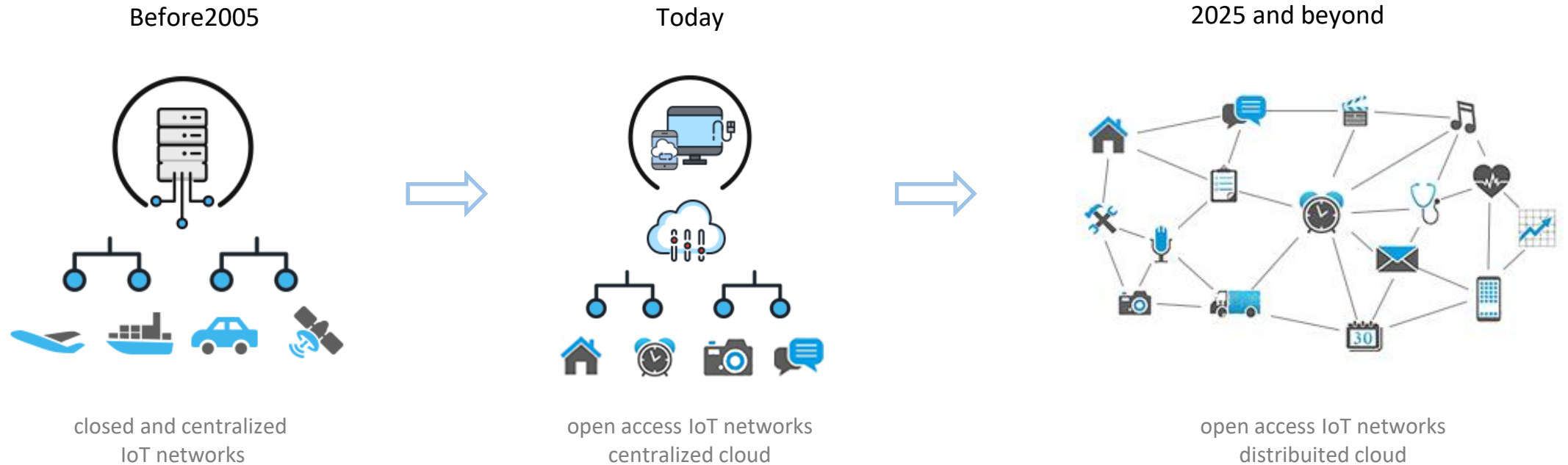


# IoT Chain

A high-security lite IoT OS

# Future Society Made Up By IoT

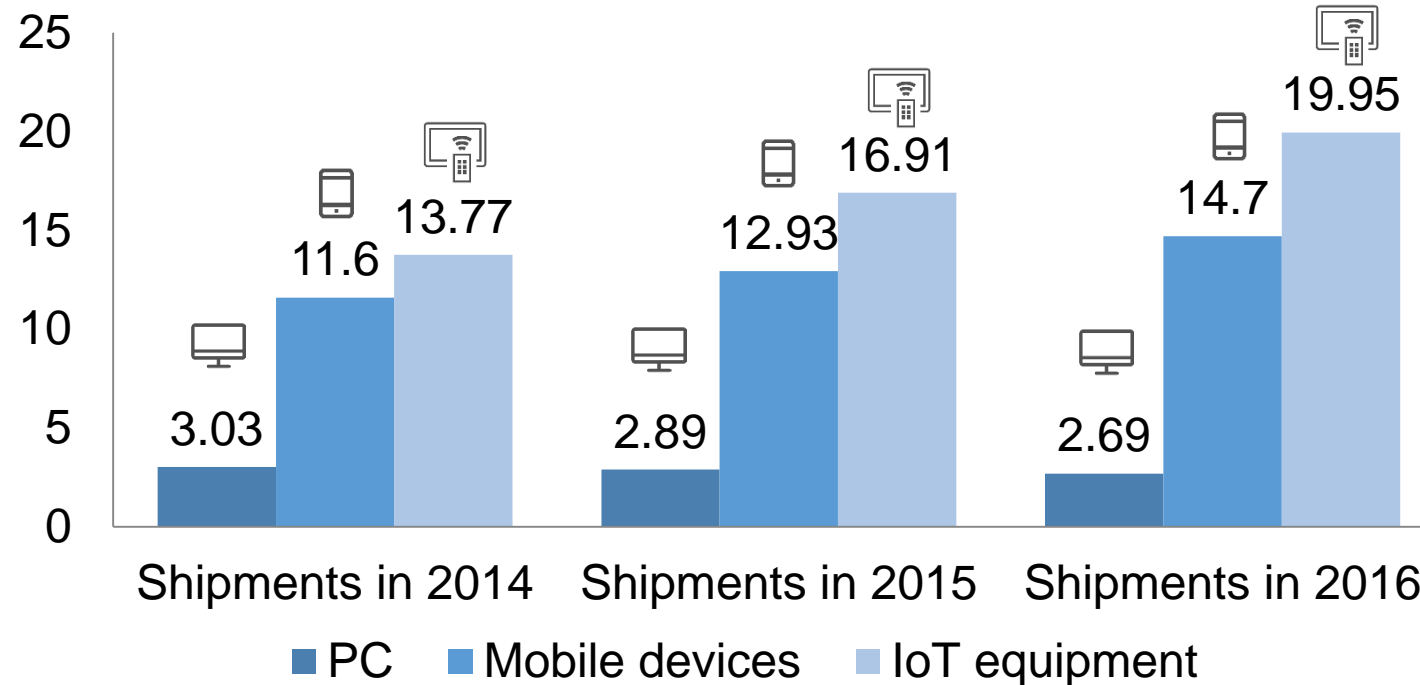
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On the basis of HIS's prediction, most articles will be intellectualized by 2025. In the future world, everything will be interconnected, from a cup to a house, and they will have their own IoT OS.

