



## **Blockchain integration of mobile-end streaming data**

### **White Paper V1.3**

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## Contents

1.0	Executive Summary .....	4
2.0	Definition .....	6
2.1	Streaming data .....	6
2.2	Mobile device .....	7
2.3	Internet of Things (IoT) .....	8
2.4	Proof of Work .....	9
2.5	Specium Token (SPE) .....	9
3.0	Market Analysis and Specium's Goals .....	9
3.1	Current market analysis .....	9
3.1.1	Japanese mobile phone and mobile device scale .....	9
3.1.2	Global Mobile Device Development Scale .....	10
3.1.3	The Usage analysis of Mobile Device .....	10
3.1.4	The Value of Mobile Data .....	10
3.1.5	Data collection and trading condition .....	13
3.2	Summary of Challenges .....	14
3.3	Specium's Goals .....	14
3.4	Specium's Innovations .....	14
4.0	Specium Ecosystem .....	16
4.1	Entering Ecosystem .....	16
4.2	Mobile Data Contributor (Contributor) .....	17
4.3	Mobile Data User (User) .....	17
4.4	Data users outside the Specium .....	17
4.5	SPE .....	18
4.5.1	Proof of Streaming Data .....	18
4.5.2	Methodology .....	20
4.5.3	Mining and Mining Difficulty .....	22
4.6	Specium's Structural design .....	23
5.0	Specium's Development Plan .....	24
5.1	Development of Specium's Main Chain .....	24
5.2	Accessing Exchange by SPE .....	24

5.3 Development of SPE's customer software (APP) .....	25
5.4 To Customer (2C) .....	25
5.5 To Business (2B).....	25
5.6 SDK Development .....	27
6.0 Sustainable Market Development.....	27
6.1 Development of Second Tier Chain .....	27
6.2 Establishing Streaming Data Resource Platform and Cross-chain Services...	28
6.3 Global Penetration .....	28
7.0 Allocation of SPE .....	29
8.0 Team	
9.0 Disclaimer and Risk analysis .....	30
10.0 Reference .....	35

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## 1.0 Executive Summary

In 2008, after Satoshi Nakamoto introduced his article - Bitcoin: A Peer-to-Peer Electronic Cash System, Blockchain technology and cryptocurrency have attracted worldwide attention. Since the first block was founded until now, there have been three important stages in the development of blockchain technology.

1. In 2009-2013, the pioneer cryptocurrency, Bitcoin, became one of the most successful application of blockchain technology. It created an ideal vision for people – a global currency. What followed was "One Chain One Coin," means one cryptocurrency is created with one particular chain.
2. In 2013-2014, the use of blockchain technology was applied in financial sectors, including the current blockchain industry standards that Wall Street banks want to build to improve the efficiency of bank settlement payments and reduce the cost of cross-border payments. In addition, the exchange actively tries to use Blockchain technology to realize several functions such as stock registration and transfer.
3. From 2015 until now, it is the era of programmable blockchain (smart contracts). Not only the application of blockchain has extended beyond other areas of finance, it covers many aspects of human social life that enable human being no longer rely on a third person or institution to gain trust or establish credit. Ultimately, it achieves information sharing which is applicable in legal system, medical care and logistics. Blockchain technology can solve the problem of trust and improve the operating efficiency of the entire system.

From these three stages of evolution, we can conclude that blockchain technology has made a great progress from a single, simple function to a complex diversity. As for now we are in the third stage of rapid progressive development.

However, most of the current blockchain application are still based on the most primitive cryptocurrency features such as data storage, peer-to-peer transmission, consensus mechanisms, and encryption algorithms. These are all required to have computers or servers with strong computing power. Instead, the application of blockchain is far more than this.

Jay Samit, the Independent Vice Chairman of Deloitte, which is one of the four largest accounting firms in the world, used to work for a number of major entertainment media companies including EMI and Sony, and is much involved in new media and digital media. Recently, he published an article, with a prediction of the trend of science and technology in 2018, in Fortune Chinese website. In this article, he mentioned: "The breakthrough innovation relies on the existing mobile device infrastructure. And he also mentioned that the most popular trend is the Blockchain Internet of Things (BLoT), a combination of Internet of Things (IoT) and blockchain technology. The Internet of Things refers to the installation of chips and sensors on different devices so that

these physical devices can be connected into a network. Jay believes that BloT can ensure companies and consumers not to worry about the valuable data in their blockchain being stolen by hackers.

The value of the data is inevitably important. "The Economist" (3) has pointed out long ago that data is the oil in digital age, and it is the most valuable asset in the current information age. All big giants like Facebook and Google have realized the value of data and made it into their strategic asset. In addition, with the increasing number of data collection and analysis companies, this truly justifies that many service providers are aware of the enormous benefits that data can bring.

However, more and more people are realized that your information has been expropriated for free. The era of big data is not only bringing convenience to people, but it also increases the risk of information leakage. The leakage of personal information may lead to harassment of spam messages or fraudulent telephone calls. In worse case, it may even expose you to the risk of property and personal safety. Unauthorized and unregulated sales of information have transformed to an unfaithful business that threatens our daily life. This has also resonates in the global community - the European Union has released the General Data Protection Regulation (GDPR) on May 25th, 2018, which set the bar and provided a new perspective for individuals, businesses, and governments to consider data protection under the big data era.

Although the awareness of the protection of personal information data is growing, many people still do not fully understand different types of data. People tend to ignore some data flow featured with sequential, massive, fast, and continuous nature. While we play with various APPs to produce various kinds of content data, the devices are also constantly generating streaming data. However, the volume and contained information of its data are not valued and have not been fully utilized(4).

Specium is an application of blockchain's smart contract for mobile streaming data. Users can securely upload their mobile streaming data, such as geographical location, health data, and log data, to the centralized blockchain in real time through smart contracts. The data is securely stored and the user is rewarded accordingly by proof of work and Token mechanism. Nowadays, blockchain technology is widely used to process various digital assets. As a digital asset, data is linked through Specium and blockchain technology, which is also arguably the most essential to blockchain technology application.

At the same time, we believe that blockchain technology would become more popular. Even today, the technology applications of various blockchains keep expanding. The technology itself has made considerable progress and development. It has been reflected in many application scenarios, and it has also cultivated many decentralized applications (DAPP). However, when we talk about blockchain technology, most people think of ledger, consensus mechanisms, and

Bitcoin, and these seem to be far away from the general public. Many media and institutions, which researched blockchain technology, have pointed out that people are getting confused by it, especially for those who are just beginning to understand blockchain technology and cryptocurrency. The terminology, complicated operations, the concepts and products which seem to drift away from our daily life. Now cryptocurrency and digital products have only attracted the attention of a few people and not penetrated into the general consumers.

Therefore, Specium not only focuses on data processing, but also spend our effect on devices that are closely related to people's daily life. We will start with mobile phones and gradually build blockchain integration of IoT device stream data.

We have done in-depth research that the usage of mobile phones is gradually increasing globally. The number of registered mobile phones in Japan has exceeded 100 million by the end of 2017 (5). People spend an average of about 2 hours a day and this number is still growing and gradually replaces the time people use other devices to browse other media (6). If these mobile device resources are integrated, the streaming data can be made use of to form a distributed mobile streaming data network. Thus, this become an important element for the infrastructure construction and development of Specium.

Specium, as a pioneer in this area, utilizes the features of wide coverage and ease of using mobile devices, realizes the potential security risks and potential value of streaming data, and allows anyone to upload data from their own mobile devices. The terminal can be any device that not limited to mobile phones, smart home, and the Internet of Things that effectively bring people closer to the blockchain technology.

Specium can be applied to many scenarios in daily life such as geographical data analysis, medical treatment, artificial intelligence, market analysis, and financial products. The establishment of Specium is based on the concept of blockchain that explicitly point to the data security by breaking the traditional data collection and analysis service model to establish a brand-new mobile end blockchain ecosystem.

Specium is aiming to become the pioneer of blockchain application which is based on mobile streaming data.

## 2.0 Definition

### 2.1 Streaming data

Streaming data(7) is a set of sequential, massive, fast, and progressive sequences that are usually sent via data record. It is small in size (a few kilobytes) and used in network monitoring, sensor networks, aerospace, meteorological measurement and financial services.

In our daily life, streaming data is not limited to that mobile or web applications used for online shopping, gaming, social networking, financial trading platform, geospatial services and even all those devices and equipment in large data center.

There are four characteristics in streaming data:

1. Real-time arrival of data
2. The arrival order of data is independent and is not controlled by the application system;
3. The data scale is massive and its maximum value cannot be predicted;
4. Once the data is processed, it cannot be taken out again unless it is deliberately saved or relatively high cost incurred.

A large percentage of data collected in our daily life can actually be categorized as streaming data and it is the most basic data source for big data analysis and has been widely applied to various daily life scenarios.

At Specium, we put our focus on the data often neglected by individuals and enterprises – the streaming data that are generated automatically by the phones and other devices. We have seen many projects that put their focus on user-generated data, including personal information, contents generated on different Apps, etc. However, these projects have overlooked the streaming data that is constantly being generated by the devices, and the intrinsic value it carries.

