BTD Whitepaper

A Distributed Edge Cloud Storage Chain
Based on the Sharing Economy

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BitRice Foundation (Singapore)

Abstract

BTD project is the first distributed edge cloud storage chain in the world. It targets at building a super cloud storage that is globally distributed and deployed close to network end users, responds rapidly, non-stop, never powers out, is intrinsically remote disaster-tolerant, self-healing and unlimitedly expandable, with data privacy and security guaranteed, and building a super media with massive data.

The massive storage and computing resources of the BTD project are open to technology partners. Based on the BTD project, technology partners can develop cloud drive services for individual users, data backup services for enterprise users, and various storage and computing service applications for other application areas, creating huge value by leveraging spare storage and computing resources, hence to take the lead in the era of distributed data storage and edge cloud data storage, and create a new era for the implementation of blockchain applications.

The BTD project is open to global storage hardware, and users can become BTD nodes by contributing their storage space. All nodes in the network work together to form a distributed storage chain that has unlimitedly expandable capacity, is intrinsically remote disaster-tolerant and capable of self-healing. The nodes gain corresponding HDT storage points

according to their comprehensive contribution in terms of storage capacity, online rate, network performance, and actual service quality. According to the comprehensive contribution of nodes to the stable operation of the entire network, such as contribution ratio of the day, historical contribution ratio and contribution ratio for future development, the nodes will gain corresponding BTD incentive points. **HDT is generated base on the PoCR (Proof of Capacity Reliability) algorithm, which is a storage point with stable value and at low cost. It enables the various dApp applications in the chain to acquire massive users for the BTD project in a fission way. BTD is generated base on the PoS (Proof of Stake) algorithm, which represents storage value of the entire network and is limited in terms of the total amount. Some BTD will be destroyed during operation, so they are born with intrinsic value growth momentum.**

The HDT+BTD incentive system is the first solid incentive system in the global distributed storage field, which is an inevitable requirement after the cloud drive applications on the storage chain are implemented, represents an inevitable trend in the distributed storage field, and is of far-reaching significance. The BTD project predicts that, after its applications are truly implemented, all distributed storage projects will actively or passively adjust their incentive systems from a

single incentive system to a solid incentive system similar to the "stable points + incentive points" as in the BTD project. Outstanding incentive mechanisms represented by HDT+BTD will also greatly stimulate the passion of the nodes and lay a long-term and solid foundation for the sustained and rapid development of the BTD storage chain.

The BTD project helps users to commercialize spare storage space and computing resources through sharing. In the future, it can also help users to realize the values by sharing the original digital content (photos, videos, articles, live broadcasts, etc.) stored, enable value circulation with the blockchain technology and reconstruct the cloud storage industry ecology with distributed technology.

The BTD project is an edge cloud storage infrastructure to satisfy data storage needs of IoT and 5G, which is bound to create enormous economic and social value.

Content

1 Overview

1.1 Cloud Storage

Cloud storage is a cloud computing system focusing on data storage and management. To put it simply, it is to place storage resources such as hard drives on the cloud for access by others. Users can easily access and store various data at any time, from anywhere, through any Internet-enabled terminal devices.

1.2 Public Cloud, Enterprise Cloud, Private Cloud/Home Cloud

Public cloud is the cloud storage that provides services to massive number of users with centralized and collective IDCs. All user files are collectively stored in the IDCs of the public cloud.

Enterprise cloud is the cloud storage based on the IDCs or infrastructure of an enterprise, which provides services only to internal users of the enterprise. It generally does not provide services to users outside the enterprise.

Private cloud/home cloud is a private cloud primarily intended for individuals/families. To understand it simply, the private cloud smart hardware is a cloud storage server in reduced size that is deployed at home. All user files are stored only in physical private cloud/home cloud smart hardware, instead of the cloud server.

1.3 Edge Computing and Edge Cloud

Edge computing is a distributed computing form that stores primary processing and data at the edge nodes of the network. According to the Edge Computing Consortium (ECC), edge computing refers to an open platform that integrates core capabilities including network, computing, storage, and application on the edge of the network close to things or data sources. It provides nearby edge intelligent services to meet the key requirements of industry digitalization in the areas of agile connection, real-time service, data optimization, application intelligence, security and privacy protection.

Edge cloud is the computing and storage service provided by the edge computing network.

As the edge cloud is deployed close to the end users of the network, it has the technical characteristics of low latency, large bandwidth, large connectivity and localization. Driven by the 5G and IoT industries in the future, edge cloud is rapidly becoming an industry hotspot.

1.4 Development of Global Public Cloud Drives

At present, public cloud drives that serve individual users mainly include iCloud, OneDrive, Dropbox, as well as Baidu Netdisk and Tencent Weiyun in China.

According to the technology system of public cloud, **centralized public cloud** service providers can view all file data stored on the public cloud, and **the privacy cannot actually meet users’ needs**.

In addition, before providing service, centralized cloud drives require large-scale initial investment in infrastructure and storage servers, resulting in high construction cost, and they also need a team of professional engineers to safeguard its operation, hence the cost for continuous operation and maintenance is also very high. On the other hand, users of early public cloud drives subscribed free of charge, although user traffic was brought in, how to commercialize the massive user traffic poses a great challenge. As of 2015, the above issue continuously deteriorates, and due to continuous loss, free public cloud drives open to individuals in China shut down successively, some public cloud drives including 360 Yunpan and Kingsoft Kuaipan stopped providing service to individuals, announcing the golden age of centralized public cloud drive in China had gone.

Globally, public cloud drives represented by DropBox have been continuously developing in recent years, which indicates from another aspect that the demand of individual users for secure data storage is still rising, and secure data storage is still a huge industry with a long-term upward trend.

1.5 Sharing Economy

Sharing economy has become the direction and consensus of the present social development. **Sharing economy encourages people to share their spare resources with others, thus accelerating the flow and full**

utilization of social resources, and providing sharers with corresponding returns.

Sharing economy is a socio-economic ecosystem that encourages people to share material resources. For example, Uber is the representative of global sharing mobility, while the BTD project is the representative of global sharing storage.

1.6 Sharing Storage

Sharing storage is a distributed storage network consisting of sharing storage nodes (various private cloud storage hardware) distributed in different regions. Each sharing storage node provides certain storage capacity resources and forms a massive pool of storage resources to jointly provide sharing storage service. Sharing storage service builds a distributed storage network based on certain redundancy and security rules, and allows users to securely and quickly access the storage content required in the nearby, with the privacy and security of user data well protected.

Sharing storage can effectively reduce the cost of building massive storage resources, improve the responsiveness of storage services, and enhance users' experience of storage. Sharing storage can make full use of the sharing edge nodes to infinitely expand the layout and number of nodes, improve the security and stability of the storage network, and realize in the meantime file storage and transmission within a one-kilometer radius.

1.7 BTD Project

The BTD project is open to global storage hardware, and users can become BTD nodes by sharing their spare storage space. All nodes of the network work together to form a distributed storage chain that has unlimitedly expandable capacity, is intrinsically remote disaster-tolerant and capable of self-healing, establishing a securer, faster, and more practical massive distributed cloud storage.

Since BTD nodes are deployed at the edge of the network that is close to end user, the massive service nodes can directly provide localized edge cloud storage service with low latency, large bandwidth and large connectivity to end users and various IoT application scenarios. It is the edge cloud infrastructure for the 5G and the Internet of Things in the future.

