BoxAxis

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BoxAxis White Paper

BoxAxis is a blockchain-based IoT application ecosystem that combines Ethereum blockchain, cryptographic asymmetric cryptography

Catalog

Foreword

BoxAxis is a blockchain-based IoT application ecosystem that combines Ethereum blockchain, cryptographic asymmetric cryptography, semi-homomorphic ciphertext computing, and a data center-free distributed architecture. BoxAxis aims to solve the serious security problems of the current Internet of Things, and to meet the highly concurrent use scenarios of the Internet of Things to achieve the interconnection of all things. The data source can connect to any node in the entire network, then publish the data, and the network will immediately send it to the subscriber. Through the fragmentation mode to achieve horizontal scalability, the underlying blockchain technology is encapsulated into an API interface, providing free access to digital information, smart contract settings, information get recorded on chain,data query and etc,. As a measure of value transfer in the ecosystem, any use of smart devices, ownership, and the value of the content ecology of smart devices all need to use BAXS for settlement.

BoxAxis is committed to advancing the blockchain technology from the Internet to the Internet of Things to realize the concept of value Internet of Things. With the IoT as the core, the blockchain technology interface collects rich data, supports big data analysis and artificial intelligence analysis, and then expands more interactive scenarios and experience scenarios of the Internet of Things. In this chain, merchants can tailor their own needs to create a wide variety of sub-chains. The main feature of this commercial eco-chain is that all data (including property rights attribution data, commodity circulation data, etc.) is authentic and can not be tampered with time stamps, so that a first-class IoT blockchain ecosystem can be established.

Although the current Internet of Things field is developing rapidly, the communication standards, data exchange standards, vendor benefits, user privacy, and fragmentation modes of various vendors restrict the development of the overall Internet of Things industry. It is not impossible to seek support from various vendors by defining a common set of protocol standards, but it is inefficient and costly. The US BHNJ expects more than 25 billion nodes to access the Internet of Things in 2020. However, if the interconnection between the entire network cannot be achieved, the fragmented

Internet of Things cannot show the greatest value. The ability to de-centralize through blockchains and economic drivers to interconnect standards is a new possibility we are trying to find.

I. BoxAxis Project Background

I.1 What is the Internet of Things?

Based on the Internet, traditional telecommunication networks and other information carriers, IoT (Internet of Things) is a network that enables interconnection between all common physical objects that can be independently located. The Internet of Things has three key features: the balance of common objects, the interconnection of automated management terminals, and the intelligence of ubiquitous services. Through the Internet of Things, everything can be connected to the Internet for information exchange and communication to achieve intelligent identification, positioning, tracking, monitoring and management objectives.

The Internet of Things has two meanings. First of all, the Internet is still the core and foundation of the Internet of Things, and it has been expanded based on the former. Second, the client side of the Internet of Things has expanded to the exchange of information and communication between all things, that is, things in the Internet of Things. The Internet of Things is widely used in network convergence through intelligent sensing, recognition and pervasive computing and other communication-aware technologies. Therefore, the first wave and the second wave of the Internet of Things in computers and the Internet are respectively called the third wave of the development of the world information industry. Because the Internet of Things is an extension of the Internet, it should be more accurately called business and applications than networks. Therefore, application innovation is the core of the development of the Internet of Things, and the creation centered on the user experience is the soul.

I.2 What is blockchain?

Simply speaking, a blockchain is a decentralized distributed ledger database. Decentralization, that is, different from the traditional centralization method, there is no center, or everyone is the center; distributed ledger database, means that the way of recording is not only to store the book data in each node, but also each node will share and replicates the data on the entire ledger. At the same time, the blockchain also has the characteristics of de-intermediation and information transparency.

For example, online shopping, after the order, our money is sent to the intermediary platform of the third-party payment institution. After the seller delivers the goods, the buyer confirms the receipt, and then the buyer informs the payment institution to transfer the money to the seller's account, but the trading model supported by the blockchain technology is different, buyers and sellers can trade directly without going through any intermediary platform. After the transaction between the buyer and the seller, the system publishes the transaction information by broadcasting. All the hosts will record the transaction after receiving the information and confirming that the information is correct, which means that all hosts doing data backup for the transaction. If there is a problem with the order produced by this machine, it will not affect its data information, because there are countless machines that back up the data at the same time.

Why blockchain make people so obsessed? We still use the above shopping example to illustrate that the so-called two-party transactions. If one of them receives the money but not send the goods to you or that he did not receive the money and do not recognize this transaction.

How does blockchain solve this problem?

Such as the same transaction, but in the process of trading, everyone knows that the other party has given you the money, and you have no way to deny it. In the end, it is a question of credit problem.

For example, food safety issues that have already begun to be implemented in Amazon, ebuy, Alibaba, and Jingdong. With blockchain technology, all transactions establish a reliable mechanism for producers, suppliers, processors, distributors, retailers, regulators and consumers in the food chain to access food source and status information at any time. It is convenient for tracking contaminated foods, delisting the problem foods, and effectively preventing the spread of food safety problems.

And when consumers buy food, they can easily see where their food is produced, how long since its production, and what fertilizers it is applied. Whether we are ready for the arrival of the blockchain, we still have to look at the future development.

I.3 Market size of the Internet of Things

Since the development policy of the Internet of Things in the United States, the European Union, and China in 2009, the Internet of Things has been developing rapidly. Traditional companies and

IT giants are struggling to interact with the Internet of Things, which has rapidly penetrated into many areas, such as manufacturing, retail, services and utilities. At present, the Internet of Things is on the eve of massive explosive growth. According to the market size and development trend of the global Internet of Things in 2017, it has reached billions of dollars, a year-on-year increase of 29%. In 2018, this figure is expected to reach $103.6 billion. From 2013 to 2018, the compound growth rate will be 21%, and new IoT devices will emerge. In 2015, it was 169.1 million, and in 2019 it will be 3.054 billion (see Figure I.3.1).