The most common types of streaming data that is generated automatically include:

Geographical data

Environment data

Log data

We will explain the value of streaming data in Chapter 3.

## 2.2 Mobile device

We are familiar with mobile devices such as mobile phones, smart watches and bracelets, smart homes, and so on. Many people also like to call mobile devices as mobile Internet terminals. People have clearly recognized that devices like mobile phones are not just a communication tool, but also a small mobile smart computer. Mobile device equipped with strong processing capability, memory, storage media, and operating system can be considered as a small computer

system that can complete complex processing tasks, and achieve dialing, photo shooting, listening to the music, playing video games, GPS positioning, information processing, etc. It definitely can adapt in various fields and become an important and vital part of our daily life.

## 2.3 Internet of Things (IoT)

IoT is the interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data. The devices being connected can reach 1,000 to 5,000 around one person and with the development of the Internet of Things, this internet will include 500 to 1 trillion objects (8). This includes all devices we are familiar with such as mobile phones, tablets, smart cars, smart refrigerators, smart headphones, smart wearable devices, etc. In the IoT, everyone can connect their devices to the Internet, and manage and control those devices via IoT to form a network of person-to-person, person-to-object and object-to-object (9).

The IoT has a wide range of applications. One of the advantages of IoT is its ability to integrate digital information of objects and objects without being affected by physical distances. This can be applied in transportation and logistics, health care, smart environment (home, office, factory), personal and social use as well. Therefore, undoubtedly, IoT has a very massive and broad market. At the same time, by gathering these scattered data and consolidating it into big data, it can make changes that can affect and contribute society in urban renewal, disaster prediction, crime prevention, and epidemic control.

## Libelium Smart World

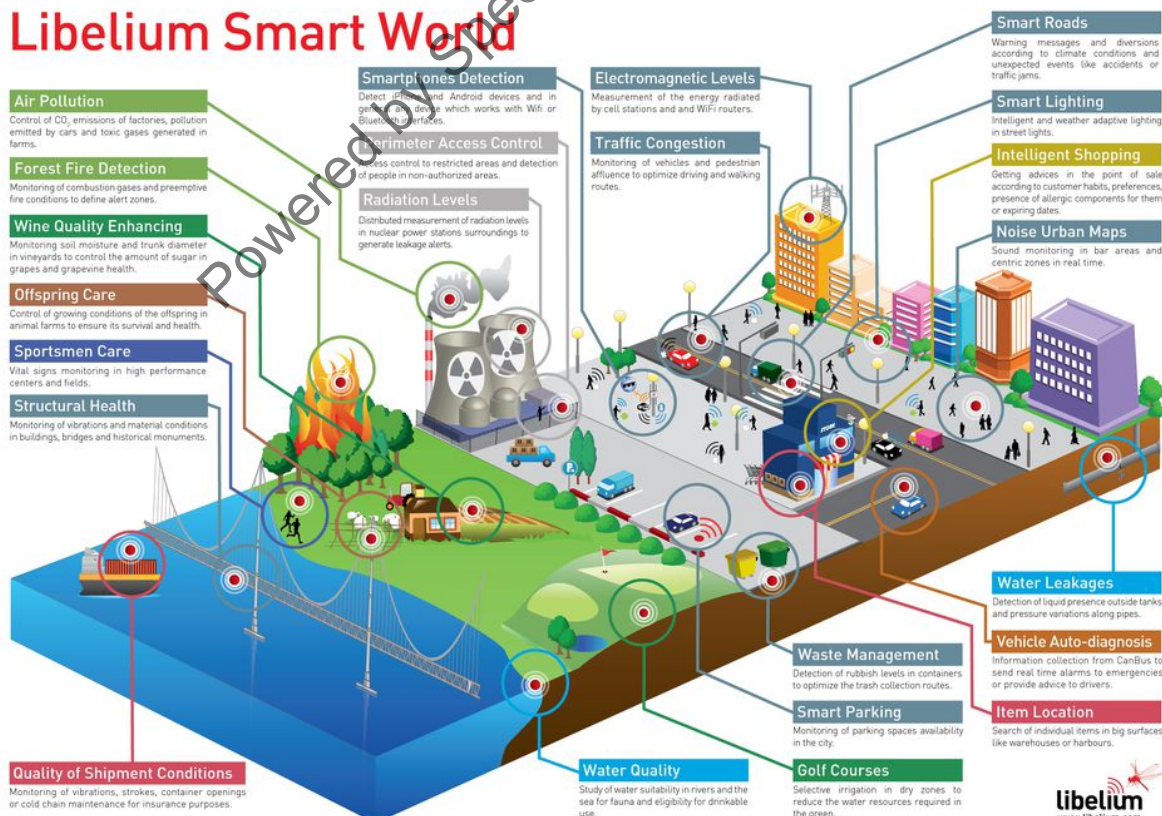




Image.1 Smart World

## 2.4 Proof of Work

Proof of work (PoW) basically is an evidence which can justify how much you had done. This is a highly efficient and effective means to provide trust across different parties.

For example, PoW are used in Bitcoin for block generation. The hash of the block contains a run of leading zeros and the number of zero required is set by the difficulty. When mining bitcoin, the hashcash algorithm repeatedly hashes the block header while incrementing the counter & extraNonce fields. And this process require a certain amount computing resource. Bitcoin stores the nonce in the extraNonce field which is part of the coin base transaction that this node provide the PoW and reward is gave in this process.

Similarly, other cryptocurrency has its own type of PoW and is released via smart contract on the coin exchange market. Like ETH coin, the co-founder, Vitalik Buterin created Proof of Stake (PoS) that varies in that a person can "mine" depending on how many coins they hold(12).

We will also introduce the original Proof of Streaming Data (PoSD) consensus mechanism for Specium in Chapter 4.6.1 below.

## 2.5 Specium Token (SPE)

The Specium Token is the blockchain cryptocurrency used for value exchange, such as rewarding data contributors, purchasing Specium's related products in Specium. This will be covered in more detail in chapter 4.6 of this white paper.

## 3.0 Market Analysis and Specium's Goals

### 3.1 Current market analysis

#### 3.1.1 Japanese mobile phone and mobile device scale

Japanese mobile phone culture plays an important part of today's Japan society. Most Japanese have smart phones and the most common communication method is via mobile phone APP due to the rapid development of smart phones.

According to the survey data (5) in 2017, the number of existing mobile phone users in Japan has exceeded 100 million. In addition, the popularity rate of smart phone in Japan has just reached 60% (13). It is not hard to imagine that with the popularity of smart phones rising in the near future, the number of mobile phone will far exceed the estimated 100 million units in the market.

Currently, people are not only connects to the Internet through mobile phones. By looking at the IoT device market in Japan, we can see that the number of devices connected to the IoT has reached more than 700 million units (14) in 2017. This number will also grow steadily in the future.

### 3.1.2 Asia and Global Mobile Device Development Scale

Let us step back and also take a look at the Asia and global market. In Asia, although the mobile device penetration is not the highest in the world, the number of mobile devices makes it the largest market without doubt. From the global market, there will be over 8.8 billion mobile devices in 2020, and the number is still growing. With this booming market, Specium has set its foot on a market with the largest user base.

Moreover, as we mentioned above, mobile device is not only limited to mobile phones, but also includes other devices such as tablets, car computers, smart home, etc. With the increasing popularity of the IoT, the number of smart mobile devices that can manage complicated function is also increasing.

A report from the CompTIA pointed out (15) that IoT is growing rapidly and it is predicted that devices connected to the IoT will reach 50 billion units by 2020. Ericsson also predicts that the number of global smartphone users will double up, from about 3.4 billion today to 6.3 billion (16) by 2021, which literally means most of adults on earth will use some form of connection with particular devices.

At the same time, with the development of smart homes, the average number of mobile devices owned by each family will continue to increase. Therefore, we predict that there will be a geometric growth in mobile devices using our service in the future, and this market will continue to grow with substantial value.

### 3.1.3 The Usage Analysis of Mobile Device

In 2015, the use of mobile device has exceeded computers (17). Although different survey may use various approaches or methodologies, overall comprehensive data shows that the average daily usage time of Japanese mobile phone users spend more than 2 hours on their phones. Especially, for young people in Japan, the average number of mobile phones per person per day is more than 4 hours (18). This number is also universal, which is why we believe it is vital to have a blockchain integration on mobile devices, since this is the only way we can reach the most users, and bring blockchain technology to the public.

### 3.1.4 The Value of Mobile Streaming Data

Given the high usage of mobile devices in terms of volume and time, the amount of data generated from it is genuinely massive. In 2018, global mobile data will reach 17 exabytes per month and will rapidly increase to 49 exabytes in 2021 (19). Therefore, we can derive that the mobile phone market in Japan generates about 150GB of data per second. In other words, the daily data generated by Japanese users can reach astonishingly 13,000 TB. If we look at the Asian market, the data volume is even greater – we estimate it to exceed 30,000 TB per day.

