pay any spatiotemporal costs. We formalize this as a rational attack. note that this is a generic attack and also applies to PoS scheme so they must also have a lower limit on the work required for initialization.

$$\Pr \left[out_V = 1 : (\sigma_P, \sigma_V) \leftarrow \left\langle P_{\text{init}}^{H(\text{work})}(id), V_{\text{init}}^{H(\text{work})}(id) \right\rangle, \right. \\ \left. (\cdot, out_V) \leftarrow \left\langle P_{\text{exec}}^{H(\text{work})}(id, \sigma_P), V_{\text{exec}}^{H(\text{work})}(id, \sigma_V) \right\rangle \right] \geq \eta$$

The quantitative results show that the combination of PoST and PoS will bring higher encryption properties, full-chain retrieval efficiency and block-out mode to TITAN chain.



3.1.3 The advantages of PoST PoS mechanisms over simple PoW and PoS

There are incomparable advantages in TITAN hybrid PoST super spatio-temporal proof mechanism PoS equity proof mechanism compared with traditional old public chain simple PoW or simple PoS mechanism.

First, on the energy consumption level, the PoS equity proof mechanism does not need to consume electricity to carry on the operation, compared with the old generation PoW, can save the energy consumption greatly.

PoS opens the door to the use of broader techniques designed by game-theoretic mechanisms to effectively block the formation of centralized monopolies and, if they take shape, to prevent acts that damage networks (such as selfish mining in PoW). in PoS-based public chains (e.g., Casper implementations to be rolled out by ethernet), a group of validators take turns proposing and voting on the next block, and the weight of voting rights for each validator depends on their deposit (i.e., equity) size.



The significant advantages of the TITAN PoS equity certification mechanism over the PoW mechanism include higher security, faster transaction processing, reduced centralization risk, and more energy saving.

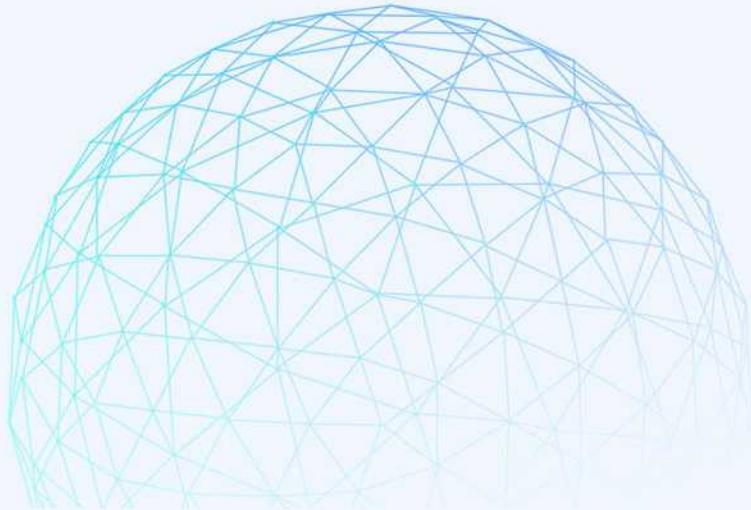
On the other hand, PoST hyperspace-time proof can make up for the deficiency of simple PoS mechanism. The first PoST also does not consume energy, and the second is the difference between PoST and PoS: the PoS is to reach a consensus through the method of mining the number of coins age, which is improved PoST the proportion effectively stored in the whole network is used as the basis for obtaining block rights.



3.2 TITAN side-chain technology

The side chain protocol is essentially a cross-block chain solution, which can maximize the expansion of the public chain and make the face ecology stronger and stronger on the road of vigorous development. Through this solution, the transfer of digital assets from the first block chain to the second block chain can be realized, and it can be safely returned from the second block chain to the first block chain at a later time point. The first block chain is usually called the main block chain or the main chain, and every two block chains are called the side chain. TITAN side chain implementation technology is based on two-way anchoring, through the two-way anchoring technology can achieve temporary locking of digital assets in the main chain. When the equivalent digital assets are locked in the side chain, the primary digital assets can be released.

With the TITAN side chain, miners and each node transfer users can add new functions such as transaction privacy protection technology, intelligent contract and so on on the

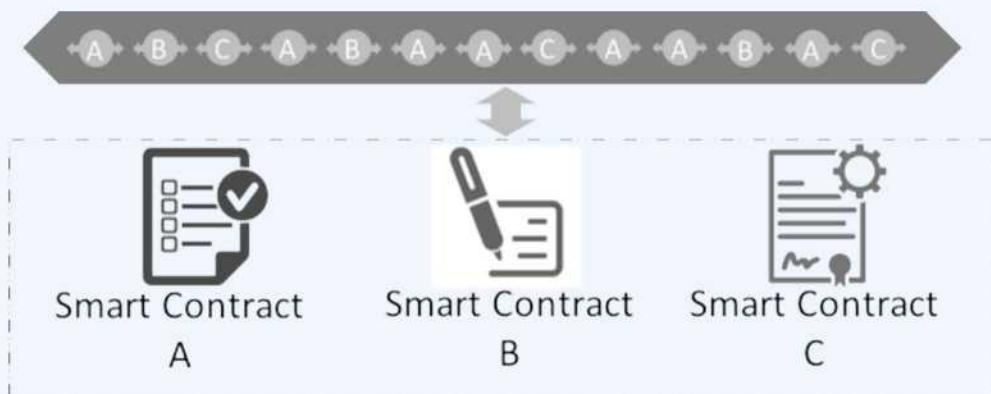


basis of TITAN the main chain, at the same time, they can let users access a large number of new services, and do not affect the work of the existing main chain. the side chain also provides a safer protocol upgrade mode, enabling applications in TITAN ecology, such as on-chain trading systems, TITAN mall, TITAN pan-entertainment plates to operate more efficiently and independently, while carrying the value carrying through the main chain and each side chain through the TITAN card TTC.



3.2.1 One chain one contract

Different from the traditional "one chain of all contracts", TITAN puts forward the "one chain one contract" structure. As shown in the following figure, each chain deals exclusively with one type of transaction and solves one type of business problem. This makes the entire architecture and data simpler and more business-friendly. By adding side chains to the TITAN, TITAN expand more functionality while maintaining an easy-to-maintain architecture.



Multiple contracts, one chain



One chain one contract
Complex data structure of Blockchain

3.2.2 Side chain dynamic index

TITAN is a dynamic system with all side chains attached to the main chain. the main chain contains the index of the system boundary (the side chain of the record mount). The chain interacts with the chain through the Merkle Tree of the main chain and the input verification of the external message, rather than directly, so that the side chain can be easily added or deleted in the TITAN system.



3.2.3 Tree side chain extension

As shown in the following figure, TITAN defines a "main-side chain architecture ". In theory, any side chain can be connected to some of the sub-chains under it and become the "main chain" of that part. As a result, the system has a hierarchical structure that enables TITAN to extend both horizontally and vertically. This idea is similar to the sub-library and sub-table in the database architecture. Each subtable performs specialized functions, and when a single table is too large to manage, it is further divided into multiple tables. and in the TITAN, this corresponds to the side chain.