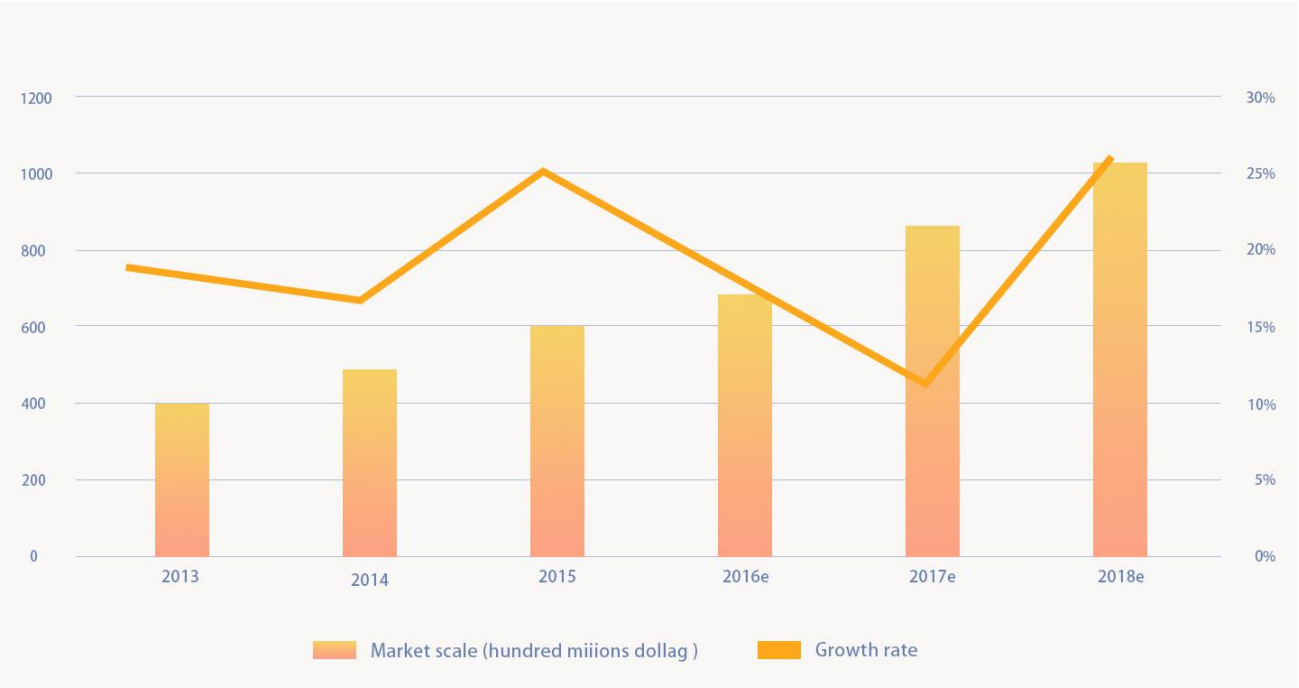


Figure I.3.1: 2013-2018 global IoT market scale and growth rate

More and more items and devices are connecting to the Internet of Things. According to the Gartner survey, the current global population reaches 7.5 billion, and the number of global IoT devices is predicting to increase from 1.4 billion in 2015 to 1.9 billion in 2017. In 2017 , the number of global IoT devices increased by 35.71% growth rate than in 2015. According to Gartner's forecast, the number of IoT devices in 2018 will exceed that of personal computers, laptop and mobile phones, reaching 20.4 billion by 2020 (see Figure I.3.2:).

Figure I.3.2: 2015-2017 global IoT market size and growth rate

In the future, everything will become unimportant. From the cup to the house, the Internet of Things will spread across all aspects of our lives (see Figure I.3.3:).

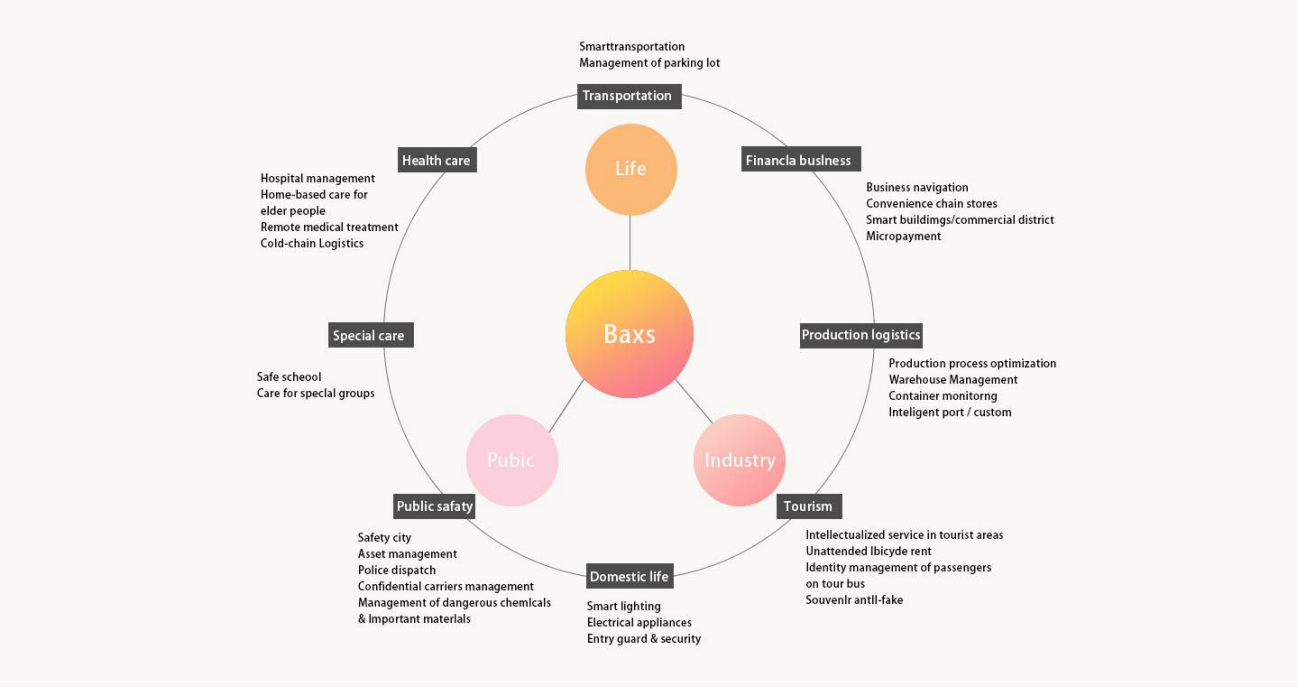


Figure I.3.3: Application of the Internet of Things in life

I.4 Challenges of traditional IoT

The current trend of economic globalization is developing in depth. The information technology of the Internet of Things is driving new technologies and new formats. The demand for logistics is growing rapidly, and it has entered a new stage of transformation and upgrading. However, the overall level is not high, and the development mode is relatively extensive, facing huge challenge.

I.4.1 Traditional attack techniques can ruin Internet of Things devices

In 1999, Professor Kevin Ash-ton of the Massachusetts Institute of Technology (MIT) first proposed the concept of the Internet of Things and was selected as one of the top 10 breakthrough technologies in the 2107 Technical Review of the Massachusetts Institute of Technology. According to statistics, Kevin Ash-ton has spread more than 2 million IoT devices, such as cameras and mobile phones. The DDos attack caused the network of the US DNS service provider to crash, and users could not access several popular websites such as Twitter and Paypal in a short time. More botnets have emerged, including the hijacking of IoT devices to mine bitcoin and botnets, which are larger and more active.

The centralized management structure cannot prove that it is not guilty, and occasionally personal private data leakage occurs. Currently, a closed source-based security model (often referred to as "through obscurity security") exposes its potential security risks and will be phased out and replaced by a new security model "through advocacy guarantees". To achieve this, it is necessary to upgrade the model to open source software. While current open source systems are still prone to incidents and low availability, they are less susceptible to government intervention and other targeted attacks. Therefore, open source systems will play an important role in the family. Such as automation and networks of vehicles and other equipment.

I.4.2 High cost of centralized architecture

Even before IoT revenues reach market expectations, the cost of the Internet of Things is still very high. Most existing IoT solutions require large investments: In addition to the commissioning of these service intermediaries, building and maintaining an infrastructure associated with centralized clouds and large server clusters represents a large capital cost.