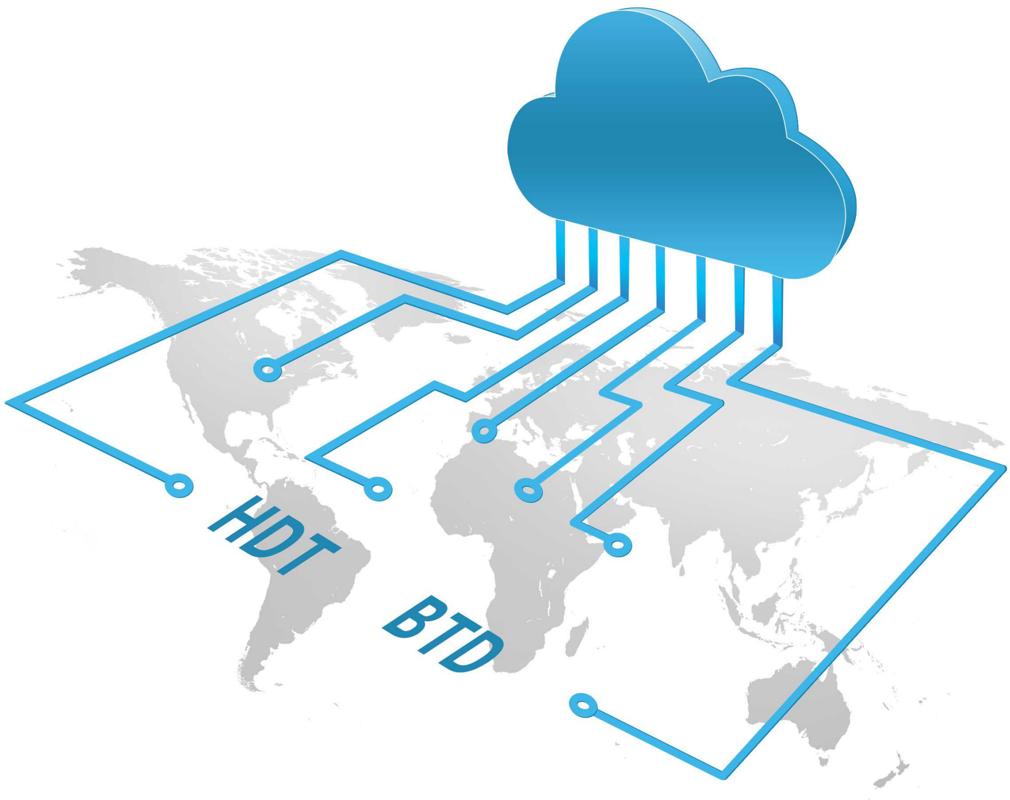
1.8 Storage Points (HDT) and Incentive Points (BTD)

According to the comprehensive contribution including the size of storage space contributed, online rate, network performance, actual storage service quality and actual retrieval service quality, BTD project nodes will receive HDT storage points as a reward.

HDT points reflect the amount of work a node contributes on a daily basis to BTD project operation.

Through weighted quantitative evaluation of the proportion of node workload to the total workload of the entire network, the contribution ratio of the node to the entire network can be obtained, and the node can receive project incentive points BTD according to the contribution ratio.

HDT is the virtual fuel that drives the daily operation of the storage chain, while BTD is the carrier of storage capability and service value of the storage chain, which is used to motivate the nodes to provide long-term and stable service, and encourage more nodes to join the BTD storage chain.



1.9 InterPlanetary File System (IPFS)

The InterPlanetary File System (IPFS) is a peer-to-peer distributed file system and hypermedia distribution protocol, which aims to make the Internet more secure and more open. The technical path of IPFS is to provide a global and unified file storage and addressing space for everyone, and its objective is to replace HTTP and become the underlying protocol for the next-generation of Internet.

IPFS replaces the domain-based addressing of HTTP with content-based addressing. When IPFS is requested for a file hash, it will use a distributed hash table to locate the node where the file resides, retrieve the file and validate the file data. IPFS has no limit on storage capacity and is a global peer-to-peer distributed storage network where large files will be fragmented and obtained simultaneously from multiple servers when being downloaded.

As long as the file CID is available, it can be retrieved and accessed from anywhere in the world.

1.10 FileCoin

FileCoin is an incentive layer project based on the IPFS protocol, which targets at encouraging more storage devices to join the IPFS network and providing public storage space for the IPFS network.

1.11 Similarities and Differences between the BTD Project and the IPFS (FileCoin) Project

The BTD project and the IPFS (FileCoin) project share something in common that they have built an incentive system to encourage storage devices to join the distributed storage network and provide storage space for the project. The incentive system of the BTD project is HDT storage points + BTD incentive points, and that of the IPFS (FileCoin) project is FIL. The BTD project and the IPFS (FileCoin) are different in the way that the objectives of the two projects are fundamentally different. The different objectives have determined that these two projects have different requirements and design of the distributed storage network. These two projects do not have overlapping functions and cannot replace each other, but they are mutually related.

The objective of IPFS (FileCoin) is to replace the HTTP protocol and become the underlying protocol of the next-generation of Internet. Therefore, its distributed storage network is targeting public service and does not provide dynamic file storage, multi-copy, file content encryption, access authority and similar functions. **As a consequence, the technical route of the IPFS (FileCoin) project is not suitable for implementing non-public services that require high privacy, such as cloud drives; while cloud drive applications that emphasize privacy and security are the number one objective of the BTD project.** The BTD project has built-in related underlying design for file fragment encryption, redundant multi-copy, dynamic storage, etc., and its objective is to become the world's largest distributed cloud drive and edge cloud storage infrastructure, providing distributed edge cloud service for the future IoT and 5G era.

	IPFS/FileCoin project (Fil)	**BTD project (HDT+BTD)**
Incentive system	FIL	HDT storage points + BTD incentive points Storage points: to facilitate storage transactions Incentive points: to motivate nodes and users
Incentive objective	To motivate nodes to provide storage resources	To motivate nodes to provide storage resources
Algorithm	PoSt+PoRep	PoCR+PoS

	(Proof of Spacetime + Proof of Replication)	(Proof of Capacity Reliability, Proof of Stake)
Project objective	**To replace the HTTP protocol**	**Cloud storage**
Project characteristics	**Providing storage service for public information announcement**	**Providing user data storage service**
Providing public storage service	**Test network being operated**	**Achievable.** **User selects storage in plaintext and the content is open to the public.**
Provide cloud storage service	**Unlikely to achieve.** **The underlying protocol needs to be substantially modified, making it meaningless and impossible to implement.**	**In April 2019, the world's first blockchain cloud drive based on the BTD storage chain has been successfully developed**
Technical difference	**As long as CID is available, anyone can access the file content for the purpose of providing public service** Uniqueness of file, non-dynamic file storage Data encryption, access authority, data backup and other issues are addressed by upper level applications	**File fragments are encrypted so the file content can only be accessed by the user, and every user has full sovereignty over his/her own data** Dynamic file storage Redundancy algorithm + multi-copy to guarantee data security
Network requirements	**The storage node needs to have a public IP address.**	**Support penetration,** **the storage node does not need a public IP**
Typical applications	Business client: provide public information service after purchasing IPFS storage space	Consumer user: use blockchain cloud drive based on the BTD storage chain Business user: use the BTD storage chain for data backup
User increment	**Consumer user does not use storage resources directly**	**Consumer user uses storage resources directly**

	End user increment: Small	End user increment: Massive, fissile
Project progress	The project is expected to launch in the fourth quarter of 2019	In April 2019, the BTD main network went online. The test network formerly known as BTR has switched to the main network.

2 BTD Ecological Chain

The BTD project is built, operated, serviced and managed by the BitRice Foundation (Singapore).

The owner of storage devices that meet the requirements of the BTD project agreement can voluntarily sign the Mutual Benefit Plan of the BTD project, voluntarily share their spare storage space to participate in the BTD project, and become nodes of the distributed storage network, thus obtaining the corresponding BTD digital assets as a reward. Node users may also quit the Mutual Benefit Plan of the BTD project according to their own needs.

The BTD project has gained support from a number of well-known cloud storage hardware manufacturers. A BTD node plan for non-specific hardware is also coming soon. The BTD project will be an elastic storage chain that is widely spread around the globe, grows explosively and expands unlimitedly. The greatly reduced storage cost will make the BTD project a leader in the cloud storage market and a benchmark in the distributed cloud storage industry in the next 3-5 years, which will occupy a major share of the centralized cloud storage market and change the global cloud storage ecosystem.

