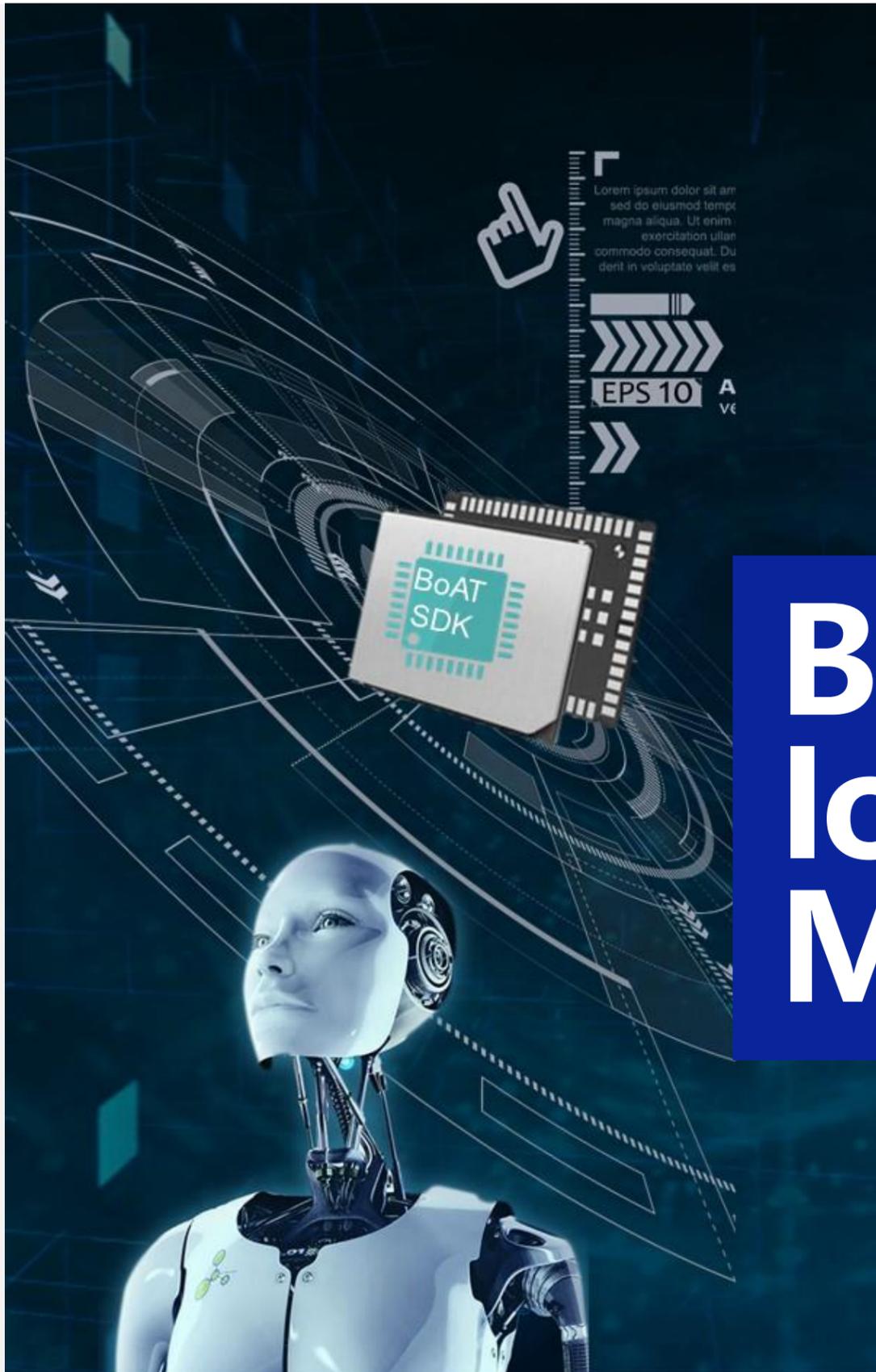




## BOAT BLOCKCHAIN IOT MODULE PRODUCT WHITE PAPER V1.0

*By Gary Xu, CTO of aitos.io*



# Blockchain IoT Module

Blockchain IoT modules lead the Internet of Things to break digital barriers and connect a new world of trust together

On December 25th, 2019, the Blockchain IoT Module Alliance was established in Nanjing, China. Nine major cellular IoT module suppliers jointly released mainstream branded blockchain IoT module products based on the BoAT Framework during the alliance founding ceremony, which marked the integration and innovation trend of the IoT+Blockchain. From a cooperation standpoint, the industry is working together to explore the value of IoT data from the source. Mr. Gary Xu, CTO & Co-Founder of aitos.io, introduced the protocol architecture of the blockchain IoT module in detail, and summarized the different IoT application categories. He juxtaposed the corresponding features of the three major module types of the IoT and correlated them with BoAT Framework (blockchain application framework).