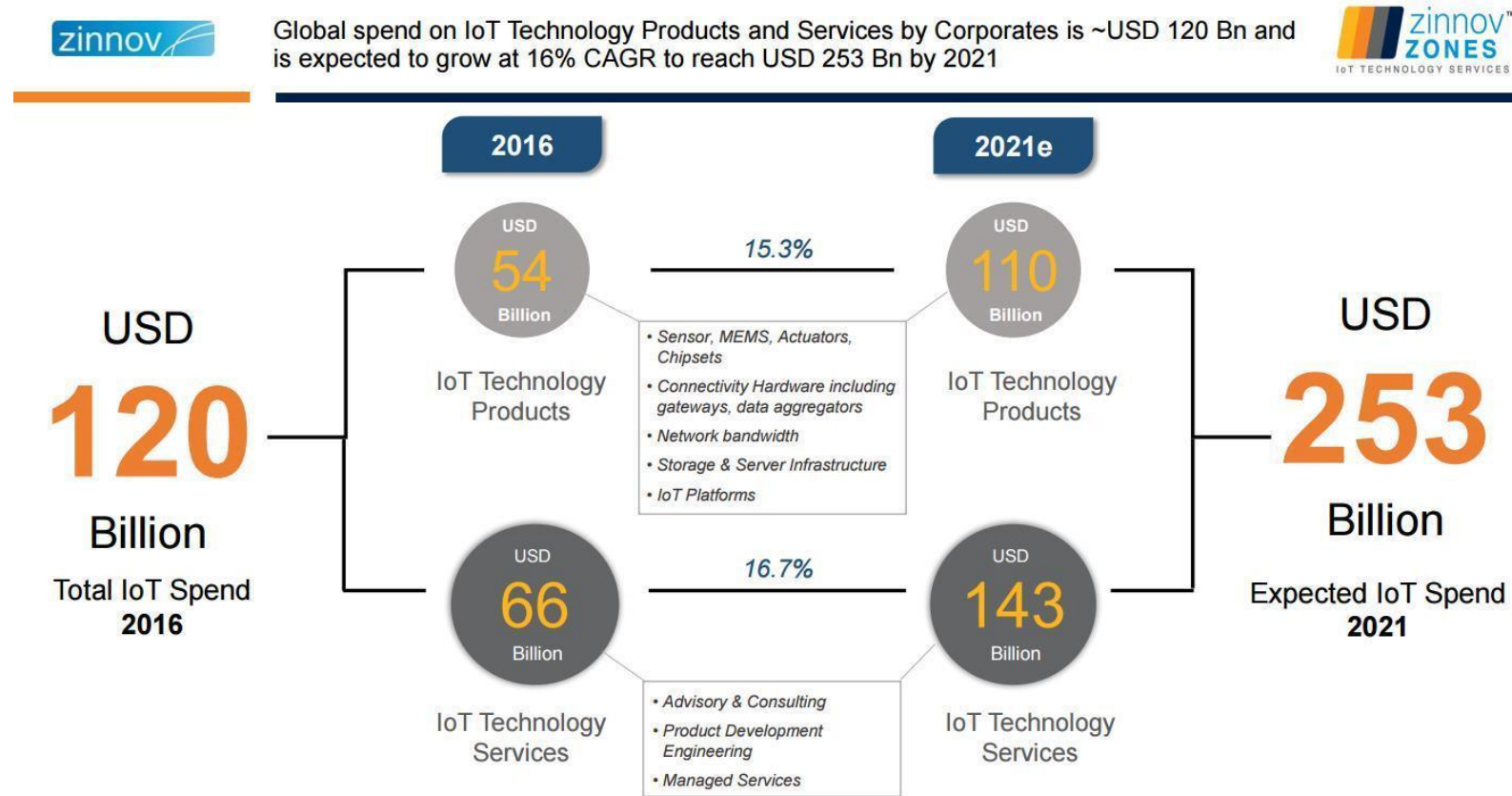
# Slow Growth of PC/Mobile phones VS Rapid Growth of IoT Devices

Resources: IDC/Zhiyan Consulting



According to Swedish Ericsson's latest research report, the number of smart-phone users exceeded feature-phone users for the first time in 2016, but both of them will soon be surpassed by IoT devices in a few years. As estimated, the number of sensors, home appliances and machines connected to IoT will exceed phones and become the largest connection device in 2018. By 2021, among the whole world's 28 billion connection devices, 16 billion of them will be IoT devices, from smart city, smart vehicles and smart home to mobile health care and diagnostic equipment.

