ioeX

Free the Internet to The World

Decentralized
Peer to Peer Network
Blockchain Ecosystem

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Project Summary

According to Strategy Analytics research, the Internet of Things (IoT) is on the path of rapid development. At the end of 2017, nearly 20 billion IoT and interconnected devices have been deployed worldwide, and the number will increase by 10 billion in the next four years. It is expected that with the development of corporate IoT and smart homes, the total number of IoT devices will reach 50 billion in 2020 and thereafter.

The rapid growth in the number of IoT devices has brought about an astonishing demand for data connectivity. In the life cycle of each smart device, the software/firmware update process will be performed several times in order to upgrade the operating system or functionalities. During this period, it would also need to connect with other smart devices such as a smart phone to interact with or even transfer data between devices.

The current software update method is to set up an OTA server to handle the update and transmission needs. However, the influx of traffic and downloads of software update in such a short period of time presents a major challenge for the system's loading and connectivity capabilities. In addition, the cost of network traffic and operation costs have caused huge financial burden to manufacturers and even eroded the profitability of products.

Based on the above points, ioeX proposes a "Decentralized Peer-to-Peer Network" solution that combines Bootstrap nodes and Peer nodes to connect and communicate, creating a new direct communication network architecture based on the existing Internet. This safe, decentralized network will be built to enable equipment manufacturers, content providers, and even individuals around the world to create, store, and transfer content in a decentralized and distributed manner. ioeX will start with online updates as an entry point and will gradually add various applications for the general public and enterprise to enrich the ecosystem chain.

In addition, ioeX incorporates blockchain technology and is the issuer of cryptocurrency “ioeX coin” in order to provide rewards and incentives for relay and storage devices. This currency system will also encourage brand owners,

solution integrators, CPU vendors, and ODM vendors to adopt this business model. The business model eco-chain also promotes the end-user's willingness to purchase smart device-related products with peer-to-peer networking functions, and turn their devices into a peer node within the P2P network

ioeX is accelerating the construction of a "Decentralized Peer-to-Peer Network" eco-chain, and has received support from a number of chip vendors, solution providers, and equipment vendors. Currently, it is forming a new type of network topology for traditional Internet applications, bringing massive benefits to traditional Internet application and general IoT application.

1. Motivation and outlook

(1) Networking requirements, market size, and challenges of IoT

A. Networking Requirements for Billions of IoT Devices Worldwide

With the increasing popularity and efficiency of the Internet, the variety of networked devices has become increasingly diverse. As a result, the number of products has grown. Such product services include web application functions of smart phones, OTT boxes that replace DVD players and cable TVs, smart speakers that can answer questions, and so on. Product diversification and iterative function updates are becoming increasingly fast.

Networking requirement 1: Software/firmware updates

The default factory version of built-in software/firmware for a network application device (hereafter referred to as "a smart device" which has a CPU/RAM/ROM, can compute, cache, store content, and transmit and receive data) can no longer meet all of users' functional requirements. Periodic improvements, upgrades, or even interactivity support with other smart devices or IoT devices (such as dumb terminals, like Zigbee sensors) must be performed to increase the product's functionality in order to satisfy end-users and maintain brand reputation and sustainable profitability.

Networking requirement 2: Interact with other devices and transmit data

A smart device is no longer just a standalone device but needs to be able to generate, store, display, transmit, and interact with data. How to output and share the results with other daily smart devices such as smart phones properly has also become a clear user need. Private/personal cloud storage is another good example of this.

(2) Operation cost concerns

A. High OTA server setup and traffic costs

If product software needs to be continuously updated, in addition to the continuous improvement of the device software, significant market research and functional development manpower are required to prepare the version

upgrade. How to enable OTA on devices, to set up the OTA server to respond to online upgrade requests from products sold in different geographic locations (for example, the same product is sold to the United States, Japan, Australia, etc.), and to support the heavy inbound and outbound traffic load on the servers, all present a huge financial concern for vendors. Cloud storage and network traffic will incur further expenditure. Overall, the financial burden can be a heavy one even for large enterprises.

B. Extremely high cost of relay server

In order to enable a smart device to interact with the at least the user's smart phone, ways to ensure that devices are still able to talk to each other and transmit data over the local network or the Internet in the same way, including remote access display and remote saving functions, all are clear user requirements in the given scenarios.

Unfortunately, smart devices such as OTT box or smart speakers are placed at home and are mostly connected to a home router (wireless router) or WIFI with a floating IP. Smart phones using 3G, 4G, or even the future 5G telecommunication networks are also floating IPs. Both OTT box and smart speakers often have difficulty connecting directly due to network traverse problems (multi-level routing or other reasons, such as firewalls, causing NAT traverse problems), leading to the fact that equipment vendors or service providers need to provide a relay server to help with issuing commands and transferring data, further eroding profit.

C. How much does this cost?

Let's simply calculate with the most conservative figures:

Set the conditions: I) A smart device supplier ships 10 million units. II) The equipment activation rate is only 50% after sales (general activation rate should be much higher than 75%). III) Assume the size of the system upgrade package is merely 50MB (system upgrade packages are usually greater than 100MB).

Exclude the following factors: temporarily ignore shipping area differences, support for resuming downloads, server rental, service fees, labor costs, load balancing, hourly floating charges, and other expenses.

Under this condition, at the Amazon Web Services network traffic cost of US$0.1/GB, a single update would cost US$24,414, approximately NT$732,422. Multiple updates would occur during a product's life cycle, and in situations where the gross profit of general smart devices is already not high, a few updates would be enough to erode profit and even cause losses.

According to trend analysis reports, with globally connected devices reaching 5.8 billion in 2016, the transmission cost for maintenance and update has already become considerable. In the future, the penetration rate of IOT smart devices will rapidly increase the overall expected cost.

(3) Technical issues

Challenge 1: Status of online update process for smart device software

The software in most smart devices comprise more than end-use applications, many of which are updated online via Google Play or App Store. The middleware software and operating system of smart devices also need to be upgraded through the vendor's own OTA server.

As shown below, smart device updates include applications, framework, and components of the operating system layer.

Schematic diagram:

Items that need to be updated by smart device vendors or solution providers

As shown in the following illustration, related companies will perform online updates of software or firmware on the sold smart devices. The data server will need to face high-volume smart devices, support multi-point simultaneous downloads, and file downloads.

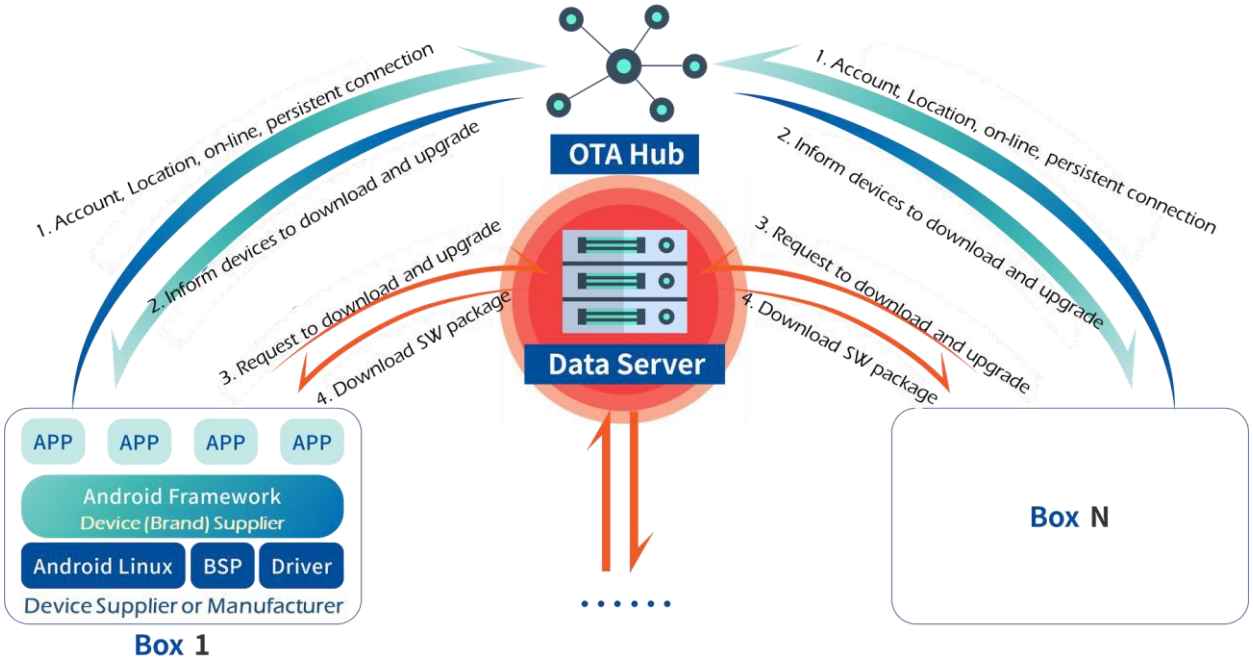


Illustration:

Due to OTA, data server must be subjected to large traffic and load balancing costs

Smart devices last longer than smart phones and have longer product life cycles. The demand for feature optimization through online upgrades and online updates cannot be ignored. However, the typical needs of current OTA data transmission often exceed 50MB per device.

A brand supplier or equipment supplier that ships more than 1 million units will inevitably face the extremely high cost of online updates. Often, the cost of a single update service will be as high as hundreds of thousands, even millions of dollars.

For suppliers who are selling more products and shipping into wider areas, the cost pressure and the efficiency of upgrading systems will become another obstacle. It is possible to imagine that transmission demands would be like November 11th Singles' Day sale, requiring extremely high performance from the data server. Multiple servers may even be required to achieve load balancing. This will be a huge factor leading to the decrease in profits.

What kind of solutions can be provided for solution providers and chip vendors who face such large volume demands? And how should the demand for additional resources and services that become increasing necessary under

competition be met? This is a difficult challenge, but also an opportunity for ioeX.

Challenge 2: Status of smart device transmission and cloud storage processes

Smart devices are placed indoors, such as in homes or offices, as shown below. Consumers often have two types of requirements:

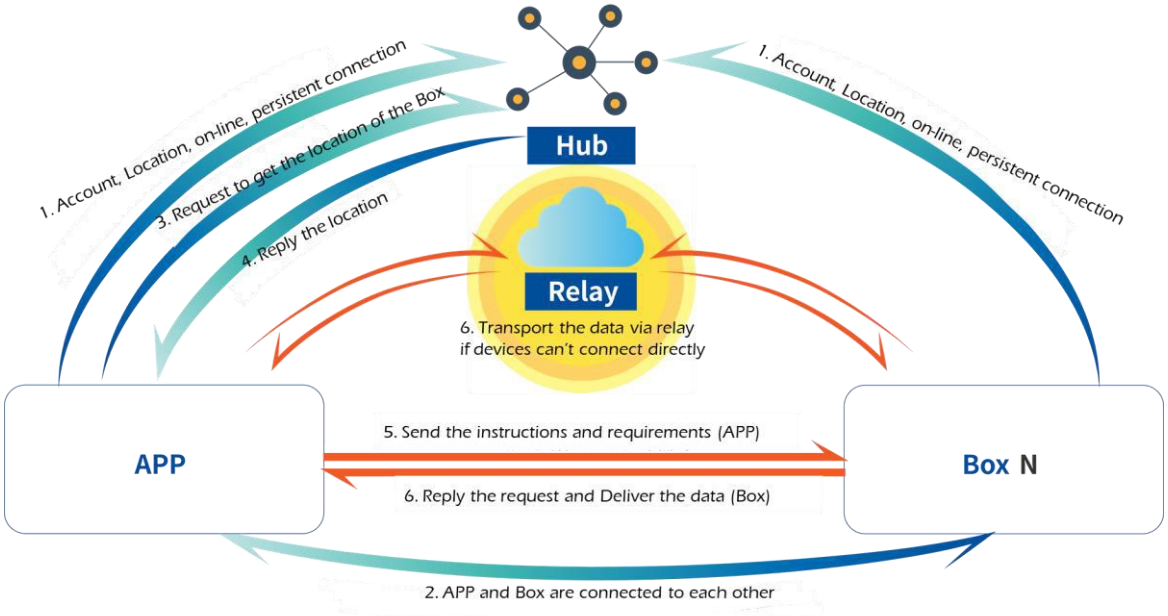
(a) Remote connection to perform function setup.