3.2.4 Side chain index system

A side chain index system connects all TITAN chains in the ecosystem. TITAN Index:

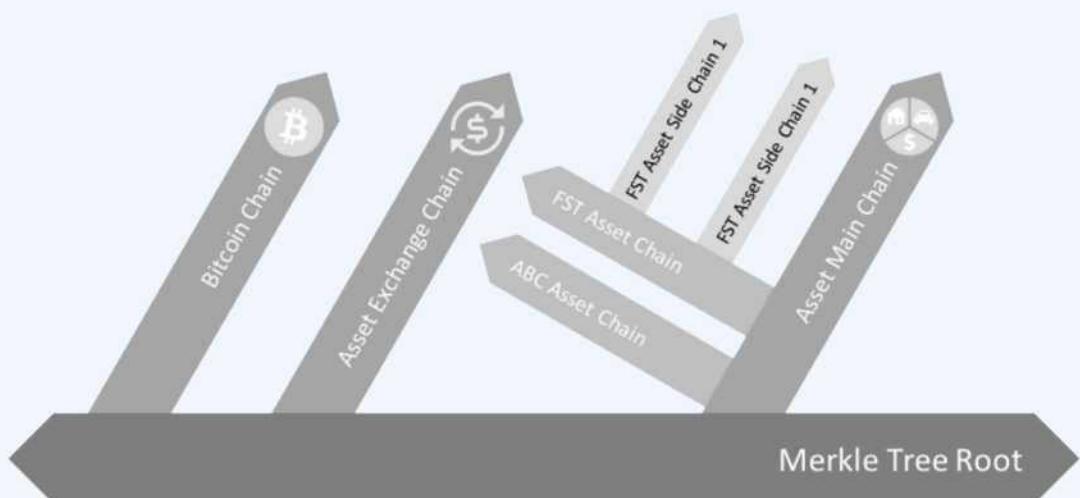
An important external chain used to expand TITAN boundaries, such as Bitcoin, Ethereum;



The internal side chain running under TITANOS, using TITAN tokens to contribute to the entire TITAN system.

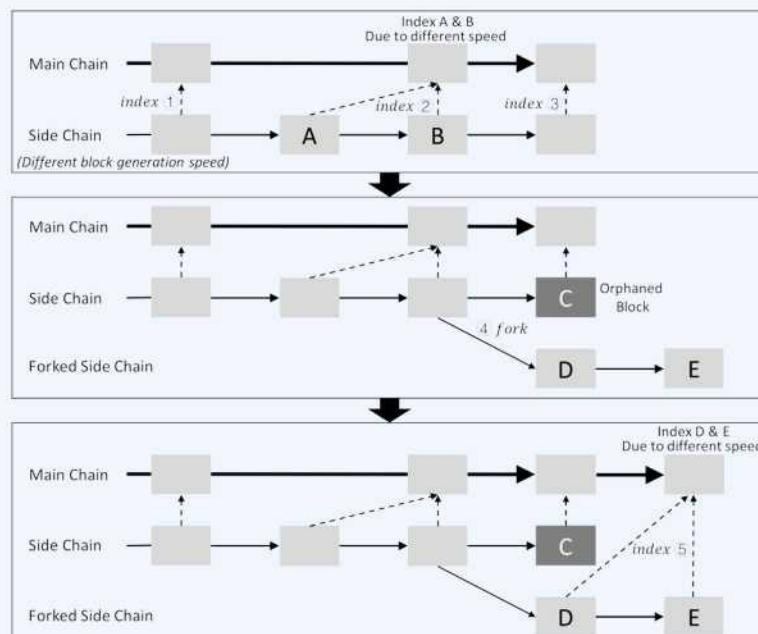
A primary chain node reads information from the side chain and generates a Merkle Tree;

The block header record of the new block Merkle Tree Root, if we want to verify the transaction BTC the 1000th block TX1, we only need to prove the existence of the Merkle Tree Root of the 1000th block through the Merkle Tree Root, of the main chain and prove the existence of the TX1 based on this (BTC the 1000th block) and the attached message. And this method is also used in other chains such as ethernet, as long as the blocks are based on Merkle Tree. organized in the form of.





Another key issue is the timing of the side chain being indexed by the main chain. If the main chain frequently indexes a side chain that is likely to diverge, it is a waste of effort in indexing solitary blocks. So we propose different indexing strategies for each chain based on its own characteristics, and these can be predefined in the system. Indexing bitcoin-like systems can take place after a minute of block formation. Because the data prove that blocks can be basically identified as not solitary blocks after a minute of formation. If a side chain is selected for mining with the main chain in the TITAN, the side chain can be indexed in real time because the main side chain is the same group Miner maintenance.



Index timing



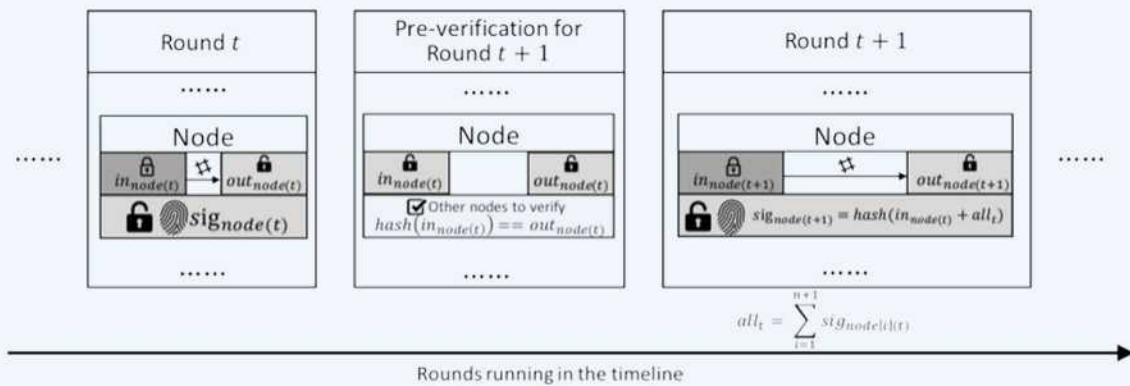
3.3 TITAN cross-chain technology

Based on the blockchain realized by the TITAN module warehouse (the ecological block chain), we can add cross-chain modules through the way of module selection to realize the interworking of the bottom layer and the TITAN. Compared with the old generation of public chains such as ethernet and bitcoin, following the protocol is different from the TITAN public chain, we need to realize the protocol conversion through special mechanism, and adapt the other public chain protocols and TITAN cross-chain protocols to achieve the purpose of unified protocol communication.

All blockchains communicate only with the TITAN main network, and the verification of transactions is the responsibility of the TITAN main network. each parallel chain trusts TITAN the verification results of the main network. Assets on each block chain can flow across the chain to any chain in the TITAN ecology that accepts the transfer of assets from the outer chain at little cost.