# IoT Market Scale



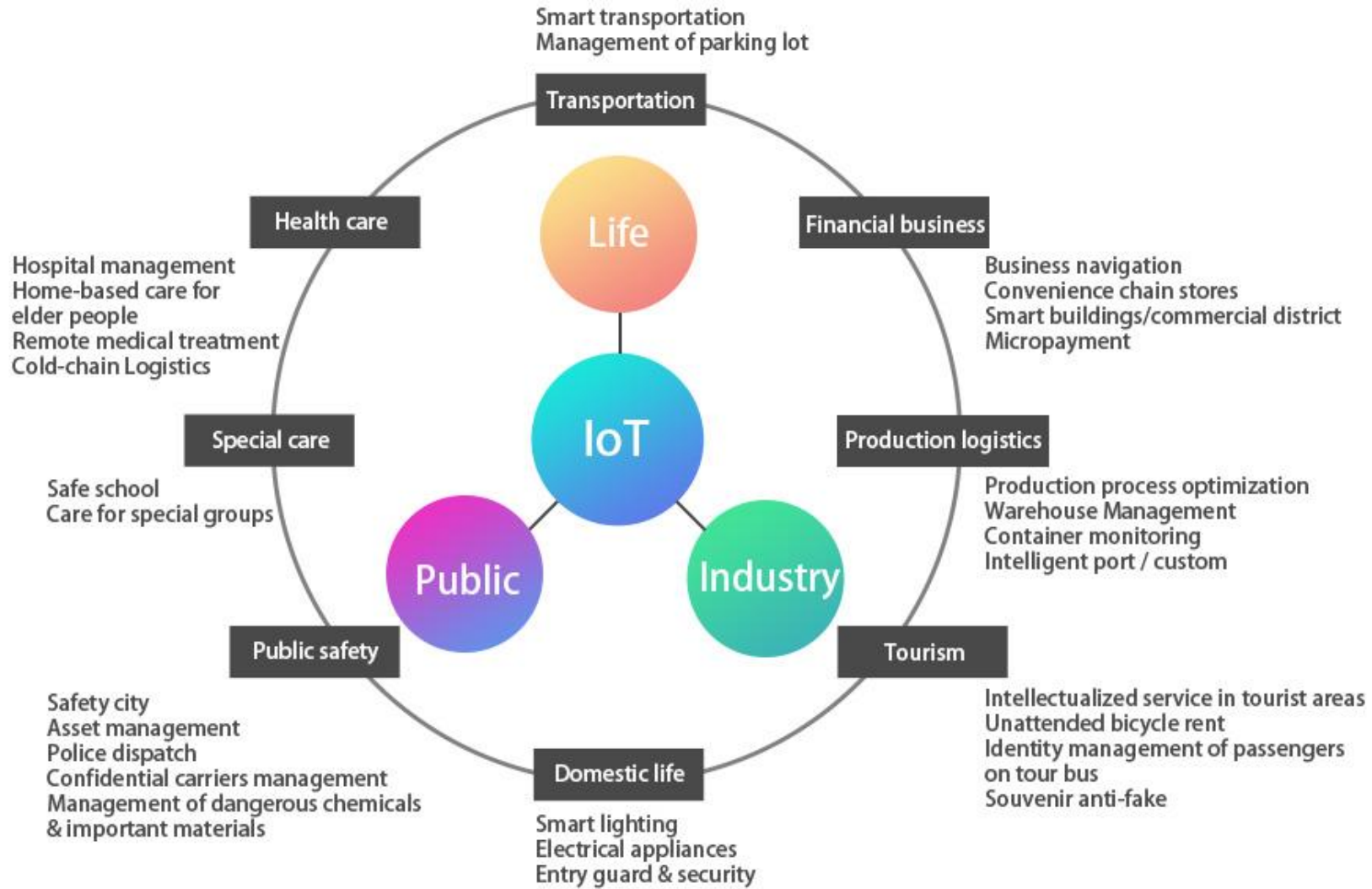
Zinnov Proprietary Confidential

Source: Zinnov Research & Analysis

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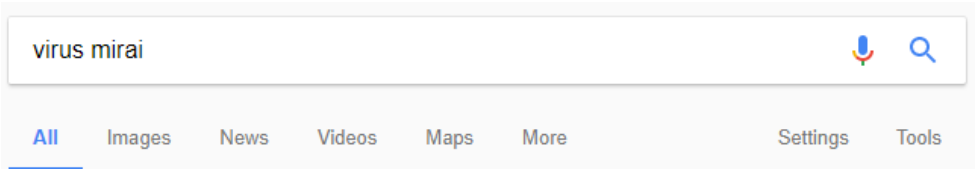
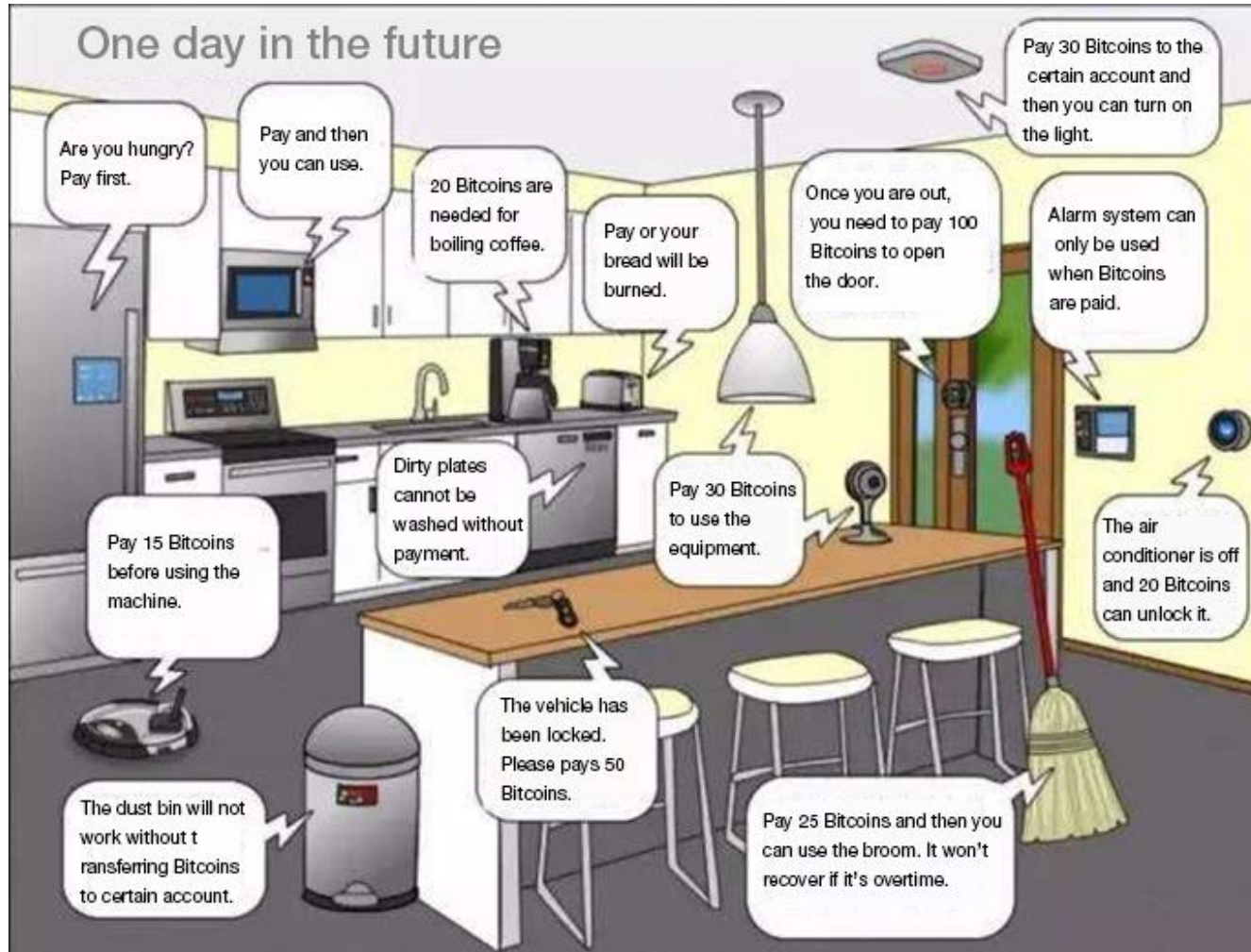
In 2016, expenses on IoT technical products and services by the whole world's enterprises have reached 120 billion dollars and this number will increase to 253 billion dollars in 2021, with a compound annual growth rate of 16%. Over the next five years, the sole expenditure on IoT technical services will rise with a compound annual growth rate of 17%, reaching 143 billion dollars in 2021. To estimate on the compound annual growth rate of 20%, Asia will have the fastest growth, reaching around 35% of total expenditure in 2021.

# Overview of IoT Industry





# Possible Future



About 449,000 results (0.44 seconds)

[Mirai \(malware\) - Wikipedia](#)

[https://en.wikipedia.org/wiki/Mirai\\_\(malware\)](https://en.wikipedia.org/wiki/Mirai_(malware))

**Mirai** is malware that turns networked devices running Linux into remotely controlled "bots" that can be used as part of a botnet in large-scale network attacks.

**Original author(s):** "Anna-senpai aka LiteSpee..."

**Written in:** C (agent), Go (controller)

**Operating system:**  
Linux

[The Mirai Botnet Isn't Easy to Defeat | WIRED](#)

<https://www.wired.com/2016/12/botnet-broke-internet-isnt-going-away/>

Dec 9, 2016 - It's going to take years to move past **Mirai**, the botnet that's causing havoc ... sort of security software on enterprise PCs, and anti-virus measures ...

