IPWeb

– High Performance Public Chain Based on P2P Storage

—— Leading the Future of Decentralized Internet

Abstract

With the rapid development of blockchain technology and the continuous improvement of smart contract, the blockchain applications will be heavily landed; P2P distributed storage is the key to the landing. The implementation of smart contract and distributed storage technology will promote the coming of the blockchain 3.0 era. Compared with centralized storage, P2P distributed storage improves the capacity and efficiency of information storage. The distributed technology solves the problem of waste of storage space and network resources by automatically allocating data which achieves flexible expansion, reduces operating costs, and avoids resource waste. Therefore, P2P distributed storage will be the trend to replace the traditional centralized storage.

IPWeb: A high-performance public chain based on P2P distributed storage.

P2P distributed storage not only provides a secure, reliable, and low-cost storage platform, but anyone can freely use the distributed storage provided by IPWeb while defining smart contracts. Based on multichain and multi-consensus, and combined with verifiable storage certification and token economy, IPWeb aims to achieve the efficient governance of nodes on the blockchain. The goal of IPWeb is to build a new type of distributed encryption storage network, provide users with efficient storage services, and build a distributed application (DApp) with rich feature.

——IPWeb makes data storage more secure.

The fault-tolerant mechanism ensures that the users' data are copied a certain quantity and stored on different nodes. Even if the data of one node disappear due to abnormal conditions, the backup of other nodes can completely restore the users' data, which greatly guarantees the data security stored on IPWeb. Distributed data storage reduces the loss and damage of the data caused by war, natural disasters, human factors, etc., which is beneficial to valuable data to be permanently stored. Data files are split into multiple parts and distributed to different storage nodes so that the data are more secure and difficult to snoop or copy. Moreover, since it is decentralized and without a centralized server, the IPWEB network is hardly affected by DDOS attacks. Therefore, when a large number of centralized accesses enter the network, they will be dispersed to different nodes without causing network congestion or even collapse.

——IPWeb makes data storage more efficient.

A file will be distributed into many copies and stored in different storage nodes around the world. When downloading files, users only need to query the corresponding address (Hash) to obtain data from multiple storage nodes at the same time, so the storage speed is faster compared with centralized storage. In terms of data transmission speed, IPWeb is also more advantageous. When the users need to read data, all the storage workers will send the data they have saved to him at the same time, and the server will automatically integrate the data after receiving. Accordingly, the download speed will no longer be subject to the bandwidth of the server, but mainly depends on the network download bandwidth.

——IPWeb makes storage cheaper.

On the IPWeb network, all files are unique and not likely to be maliciously tampered with, which greatly reduces the waste of storage resources and the cost of storage resources. IPWeb distributed storage makes full use of the resources of public idle storage and bandwidth, which improves the utilization rate of the resources and reduces the use cost.

——IPWeb can better support the blockchain applications.

One of the bottlenecks in the development of blockchain is the distributed storage capacity. At present, the biggest problem with most public chains is impossible to store a large amount of hypermedia data on their own chains. IPWeb distributed storage will be the infrastructure of all blockchain projects, laying a good foundation for the large-scale development of blockchain applications.

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01 Background

Nowadays, the world is in a phase of gradual transition from the Industrial Age to the Information Age, and data are becoming the most valuable resource in the world. With a huge amount of data being generated along with the various behaviors of human beings, it is more and more significant to store and further utilize the data. The migration from on-premises storage to cloud storage is not only the subject of the past decade but this trend is now being accelerated. On the other hand, a large amount of storage space is idle on the hard disks of people around the world, virtually wasting many resources.

The birth of blockchain technology, which opens up a new path for the development of software defined storage, creates the possibility to rethink cloud storage and find ways out of industry dilemmas at the technical and economic levels. Firstly, the pooling of storage can be implemented in a wider space and in a richer form. Secondly, the Token incentive mechanism can drive people to contribute the remaining storage space of enterprise storage, servers, PCs, mobile storage. Finally, the actual data stored in each node are just some slices stored in encrypted form, which securely protects the date, and hence even if users providing the storage nodes has the opportunity to view the slices, the data segments they have seen are not meaningful. The distributed business model of blockchain, DAO, can accelerate the development of the distributed storage industry with the help of global resources and talents. Distributed storage based on blockchain is safer, faster, less costly, more censored and more widely distributed than the cloud storage, and it creates a market that allows people around the world to monetize their spare storage space, which will lower the storage prices of the market with the influx of the suppliers all over the world. The blockchain ensures that these are achieved in a secure, trust-free, peer-to-peer manner. From centralized storage to decentralized storage and from a centralized Internet to a decentralized Internet, we are at a turning point in history.

Advantages of distributed storage based on blockchain:

1) Distributed storage takes advantage of the sharing economy. Users can make full use of the free space of the hard disk and gain revenue.
2) The data are split into small pieces that are spread over many nodes only after being encrypted, which avoids the event of centralized storage "stealing" files, and even if users unlock a piece of data, it is only part of the data, not all. In addition, there is no need to worry about the risk of data leakage caused by the failure of the centralized server.
3) During the download process, the fragments will be reorganized, and the parallel speed of the download will be much faster than the centralized storage.
4) Through smart contracts, the network can automatically determine the situation and incentives of the use.

02 What is IPWeb?

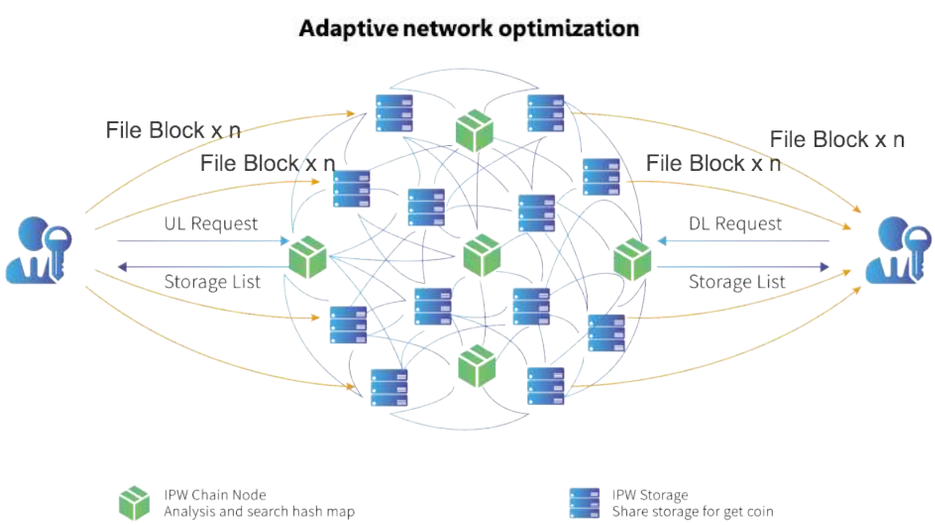
IPWeb is a high-performance public chain based on P2P distributed storage.

Built on the public chain, the distributed storage service platform is developed to achieve decentralized storage, which is faster, safer and less costly than the centralized storage. Files will be divided into multiple small parts (guaranteeing certain redundancy) and stored in a number of nodes on the network. As long as a certain number of nodes are functioning, files can be secured and complete.

When a user enters a URL in a web browser to obtain information, the URL is parsed to an IP address which will find the server that stores the information the user is looking for. Almost every publisher, vendor and service provider on the web store information in the servers of the particular data center they control, which makes the network centralized today.

IPWeb network protocol enables users' files stored. As a by-product of the IPWeb mining process, the innovative encryption and proof of work create a set of useful and valuable service for customers. The miner' s hard drive space needs to be verified on the IPWeb network protocol firstly. After verification, the miner will be eligible for storage on the market. The more he stores, the more proof of stake (Token) he earns, which motivates miners to use their hard drive space to get paid from verifiable storage market of IPWeb.