Although it is hard to determine the specific value of the data, the importance and high value of the data is beyond any doubt. A study at the University of North Carolina, United States, clearly shows that our mobile data is far more than 1GB/RMB no matter it is user active auction data or corporate purchase data (20).



Image 2. Monetizing individual data

We can also use an intuitive way to estimate the value of data we are generating. In recent year, geo-targeting advertising has become more and more popular, and almost all large companies are paying high prices to collect geographical data in order to improve their business. We have research a number of third party geo-data providers, and we found that value of geo-targeting advertisements ranges from 1rmb to 20 rmb per click. That is to say, we can estimate that one person's geo data generated per day values around 1rmb. With more than 1.5 billion mobile device users in East Asia, even if only 10% of the people is contributing their geo data, the data value would exceed 50 billion per year.

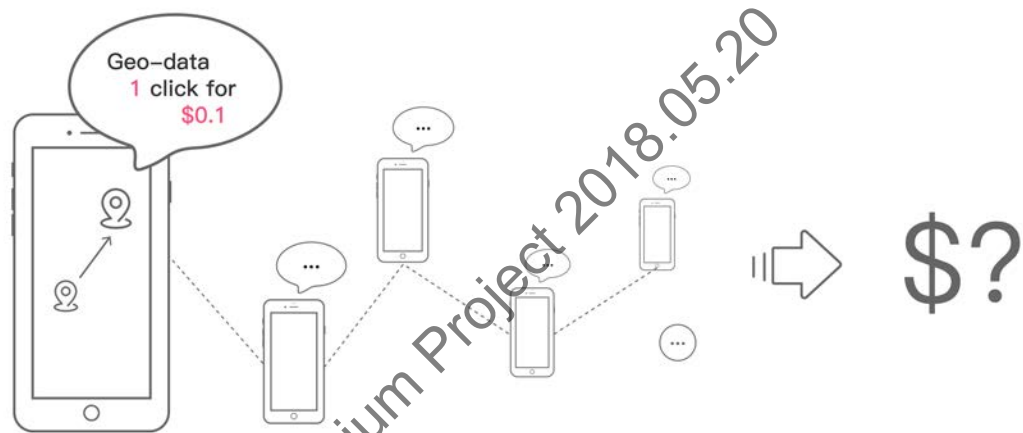


Image 3. The value of geo-data advertising

However, we should not forget that mobile streaming data and machine generated data have not yet received the attention they deserve in the current market. Machine generated data is a digital information created by computers, mobile phones, embedded systems and other networking devices. With the advancement of technologies such as radio frequency identification (RFID) and telematics, these data have become more common. Recently with the enhancement of IoT, use of Hadoop and other big data management technologies, mobile streaming data has become more and more distinct and pronounced. Thus, the value of mobile streaming data is more explicit, and we expect it to grow even further in the near future..

Therefore, we can conclude that the value of mobile streaming data is vast and titanic. We have reasons to believe that this is a trillion-level market.

### 3.1.5 Data collection and trading condition

We also noticed that people are paying more and more attention to data security. According to surveys, people are very concerned about data security issues when using mobile phone APPs and services. Among them, several aspects which people are highly concerned about include whether the data can be deleted or they can reclaim the right to use their own data, what nature of data are collected, how it to be used and so on.

It is not surprising that people are particularly concerned about these issues. In recent years, the problem of data security issues have emerged one after another. When you open the smart phone app, do you receive such prompts: "Allow xxx to get your location information". This information is collected via different channels, and used for geo-targeting advertising, or other purposes that are not disclosed to you. However we, as the data producers and owners, most likely have no idea how our data is stored, used, or even traded.

And now, the problem of data leakage is getting worse. A few days ago, a survey conducted by China Youth Daily Social Survey Center's joint questionnaire network with 2006 respondents showed that 79.0% of respondents felt that personal information was leaked (21). According to the "China Internet Rights Protection Survey Report (2015)" published by the China Internet Society 12321 Network Disadvantaged and Spam Reporting and Handling Center, the total losses caused by the leakage of personal information, spam, and fraud information by Internet users in 2015 is 80.5 billion yuan, about 124 yuan per head (22).

This is not only happening in China, but also impacting us on a global scale. In 2015, Comcast Telecom of the United States leaked 75,000 users data; On March 16, 2018, Facebook was revealed that in 2014 there were more than 50 million users (close to one-third of Facebook's active users in the US, and a quarter of the voters in the United States). The data was illegally used by Cambridge Analytics. Sending political advertisements, some media see it as the largest data breach that Facebook has ever encountered. In the absence of a transparent and fair system, we also bear the risk of data security problems.

Data security issues not only affect personal data, but also impact the streaming data directly generated by the computers and devices. According to a report by Samsung (24), data security and privacy protection have become the most pressing issues in IoT. In Japan, the cost spent on IoT security has reached 700 million U.S. dollars in 2017 (25). The security issues involve all aspects of equipment, communication, cloud and management. This further proves that there are many data security problems in the IoT market and the potential market is huge and solid.

### 3.2 Summary of Challenges

- The volume of individual mobile phone users in the Japanese and Asian market is huge, and the growth of mobile devices is rapid
- The mobile streaming data is massive and in various types, and its the value and potential has yet not been explored
- The mobile streaming data market is broad but it faces data security challenges
- Existing data services are not transparent and poor in security aspects.

### 3.3 Specium's Goals

In order to solve the above problem, we made a proactive idea and try to make it happen.

Specium aimed to make mobile devices connected to form a huge distributed mobile network. Blockchain technologies are used to process these mobile streaming data so as to provide services to individuals and enterprises. We will start with mobile phones and continue to extend our chain to other devices in the IoT. The blockchain features and distributed ledger technology will ensure the special networking equipment is easy to deploy with high level of security on data, equipment and transaction. Moreover, time and resource are saved.

This will have invaluable practical applications in daily life such as scientific research in medical, financial an educational use, gaming analysis and artificial intelligence. Specium also provides countless nodes that can perform node operations on cryptocurrencies and smart contracts for data link operations in the chain economy.

After the innovation of blockchain technology, many companies have also focused to develop data related processing. However, some applications in the market only focus on data storage or simply establishing a platform for data trading. None of them links among mobile streaming data, IoT and blockchain technology. We, Specium, does exactly what it is to ensure fair and secure processing of mobile data generated by users, and a clear and transparent rewarding system which welcomes and benefits all individuals. We will build an blockchain ecosystem that is accessible from mobile devices, and a SAAS layer will be constructed. We are also confident that Specium will liaise with other chains to create more diverse stereo for cross-chain services.

Our goal is to become an application and system leader based on proof of work on mobile streaming data to create a new mobile end blockchain ecosystem!

### 3.4 Specium's Innovations

- **New mobile streaming data blockchain ecosystem**

Specium will focus on mobile phone, which is the top category in mobile devices, and mobile streaming data which is highly under-valued. We strongly believe that only by allowing blockchain technology to be accessed from the mobile end, can we bring this innovation to the all individuals and benefit the public. In the near future, the service will also be expanded to other IoT devices. With detail planning, we will develop our own ecosystem, community, blockchain services, and blockchain-derived digital products



Image 4. New mobile streaming data blockchain system

- **Challenge traditional data service system**

Traditional data service systems: opaque, unfair, inefficient, and plagued by numerous security issues

Specium: transparent and secure

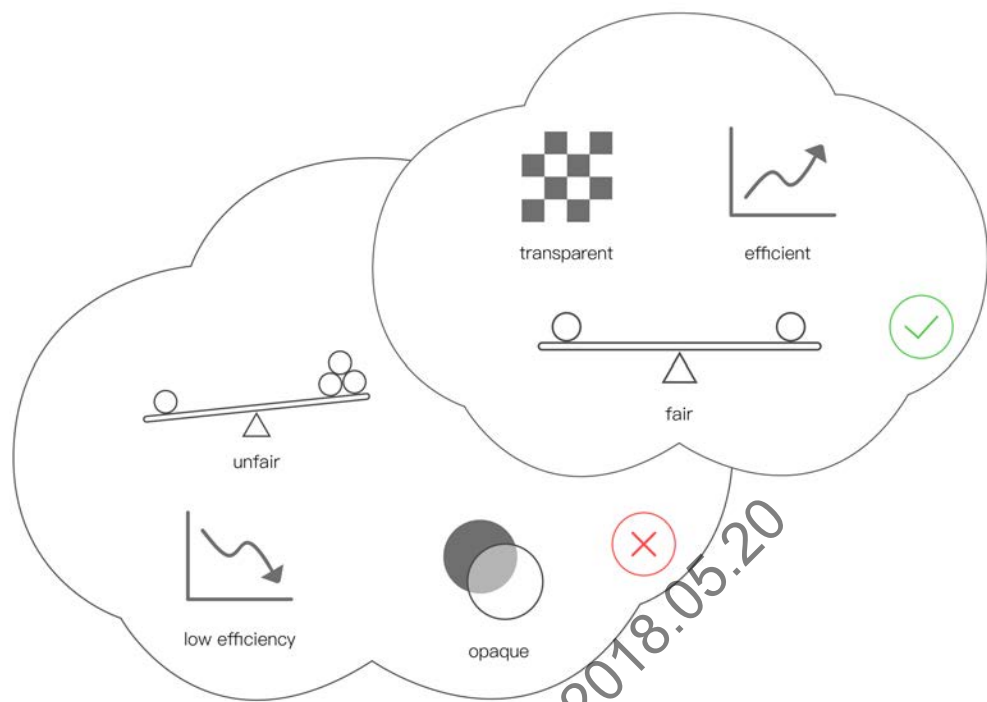


Image 5. Advantages of Specium

- **Easy to deploy and wide base of users**

Although Specium is an application based on blockchain technology in mobile data processing on mobile devices, this concept is simple and easy to understand. The reward mechanism and proof of work is fair and effective. The user guide is also very simple that can allow different people joint our chain emerging ecosystem with their mobile devices. With the large market base, we are confident the Specium can be adopted by a growing number of users in a short period of time.