Unfortunately, current IoT solutions are unable to meet service supply and continue to ignore customer expectations. In the past, the costs and revenues of the IT industry have always been consistent. As manufacturers and buyers sign a support contract, large servers will receive

long-term service over their longevity. For personal computers and smartphones, although there is usually no high-profit support plan, this is usually not a major problem due to its relatively short life span.

However, for the Internet of Things, device manufacturers typically work at a lower margin, so that they do not generate enough profit to support and maintain the device for a long time. At the same time, huge amounts of money are needed to serve hundreds of billions of smart devices, not to mention the high maintenance costs associated with centralized servers to distribute and update software.

I.4.3 Lack of standards

IoT vendors are currently forming a series of data islands, the information flow is not smooth, cross-vendor access and settlement is a big problem.

I.4.4 Inefficiency

Verify the connection through the cloud server. The connections between devices are handled through the central server, and the efficiency cannot meet the real-time needs of the Internet of Things.

I.4.5 High cost

Under the current IoT ecosystem, all equipment such as centralized cloud servers, large servers and network equipment have high infrastructure and maintenance costs. When the number of IoT devices increases to tens of billions, it will generate huge amounts of communication information, making IoT solutions very expensive.

I.4.6 Security hazards

The centralized network has extremely high security requirements for the central server, and the security loophole of the centralized server will affect the nodes in the entire network.

I.4.7 Privacy protection

The existing centralized network can collect user privacy casually, and after the user realizes the value of his data, the user will gradually dislike and even protest. The Internet of Things cannot obtain user trust because it involves more information from users, including health information and vehicle travel information. BoxAxis uses an innovative behavior- private key (BPK) algorithm model that allows users to choose open absolute encryption for privacy processing.

II. Solutions From BoxAxis

II.1 Concept of blockchain

The blockchain is a scattered database. In a narrow sense, a blockchain is a chained data structure in which data blocks are linked in chronological order. It is also a distributed ledger that cannot be tampered with or forged under the protection of cryptographic methods. Broadly speaking, blockchain technology is a new distributed infrastructure and computational paradigm that uses chained data structures to validate and store data, uses distributed node consistency algorithms to generate and update data, and uses cryptographic methods to ensure the security of data transmission. As well as data access and the use of smart contracts consisting of automated script code to program and manipulate data.

Blockchain technology enables everyone to participate in bookkeeping in a more informal way. There is a database behind each system, and if we treat the database as a large ledger, then the person responsible for bookkeeping is very important. Under the current technology, the person who owns the system is responsible for bookkeeping. In the blockchain system, everyone has the opportunity to participate in the bookkeeping process. Everyone in the system can participate in bookkeeping if there is any change in the data during a certain time period. The system selects the fastest and most qualified users to write their records on the ledger, and then distributes the updated ledger copies to other users on the system as backups. Therefore, everyone in the system will have a complete ledger. This method of bookkeeping is called blockchain technology.

II.2 Advantages of blockchain technology

Everyone responsible for bookkeeping brings significant advantages:

II.2.1 High security: The basic architecture of the blockchain is not affected by traditional Internet attacks. IoT information encryption and secure communication are characterized by security through publicity, which helps protect users' privacy. Identity access and multi-party consensus management will help identify misbehaving nodes and prevent malicious nodes from accessing or disrupting the network. The structure of the chain-based data will help to build electronic evidence that can be verified and tracked.

II.2.2 Low Cost: Decentralized, multi-centered and weakened centralized features will reduce the operating costs of a centralized architecture.

II.3 Solution

BoxAxis uses asymmetric encryption. As long as the private key remains correct, even if data is collected, the data cannot be cracked. At the same time, all nodes in BoxAxis are the same, which protects the privacy of the user. In addition, manufacturers and service providers will not be able to tamper with user information based on features that blockchains cannot be tampered with.

The future of BoxAxis will have tens of thousands of nodes, which are absolutely sufficient for the needs of IoT data storage, combined with the distributed ledger technology of the blockchain. Due to the decentralization of blockchains, highly dense computer clusters are not required. Both technologies greatly reduce the operating and maintenance costs of the entire IoT.

II.4 Blockchain 3.0 concept

Blockchain is a new application mode of computer technology such as distributed data storage, point-to-point transmission, consensus mechanism, and encryption algorithm. In the 3.0 era, in addition to key advantages such as the original consensus mechanism, programmable is its second major achievement, which allows it to write more sophisticated and intelligent protocols-smart contracts based on a variety of different business needs.

II.5 Advantages of Blockchain 3.0

II.5.1 Decentralization - Reduce the performance bottleneck brought by the center and maintain stability together.

II.5.2 Openness - Information is transparent and open to avoid black-box operations.

II.5.3 Consensus Mechanism - Decentralized trust.

II.5.4 Information cannot be tampered with and forged - most are justice, professional high-end cryptography guarantees the security of operations.

II.5.5 Anonymity - The information of a transaction does not depend on trust in identity.

II.5.6 Smart Contracts - Programmable, unambiguous, one-to-one contracts for security and privacy.

II.6 Blockchain Application Description

Taking the logistics link of the goods as an example, when the logistics company receives the goods, it writes the corresponding BAXS label into its related attribute information, and stores the information of the goods in the logistics center database through the BAXS scanner and its connected control management PC. After the completion, by means of calling the smart contract, the logistics company will publish the information of the goods in the form of transaction, and thus the data of the goods, the quantity, the distribution site and other data related to the goods will be recorded on the chain. So correspondingly, The goods are received in the same way, such as goods receipt, logistics, arrival, and delivery to the home, all these information can be recorded on the chain,so that the links can be collaborated to reduce costs and subsequent traceability of goods.

III. BoxAxis Schemes Design

The BoxAxis project is derived from a community practice of Apache Mynewt (Apache Open Source IoT Operating System). The team initially tried to reduce the complexity of hardware development by software defining hardware. However, even if the abstraction layer of the system is defined, how to form a unified ecology between hardware and hardware is still a challenging problem. Later, the team thought about it and considered economically driving the integration between different systems.

BoxAxis is an economical-driven blockchain application platform and interaction standard for the Internet of Things. The parallel chain structure connects devices to each other to form a distributed network, and the consensus algorithm is used to ensure the legal trustworthiness of transactions between devices. At the same time, different types of equipment can access different parallel chains to avoid the explosive growth of the general ledger.

The existence of BoxAxis can greatly reduce the development difficulty of IoT blockchain applications. It can relay different Internet of Things, form an edge computing network, effectively circulate resources, and accelerate the popularity of the Internet of Things. Designed as a scalable heterogeneous multi-chain, BoxAxis provides a relay chain platform on which to build a large number of verifiable, consistent, consensus data structures. In other words, based on ensuring overall security and inter-chain trust, BoxAxis is committed to transforming the IoT blockchain into an IoT infrastructure like TCP/IP, unconsciously affecting people's lives.

In order to achieve the above goals, we must do the following:

III.1 Software Define Resources

There are fundamental differences between software development and hardware development. Because of the cost design constraints, hardware is generally relatively scarce, so when we want hardware to add extra cost and provide additional resources, it must be impossible (for example, to provide additional computing power, additional power). So the problem we want to solve is not to provide additional resources, but if the hardware itself is a WIFI, or a temperature collector, when it needs to provide its own value to other services or hardware, it can propose a

charging strategy. The resources we are involved in are abstracted from the real world according to different devices, mapping existing entities (whether hardware or data), and providing consistent calls in the form of services.