## Blockchain IoT Module Alliance Ceremony

Dec 25<sup>th</sup> 2019 | Nanjing, China



## How do Blockchain modules help clear barriers to the path of Blockchain + IoT integration?

According to a Gartner survey of more than 500 US companies, 75% of companies have adopted or plan to adopt Blockchain in their Proof-of-Concept projects by the end of 2020, and 86% of them plan to implement the integration of IoT+Blockchain. As a kind of infrastructure, the combination of the Blockchain and IoT can provide the latter with extensive trust, thereby providing support for data sharing and the transfer of data value.

Although Gartner's research is exciting, IoT and Blockchain will still face many challenges from use case-proof of concept-test pilot-product development. These challenges include finding a win-win business model for all parties in the IoT industry ecosystem such as Silicon chips, Cellular modules, equipment, and service providers, as well as technical integration across multiple fields such as communications, cloud, blockchain, and security. It also involves the balance of TTM (Time To Market), BOM cost, R&D cost, and operating cost. It is possible to produce sustainable IoT + Blockchain business scenario applications only after these challenges are properly addressed.

In the IoT industry ecosystem, service providers in the forefront of market needs often have a keen sense of the valuable role of the blockchain, but their traditional IoT equipment suppliers are likely to lack the ability to develop blockchain functions and offer equipment that meets their needs.

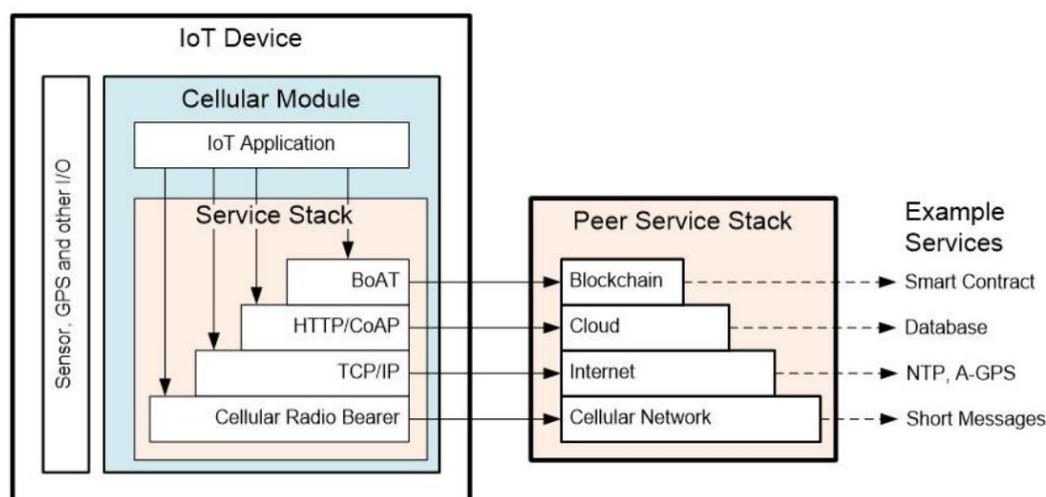
On the other hand, mainstream blockchain service providers often do not have a deep understanding of the fragmented nature of the IoT industry, and will encounter many difficulties when trying to provide blockchain services on fragmented IoT devices. With this pain point in mind, the concept of an IoT module with the ability to connect to the blockchain, thus becoming a blockchain-enabled IoT module, came into being.

The cellular IoT communication module is a core component in IoT devices. From the perspective of the protocol stack, the cellular module provides a set of communication service layer stacks for IoT applications. The bottom layer of the service layer stack is the basic cellular communication service. It provides 2G/3G/4G/5G radio bearers (RB, Radio Bearer) to provide services such as PLMN (Public Land Mobile Network) selection, idle state and/or connected state mobility management, data transmission, short messaging(SMS) and other cellular communication capabilities. Based on the basic cellular communication capabilities, the cellular IoT module generally integrates the TCP/IP protocol stack, so that applications can connect to the Internet through TCP or UDP to obtain corresponding services. The module usually integrates higher-level application-oriented protocols such as HTTP, CoAP, MQTT, TLS/DTLS, etc. on top of the TCP/IP protocol. Applications can easily exchange data with the cloud (server) and implement device management, data upload and other services through these protocols.