## 4.0 Specium Ecosystem

Specium aims at creating an ecosystem powered by mobile devices. In this ecosystem, the main roles are mobile data contributors and mobile data users, who are rewarded by mobile data token based on their roles. We will introduce the ecosystem in detail in the chapters below:

### 4.1 Entering the Ecosystem

- Download Specium App
- Developers install Specium SDK
- Web install



## 4.2 Mobile Data Contributor (Contributor)

Mobile data contributors are an indispensable part of the Specium ecosystem. The contributors connect their mobile devices to the Specium, and provide streaming data. Take mobile phones as an example: after connecting their phones to the Specium, the contributors can open the App, and the Specium will start collecting various types of real time streaming data according to the smart contracts on the chain. Contributors can then be rewarded following the Proof of Streaming Data.

## 4.3 Mobile Data User (User)

On top of the Specium, we will build a SAAS model, which will interact with Specium directly, use the real time streaming data uploaded by Contributors, and create multiple products. When Users use the real time streaming data, they will need to pay Mobile Data Token (more details can be found in chapter 4.6).

## 4.4 Data users outside of the Specium

Although Contributors and Users are the only two roles in the Specium ecosystem, individual and enterprise users can trade with the Users (SAAS) outside of the Specium, and use the streaming data products. Any outside users can obtain the relevant streaming data from the Contributors after purchasing the SAAS products. This service is transparent, real time, and efficient.

For example, a geographical services company may want to collect real time geographical data. However, current data services are often times slow, low quality, and not transparent. Through the SAAS model on top of Specium, and the blockchain technology as well as smart contracts, this company can easily obtain streaming data in a timely fashion while maintaining high quality. After receiving the high quality data, this company can analyze the data based on their own needs, which will benefit them in developing their business. Furthermore, this geographical services company can also establish a long term relationship with the Specium Chain SAAS model, which will allow it to receive a bountiful of real time streaming data continuously.

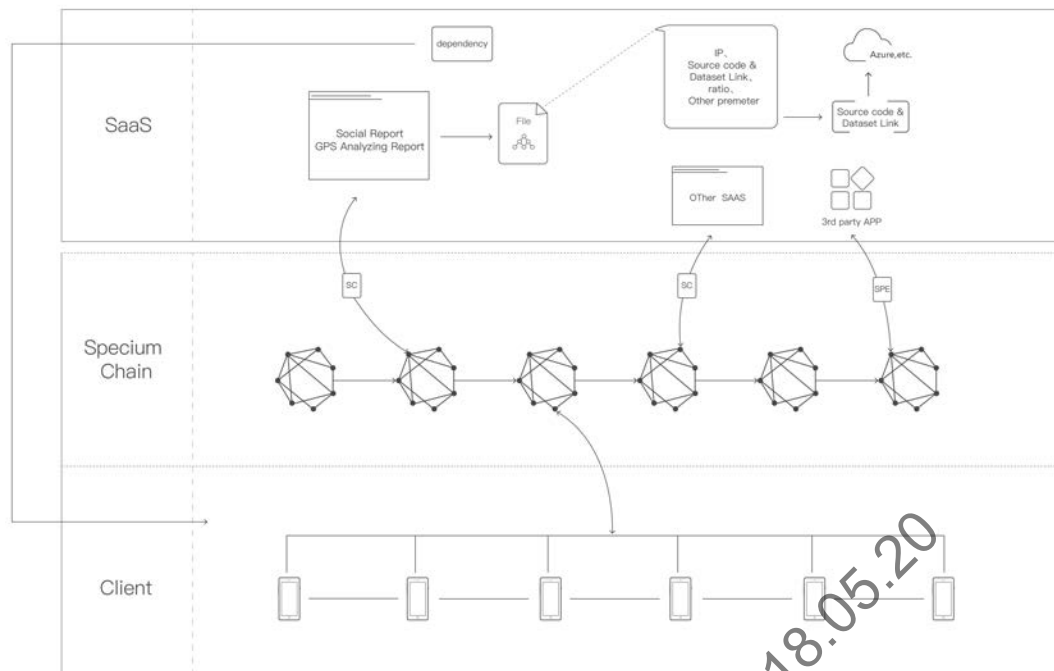


Image 6. Specium's SAAS layer interacting with users outside of the chain

This, of course, is only one example of users outside of the chain using Specium services. More applications of enterprise facing services will be introduced in detailed in chapter 5.5.

## 4.5 Specium Token (SPE)

Token (SPE) is a digital currency that is used to determine the volume and value of trade of Specium. It plays an important role in the Specium ecosystem, and is the official cryptocurrency of Specium. SPE can be used to reward the Contributors for uploading the data, and Users can use SPE to cover the cost of streaming data usage.

Total SPE supply: 87 million tokens

We believe that as a project that integrated multiples devices and is feasible to be launched, Specium's cryptocurrency SPE best showcases the value of its services. With the development of the IoT and the increasing needs in the market, the market value of SPE will gradually become more and more prominent. Therefore, the earlier and the more you hold SPE, the better chances you have for continuously receiving high quality services.

### 4.5.1 Proof of Streaming Data

Before explaining the unique consensus mechanism of Specium, let us introduce two of the most common ones.

PoW: Bitcoin laid the foundations for Proof of Work and this consensus leads block generation. However, as it becomes increasingly hard to generate a block, it becomes easier for long side chains to replace the accurate sidechains, which also causes of waste of computing power.

PoS: Proof of Stake. This is be seen as an upgraded consensus mechanism. It controls the mining time depending on how many tokens and how long a node has held thses tokens. PoS can effectively shorten the mining time, however, it still cannot solve the problem of computing power waste.

Specium, on the other hand, will adopt a brand new consensus mechanism that complies with blockchain technology and identifies with the needs of Specium. It can ensure a fair and transparent reward system within the Specium ecosystem.

We define “Streaming Data” as the total amount of data uploaded by the Specium community members. If a Contributor chooses to connect more devices to Specium for a longer time, and start uploading data earlier, the amount of data they contribute will be larger. Whoever contributes more data will be rewarded with more SPE, and this is all determined by the Proof of Streaming Data in Specium.

Proof of Streaming Data, or PoSD, is a consensus mechanism that incorporates the Specium smart contracts. Since there is an SAAS model on top of Specium, in order to maintain the Specium ecosystem and ensure that the Contributors and Users can interact fairly, whenever SAAS requests to inquire real time streaming data, the Contributors whose data is used will be rewarded again. That is to say, the longer the Contributors stay on Specium, the greater chance their streaming data will be user, and the more they will be rewarded.

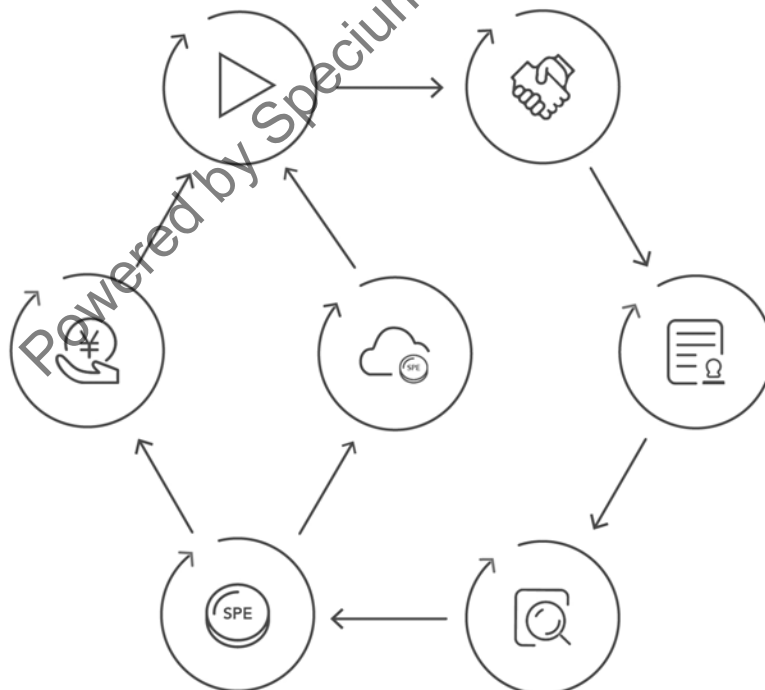


Image 7. SPE transaction

Contributors confirm interacting with Specium services → Contributors sign contract → Encrypted data uploaded to Specium → rewarded according to PoSD ← Users obtain relevant data from Contributors, pay SPE in return

## 4.5.2 Methodology

### (1) Mobile streaming data methodology

We define the contributor's ability to provide streaming data as Daily Streaming Provider. In relation to DSP, there are three main variables: streaming data one can contribute per hour (KB per hour), Public Streaming Data (PuSD), and Private Streaming Data (PrSD).