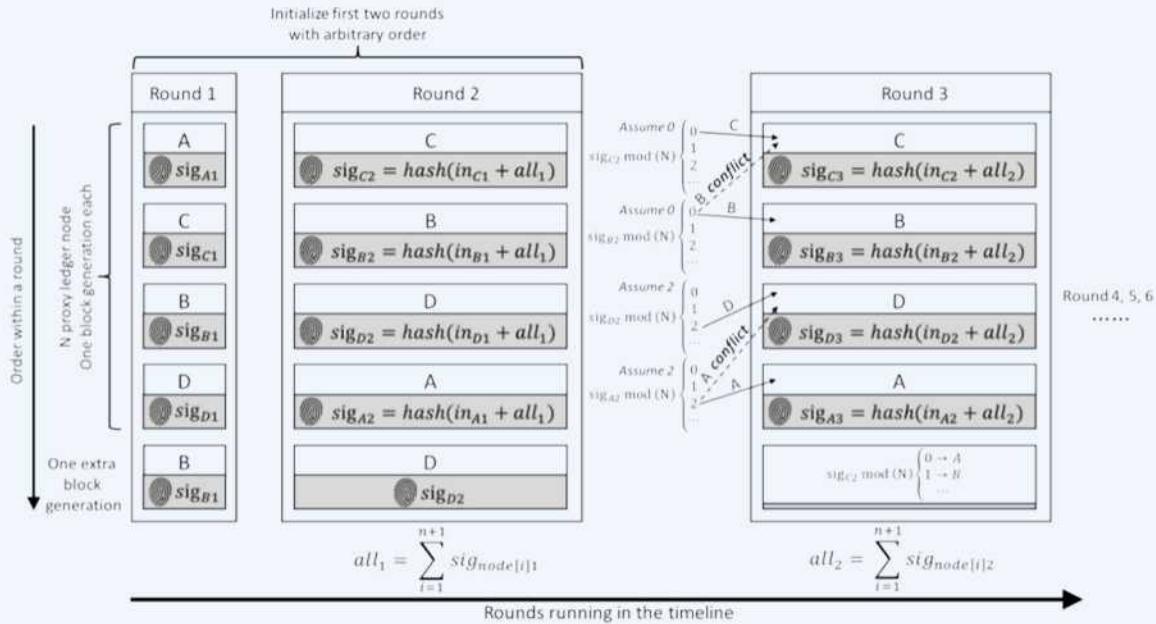


Pre-validation :(t+1) before a node in the wheel begins to produce a block, its state in the t wheel needs to be verified first. innode (t) has been published and outnode (t) can be queried at any time in the t+1 round. So to verify the state of the node in the t wheel, other nodes can verify -- outnode (t), hash (in node (t))
$$\text{signode}(t+1) = \text{hash}(\text{innode}(t)) + \text{allt,all}$$
 where n1,allt =Signode[i](t) is calculated. here, node[i](t) represents this node to handle the i transaction in the ship.



Pre-inspection

Considering the conflict, where the result points to a non-empty position, we point the node to the next vacant position. if the node conflicts with the n position, we look for the available address from scratch.



Details of the first 3 computation rounds

$\text{signode}[0](t)$ is determined by (1) all signatures of the previous $(t-1)$ wheel ;(2) its own in value in $(t-1)$ wheel; and (3) which node generates redundant blocks. so it can only be obtained after the end of the $(t-1)$ wheel. Also, because it requires all the signatures of the previous round, and the in value is also entered separately by each node, it is impossible to control this order. overall, we create a stochastic system that relies on external inputs. Based on the assumption that none of the nodes in each round is aware of the input of all the other nodes, it can be concluded that no one can control sorting.



If a node can not generate blocks at t wheel, it can not enter in value at this round. in values for the previous round will be used in this case. Since all mining nodes are elected reliable nodes, this is not often the case. Even if this happens, the strategy mentioned above is good enough to cope with it.

Each node has only a specific T seconds to process transactions. $T=4$ is a reasonable value in the current network environment, meaning that each node has only 4 seconds to process transactions and submit results to the network. Any delegate node that fails to submit results within 4 seconds is considered to have abandoned the block. if a node fails twice in a row, it gives the node a window period of W hours ($W=2 N$, N is the number of failures).





3.4 TITAN chain sharding technology

TITAN has made major improvements in the etheric compartmentalization technology, the main difference being that the blocks on the TITAN chain are stacked vertically and therefore can run different applications. A first landing application of TITAN technology would be a decentralized exchange compatible with each block chain. TITAN a significant advantage over ethernet's shards is that the state of the entire network is created a copy before each block is produced. As a result of the fragmentation technology, there is a problem with the trade fair between the fragmentation and the fragmentation, and all transactions in the TITAN chain share the same global state, thus eliminating the problem Health. because each block is validated by different groups of validators, consensus is generated for each layer of blocks, TITAN the only limitation on the extensibility of the public chain is the number of validators of currently working pledged tokens.



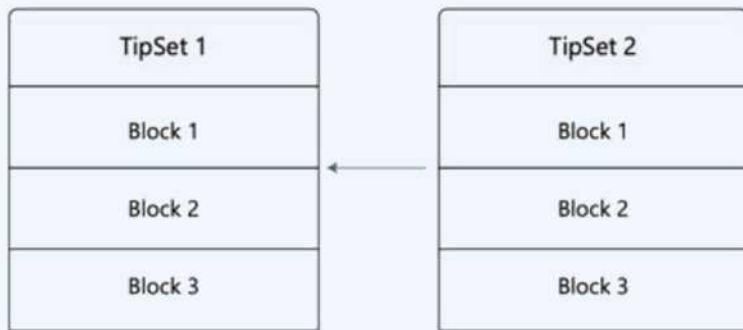
bottom layer of the common chain, sharding technology is TITAN adopted. TITAN design principles are mainly around ease of use, high expansion, stability and development.

Ease of use is to make the components of each system as simple as possible, optimize practicality and comprehensibility, and do not add redundant burdens to the underlying protocol; scalability, with economic rationality, TITAN have no upper limit to support the operation of Web applications that are global in scope; stability is to provide a stable base layer and to conceal the implementation details of underlying technologies as much as possible, allowing developers to use their familiar language and patterns during development and ensuring the platform's security during operation.

Achieving a slice-based block chain is like adding N multiple toll gates to a highway with only one toll station. It will greatly improve the speed of vehicle traffic, the fragmentation technology brings great differences, and can significantly improve the speed of block chain transactions.



Different from the current majority of mainstream use of beacon chain plus chip chain structure, TITAN use a single chain structure. A chain consists of a chain of TipSet arranged sequentially. TipSet consists of Block, a slice corresponding to a Block.. each TipSet will contain multiple Block information. TipSet do not contain transaction information, transactions are stored in the Block, all transactions in the network are divided into pieces and packaged into the Block.