[Mirai: what you need to know about the botnet behind recent major ...](#)

<https://www.symantec.com/.../mirai-what-you-need-know-about-botnet-behind-recent...>

Oct 27, 2016 - A distributed denial of service attack (DDoS) on DNS provider Dyn last week managed to disrupt an array of the internet's biggest websites, ...

[The Mirai Botnet: All About the Latest Malware DDoS Attack Type ...](#)

<https://www.corero.com/resources/ddos-attack-types/mirai-botnet-ddos-attack.html>

**Mirai** is a self-propagating botnet **virus**. The source code for **Mirai** was made publicly available by the author after a successful and well publicized attack on the ...

## ? Challenge One: Low Security

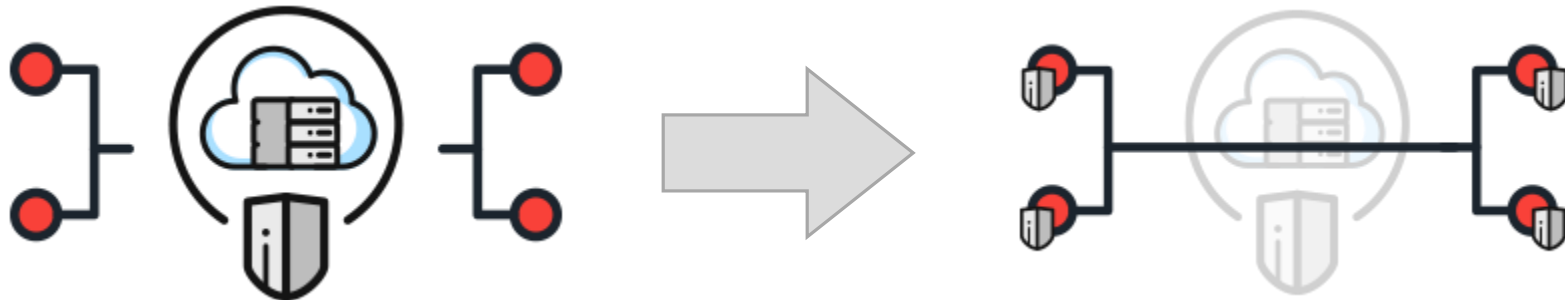
The Botnets of Things created by Mirai was entitled as one of the Ten Breakthrough Technologies in 2107 by *MIT Technology Review*. According to the statistics, the Botnets of Things have infected more than 2 million IoT devices, for example, the cameras. The DDos attack launched by this made the network of American DNS service provider Dyn break down and users could not visit several popular websites such as Twitter and Paypal within a short time. Afterwards, more botnets appeared, including the one that hijacked the IoT devices to mine Bitcoins and the http81, which has larger scale and is more active.

Centralized management structure cannot prove its innocence and individual private data being revealed has happened occasionally. For example, in May, 2017, People's Daily Online once reported that 266 cameras in Chengdu were enforced for webcast.

At present, the security model based on closed source (often called "security through obscurity") has exposed its potential safety hazards and will be abandoned gradually and be replaced by a new security model, "security through publicity". To realize this, it is necessary to upgrade the model to open source software. Though the current open source systems are still vulnerable to accidents and are of low availability, they are less prone to government interference and other targeted attacks. Therefore, the open source system will play an important role in home automation as well as networking of vehicles and other devices.

## 💡 Solutions

IoT Chain (ITC) has adopted the asymmetrical encryption. As long as the private key is kept properly, the data cannot be cracked even if it's collected. At the same time, all the nodes in ITC are equal, which protects the users' privacy. Moreover, based on the character that block chain cannot be tampered, the manufacturers and service providers are not able to tamper the user's all information.



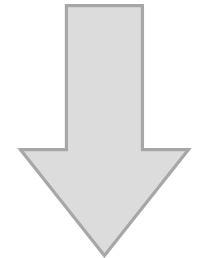
## ? Challenge Two: High Cost

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Before the revenue of IoT reaches market expectation, the cost of IoT is still extremely high. Many of the existing IoT solutions are of quite high expense. Besides the cost for intermediaries of these services, building and maintaining the basic facilities related to centralized cloud and large-scale server cluster are also very expensive.

But for IoT, the equipment manufacture enterprises don't have enough profits to make up the money for supporting and maintaining the equipment for a long period. Meanwhile, it will cost a great deal of money to serve hundreds of billions of smart devices. Even the maintenance of centralized server for updating software will also cost a lot.

The operating costs of WeChat server for 600 million users have reached above 300 million yuan per month. Now there are 4.9 billion devices online, the annual operating cost of servers will be 29.4 billion yuan and the number is still increasing rapidly every year.



## 💡 Solutions

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The future ITC will surely have tens of thousands of nodes and they will be absolutely adequate to meet the needs of IoT data storage with a combination of blockchain's distributed ledger technology. And thanks to the de-centralization of blockchain, there is no need for highly-intensive computer cluster. Both of the technologies have dramatically reduced the operating and maintaining cost of the whole IoT.



# Advantages of Blockchain Solutions

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## 1 High Security

The basic architecture of blockchain is immune to traditional internet attacks.

The features of decentralization, multi centers and weakening centralization will reduce the operation cost of centralized architecture.

## 2 Low Cost

# Biggest Barriers to Blockchain Application: High Resource Cost & Low Performance

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## Resource consumption

Bitcoin's POW (Proof of Work) is consensus mechanism with high resource consumption while most IoT devices have problems like low computing ability and network capability as well as short battery life.

## Data expansion

With the growth of blockchain, can IoT devices provide enough storage capacity? Until now, Bitcoin needs 100 G physical storage space

## Performance bottleneck

The limit speed of traditional Bitcoin trade is 7 transactions per second and it will take about one hour to write in the blockchain plus the time for consensus confirmation. This will lead to feedback and warning delay, which are infeasible in delay-sensitive industrial IoT.

## Partition tolerance

The industrial IoT emphasizes that the nodes should be “always online” but it happens all the time that ordinary IoT nodes become failure and join or exit the network frequently. This will generate network shocks which consume a lot of network bandwidth and even cause “network partition”.

# Four Technologies of ITC

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## SPBFT

For resource consumption, using super-voting consensus mechanism SPBFT can not only reduce the notice of resource consumption, but also speed up the transaction and lower transaction delay. Of course, there are certain losses in the extensibility of nodes and this will be adjusted through weight when facing a specific scenario.