The DSP calculation formula is:

$$\text{DSP} = \text{PuSD} * k - \text{PrSD} * y$$

When PrSD equals to 0, DSP equals the Public Streaming Data. Also,  $k$  would continue to decrease whereas  $y$  would continue to increase. The relationship between  $k$  and  $y$  is  $y = \ln( k / ( 1-k ) )$

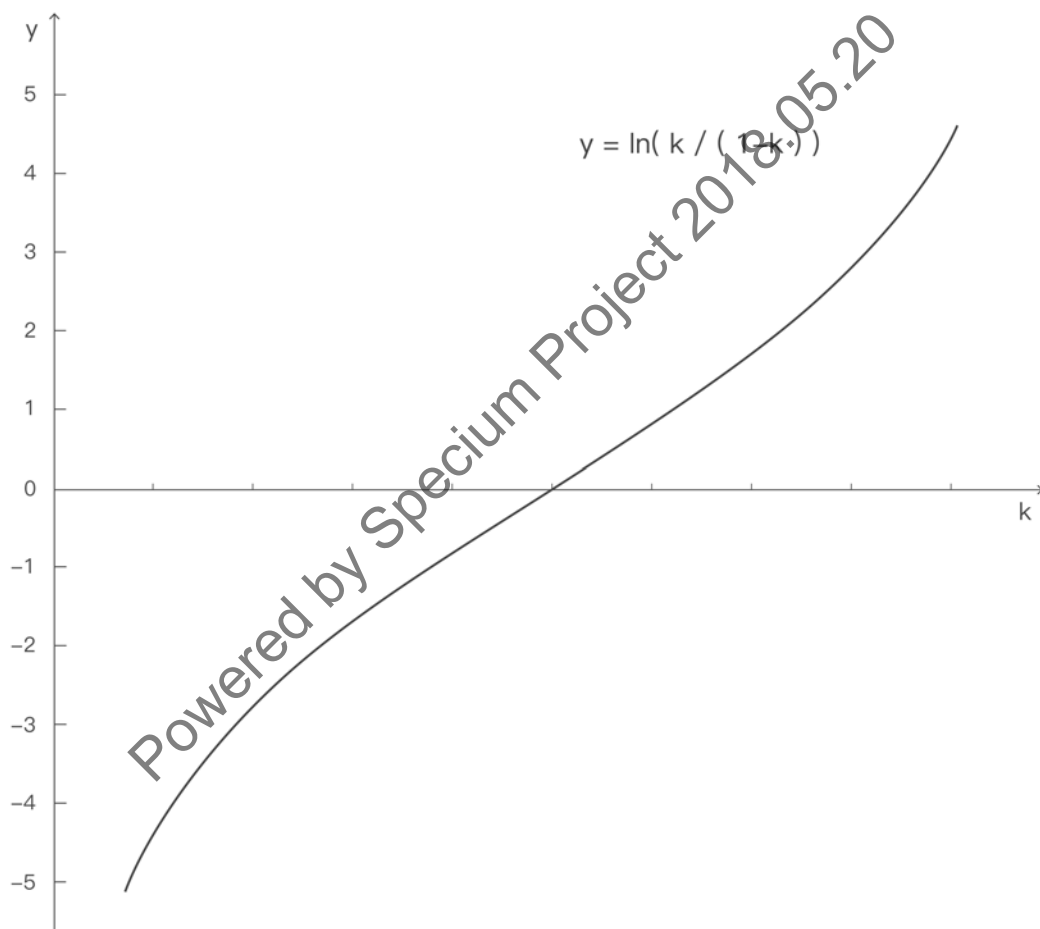


Image 8.  $y = \ln( k / ( 1-k ) )$

We can see from this chart that when  $k$  approaches 1,  $y$  is approaching  $\infty$ . On the contrary, when  $k$  approaches 0,  $y$  is approaching  $-\infty$ . This proves that the earlier people is involved, the better they can control their budget.

We will be introducing the PuSD and PrSD concepts, as well as the mining difficulty in chapter 4.6.3 below.

### (2) Power Ranking

The SPE distribution, the amount of data Contributors can provide are ruled by probability under normal distribution. Therefore, we categorize the overall streaming data provider power ranking into four groups by standard deviation:

- A:  $(+2\sigma, +\infty)$
- B:  $(0, +2\sigma)$
- C:  $(-2\sigma, 0)$
- D:  $-2\sigma$  or below

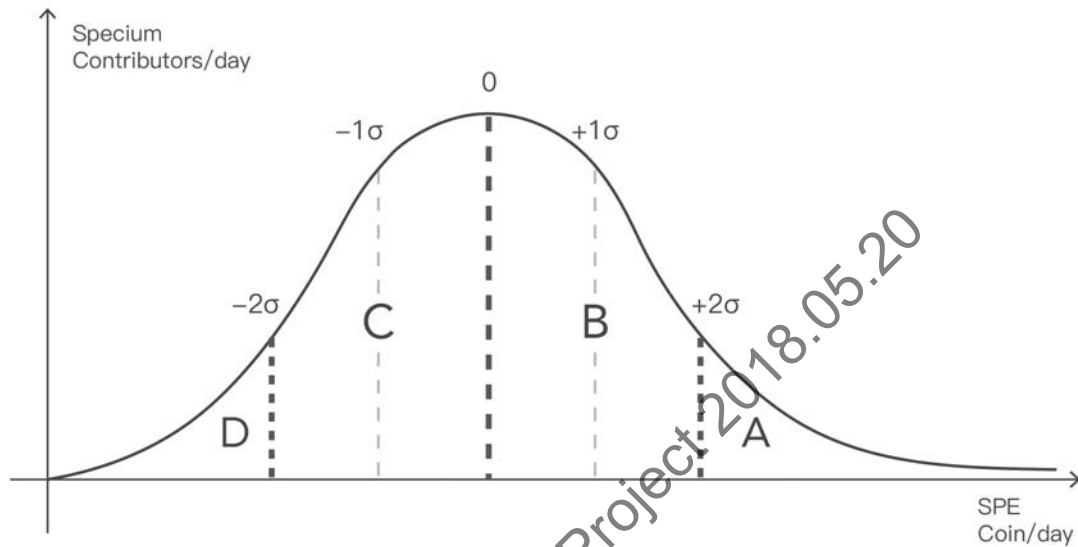


Image 9. Streaming data contributors distribution

### (3) The calculation of DSP standard deviation

We know that DSP is the number of SPE a Contributor can be rewarded every day.

$\sigma_\mu$  is the standard deviation(26) of DSP, and the calculation formula is as follows:

$$\sigma_\mu = \sqrt{\frac{1}{n} \sum_{i=1}^N (DSP_i - \mu)^2}$$

In this equation,  $\mu = \text{DSP}$ ,  $\mu$  is the mean of DSP, and is also the only minimum value of the  $\sigma_\mu$  sequence.

From the perspective of geometry, standard deviation can be understood as a function of the distance from a point in n-dimensional space to a straight line. To give a simple example, there are three values,  $DSP_1, DSP_2, DSP_3$ . They can determine a point P in a three dimensional space.  $P = (DSP_1, DSP_2, DSP_3)$ . Imagine there is a line L that passes through the origin:  $L = (r, r, r): r \in R$ . If the three values are equal, then P is one point on line L, and the distance from P to L is 0, and the standard deviation is also 0. If the three values are not equal, then we do a vertical line PR perpendicular to L, PR and L meets at point R, and the coordinates of R equals to the mean of the three values:  $R = (\text{DSP}, \text{DSP}, \text{DSP})$ .

Through calculations, we can see that the distance between P and R (which is the distance from point P to L) is  $\sigma\sqrt{3}$ . In a n-dimentional space, this law still applies, we only need to replace 3 with n.