From the perspective of the protocol stack, these protocols are stacked from the bottom up. The lower layer protocols provide services to the upper layer protocols. The data of the upper layer protocols is the payload from the lower layer protocols. It is interesting, however, that despite the hierarchical relationship of these protocols, each of them is open.

The top-level IoT applications can either make POST/GET and other requests to upper-layer protocols such as HTTP, or make TCP-based or UDP-based service requests to the middle-level TCP/IP layer, or even directly to the basic cellular communication protocol to initiate service requests, such as sending text messages. This layered but open protocol stack system has constructed a very flexible and diverse business ecosystem.

Blockchain IoT module is not a new module category. As shown in the figure below, the Blockchain IoT module is essentially a layer of the blockchain client protocol on the open protocol stack hierarchy. Applications can request blockchain services such as blockchain transactions and smart contract invocations from this layer of blockchain client protocols. The blockchain client protocol is further combined with key life-cycle management, device attestation, etc. to form a module-based "BoAT" Framework (blockchain application framework) and could also be further interpreted as "Blockchain of AI Things", or a Device BoAT Wallet(blockchain device wallet) As the application of Blockchain in the Internet of Things is becoming more and more widespread and mature, it is quite possible that BoAT will become the near-future, defacto standard configuration of cellular IoT modules like HTTP, CoAP, TCP/IP, etc. . BoAT will play an important role in connecting the Internet of Things and blockchain industries.



IoT service stack supported by a Blockchain IoT module

On the one hand, the Internet of Things industry is highly fragmented, regardless of scenarios or devices. BoAT adapts different cellular modules that are widely used to deliver the data from the IoT devices, enabling the devices to upload data onto blockchain.

On the other hand, the blockchain industry is also diversified. By adapting a variety of mainstream blockchain networks suitable for the Internet of Things field, BoAT brings diverse options of blockchain for IoT data. From the perspective of the IoT industry, the Blockchain IoT module provides fast passageways for IoT applications to board blockchain ships. In turn, from the perspective of the blockchain industry, the Blockchain IoT module also provides a one-stop, direct channel for the blockchain business to land on the IoT shore. From the perspective of the Internet of Things industry, the blockchain application scenario in the IoT is significantly different from the people-centric blockchain application scenario where people are the main users.

	Blockchain Application scenarios for IoT	Blockchain Application scenarios for human users
Typical Biz Ex.	IoT Data on-chain digital notary	Transfer, dAPPs (Gaming, Voting)
Behavioral Certainty	Device behavior is pre-programmed and is basically deterministic	Human beings as the main body of operation usually have a high degree of uncertainty
Equip. Type	Wide range of devices	Focus on PCs & Smartphones
Processor	Mostly ARM, and RISC-V processors thriving. Processing capacity varies greatly from device to device. Processors: single-core 50MHz to octa-core 2GHz & even with GPU	Smartphones are ARM-core & PCs are x86 CPU. Different device processors of the same period have roughly similar processing power, comparing with IoT devices.
Oper. System	Various RTOS, Linux, Android, Windows Embedded	Smartphones: Android and iOS, PCs: Windows and MacOS
Equip Resources	Different devices are very different, with memory capacities ranging from tens of kB to tens of GB.	Limited difference on resources for PCs & Smartphones
Power requirements	Some have continuous power supplies. Some others are powered by non-rechargeable batteries and must be available for months or even years	Power consumption requirements are relatively loose, and little special considerations are required at the application software level
Communications capabilities	Different devices have large differences, from those that occasionally transmit small amounts of data to those that continue to transmit data at high speeds	With high-speed communication capabilities

Since Satoshi Nakamoto proposed Bitcoin in 2008, the long-term development perspective of the blockchain, has mainly been for human usage. Overall, compared with the fragmented market, discrete demand, and differentiated software and hardware platforms for the Internet of Things, the differences in people-centric blockchains are relatively small. In recent years, combining Blockchain + IoT ecosystem has become an innovative channel for expanded blockchain utilization, but the fragmentation, discretization, and differentiation of the Internet of Things has added to the complexity of adoption for the blockchain industry. The blockchain industry urgently needs the technical tools to connect the fragmented IoT ecosystem, and the Blockchain IoT module is just such a vessel to help shield the fragmentation, discretion, and differentiation from IoT+Blockchain, because it presents a consistent interface to the Blockchain world.

Blockchain IoT modules have become the best transport vehicle. The advantage is that for blockchain applications framework BoAT Framework is flexible enough to adapt to different types of cellular modules.