We can't add extra functionality to existing devices, but in a relative hardware ecosystem, perhaps we can get more revenue from the economics-driven, letting various devices open their own functions. Because the essence of a standard monopoly is profit, and the token itself can provide profits, and because of the floating nature of the token price, it may generate additional economic benefits. Relative returns are not lower than absolute profits.

So we will try a new model to drive the hardware to open its own capabilities by sharing the benefits, to centrally obtain profits, rather than gain profits through a centralized monopoly.

III.2 Monetization of resources

In our definition, we need a stable weights and measures. We will not use BoxAxis for settlement within the IoT network, but will adopt a mechanism similar to ETH's GAS. Because the device's resource settlement requires a relatively stable weight and measure, the resource will be settled in the following ways:

Price type: Pay according to the calibrated price;

Metering: Segmented billing according to the timeline, or other dimensions;

Bidding: Initiate a bid to all devices that need to call a resource, the higher price wins;

CPP (Cost Per Purchase): Pay based on the end result of the resource;

Because there are smart contracts, it can be coordinated and interacted in a way that many traditional architectures cannot. The specific way can be agreed on the chain in the form of smart contracts.

III.3 Resource Trading Configuration

Related nodes should purchase resources in a semi-automated manner through custom policies.

III.4 Privacy protection principles

Another particularly important issue in the current Internet of Things is user privacy. User

privacy protection for the Internet of Things is extremely fragile. Because user data is collected in large quantities through sensors, it is very easy to predict user behavior. Moreover, the current architecture model, even with the OpenID approach to desensitize for users , as long as multiple dimensions for comparison analysis, it is easy to infer the user's identity. In response to this problem, we try to use a zero-knowledge proof algorithm and adopt our innovative behavioral private key (BPK) algorithm model to pass user intents to other hardware without passing user symbols. This is not only can effectively protect user privacy, and can also solve the problem of worrying about user loss.

Our innovative BPK algorithm model clusters behavior by unsupervised learning or strategy models for user data, and desensitizes users with a zero-knowledge proof algorithm. In this way, devices can share resources based on intent between devices, and do not need to share data based on users, which can effectively solve user privacy problems.

III.5 Security

Can the device will kill like a mechanical bee in the Black Mirror? This may not be the case, but it is not uncommon for a self-driving car to hit someone. The security is a top priority for the future of IoT, and BoxAxis will try to filter the intent through the innovative BPK algorithm to ensure user security.

IV. BoxAxis Concept Prototype

IV.1 System Framework

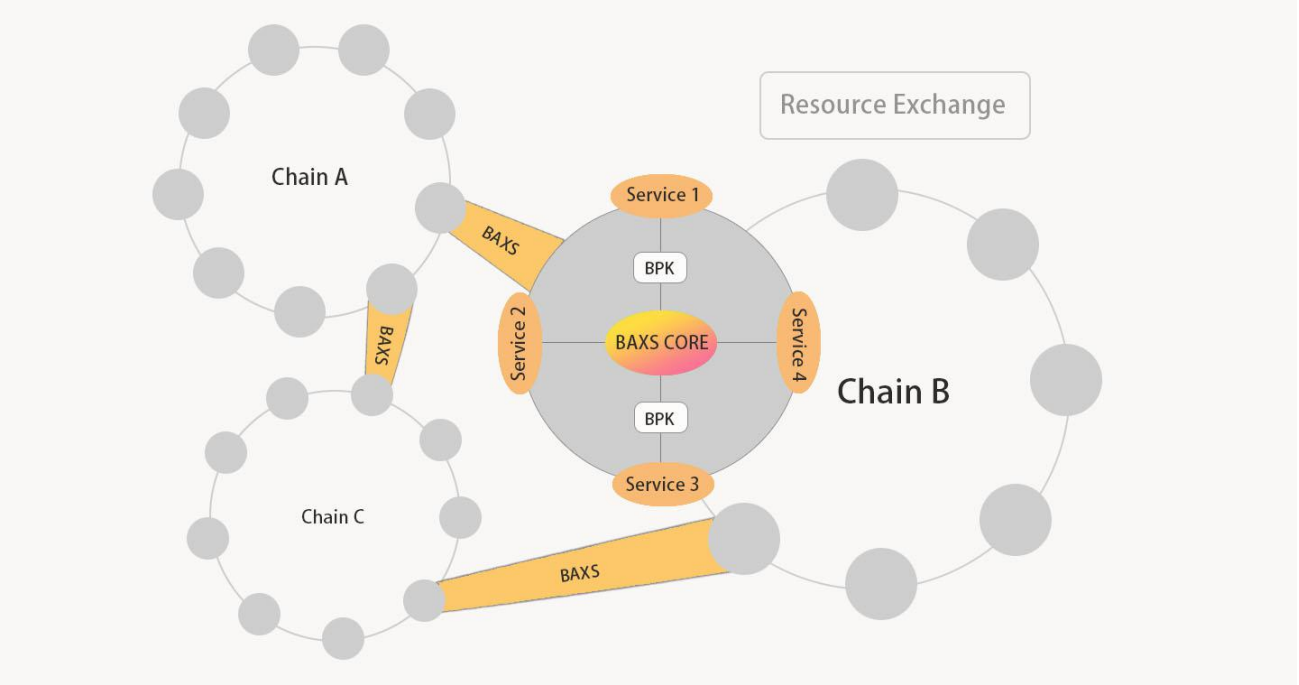


Figure IV.1.1: Application of the Internet of Things in life

IV.2 Providing services

The machine automatically combines semi-dynamic configuration through smart contracts, plug-and-play access to basic services such as networking, power, computing, and self-discovery. The developer API trading market forms a trading system for data and services in the cloud.

IV.3 BoxAxis (box shaft chain) token

The BoxAxis will take a two-tier token structure. The first level is the traditional token structure, which participates in exchange trading. The second layer uses the first structural token, limited time bidding, floating targeting currency, mainly to solve the problem of token volatility, reduce volatility, and facilitate billing.

IV.4 Machine node

Nodes may have traditional PC Server nodes or STM32 nodes for configurable tailoring based on machine performance. The Internet of Things is a typical Fog Computing scenario. The existing blockchain network is not suitable for the Internet of Things. How to share power in such a highly scalable network? In fact, the core of this is economical, so we need to define a solution such as BoxAxis.