We believe that the addition of decentralized storage space will enable customers to reduce network storage costs and enjoy better storage services. Since it is a decentralized protocol, the data and the link stored on the network are not controlled by a central point, which improves reliability. Compared to single centralized servers and content distribution networks, information that is transmitted on a large scale between IPWeb miners is stored closer to users, making information search faster. The data, retrieved by the encryption algorithm on the IPWeb, enable customers to manage and update a large amount of data more efficiently. Finally, as an open source project, unlike most cloud storage and distribution platforms today, IPWeb is openly subject to inspection, verification and promotion. With the continuous upgrade of IPWeb and the addition of the new features, we hope that IPWeb network can be a platform for the mass (even if not everyone) to store and distribute network information.



03 IPWeb Mission

The mission of IPWeb is to lead the future of decentralized storage and decentralized Internet.

IPWeb will always adhere to the following principles in the development process:

• The principle of value sharing:

IPWeb will realize the value transfer of sharing ecosystem. Through an effective motivate mechanism, users are encouraged to share idle storage space, which will continuously expand the scale of the storage network, and form a benign ecosystem.

• The principle of data security:

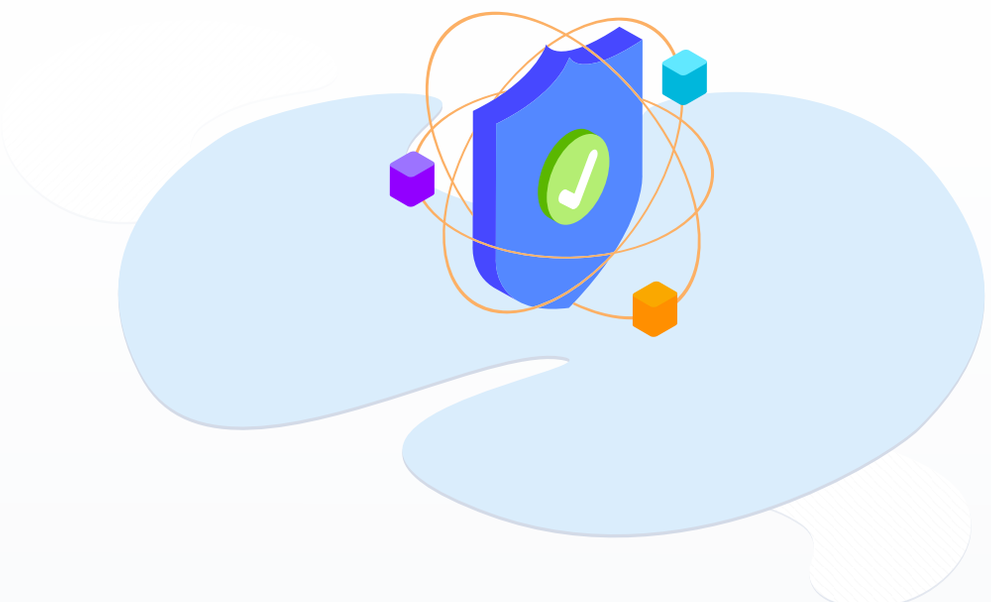
The data are distributed to the distributed storage network through the process of blocking, encoding, etc., so as to enhance the security to a high level to enable that no other people and company in the network can snoop the users' data.

• The principle of platform development:

By providing the standardized underlying technology platforms and supporting standard tools, IPWeb provides distributed resources to companies and organizations in need, including storage resources, computing power, and more. Companies or organizations can develop their own DAPP (distributed applications) on this platform.

• The principle of scalability:

IPWeb can simultaneously multiplex many peer-to-peer connections. With such flexibility and scalability, IPWeb's scalability will be the same as HTTP, enabling unlimited expansion.



04 IPWeb Infrastructure

IPWeb will provide a variety of infrastructure for all participants of the ecology:

· P2P cloud storage services based on the sharing economy model;
· P2P data trading platforms connecting global data;
· P2P decentralized Internet (domain name system and browser under IPWeb protocol);
· Decentralized service and content platform;
· High-performance public chain, customized side chain;
· Digital currency based on decentralized Internet ecosystem.

File Browser (IPWeb.io)	**IPW Storage Mining Machines**	**Block Browser**
Autonomous Node Networks	**File Storage System**	**File Sharing System**
IPW Digital Wallet	**Retrieved Mining Machines**	**Search Engines**

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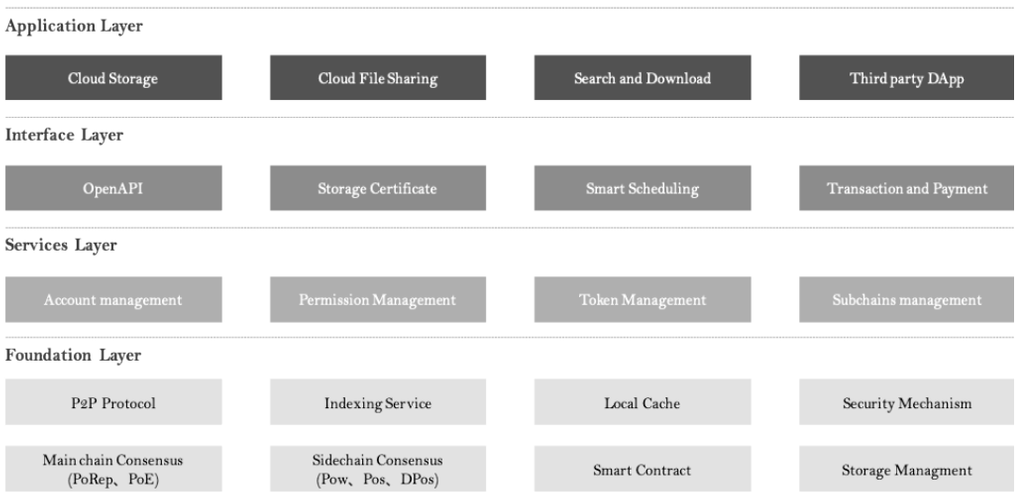
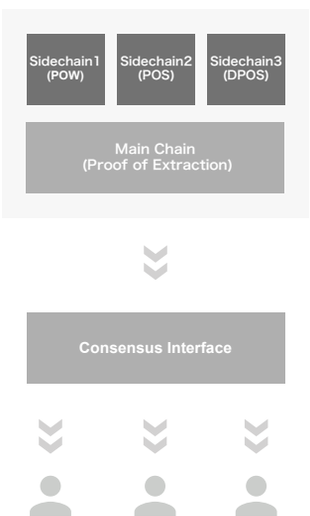
5.1 Architecture



The Hash of the file computed by IPWeb is the unique identifier of the object in the system; the fragment generated by the file is encrypted and encoded as the object data. The storage nodes store the object data in their own storage units, and the super nodes are responsible for maintaining the mapping relationship between the object data and the storage nodes, among which the storage nodes are completely peer-to-peer and can transfer data to each other through a set of P2P transmission protocols. As schedulers, the super nodes accept the information of the storage nodes and updates the real-time information of the storage objects according to the broadcast, so that the users can quickly return the object location when accessing the storage objects.

5.1.1 Double-layer Network Design

IPWeb separates the storage network and the retrieval network into two layers, improving network efficiency and reducing mining thresholds. To mining machines, the requirements for storage and retrieval are different, among which the retrieval requires expensive computing power and energy consumption, while storage requires storage resources and bandwidth resources that are idle. Separation of storage and retrieval is more conducive to contributing to IPWeb with low-cost mining machines.