### ( 4 ) Algorithm for Daily supply of SPE

We define the standard deviation between  $(+2\sigma, +\infty)$  as Group A Contributors, who can divide 50% of the SPE distributed on that day, which is

$$100,000 \times 50\% = 50,000 \text{ tokens.}$$

The standard deviation between  $(-2\sigma, +2\sigma)$ , who are Group B and C Contributors, can divide 40% of the SPE distributed on that day, which is

$$100,000 \times 40\% = 40,000 \text{ tokens.}$$

The standard deviation below  $-2\sigma$  are Group D Contributors, and can divide 10% of the SPE distributed on that day, which is

$$100,000 \times 10\% = 10,000 \text{ tokens.}$$

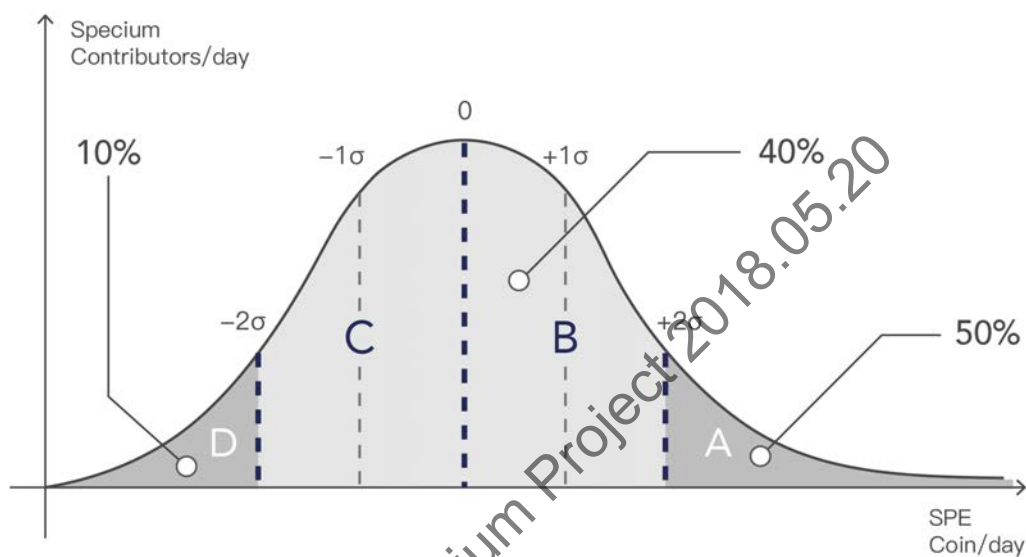


Image 10. Daily supply of SPE

### 4.5.3 Mining and Mining Difficulty

In the Specium ecosystem, the process of Contributors providing streaming data and being rewarded by SPE following PoSD is called mining.

Different from the standard approach of combining computing power as the mining pool, the “mining pool” in Specium is the streaming data from all devices from the members (e.g. mobile phones and other devices in the IoT).

We define that: when mining the first 30% of SPE, there is no private streaming data pool. All Contributors need to contribute streaming data to the public streaming data pool. Only after the first 30% of SPE are all mined will the private streaming data pool appear.

In the private streaming data pool, the streaming data is collected by private parties, but still traded with SPE. Therefore, in the mobile streaming data methodology, in order to make sure that the early stage Contributors and followers can continue to contribute to the development of Specium,  $k$  will decrease by year while  $y$  increases by year. That is to say, it will become increasingly difficult and expensive to mine with the private streaming data pool.

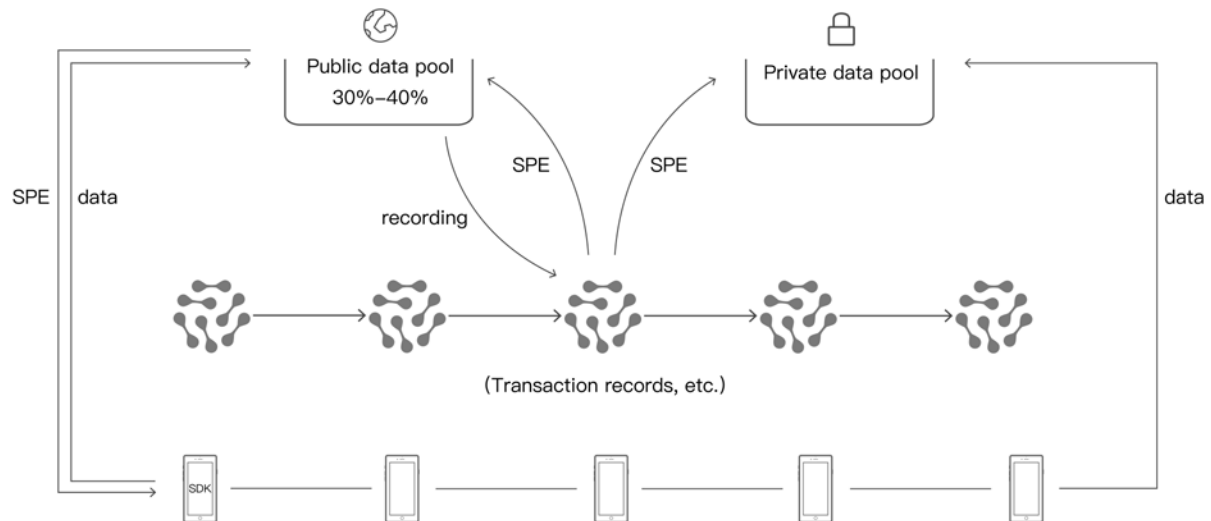


Image 11. SPE mining

## 4.6 Specium's Structural design

We will divide Specium into two levels, the Specium and the SAAS model (Software as a service). Specium is based on blockchain technology, and interactive with Contributors directly through smart contracts. The mobile devices of Contributors form the infrastructure, laying a solid foundation as well as serving as the fundamental source of Specium. Through the encrypting technologies on the chain, we will connect the streaming data uploaded by Contributors with PoSD. This will ensure that we can provide the SAAS model with different types of data while maintaining data security.

The SAAS model level provides a comprehensive application. Inside the Specium ecosystem, we can obtain real time streaming data from the interaction between SPE and Contributors. Outside of the Specium, SAAS can connect with individual or enterprise users, and provide different types of products. If an outside user requests to obtain non-real time streaming data, or request to archive data, they can also submit these inquiries. Our team consists of cloud computing experts, who specializes in using cloud technologies to solve data storage issues. At the beginning of the project, the data will be stored through AWS cloud services. When the blockchain storage technologies are more developed and mature, we will switch to those services such as Storj.

The SAAS level provides a list of comprehensive decentralized applications, aiming at both 2C and 2B users, meeting their distinct data needs in various scenarios.

Specium will also create a complete SAAS service for developers, enabling them to access data on Specium easily in their own software.