The BTD project used to run a test network formerly known as BTR. In April 2019, after the main network of the BTD project officially went online, the original BTR test network switched to the main network and will be shut down within a certain period of time, and the project fully steps into the BTD main network era.

3 BTD Nodes

The BTD project opens to global storage hardware, and users can become nodes by contributing their spare storage space. The BTD project supports two types of storage nodes: the dedicated nodes and the non-dedicated nodes:

3.1 Non-dedicated Storage Nodes

In the present market, there are a wide variety of private hardware such as intelligent hardware and PCs with storage capabilities. Generally speaking, storage capacity of private hardware is mainly used for self-supporting storage, but sometimes there are quite some storage spaces that are not used for a long time. If the user is willing to contribute his/her spare storage steadily and in the long term, the user's private hardware becomes a non-dedicated storage node.

3.2 Dedicated BTD Storage Nodes

The core function of the dedicated BTD storage nodes is to provide storage space, bandwidth resources and computing resources for the BTD project, and they do not carry other services. According to the different deployment locations, the dedicated nodes of the BTD project can be divided into two major categories: home nodes and professional nodes.

Home nodes are relatively small in size and low in noise, and are suitable for ordinary home users to participate in the BTD network.

Professional nodes generally adopt standard rackmount server design, which are more suitable for deployment in small server rooms, especially in areas with better bandwidth resources. They provide excellent network resources for the BTD network, and are more suitable for professional users to participate in the BTD network.

During test operation of the BTD network, a number of non-dedicated BTD storage nodes and professional BTD nodes of different brands/models from different partners have joined the BTD project. The various BTD storage nodes have experienced a number of software and hardware iterations, and a solid network foundation has been laid for the BTD network.

4 Basic Blockchain Framework of the BTD Project

4.1 What is a Blockchain?

Blockchain technology enables recognition and verification of information through collaboration of the participating parties in the system on the basis of the consensus technology in an environment where mutual trust is not required for the multiple parties. In this kind of collaboration, a reliable and tamper-proof data log is jointly recorded, maintained and confirmed by multiple nodes in a decentralized way. Blockchain technology enables users to have complete control and trust over the data with no need of a central server environment with single nodes, making production relations in the digital age more reasonable and more secure, and providing more effective incentives to users.

Because block data is generated with cryptography, and data blocks are chained together through data fingerprints, the structure is called the blockchain. Since each full node has all transaction records or data log ledgers, it is also called the Distributed Ledger Technology.

The Bitcoin network is a representative project of the blockchain technology and the first successful application.

platform ChainSQL. ChainSQL is an open source blockchain platform that integrates blockchain to traditional database. Its core concept is to treat database operation as a transaction and build a log-type database platform based on the blockchain network in the bottom layer, hence to make the data operation history traceable and tamper-proof, thereby realizing a distributed and decentralized database.

ChainSQL sets up the ledger system based on four main characteristics of blockchain: decentralized, trustless, collectively maintained and reliable database. The system adopts a modular design and encapsulates functions such as consensus algorithm, P2P communication protocol, and block writing, and the modules can seamlessly connect to each other. Sharing vouchers are stored in the blockchain and incentives are also issued from here. The traceable and tamper-proof mechanism of the blockchain ensures the BTD project operation data to be open, transparent and fair.

On the basis of the ChainSQL platform, the BTD project has adopted the following underlying blockchain technologies during construction:

4.2.1 Consensus Algorithm

RPCA (Ripple Protocol Consensus Algorithm) is used as the consensus algorithm.

To address the Byzantine faults, the POW algorithm is adopted by Bitcoin and Ethereum, and the PBFG algorithm is adopted by HyperLedger. However, in these distributed payment systems, consensus efficiency is relatively low because synchronous communication is required among massive nodes. In order to minimize the cost of such a synchronous communication, RPCA has adopted a design that allow sub-networks to trust each other and form a large network. The trust cost of sub-networks here is very low and can be further reduced to atomic selection of the network node for other nodes inside the sub-network. In addition, in order to maintain the consistency of node data throughout the entire network, connectivity required between the sub-networks cannot be less than a threshold. With the above measures taken, RPCA enables an algorithm with high performance and relatively high Byzantine failures tolerance. RPCA has been applied in the Ripple consensus protocol and has been verified by a large number of practical applications.

This consensus algorithm supports high network throughput at an expected average of above 1000 TPS. In this network, all nodes are non-anonymous nodes, and each participating server maintains a UNL (Unique Node LBTD) list. The servers set on the list are the trusted representatives in the entire network, i.e., the accounting nodes, and the final consensus will be decided by accounting nodes on the list.

4.2.2 Problems Solved with the Consensus Algorithm

In recent years, more and more research has been done on distributed consensus systems, and the objective of which is to realize a high-performance, low-cost and decentralized trading system. In the research process, three kinds of problems are encountered: correctness, consistency and availability.

Correctness refers to the capability of a distributed system identifying normal transactions and fraudulent transactions. In a centralized system, this problem is solved by ensuring that a transaction is indeed initiated by an institution through trust among institutions and digital signatures. While in a decentralized system, everyone else is a stranger, so it's natural that similar trusting relationship cannot be established, hence there must be an alternative to ensure the correctness of transactions.

Consistency refers to ensuring a globally unique consensus is reached in a decentralized system. Unlike correctness, a malicious user may not initiate a fraudulent transaction, but he can profit from initiating multiple correct transactions simultaneously. A typical example in the blockchain would be the Double Spending problem. Therefore, the consistency problem can boil down to how to ensure that there is only one transaction set in the system that is globally and uniquely identified.

Availability in a decentralized payment system generally refers to performance issues. Suppose a system guarantees both correctness and consistency, but it takes a year to confirm a transaction, it is obvious that availability of the system is low. In addition, other aspects of availability include the level of computing power required to achieve correctness and consistency, the complexity of algorithm applied to keep user away from fraudulence, and so on.

These three problems can be well solved with the implementation of RPCA.

4.2.3 Basic Concepts of the Consensus Algorithm

A service node is a blockchain node that can receive transactions, which may be a verified node or a non-verified node. A verified node refers to a node that is added to the trust list by other nodes, which can participate in the consensus process, while a non-verified node does not participate in the consensus process.

Block and block-recorded transactions. There are two critical blocks in RPCA, one being the newly closed block, which is the last block that has reached a consensus, the other being the open block, which is the one that is currently reaching a consensus. When the open block reaches a consensus, it becomes the last closed block.

UNL (Unique Node LBTD) List of trusted nodes. Every service node maintains a list of trusted nodes, and trusted here means the nodes in this list will not join force to cheat. During the consensus process, the system only accepts votes from nodes in the list of trusted nodes. In the underlying chain, the trusted nodes specify the UNL by adding the public key of other verified nodes to their profiles.

4.2.4 Consensus Process

The underlying chain network generates a new block every few seconds, and the process of generating this block is the process of RPCA consensus for all network nodes. Assuming the consensus process is successful and there is no fork in the network, the newly generated block is unique across the entire network.

RPCA completes the transaction in two stages. In the first stage, a consensus on the transaction set is reached; in the second stage, the newly generated block is proposed, and a consensus block is ultimately formed.

A consensus on the transaction set is reached in multiple rounds, and the following operations are performed in each round:

At the beginning of the consensus, each node collects as many as possible transactions that need a consensus and puts them in the Candidate Set;

Each node makes a union set of the Candidate Sets in its list of trusted nodes and votes for each transaction;

The voting results of transactions are communicated at service nodes in UNL, transactions that reach a certain voting proportion will enter the next round, those below the proportion will either be discarded or enter the Candidate Set for the next consensus process;

In the final round, all transactions with more than 80% of the votes will be put in the consensus transaction set, which is in Merkle tree data structure like the bitcoin.