IV.5 Consensus

In the consensus algorithm, since the traditional DPoS consensus algorithm has begun to deviate from the original intention of the decentralization of the blockchain and evolved toward the centralization direction. We have a deep understanding of the core of the DPoS consensus algorithm, and according to the BoxAxis actual application scenarios and the current development of ITO equipment have pragmatically created a new consensus algorithm, which we call the "Double Chain" consensus algorithm. The basic architecture is shown in Figure IV.5.1:

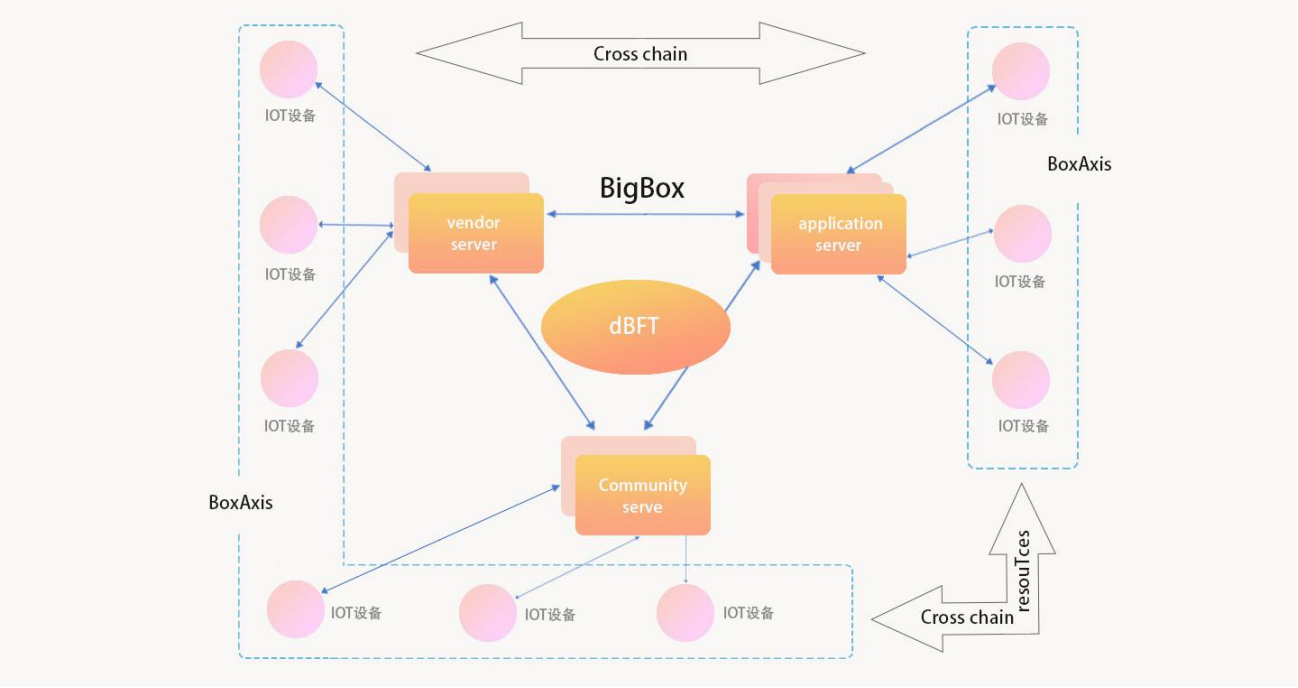


Figure IV.5.1: Schematic diagram of the BoxAxis double-chain consensus algorithm

Among them, "BigBox" that consisted of servers provided by equipment manufacturers,

community leaders, and eco-enterprises is the core of the entire architecture. "BigBox" consists of "BigBox" node, and the "BigBox" node is generated by community voting, and finally produces 2n+1 box axis nodes. And write the address information of the node to the creation block of the big box axle chain.

The main function of "BigBox" is to use the dBFT/DPoS consensus algorithm for the block operation and to coordinate the work of the nodes on the BoxAxis. Which consensus algorithm is used depends mainly on the number of nodes on the BigBox chain. In the early days of the project we used the dBFT algorithm.

The following TX will remain in the block of the BigBox: 1. Node Packet TX; 2. Node Work Report TX; 3. Identity Authentication TX. Among them, the identity authentication TX is the key to the continuous operation of "BigBox". The identity authentication information with n+1 box axis signatures will be reported on the chain. Through this mechanism, the system can vote to approve the new "box axis node" to join "BigBox", or vote to kick out manufacturers that are no longer participating or BigBox node that is not working properly.

In addition to the "BigBox", there will be a BAXS box axis consisting of various types of IOT device nodes produced by a large number of different manufacturers in the entire architecture, and all nodes on the "BigBox" also belongs to the BAXS box axis.

The nodes on the BAXS box axis continuously read the information on the "BigBox" to work efficiently. Mainly include:

1. According to the block information of "BigBox", determine which node the next block is out of (the block on the BAXS box axis is also output by the BigBox;

2. By reading the "BigBox" information, determine the group where the current node is located, and then determine the block data to be saved, and complete the data segmentation;

3. Read the legal manufacturer information of the "big box axle chain" to determine whether the data information reported by other devices is legal;

4. Report the work information of the BAXS box axis node.

With this design, the main TX of the BAXS box axis is left with IOT data collection TX and scalable smart contract running TX, while the consensus algorithm logic and device/data legitimacy judgment logic are moved up to BigBox. Thereby, the block stability and the block speed of the BAXS box shaft are improved, and the data segmentation of the BAXS box axis is realized, which reduces

the requirement of the performance storage capacity required for the IOT device to become a block chain node.

IV.6 Consensus mechanism process

The operation flow of the BoxAxis consensus mechanism is as follows (Fig. IV.6):

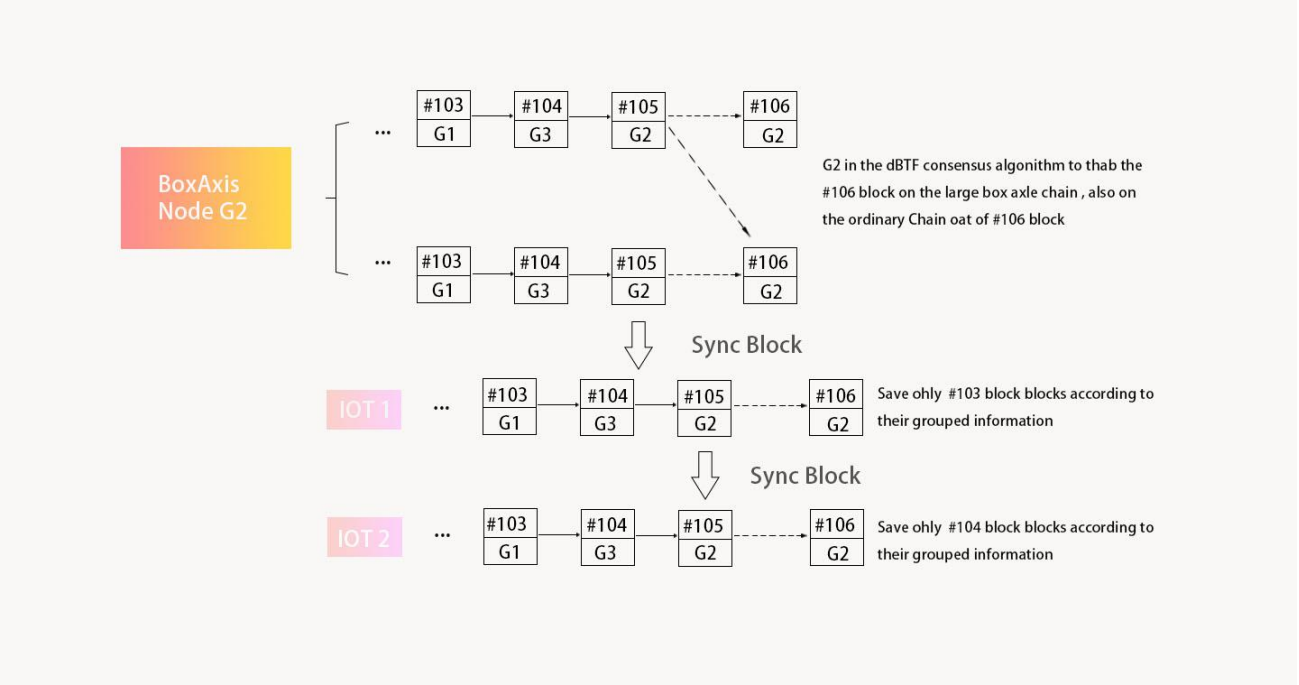


Figure: IV.6: Schematic diagram of the consensus mechanism process

The entire process runs as follows:

1. The BigBox node is released by the dBFT consensus algorithm;

2. The box axis node running on the server where the BigBox node generate the block after the BigBox is generate the block;

3. The box axis node running on the IOT device reads the group information on the BigBox to determine the group it is in. The IOT device that enters the network for the first time also needs to register the node on BigBox;

4. The ordinary node on the IOT device selects a BigBox node to keep connected according to its own grouping information, and is used to update the block and deliver the TX. This design improves TX's acknowledgment speed and reduces the bandwidth consumption of TX broadcasts in the narrowband edge network of IOT.

5. The IOT device can delete the BAXS box axis block that does not belong to its own group according to its own grouping information;

6. The IOT device delivers the running log to the BigBox through the node work report TX to obtain the salary income;

7. The IOT devices send ordinary TXs to each other to call functions or send collected data.

8. The BoxAxis block browser displays the block information of the BAXS box axis by default;

9. The BoxAxis wallet can submit the BAXS box axis TX to any IOT device node, or the BAXS box axis TX can be submitted to the BAXS box axis node running on the large box axis node. This method is similar to the reprinted standard TX, and also supports anonymous submission using broadcast;

10. BigBox periodically creates device group TX according to the registered IOT device node information.

IV.7 “Mining mechanism” that separates calculation from bookkeeping.

After using the double-chain formula algorithm, no IOT device will have a chance to generate block, so there is no way to get rewards through the block. Although from the perspective of the economic model design of BoxAxis, IOT equipment can generate revenue by providing functions and reporting key data, but in order to make the entire blockchain network work healthier, we have designed an incentive mechanism to reward normal working IOT device (node). From an realistic point of view, BoxAxis currently uses the mechanism of paying wages according to the working conditions of the equipment, but in order to distinguish it from the traditional incentive mechanism based on the block reward, we call such mechanisms as a mechanism that separating calculation from bookkeeping.

The core content of the mechanism is as follows:

1. The IOT device periodically packs its working status into “Node Work Report TX” and submits it to BigBox. The working status includes information such as "device startup", "device shutdown", "device completed node operation work", and support for extension.

2. In a time period, the BigBox will contain the working records of all the devices of the entire BoxAxis ;

3. BoxAxis will disclose a salary calculation algorithm. The input of this algorithm is all the

equipment work records in this time period, and the output is the salary table of each equipment, and the salary list is publicized during the publicity period. After the publicity period is completed, the BoxAxis Foundation will issue the BoxAxis Token based on the payroll. In addition to calculating the payroll, this salary calculation algorithm can be iteratively optimized every period to identify data fraud;

This mechanism also solves the problem that the traditional blockchain economic parameters are not easy to modify once they are set. Moreover, by publishing the algorithm and the input of the algorithm, the openness and fairness of the core mechanism of the blockchain are maintained.

IV.8 Extending business logic with smart contracts

BoxAxis Chain provides a basic capability to allow different device vendors to extend smart contracts running on their own sub-chains. But considering the hardware capabilities of IOT devices, there is no traditional virtual machine-based approach to extend smart contracts. We call this ability to extend the blockchain smart contract TX as BoxAxis Contract. The principle of BoxAxis Contract is related to the implementation architecture of the BoxAxis chain. The implementation architecture of BoxAxis chain is as follows (Figure IV.8.1):

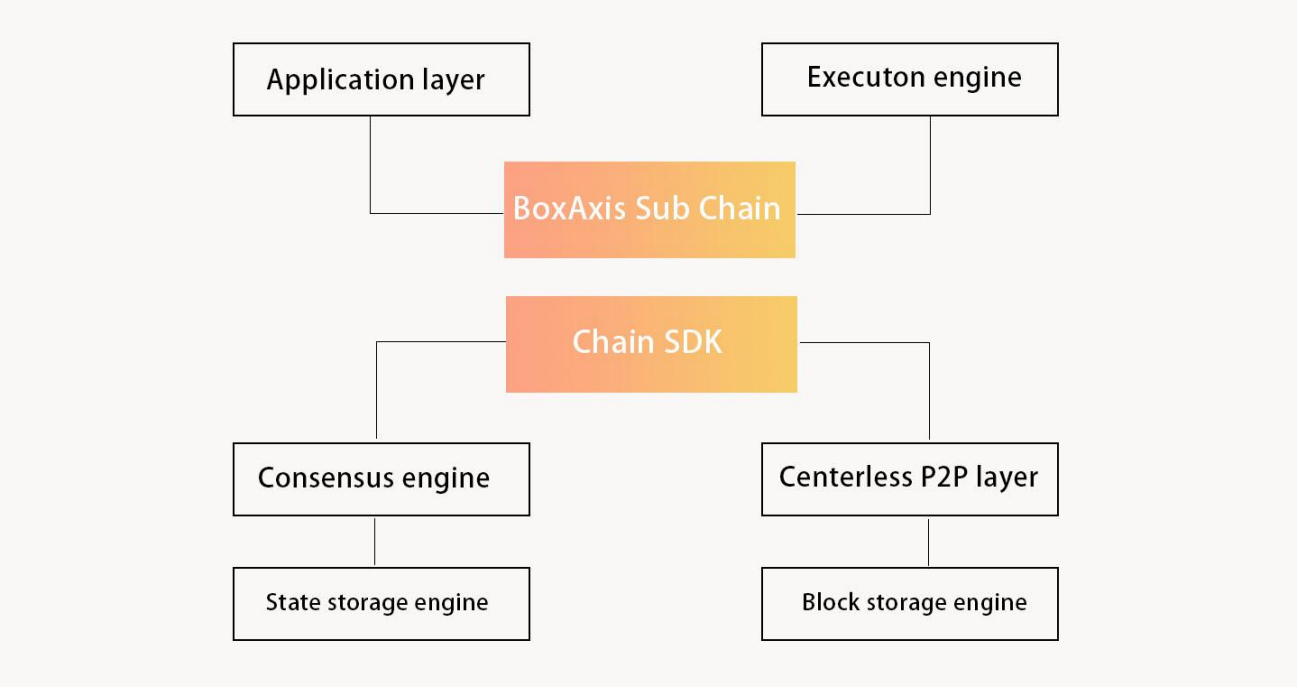


Figure IV.8.1 BoxAxis (box axis chain) implementation framework

Each BoxAxis Sub chain is developed based on the same Chain SDK. But allow different Sub chains to extend their BoxAxis Contract at the TX execution engine layer. In order to extend BoxAxis Contract ,the traditional development language (JavaScript) will be used, does not require a specialized smart contract VM, and it can run directly on the IOT's OS. It has high execution performance and low resource consumption, and is suitable for the actual execution environment of the IOT device. And using the regular development language, it also effectively reduces the learning cost and engineering cost of BoxAxis Contract.