## SPV

For data expansion, ITC will apply simple payment mode (SPV) and compress transaction records through Merkle Tree. And for system architecture, heavy nodes as well as light nodes can be applied. The former ones will store blockchain's all data and the latter ones will only store 256 hash values of Merkle Tree Root's nodes for verification.

## DAG Lisk

ITC has adopted DAG's data structure to solve performance problems. On the one hand, the transaction performance can be improved. On the other hand, ITC can resist quantum attack. Meanwhile, Lisk has applied main chain – side chain and other cross-linked technologies to conduct management dividing into zones to greatly improve its performance.

## CPS

ITC will adopt multiple CPS clusters to achieve partition tolerance and bear potential network partition risks. Also, ITC system will support both on-chain and off-chain transactions, especially the off-line transaction.

# ITC Performance Analysis

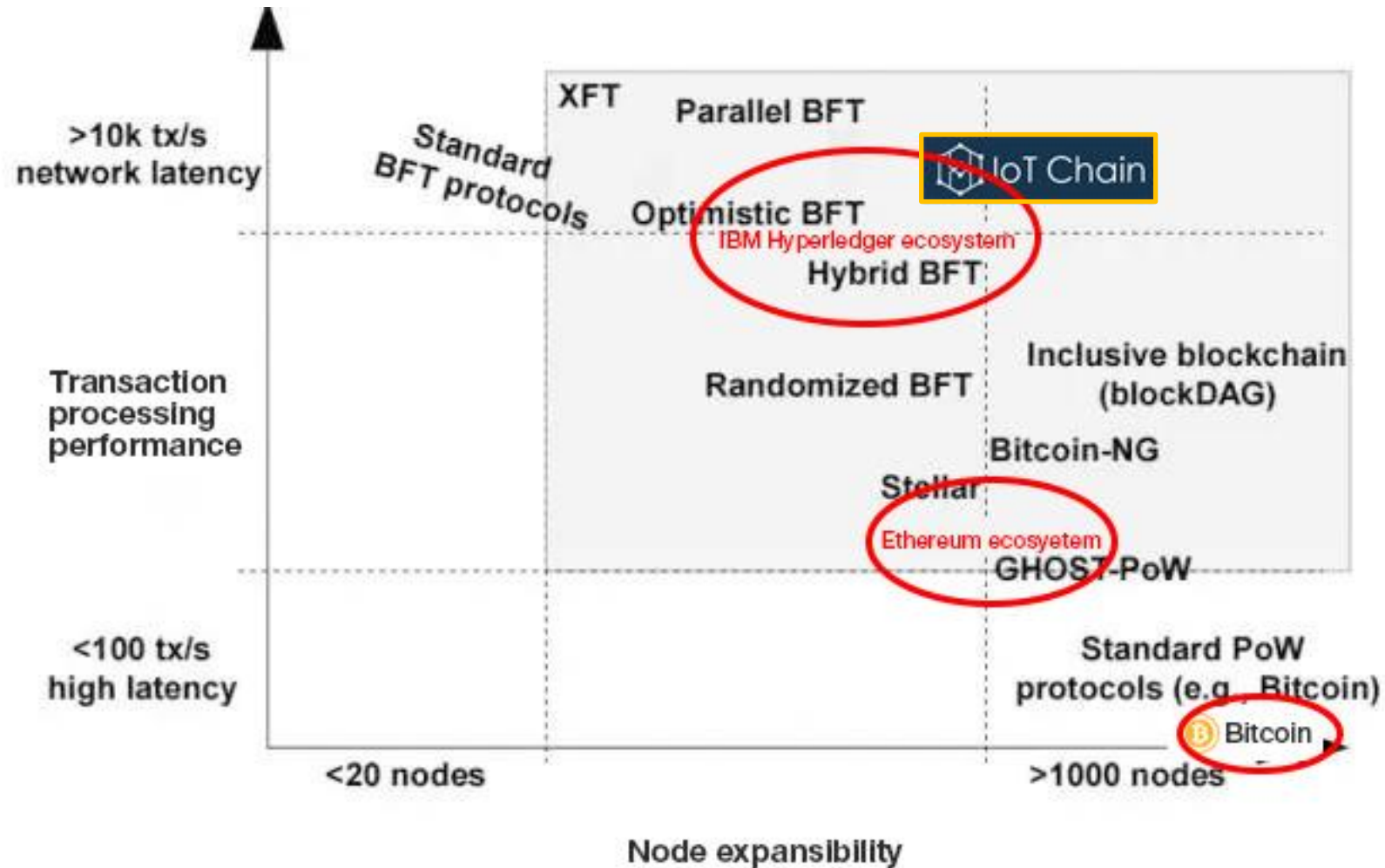
Transaction verification speed : The speed of Bitcoin is about 10 minutes; The speed of Ethereum is about 10 seconds; The speed of ITC is millisecond.

Average transaction verification speed (Figure)

Average transaction verification speed (Minutes)



# Performance Analysis of ITC Execution Efficiency





# Comparison of Running Configuration: Traditional Blockchain VS ITC

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## Running configuration of traditional blockchain