After the transaction set is formed, each node begins to pack a new block. The process of packing a block is as follows:

Put together the new block number, the Merkle root hash of the consensus transaction set, the parent block hash, the current timestamp, etc. to calculate a block hash;

Each node broadcasts its own block hash to the visible nodes. The visible nodes here refer to not only those in the list of trusted nodes, but also those can be discovered in the node discovery process;

After collecting the block hash broadcasted by the nodes in its list of trusted nodes, the node calculates a ratio for each block hash according to the block hash generated by itself. If the ratio of a certain hash exceeds a threshold (80% in general), this hash is considered to be a block hash with a consensus. If the hash generated by itself is the same as the one with a consensus, it means that the packed block is confirmed and is the new consensus block, which is saved directly to the local with the status updated. If the hash generated by itself is different from the one with a consensus, new block information needs to be requested from the node with correct block hash, and stored locally with the current status updated; If a certain block hash does not exceed the preset threshold, the consensus process will start again until the conditions are met.

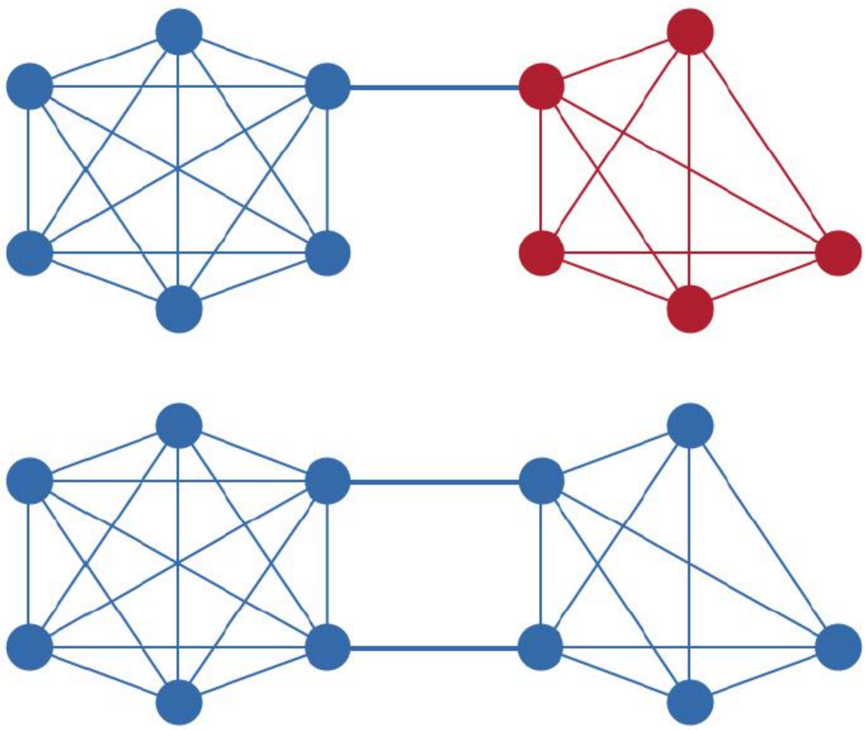
At this point, consensus process of a block is complete, and the next round of consensus begins.

4.2.5 Verification

Faster and more efficient block authentication technology: accounting is done by all trusted nodes on the entire network, and blockchain that is maintained by more than half of the accounting nodes is considered valid. After a block is generated, it is broadcast to the entire network for voting by the accounting nodes. According to the total votes received for a certain block, the accounting nodes will decide whether it is a valid block or not. It takes about 3 seconds to generate a block.

Correctness: Verification of correctness in RPCA is very simple. Because the consensus requires 80% of the threshold, as long as 80% of nodes in UNL are honest, a consensus can be reached. Even when there are more than 20% of fraudulent nodes, they will not impair the correctness, because it needs more than 80% of fraudulent nodes to reach a consensus. Regardless of fraudulent nodes or honest nodes, no consensus can be reached if they are below 80%.

Consistency: Consistency is guaranteed by the connectivity between the sub-networks. To make sure the blockchain is not forked, connectivity must be maintained between each sub-network and at least 20% of the entire network nodes.



Availability: During each round of voting, the node will collect the response time of each node in the UNL. Nodes that respond slowly will be eliminated, so UNL can maintain relatively high communication efficiency. Under the premise of efficient communication, the RPCA algorithm can guarantee to generate a block in 3 to 10 seconds at TPS > 1,000.

4.2.6 Multi-point Data Synchronization

In case the node data is incomplete, the node will request data from adjacent nodes. The system features excellent data transmission and allow transmission to resume from break-point by means of data discretization, multi-node simultaneous requesting, and local recombination.

4.2.7 Radix-Merkle Storage Algorithm

The status and transactions in the blocks are assembled in the form of a Merkel tree based on the hash result. Multiple leaf nodes are designed based on the structure of a radix tree, and a specific transaction or status can be quickly indexed with the key value.

4.2.8 Improved lz4 Compression Algorithm

Each field in the transaction content is sorted by name to obtain data content in a fixed sequence. With the improved LZ4 algorithm, higher compression ratio and compression speed are obtained.

4.2.9 Smart Contract

Issuance of storage points and incentive points of the project is based on the execution of the smart contract, which motivates node users who provide storage services.

4.3 Hierarchical Framework

The technical hierarchical framework of the BTD project includes the application layer, the network node layer, the storage node layer, the file system layer, and the blockchain consensus layer.

Distributed storage nodes: storage nodes that provide storage, bandwidth, and computing resources for the BTD project;

Distributed network nodes: network nodes that provide P2P penetration and domain routing functions for the BTD project;

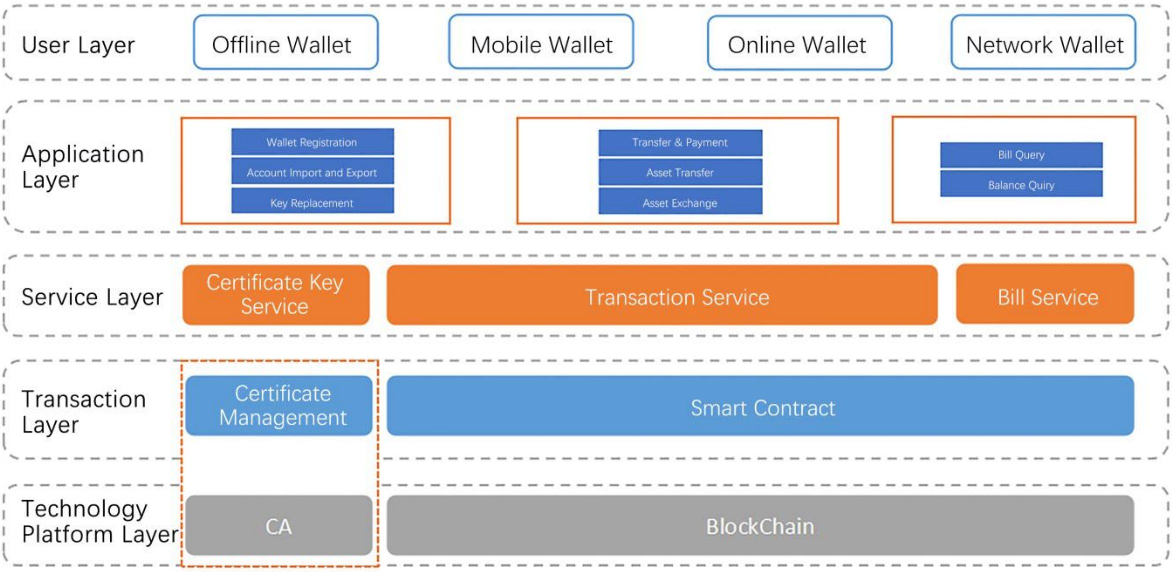
Distributed file system: distributed file system BDFS of the BTD project.

Blockchain consensus layer: based on the ChainSQL platform, and the consensus mechanism is based on RPCA.