5.1.2 Multichain Structure (Main chain and Side Chains: Multichain and Multi-consensus)

The main chain of the IPW Chain uses PoRep (proof of replication) system and PoE (proof of extract) system. IPW Chain provides the Consensus interface and entities such as POW, POS, DPOS, etc. Developers can create and complete the deployment of their own nodes through the Consensus interface provided by the main chain. For side chains, DPOS can be used with high performance requirements, while POW can be used with requirement of high decentralization.

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5.2 Storage Network

5.2.1 DHT

The essence of P2P is a new network communication technology, which breaks the traditional structure, gradually decentralizes and flattens, so as to achieve the future trend of node equality. The application of P2P file sharing (BTs/eMules, etc.) is the most concentrated embodiment of P2P technology. With P2P file sharing network as the entrance and around a file network system, IPWeb combines its operability with blockchain formula algorithm to design a new flat and decentralized cloud storage network, while retaining the open and transparent characteristics of blockchain.

Distributed Hash Table (DHT) is a distributed storage method. In DHT, a type of information that can be uniquely identified by a key value is stored in a plurality of nodes according to a certain convention/protocol, which can effectively avoid the collapse of whole network caused by a single failure of the "centralized" servers (such as Tracker). Different from the central node server, each node in the DHT network does not need to maintain the information of the entire network, but only stores its neighboring subsequent node information in the node, which greatly reduces the bandwidth occupation and resource consumption. The DHT network also backs up the redundant information on the node closest to the keyword, avoiding the problem of single node failure.

There are many technologies/algorithms for implementing DHT, such as Chord, CAN, Pastry, Kademlia, etc. Considering the technology maturity and market utilization, IPWeb uses the Kademlia algorithm. Kademlia, often referred to as the third-generation P2P technology, is a P2P universal protocol that is suitable for all distributed peer-to-peer computer networks; it defines the structure of the network, and plans the communication between nodes and the specific information interaction processes. In Kademlia, network nodes use UDP to communicate. By a distributed hash table used to store data, each node has its own ID, which is used to identify the node itself and also to assist in implementing Kademlia algorithms and processes.

5.2.2 KAD Network

Nodes in the KAD DHT storage network include the following features:

· NodeID needs to be 160bits or 20bytes in KAD;

· Contact contains NodeID (NodeID), Address (string), and UDP Port Number;

· Bucket [VaugeKConst]*Contact is used in Node′s Routing, a bucket can contain k Node, and all Nodes disappear after 60 minutes;

· VaugeKConst is statistically set to 20;

· Router contains Contact and KBucket; KBucket has a bucket in every bit of the ID.

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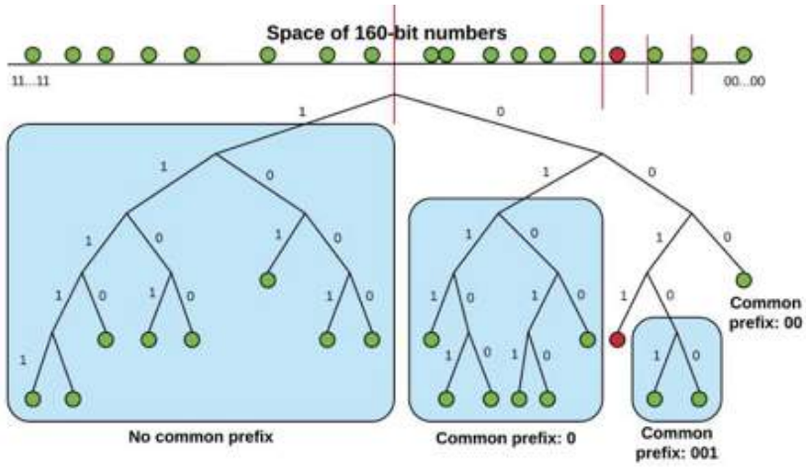
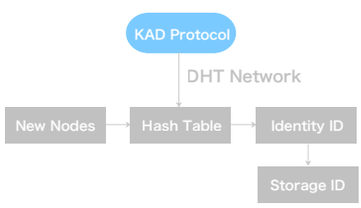


Kademlia uses key values to identify nodes and data on the KAD network. The key value of KAD is invisible and has a length of 160 bits. Each computer that comes in will have a key value that is called NodeID and populated in the key-value space with 160 bits. Since the KAD stores content by a KV (key-value) pair, each data in the KAD DHT is also independent of the space corresponding to the key in the 160-bit key value. At the beginning, a node has no connection with other nodes. After a new node is registered, the link of this node will find the node and save the new NodeID. When the storage overflows, the contact is selectively removed and then organized inside the bucket. The way to find a NodeID from a node is to find another nearest node from a node in a known routing table until the RequestNode is found.

Each KAD node has a 160-bit NodeID, and the key value of each data is also a 160-bit identifier. In order to determine which node the KV pair exists in, the KAD uses the concept of the distance between two identifiers. Given two 160-bit identifiers, x and y, KAD determines the distance between them by their XOR and expresses them as an integer $d(x,y)=x \oplus y$. What XOR (exclusive OR)obtains is the distance that the system binary tree framework defines. n a full 160-bit binary tree ID, the size of the two ID distances is the smallest subtree containing two nodes. When the tree is not a fully binary tree, the leaf closest to IDx is the leaf that shares the longest common prefix withx. For example, the distance between 0011 and 1001 is $0011 \oplus 1001=1010$, and 1010 is 10 by integer expression, so the distance between the two nodes is 10.

5.2.3 Node Identity ID



The identity information of the peer node and the routing rules are generated and formulated by the Kademlia protocol. The KAD protocol essentially constructs a loose distributed hash table, referred to as DHT. Everyone who joins this DHT network must generate their own identity information that allows them to be responsible for storing the resource information and other members' contact information on this network. If the new node A needs to find the contact information of the node B without the contact mode, the node A can obtain it by contacting any node that is associated with the node B.

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5.2.4 Search Algorithm

The node lookup process in KAD is to locate k nearest nodes by the given key value. KAD chooses to use a recursive algorithm in node lookup. The party that initiated the lookup first finds a node from the non-empty k-bucket (or if the bucket has fewer key-value pairs than α, it can only get the α nearest nodes by key value.). The initiator sends FIND_NODERPC to the selected α nodes in parallel and asynchronous mode; α is a concurrency parameter of a system. In the recursive phase, the initiator resends the FindNode to the node that had previously sent the RPC, and the nodes that cannot respond quickly are removed unless they are replied.

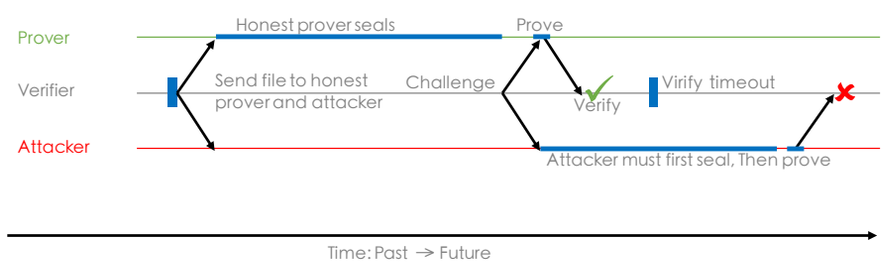
If a round of looking for a node does not find any closer to the nearest observed node, the initiator will resend the FindNode to find k most recent ones that have not been requested. The search process will not end until the initiator receives a reply from the k most recently observed nodes. Each node knows at least one node in each of its subtrees and can locate other nodes through the NodeID. To store a KV pair, the node needs to locate the corresponding k nearest nodes by key value and then send STORERPC; to find a KV pair, the node needs to find the k nodes with the closest key value. However, the value lookup uses FIND_VALUE instead of FIND_NODE, and this process stops as soon as any node returns a value.