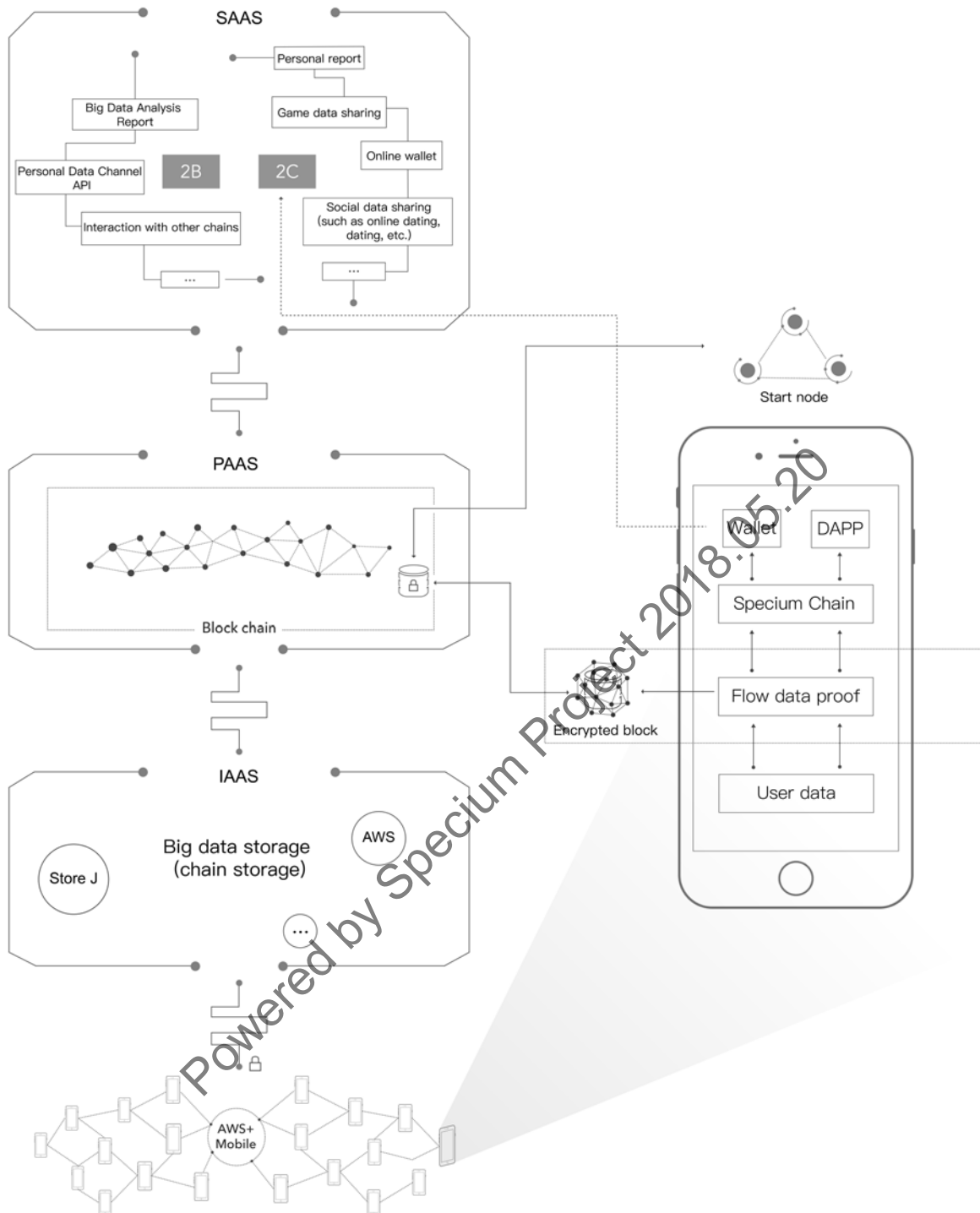


Image 12. Specium structural design

## 5.0 Specium's Development Plan

### 5.1 Development of Specium's Main Chain

### 5.2 Accessing Exchange by SPE



## 5.3 Development of SPE's customer software (APP)

### 5.4 To Customer (2C)

Specium provides a channel for mobile data to consumers. For example, for 2C users: it allows you to better understanding of your personal trails while you are contributing streaming geo data. Imagine that you are on a tight schedule and has to run 5 errands throughout the city, by connecting to Specium and contributing your location data, you could analyze the best route to avoid traffic jams, lines in stores, and come up with the best way to finish all tasks in time. It is like having the best personal concierge, without worrying about data leaking or other security problems.

Also, another use case is that for individual researchers, Specium gives them the possibility to obtain large amounts of mobile data in real time. For individual research projects, the old problem, that it is difficult to obtain or collect meaningful data, has been solved.

Specium starts from mobile phone then divert to other mobile device, leading to ultimately linking with IoT. Consequently, Specium will become a part of daily life, making changes on people's norms.

### 5.5 To Business (2B)

- **Geo-Targeting Advertising**

Geo targeting is the method of determining the geolocation of a user and delivering different content to that user based on their location. This includes country, region/state, city, metro code/zip code, organization, IP address, ISP or other criteria. A common usage of geo targeting is found in online advertising, which is widely used by Facebook, Google, major video streaming sites, and other large companies, who purchases geo data mainly from third party data collecting companies. In these circumstances, Specium would be a better choice than any other third party geo data providers, as we can provide real time streaming data contributed by our large user base. That is to say, our geo data is the most accurate, and also possibly the largest in volume. By cutting out the third party that trades data as a middle man, the companies which want to use geo-targeting advertising to improve their business can also save money, since they will be trading directly with the SAAS layer of Specium. This not only cut down on the prices, but also since Specium utilizes blockchain technology, the data they are purchasing are the most accurate and secure.

- **Machine Learning**

Currently, machine learning is one of the hottest areas. One of the major problems faced by machine learning is how to obtain the data and use it train machines. This can be divided into

data quantity, data acquisition speed, data type, and data quality. The data service provided by Specium can perfectly solve these four problems. With the large amount of instant and high-quality mobile data generated by the data contributors, products can be developed to suit for machine learning for enterprises. Our project can allow us to use the mobile data to tailor make for different machine learning algorithms and models.

- **Health Care Industry**

We believe that insights can be realized by using mobile streaming data. For example, streaming data + medical care as a smart medical system.

For insurance companies, geographical information and health data generated by mobile devices can also allow them to evaluate customers to provide better services precisely.

Although many existing projects already provide data for medical and insurance companies, they are not able to provide accurate, instant, and large in volume mobile streaming data. In the leading report of the blockchain industry, McKinsey expressed optimism about the development combining blockchain technology with the insurance industry. Therefore, we are very confident with the application of Specium to cater for health and medical industry.

- **Equipment maintenance and operation analysis**

Application, server and business process logs, call detail records and sensor data are the main examples of machine data. Internet clickstream data and website activity logs also involving machine data. By combining machine data with other enterprise data to analyze, this can provide new insights and ideas for business activities and operations. For example, some large industrial manufacturers are analyzing machine data for field device performance and historical performance data to better understand service and try to predict device maintenance issues before a machine failure occurs.

- **Natural disaster monitoring and warning**

In the future with various high-tech mobile devices, we can see many examples of applications such as mobile devices for monitoring oil and gas pipeline settings, natural disaster warning systems based on the data from ocean sensors, data acquisition prediction systems from satellites and weather stations to help predicting weather in geographic areas and data obtained from HVAC And elevator to improve the efficiency of building energy management systems. As emerging machine learning applications begin to mature, many other applications are definitely coming up. It can be seen that these scenarios using mobile streaming data and machine data will bring tremendous benefits to daily life to solve problems and reduce costs.

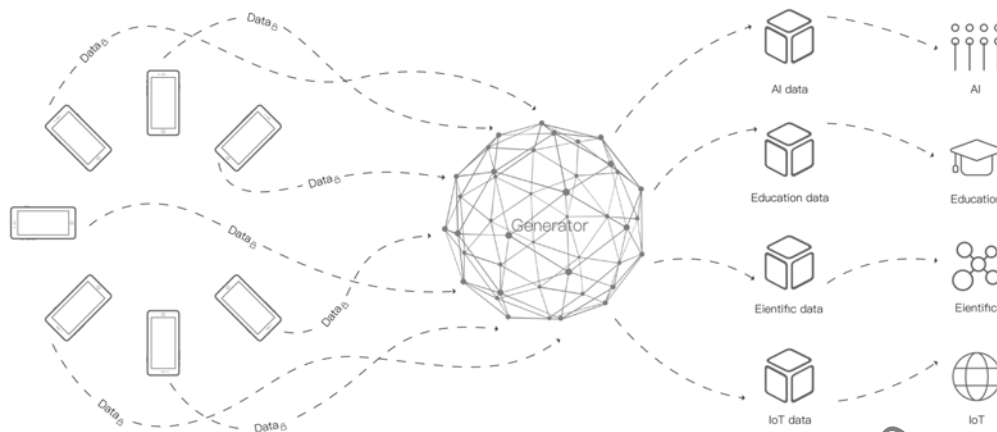


Image 13. 2B applications of Specium

## 5.6 SDK Development

Targeting some open source software developers, SPE can be mined by SDK open source by embedding their own open source software with Specium to support Specium's ecology.

## 6.0 Sustainable Market Development

The Specium's project team will work hard to create a new ecosystem of mobile devices and IoT and promote applications combining mobile data, IoT and blockchain technology.

### 6.1 Development of Second Tier Chain

Based on the main chain of Specium, we will open the secondary chain for other IoT devices such as smart refrigerator chain, smart car chain. To enhance the ecological diversity of Specium, we can ultimately create a comprehensive IoT mobile blockchain system with extensive coverage.

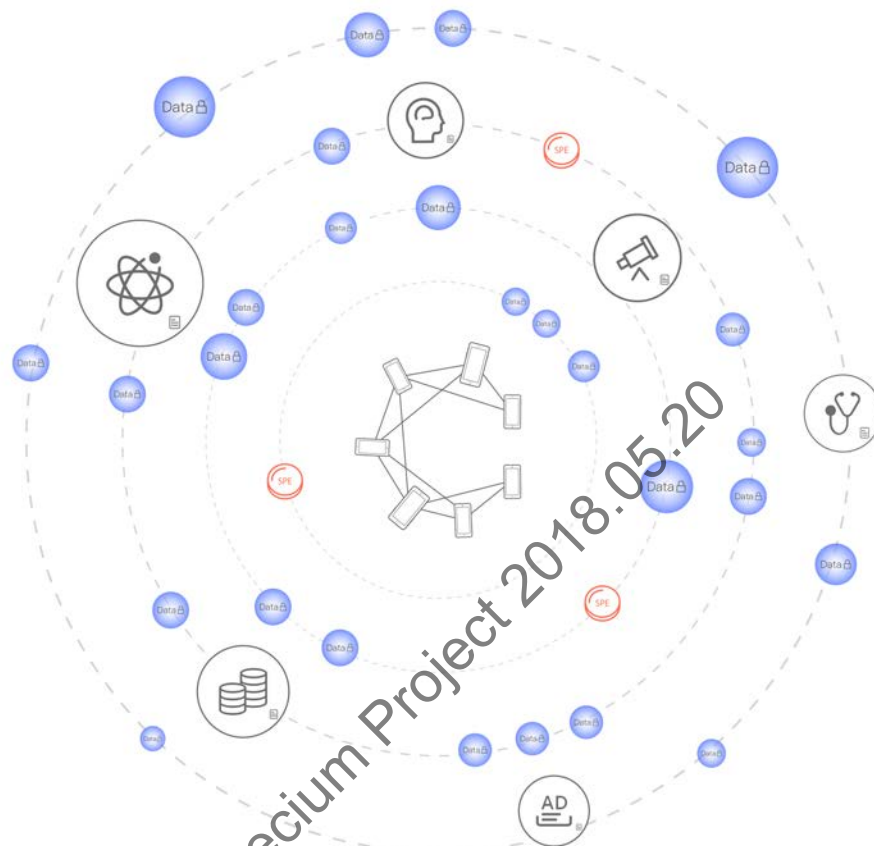


Image 14. Development of second tier chain and ecosystem in the future

## 6.2 Establishing Streaming Data Resource Platform and Cross-chain Services

With the increasing number of users, the expansion of community and the development of the ecosystem, a data resource platform will be established at the right time to meet the needs of different individuals and enterprises by blockchain technology.