One of the key reasons why cellular modules can play a huge role in the IoT industry is that the IoT industry's ecosystem is highly fragmented, but it is very focused on the demand for wireless communications. Based on solving wireless communication capabilities and in order to better match different application areas of the Internet of Things, cellular modules can be further subdivided into



Module Type	Main Features	Application Example
Smart Module	SoC chip capabilities are comparable to low-end mobile phone chip, with multi-core CPUs and GPUs, with Android as the operating system, and support for high-speed communication systems such as 4G. Suitable for IoT application scenarios with screens and complex human-machine interaction  Typical SoC chips such as Qualcomm SDM450, where the application processor is an octa-core Cortex A53, the typical working clock is 1.8GHz, the typical memory capacity is several GB of RAM, and a dozen GB of flash.	Vending machine with color screen  Industry handheld terminals (such as POS device)
Standard Module	SoC chips generally have a single-core application processor with strong processing capability, using Linux or RTOS as the operating system, and supporting either 4G or NB-IoT, eMTC or other communication standards. Suitable for IoT application scenarios with continuous power supply, no direct human-machine interface or simple human-machine interface such as buttons / indicators  Typical SoC chips such as Qualcomm 9207, where the application processor is a single-core Cortex A7, the typical working clock is 1.2GHz, the typical memory capacity is hundreds of MB of RAM, and several GB of Flash	Connected-Car T-Box  Electric power equipment monitoring
Thin Module	The SoC chip uses a low-power weak application processor (or a processor shared with the communication protocol), uses RTOS as the operating system, and supports low-speed communication standards such as NB-IoT or eMTC. Suitable for IoT application scenarios with severe cost requirements or battery-powered, low duty cycle, small amount of transmitted data, and no direct human-machine interface.  Typical SoC chips such as Hisilicon Boudica 150, of which the application processor is a single-core Cortex M0, the typical working clock is about 50MHz, the typical memory capacity is tens of kB RAM and hundreds of kB Flash	Metering  Smart Lock

Based on the understanding of the fragmentation, decentralization, and differentiation of the Internet of Things, the blockchain application framework BoAT Framework has different characteristics for these different module types.

Module Type	Main features of blockchain application framework
Smart Module	<p>The application processor has strong capabilities and ample storage space. The blockchain application framework can use high-level languages such as Java and JavaScript. It has good cross-platform characteristics and is easy to integrate with IoT applications. In order to meet the needs of smartphone-based and browser-based users, blockchain vendors usually provide Java and JavaScript versions of the blockchain client software, which also makes it easier to integrate blockchain clients and other supporting functions, such as key lifecycle management on smart modules, then implements a more complete blockchain application framework.</p> <p>SoC chips are born from mobile phone chips and generally inherit security features such as TEE (Trusted Execution Environment), Secure Boot, fuse, etc. Blockchain protocol message assembly, private key lifecycle management and signature, encryption operations and other sensitive operations can be performed in the TEE. Some chip vendors further support remote device attestation (e.g. Qualcomm Wireless Edge Service or QWES), by securely injecting an immutable attestation key as well as probe mechanisms at chip manufacture time. IoT service providers/operators can validate a remote device by requesting and verifying an attestation report from the device. This further enhances the security level to meet financial-level security requirements, allowing only honest devices to upload data onto blockchain.</p> <p>Note: Although the smart module has the processing and storage capabilities equivalent to low-end mobile phones, the IoT device using the smart module is still a limited-capacity IoT device due to limited data traffic, Flash storage space and erase cycles, generally do not download and store the complete ledger or participating node consensus.</p>
Standard Module	<p>Limited by the processor capacity and storage space, the blockchain application framework is usually written in C/C++ language. Different module platforms need to be ported according to the chip, compilation environment, operating system environment, etc.</p> <p>Some of these SoC chips have TEE capabilities, some do not have TEE capabilities, and some have TEE with some pre-installed TAs (Trusted Application), but users cannot develop their own TAs. A chip platform with TEE and customized TA development environment can place sensitive operations within the TEE. Chip platforms that do not have TEE capabilities, or that have TEE but do not support customized TA development, need to use an external secure element chip, or use software obfuscation and reinforcement to protect sensitive information and sensitive operations according to different security requirements and cost requirements. Remote device attestation may be supported by some of the newest version chips.</p> <p>In the world of consumer electronic devices, security and cost often lead to a paradox when trying to please both requirements. The high cost of IoT equipment caused by excessively high security technology may lead to a low-margin, resulting at times in IoT manufacturers possible consideration to abandon the use of the blockchain in their design. The loss from security risks caused by too low security technology may also cause IoT manufacturers to abandon the use of blockchain, due to legal considerations. The balance between security and cost should usually make the cost of an attacker far greater than the benefits of a successful attack. This is an economic security.</p>
Thin Module	<p>The SoC's CPU processing capacity and storage space are very limited, and the power consumption requirements are usually harsh. Blockchain application frameworks are generally written in C and customized for specific application scenarios, eliminating unnecessary functions and minimizing resource consumption.</p> <p>If the SoC chip itself does not support the cryptographic algorithms required for blockchain signature and encryption (such as the ECDSA secp256k1 elliptic curve signature algorithm commonly used in blockchain architecture), due to processing power and storage space limitations, it is not feasible to implement cryptographic algorithms in software and hence the design in of a stand-alone security chip or Universal SIM card might be used to implement cryptographic algorithms and key management.</p> <p>Such mainstream SoC chips also generally have not designed-in TEE security and remote device attestation capabilities, but some chip manufacturers are trying to design-in the next-generation silicon chips with relevant security capabilities, which may become a new choice for thin modules in the future. The latter may support related cryptographic algorithms during chip development.</p>