Apple macbook

CPU: Core Duo Quad 2.4 GHz

RAM: 8G RAM

Hard Disk: 1T

Size: 180 mm x 200 mm

## Running configuration of ITC

ESP8266

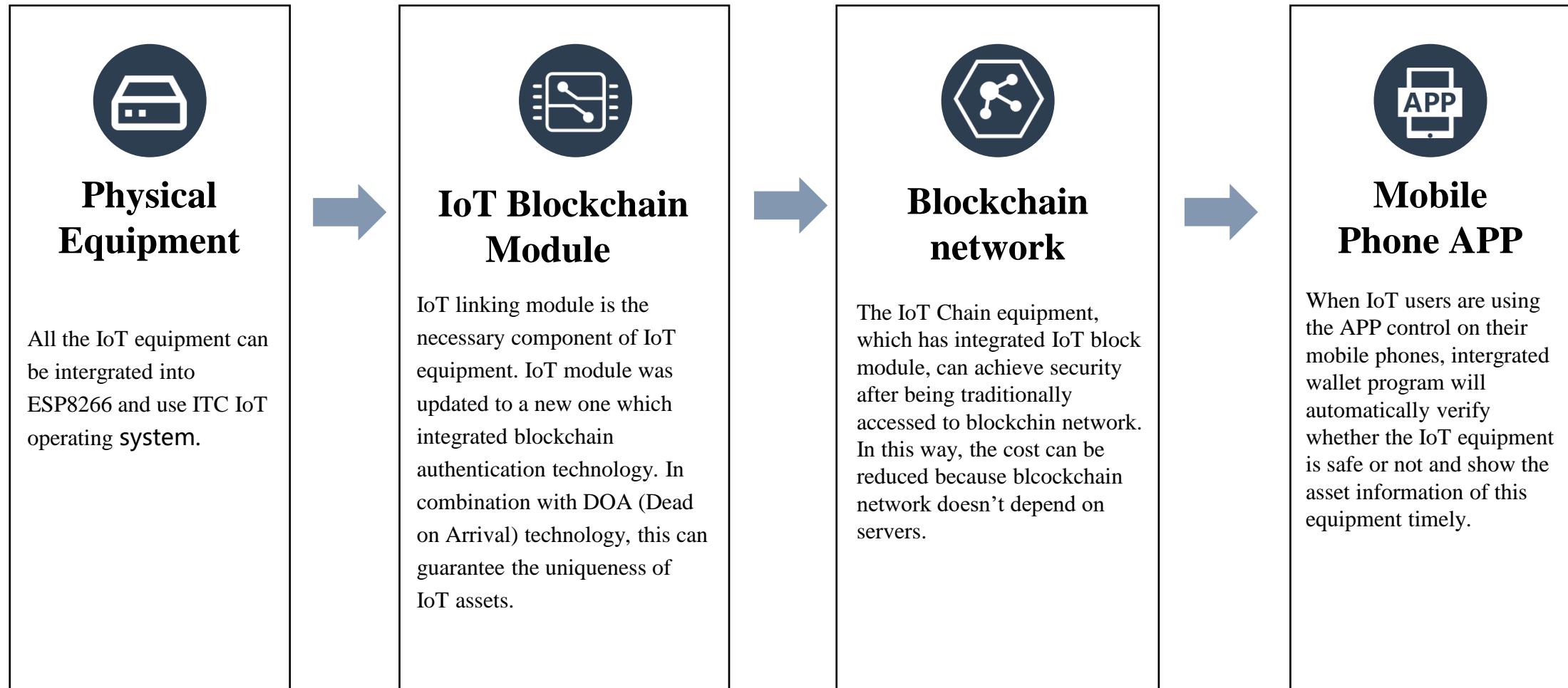
CPU: 0.08GHz

RAM: 0.002G

ROM: 0.012G

Size: 18 mm x 20 mm

# Users' Usage Scenario



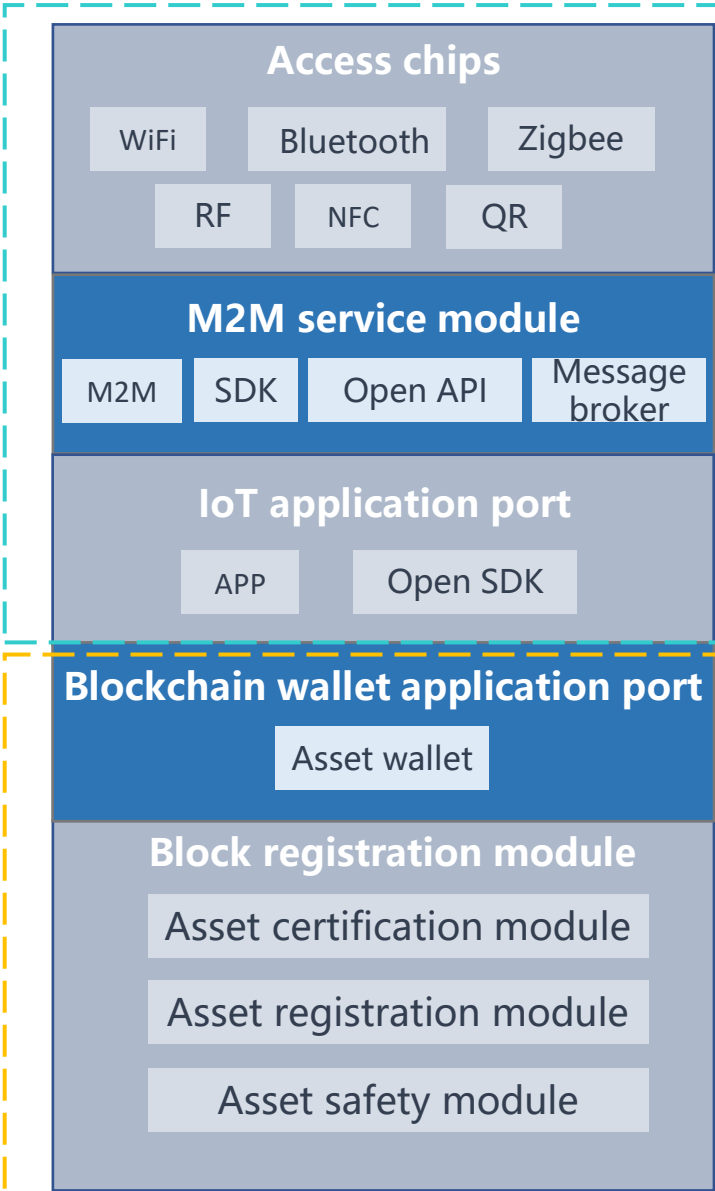
# Architecture of ITC Platform

## ITC solutions

## Blockchain IoT devices

Ordinary devices

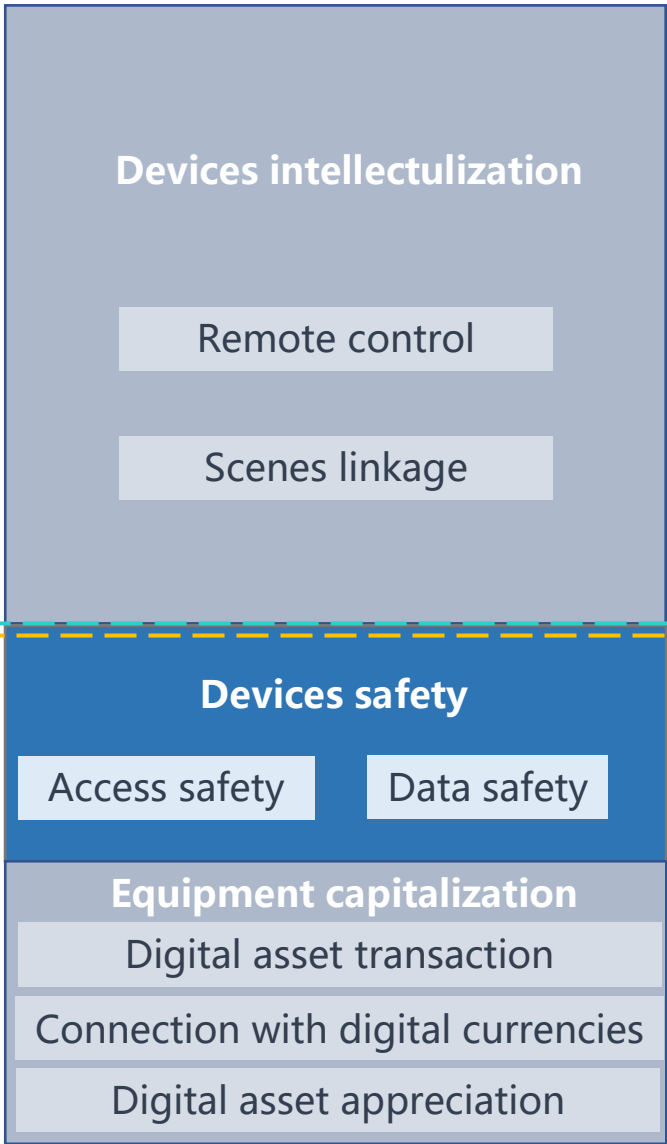
+



IoT technology

=

Blockchain IoT technology



# Competitiveness Analysis of ITC Business Mode

	IoT Chain	IOTA	SLOCK.IT	IBM-ADEPT	A Chinese Project
Supporters	Ordinary Single-chip Microcomputer	Self-developed by customers	Ethereum specialized computer	Customized based on customers' demands	Pasting RFID label
Risk of being tampered before going on chain(上链)	No risk	No risk	No risk	No risk	Quite high risk
Service mode	Non-perceived update	Customers self-develop IOTA adaption protocol	Provide Ethereum computers to users	Customized based on customers' demands	Unknown
Do the customers need to develop by themselves?	No	Yes	Yes	Yes	Yes
Resolved problems	IoT centralization/IoT security/physical asset digitization/equipment share	M2M micropayment efficiency/micropayment without service charge	Physical equipment share	Customized based on customers' demands	Physical assets datafication
Basic blockchain technology	Decentralized main chain based on PBFT consensus in combination of DAG subnet	Tangle based on DAG	Ethereum	Hyperledger	Unknown
Targeted applying fields	Smart lighting/safeguard/electronic appliances/industrial IoT	Smart electronic appliances/industrial IoT	Smart lock	Multiple industrial IoT fields	License plate trade/Asset digitization trade
Identified applying fields	Lighting industry has been settled. Safeguard & smart home is carrying on.	Canonical Company promotes its telecom settlement service	Ethereum lock has been developed.	Unknown	Unknown

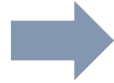
# Technology R&D Schedule

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**R&D of basic chain  
accomplished.**

December, 2017



**Wallet test**

February, 2018



**R&D of IoT OS  
accomplishes.**

May, 2018



**Overall system  
operation test**

February, 2019



# Business Action Plan

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**Lighting field**

The later half of 2017



**Electronic  
equipment**

The first half of 2019



**Industrial IoT**

2022

# Smart Lighting Solutions

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# Blockchain IoT Lighting App