IV.9 Coping strategies for the problem of traceability of the public chain

Logically, the physical objects is impossible to be chained, so you need to give each "object" a digital ID, in the form of a number or a two-dimensional code. However, the correspondence between this ID and "object" depends on people, which has great subjectivity and pseudo-space, and the reliability of blockchain traceability is insufficient.

Taking Ethereum as an example, the smart contract deployed on Ethereum cannot access the network outside the blockchain, and it is even more impossible to directly call the Restful API like a development application. Therefore, the blockchain and the data source of the physical world still have great gap. This requires an automated tool that provides a reliable source of data for blockchain smart contract execution. Oraclize has introduced the Oracle tool, which is verified by TSL Notary to ensure that data is not falsified to some extent.

According to the above, in the IoT data traceability application, the key source data of the "object" is collected, processed and recorded on the chain. It minimize artificial participation and the economic incentives of the falsification, which is the core strategy for dealing with the application problem of traceability.

The BoxAxis chain's Shell, will develop Oracle-like tool for the smart contract modules, consisting of Software Fetch and Hardware Fetch, provides reliable execution source data for the BoxAxis smart contract, both at the software and hardware levels.

IV.10 Cross-Chain Interoperability Agreement

The cross-chain interoperability protocol for the BoxAxis trunk chain will be divided into two parts:

the “cross-chain asset exchange protocol” and the “cross-chain distributed transaction protocol”.

IV.10.1 Cross-chain asset exchange agreement

Expanded on BoxAxis chain 1.0's double-chain atomic asset exchange protocol, allowing multiple participants to exchange assets across different blockchains and ensuring that all steps in the entire transaction process successful or fail. To achieve this, you need to use the functionality of BoxAxis Contract to create a contract account for each participant. For other blockchains, if it is not compatible with BoxAxis Contract, it can be compatible with the cross-chain protocol of BoxAxis (box axis chain) as long as it provides simple smart contract functionality.

IV.10.2 Cross-chain distributed transaction protocol

A cross-chain distributed transaction means that multiple steps of a transaction are spread across different blockchains and ensure the consistency of the entire transaction. This is an extension of cross-chain asset exchange that extends the behavior of asset exchange to any behavior. That is , the BoxAxis trunk chain makes cross-chain smart contracts possible. A smart contract can execute different parts on multiple different blockchains, which can be all done or return to the status of before done.

IV.11 Package method of blocks

Between different chains, there may be a chain with high frequency and low block time, or a highly encrypted block. Therefore, each parallel chain adopts different packet packing methods and integrates consensus through the cross chain technology. This part of the consensus integration will be bookkeeped by the main node.

The Internet of Things is a very special network, and the transmission of data is particularly different for delaying the accuracy of different protocols. Therefore, in terms of network architecture, we will adopt the MQTT method and do specific implementations and protocol improvements for MQTT to meet the needs of the blockchain.

IV.12 BoxAxis Application Case and INTDAPP

As the number of IoT devices increases dramatically and the level of machine intelligence increases, more and more automatically running IoT DAPPs will be installed on smart devices. Machines and machines, people and machines will pass through the distributed Internet of Things

DAPP to do real-time and trusted automatic data exchange and automated trading. BoxAxis will realize the direct data transmission between IoT nodes. The IoT solution does not need to introduce large data centers for data synchronization and management control. Data acquisition command transmission and software update all can be transmitted through the network of blockchains. Some BoxAxis typical application scenarios include:

①、Intelligent manufacturing:

For example, product transportation, even if the goods are transferred through multiple logistics, you can track the product to ensure safety and timely delivery. Production, inventory management, product sales and inventory data are recorded, so that the business and production department can share to strengthen on-time production and improve operational efficiency.Manufacturing equipment and systems are more and more intelligent, so as to gradually enter the virtual world ;

②、Smart car:

DAPP automatic operation of the Internet of things makes the vehicle change into the intelligent application terminals, the owner can use block chain track IoT equipment, such as vehicle inspection, automatic tracking, auto insurance. Automatic data exchange will be done between vehicles, such as road congestion data source map, so that owners can understand the real-time traffic conditions to achieve a more secure automatic driving, automotive navigation, road rescue etc.;

③、Intelligent Finance:

With the implementation of the blockchain distributed data can not be tampered with and data ownership, guarantee the authenticity of the data of financial institutions, to avoid credit, corporate debt and bond trading platform, payment, exchange rate, contract cost and orders and other fraud problem to improve traceability of financial security in the network;

④、Intelligent equipment:

Use sensors to track the bridges, roads, power grid and other conditions, and even help to monitor natural disasters in remote areas to prevent large-scale fires, pest disaster to realize intelligent city management, city greening and pollution prediction, and maintenance, sharing efficient city management. The different IoT chains can effectively circulate resources and greatly lower the access threshold of IoT , shorten the development cycle, reduce the risk of application development. In the future, smart grid, smart logistics, smart, intelligent furniture,intelligent

billboards, smart city, military and other aspects will be widely used. The intelligent medical have reached a cooperation with domestic well-known pharmaceutical Intel leading listed companies. Equipped with RSPS technology BoxAxis system successfully solved the drug packaging waste of resources, environmental pollution, and drug safety issues is difficult to guarantee during the transportation. It can not only provide real-time location information, but also to protect the drug circulation safety, traceability, and open up the end-to-end business data, improve the efficiency of drug circulation.

V. BoxAxis Cooperation Partner

VI. BoxAxis Tokens Distribution

BoxAxis Issued a total of 500000000 BAXS. The distribution proportion is as follows:

① 25% (Freeze) - 125,000,000 BAXS - BoxAxis community ecologic construction fund;

The first defreeze time on September 9, 2019. 0.5% will be defreezed every 30 days, it will be totally defreezed after 50 times .

② 10% (Freeze) - 50,000,000 BAXS - BoxAxis team rewards;

The first defreeze time on September 9, 2019. 2% will be defreezed every 365 days, it will be totally defreezed after 5 times .

③ 5% (Freeze) - 25,000,000 BAXS - BoxAxis token award;

Thaw began in December 9, 2019.