On the other hand, from the perspective of the blockchain industry, the Blockchain IoT module has become a very efficient and cost-effective transportation tool for Blockchain+IoT. BoAT Framework adapts different blockchain networks and their contract calls on interfaces to perform targeted adaptation, so that the diverse blockchain networks present a relatively consistent interface for IoT applications.

According to incomplete statistics, there are currently hundreds of various blockchain networks. Some of them are known for their high TPS (Transaction-Per-Second), some of them focus on privacy-preserving, and some focus on scalability. Although as long as it is a blockchain that supports smart contracts, it is possible to use it in the IoT scenario; however, in reality, due to the fragmentation of the IoT industry, the choice of a blockchain network in IoT + Blockchain applications is often affected by the impact of various demands of the application scenario, which can be different from what was originally perceived. As a universal component, the Blockchain IoT module must provide a certain degree of flexibility in the choice of blockchain networks used for IoT applications, which is very important for the IoT + Blockchain ecological diversity.

For example, PlatONE, jointly developed by the Wanxiang Blockchain and Juzix, is characterized by privacy-preserving computation. It's suitable for scenarios that specific information contained in the particularly sensitive data is desired to be shared without revealing plain text data. Hyperledger Fabric has a high TPS (the corresponding degree of decentralization is lower), which is suitable for instances where data is frequently submitted onto blockchain, but the degree of trust among organizations (that setup this blockchain network) is high, and there is no need to rely entirely on decentralized trust.

Although there are many differences in the protocol interfaces of different blockchain networks, BoAT Framework encapsulates it into a set of interfaces for IoT applications that are as consistent as possible, making it easier to choose a suitable blockchain network and apply IoT applications based on Blockchain IoT modules.

## Internet of Things + Blockchain ecosystem: Focusing on "stakeholders"

IoT + Blockchain integration ecology is becoming an important part of "network-based infrastructure", which has a multiplier effect and a leveraging effect on the entire national economy. Since it is infrastructure, it must be different from the past purely corporate benefit distribution method, since as an ecosystem its oriented to business models and technological innovation. It must be built around stakeholders, the core of which includes users, investors (government & private), enterprises, developers, and research institutions.

1. Various Industries use blockchain application dAPPs, products or services to implement services such as data asset transactions; these applications include voting, governance, data storage, ID authentication and even payment and other financial operations associated with performance in business processes.
2. An Investor is referred to as either a government, company or individual who invested capital to participate in the blockchain's ecosystem construction. In addition to pursuing returns, more investors are motivated by a sense of mission and affirming the value of the blockchain, hoping that the blockchain can better solve social and economic problems.
3. The enterprises in the converged ecosystem are divided into two parts. One is the software, hardware and service providers from within the IoT industry. They use the blockchain in their business activities. As industry leaders, they actively bring 5G, IoT, artificial intelligence and other new technologies to market for customers and end users. The other type of enterprises is called blockchain technology solution providers. They help implement the consensus mechanism of building blockchain nodes and are actively participating in the blockchain network. They help to enable traditional IoT devices with the end-to-end blockchain solutions
4. Community developers are another important force to be reckoned with that cannot be ignored in a converged ecosystem. As an open ecosystem, more application developers, products and service providers need to be encouraged to use blockchain protocols and platforms to achieve distributed application innovation and provide strong technical support. At present, mainstream blockchain protocols and networks have open source communities
5. Research institutes and technology alliance associations are also an integral part of the ecology. The new technology brings opportunities for change, but there are still many obstacles in realizing its potential. We need a neutral and calm perspective coming from professional and impartial third-party research institutions to help educate the public.