(b) Remote file downloads.

Schematic diagram:

The smart device plays a role of transmission and cloud storage in a fixed location

For the first need, smart device suppliers often have to provide corresponding network connectivity and transmission capabilities and services. When an external network is used to connect, oftentimes mobile sides and indoor devices are not able to connect directly. A relay server must be present to provide the relay function. This will increase operating costs, and even require a large number of relay servers to handle the dense traffic.



Schematic diagram:

If the mobile device APP and the indoor IOT box cannot be directly connected, they must pass through the Relay server.

(4) Potential market size

A. OTT box market in Mainland China

Influenced by the flourishing development of the pan-entertainment industry, the OTT equipment market is already a booming sector. For example, in China, where the OTT box adoption rate is higher and the market is huge, OTT growth was rapid before 2015, and by the end of 2017, cumulative shipments of OTT equipment in China will have approached 200 million units. Additional 55 million new units are expected by the end of 2018.

To update the software for such a large number of devices online and to enable so many devices and smart phones to generate the function of external network connection calls, the required OTA and relay energy, including traffic and storage space, will be a major roadblock.

Chart: Annual sales of OTT smart devices in China

B. Smart speakers

According to a report published by Canalys, it is expected that the market of global smart speaker will increase to 56.3 million units in 2018, significantly higher than the 30 million units in 2017. As for national market share distribution, the United States is still expected to remain the most important market for smart speakers in 2018, with shipments expected to reach 38.4 million units. China ranks second with 4.4 million units. Since the advent of smart speakers, there has been only one major supplier, and more system suppliers and equipment suppliers were gradually added to the supply chain. The market shares of different geographical regions in different industries are also different, but shipments continue to climb.

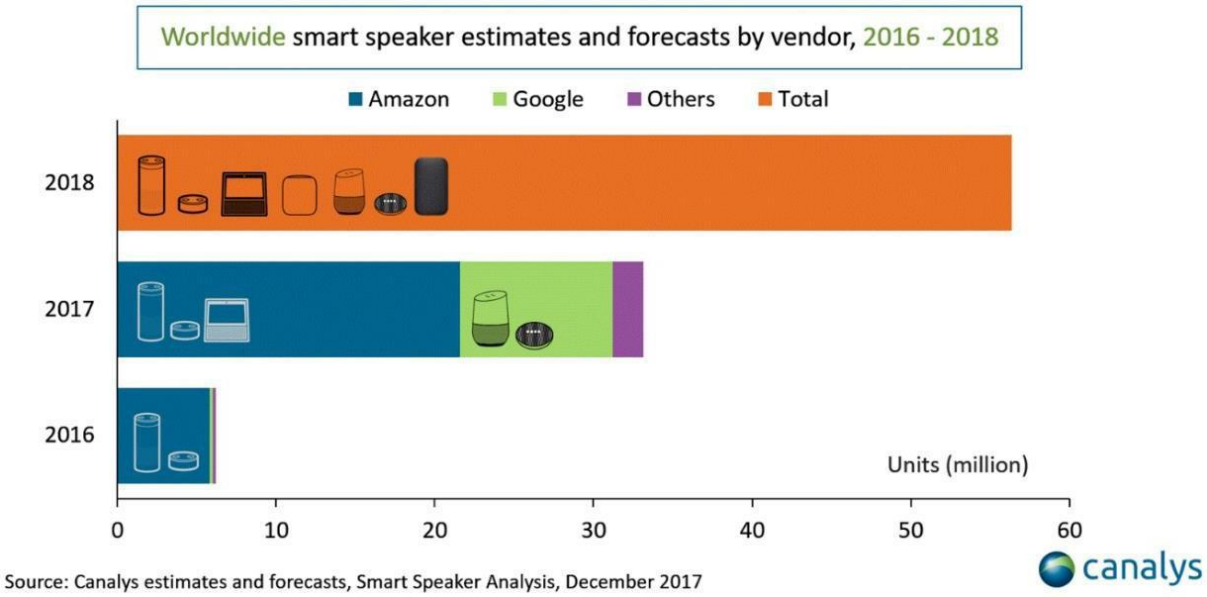


Figure:

The shipment of smart speakers to the global market

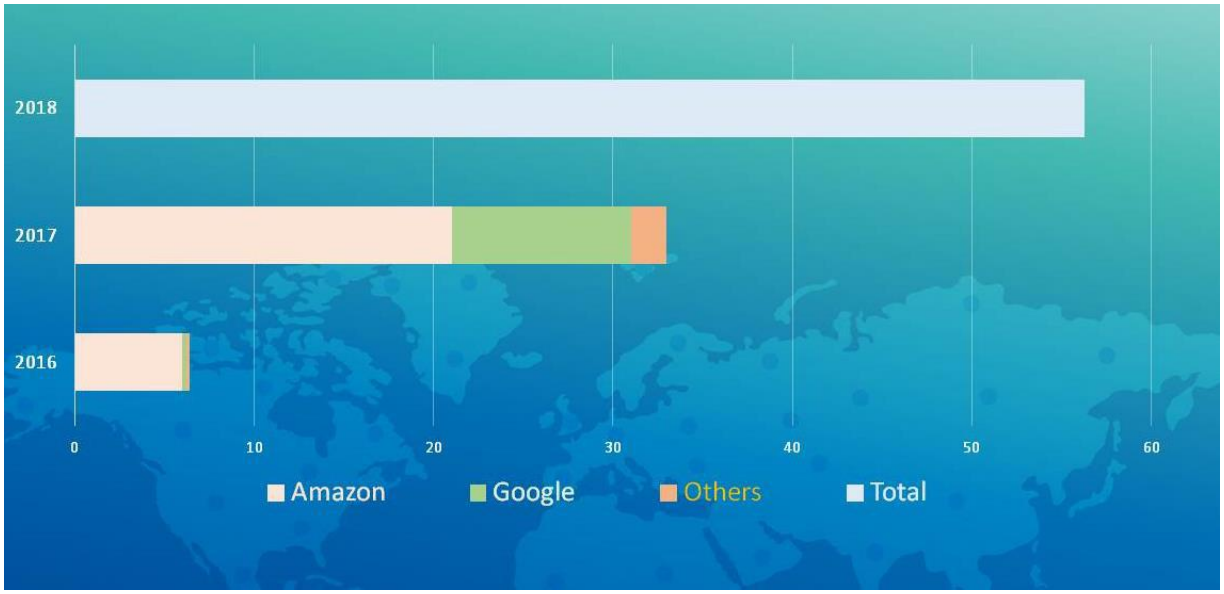


Figure:

The shipment of smart speakers to China market

C. Analysis of global market

According to Cisco's trend analysis "The Zettabyte Era: Trends and Analysis", by 2021, the number of devices connected to the Internet will exceed three times the global population. By 2021, per capita networked devices will reach 3.5, higher than the 2.3

networked devices per person in 2016. Personal devices and machine-to-machine (M2M) connection devices will be used more widely, and their number will increase from 17.1 billion units in 2016 to 27.1 billion units in 2021. Indicators also point to Internet users growing from 3.3 billion to 4.6 billion people (58% of the global population).

The M2M application in many industries has accelerated the phenomenon of the Internet of Everything (IoE). The report points out that on a global scale, the networking of M2M products will increase by 2.4 times, from 5.8 billion in 2016 to 13.7 billion in 2021. By 2021, an average person in the world will have 1.75 M2M product connections (see below).

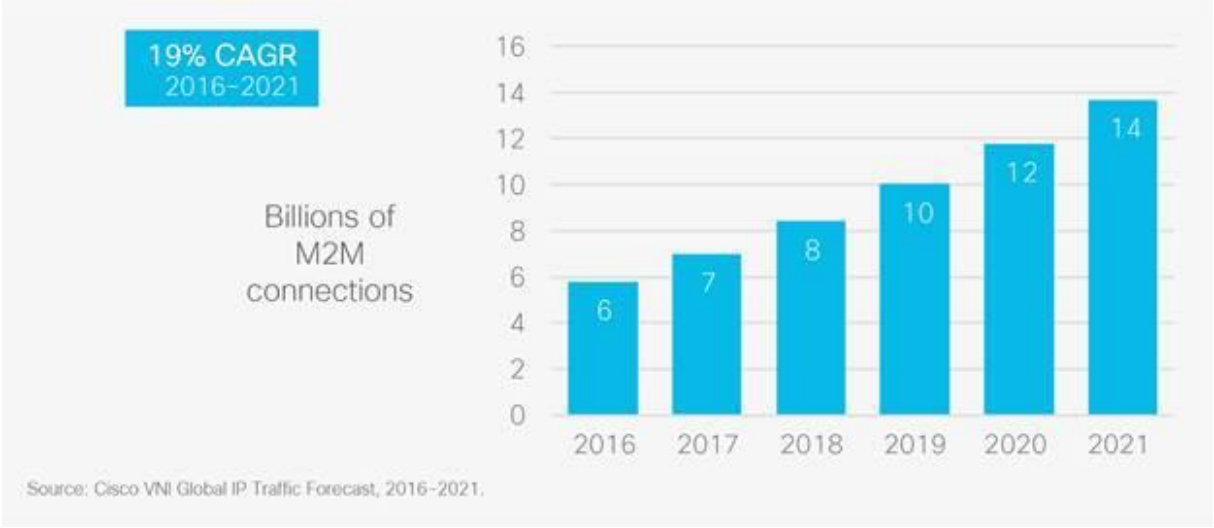


Figure:

Global M2M Connectivity Growth

By 2021, connected home applications such as home automation, home security and video surveillance will connect home appliances and tracking applications and account for 46% of the total number of M2M connections, followed by the number of connections to connected work, showing that M2M is becoming commonplace in our daily lives (see below). These smart devices all share one characteristic: they use large amounts of network traffic.

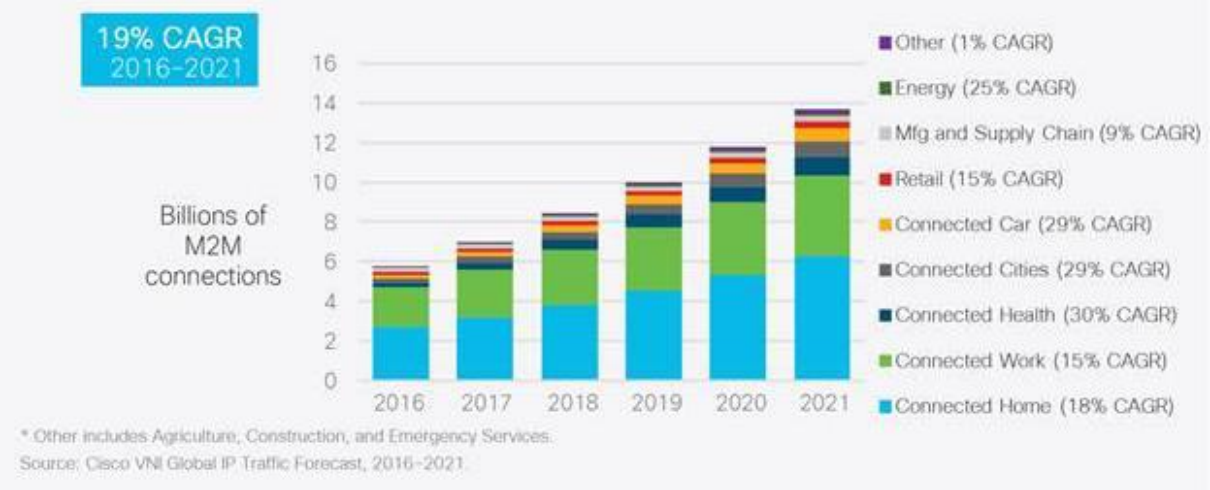


Figure:

Growth of M2M connections across industries around the world

Although the number of connections has increased by nearly 2.5 times, global M2M network traffic will increase by more than 7 times in the same period, from 2EB per month (2% of global network traffic) in 2016 to more than 14EB (5% of global network traffic) in 2021.