④ 5% (Freeze) - 25,000,000 BAXS - BoxAxis follow-up research and development Fund;

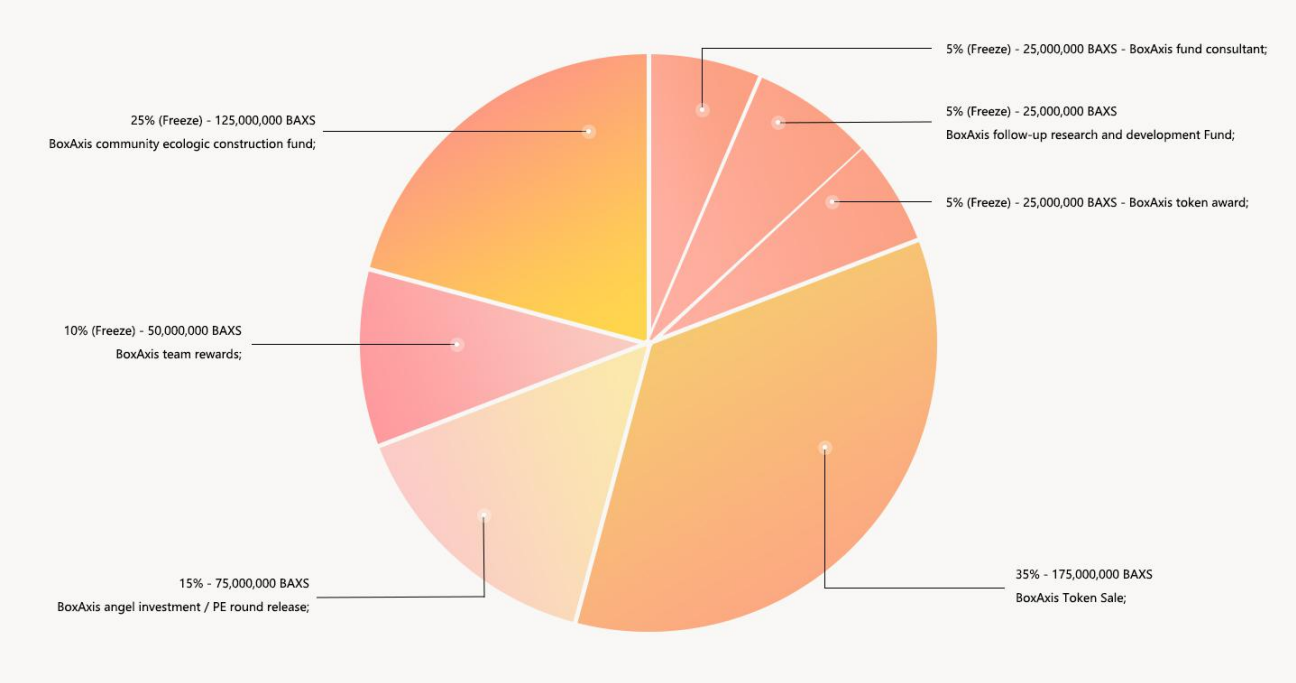
Thaw began in December 9, 2019.

⑤ 5% (Freeze) - 25,000,000 BAXS - BoxAxis fund consultant;

Thaw began in December 9, 2019.

⑥ 15% - 75,000,000 BAXS - BoxAxis angel investment / PE round release;

⑦ 35% - 175,000,000 BAXS - BoxAxis Token Sale.



Ⅶ. BoxAxis Team

Maxim Prishchep

The blockchain architect, founder and CEO of Integral LLC. Maxim, is the founder and CEO of two innovative IT Company.

Ashton Addison

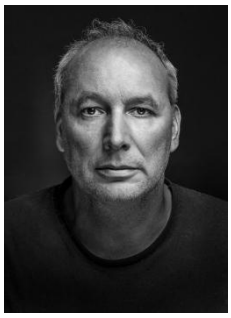
Chief market strategist, CEO and founder of EventChain.io, leaders, entrepreneurs, blockchain technology enthusiast.

Nikke Nylund

Nikke is a former low latency algorithm trading strategist. As the founder of information communication technology and technology companies and continuous investor, he has 20 years experience in management and entrepreneurship, and had several successful exit. Nikke holds a Bachelor's degree in Finance and Entrepreneurship from the Helsinki School of Economics.

Risto Karjalainen

Risto, data scientist and professional Ph.D. in finance from the Walton School of business. She has occupation career in automation, systematic transaction and institutional asset management . Risto's interests include real-time computing, machine learning, evolutionary algorithm, behavioral finance, blockchain and financial technology .



Henri Pihkala

Henri is a software engineer, a continuous entrepreneur and former algorithm trader. He led two high-frequency algorithmic trading platform, and he designed ,managed and built distributed Streamr cloud analysis platform. Henry is passionate about complex architecture, scalability, availability and blockchain.

Faud a.Khan

The international standard organization (ISO /IEC SC27) Canada chairman, IOT special working group convener; ISO/IEC SC41 international convener; CEO and security analyst of TwelveDot Labs, to provide network security solutions for the global customers; more than 21 years of experience in network security industry.

Gil Monteiro

Former CFO in a multinational manufacturer company .she has a solid background experience and has a statutory auditor in several industries such as Manufacturing, Real Estate and Services. Having more than 20 years ' experience in Finance, she has worked as a consultant globally with focus in South America and Europe. She responsible for multi-million euro budgets and focus on optimizing performance and allocate resources to exceed profit and stakeholder expectations.

Sanja Kon

Sanja is a senior digital executive with more than 10 years' experience in developing and executing global digital strategy, delivering sustainable revenue growth in multinationals within the E-Commerce, Fintech and Telecommunication industries. As the VP of Global Partnerships at UTRUST, Sanja's main focus is to partner with key international players to improve the accessibility of digital assets and increase cryptocurrency merchant adoption.

Ⅷ. BoxAxis Development Planning

2017 - 08 Creating an initial team to start the project

2017 - 08 BoxAxis 1.0 released the white paper

2017 - 08 BoxAxis get support from app developers

2017 - 10 BoxAxis study and discuss the intelligent development and application of block chain + IoT

2018 - 02 BoxAxis completes base layer and core layer research

2018 - 05 BoxAxis completes core network test

2018 - 05 Get the second angel investment 5%

2018 - 06 BoxAxis completes basic layer network testing

2018 - 06 Get the third angel investment 5%

2018 - 07 Publish apps for non-blockchain applications and conduct internal testing

2018 - 07 Created BoxAxis(BAXS) based on ERC-20

2018 -08 Improve and develop reach 3200 ~ 9400tps / s, complete by layers , research and develop Cross chains

2019 - Q1 BoxAxis Web application package

2019 - Q2 BoxAxis PC application package

2019 - Q2 BoxAxis MAC application package

2019 - Q2 BoxAxis Android SDK, IOS SDK application package

2019 - Q3 Optimize intelligent equipment point-to-point drive, intelligent equipment network chip point-to-point new standard research

2019 - Q4 Build BoxAxis ecosystem

IX. Contact Us

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Disclaimer:

This document is used only for the purpose of conveying information, does not constitute opinions related to trading BoxAxis token. Any such proposal will be in a trusted and under the terms of the securities law and other relevant laws can be used to allow for investment decisions, or specific advice does not constitute the above information or analysis.

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BoxAxis Clear, clear understanding of the risk related to the intention of the user of the BoxAxis platform, once said that investors invest in understanding and acceptance of the project risk, and are willing to bear all the corresponding results or consequences.

BoxAxis A token is a BoxAxis platform in the use of digital encryption currency. To write this text, BoxAxis is still unable to buy currency related goods or services. We cannot guarantee that BoxAxis coins will be added, but it may also occur in some cases declined in value.

BoxAxis Money is not a kind of ownership or control. Control does not represent the ownership of the currency BoxAxis or BoxAxis application, BoxAxis INT does not grant any money or any person involved in the control of any BoxAxis and BoxAxis on the application of decision rights.

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