## In what scenarios will the Blockchain + IoT focus on?

In this article, we refer to the classification method of ITU-T FG DLTD2.1 distributed ledger technology (DLT) use cases, and divide the cases into horizontal areas. The application of the Internet of Things + Blockchain mainly involves 5 major areas:

### 1. Internet of things identity management

Blockchain technology can protect sovereign digital identities through encryption technology and privacy-preserving computing. Individuals and business groups can use public and private keys for data on-chain methods to more effectively control the storage and authentication process through key management. By utilizing decentralized, open source blockchain technology and identity management tools, we can build an immutable digital watermark to sign and verify all real-time transaction data.

### 2. Security protection of IoT devices

Due to cost pressures, IoT devices lack effective security protection mechanisms, and are extremely vulnerable to hostage and DDoS attacks on specific network services. Malware can take over control of wearable devices, logistics tracking, wireless meter reading, shared bicycles, connected-cars and many other industry devices, such as street lights and smart detection sensors, have exposed cities, transportation, supply chain finance, and even children to danger. Through security management mechanisms, such as asset and information classification, threat assessment, and risk assessment to identify threats, asset classification, and system vulnerability analysis, thereby increasing system resilience, encryption, auditing, and transparency, achieving comprehensive prevention of

DDoS attacks and strengthening trusted IoT device security management.

### 3. IoT data management capabilities

IDC's latest forecast indicates that with the arrival of 5G in 2025, 50% of global data will come from IoT devices. The total amount of this part will be 40 billion units, which will be about 5 times the global population. By introducing cryptography technology in the blockchain, it not only improves the defects from a traditional data storage model, which is centralized and vulnerable to be attacked and tampered with, it also directly brings the data to the blockchain in real time from the source of IoT data generation. All activity information in the device's entire life cycle was originally signed or stored on the blockchain by all relative parties, in order to achieve data privacy-preserving from the source.

### 4. IoT network infrastructure operation and maintenance management

The public infrastructure built by massive IoT devices around the world will face three major operation and maintenance challenges in the future: (1) routine maintenance, inspection and other work, which will consume a lot of manpower and time; (2) operation and

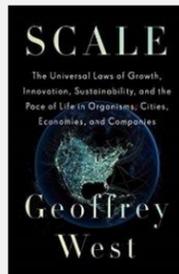
maintenance data may also face fraud and mistrust problems; (3) centralized cloud and large server farm related infrastructure and maintenance costs are high, short-term data processing capacity has an upper limit, and excessive data upload will impact the network. Based on technologies such as the IoT+Blockchain+edge computing, these problems can be alleviated or solved. Through many temperature and humidity sensors or cameras on an equipment site, various types of operation and maintenance data and environmental data are obtained in real time, to realize automatic data collection and credentials on-chain certification.

### 5. Trustworthy machine payment capabilities with privacy-preserving

The biggest problem with massive intelligent hardware in the Internet of Things is that data cannot be trusted and shared securely. By setting a unique ID for all IoT devices, machines communicate with other machines, and the machine payment can be made through blockchain technology. Based on a decentralized consensus mechanism, smart contract technology is provided to turn smart devices into self-sovereign and adjustable intelligent machines.

## Scale is key

Scale: The Universal Laws of Life, Growth, and Death in Organisms, Cities, and Companies



Jeffrey West

As Jeffrey West mentioned in "Scale": "You can't cross the San Francisco Bay by a wooden plank. In order to build a bridge over it, we need to take a longer evolutionary journey, which spans multiple processes, beginning with an innovatory phase. In this example, iron ore was finally discovered and the suspension bridge was eventually built." With the establishment of the Blockchain Module Alliance, mainstream module suppliers will release their own branded Blockchain IoT module

products based on the BoAT Framework and actively explore the evolution of the Internet of Things by building on an innovative roadmap to creation of a "Blockchain-enabled" path. BoAT will become a ferry boat between the blockchain world and the fragmented, discrete, and differentiated IoT world, carting the IoT industry into a new world of pan-trust, based on the blockchain.