5.2.5 Storage Dispute Resolutions

In a distributed storage network, data nodes are scattered in an untrusted edge network, so it is necessary to ensure that the data are stored on data nodes and can resist cheating attacks such as witch attacks, outsourcing attacks, and generation attacks. In the case of considering the existence of malicious nodes, distributed storage systems need to guard against various attacks. IPWEB implements proof of replication (PoRep) and proof of extract (PoE) through the Zero-Knowledge Succinct Non-Interactive Argument of Knowledge (zkSNARK) and the Seal, enabling storage certification with low resource consumption and high efficiency.

Proof of Replication (PoRep)

Different from proof of work and proof of stake, proof of storage is a consensus algorithm used in the field of distributed storage. It incentivizes users according to the storage space contributed by them to the distributed cloud storage platform, as well as traffic, bandwidth, and online duration. The proof allows the user of providing storage services to convince the verifier by providing a proof of copy (π). When the verifier issues a random challenge, the users need to provide the proof to prove that the proof data X relative to the specific copy Y of the prover has been stored in a unique dedicated physical storage district. The PoRep algorithm ensures that each piece of data is stored independently, preventing witch attacks, external attacks and generated attacks.



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Three construction phases of PoRep system:

· PoRep.setup() --> copy Y; copy Hash root, Merkel root of Y; proof of seal π SEAL;

· PoRep.prove() -->proof of storage π PoRep;

· PoRep.Verify()--> bit b (proof of storage validity b1(π PoRep) ^ proof of seal validity b2(π SEAL))

Proof of Extract (PoE)

In order to avoid the waste of computing resources caused by the storage node repeatedly searching, IPWeb has designed a new proof algorithm, Proof of Extract. Driven by the benefits of the token economy, the storage node proactively provides a proof message back to the retrieval miners when it responds to the user’ s retrieval and download requirements. IPWeb does not need to frequently retrieve whether a storage node stores files correctly since only when the file can be successfully retrieved, the network executes a reward smart contract, and the storage node can be rewarded.

The whole process is as follows:

· IPWeb first signs a storage contract with a storage node;

· The storage node starts to store files;

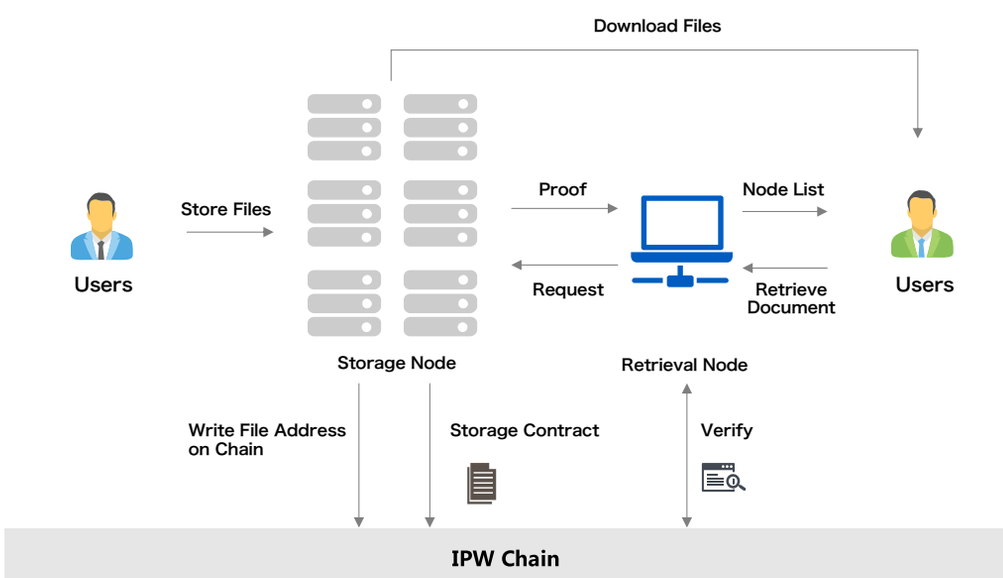
· The retrieval node sends a request to the storage node according to the storage contract when the user retrieves the file;

· The storage node returns a proof of storage to the retrieval node after receiving the retrieval request;

· The retrieval node verifies the proof fed back by the storage node;

· The user successfully calls the file of the node from the list of verified storage nodes;

· The storage node obtains the storage incentives for storing this retrieval.



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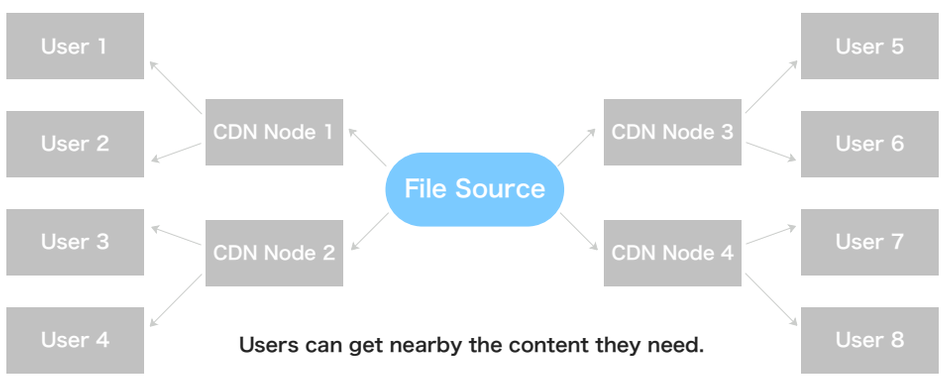
5.2.6 Redundancy Processing

If a node fails to patrol, the system initiates a network replication process by transferring an existing copy of the network to a new node; therefore, the network can return to normal after each inspection. Each fragment is uniquely encrypted, which means that a malicious user cannot pretend to have multiple redundant copies when he has only one copy of a file. We can do this by adding deterministic obfuscation values when centrally encrypting fragments. Even if the decryption key is a known specific file, the malicious user cannot complete the audit of the fragments they are not assigned to. In this way, we can prove the redundancy of a particular fragment, because each redundant copy is unique.

In addition, both users and applications are controlled by the parameters of K-M erasure code technology, and by the distributed redundancy. For simple data storage, users can choose the recommended file storage level setting; however, if the data are particularly important, users can choose a high-level file storage setting to spread the data across multiple storage nodes (including multiple super nodes), which protects the data from special situations (such as natural disasters).

5.2.7 File Distribution Network

The core idea of the file distribution network is to avoid bottlenecks and links on the Internet that may affect the speed and stability of data transmission, so that file transmission is faster and more stable. By placing a layer of intelligent virtual network consisting of node servers throughout the network, the CDN system can redirect user requests to the nearest service node in real time based on network traffic, the connection and load status of each node, as well as the distance to the user and response time. The purpose is to enable users to obtain the required content in the vicinity, solve the congestion of the Internet network, and improve the response speed of users visiting the website.



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5.3 Encryption Security (Searchable Encryption/IP Concealment)

In data protection, the privacy of personal information needs to be prioritized. The second thing to support is the change of dynamic data, that is Dapp's modification of decentralized data storage. Based on the business scenario, IPWeb uses a searchable symmetric encryption (SSE) method consisting of five algorithms, as follows:

K=KeyGen(k): Enter the security parameter k and output the key K randomly generated. This operation is usually performed locally on the data owner side.

(I,C)=Enc(K,D): Enter the key K and the plaintext file set D=(D1,D2, ... ,Dn), and output the index and ciphertext file set. This operation is performed locally on the data owner side.

TW=Trapdoor（K,W）: Enter the key K and the keyword W and output the trapdoor corresponding to the keyword. This operation is performed locally on the data owner side.

D(W)=Search（I,TW）: Enter the index I and the trapdoor TW of the keyword to be searched, and output a set of identifiers of the file containing the keyword W. The Search operation is performed by the key distribution control in Genaro.