Digital Assets Wallet



Smart Lighting Control



# Why Us?

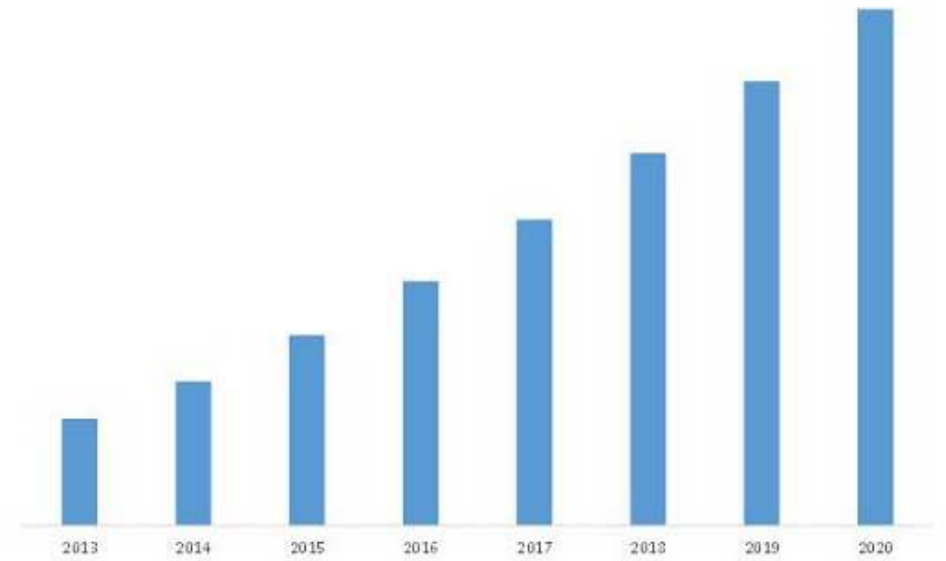
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The biggest basic architecture of IoT is intelligent lighting devices and their nodes are distributed all over the world.

Shanghai Zhuonian Software Research and Development Co., Ltd. is the core provider of IoT technology for global top smart light companies



Smart Lighting Market Size (USD Billion), 2013-2020



Source: MarketsandMarkets analysis

# More Cooperative Brands in Various Fields

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# ITC Identified Cooperative Companies



The annual shipment of Lenze Technology is about 150 million chips. It is the core provider of smart lock's chip for Xiaoming sharing bikes and of Hangzhou Paradise Umbrella's sharing umbrellas. It also provides IoT chips for many other sharing equipment, such as sharing charge pal.

**Cooperation** : We have reached cooperation intent with Lenze and IoT chips will be gradually added to ITC project in the future. The ITC operating system will ensure the safety of its underlying IoT devices and help realizing safe sharing of everything.

# ITC Identified Cooperative Unit



Zhejiang Dahua Technology Co., Ltd.(Stock Code: 002236) is a leading solution provider in the global video surveillance industry with around 10,000 domestic partners and more than 300 overseas partners . Based on technical innovations, Dahua provides end-to-end video surveillance solutions, products, and services, creating values for urban operation, enterprise management and customer daily lives.

**Cooperation:** Apply ITC technology to protect the information security of its video surveillance system and the privacy security of its users.

# ITC Identified Cooperative Unit



People's Daily Digital Communication (Shanghai) Co., Ltd. is subordinate to People's Daily and is the only main organization in charge of setting and operating People's Daily Electronic Reading Column in Shanghai. Up to June, 2017, more than 6,000 People's Daily electronic reading columns have been set up in Shanghai, becoming the first authorized screen media which is based on Party and government organs (the only one) as well as colleges and universities (the first one) in Shanghai.

**Cooperation:** ITC operating system will ensure the information security of its electronic screens and protect the cloud from being invaded by Hackers releasing harmful information.