Due to the increased demand for online updates of applications on M2M connections, and applications such as software and firmware systems that require greater bandwidth and lower latency, network traffic has grown faster than the number of connections.

Figure:

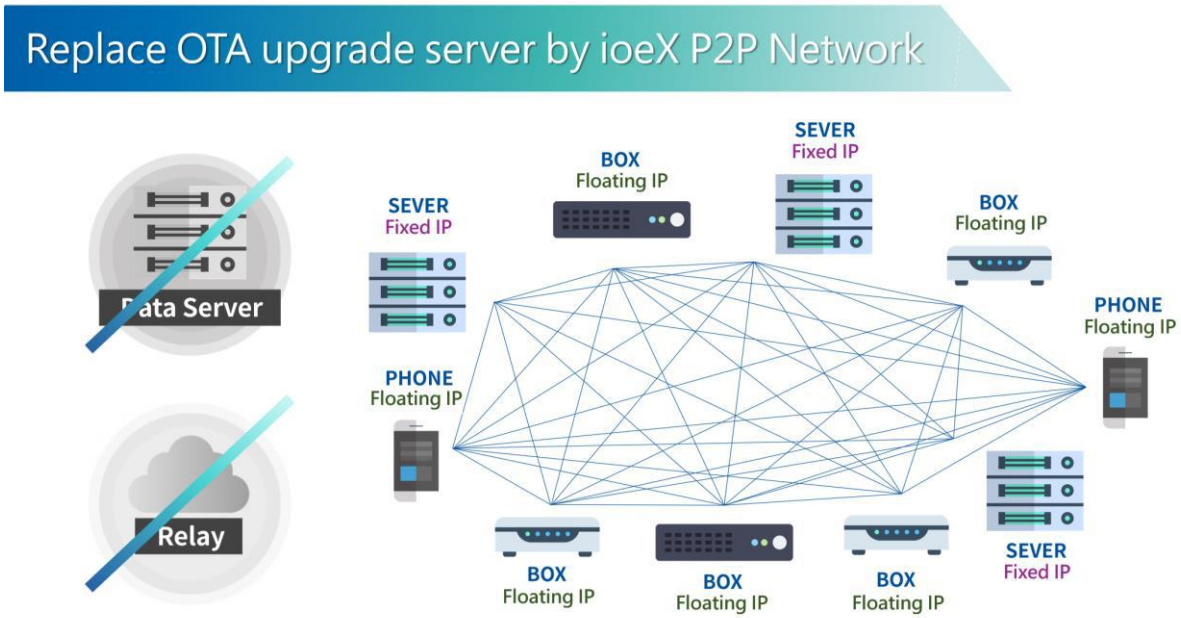
Global M2M traffic growth/monthly Exabytes

If the calculation is based solely on the AWS rate of US$0.1/GB, temporarily ignoring the basic cost of the server itself, the equipment cost caused by load balancing (floating fee per hour), labor costs, and the cost of geographical location, on average, data transmission fees per month will add up to more than US$1.5 billion, with M2M traffic market valued at US$18 billion a year.

2. The ioeX solution

(1) How ioeX solves the problems outlined above

ioeX employs a "Decentralized Peer-to-Peer Network" as a solution to replace the costly Relay Servers and OTA Servers. ioeX aims at lowering or even eliminating the enormous costs and expenses resulted from network connections, file storage, access and transfer.



Schematic diagram:

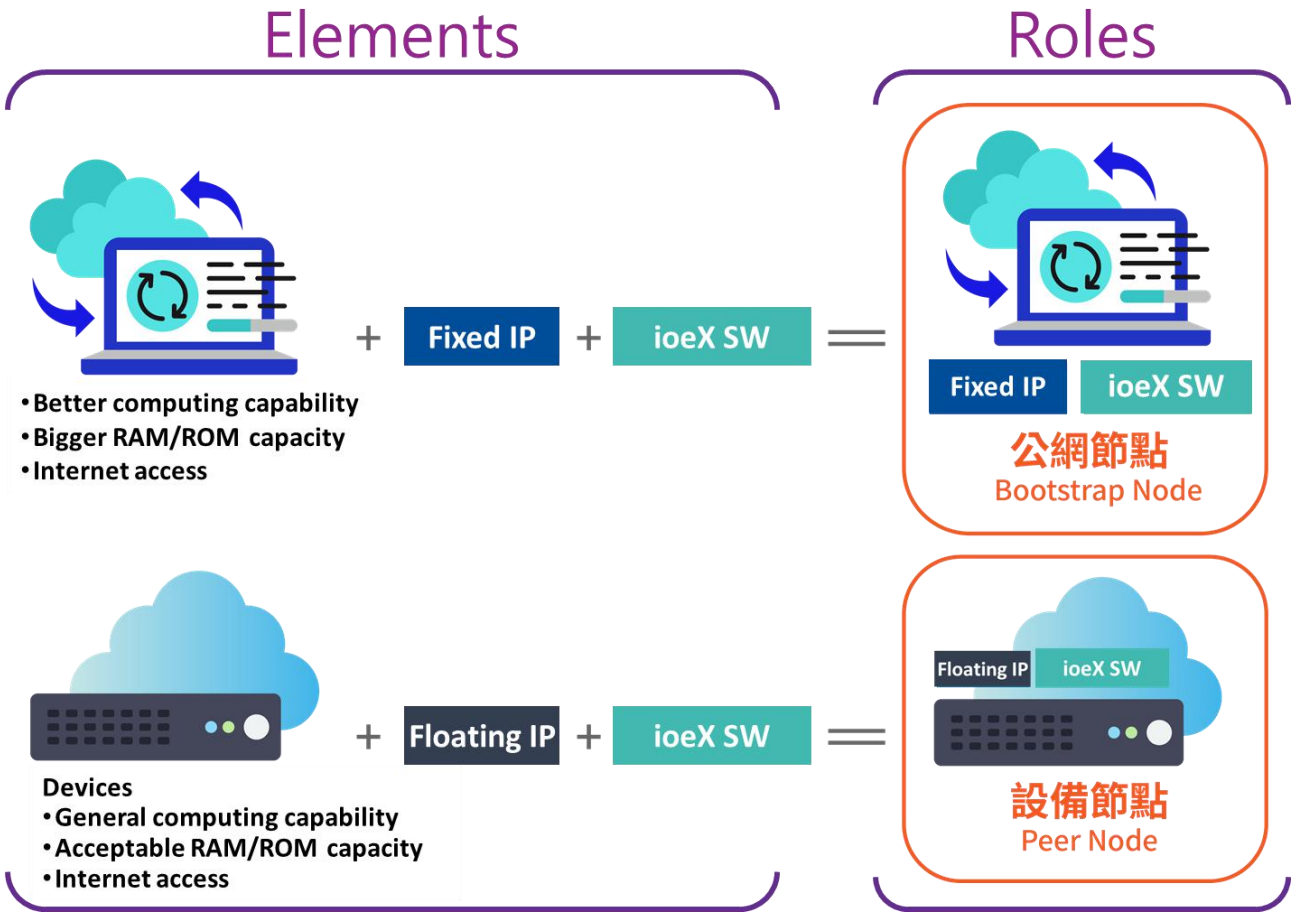
Replacing high-cost Relay and OTA with decentralized peer-to-peer network.

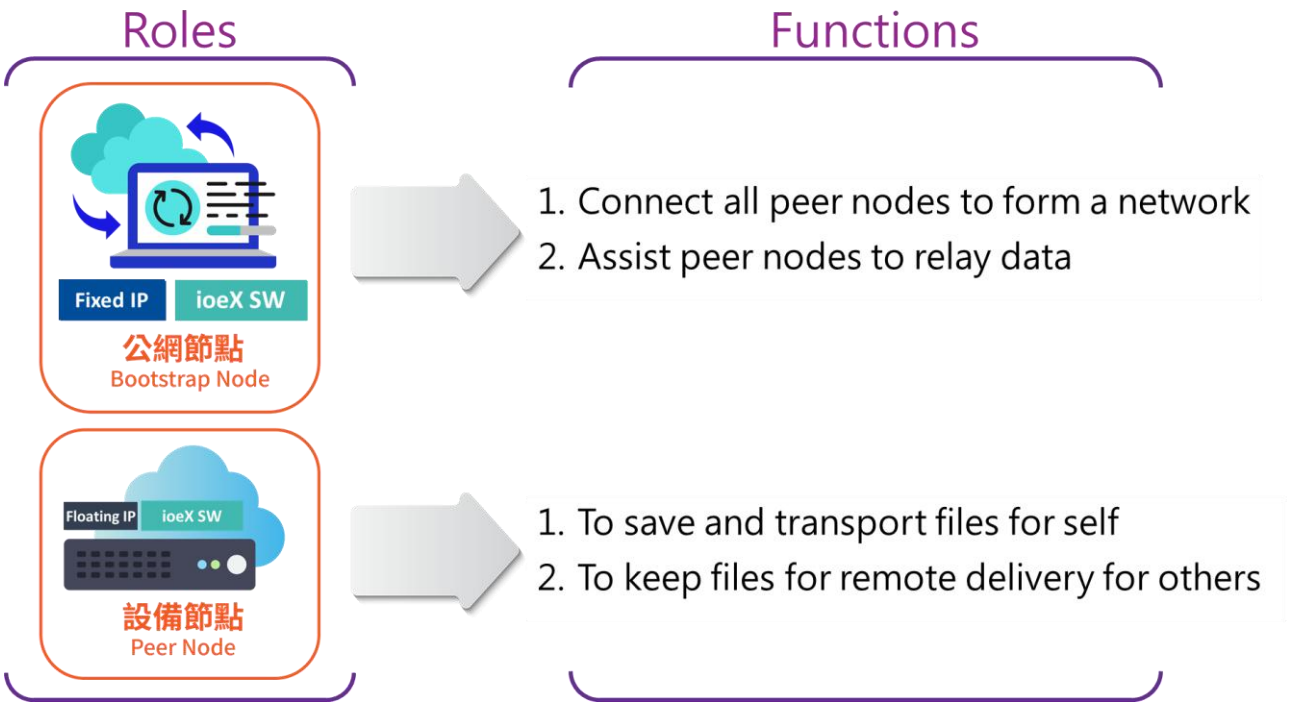
(2) What is "Decentralized Peer-to-Peer Network"?

The Decentralized Peer-to-Peer Network used by ioeX (referred to as "Carrier" in this chapter) was built on top of Elastos. ioeX can be treated as an application extension of Elastos and part of its ecosystem. It will focus on practical applications for enterprises, targeting both business and general needs. In addition to developing functions for general use cases such as communication and personal cloud storage, ioeX also develops functions for business users, thus expanding Carrier's networking functionalities. These will be continuously integrated with future Elastos iterative networking updates as well as built-in functions in Elastos RT, such as ID recognition.

Carrier is a Friend-to-Friend (F2F) basic communication network built on DHT decentralization and distributed network technology. The "Peer-to-Peer" in Carrier

means node-to-node. The "Bootstrap Nodes" that connects to the network via fixed IP addresses is the basic network architecture used by Carrier for networking. They help floating-IP-address-only smart devices installed with the Carrier SDK to connect to Carrier network. These smart devices then become "Peer Nodes" and aggregate across the P2P network. Bootstrap Nodes provide Relay (file relay) functions to peer nodes, but do not function at the application level. This means that no Friend relationship exists between these two types of nodes. Peer nodes on the other hand, participate in application-level functions, and data/message exchange between them requires a Friend relationship to be established. One of the most basic-level API in the Carrier is to establish a Friend relationship between nodes.





Schematic diagram:

Two types of nodes in a network: Bootstrap nodes and peer nodes

Since Carrier network architecture is Friend-to-Friend based, as long as no Friend relationship is established, no direct communication between nodes is possible, even if they are on the same DHT network, making it harder for hackers to launch DDOS attacks. This improves the security factor in Carrier network.