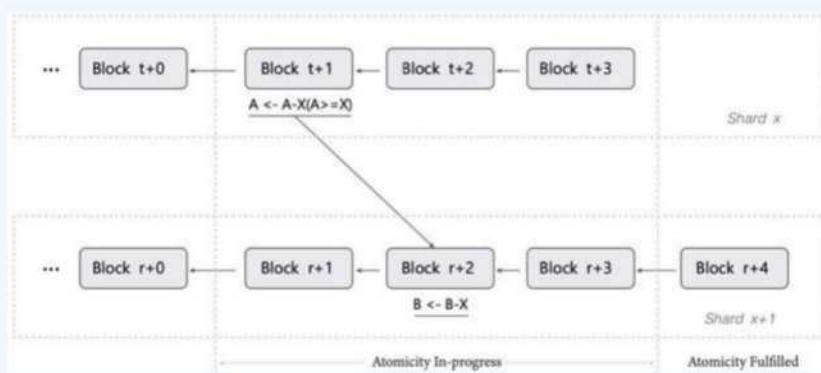


In the PBFT protocol, it is obviously unrealistic to let so many validators each block participate in the verification because considering that TITAN validators can reach up to 100,000. To do this, we use a deterministic gadget, like Ethernet 2.0, that uses proof to determine blocks. to reduce system complexity, we use deterministic tools that in any case will not



affect the bifurcation selection rules but only introduce additional penalty conditions. As a result, once a block is determined by a deterministic tool, it is not possible to fork out unless a significant percentage of the total equity is forfeited. TITAN Protocol deterministic gadgets refer to Solana PoH design.

The TITAN uses a PoS consensus mechanism, which means that the outlier and the verifier lock a certain number of tokens for a period of time. each collector and verifier is not forced to be an independent entity in the TITAN, but each collector and verifier requires a separate pledge. All collectors and verifiers work together to build a single blockchain, which we call Msternode Chain, the main chain. The accounts of the main chain are divided into sections. Each collector and verifier only downloads a subset of the state corresponding to a slice locally at any time, and only processes and validates transactions that affect this portion of the state.





3.5 TITAN chain storage technology

3.5.1 Design objectives TITAN found in data storage value

A decentralized system for data value management storage. TITAN upgrade the IPFS, implement the encryption mechanism and authorization mechanism to the file, use the unique "encryption after the de-heavy" technology to ensure that encryption does not increase the system storage costs, and increase the computational power addition mechanism, which can not only be used to save private files of individuals or enterprises, so as to truly replace the http protocol, but also from the IPFS "storage network" to "storage encryption computing network ", thus has a complete infrastructure capability, both application scenarios and business models have unlimited. The space for development.



3.5.2 TITAN proposed technical solutions

TITAN the following technical and innovative solutions after multi-party analysis to achieve TITAN design objectives.

TITAN using a distributed ledger with a TTC architecture and a virtual machine with database functionality, anyone can write databases and publish smart contracts and DApp, so they can set rules for data ownership, data transaction formats, and data value conversion in their own projects.

For example, in an experimental project, multiple laboratories may be required to work together, each of which can share useful experimental data in the same database and establish the number of pass cards available to contributors, while data users pay pass cards and the analysis results obtained by data users can be re-shared to obtain pass cards. When the collaborators make mutual agreement for the economic value of the card, the card can be used as the carrier of the data value. Only when the right person really uses the data itself, and defines the rules of storage carrier and transfer, the data value can be truly reflected.



3.5.3 Cross-sharding transaction

TITAN networks allow transactions to be sent from one slice to another. since the network uses an asynchronous model, validation and processing are performed first in the sender slice and then in the receiver slice. when transactions are scheduled, the TITAN chain ensures its security by creating and proposing new blocks (blocks created on the TITAN chain) and notarization of blocks coming from the sending shards.

The block contains the following information about the speed of each slice: sender slice ID、 receiver slice ID and slice block hash.

In a cross-splitting transaction, a slice receives the hash of the relevant shard blocks of the transaction from the block (blocks created in the shard, not in the TITAN chain), requests to send shard blocks in the shard, analyzes the transaction list, requests missing transactions (if any), and finally executes the same shard blocks in the local shard, and sends this shard block into the meta-chain to become blocks. once this is notarized by the TITAN chain, the transaction is finally completed.



3.6 TITAN chain information and asset encryption

TITAN is committed to contributing its own strength to the development of the block chain to ensure the assets and information security of users on the TITAN main network chain. To this end, it TITAN an original solution, which is highly secure, can be quickly installed and signed, and is easy to retrieve in special circumstances, and plays an important role in the confidential documents of many companies.

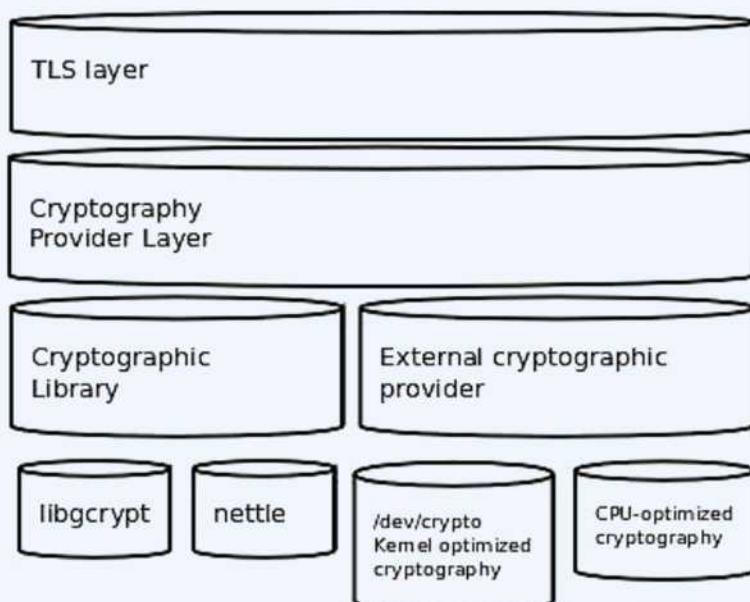
TITAN invested many development resources to achieve TISS. TISS as an encryption protocol for distributed key generation and signature, it can be compatible and reused in ECDSA-based blockchains, including TITAN chains, bitcoin and ethernet networks, etc.

The lowest foundation of any blockchain is the encryption layer. and this is essentially blockchain DNA, as this layer is the design layer for trading and block validation conditions.



The network uses Schnorr scheme for transaction signature and verification; using Schnorr signature takes up less data space. Schnorr scheme is not only simple and efficient, but also adopts the algorithm which has been fully studied and long-standing. This method of creating digital signatures already exists in a variety of encrypted currencies, and it has also been suggested to integrate it into bitcoin networks.

Because block validation requires aggregate signatures from multiple validators, multiple signature schemes are required. as such, the network will use Boneh-lynn-shacham (bls) multiple signature schemes for block signature and validation.





TISS main steps:

Vault initialization: this step will establish an end-to-end encrypted communication channel to initialize the parties involved. For example, tripartite involvement is required.

Key generation: In this step, we need to determine the threshold policy for the number of signatures and share the private key. For example, with a 2/3 policy, this means that the private key will be split into 3 private key fragments, and any 2 of the 3 participants can sign the transaction.

Signature: Generates a digital signature from the respective private key share and the private key does not leak.

Vault reorganization: if someone loses the private key in his custody, it is necessary to re-share the private key. Reorganization generates new key fragments, while previous fragments will fail.

4

TITAN Ecology

Five in One



In 2008, an anonymous geek called Nakamoto published a Bitcoin white paper, and since then a blockchain technology represented by Bitcoin has emerged. Since the birth of Bitcoin, in a short period of more than ten years, its value has soared by nearly 20 million times, so it can be seen that blockchain technology in the future.