Application layer: BTD wallet APP (iOS, Android, Windows, etc.).

4.4 BTD Wallet

BTD wallet is divided into the user layer, the application layer, the service layer, the transaction layer and the technology platform layer. It provides decentralized account management and settlement interface, and features built-in secure transaction function, with the main body being a lightweight blockchain client.



Basic functions

It includes address registration, account import and export, and transaction password management, and other functions. User's wallet file and private key are under user's custody, and user's rights are completely returned to the user, hence the system is more private and secure. Once user's private key is lost, the wallet can never be retrieved. Transaction password is used only to secure user's daily operation, and can be reset with the private key.

Asset function

Two-way HDT/BTD transfer, exchange and other functions.

Query function

HDT/BTD transaction inquiry makes sure all data is under control.

5 Technical Proposal for the BTD Project

The core objective of the BTD project is to create a distributed edge cloud storage service based on the sharing economy.

5.1 Formation of Storage Resource Pool

The storage resource pool of the BTD project originates from all users who are willing to contribute their spare storage space.

User participates in the BTD project by contributing their spare storage space, and obtains the corresponding digital asset HDT+BTD as a reward.

After joining the BTD project, the storage space contributed by the node will become part of the distributed storage pool of the BTD project, and the huge number of storage nodes jointly build a massive, flexible and expandable storage pool.

5.2 Construction of Storage Nodes and Storage Chains

Each node running the BTD project storage service serves as both a provider of the storage service and a verifier of the storage service as well as a messenger of the information on the storage chain.

All storage nodes work together in real time to ensure stable operation of the BTD project.

5.3 HDT Storage Points of Storage Nodes

Based on the classic Proof of Work consensus mechanism and the technical characteristics of distributed storage, and in consideration of the working characteristics of distributed hardware nodes, the BTD project proposes a Proof of Capacity Reliability (PoCR) algorithm, which verifies and motivates node service according to the storage space shared by the node, the online rate, the network uplink and downlink bandwidth, and the actual service quality of storage, retrieval and reading, and the node gains its HDT storage points.

Define the quantity of storage points HDT gained per storage node per day to be A, and A is calculated according to the following algorithm:

A= storage capacity contributed by the node * online rate scoring coefficient * network bandwidth scoring coefficient * node hardware scoring coefficient * node reliability scoring coefficient.

Define 1 HDT = 1G * 1 month, which represents the service workload of a storage node continuously providing 1 Gigabyte of storage space for 1 month.

For a BTD storage node that contributes 1T storage capacity in a standardized environment (with online rate scoring coefficient =1, network bandwidth scoring coefficient =1, node hardware scoring coefficient =1, and node reliability scoring coefficient =1), the quantity of HDT produced per day is:

A = (1024G * 12 months / 365 days) * 1 * 1 * 1 * 1 = 33.7 HDT.

Because the above-mentioned coefficients may be different, the actual quantity of output per day of the node will vary.

Online rate scoring coefficient is evaluated according to the online rate of the storage node. If online rate is lower than 70%, the scoring coefficient is 0. If online rate is between 70% and 90%, the scoring coefficient is 50%; if online rate is above 90% and below 100%, the scoring coefficient is 80%; if online rate is 100%, the scoring coefficient is 100%.

Network bandwidth scoring coefficient: reference bandwidth - 5MB/s (uplink) and 20MB/s (downlink). If too many storage node devices are operating on the same broadband, the return ratio of each storage node device will decrease.

Node hardware scoring coefficient: ranges between 0.8 and 1, based on the processing capability indicators of hardware (such as the processor) and the efficiency of the actual node hardware running the BTD client software.

Node reliability coefficient: when the node reliability mechanism is activated, the initial reliability value of all nodes is 5%. If online rate is 100% on the next day, reliability increases by 5%. If the online rate is maintained for 20 consecutive days, node reliability coefficient reaches 1. Node reliability will not increase further after reaching 1. If online rate drops below 90% on any day during operation, node reliability will fall back to 5%. After the reliability mechanism is started, nodes can increase their reliability by pledging BTD, and promise to accept the punishment of deducting the pledged BTD in case of reliability breach. The deducted BTD will be destroyed. The node reliability mechanism will be activated when the daily HDT output reaches a certain level.

Settlement interval: every 24 hours.

5.4 BTD Incentive Points of Storage Nodes

HDT points reflect the amount of work a node contributes to the operation of the BTD project. BTD reflects the value contribution proportion of the node to the entire network. BTD is calculated based on the PoS algorithm.

Define the quantity BTD incentive points gained per storage node per day to be B, and B is calculated according to the following algorithm:

B = value contribution proportion of the node to the entire network C * the total amount of BTD increased on the entire network on the day.

[Note: The total amount of BTD increased on the entire network on the day is determined according to the number of new HDTs on the day. Refer to the section BTD Distribution and Output in the whitepaper for details.]

Define the value contribution proportion of a node to the entire network per day to be C, and C is calculated according to the following algorithm:

C = (The number of new HDTs of the node on the day / The number of new HDTs of all nodes on the day) * proportion of storage capacity on the day + (HDT balance of the node / Total HDT output of all nodes) * historical proportion of storage capacity + (BTD balance of the node on the day / Total BTD balance of all nodes) * proportion of future development;

Value range of the proportion of storage capacity on the day is 0% - 100%.

Value range of historical proportion of storage capacity is 0% - 30%.

Value range of proportion of future development is 0% - 100%.

BTD output has taken into account contribution of the node to the entire network on the day (analogous to the daily wages paid by enterprises to employees in the real world), historical contribution (analogous to the long-term contribution bonus that enterprises issues to senior employees in the real world), and contribution to future development (analogous to options issued by enterprises to core employees in the real world). This scheme represents the most reasonable contribution mechanism in the field of distributed storage.

The BTD project decides whether the current storage capacity meets the needs of the storage market and whether the market is overheated or too cold according to the operational indicators, such as the trend of daily HDT output change, the system HDT pool balance and consumption ratio, concentration of the BTD holder accounts, etc. If the indicators exceed the threshold, the smart contract will be triggered, proportion of storage capacity on the day, historical proportion of storage capacity, proportion of future development and other parameters will be adjusted. In case of insufficient storage capacity, more nodes will be encouraged to join the storage network to improve the storage capacity. In case the BTD holder accounts are over-concentrated, new users will be encouraged to decentralize the BTD-holding ratio, hence promoting and ensuring the constant, healthy and stable operation of the BTD project.

5.5 Smart Contract and System HDT Pool

If we consider the BTD project as a virtual economy, as the storage network continues operating and performing storage tasks, the total HDT points produced by the project represent the total economic size of the virtual economy.

On the other hand, as the value bearing system of the entire BTD project, the BTD output from the project represents the total exchange value of the virtual economy.

Therefore, it can be considered that the total value of BTD currently in circulation at any time = the total value of all circulating HDT + BTD liquidity premium.

If the BTD liquidity premium is greater than 0, at any point of time, it can be considered:

1 BTD > = (current total circulation of HDT in the system /current total circulation of BTD in the system) * 1 HDT.

Therefore, the BTD project empowers user to exchange for HDT with BTD through the smart contract on the chain, but the exchanging user can only use the exchanged HDT for storage service.

Smart Contract: 1 BTD= (current total circulation of HDT in the system /current total circulation of BTD in the system) * 1 HDT.

Smart contract further defines the intrinsic value and exercising right of BTD in the form of a contract.

BTD holders may evaluate at their discretion whether to use the right and when to use.

In order to guarantee the execution of the smart contract, a system HDT pool is set up in the BTD project.

Daily total HDT increase in the system = HDT increase at all nodes of the entire network + HDT increase in the system pool.

HDT increase in the system pool = HDT increase at all nodes of the entire network * proportion of the system pool. The value of proportion of the system pool ranges from 5% to 20%.

Execution of the smart contract: BTD is transferred from user address to the smart contract address, and the smart contract transfers corresponding HDT to the user address.