As detailed above, Carrier itself is a basic communication framework and does not have any application features or properties, i.e. it is a relatively generic development interface. What functions and logic it provides are realized through applications developed from its API. Carrier does not store any user information, user messages, communication records between nodes, Friend relationships, etc. are stored on the peer node device.

In addition to basic Friend-to-Friend API, Carrier also provides an API for messaging. Once a Friend relationship is established between nodes, the most basic messaging can be done with DHT network broadcasting.

In addition to DHT networking, ICE (Interactive Connectivity Establishment, a traversal technique that combines STUN with TURN) is also used by Carrier to realize P2P direct data transfer.

Carrier provides data encryption/decryption and multiplexing for data transfer. The interface can even forward upper-layer semantics to provide better application support for Carrier developers. Carrier data transfer API is divided into two levels, the Call level and the Section level. Call is essential while Section is optional. The developer may choose to introduce only Call or additional Section APIs based on their needs. As a general rule, Call would suffice for messaging, only consider Section when streaming is involved, for a better control of the scale of your application.

Carrier also provides Session APIs to assist in establishing connection-oriented or UDP packet communication, called Streams in Carrier. Carrier Session API comes in two levels. The first is an UDP packet-like mode, and the second a TCP-like streaming mode. These two modes are implemented on Stream and can be selected from a drop-down menu.

The two modes look exactly the same on the interface, but two different underlying operating mechanisms set them apart. The base transport protocol of Carrier is UDP, as it is harder to conduct traversal through TCP, and P2P traversal may be done in 70%-80% of the cases with UDP. It can be used to implement peer-to-peer direct transfer to a larger extent. Although the base transport protocol uses UDP, Carrier API provides both UDP-like data packets and TCP-like streaming modes, depending on the need of the upper-layer applications. It also supports encryption should one choose to.

For transferring large-scale data, a Socket communication mechanism becomes necessary. As Carrier only provides TCP and UDP-like transport channels, it does not support resuming downloads. Instead, the developers themselves have to provide Socket support in their applications. The API of Carrier itself involves a lot of I/O. The entire implementation is based on asynchronous I/O (AIO, Async I/O). Underneath is a worker thread, and all user APIs are asynchronous. Both direct call and callbacks are supported. (The basic idea behind AIO is to allow a process to initiate many I/O operations without blocking or waiting for any operations to complete. The process can retrieve the result of an I/O operation later or when it receives a notification of its completion.)

If direct transmission between peer nodes is not possible, relay takes place through bootstrap nodes. The implementation of relay involves some basic protocols for P2P

traversal inside Carrier. Carrier implements the P2P traversal protocol using the standard RFCDE specification, and the relay function is also implemented based on it, except that the discovery, query, and use of the Relay (bootstrap node) have been bundled with DHT to be performed automatically. Carrier function kits on Peer nodes can also find and connect to available bootstrap nodes automatically based on network topology without the need for a centralized relay center. There will be many relays (bootstrap nodes) on Carrier network and the algorithm selects a relay on the DHT network that is optimal for the peer node itself. These specific mechanisms are outlined in RFC documents. In a DHT network, each peer node does not store all bootstrap node IDs, instead, it stores the neighboring bootstrap node in a table determined by the algorithm. This node table snippet is stored locally, and accessed in the next relay connection.

Within Carrier, your UID is unique and your only identification on the DHT network. Carrier ID is your external ID tag. However, if someone gets your Carrier ID, they cannot access your data directly. They would still need to establish a Friend relationship with your ID first. Carrier has a basic authentication process that is done by the application. Carrier ID is a public key corresponding to a key on the ECC Curve, comparable to the ID of a cryptocurrency wallet. It is generated when a Carrier node is initialized and run for the first time. Carrier ID is a public key, associated with a private key. All communication and data transmission between peer nodes are encrypted by the private key from both ends, including authentication. If a private cloud drive is built on Carrier, things like IP address and URL become irrelevant. You can access the drive simply using Carrier ID.

We further explain the F2F binding mechanism through the private cloud drive example. If the private cloud drive is set up using the standard owncloud protocol, its account and password could be set using functions provided by owncloud. Carrier itself doesn't provide any account and password functionality, only access authentication. In other words, when accessing a deployed owncloud service through a mobile phone, the relationship between nodes has to be established through Carrier API. The mobile phone and the private cloud drive service have to be paired through a "pairing code." It is set by the user while deploying the service. Once pairing is complete, it is now possible to access the private cloud drive from the client side. The user then have to provide the correct private cloud drive login info to actually access

the oncloud drive. The authentication is therefore two fold. First is the pairing authentication, then the oncloud user account authentication. To develop similar applications on Carrier, some Friend relationships may be established in advance based on application needs. In addition, default pairing code may be used to automatically establish Friend relationships at later stages.

Carrier does not support offline messaging.

The memory footprint on Carrier is relatively small. Static footprint is about 1 MB, and runtime footprint is about 2~3 MB. The DHT network needs to keep running after Carrier initialization, so there will be some bandwidth consumption to maintain it. This is something to be aware of on the mobile client side, as it would lead to greater power consumption. Improvements on peer-node applications may compensate for that.

Carrier supports a multitude of application developments. In addition to the example mentioned above, many cross-network scenarios can be made through PFD applications. For example, the home or office server can map out remote ACH visits or remote desktops, etc. To provide more diverse enterprise applications, more functions will be developed on, and more Elastos iterative updates will be integrated into Carrier.

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(3) "Decentralized Peer-to-Peer Network" as a Solution

Let's briefly review the P2P network nodes types:

"Bootstrap Nodes" that connects to the network via fixed IP addresses is the basic network architecture used by Carrier to build its P2P network. It can help floating-IP-address-only smart devices with Carrier SDK gain access to the network. This will enable these smart devices to become "Peer Nodes" and aggregate across the P2P network. Bootstrap nodes also provide a transparent relay function to peer nodes.

- **Bootstrap Node:**

It must have a fixed IP address, can be searched easily and accessed, mainly used as the backbone of the P2P network, does not function at the application layer, and does not

have Friend relationships (account-binding) with any peer node.

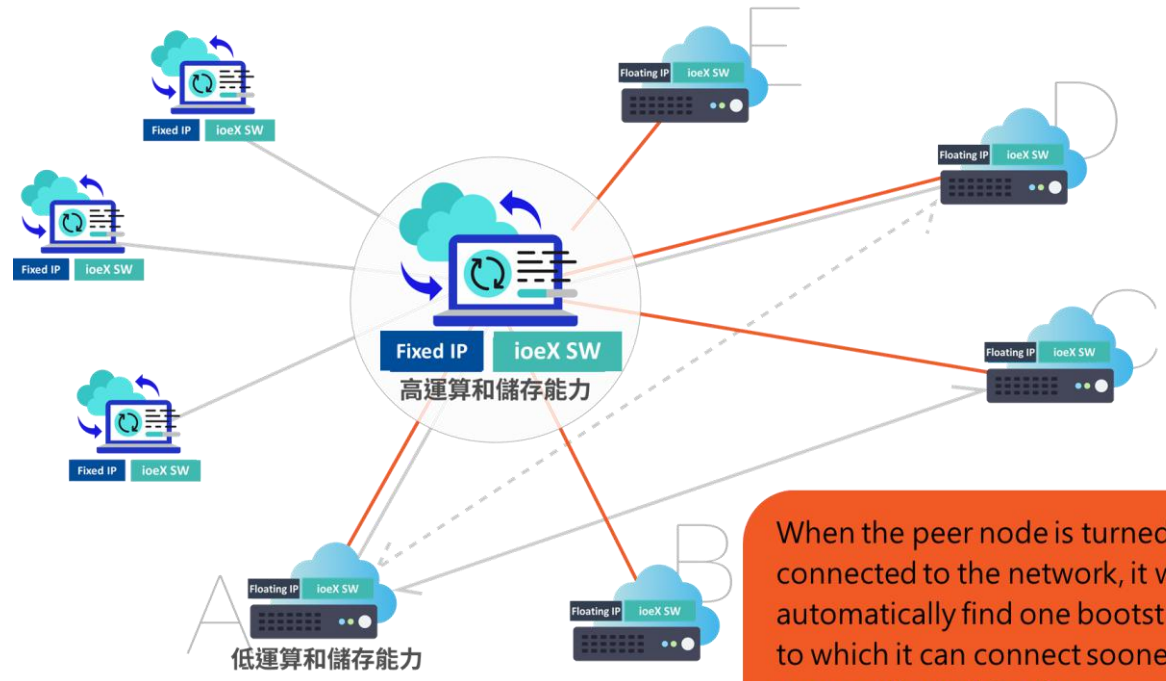
- **Peer Node:**

It is an ordinary node that is linked to a floating IP and participates in application-layer functions. Interaction between peer nodes requires a Friend relationship. Once a peer node is powered up, it automatically search for and connect to bootstrap nodes.

A. Peer-to-Peer Network transfer: cloud storage solution concepts

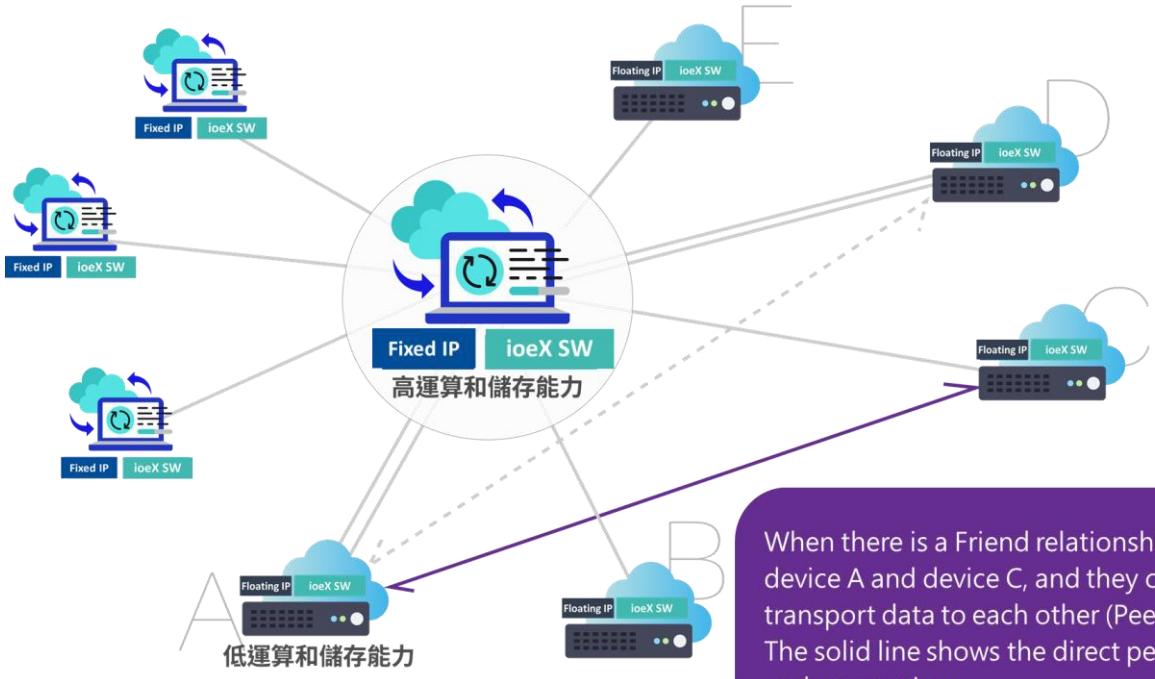
When a file is transferred between devices or mobile phones, if both parties have already formed a Friend relationship and they are able to traverse NAT and connect, then it is an ordinary P2P network direct connection. If the peer nodes with a Friend relationship cannot traverse through NAT (source to destination), then the P2P network will automatically provide relay through bootstrap nodes for the transfer.

As shown below, after the peer node is powered on and connected to the network, it will automatically search for bootstrap nodes to connect to and continuously update its location. The devices connecting to the same bootstrap node form a small P2P network. Whether it is a direct connection or a relay connection, it is transparent to the application level. The P2P networking software manages it based on the topology of the network, including the selection of relay path. This kind of P2P network addressing (i.e., Peer nodes with Friend relationships searching for each other) is very similar to the way digital currency wallets, such as Bitcoin wallet, handle addresses.