Blockchain technology has the advantages of decentralization, transparency, participation of the whole people, ecological incentives, traceability and so on. These characteristics can bring subversive changes and promotion to the traditional financial industry or the traditional Internet industry at present.





TITAN Ecology: Five in One



Like bitcoin, TITAN is also initiated by a global group of digital geek MCobian、Sadlife who are proficient in blockchain technology. they have a passionate pursuit and belief in blockchain integration with the traditional internet and business, convinced that the value of technology lies in exploring, storing and enabling all human civilized activities and facilitating people's lives.

Based on this, through the integration of block chain technology, TITAN created the new card entertainment, industry-wide live broadcast, inclusive new finance, a brand-new consumer mining mall five and one-click coin integrated ecological system, to create a global card economy 3.0 empire map.



4.1 New Entertainment

Community economy network

The dimension of information quality evaluation is complex, and there are still many difficulties in quantifying and evaluating the concept of information quality. From a practical point of view, social recommendation is a more efficient way than algorithm recommendation. in addition to introducing multidimensional Metadata to improve information quality, TITAN will bring together people with common interests, common values and common expectations through the establishment of information communities to further evaluate the credibility of information within the system.

TITAN ecology, community is the main form of information organization, whether new content or externally introduced content is published through the community, and further disseminated through the evaluation of community users. The quality of the community is determined by the content contribution of all individuals in the community, and the community score in turn affects the quality evaluation of the



content in the community. For community hydration to be avoided, any user who joins a community must first store a small amount of TTC, storage at the time of the establishment of the community, or the community members vote.

Community is also a self-organizing ecology, each community member is the community's benefit-sharers, the community's growth and quality improvement will get the TTC incentive from the system, the incentive will be distributed according to the community member's per capita contribution, any damage to the community or irrigation behavior may cause the community member's unanimous resistance or even be expelled from the community.



A user-autonomy content community



Traditional communities, on the one hand, have a natural foundation of trust and on the other, are very vulnerable, and they are often easily exploited by individuals to disseminate false information. Block chain trust mechanisms make up for the shortcomings of community trust, avoid malicious information attacks on the community, TITAN the introduction of economic incentives in the community also gives the community more potential for self-growth.

4.1.1 Short video

In the mobile Internet industry overall growth slowed in the background, short video industry suddenly emerged. According to statistics, the domestic head short video platform average daily live users 600 million people. Such a huge user gathering area, naturally will attract the favor of many brand advertisers. At present, all industry brands take short video as the main battlefield of self-media marketing. Against this background, the



short video marketing market also presents the high cost of obtaining traffic exposure, data can be changed untrue and so on, and the birth of TITAN short video is to break.

TITAN short video aims to create an international short video community supported by block chain technology of national shareholding and national dividend, and effectively crack down on the phenomenon of short video piracy by using the technology that block chain can not be tampered with, and hold the authorization of the work in the hands of the original author to complete copyright tracking and protection of rights and interests. At the same time, through the platform card TTC to achieve creative and interactive incentives to make the platform more open, inclusive and full of vitality.

TITAN short video ecological side chain, whether short video creators or short video viewers, can obtain the corresponding card income, entertainment money is not wrong, the real realization of "time for money ".For creators, uploading short video works can obtain TTC incentives, while the amount of incentives will be divided according to the quality of the uploaded works, the more quality by the user welcomed the more



works can get more TTC incentives. At the same time, if there are other creators want to imitate the original author's work, can be discussed after the use of card TTC to trade to buy copyright, so as to protect the original, for the content of the copyright declaration.



Second, for users, whether watching short video, or participating in the interaction, to report (need to be approved, malicious reports will be punished accordingly), likes, retweets,



comments and so on in the process will also be based on the length of time, frequency and quality of incentives. TITAN through this "interactive mining" way to encourage users to jointly maintain ecology and maintain ecological balance.

Conventional Internet is to provide products and services, while TITAN platforms create a rule and ecology. All are value creators and value holders in TITAN ecology. Compared with the existing short video products, the content producers, content audiences, content communicators and advertisers in the TITAN ecosystem are no longer subject to the platform, and the ecological roles no longer have the distinction of high and low, which realizes the free trade and dissemination of high quality content point-to-point under the decentralization system, and realizes the benign and sustainable cycle of ecology.

4.1.2 Decentralized games

TITAN will also build a decentralized game side chain, that is, a decentralized distributed intelligent contract game organic



ecological world, and provide a new generation of game ecological platform based on blockchain technology, which integrates multi-type games.

At the TITAN platform, the game parties quickly build trust through open source contracts, the use process is completely transparent, the information is completely symmetrical, the game data can not be tampered with, and the change of the rules of the game is also decided by community voting. At the same time, can effectively protect the assets of users, the assets of gamers will not be lost because of the decline of the game or the unreasonable recovery of game manufacturers.

TITAN in addition to their own development of the game, will also access a large number of quality third-party games. Therefore, transaction data should not only flow, but also keep the transparency and privacy of transaction users. For TITAN game chain transaction data transparency and security are very high requirements. TITAN have also adopted the most advanced technologies in both areas to ensure the user's sense of experience and complete implementation of decentralization.



4.2 Inter-industry live-streaming

Based on the model of card economy, the advantages of point-to-point transaction, fairness and transparency, behavior and reward make TITAN webcast more suitable and attractive to users.

Based on another side chain TITAN industry-wide live broadcast, the anchorman who participates in the TITAN webcast can directly receive the user's card and reward, and the proceeds are all owned by the anchorman, and do not need to be divided through a central platform. Second, users can also watch live broadcast, reward anchor, participate in discussions and other behavior, get feedback. Anchorman and user-owned card can also be directly used for shopping mall, platform trading. This is equivalent to the user in the "consumption" but also in the "profit ", increase user participation, innovation of the current live broadcast industry ecological status and consumption model. Also, the community model of everyone's participation allows T to ITAN webcast platform continues to produce economic benefits makes the whole ecology more cohesive.



A real live interactive system is built in the TITAN world, where consumers connect directly with content producers, consumers pay directly and reward content producers, and the "center" is dispelled. Based on the decentralized design, TITAN set up an open, fair and democratic Internet paradise for content producers and consumers. At the same time, interactive cross-platform anonymous chat can be realized in the TITAN live broadcast ecology, without registering account wallet address and account, protecting the privacy of user chat content and no third party supervision. You can issue a token as an incentive, or you can and Other community teams with fans work together to build platform industrialization for platform drainage.

TITAN used a completely new design open content value evaluation system. In this system, we're going to

Rong's value score is no longer calculated simply by using such indexes as click quantity, but takes into account the factors of social recommendation, content dissemination and author's credit, and measures the value of content comprehensively from two aspects: depth and breadth.



The way the reader interacts with the content, according to the cost paid by the reader from low to high can be sorted as click, like, comment, forward, reprint. The higher the cost to the reader, the greater the contribution to measuring the value of the content. A reader can show the value of the content more than a few likes, and a reprint can show the value of the content more than a forwarding. An accurate evaluation of the value of the content must enable a comprehensive assessment of all factors. TITAN user interaction indicators used in the evaluation system include likes, comments, retweets and reprints:

$$V_c^t = \sum_{i=1}^3 \sum_{j=1}^{c_i^t} \alpha_i H P_j I_j + \beta \sum_{j=1}^{d^t} H P_j I_j S_j$$

where $\#$ is the value score of the content / $\#$ at / $\#$ moment , $\#$ and $\#$ correspond to the weights of likes, comments, retweets, reprints, respectively. The $\#$ is the number of i interactions in a given time window at $\#$.