Di=Dec(K,Ci): Enter the key K and the ciphertext file Ci, and output the plaintext file Di corresponding to the decryption. This operation is performed locally on the data owner side.

Furthermore, IPWeb separates the storage network and the retrieval network into two layers, improving network efficiency and the user experience. However, the retrieval node is the most easily searched and attacked part of the entire P2P network; therefore, it is necessary to provide additional protection for the retrieval node by encrypting the IP address and preventing the user from directly querying through the IP.

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5.4 Other Technology Innovations

5.4.1 Decentralized Storage

The distribution of files into fragments can better ensure the security of the data since no user has a complete copy as long as the stored file is of standard fragment size. We define the people who rents his or her hard disk space to the network as a user, and define the standard fragment size as a multiple of bytes (8KB/16KB/32KB/256KB/1024KB, intelligently filter the scatter standard based on file size). These are kept at pre-set sizes to prevent malicious storage of small files (For large files, large numbers of fragmentation are more advantageous; for small files, especially for files smaller than a certain size (such as 64M), the P2P transmission efficiency is very low, and it is easy to impose an additional burden on the network).

5.4.2 Peer Rating / Node Classification

All nodes in Filecoin are peer, which brings more decentralization, but at the expense of efficiency. IPWeb will classify storage nodes according to the reliability, and initially decides to divide storage nodes into mobile phones, personal computers, professional mining machines, enterprise-level nodes, and super nodes. Because super nodes and enterprise nodes have very high reliability, fragmentation of all files will be backed up on them first to improve the efficiency and reliability of the IPWeb network.

5.4.3 Storage-level Settings

Users can set the level of the file storage according to their needs. For example, users can set the file loss recovery ratio to 1/3, 1/2, 2/3. The higher the level is, the higher the security (the lower the risk of loss).

5.4.4 Anti-cheating Mechanism

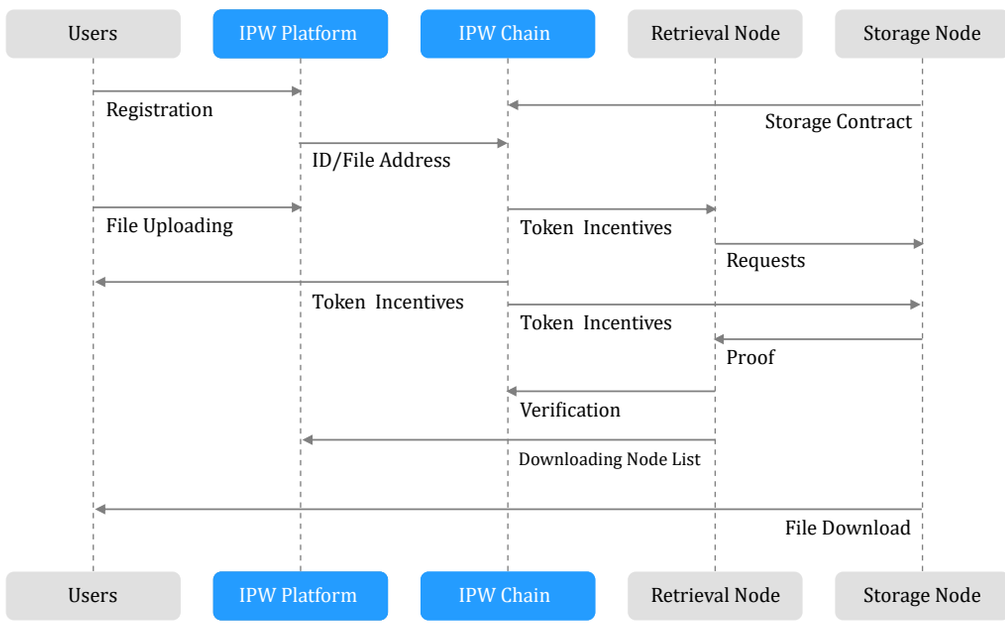
Storage node A and user B may collude to cheat to defraud storage incentives. For example, storage node A lied that it stored 1T file F, and user B lied that he successfully retrieved file F stored in A. We have multiple precautions against this type of cheating. Firstly, we will adopt a dynamic IP mechanism (preventing cheating in brushing machine, retrieval and storage) (change of Peer every time). Secondly, large files are also divided into a larger number of parts on many nodes as they are easier to use for cheating. Moreover, user B may pay for the retrieval, but node A can only get few incentives, while other nodes can get the most storage incentives, which can also effectively inhibit the arbitrage behavior of the brush machine.

5.4.5 IPWeb Browser

The IPWeb browser can access the IPWeb protocol network and is also compatible with the HTTP protocol. Not only that, but users can set the storage space of their personal devices for mining through the browser. The browser will be able to dramatically increase the number of IPWeb users and expand the community. More people can contribute to the IPWeb network and become a consumer of the IPWeb ecosystem. IPWeb will also come with a wallet feature. All browser installed users will also have their own wallet. When necessary, the IPWeb browser can also be compatible with the IPWeb protocol and become the traffic entry for the IPWEB ecosystem.

06 IPWeb Token Economy Model

The economy model of IPWeb is a set of economic incentives mechanism that motivate producers (service providers) and consumers to participate in the IPWeb system and that stimulate the storage and retrieval of the data. IPWeb has a simple and clear underlying incentive model and a rich and scalable multi-layered incentive model.



From infrastructure to C-side content consumption/service provision, there are rich production-consumption relationships in the Internet ecosystem. Multi-level and rich production-consumption relationships can stimulate the vigorous development of the ecosystem. In the early days of the birth of the Internet, the Internet ecosystem was very simple and thin; only large scientific projects and large enterprises were using the Internet, and even producers and consumers are the same people who use the Internet as tools for their work. Later, some people created content on the Internet, and others needed a channel to browse the content. At this time, the browser came into being. Subsequently, producers and consumers were beginning to differentiate. In addition to the producers of the content, the producers of the first layer of tools (browsers) were beginning to appear. Since then, the number of websites had become more and more, and portals such as Yahoo had become a new tool in the Internet ecosystem. The number of producers and consumers of the Internet had further increased, and the growth of the second-tier tools (portal) had also emerged along with further enrichment of the production-consumption relationships. From the past development, we can see that only multi-level and rich production-consumption relationships can support a great ecosystem.

In the underlying economy model, the producers in IPWeb ecosystem are mainly the storage nodes and the retrieval nodes, while consumers are mainly the users who initiate the requests of the data storage and retrieval. Consumers initiate the requests of the data storage and retrieval on the IPWeb, and pay the IPW tokens as the storage gas and retrieval gas. The storage nodes contribute idle storage space and bandwidth, provide consumers with P2P distributed data storage services, and obtain storage gas tokens as rewards. The retrieval

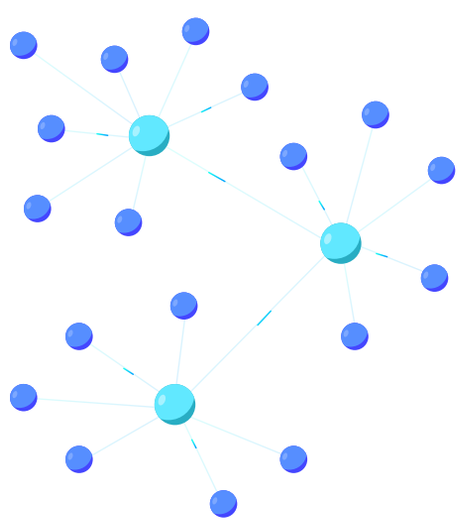
06 IPWeb Token Economy Model

nodes contribute idle computing power and bandwidth, provide consumers with P2P distributed data retrieval services, and obtain retrieval gas tokens as rewards. In addition to the storage rewards and retrieval rewards, some super nodes can also participate in the accounting of the IPW Chain and get the rewards generated by the blocks.