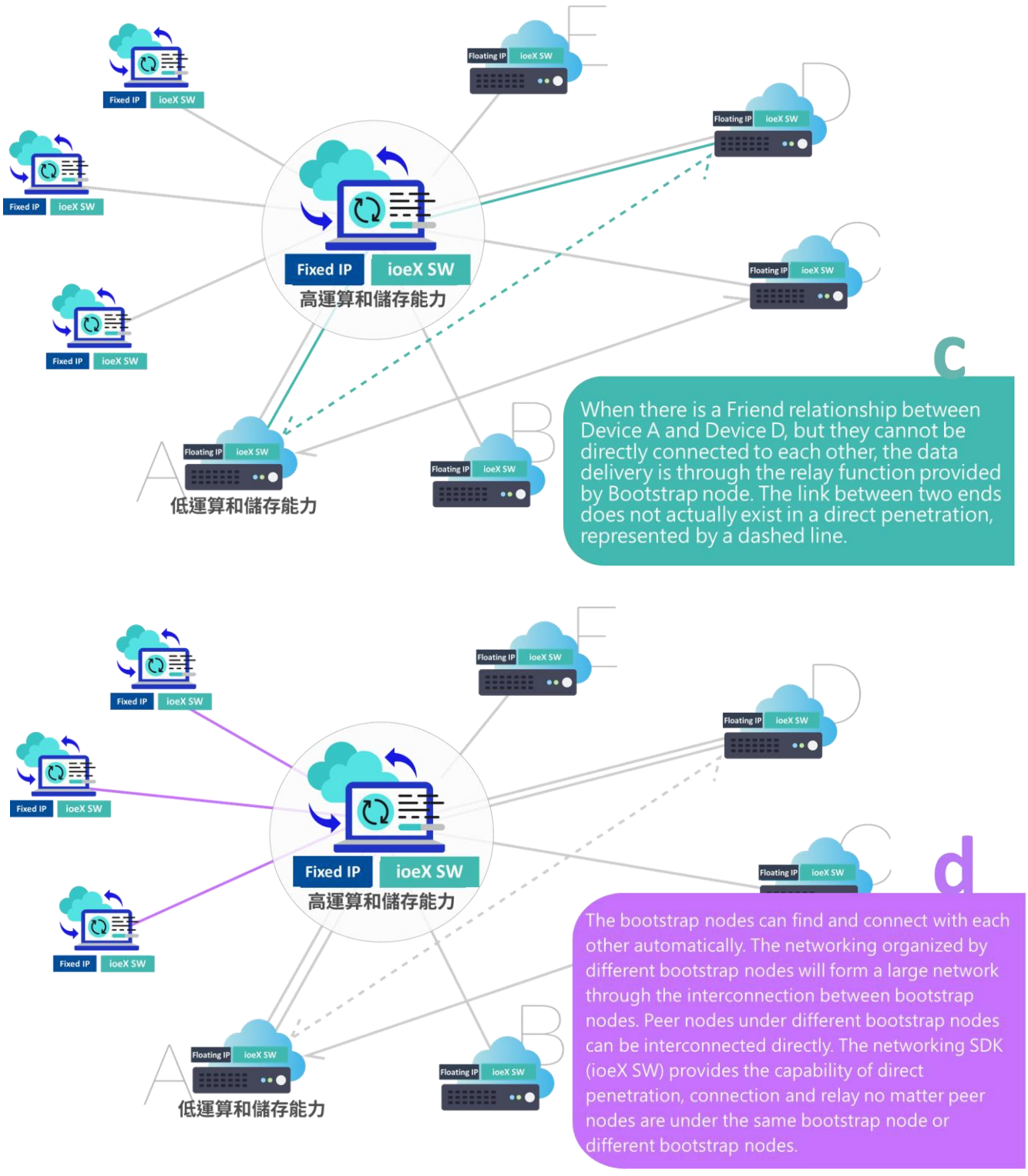
a

When the peer node is turned on and connected to the network, it will automatically find one bootstrap node to which it can connect soonest and connect it persistently.



b

When there is a Friend relationship between device A and device C, and they can directly transport data to each other (Peer-to-Peer). The solid line shows the direct penetration and connection.

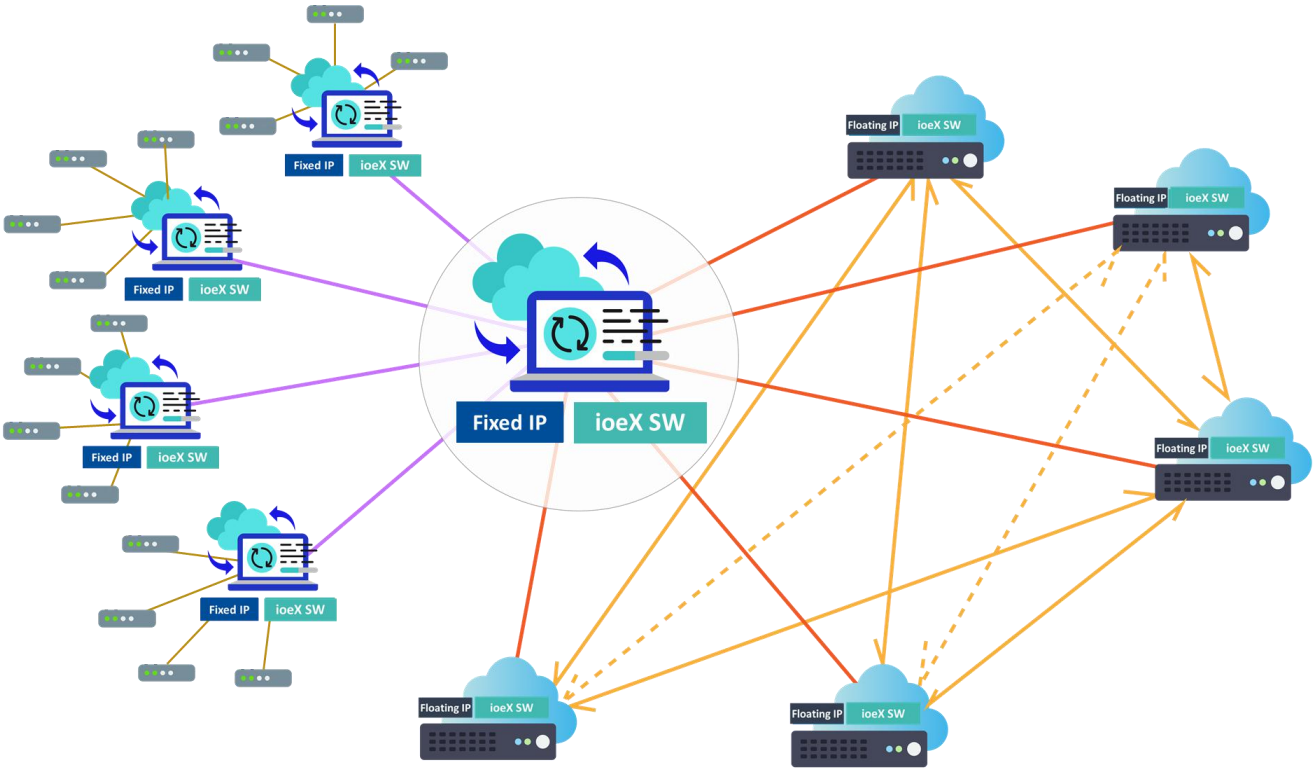


Schematic diagram:

Diagram of transmission of peer-to-peer networking

Bootstrap nodes saves information which they can use to search each other. Through connections between bootstrap nodes, respective groups of small P2P networks can be combined into a large P2P network. Any peer node in a large P2P network can form a

Friend relationship with another node and begin transfer of message or files.

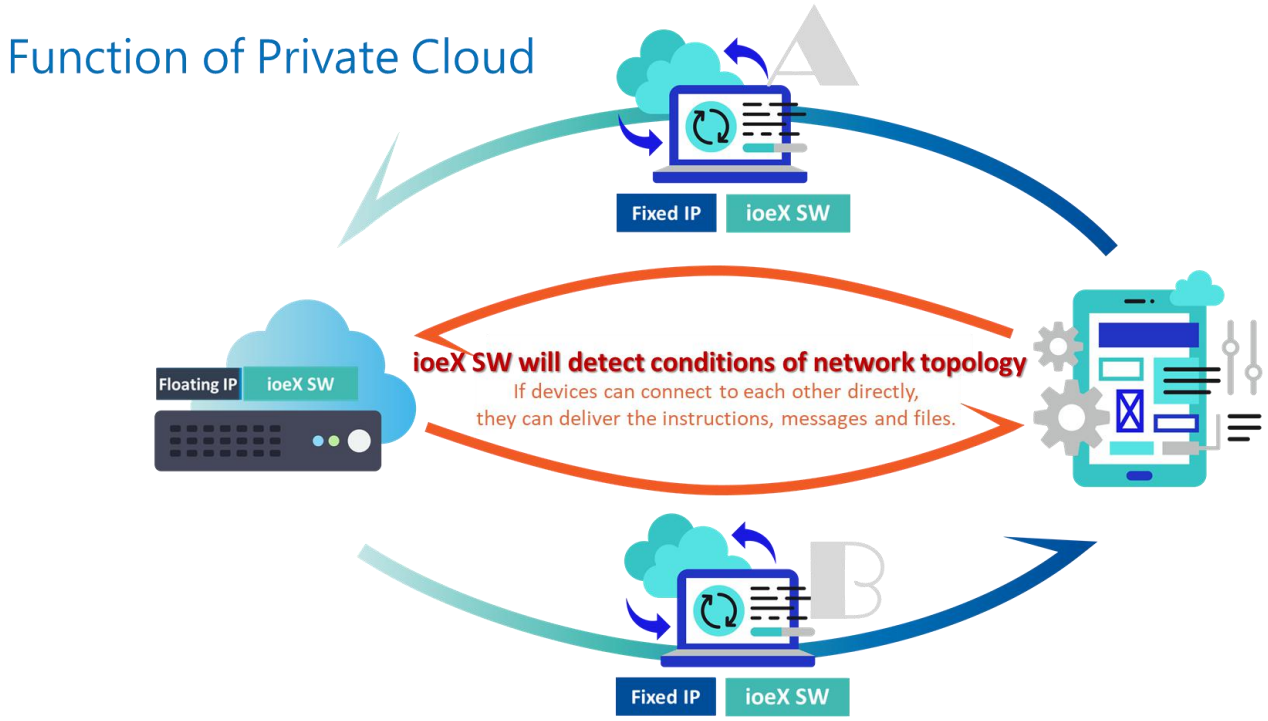


Schematic diagram:

Each bootstrap node forms its own network, and bootstrap nodes are connected together to form a large network.

As shown in the figure below, a Friend relationship exists between a smart phone and another smart device, both with P2P network capabilities. If both parties can communicate directly with NAT traversal, then files are transferred through a direct P2P network connection.

If the two cannot be directly connected, suppose the smart phone is in the P2P network from bootstrap node A, and the smart device is in the P2P network from bootstrap node B, the P2P software can automatically link node A and B. They will be able to transfer files via relay connections with the bootstrap nodes.



Schematic:

Peer-to-peer networking operation concept of personal cloud storage

B. Online Update Mechanism Derived from Personal Cloud Storage

In addition to the nodes formed by the public, ioeX will continue to aggregate and build large-scale self-operatng seed bootstrap nodes and seed peer nodes to provide basic and smooth peer-to-peer networking.

Use the following illustration as an example. ioeX receives a new software update package from a smart device vendor for their smart terminal device which has built-in P2P network capability. ioeX will transfer and store the package to seed peer nodes and then use other nodes with Friend relationship and/or authorization codes for mass distribution.

Each update package stored at a peer node will have its own download address, and ioeX will make a list of these addresses and provide it to the smart device vendor. The smart device vendor can then follow its original online upgrade mechanism and notify their devices about the list. These devices randomly select one of the addresses,

automatically fill in the authentication code, and download the update package (this involves P2P network searching). Once the download is complete, the device can be upgraded.