Credit score of the user performing the span> interaction. Similar to the Voting Power idea ,* is the user's energy value interacting:

Where / span>* is the non-locked state of the user account at the j interactive operation, and / span>* is the total number of user interaction operations within a given time window at the j interactive operation time. θ is the threshold. As the user performs frequent interactive operations over a period of time, the HP will continue to decrease, resulting in the user's operation on the content value evaluation of the impact of continuous reduction. After the user stops operating frequently, the HP recovers over time. For content reproduction, additional consideration is required of the quality factor C> of the source of the reprint:

$$S_i = \frac{s_i}{\sum_j s_j}$$

$$s_i = \sum_{i=1}^{C_a} \left[\frac{1}{C_i} \sum_{C_i} V_{C_i} \right] \cdot C_a C_p^2$$



Si obtained by normalization of the quality score Si of the source of the reprint. Si is calculated by the value score, the number of authors and the total number of reptile. where Ca is the total number of authors and Cs is the total number of reptiles. Si is also used to prevent a single author or a single reptile through the way of self-generated reprint fraud reward. Noting that the definition of / span>' includes the content value score / span>"#, the calculation of / span>' is therefore an iterative process. For a new source of reprints, the initial quality score is set to a smaller fixed value . As the number of reprints from this source increases, its quality score will be updated and will ultimately serve to evaluate the value of a new content.





4.3 Inclusive new financial side chains

The core of finance is the establishment and transmission of credit, and the block chain is naturally suitable for many financial scenarios because of its characteristics of non-tampering, security and transparency, decentralization or multicenterization. TITAN will embrace blockchain technology, lay out multi-product and multi-service financial scenarios, and provide high-level, intelligent and all-system intelligent financial services for global users.

4.3.1 Decentralized lending

In the existing financial system, financial services are mainly controlled and regulated by centralized institutions (such as traditional banks), so users can not bypass banks whether it is basic access transfers, loans or derivatives transactions.

Such over-centralized financial services are prone to problems such as inefficiency, high intermediate costs and high



entry barriers. Behind these pain points are billions of users who can not access normal financial services.

According to World Bank data, the proportion of people who do not have access to banking services varies less than 1 per cent in some developed countries and more than 98 per cent in some developing countries. On the other hand, as of 2016, the average use of mobile phones in the global population has reached 62.9%, but the global average use of mobile phone payments is only 2%. The reason behind this data, in addition to the high barriers to traditional financial services unexpected, there is a lack of trust in traditional financial institutions.

TITAN network, will bring a new perspective to solve this dilemma. TITAN, with the vision of "bringing the value of blockchain to billions of people around the world ", uses blockchain technology to create a more decentralized and inclusive financial system, lowering the threshold of financial services through a certification mechanism, providing services such as decentralized lending, mining, storage, quantitative trading based on digital assets, so that all people can participate



in the construction of financial ecology and obtain corresponding incentives.

"Finance has no boundaries, everyone can develop", TITAN will gradually promote the realization of global inclusive finance.

4.3.2 Decentralized wallets and cross-border payments

TITAN multi-chain wallet (similar to im card wallet). With TISS encryption technology, ensure the security of assets in the wallet, and can be used for the storage of mainstream digital assets, as well as the use of certificates in DApp. For the future, the TITAN wallet system will be a blockchain era fan and traffic entry, and future applications will be richer when the wallet traffic is large enough, like WeChat's Mini Programs and public number. In the current cross-border payment, mainly by bank wire transfer, third-party payment and cash withdrawals, the cross-border financial institutions reconciliation, clearing, settlement process is complex, involving a number of manual processes, deposit In the high cost, long settlement cycle, large



use of funds and other issues, and because of the high cost of small cross-border payments can not be achieved.

During cross-border payment and settlement, TITAN can abandon the role of transit bank and realize point-to-point fast and low-cost cross-border payment. Future banks and banks will no longer through the third party, but through the TITAN to achieve point-to-point payment, not only save the third party financial institutions link, but also can achieve round-the-clock payment, real-time accounts, convenient withdrawals and low costs. When they have the advantage of being low-cost and efficient, financial institutions can deal with small cross-border payments that were previously considered unrealistic because of cost factors.

TITAN Chain in good completion of the main chain function, can cooperate with other currencies of the main chain, as a side chain to enhance transaction speed, security, and privacy protection. TITAN Chain improved side-chain technology for peer wallets:



- 1 bi-directional anchoring (two-way peg) maps the main chain assets to the side chain transactions;
- 2 smart contract (EVM) compatible with ethernet smart contract;
- 3 support for the digitization of real/virtual world assets;
- 4 security and privacy enhancements. The main chain is only responsible for the transfer of assets to confirm the right, side chain to complete rapid transactions, transaction information protection, account security protection and user privacy protection.

Basic principles:

2to2 bidirectional micro-payment channel is constructed using 2 multiple signature (multi sig) wallet pre-charging. Through the construction of more two-way micro-payment channels to reach the whole network node lightning network way, so that the transfer of assets on the main chain to achieve instant and very low handling fees.

Technology-based:



- 1 Recoverable Sequence Maturity Contract RSMC
- 2 Hash Time Lock Contract HTLC lightning network
- 3 multi-level hop nodes (Lightning Network)
- 4 Trans-chain atomic trading (atomic cross-chain swaps)

4.3.3 Supply chain finance

In the traditional supply chain finance, in the consideration of wind control, banks only provide factoring and financing services to the upstream and downstream large suppliers of the core enterprises in the supply chain, which makes the financing of small and medium-sized enterprises in the supply chain difficult, high cost and long credit reporting period. On the other hand, commercial bills, bank bills use scenarios are limited, transfer is difficult, transfer audit process is quite complex.

If a digital bill is issued and run on a TITAN, it can be split and transferred in an open, transparent and multi-party witness. This model is equivalent to making the credit in the whole business system conductive and traceable, providing financing



opportunities for a large number of small and medium-sized enterprises that could not be financed, greatly improving the efficiency and flexibility of the circulation of bills, and reducing the capital cost of small and medium-sized enterprises. The bank and the core enterprise use the block chain multi-signature, can not tamper the characteristic, causes the creditor's rights transfer to obtain the multi-party consensus, reduces the operation difficulty.

4.3.4 Asset based securitization

Traditional asset securitization requires multiple coordination of clearing institutions, exchanges and securities companies. Through the alliance chain carrying intelligent contracts, it can automatically realize the trading of securities products across multiple subjects.

The asset securitization management system based on TITAN blockchain technology can ensure the authenticity of the underlying asset data of consumer financial services companies,



and can not be tampered with, traceable, and improve the confidence of institutional investors, thus reducing the threshold and issuing cost of the ABS issued by consumer financial services companies. At the same time, it can also carry out ABS life-cycle management to identify and control risks in a timely manner.