# ITC Identified Cooperative Companies



Shanghai High-Flying Electronics Technology Co., Ltd. is a high-tech enterprises specialized in embedded wireless communication domain and designs, develops, manufacture and sells total IOT solution (Cloud Servers and Intelligent terminal APP) to the customer. High-Flying is the module provider for Baidu DuerOS of Ai Strategy.

- High-Flying also launched smart light solution provided wireless solution for GE and CREE.
- High-Flying is the core IoT chip company invested by Biadu.

**Cooperation:** Annual shipment of High-Flying is 15 million IoT chips. We have reached cooperation intent with High-Flying and IoT chips will be added to ITC project gradually in the future. The ITC operating system will ensure the safety of its underlying IoT devices.

# ITC Identified Cooperative Companies



Telink Semiconductor (Shanghai) Co., Ltd. 's major business is design and sale of integrated circuit chips. It also provides related technology consulting and technical service. Telink covers numerous markets including smart lighting, smart home, wearable products, and wireless peripheral, wireless toy, industry control, smart city as well as other IoT and consumer electronics.

- On 2016 Apple's New Product Release Meeting, Telink became Apple's cooperative IoT partner.
- GE has adopted Telink's BLE Mesh technology in its smart lighting.
- Telink was recently listed on *2016 Global Most Notable Newly-developing Semiconductor Enterprises* selected by EE Times.
- Telink has gained Intel's strategic investment.

**Cooperation** : In the future, Telink module will all use ITC OS and as the underlying safety technologies, ITC OS will ensure the security of using Telink chips.



# ITC Identified Cooperative Companies



Shanghai Shuncom Smart Technology Co.,Ltd. (Stock Code: 603515) has been dedicated to the field of wireless communication (ZigBee as the core) since its inception in 2004, while expanding the Wi-Fi, GPRS, 4G, Rola, NB-IoT and other communication technologies.

- Shuncom is a member of Alibaba Smart Living IoT Alliance
- Shuncom took part in Shanghai International Smart Home Exhibition.
- Shuncom provides the first super-low-power-consumption module in this industry for Haier cloud lock.

Cooperation: In the future, all the smart lighting devices and municipal lighting devices will be accessed to ITC network to ensure its safety. .

# ITC Identified Cooperative Companies

**GALAXYWIND**



Shenzhen Galaxywind Network System Co., Ltd. is responsible for research and development of Galaxy Super Computer. Galaxywind provides self-developed high-performance routers for special use or general use, exchange platform and security platform as well as total solution and technical service of smart home for government and users in all industries.

**Cooperation:** Dozens of electrical appliance companies have joined MACBEE alliance launched by Galaxywind and we have reached cooperation intent with MACBEE , whose members will all adopt ITC to ensure their IoT network's security.

# ITC Identified Cooperative Companies



Shanghai Be-Tiger Network Technology Co.,Ltd. was founded in 2015 and first created the brand new outdoor media -- TBA (Taxi Back-window Advertising). Be-tiger has long devoted to internet application in automobiles, building man-automobile internet ecosystem through cloud computing and many professional technical methods.

**Cooperation:** Since outdoor advertising medium is sensitive industry, it will cause great harm to the society if bad information is released by hackers who invade its centralized delivering cloud. ITC technology can efficiently protect the safety of advertisement contents.

# ITC Core Team



**CEO**  
**Xie Zhuopeng**

## Senior entrepreneur in IoT field

He has been engaged in smart hardware field for four years and has profoundly studied blockchain for three years. Xie has deep insights in smart hardware and was invited to address speech in many summits of smart hardware. He has participated in designing smart lighting architecture for several lighting companies at home and abroad. Besides, he has taken part in many designs of smart hardware architecture.



**CTO**  
**Ding Ying**

## Expert in Code & Hardware Encryption

Ding is a master of Hangzhou Dianzi University, majoring in Digital Image Processing. He was once the R&D supervisor of firmware in Huahong, the famous chip design company, and was in charge of developing the chips of UnionPay credit cards.



**CFO**  
**Zhao Tan**

## Multinational financial management expert

Zhao Tan, MBA of MIT, CPA of China, Singapore and United Kingdom (chartered). He once was the Asia Pacific CFO of Kerry and was in charge of foreign exchange hedging of hundreds of millions of dollars, strategic planning of cross-border capital, management of cash flow and building banking business system (J.P. Morgan). He once worked on auditing and IPO in China and Singapore's KPMG. Zhao has abundant experience in financial management, financing and IPO and is quite interested in financial techniques innovation.

# ITC Core Team

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**Major Programmer**  
**Liao Dongnian**

## Expert in IoT Field

Liao has engaged in smart hardware field for four years and led in designing the smart lighting architecture of the world's top-one lighting company. He has studied blockchain technology for three years and mastered java, C++, ruby, mqtt and blockchain



**Major Programmer**  
**Hu Yasheng**

## Expert in IoT Field

Hu has engaged in smart hardware field for four years and started to do research in blockchain IoT technology since 2013. He once participated in researching and developing IoT architecture design of an international famous brand. Also, he once was the technical manager of installment business department of Tongcheng Tourism Petty Loan.



# ITC Consultant Team

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**Liang Ran** : As an expert in blockchain technology, Liang mainly studies the issue and transaction of assets in blockchain. He co-edited the *ChinaLedger Whitepaper* as well as *China Blockchain Technology and Application Development Whitepaper* issued by MIIT and he is the judge of MIIT First China Blockchain Development Contest. Also, he is the co-founder of RippleFox (RippleFox is China's biggest Ripple and Stellar's gateway and the leader of Chinese community of both Ripple and Stellar).

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**Zhou Shuoji**: Zhou is the founding partner of FBG and he is an expert in digital currency transaction as well as an active investor in blockchain field. As one of China's early pioneer practitioner of blockchain technology and the opinion leader of China digital currency community, Zhou has started and managed two digital-currency private transaction funds.

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**Ma Zhiwei**: Vice president of Oppl Lighting Co., Ltd (603515). After Oppl's going public, it became the world's largest lighting company with more than 30 million yuan market value.

# ITC Consultant Team

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**Ji Xinhua:** Master of Shanghai Jaitong University and winner of first prize of Shanghai science and technology advancement. Ji took part in establishing standards for Unionpay credit cards' encryption chips and for Central Bank's digital currency.

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**Sheng Wenjun:** Founder of Telink. He got his bachelor, master and doctor degree from Tsinghua University. Telink gained Intel strategic investment and is also the cooperative partner of IoT.

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**Qiu Haiyi:** Founder and general manager of High-Flying. High-Flying is the distributor of Ai chips and the only IoT enterprise invested by Baidu. The annual sales volume of High-Flying chips is about 15 million





**THANK YOU**