Peer-to-peer networking will introduce IPFS function in the next stage, which supports file encryption and distributed storage. This will greatly increase the privacy and security of cloud backups.

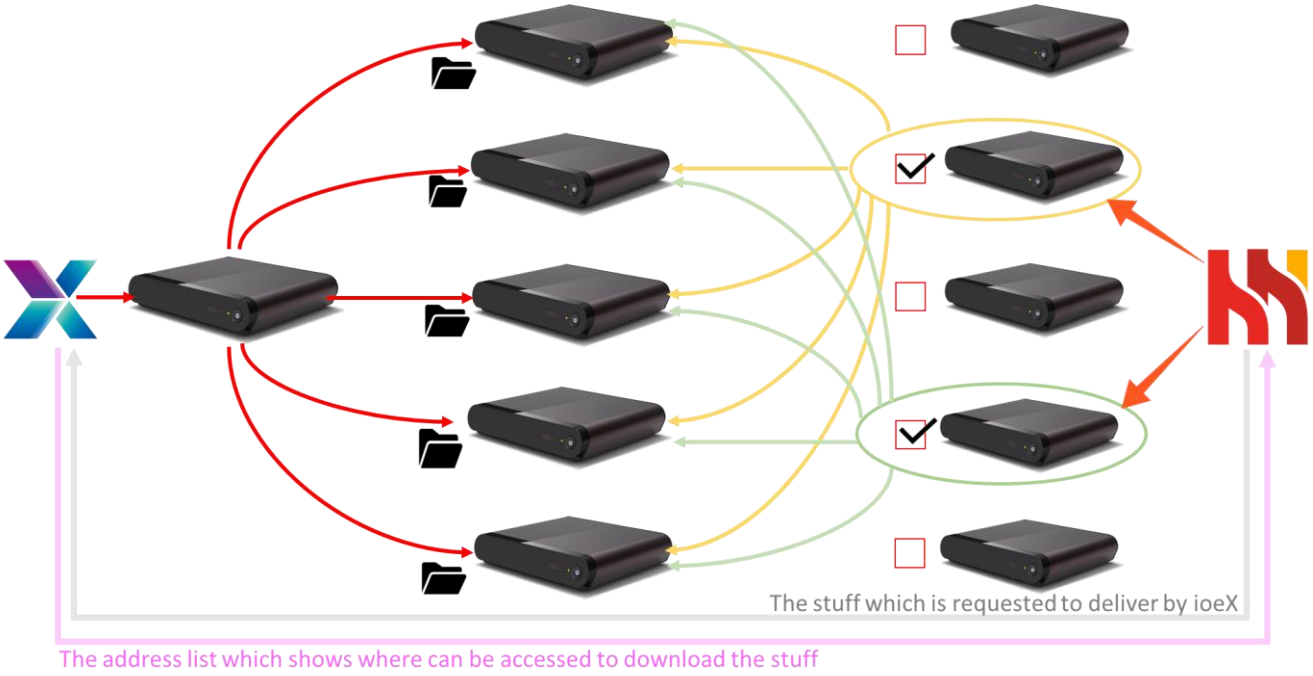


Diagram:

Online upgrade mechanism derived from personal cloud storage

In other words, the Data OTA Server or Relay Server is no longer a concern for device service providers or vendors. Online updates can be done through the ioeX peer-to-peer network.

3. How ioeX creates a Peer-to-Peer Networking ecosystem chain?

(1) Market Entry Strategy

ioeX enables smart devices that use a large amount of network traffic to directly join the "Decentralized Peer-to-Peer Network, so that they can be automatically found and propagate data. A network traffic consumer can also serve as a peer-to-peer network node which enables data transfer or temporary file storage.

There are several ways to achieve this:

a. **Equipment manufacturers can burn the P2P network software into their product during manufacture. Collaborate with equipment manufacturers and brand owners.**

b. **Solution providers can provide production solutions embedded with P2P network capabilities to manufacturers. Partner with solution providers.**

c. **Chipset manufacturers can provide software/hardware integrated production solutions with P2P network capabilities. Work with smart device chip manufacturers.**

d. **Collaborate with software companies that offer license to other chipset manufacturers, to provide licensed software with P2P network capabilities.**

ioeX's initial target customers are equipment manufacturers, including chipset manufacturers, solution integrators, and ODM vendors in the product chain for, but not limited to, OTT box, Smart Speaker, IoT box, Home kits and Smart Router.

Currently, negotiations are underway with Rockchip, Amlogic, Allwinner, Actions, Mediatek, LimeMicro and other chipset manufacturers. Smart Speaker and smart IoT devices solution providers are also involved, including Everex, Along, WaterWorld, and Emdoor.

Everex, which is both an equipment supplier and a vendor, has confirmed their partnership with ioeX. Domestic and international business expansion efforts are expected to continue, and we hope to partner with big players such as Foxconn, Cisco, Fujitsu, and Huawei in the future. We also expect to devise more use case scenarios, adding more value to the P2P network from the perspective of networking, blockchain integration, and application.

Figure:

Target smart device chipset vendors

(2) Existing business that helps the expansion of bootstrap nodes

a. **ioeX has a number of high-performance e-commerce system servers in operation which can become bootstrap nodes by introducing P2P network capabilities to them.** Participating businesses in the e-commerce system project at the end of 2016 has been notified, to promote this initiative. We hope to leverage cryptocurrency as incentives for businesses to offer their e-commerce system servers to the peer-to-peer network as bootstrap nodes.

   Such systems are deployed primarily with AWS, Azure, and Google Cloud Servers, allowing bootstrap nodes to be distributed globally, and a number of companies have already expressed their interest. Business cases like this, where companies offer bandwidth and traffic as trade-offs for benefits outside of their original business scope, are also ways to populate bootstrap nodes.

b. **Integrate e-commerce system into a software suit, paired with small servers with which ioeX can market to interested parties at an affordable price.** By integrating a large number of existing internet commerce modules into a highly reusable network commerce system, it can be installed into small and micro servers, to allow general businesses to operate at a low cost, both online and offline.

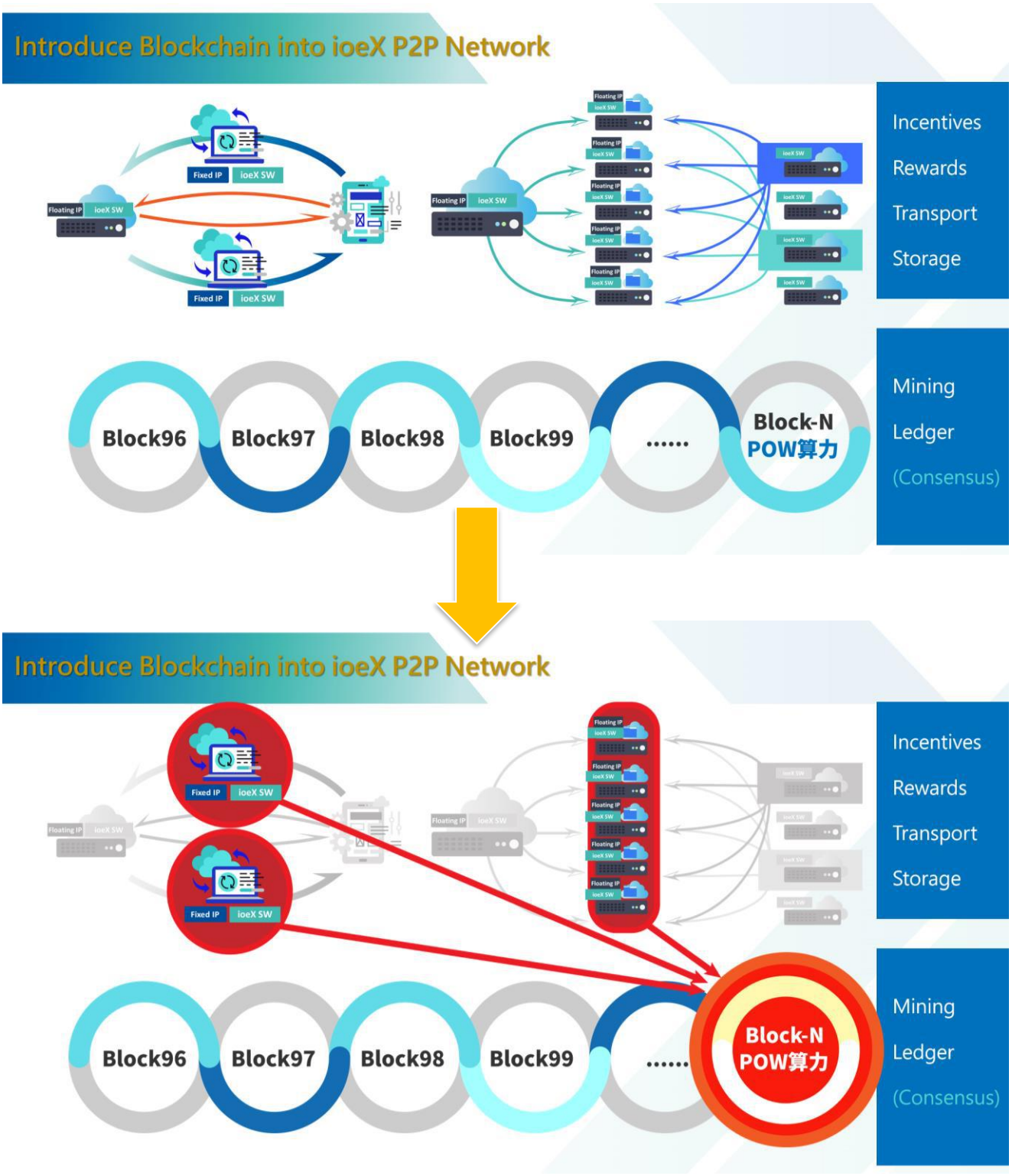
   These systems will connect to public IP addresses and can spread around the market more effectively, forming bootstrap node groups. This type of equipment can be sold as a hardware product from ioeX, so that earning cryptocurrency is no longer a monopoly for general mining machines and NAS or OTT-like products. This way, business owners may earn cryptocurrencies while running real-world businesses at the same time.

(3) Existing business that helps expansion of peer nodes

Based on currently existing developments, using Android system as an example, ioeX team has integrated P2P network capability as "Application Service Software (Service APK)" into smart device systems (such as IoT Box), so that when a user turns the device on and connects it to the internet, the device will automatically become a peer node in the network. We've already contracted with multiple vendors, and their devices will become peer nodes in ioeX's Decentralized Peer-to-Peer Network. With our market entry strategy, we expect a huge growth of peer nodes. ioeX will also show the distribution and total number of peer nodes on the official website, to appeal to potential participants and encourage them to join the network.