After the smart contract is executed, it means the corresponding BTD has been exercised and will be permanently locked in the system pool. The smart contract address will be destroyed and no longer participate in circulation.

In addition to guaranteeing the execution of BTD smart contract, the HDT pool is also used to support dApp services based on the BTD storage chain.

When calculating the contribution ratio of the node HDT to the entire network, the system HDT pool balance is not involved.

In case the system HDT pool is insufficient, execution of the smart contract will be postponed, and the parameters in the BTD output algorithm, such as the proportion of storage capacity on the day, the historical proportion of storage capacity, and the proportion of future development, will be adjusted, and execution of the smart contract will continue after the smart contract execution conditions are met.

5.6 Value of BTD

The total amount of HDT will constantly grow with time and the rapid increase of network scale at a pace faster than that of BTD growth. The total amount of BTD is limited and reducing as BTD is destroyed in various scenarios such as node reliability pledge breach, execution of a smart contract, and repurchase for destruction. According to the smart contract for BTD exchange, the HDT amount that a unit BTD is equivalent to will be continuously increasing.

Therefore, if the storage network of the BTD project continues operating and developing steadily, the storage service capacity of a unit BTD will grow, and the BTD has a natural and intrinsic attribute of value growth.

5.7 Specific Implementation of the BTD Project

Every user account of the BTD project is actually a BTD wallet address. User takes care of his/her private key and saves the algorithm corresponding to the public key to the BTD project.

BTD project user uses HDT to drive storage service. On the one hand, BTD project user drives the entire BTD project to implement the related functions through file storage, accessing, and sharing; on the other hand, user needs to pay HDT when storing and accessing files, thus motivating the storage service nodes and secondary verification nodes of the BTD project to operate orderly.

The specific technical implementation of the BTD project consists of file storage, file retrieval and file accessing.

5.8 File Storage

When the BTD project users store files, they need to use HDT to drive the BTD project.

In the BTD project, the BDFS distributed file system is used as the underlying file system.

5.8.1 Typical Storage Process

When User A of the BTD project saves a file, he firstly performs file fragmentation and redundancy encryption to obtain the Merkle tree of the file fragments, then he broadcasts the corresponding fragment storage request message to the storage chain, which includes serial number of the task, file fragment size, hash value, the number of copies to be stored, downward broadcast hop-count of the node, validity of the broadcast, and the HDT to be paid. The smart contract verifies User A's HDT and freezes his HDT payment before the broadcast message can be sent, in order to prevent users with insufficient HDT from wasting the storage resource.

When the neighboring node and the routing node of User A in the BTD project receive the task broadcast, they firstly verify if the BTD project address is true and the HDT input for the contract task is sufficient. After verifying authenticity of the task, they decide whether to respond to the storage task or not. If the neighboring node decides to perform the task, the broadcast hop-count is decreased by 1 and the message is broadcast to its neighboring nodes. If the neighboring node decides not to participate in the task, the message will be directly broadcast to the neighboring nodes without decreasing the broadcast hop-count. The message will be broadcast by the nodes in turn until the hop-count comes to 0.

All nodes that decide to participate in the task establish direct connections with User A. At this point, user A will decide on the next step according to the number of nodes N that have responded to store the file and the number of copies M to be stored:

If N >= M, the smart contract will pick M nodes for the storage task according to the time sequence of node response and the weighted node storage service quality, and the M nodes that are finally selected and verified to have completed the storage service will share the HDT that User A paid for the storage service.

If N < M, the smart contract allows the N nodes to perform the current storage task, and initiates in the meantime a second broadcast. In the second broadcast, the number of copies to be stored is changed to N-M, and the HDT o be paid is also changed correspondingly to the amount entitled to the remaining part of the task. At this point of time, the nodes that have performed storage of this file will judge according to the hash value and ignore the task, and the message is broadcast directly to the neighboring nodes without decreasing the hop-count. The process is repeated until User A's storage task is completely executed and verified, and User A pays in full to the M nodes HDTs corresponding to the storage service.

In general, typical storage tasks can be completed in maximum 2 broadcasts if there are no malicious nodes.

The BTD project innovatively uses the successful transaction of HDT for reliability judgment. Reliability of a storage service user is positively correlated to the total amount of HDTs that the user address spent for storage, and **reliability of a storage node is positively correlated to the total amount of HDTs that the storage node address obtained by providing storage services**. Therefore, a storage task that is properly completed increases reliability of both User A and the storage node at the time when HDT paid by User A for the storage service is transferred to the storage node.

5.8.2 Verifying Storage Service, Discovering and Handling Malicious Storage Nodes

After the storage task is completed, User A initiates verification of the storage service provided by the M nodes. User A independently performs reverse fast verification of the content stored by each node based on Merkel Tree-Digest HASH. If there is no successful response, the node has not actually stored User A's file and User A will note the node as a malicious node and refuse to pay HDT to the node for the storage service.

Each user may independently maintain a list of malicious storage nodes. Real malicious storage nodes will soon be independently discovered by legitimate users and blacklisted, thus eliminating the long-term harm to the storage chain.

The above storage mechanism limits the impact of malicious storage nodes on the entire storage chain even if they exist.

5.8.3 Discovering and Handling Malicious User Attack

A malicious user attack refers to the behavior of refusing to pay the needed HDT incentive points for the storage node after storage service is actually completed by a storage node.

In order to prevent the above attack, the BTD project has adopted an innovative trust mechanism. When User A uses storage service for the first time, the reliability of his address is 0 (because he has never performed a storage task successfully in the past). Although User A requests to save a huge file, the request will be split into smaller files by the smart contract of the storage node, and account will be settled with User A after the storage task of a small file is completed. Only when settlement is completed and the storage node has received the HDT incentives, will User A’s reliability be raised and the size of his storage be automatically increased, so the following tasks can automatically continue. Therefore, a user must spend HDT in order to grow his reliability.

A malicious user must pay advance cost (reliability of the user address must be greater than 0 before an attack can be initiated, which means a malicious user must pay advance cost in order to implement the attack), and the cost will go up quickly and become unbearable as the user attempts to maliciously consume more storage capacity. In addition, a malicious attack by a malicious user can be discovered by a storage node very quickly, and the storage node will delete the file it has saved and blacklist the malicious user, preventing him from making a broad and substantial impact on the storage chain.

5.9 File Retrieval and Reading

When user searches for a stored file or reads the file content, a broadcast retrieval is done in the BTD storage chain according to the file HASH identifier, and storage nodes that have the HASH resource notify the user after receiving the broadcast. After verification and confirmation, user selects multiple nodes with the optimal network channel according to the network status of the storage nodes, synchronously reads different data fragments of the file and downloads in parallel, obtains enough file fragments for decryption and recovers the file.

5.10 Summary

The BTD project is a distributed storage network consisting of storage nodes distributed around the world. Each storage node provides certain storage capacity resources and network bandwidth guarantee to form a massive and flexible storage resource pool that provides private and secure sharing storage service.

Except for the user, any other party, including the storage node and the technical team of the BitRice Foundation, cannot obtain the content of the file, thus ensuring a very high level of privacy of the BTD project.

The redundant backup of massive nodes around the world also prevents a single node failure from influencing the file storage service, thus ensuring the BTD project is naturally remote disaster-tolerant and capable of assuring data security.

At the same time, the BTD project does not rely on any central server, which means any malicious attack from a single node will fail.