## Here are some key endorsement quotes from the founding members of the Blockchain IoT Module Alliance

### Fibocom 广和通

Ying Ling-peng,  
CEO of Fibocom

As the earliest pioneer of the Blockchain IoT module, Fibocom initially proposed the MaaS (Module as a Service) strategy. Over the past 20 years of Fibocom's history, it has always been full of vitality, which is mainly due to its strong R&D strength and continuous investment in new technologies. The MaaS innovative module strategy involves adapting to changing business models and visionary map of future digital transformation. With the goal of analyzing how to profit from big data and the Internet of Everything, MaaS will be an integral part moving forward. As early as April 2019 at the China Unicom 5G Conference, Fibocom intensely listened to the speeches of China Unicom's IoT General Manager, Mr. Chen Xiaotian and WanXiang Blockchain's General Manager, Mr. Xiao Feng on "Blockchain + 5G", which also gave us great confidence to invest in the concept of IoT+Blockchain innovation. It is a great honor to join IoT+Blockchain Innovation Center and co-found a Blockchain Module Alliance. We are honored to be able to jointly participate in China Unicom IoT and WanXiang Blockchain projects, and appreciate the chance to combine MaaS and BoAT SDK to contribute to data governance together.

### QUECTEL® 移远通信

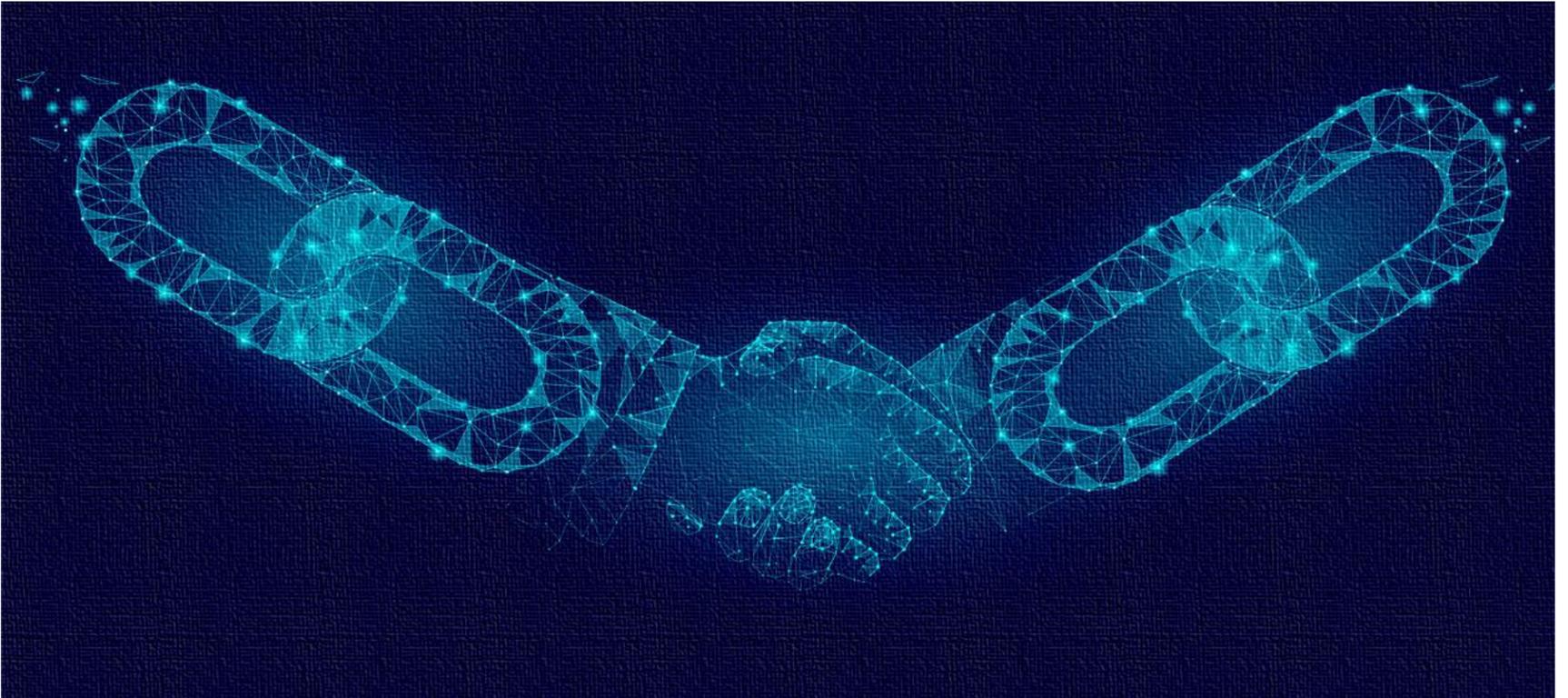
Liu Ming-hui,  
Deputy General Manager of Quectel

Blockchain IoT modules are an important entry point for the Internet of Things. Today, in the process of product development and customer service, we increasingly need to consider data security and privacy issues. I am very honored to join the IoT+Blockchain Innovation Center. From the release of the world's first 5G Blockchain IoT modules with aitos.io in June, 2019, to becoming the co-founding member of the Blockchain Module Alliance, we feel honored to collaborate with China Unicom IoT, WanXiang Blockchain and aitos.io to develop various types of 4G/5G IoT devices to better achieve trusted identity authentication and data privacy-preservation. In the future, Quectel will accelerate the innovation and development of Blockchain+IoT technology, provide more secure, stable, and fast connections for IoT devices, spawn diverse application scenarios, and enable digital transformation of traditional industries.