4. Introduction to ioeX token

(1) Cryptocurrency "ioeX"



Schematic diagram:

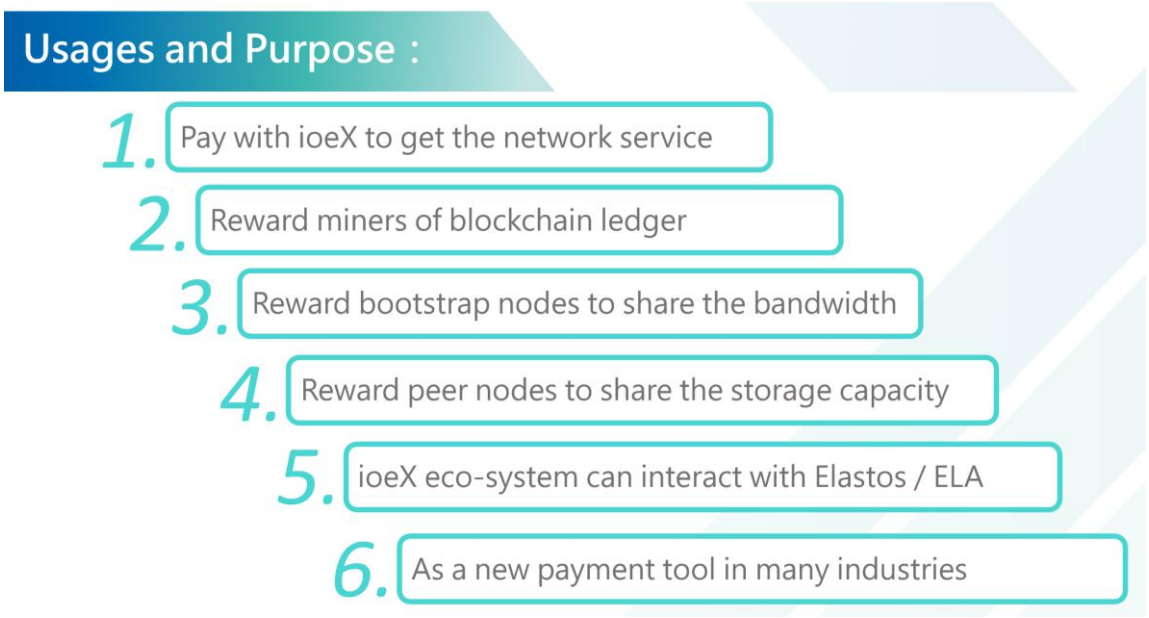
ioeX uses blockchain technology to provide incentives and rewards for relay and storage devices

The construction of a decentralized peer-to-peer network can meet the requirements of many network and storage requirements, including solving the cost and efficiency issues related to a smart device provider's network and storage needs. To encourage bootstrap nodes that provide relay functions and peer nodes which provide temporary storage to continue providing services, the blockchain technology, which is irreversible and tamper-resistant, was incorporated to record the amount of bandwidth they shared for the blockchain. Ledgering (mining) will be done through the bitcoin consensus mechanism.

Nodes that provide network traffic and storage will be rewarded in cryptocurrency according to records saved in the blockchain ledger.

This reward should serve as an incentive for brand owners, solution integrators, ODM vendors, etc. to join the ecosystem, and encourage end-users to purchase these kind of smart devices and become P2P network nodes.

In order to provide this incentive mechanism, a cryptocurrency "ioeX" is issued.



ioeX is the key to the P2P network economy. Through strategic partnership with Elastos we incorporate merged mining with bitcoin. The bitcoin miner can generate additional reward without extra costs in the mining process. In addition, the company will obtain additional compensation, i.e., ioeX coin. Every two minutes, the ioeX coin will be billed, and blocks will be generated during the merged mining process. The acquisition of each accounting right will reward a fixed number of ioeX coins, which is counted as 20 ioeX

at a time. The number of ioeX coins from mining remains unchanged despite the fluctuation of the ioeX coin market price.

In order to support the mining credit line, the issuance of ioeX will increase 3% every year. In order to maintain and appreciate ioeX currency value, ioeX will use 25% of its annual profit on the market from time to time, at indeterminate dates, times, and amounts to buy back ioeX coins so as to reward the nodes participating in the P2P network operation.

(2) "GAS" token issued on ioeX

To minimize the number of steps in network operations while paying for services with digital currency, and lessen the fluctuations in pricing due to volatility of ioeX currency, another token, temporarily called "GAS" (will be renamed prior to official launch), will be introduced. GAS will not be launched on the digital currency exchange, but can only be exchanged through ioeX-dedicated wallet for ioeX network-related services, including services provided by ioeX team, as well as future application services developed by independent traders using ioeX open source functions, and approved by basic verification tool, and registered with the ecosystem.

Services provided by ioeX network will be denominated in fixed GAS price. For example, the price for each unit of service A is 0.1 GAS, and that for each unit of service B is 5 GAS. The "unit" for each service is defined by its provider, and the services include continuous execution time, storage capacity, bandwidth, etc.

Users seeking network service may convert their ioeX coins in their dedicated wallet to the corresponding quantity of GAS to pay for network services.

The dedicated wallet will be valued on the current ioeX coin value at the exchange rate to determine the number of GAS that can be exchanged with one ioeX coin. For example, if the current value of one ioeX coin at the exchange is 10 USDT, then one ioeX coin can be converted to 10 GAS through the exchange option within the dedicated wallet to purchase 100 units of service A or 2 units of service B (It does not mean that one GAS is equivalent to the value of one USD. GAS and USD have no exchange rate between them, as it is only used to serve as an example to the fixed price of USD).

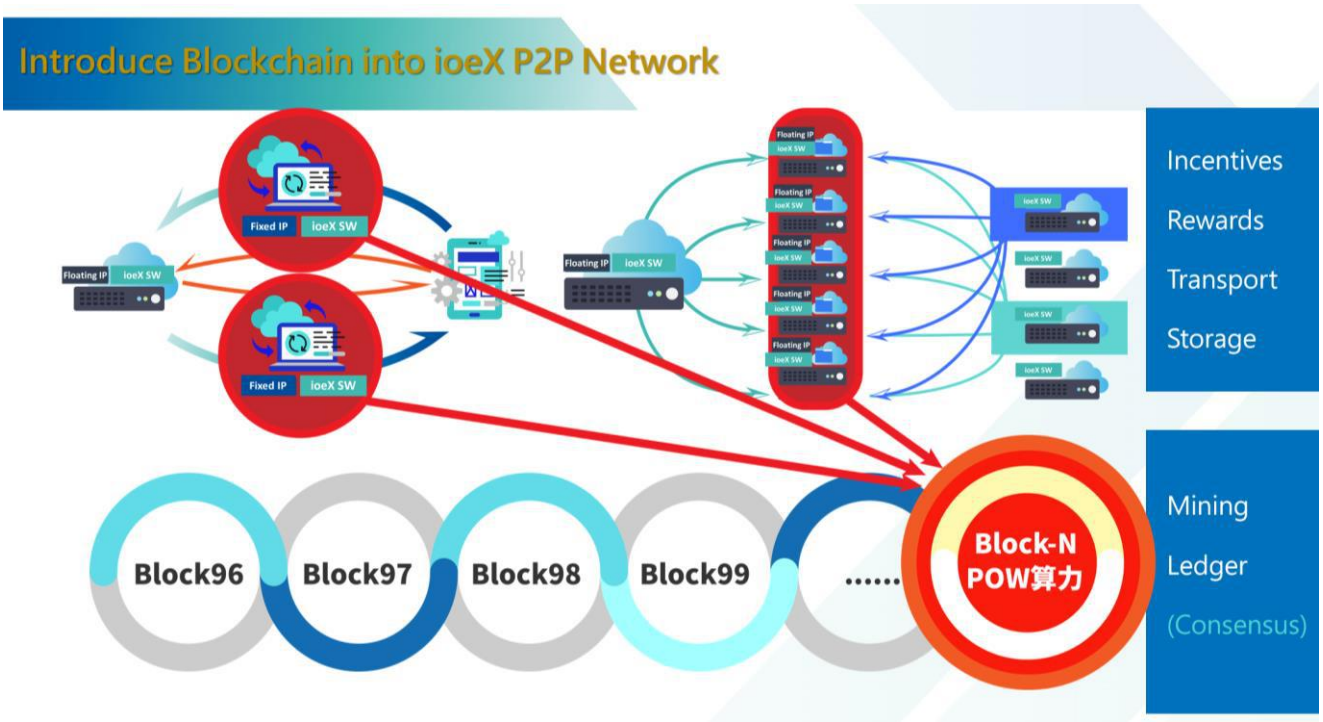
In the future, options will gradually be added to deal in other main chain currencies to exchange for GAS through the dedicated wallet. For example, the newly added ELA in the future can be used to exchange for GAS for ioeX network services.

The sources of GAS tokens are:

1. Exchange with ioeX coin in ioeX-dedicated wallet.
2. As per the exchange rate of ioeX coin in the dedicated wallet at the time of exchange, exchange for equivalent GAS.
3. Transfer to own ioeX-dedicated wallet from another person's ioeX-dedicated wallet.
4. In the future, users may exchange via ioeX-dedicated wallet by using third-party public blockchain such as ELA, which has formed a strategic relationship with ioeX.

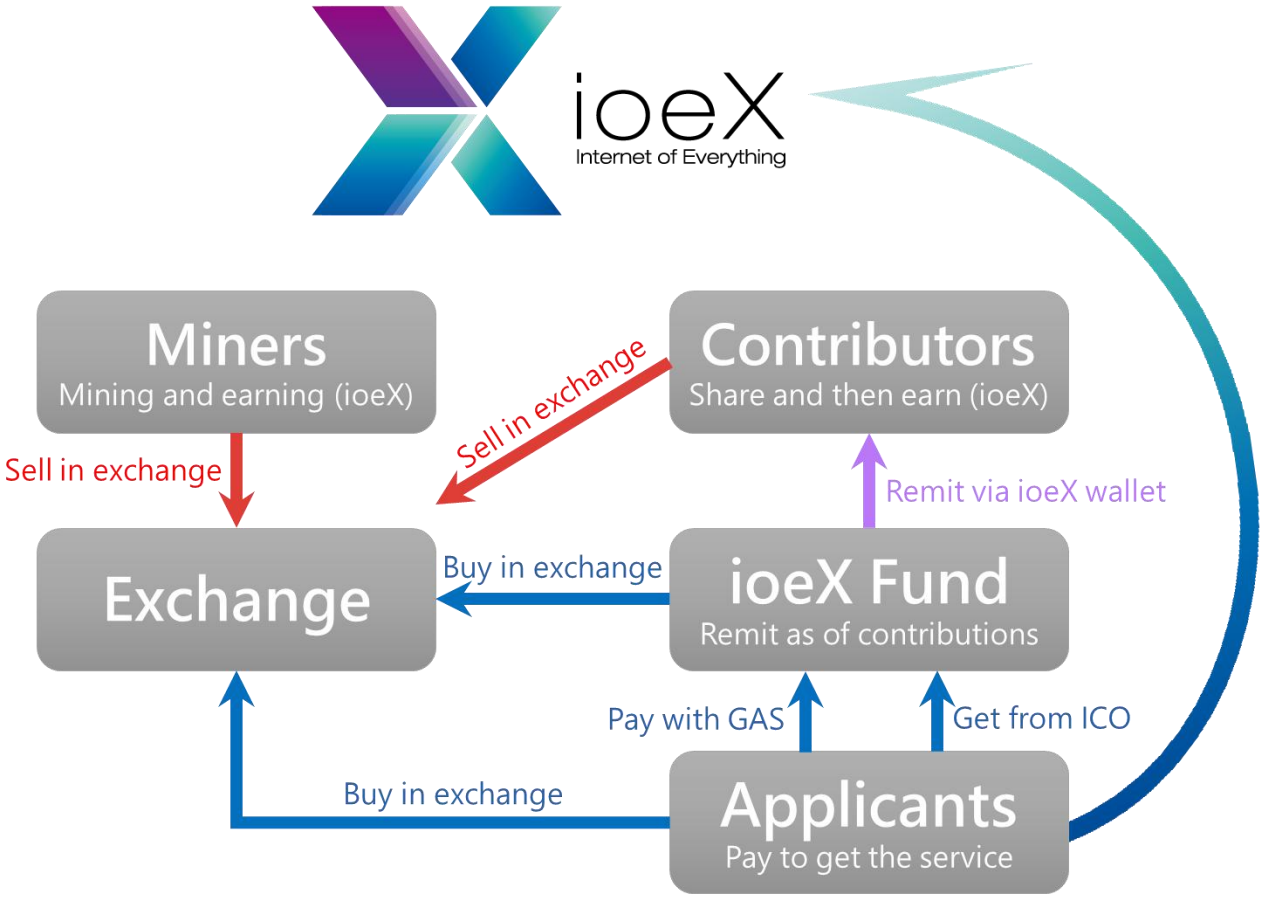
Through GAS token mechanism, when users on the network service use digital currency to pay for services, their willingness of usage and determination of quota would not be affected by fluctuations in the value of digital currencies.

The network service providers will be rewarded with ioeX coins for providing relay and storage functions. The proportion of contribution to the ioeX currency reward will be defined after ICO and prior to official launch.