6 BTD Incentive System

6.1 BTD Allocation Mechanism

Holder	Proportion	Quantity (in 10K)	Purpose
Storage nodes	80%	224,000	Storage nodes are motivated to join the BTD project to share their storage space and build a distributed storage network.
Foundation	9%	25,200	The Foundation is responsible for project operation, market promotion, community development, and long-term services.
Public welfare Storage	2%	5,600	Providing free storage services to various public service organizations around the world.
Market ecology	3%	8,400	Motivating participants in the ecological chain.
Institutions	2%	5,600	To be held by institutional investors and industrial investors.
Cornerstone investment	1%	2,800	To be held by early investors.
Team	3%	8,400	To be held by the team and released by stage after 2 years of locking.
Total	100%	280,000	

The total amount of BTD is 2.8 billion, and 80% of which is gradually produced by storage nodes contributing storage spaces and performing storage tasks;

9% of which is held by the Foundation for project operation, market promotion, community development and long-term services;

2% of which is reserved for the purpose of providing free storage services to various public service organizations;

3% of which is used for market ecology to motivate all parties in the ecological chain to actively participate in application implementation and ecological construction;

2% is held by institutional investors.

1% of which is held by cornerstone investors.

The remaining 3% is held by the project team and to be released by stage after 2 years of locking.

Comparing to the distribution mechanism of the test network**, the BTD main network has greatly increased the BTD proportion of storage nodes, and is the first to provide free storage for public service organizations around the world. The distribution mechanism has been greatly optimized, and the social value and the potential for long-term development of the project have been greatly improved.**

6.2 Daily Output of BTD

The total number of BTDs produced by BTD storage nodes is 2.24 billion.

The amount of BTD output is determined by the number of HDTs increased on the day.

The relationship between the daily BTD output quantity and the HDT quantity is:

HDT output increased on the day (in 10K)	BTD output on the day (in 10K)
<10	1
10-30	1-5
30-100	5-11
100-200	11-17
200-300	17-23
300-400	23-29
400-500	29-35
> 500	35

That is, when the number of HDT is increased, more BTDs are produced accordingly. However, when daily HDT increase exceeds 5 million, daily BTD increase is kept at 350,000 until the BTD output is completed. After the BTD output is completed, storage nodes will continue producing new HDTs every day. At this time, the number of HDTs that each BTD can obtain through exercising will keep increasing.

6.3 BTD Destruction Mechanism

During the operation of the BTD storage chain, there are multiple scenarios that trigger the destruction mechanism of the BTD.

Scenario 1: Exercising of a smart contract. When exercising of a smart contract is triggered, the exercising party exchanges its BTD into HDT according to 1 BTD = (current total circulation of HDT/current total circulation of BTD) *1 HDT. While the exercising party obtains HDT, BTD paid by the party is destroyed.

Scenario 2: Repurchase for destruction. For the ecological chain and technology partners that have received support in storage resources and computing resources from the Foundation, 30% of their market return will be used to repurchase BTD for destruction.

Scenario 3: Destruction of pledged BTD. After the node reliability mechanism of the BTD storage chain is started, nodes can improve their reliability by pledging BTD. In case of node breaches due to unsatisfying online rate and/or failure rate, the pledged BTD will be deducted as a punishment and destroyed.

Destruction of BTD will be regularly announced by the Foundation.

6.4 Construction Direction of Ecological System of the BTD Project

To optimize and accelerate ecological construction of the BTD project, the BTD Foundation continuously motivates and rewards all aspects of the ecosystem construction, including

- **Solicitation and promotion of BTD storage nodes**
- **dApp development based on the BTD project**
- **dApp user promotion and reward for use**
- **BTD Project community service reward**
- **BTD project application scenario expansion reward**
- **Exchange service for BTD and other blockchain assets**
- **BTD value exchange and application scenarios**
- **BTD ecological guardian reward**

In order to promote the further diversification and enrichment of the value exchange and practical application scenarios of the BTD project.

Implementation of the above BTD incentive system will rapidly increase and stabilize the number of long-term users of the BTD project and accelerate the development of the BTD global ecological chain.

6.5 HDT/BTD Application Scenarios

HDT/BTD digital assets have already included the following application scenarios, and as the number of BTD storage nodes and BTD project users continue to grow in the future, the application scenarios of HDT/BTD digital assets will continue to grow.

6.5.1 Storage Service

- Exchange for various DAPP services based on the BTD storage chain.

  Users can exchange for various DAPP services based on the BTD storage chain, such as cloud drive storage.

6.5.2 Mall Service

- Exchange for commodities in the mall.

  Users can exchange for various commodities in the mall.

6.5.3 Peer-to-Peer Service

Users can exchange for services required in a peer-to-peer way.

6.5.4 Offline Service

The project has developed exchange for offline services in many countries and regions around the world, and the coverage will be further expanded.

6.5.5 Other Services

With the further acceleration of globalization of the BTD project and the in-depth development of cross-domain cooperation, the number of scenarios where HDT/BTD can be used will increase, and the value of HDT/BTD will also increase.

7 Development History and Development Plan of the BTD Project

Timeline	Events/Milestones
2017.2	The blockchain decision-making committee of the BitRice project established
2017.3	The BitRice decision-making committee studied and tracked projects in all areas of the blockchain, made decision on and selected technical proposals and market directions
2017.6	The decision-making committee decided on market direction: blockchain distributed storage
2017.10	Development for the basic chain of the BitDisk storage chain completed
2017.12	Verification and release of the BitRice digital assets The BTR test network officially went alive
2018.2	Strategic cooperation agreement reached with well-known private cloud hardware vendor, the very first miner model supporting the BitRice ecological chain appeared
	Official launch of the BitRice Wallet APP
2018.5	Major iterative upgrade of private cloud storage hardware, the second miner model of the BitRice ecosystem appeared, which was also the first mainstream BitRice miner, The number of nodes in the BitRice ecological chain grew rapidly
2018.6	Strategic cooperation entered with a well-known miner manufacturer, the third miner model of the BitRice ecosystem appeared The first outbreak of the BitRice ecological chain, the total number of nodes supported exceeded 50,000 BitRice user number exceeded 100,000
2019.1	The BitRice exchange service and eco-chain development officially started, and BitRice could be used for exchanging paying storage services, topping up phones,

	and many other services
	Core technology for distributed storage achieved a major breakthrough, and testing DAPP went online
2019.3	Storage nodes covered more than 15 countries BitRice user number exceeded 300,000
2019.4	**Suspension of the mutual benefit plan based on the BTR test network**
	BTD whitepaper V2.1.5 released
	The incentive system optimized to be the HDT+BTD incentive system
	Storage miners of more models from more manufacturers came to the BTD ecological chain, more storage nodes appeared
	The HDT+BTD incentive system officially launched for BTD nodes, and the mutual benefit plan restarted.
	Key ecological application based on the BTD storage chain: the world's first blockchain cloud drive BitDisk, released by technology partner
2019.5	**BTD gradually enters the stage of globalization and appears on multiple platforms across many countries**
	BTD main network completely replaces the BTR test network
2019.6	**The original BTR test network stops operating** **Entering the era of the BTD main network**
2019.12	**BTD storage nodes cover more than 20 countries** **The total number of BTD storage nodes exceeds 300,000** **The total number of BTD user addresses exceeds 5 million**
2020.12	**BTD storage nodes cover more than 100 countries** **The total number of BTD storage nodes exceeds 2 million** **The total number of BTD user addresses exceeds 20 million**

As of April 2019, the BTD project entered a stage of rapid development, with its global development strategy and objectives being:

- 2019.04 Supports technology partner to release the world's first blockchain cloud drive based on the BTD storage chain, and makes full use of the blockchain cloud drive APP that supports fission development to develop users at full pace.
- 2019.08 The total number of BTD addresses on the entire network exceeds 1 million, making it the blockchain storage project with the largest number of user addresses in the world.
- 2019.10 The total number of actual files stored based on the BTD storage chain exceeds 100 million, making it the largest blockchain storage project in the world in terms of the total number of files stored.
- 2019.12 - The total number of BTD addresses on the entire network exceeds 5 million, making it the blockchain dApp project with the largest number of user addresses in the world.
- 2020.06 - The number of BTD addresses on the entire network exceeds 10 million, making it the third largest blockchain project in terms of global user addresses, second only to BTC and ETH.
- 2020.12 - The total number of BTD addresses on the entire network exceeds 25 million, overtaking the total number of BTC addresses.
- 2021.06 - The total number of BTD addresses on the entire network exceeds 50 million, making it the largest blockchain project in the world in terms of user addresses.
- 2022 - With the rapid growth of BTD addresses and storage applications across the network, the market value rises sharply and challenges the largest blockchain project in the world in terms of market value.