### MEIG 美格

Du Guo-Bin,  
CEO of MeiG

Blockchain IoT modules, as an important part of data on-chain from the device side, will play a data on-chain guaranteed role in a wide range of IoT links, especially in the fields of financial assets, asset residual value guarantees, agricultural living assets, etc. MeiG Smart Blockchain IoT Module is committed to providing customers with a secure, simple and reliable device data on-chain technology guarantee. Relying on the accumulated experience of baseband chip technology in cellular networks for more than ten years, MeiG ensures that customers' products are easily and securely processing data on-chain to achieve and manage value-added data results.



## Neoway 有方

Xiao Yue-shang,  
CTO of Neoway

The combination of blockchain and IoT industry applications will first start in scenarios related to finance, insurance, and asset management, ensuring the reliable sharing (transaction) of asset status and data, and therefore reduce repeated investment in IoT devices. At present, the challenges of blockchain on IoT modules are twofold: (1) How to achieve "light" integration in thin modules such as NB-IoT/CAT-M? (2) How to ensure the credibility of raw data such as sensors? Neoway Technology will conduct in-depth research on data sources with aitos.io. For specific applications, based on BoAT Framework, by optimizing existing security solutions, that is, in cellular modules and data acquisition units, it is also necessary to consider secure and trusted data interaction.

## MobileTek

Pan Feng,  
Deputy General Manager of MobileTek

From the beginning of its establishment, MobileTek has clearly formulated a long-term plan focusing on the cellular IoT industry and has deeply fostered the industry over the past 10 years, resulting in rich industry experiences and customer appreciation. The module industry's gross profit margin has been declining, resulting in Lost Leader impact in the industry. The best response strategy is to actively reinvent and seek new development opportunities through extensive cross-border cooperation. MobileTek is honored to be the co-founding member of the Blockchain Module Alliance, which is also a key strategic move. At present, MobileTek and aitos.io have launched the LYNQ® smart module series product array based on aitos.io BoAT Framework. In the future, we will work with alliance partners to provide more secure, stable, and reliable connectivity capabilities for kinds of verticals, and welcome the arrival of the new digital economy.

## GOSUNCN 高新兴物联

Yao Nan,  
General Manager of Gosuncn IoT Module Product Line

As a world-renowned high-tech enterprise, Gosuncn insists on continuous technological innovation to continuously create value for customers with its outstanding R&D capabilities and technical judgment. As a member of the IMT-2020 C-V2X working group, the 5G autonomous driving alliance, and the China Intelligent Transportation Industry Alliance, Gosuncn maintains long-term, in-depth cooperation with alliance partners and strategic partners, and is committed to providing trusted IoT connectivity technologies and products. Gosuncn is a co-founding member of the Blockchain Module Alliance. Together with China Unicom IoT, WanXiang Blockchain, and aitos.io, and is oriented towards 5G evolution technology embedded in multiple types of IoT modules. BoAT Framework implements the deployment of blockchain technology.

## lierda 利尔达科技集团

Li, Ya-chun,  
General Manager of Lierda Cellular IoT

The industrial ecological application relies on Internet of Things technology to continuously and repetitively upgrade to achieve "device as a service". As an IoT module and application solution provider, Lierda has previously helped customers manage equipment networking and terminals in many cases. The appeal of sensor data on the cloud focuses on solving the integrity of sensor data collection and the reliability and stability of data transmission. However, the application of Blockchain+IoT solves the problem of data credibility, so Lierda hopes to cooperate with industry partners for in-depth blockchain collaboration. For original product architecture, we provide a complete solution for customers to efficiently and quickly integrate data on-chain from the device side, so that more IoT devices can be blockchain "enabled" and ready. The MCU of IoT devices have limited processing and sensitive power consumption, so we need to do some new architecture and processing optimization when integrating the development of the blockchain solution on the device or module side. We offer customized solutions for IoT+Blockchain in different segments to enable other product key indicators to be unaffected after the product is adapted with blockchain.