The simple storage and retrieval service can only build a decentralized data storage and retrieval platform, which is a platform for benchmarking the cloud storage services, but such infrastructure is just similar to the first phase of the Internet, with only large enterprises and large projects (such as video imaging companies) considering the costs of P2P storage and becoming corporate paying users. Only with the underlying facilities, but without the rich application-layer producers and consumers, IPWeb cannot support the great idea of decentralized Internet, so IPWeb also designs a high-level economy model based on the underlying economy model.

In the second-tier economy model, as a traffic carrying tool for IPWeb network, the IPWeb browser will have two functions of storage mining and IPW wallet. By setting it in the browser, the users can contribute the idle storage space for storage mining; the rewards obtained by the storage will go directly to the users' IPW wallet. Browser mining allows almost all users to become producers to get IPW incentives. Users can also easily perform payments and transfers in the browser, and those who have IPW in their wallets will be more likely to participate in the high-level economic activities.

In the third-tier economy model, we have a set of economic incentive mechanisms to encourage developers to develop IPWeb-based websites and applications. In this layer, the decentralized Internet ecosystem is close to the centralized Internet ecosystem. The goal of IPWeb is to shape a decentralized version of the Internet application ecosystem, make IPW the currency of this application ecosystem, and allow developers to get IPW profits from consumers to pay for IPW development costs. IPWeb motivates more nodes and users to join the decentralized storage and decentralized Internet through a multi-layered and constantly improving economy model. This is a new era brought about by the sharing economy and the blockchain technology.



07 IPWeb Token– IPW

IPW, a digital asset under the IPWeb sharing ecosystem, is a value measurement storage and incentive tool built into the system and used for tool attributes. The total amount of IPW is 100 million and will never be issued. The value can be transferred between the main chain and side chains, and between side chains, such as the payment of transaction fees, the purchase of storage services, the incentives to contributions, etc. IPW is the blockchain-based certificate of rights and interests, the key element of a distributed storage system, and the economic driver that drives users to contribute storage space and bandwidth. The value of IPW is endorsed by the storage, the bandwidth and the revenue that utilizes these resources. By realizing the commercial operation of the platform, the actual value of IPW under the ecosystem will be gradually improved. In addition, IPWT(IPW Token) will be issued as a circulating token. The initial number of issuance is 10 billion, and it will be destroyed by stages to 100 million in one year after issuance. The main network token (IPW) and the circulating token (IPWT) are equivalent,i.e. 1 IPW = 1 IPWT, and The official exchange channel is available.

IPW	
Source	IPW Chain
Uses	Payment of Transaction Fees, Purchase of Storage Services, Incentives to Contributions, etc.
Users	IPWeb Ecosystem Participants

The Uses of IPW

IPW is a native Token issued by IPW Chain and will be used for:

· Ecosystem incentives (including maintaining public ledger, uploading and sharing content, contributing storage space and contributing retrieval power);

· Fees for file storage and smart contract deployment;

· Fees for retrieval and file downloading;

· Gas costs for trading.

Users can obtain IPW by:

· Campaigning super nodes and participating in public ledger maintenance to obtain the accounting incentives of the platform;

· Joining the retrieval node and sharing the computing power to obtain the retrieval incentives of the platform;

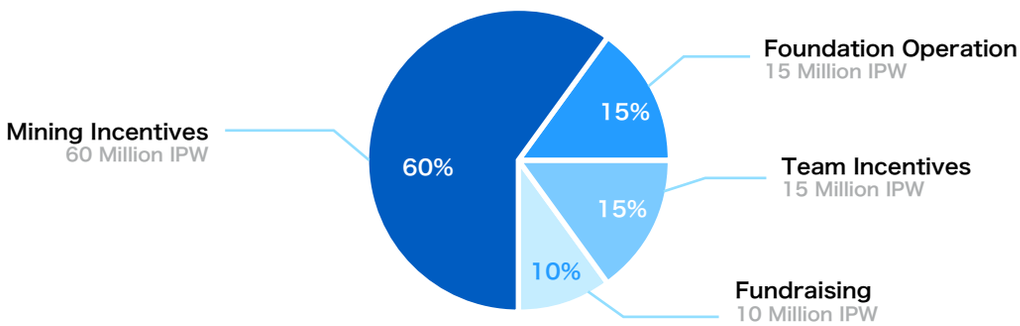
· Sharing storage space to obtain the storage incentives of the platform;

· Contributing traffic to the platform, uploading content and sharing content to make more users share premium content;

· Trading on the market (including giving, purchase, etc.).

07 IPWeb Token– IPW

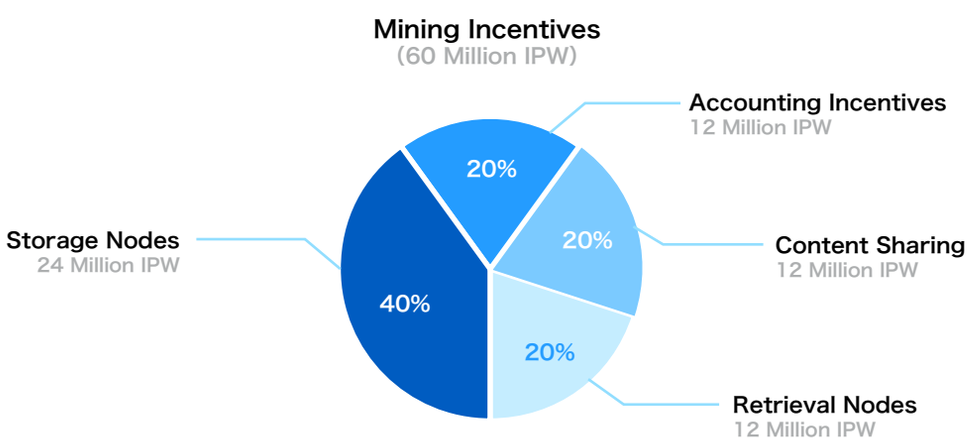
7.1 The Allocation of IPW



Note: The 15% IPW held by the founding team will be locked for 2 years and then released linearly in 2 years.

7.2 IPW Incentives

Users can obtain IPW by contributing their own resources (storage space, computing power, content, etc.). IPWeb provides 60% of the total IPW(60 million) to motivate users to build the IPWeb ecosystem, of which 20% is used for public ledger maintenance to ensure the stability and effectiveness of the entire IPWeb-based public ledger, 40% for mining incentives for storage nodes, 20% for user content upload and sharing incentives to enrich the ecosystem of IPWeb, and 20% for incentives of retrieval nodes.



07 IPWeb Token– IPW

7.3 The Release Rules of IPW

From the date of starting mining, the block output will gradually decrease, and all IPW will be completed within 10 years. The time for the block is 1s. After 10 years, the block no longer generates new IPW. The IPWeb platform will go online the demand docking system, after which the miners' incentives are provided by the demand sides. In the IPW ecosystem, the more resources users contribute, the more IPW they will get. IPW is allocated every 24 hours. The system allocates IPW obtained by users and nodes in each valid period within 24 hours and writes the information on the IPW Chain.

08 IPWeb Application Scenarios

8.1 Distributed File Storage

The IPWEB distributed storage platform provides the basic cloud storage service. Customers can easily access and use the IPWEB cloud storage service through OpenAPI, which makes the service safer, more reliable and cost-effective.

8.2 Distributed File Sharing

The distributed sharing platform is based on the storage service of the distributed storage platform. Users can share their files such as digital media or other valuable content, and they can set a certain amount of IPW incentives for the sharing according to the specific content. If other users want to download or view the files in full, they will need to pay the corresponding amount of IPW as incentives to the uploader. As a file sharing service platform, IPWEB will review and manage content uploaded by users in strict accordance with the legal requirements of the location where it operates.