8 Project Governance Structure

8.1 Overview

The BTD project is managed by the BitRice Foundation (Singapore), which is responsible for all general matters and privileged matters of the BTD project as well as external cooperation.

The BitRice Foundation is committed to the technical development, transparent governance, community service and ecological chain development of the BTD project, in order to promote the long-term and stable development of the project.

The governance goal of the BitRice Foundation is to ensure the sustainability, the management effectiveness and the security of capital use of the BTD project. The BitRice Foundation commits to using all funds obtained through the BitRice Foundation for technology development, community development, and ecological development of the BTD project.

The BitRice Foundation consists of a decision-making committee and a product operations center.

8.2 Governance Structure

The division of work of the BitRice Foundation functions is as follows:

(1) The decision-making committee: is responsible for the management and decision-making of major issues, including appointing or dismissing

the head of the product operations center and making important decisions. Members of the decision-making committee serve for a term of three years and are eligible for reappointment. The committee has a chairman who is elected by all members of the committee through voting. Members of the first decision-making committee are elected by the founding team and early investors of the BTD project.

(2) Product operations center: is responsible for the technical development, product testing, product launch, product audit and other product development work of the BTD project, as well as community promotion and publicity, financial, legal, personnel, administrational and other day-to-day management. Finance department is responsible for the use and review of project funds; Legal affairs department is responsible for the preparation and review of various documents in order to prevent possible legal risks; Administration and HR department is responsible for personnel, benefits and daily administrative work. Product operations center communicates technical progress and product progress with stakeholders, community contributors and open source project developers in the BTD project community, organizes technical exchange meetings and product research seminars from time to time, and continues to expand the ecosystem of the BTD project.

8.3 For Information

Please visit: https://bitrice.io

8.4 Project Cooperation

To cooperate with the BTD project, please contact: info@bitrice.io

9 Introduction of the Core Team

9.1 Project Core Team

The BTD project is run by the BitRice Foundation (Singapore). The BTD project team has more than 30 members, and the core team members are:

Michael Liu, Master

Chairman of the Foundation and Head of Product Operations Center. Michael has served as the head of system development and chief engineer for many large international companies such as Honeywell in Singapore. Michael is an early participant of Bitcoin and manager for a big data analysis team, with extensive entrepreneurial and corporate management experience. In this project, Michael is responsible for the establishment of the BitRice team and the daily management of the Product Operations Center.

Dr. S. M. Hosseini

Dr. Hosseini mainly works on developing large-scale data analysis, data mining algorithms and blockchain systems. He has participated in a number of data intelligence, data mining and blockchain projects, and has rich experience in project research and development. In this project, Dr. Hosseini is mainly responsible for the rationality analysis of Token logic and the design and development of Token incentive mechanisms and algorithm.

B. Nasrulin, Master

With more than 5 years of development experience, Nasrulin is proficient in C++, C, Python, Java, SQL, R and other development languages, and familiar with OpenCV, YARP, PYL, CUDA, Thrust, scikit-learn, Spark and other frameworks. Nasrulin is a core development member of the Hyperledger Iroha project. In this project, Nasrulin mainly participates in the core code development for the blockchain system.

I. Nurgaliev, Master

Nurgaliev has more than 5 years of development experience, is proficient in C++, Java, Python, etc., and is familiar with CUDA, OpenCL, OpenMP, Scala, JS, etc. In this project, Nurgaliev is mainly responsible for the core development of the BitDisk storage service.

John Wang, B.S. in Computer Science

John has more than 10 years of experience in R&D and management. In this project, John is mainly responsible for the overall design of the BTD project wallet and the smart contract.

Pony Meng, Master of Computer Science

Pony has more than 8 years of experience in R&D and management. In this project, Meng is mainly responsible for the overall design of the BitDisk storage service.

Dyson Wang, B.S. in Computer Science

Dyson has more than 6 years of experience in research and development. In this project, Dyson is responsible for developing applications for the wallet and the smart contract of the BTD project.

Pony Lee, B.S. in Computer Science

Lee has more than 5 years of experience in research and development. In this project, Lee is mainly responsible for developing applications for the BitDisk storage service.

9.2 Project Consultants Team

Lianjin HUANG

World-class blockchain technology expert,
famous leader in blockchain technology,
member of the ACM Practitioner Board, expert
member in blockchain of the Chinese Institute of
Electronics.

Dong LIU

Bachelor, Master and Ph.D. of Peking University;
experts in technical fields including cloud computing,
internet of things, big data and blockchain. Author of
25 academic research papers and owner of 11
multi-national invention patents.

Yiyun ZHANG

Founder of Geekbeans Capital, top new player in
blockchain, Bitcoin geek.

Dachao TIAN

Founder of Chain Fir Capital; founder of Follow Me FM,
the first audio service on blockchain; opinion leader in
the blockchain investment field.

10 Functions, Nature and Risks of HDT/BTD

For HDT holders, HDT serves as the storage service credentials on the BTD storage chain. HDT holders can access the BTD storage chain for file storage by paying with HDT.

For BTD holders, BTD is a credential that can be exchanged into HDT at any time:

1 BTD = (current total circulation of HDT/current total circulation of BTD) * 1 HDT. BTD holders can convert their BTDs into HDTs at any time and then use HDTs to pay for file storage.

Within the jurisdiction of Singapore, HDT/BTD does not represent any forms of equity, dividends, obligatory right or investment, nor does it make commitments to the HDT/BTD holders on any income, profit or return on investment, nor does it represent any forms and proportions of the assets owned by the BitRice Foundation (Singapore) or its affiliates or other companies.

As to BitRice Foundation (Singapore), all HDT/BTD holders have understood and accepted that HDT/BTD come with the following natures:

(a) BitRice Foundation does not exchange HDT/BTD into cash, nor can HDT/BTD be exchanged into any forms of marketable asset that requires the BitRice Foundation (Singapore) or its affiliates to make payment commitments;

(b) HDT/BTD does not represent the holder is granted any rights to the income or asset of the BitRice Foundation (Singapore) or its affiliates, including future income, shares, ownership, equity, collateral, voting, distribution, redemption, liquidation, intellectual property, finance, legal or equivalent rights, or any other corresponding rights related to the BitRice Foundation (Singapore);

(c) HDT/BTD does not represent any money, asset, commodity, obligatory right, debt instrument or financial or investment instrument of any other kind;

(d) HDT/BTD is not a loan of the BitRice Foundation (Singapore) or its affiliates, and does not represent any debt owed by the BitRice Foundation (Singapore) or its affiliates. The BitRice Foundation (Singapore) does not make any income commitments to HDT/BTD holders;

HDT/BTD holders are also required to understand and accept that the following risks exist in the process of exchanging, holding and using HDT/BTD:

(e) In Singapore, the BitRice Foundation (Singapore) was established in strict accordance with Singapore laws and currently there are no other special laws and policies that the BitRice Foundation (Singapore) need to abide by. However, it is currently impossible to predict if or when the Singapore government will introduce new regulatory or stimulating policies for blockchain technology companies such as the BitRice Foundation (Singapore) and/or blockchain applications such as the BTD project. New regulatory or stimulating policies may have a positive impact on the operation of the BitRice Foundation (Singapore) and/or the BTD project, but they may also bring negative or even severely negative impacts.

(f) In other countries and regions outside Singapore, participants in the BTD project eco-chain need to make assessments on their own and confirm that the entire process of exchanging, holding and using HDT/BTD complies with the legal requirements of the country and region, and bear the corresponding legal liability.

(g)The BitRice Foundation (Singapore) notifies risks on (e) and (f), and does not assume any potential risks or losses caused by (e) and (f).