Schematic diagram:

Correspondence between the network and the blockchain to ensure transmission and storage are rewarded and accounted for by the mining industry



Schematic diagram:

Cryptocurrency maintenance value-added cyclic diagram of the network

In addition to enterprise applications, general consumer application services can also be obtained with GAS. Examples include:

a Private cloud drive storage

b Peer-to-peer instant online communication tools

c Remote screen control

d Household appliance control functions

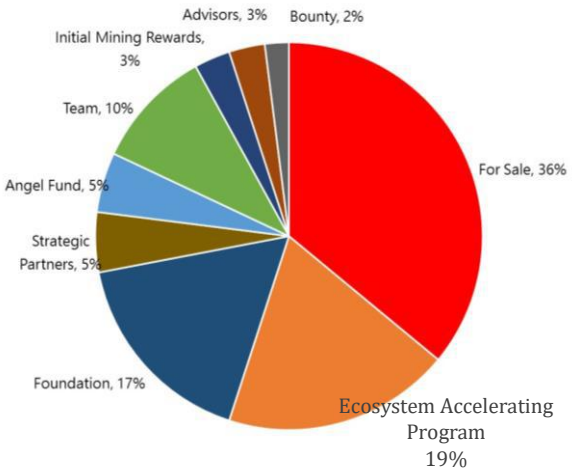
e Other functions to be developed with future alliance partners.

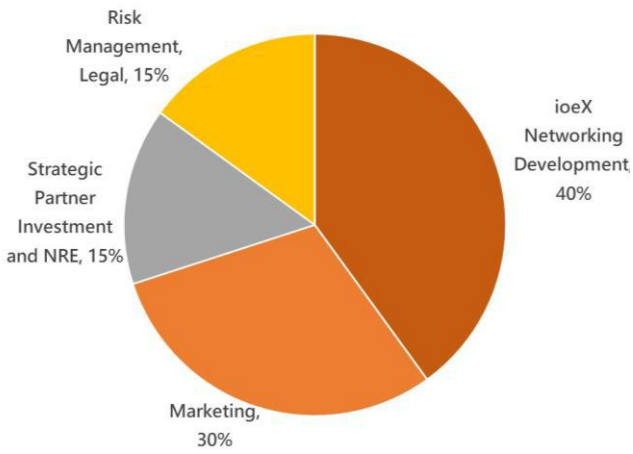
More and more alliance in the eco-system are providing their service to expand the diversity of the ioeX service. It includes self-media online interaction and

exposure with the ledgering system of its own. Besides, smart devices with ioeX function can collect environmental data such as the air quality around it to form a self-driven air-quality-index that covers the globe with even higher precision than the current one. The data collecting process are recorded and will be rewarded base on its contribution and then spurs the voluntary activities. A new data collecting model through different area in our life can be realized.

A. ioeX token allocation [updated 0.96 beta]

ioeX tokens are limited in number, and a total of 36% tokens are being sold in the ICO. Purchasers can use a dedicated wallet to convert ioeX into GAS tokens with one click and perform the necessary P2P network functions





B.

a 36% will be sold to the public, including private sale and crowdfunding. The ioeX tokens can be used in the ioeX ecosystem and its partner ecosystems.

b 19% will be used in coin swap with P2P networking eco-system partners. The objective is to expand business outreach and facilitate the realization of P2P network applications. The wallet address will be available to the public on the official website for supervision, and the amount of exchanged coins will be open information」

c. 17% are used by the ioeX Foundation for the future development of ioeX coins, the content of which will be supervised by the ioeX review committee and announced to the general public.

d. 10% will be held by team members in sealed state for 30 months and gradually released every six months. For sealing terms please refer to Appendix 1.

e. 5% will be held by angel investors in sealed state for 30 months and gradually released every six months*. They will be sold to well-known manufacturers and related organizations in the ecosystem to build the initial ecosystem together.

f. 5% will be held by strategic investors to be sold to chipset vendors and solution providers and other strategic partners to build the initial ecosystem together.

g. 3% will be held by consultants.

h. 3% will be mining reward (it performs Merged Mining with Elastos)

i. 2% will be used for promotional incentives as marketing expenses for project promotions.

C. Funding use post-ICO

a. 40% Future P2P network development

b. 30% Marketing, listing on exchanges

c. 15% Alliance building in strategic manufacturers investments

d. 15% Reserve fund for future development use

5. ioeX Roadmap

(1) Functional Evolution Planning

2018-7 Release of basic service SW of ioeX P2P network
Messages and files can be sent by single-peer-to-single-peer and single-peer-to-multi-peer.

2018-8 Import ioeX P2P network function into IoT box and its remote Zigbee control APP.

2018-9 Import ioeX P2P network function into AI Smart Speaker and its remote control APP.

2018-10 Android/iOS/Linux/Windows version of ioeX P2P network function are ready.
Form the personal VPN through ioeX P2P network, creating a private and secure connection.

2018-11 P2P network function incorporates blockchain ledger function to enable ioeX cryptocurrency reward mechanism.

The Alpha version of Cryptocurrency wallet of ioeX

2018-12 The Beta version of Cryptocurrency wallet of ioeX
Beta version of OTA upgrade through ioeX P2P network function; more than 200,000 peer nodes and over 500 bootstrap nodes distributed throughout Asia, Europe, Americas, and Australia.
ioeX P2P network will begin the project to incorporate IPFS function.

2019-1 Officially released the 1st version of OTA upgrade through ioeX P2P network function.

All devices can be rewarded.

Various new functions has been planned for 2019, including peer-to-peer direct

messaging software, decentralized digital currency exchange developing, and joint development with strategic partners.

6. ioeX team

(1) Executive Team

Aryan Hung　Founder & CEO

- ioeX Founder and Chief Officer Executive of a promising start-up.
- Established a start-up that broke even within 12 months.
- 11-year Foxconn Group mobile phone ODM Project Manager, Head of Department and Site Manager.
- Spreadcomm Tech (Chengdu) Site Manager.
- Senior manager in Kortide (now known as Elastos), responsible for Shanghai, Chengdu and Taipei.

Adguel Wang Co-Founder & COO

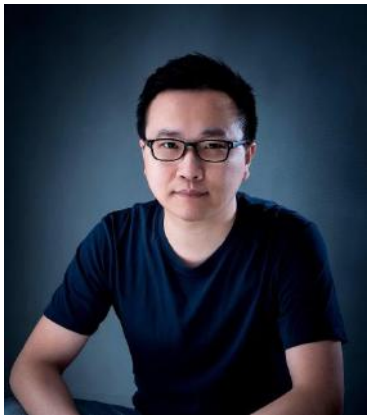
- 15 years of RF engineering experience. Spent 5 years in business customer service.
- Pegatron Ltd. and Foxconn Group Mobile, Manager of Hardware Development.
- Business Manager of FIH Android GMS

Michael Wu　Chief Sales Officer

- Leaders of 12 top fintech projects in Taiwan.
- General Manager of 65-person mobile application group.

Finance industry expert with 10 years of experience.

Neo Peng　Co-Founder & Chief Marketing Officer



- Bitcoin early investor, cryptocurrency community influencer
- 10 years of brand marketing experience and 4 years product manager of a renowned international brand
- Greater China Strategic Development Consultant,
- Investors of many ICOs

Kenneth Kuo Co-Founder & Chief Strategy Officer

- Invested in more than 30 blockchain projects. T
- Top fundraiser of global institutions.
- 4 years' international work experience, token economist, community influencer.
- Token development strategy, business development for Europe, the U.S. and Taiwan.

Monika Lin　Chief Public Relations Officer

- 4 years as Leo Burnett Account Manager.
- Brand manager. Online and offline advertising, event execution.
- 2 years' international work experience.
- Public relations and media operation.

(2) R&D Team

Anthony Lin　Chief Technology Officer

- 15+ years' Android and Linux IoT system and device development.
- Quanta Coumputer Inc. and Foxconn senior developer.
- Firmware and framework SW experienced programmer.

Elvis Lin　R&D Manager

- 8+ years' experience as full-end and database engineer
- Passionate about EC and transaction systems.
- Former Kortide Internet Eco-function core team member.

Bruce Huang　R&D Manager

- 15+ years' experience in graphic design, 2D animation, and web development.
- Core team member in Kortide.

Wade Ku　R&D Member

- 15+ years' experience in Linux and C++ development
- Firmware and system software development, PHP background development.
- Veteran in DBTEL, Quanta Computer Inc, Foxconn, and Kortide.

Art Hsu R&D Member

- 10-year veteran in network architecture and protocols.
- Mobile apps and framework developer in Acer and Foxconn.
- Sufficient experience with Linus, Windows, and Android development.

Jay Chuang R&D Member

- iOS, Android APP, and PHP background development.
- 8 years as smart phone application developer.

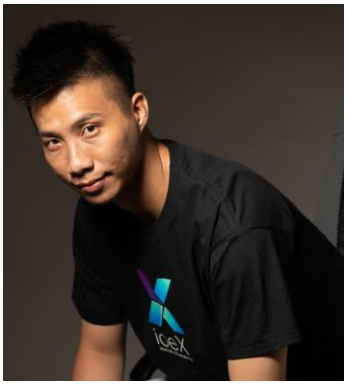
HungJiun Shieh R&D Member

- Firmware and system software development.
- Over 10 years' experience in network communications and mobile devices.
- Familiar with video streaming and e-commerce systems.

Earnest Chen R&D Member

- 13 years' experience in mobile devices and ioT devices.
- Full-end engineer of Web func. development.
- Worked in Availink and Foxconn for more than 10 years.

Ricky Huang　R&D Member



- Cloud computing engineer passionate about blockchain.
- Senior Linux developer
- Former Elastos Cloud Func. development core team member.

(3) Advisory Board

Rong Chen Elastos Foundation Founder

- Founder of Elastos.
- University of Illinois at Urbana-Champaign.
- Highly respected Internet expert and operating system scientist.

DingHe Hu Elastos Capital Chairman

- Chairman of Elastos Capital.
- PhD, Wudaokou Finance College of Economics, Tsinghua University.
- Renowned expert in economics and investment in China.

Simon Szeto SBI E2-Capital HK Director

- Board Director of SBI E2-Capital Hong Kong.
- Former manager/expert at Merrill Lynch, Wells Fargo Investment, and Countrywide Financials.
- Deep understanding of Silicon Valley industry.

Raymond Lee Everex Group Chairman

- Chairman of Everex Group.
- Bachelor of Law, University of Toronto.
- Higher Diploma in Law, University of Hong Kong.
- British Law School professional license since 2012
- 20-years expert in consumer electronics supply chain.

_____EOS Global VC

(waiting for appointment)

-
-
-

Ling Zhang Overseas Chief Marketing Officer

- Experienced real estate investor and start-up angel investor
- Strategic partner of several global renowned Capitals
- 10 years enterprise financial advisor and accounting officer.

Early ICO participants

Miranda Tan Robin8 CEO

- Graduated from Cornell University.
- CEO of Robin8.
- PR and marketing expert, China influencer and KOL marketing expert.

Xavier Hou Prometheus Capital Founder

- Prometheus Capital Founder
- Social Economics Expert
- Blockchain Angel Investors
- Blockchain Scholar
- BVI Global Business Consultant

(4) ioeX Partners

More on the way!

Elastos Foundation	EOS Global VC	Market Intelligence & Consulting Institute	Everex Group
elastos	eos vc	MIC 產業情報研究所	EVEREX ELECTRONICS LTD.
Maestro Tech Ltd.	**RabbitJets Ltd.**	**Shuttle Incoporation**	**Unified Computer Intelligence Corporation**
maestratech	RabbitJets	Shuttle 浩鑫	UCIC
Robin8 Tech	**Emdoor Information**	**Ezfly**	**Shun Fu Hsih Construction Co. LTD**
ROBIN8	Emdoor INFO	ezfly 易飛網 www.ezfly.com	順富鑫建設 SHUN FU HSIH CONSTRUCTION CO.,LTD
Azio Electronics Co.,Ltd	**Prometheus Pro Fund**		
azio SMART IDEAS	PROMETHEUS PRO FUND		

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Telegram (Announcement): https://t.me/ioeXnetwork_news_EN

Medium(EN)：https://medium.com/ioexnetwork-en