8.3 Multimedia Applications

At present, the traditional online video websites adopt the centralized storage service that requires high storage costs and bandwidth charges, and the related expenses are converted into watching long-time advertisements and restricting non-members' viewing. However, the use of IPWeb as the storage service will greatly reduce the redundancy of the same resources, and at the same time save a lot of bandwidth costs generated by users when playing video, which makes watching video more efficient and cheaper.

8.4 Digital Content Trading

Thanks to the blockchain technology and the distributed storage technology, the IPWEB storage platform is ideally suited for copyright transactions of long-tail content to store. Distributed ledgers can provide open, transparent and unalterable records for transactions, and also leave an unalterable and unique digital signature on the blockchain for the digital content work as a copyrighted logo. With the support of the IPWEB platform, a large number of long-tail videos, audios and photography creations have a low-cost and sustainable trading platform.

8.5 Social Applications

A decentralized social network can be created by the technology of IPWeb. As a decentralized application, the IPWeb network allows social applications to work without any central point and is completely peer-to-peer.

09 IPWeb Ecosystem

9.1 Storage Ecosystem

Storage miners provide data storage for the network and participate in IPWeb operations by providing disk space and responding to customers' requests. To become a storage miner, users need to provide storage space and bandwidth resources. Miners earn IPW by storing the users' data segments into the sector, and respond to the users' requests of storage by storing the data for a specific time. Miners generate proofs and submit them to the blockchain network to prove that they have stored the data for a specific time. If the data fail or are lost, the storage miners will be fined for partial IPW. The workflow of storage miners is as follows:

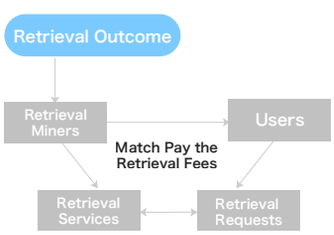
· Storage miners store the mortgaged IPW on the blockchain to ensure stable storage to the network. The mortgaged IPW exist to guarantee the service. If miners generate the proof of storage for the stored data, the mortgaged IPW will be returned; in contrast, if failing, they will lose the mortgaged IPW.

· Once the mortgage transactions occur on the blockchain, miners can provide storage services on the market.

· Once orders are matched, storage miners will receive customers' data. After the data are received, miners sign the transaction orders with the customers and submit them to the blockchain.

· When storage miners are assigned data, the proof of storage must be generated repeatedly to ensure that the proofs they are storing data are published on the blockchain and verified by the network.

· After the verifications are successful, storage miners will receive the corresponding storage incentives.



9.2 Retrieval Ecosystem

The retrieval miners provide data retrieval services for the network and participate in the IPWeb operations by providing the data needed by retrieval requests of users. Unlike storage miners, they don't need to mortgage IPW, submit storage data or provide proof of storage.

9.3 Application Developer Ecosystem

IPWeb needs more business to prosper the entire ecosystem and requires corresponding application developers to run the business to allow more users with storage requests to come in.

9.4 Application Service Ecosystem

IPWeb provides users with the services of file storage and retrieval; users use various services provided by IPWeb through IPWeb browser.

10 IPWeb Planning

2018 Q2

- IPWeb Project Approval
- IPWeb Team Building

2018 Q4

- IPWeb Main Chain (Beta)
- Block Browser (Beta)
- File Browser (Compatible with HTTP)
- Picture Sharing Website (www.ipweb.io)
- IPW Mining Machine Prototype

2019 Q1

- IPW Mining Machine Presale
- Open Beta Test of IPWebChain Main Network
- Open Beta Test of IPWeb Browser
- Open Beta Test of IPW Wallet
- Open Beta Test of Application Layer Products

2019 Q2

- IPW Mining Machine Sales and Ecosystem Construction
- Ecosystem Construction of Application Layer Developer, etc.
- Browser Online (Browser Mining)
- Domain Name Promotion
- IPW Wallet Online and Promotion
- IPWebChain Main Network Online

2019 Q3

- Ecosystem Construction
- Application Layer Products Online

11 Team Structure

Richard

CEO & Founder

Master of Engineering in Japan, major in fuzzy mathematics and artificial intelligence. Richard has led the development of the projects of speech recognition, image recognition, distributed storage, P2P communication, blockchain technology, and founded a software company that reached a scale of more than 1,000 people.

Edward Nakamoto

Co-Founder

More than 15 years of experience in financial system software development; participation in the architecture and base development of several large financial software systems.

Edward Nakamoto began to participate in several blockchain POC projects in 2015. He is well versed in the design of alliance chains, private chains and smart contracts, and now focus on the promotion of blockchain technology, business proposals and the landing of blockchain projects.

Zhu

Architect of Big Data and Application Platform

Department of Computer Science, Tsinghua University.
Zhu has worked for IBM and Motorola.
20 years of working experience in the software industry has given him extensive project experience in the architecture and application of the Internet of Things and big data platforms.

Tom Li

Blockchain Architect

IT consultant, system architect; proficient in business proposals.
Tom Li has been developing blockchain products and designing ICO distribution solutions since 2013.
He has worked for IBMand KPMG, and has served as the cheif investigator and lecture of the blockchain for the enteprises.

Phenix Cho

System Architect

More than 15 years of experience in the design and practical construction of platform architecture for large-scale systems. Phenix Cho focus on open source software technology.
He has served as a technical partner of an electronic music sharing community and has rich practical experience in application development.

11 Team Structure

Taiyong King

AI Architecture Expert

Doctor of Engineering (Computer Science), Kyushu University, Japan; nearly 20 years of experience in the software industry, familiar with a variety of open source technologies.
Taiyong King has extensive project practice and management experience in the fields of industrial internet, artificial intelligence and big data.

Ian

Expert in Open Source Software and Network Communication

More than 20 years of experience in system software development, familiar with a variety of open source software technologies. Ian concentrates on the development of Internet application system, and has rich experience in the research and development for WEB front-end, mobile end and back-end.

Peter Pan

Internet Full Stack Engineer

Good at PC and mobile application development, and background applications and server construction.

Tommy

Blockchain Engineer

IT engineer; rich experience in web design and development and Ethereum smart contract design and development; good at mobile application development and design.

Logan Yokoyama

Media Promotion Expert

SNS New Media Promotion Expert; 5 years of working experience in Silicon Valley, USA; familiar with various media promotion in Japan and the United States.

Charity Liu

Head of Community Promotion

Proficient in market planning, publicity and promotion; rich marketing experience in Japanese and English channels.

Cony Hirano

Data Analysis and Market Planning

Good at data analysis and market information collection of block chain industry; proficient in marketing activities planning.

12 Community Governance

In order to ensure the healthy and orderly development of IPWeb project, the IPWeb team proposed a decentralized governance structure that can solve the governance problems of blockchain projects. A decentralized governance structure is established to solve the problem of fair decision-making through the voting mechanism of all the holders. All IPW holders can participate in the governance of the IPWeb community by voting, one IPW for one vote.

12.1 Governance Mechanism

IPWeb intends to operate and govern the community in three layers: community conference (network form), autonomous committee and operation committee. The community conference is the entire IPW holders' conference (network form) and the highest decision-making body of the IPWeb project. IPW holders have the rights to vote and stand for election in the community conference. The IPWeb Foundation, the main body of IPWeb governance, is responsible for the community conference, implementing community conference resolutions, selecting and appointing members of the operations committee, supervising the work of the operations committee, safeguarding the rights and interests of IPW holders, publicizing and promoting IPWeb brand, etc. The operation committee is responsible for the daily operation and management of the IPWeb project. It consists of research and development center of blockchain, the business center, the finance department, the legal affairs and risk management department, and the general affairs department, which respectively complete the corresponding tasks.