4.3.5 Boarderless currency

A TITAN financial system would create an open, inclusive and technically viable unbounded currency that could be shared by people around the world, while building an accessible payment system. Digital money without borders allows the world's poorest and most vulnerable groups to enjoy financial inclusion and participate in the local, national and even global economy.

For the future, TITAN users will be able to quickly and safely cross-border remittances and transfers, like sending photos and emails, and promote the accessibility of global value flows.



4.4 Mining mall

TITAN will create the world's first decentralized consumer-flow aggregation community. TITAN will create the world's first decentralized consumer mining innovation mall TTC, using blockchain technology. TITAN mall uses the flow funnel to inject the accurate flow into the real economy, at the same time, the ecological dividend of the real enterprise is fed back to the flow pool in the form of trading TTC, so that the consumer consensus is growing. TITAN Xintongqi economy is based on block chain, which brings new vitality to real enterprises and provides new solutions for customer loyalty programs. TITAN to be addressed In order to realize the same rights of the stock, the growth value of the real enterprise is returned to the community, and each contributor can share the value dividend of the ecological growth of the real economy consumption.



4.4.1 Decentralized Mall

Compared with the traditional centralized e-commerce, the decentralized e-commerce through trading card TTC, TITAN can effectively enable buyers, sellers, platforms to fully participate in the ecological operation and obtain corresponding incentives. TITAN Innovation Mall is rich in variety, including fresh food, wine, health, daily makeup, digital electronics, home textiles, mother and child products, tourism, education and home department stores, and will further cover RV tourism, yacht services, luxury goods and other goods and services, more than 200,000 commodity categories. TITAN Mall only accepts the TTC digital asset payment which is confirmed by block chain for commodity consumption. What lies in determining the long-term right of a business platform to work with a flow-based digital asset to help consumers spend less and earn more.

TTC card, as the soul of the decentralized e-commerce TITAN platform, is responsible for activating the whole community.



The burden of state. TITAN encourage ordinary users to share goods, consumers on the platform can be personalized push, good goods recommended to targeted people, good things do not enjoy at the same time let the flow conversion rate higher, but also for their own card reward income.

4.4.2 Offline consumption scenarios

TTC can be used for offline consumption scenarios. Consumers can choose to consult online, then pay the bill offline, promote sharing and get a pass reward. TITAN rely on traceability alliance chain, and combined with intelligent contract to issue exclusive points, consumers can quickly view beauty products on the platform DApp, instant consultation customer service, quick booking courses, and then after the end of the service for offline payment. In addition, consumers can also be online promotion and sharing, get a pass reward. TITAN is committed to becoming a pioneer in blockchain sharing economy through online and offline integration.



4.5 One-click coin issuance (Black 'Ethereum')

Ethereum provides a simple coin system, creating the peak of the ICO block chain, but it also requires programmers to write code to complete the money, which is still a high threshold for traditional users.

One-click coin in the TITAN ecology, only need to fill in the full name of the token, abbreviation, issue quantity, upload the LOGO after 1 minute to complete the coin. Make digital assets accessible to every potential user around the world.

On the basis of the above several large ecological plates, a complete ecological closed loop will be formed. With the value bearing of the TTC ecological communication certificate, the differentiated and competitive ecological platform will become the whole industry flow entrance, thus creating a truly landing, high practical TITAN full closed loop ecology.



5

TITAN ecosystem token



5.1 TITAN Singapore Foundation

TITAN communities ensure the sustainability of community projects, the effectiveness of refined governance and the security of fund-raising by setting up TITAN Singapore Foundation.

TITAN Singapore Foundation is responsible for hosting funds and development reserve tokens collected from TITAN projects. At the same time TITAN the Singapore Foundation assumes the obligation to use and allocate funds rationally. After the node election is completed, the Foundation will gradually disclose the use of funds in the appropriate environment.





5.2 TITAN economic model

The Titan (TITAN) network is built in a master Netcom token called TITAN Coin, abbreviation is TTC. TTC are drivers throughout the TITAN ecosystem that will be used to support community building, community governance, application development, payment of consumption, participation in consensus incentives, payment of transaction fees, payment of chain-building consumption and handling fees for cross-chain circulation of assets, etc.

5.2.1 TTC distribution

Token Name: TITAN(Titan) TTC.

Total Distribution :180 million

Distribution of tokens:

- A 180 subscription in the mother currency - about 1%
- B 1.782 billion for mining --99%



TITAN ecosystem token

Daily currency output :0.3 TTC/0.5s x 10x12x 60x 24=51840

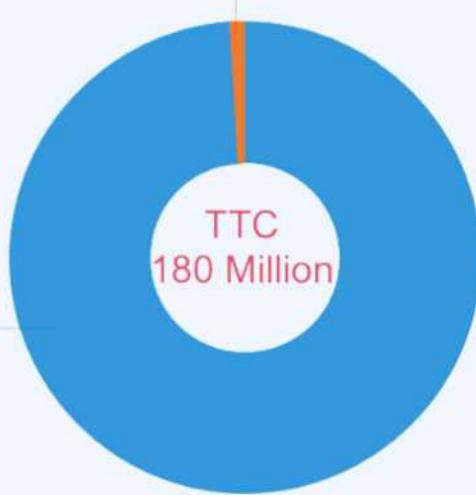
Annual production :18.9216 million, low production, high demand, high value-added space.

Reduction mechanisms:

$$Y=X * \left(51840 + \frac{51840}{2} + \frac{51840}{4} + \frac{51840}{8} + \frac{51840}{16} + \dots + \frac{51840}{2^n} \right)$$

1.8 million for pioneer coins & market circulation (0.2 million for market circulation and 1.6 million for pioneer coins, accounting for 1%)

178.2million for mining, accounting for 99%



The Distribution of TTC

According to the formula, the X is about 1750 days (approximately equal to 4.79 years), that is, the half period is 1750 days.



-1750 days :90.72 million
-3500 days :45.36 million
-5250 days :22.68 million
-7000 days :11.34 million
-8750 days :5.67 million
-10500 days :2.835 million

...

Total 180 million, a total of 30 years to mine.

5.2.2 Destruction mechanisms

The most basic idea contained in economics, in the case of high market demand, the relative scarcity of assets can better withdraw the value of goods. TITAN ecological token TTC will be in the state of "deflation" for a long time, and the TTC in circulation will be worn and destroyed by different mechanisms, thus ensuring an unlimited rise in the unit price of TTC. The so-called "one coin forever spread, the value rises infinite".