1、IPWeb Community Conference

The IPWeb community conference, which is composed of all IPW holders, is the supreme authority of the IPWeb project, exercises the following powers:

· Amendment of the IPWeb Management Charter;

· Supervision of the implementation of the IPWeb Management Charter;

· Election and change of IPWeb Foundation members (considering the particularity of the initial stage of IPWeb, the first IPWeb Foundation members are determined by the IPWeb project legal entity and the founding team);

· Revocation of inappropriate decisions by the IPWeb Foundation;

· Approval of major changes to IPWeb.

The voting rights of the above resolutions shall be in the form of the number and time weight of IPW held by IPW holders.

The IPWeb Management Charter is the constitution of the IPWeb autonomous system. The publicity window is the IPWeb official website. IPWeb Management Charter is planned to be published within six months of trial operation of IPWeb, and the first version of Management Charter is formulated and published by the autonomous fund committee.

The IPWeb community conference is held once a year; however, if the IPWeb Foundation deems it necessary, or more than one-fifth of the IPW holders propose, the IPWeb community conference can be held temporarily.

2、IPWeb Foundation

The IPWeb Foundation is in charge of the command and supervision of IPWeb operations, IPWeb community conference, and the implementation of the conference decisions. The

12 Community Governance

IPWeb Foundation exercises the following powers:

· Convening of IPWeb community conference and reporting to the conference;

· Implementation of the resolution of the IPWeb community conference;

· Appointment and dismissal of the CEO of IPWeb operations committee, and appointment and dismissal of other members of the executive committee based on the nomination of the CEO of the IPWeb operations committee;

· Resolutions of the IPWeb basic management system;

· Resolutions on major problem resolutions such as IPWeb open source code and the use of funds;

· Response to emergencies of IPWeb.

With six members and one chairman, the members of the IPWeb Foundation are appointed for a term of one year and can be re-elected. The chairman of IPWeb Foundation is elected by the committee. The IPWeb Foundation convene a plenary conference at least every six months. The conference is proposed by the chairman or more than half of the members, and all members are notified 15 days before each conference. The resolutions made by the IPWeb Foundation must be approved by members of the Foundation and posted on the IPWeb website.

The chairman of the IPWeb Foundation exercises the following powers:

· Hosting and convening of the IPWeb community conference and hosting of the IPWeb Foundation conference;

· Inspection of the implementation of IPWeb Foundation resolutions;

· One-vote veto on the resolution of the IPWeb Foundation conference;

· Signing of the IPWeb external cooperation agreement.

3、IPWeb Operations Committee

The IPWeb operations committee is in charge of the daily operation and management of IPWeb project. There is a CEO who is responsible for the IPWeb Foundation; the members are mainly the heads of the functional departments.

The CEO of the operations committee exercises the following duties:

· Organization of the daily operation and management of IPWeb, implementation of IPWeb Foundation resolutions, and drafting of the IPWeb management system;

· Decisions to appoint or dismiss members of the Operations Committee or other senior managers;

· Drafting of solutions for issues of the IPWeb open source code and the use of fund.

12.2 Information Disclosure

In order to protect the interests of investors, strengthen the supervision of the management and use of digital assets raised by ICO, and promote the healthy development of IPWeb projects, the IPWeb project sets up an information disclosure system that the annual report is prepared and disclosed within three months from the date of each fiscal year, and the quarterly report is disclosed within two months after the end of each quarter. The report includes, but is not limited to, the progress of IPWeb project technology development, market operations, digital asset management, performance and changes of core team members, financial revenue and expenditure, important business cooperation matters, and legal proceedings related to IPWeb.

13 Risk Statement

Participants in the IPWeb project, please read the white paper carefully, fully understand the technical characteristics of IPWeb, the risk-return characteristics of IPWeb, and comprehensively take into account your own risk tolerance, participate rationally and make prudent decisions. Whether as a purchaser, user or investor, it may face the following risks:

Political Risk

Blockchain technology has become the subject of regulation in all major countries in the world. However, the current policy regulation in the areas of blockchain and digital currency is unclear; therefore, if the relevant policy changes in the future, the project may be affected.

Risk of Development Progress and Technology

Due to external factors or the inadequate execution of product development cases, the development schedule may be slowed down; the IPWeb landing application may cause poor user experience or even loss due to problems such as untimely updates and serious functional defects.

Cybersecurity Risk

Hackers or other organizations have the possibility to attempt to destroy the functions of IPWeb applications or IPWeb tokens in any way, including service attacks, Sybil attacks, guerrilla attacks, malware attacks or consistency attacks. In addition, the rapid development of cryptography and quantum computers may bring the risk of cryptocurrency and IPWeb platforms being cracked, which may lead to the loss of IPWeb tokens.

Risks Associated with the Credentials

Any third party who obtains the purchasers' login credentials or private key may directly control the purchasers' IPWeb tokens. To minimize this risk, the purchasers must protect their electronic device from unauthorized access requests passing through and accessing the device content.

Risk of Brain Drain

The situations are not conducive to the project development, including the shortage of talent resources in the blockchain field, the loss of core technical and operational talents of the team, and the disclosure of nuclear technology secrets.

Risk of Market Competition

There is a possibility that IPWeb applications are not used by a large number of individuals or organizations, which means that the public does not have enough interest to develop these related distributed applications. Such a phenomenon may have a negative impact on IPWeb applications. Furthermore, IPWeb platform has an impact on traditional business factoring and bank pledge business, and therefore, when the competitors make market adjustments in the future, some users and resources will be lost.

Transaction Risks

There is a possibility that IPWeb applications are not used by a large number of individuals or organizations, which means that the public does not have enough interest to develop these related distributed applications. Such a phenomenon may have a negative impact on IPWeb

13 Risk Statement

applications. Furthermore, IPWeb platform has an impact on traditional business factoring and bank pledge business, and therefore, when the competitors make market adjustments in the future, some users and resources will be lost.

· Property loss

Since IPWeb applications are currently in the development phase and may undergo major changes before the release of the official version, IPWeb's own or the buyer's expectations of the function or form of the IPWeb applications (including the behavior of the participants) may not meet expectations, and any price inconsistency caused by incorrect analysis may result in loss of user property.

· Risk of not participating in insurance

Unlike accounts of banks or other financial institutions, assets stored on IPWeb accounts or Ethereum networks are generally not covered by insurance, and in no case will any open individual organization cover your losses. However, institutions such as FDIC or private insurance companies will provide protection for buyers.

· Dissolution risk of IPWeb

IPWeb projects can be hit or directly disbanded at any time for a variety of reasons, including fluctuations in ETH prices, problems with IPWeb application development, disruptions in business relationships, or intellectual property claims.

14 Disclaimer

IPWeb is a non-profit system. The system's internal incentive mechanism and the operation and maintenance mechanism will use virtual digital assets (ie, virtual goods) rather than monetary incentive mechanisms as the incentives. The digital tokens generated by the system itself can be used as rewards for system maintenance, but in order to exchange resources between the system and other systems or other social entities, a certain amount of Bitcoin or other virtual assets are needed. Accordingly, the assets acquired from IPWeb are only similar virtual digital assets, such as Bitcoin. The white paper only intends to convey the purpose of the information and does not constitute any investment advice, investment intention or instructed investment. The white paper does not constitute or be construed as any purchase or sale, any invitation to buy or sell, any form of securities, or any form of contract and commitment. Participants in the IPWeb project, please be sure to read this white paper carefully to fully understand the technical risk-return characteristics of the blockchain, consider your own risk tolerance, judge rationally and make prudent decisions. Once you participate in the project, it means that you understand and accept the risk, and are willing to bear the corresponding results or consequences.

IPWeb - High performance public chain based on P2P storage

WEB http://www.ipweb.io/

Email contact@ipweb.io