The TTC Pass will adopt the following mechanisms to destroy the TTC, in circulation to protect the ecological value enhancement:

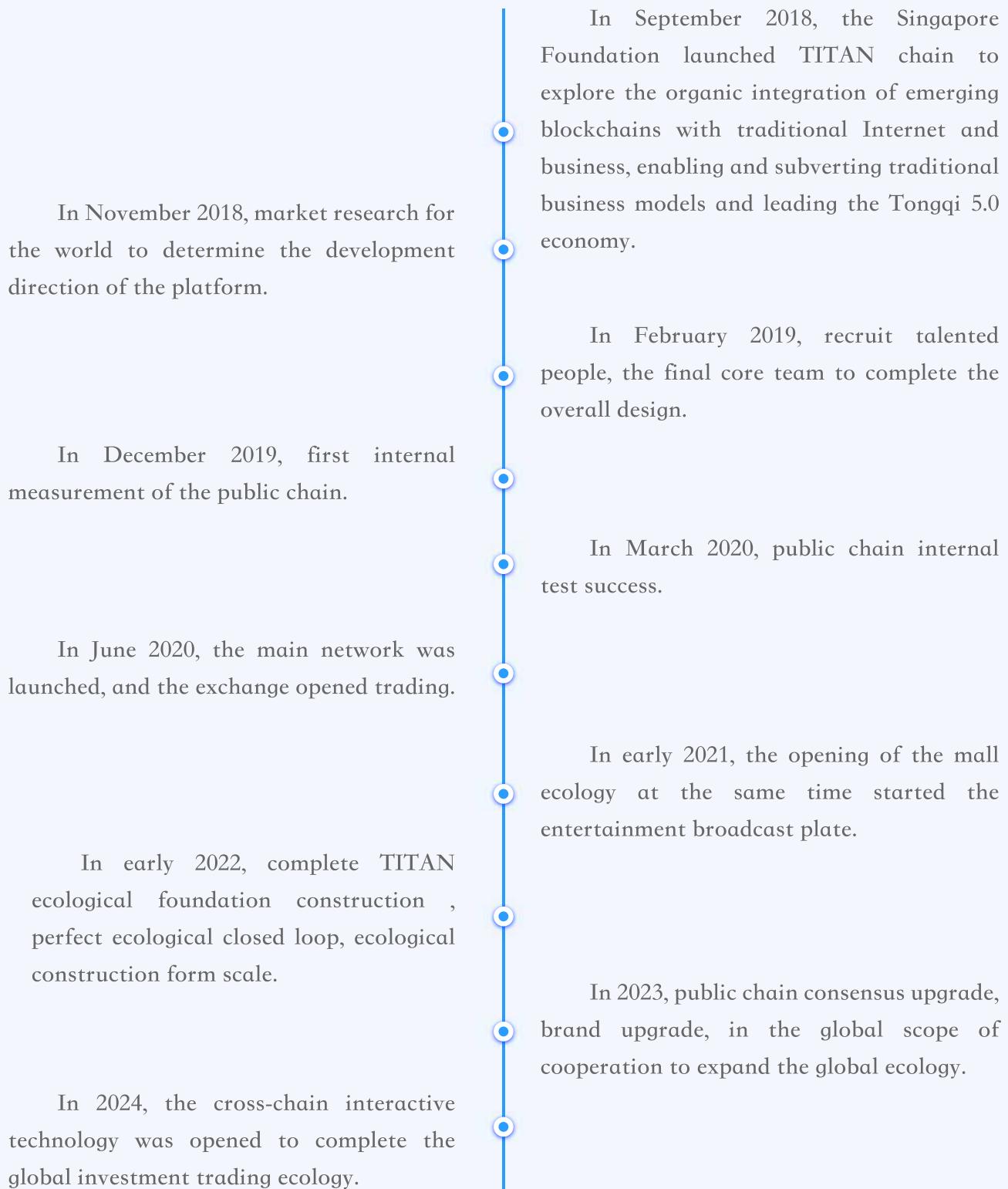
- 1 tokens that can not be fully distributed will be destroyed when the total currency of the day is not fully shared by the entire network;
- 2 TTC 80% of the transaction fees will be destroyed on a regular basis;
- 3 TITAN the Singapore Foundation buyback from the secondary market;
- 4 The transfer fee 5.TTC the public chain is 0.01 TTC,TTC 100% of the net transfer fee will be destroyed.

6

TITAN Milestone



TITAN Milestone



7

Disclaimers



Disclaims and risk statement

1 The Risk of Losing TTC Caused by Certificate Losing

TTC of a buyer's is likely to be associated with a TITAN account before allocated to him or her. The only way to access the TITAN account is the relevant login credentials chosen by the buyer. Losing these credentials will lead to TTC losing. The best way to safely store the login credentials is that the buyer should keep them in one or several places and do not store them at workplace.

2 The Risk of Judicial Supervision

The blockchain technology is now under supervision in most major countries in the world. If the main body of such supervision intervenes in or impose influence on TITAN application and TTC, TTC is likely to be affected. For instance, decrees may impose restrictions on the use, sales and functionality of TTC and even TITAN system; intervene in and even terminate the development of TITAN application.



3 The Risk of a Lack of Public Attention on the TITAN Application

There is a chance that TITAN application is not widely used by individuals or organizations, which means that the public does not show sufficient interest in the development of such distributed applications. A lack of social spotlight therefore may draw negative effects on TITAN and its application.

4 The Risk of the Fact That TITAN and Its Related Application Fail to Satisfy the Expectation of TITAN Initiators and Buyers.

TITAN is currently undergoing the development stage, certain (major) alternation may therefore take place prior to its official launch. TITAN self-induced or buyers' expectation and imagination on TITAN application or TITAN function or form (including the behavior of participants) may not be (fully) realized. Meanwhile, any erroneous analysis or alternation in TITAN design may lead to the conditions mentioned.



5 The Risk of Hackers and Theft

The operation of TITAN application and its token function may be interrupted by hackers, other organizations or nations with the approaches of (including but not limited to) service attack, Sybil attack, vicious software attack or organized consistent attack, etc.

6 The Risk of System Loophole or a Rapidly Leaping Development of Cryptography.

The leaping development of current cryptography or huge progress in other kinds of technology such as the development of quantum computation may present risks to cryptocurrencies and TITAN platform. And this may consequently lead to the loss of TTC.

7 The Risk of a Lack of Maintenance and Usage

In the first place, TTC should not be regarded as a type of investment, even TTC may enjoy investment value with time. However, if there is a lack of maintenance or usage of TITAN, the investment value may go lower. If this case takes place, there may be few or even no second-movers to this platform, which puts TITAN, obviously, at a disadvantageous place.



8 The Risk of Not Being Insured

Unlike bank accounts or accounts in other financial organizations, contents stored in TITAN accounts or in Ethereum network are normally not insured. In no event shall any individuals or organizations be held reliable for your loss. However, if you are a beneficiary of an insurance firm such as FDIC or any other private insurance firm, they may be held reliable for your loss.

9 The Risk of TITAN Application Malfunction

Malfunction caused by different reasons may lead to the fact that TITAN platform becomes unable to serve its duties, while under some serve circumstances, TITAN user information may lose.

10 The Risk of Unexpected Situations

Cryptography is a brand-new yet not fully tested technology, therefore, there exists other risks which are not fully covered in this White Paper or unmentioned by the TITAN administration team or even not fully expected. In addition, there may be some unalarmed risks or risks above-mentioned coming into existence in bundle.



11 Additional Risk Warning

As a type of cryptocurrency, TTC is not a kind of currency in the true sense of word, which means it is a digital commodity and cannot circulate in the market out of blockchain. Thus, this is an event in which all market entities voluntarily participate, and they are all able to shoulder the unpredictable risks on their own.