We believe that Specium can link different kinds of data and provide the possibility of cross-chaining. For the future development, Specium will cooperate with other chains to create more different types of cross-chain services. For example, we will work with Ethernet chain to facilitate the performance of mobile streaming data on the mobile devices to provide a deeper industry analysis.

## 6.3 Global Penetration

In addition to the mentioned development plans above, we will also develop the commercial layout of Specium on top of the Japan's perceived market. We will radiate to other Eastern Asian regions such as China, Hong Kong, Taiwan, and South Korea. For markets outside Eastern Asia, we will introduce different Specium's services based on the differences in regional culture, infrastructure, and policies.

Note: The above market layout may change with market demand, environment and other factors.

## 7.0 Allocation of SPE

Total SPE Supply: 87million tokens

Proportion	Number of Token	% Split	Purpose
Non- issued 50%	50,000,000	40%	Release according to PoSD to Contributors
		10%	Early-bird rebates
Issued 50%	50,000,000	10%	For the fund of Specium such as community building, bonus, and international market promotion
		30%	Open to venture capital and use for early development including talent resources and hardware acquisition
		10%	Start-up team

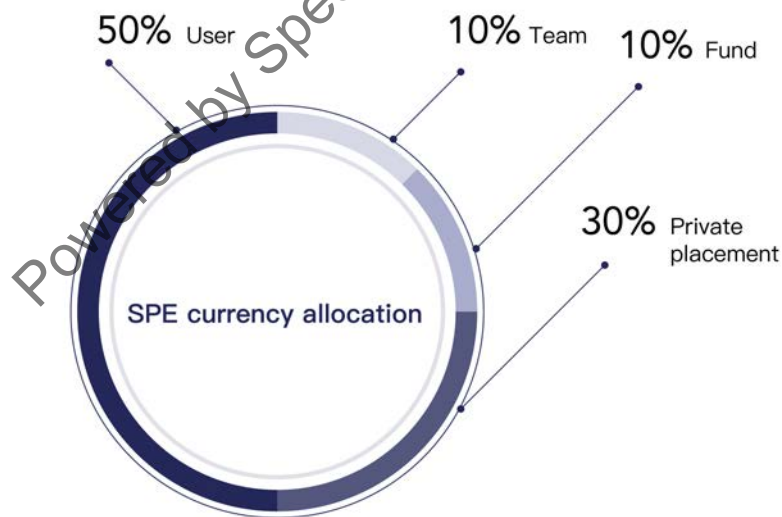


Image 15. SPE allocation

Note: The start-up team tokens will be locked for 12 months and cannot be traded. It will be released linearly within two years after the lock is lifted.

There are three ways to obtain SPE:

- Download Specium App, contribute your own streaming data, and rewarded according to PoSD
- Trade through third party exchange markets

- 2B, connect to third party mining pool, rewarded from contributing streaming data

## 8.0 Team

Our team consists of expertise from China, Hong Kong, and Japan, and has a mature tech team and marketing team.

### Founding Team



**Laura Cheng**

**Co-Founder, CEO**

Master Degree at Harvard  
Blockchain Entrepreneur  
International Education Maniac  
Public Speaker



**Yoshiyuki Ueda**

**Co-Founder, COO**

Enterprise IT & martech business  
professional in Tokyo. former  
business director at CI&T Asia-  
Pacific & Japan



**Becky Zhang**

**Co-Founder, CMO**

AWS Community Hero  
Speaker of AWS re:Invent 2016  
Community Leader of  
Shanghai AWS User Group &  
China Drupal User Group

Powered by Specium Project 2018.05.20

## Core Team



**Joseph Ye**  
Product Director



**Leon Wang**  
Operation Director



**Emily Xue**  
Global Affairs & Financial Advisor



**Steven Shi**  
Blockchain Developer



**Town Chen**  
Senior Full Stack Developer

Powered by Specium Project 2018.05.29

## Advisors



**Keith Yau**

**Tech Advisor**

CEO of EUBChain

Experienced Blockchain Entrepreneur

Famous Cloud Expert

AWS Community Hero(China Region)



**Jerenus Zheng**

**Tech Advisor**

Chief Risk Management Engineer

@EUBChain

Former VP/CRO of an 1-Billion-Transaction  
Fintech Company

Team Leader of Digital Communication

Depart Of NYUSH

Scholarship Winner of DrupalCon USA 2017



**Aaron Palileo**

**Business Advisor**

Co-Founder of Bootleg Innovation Design

An associate guru at

the Ateneo Graduate School of Business



**Arnab Gupta**

**Business Advisor**

Exec at Singapore mobile startup

10+ years in tech, product

& program management

Worked at GE, HP/Agilent



**Kazuki Ishihara**

**Legal Advisor**

Attorney at Law

CEO of Seven Rich Law Office

Former Yahoo! Japan in-house lawyer



## 9.0 Disclaimer and Risk analysis

### Disclaimer

This document is only for conveying information and does not constitute an opinion on transaction of project shares or securities. Any proposal or request for offer to such effect will be made under credible terms in accordance with the permission of applicable security laws and other related laws. The above information or analysis does not constitute any investment decision or concrete advice.

This document does not constitute any investment proposal, investment intent or investment solicitation on securities. This document does not constitute and shall not be construed as a transaction offer or an invitation to transact any form of securities, neither is it a contract or promise in any form.

All the examples of returns and profits in this document are for demonstration purpose only or represent the industrial average, and do not constitute a guarantee for the result of user's participation.

Specium clearly states that users with relevant intent shall have clear knowledge of risks on BC platform. By making investment, investors confirm their knowledge and acceptance of the project risks, and are willing to personally take responsibility for all corresponding results or consequences.

Specium clearly states that it will not take responsibility for any direct or indirect losses arising from the participation in Specium project, including: (i) reliability of all information provided in this document; (ii) any resulting mistake, negligence, or information inaccuracy; (iii) or any subsequent behavior.

SPE is a digital Token used, besides other scenarios, on Specium platform. Specium is not an investment target and we cannot guarantee the value addition of Specium, whose value may decrease under certain conditions. Due to unpredictable factors, targets listed in this White Paper may change. While our team will make its best efforts to realize all targets stated in this White Paper, all individuals and groups purchasing SPE shall shoulder the risks on their own.

Specium does not represent a right of ownership or control. Controlling SPE does not mean ownership of Specium or Specium applications. Specium does not confer any right on any individual to exercise participation in, control over or decision-making on Specium and Specium applications.

### Risk analysis

As a new model of investment, investment in digital asset involves various risks. Potential investors shall discreetly assess the investment risks and their own risk tolerance.

#### ✦ Risks on Token Sales Market

The environment of Token sales market is closely associated with the situation of the whole digital currency market. In case of sluggish overall market situation or existence of other uncontrollable factors, the price of Token may be underestimated over a long period of time, in spite of their own good prospect.

#### ✦ Supervision Risks

Since Blockchain is still in the early stage of development, there are still no laws and regulation across the world, including in China, that stipulate requirements for precondition, transaction, information disclosure, and locking, etc. in the process of ICO. Also it's still unclear as to how the current policies will be implemented. All these factors may bring uncertainty to project investment and liquidity. Blockchain technology has become the main target of supervision in major countries of the world. If there is any intervention or exertion of influence by supervising authorities, Specium application or SPE may be affected. For example, if there is legal limitation on the use and sale of

Token, SPE may suffer restriction and obstruction, or the development of Specium application and SPE may be directly terminated.

#### ✦ Competition Risks

With advancement of information technology and mobile Internet, digital assets with “Bitcoin” as a representative are gradually prospering and various decentralized applications are continuously emerging, heating up industrial competition. With the steady appearance and expansion of other application platforms, the community will face constant operation pressure and certain risks from market competition.

#### ✦ Risk of Talent Loss

Specium has gathered a technical team and expert consultants with leading advantage and profound experiences in their respective professional sectors, including professionals with lasting engagement in the Blockchain industry and core team with rich experience in development and operation of Internet product. The core competitiveness of Specium in the industry lies in its stable core team and consultant resources, the loss of which may affect stable platform operation or its future development.

#### ✦ Risk of Development Failure Due to Fund Shortage

In case of dropping price of Token raised by the founding team or prolonged development time, the team may face a shortage of development fund and possibly even suffer subsequent serious shortage of fund for all activities. In such case, there will be a risk that the intended targets will not be realized.

#### ✦ Risk of Private Key Loss

After the digital wallet address of SPE is extracted by the buyer, the only means to operate content contained in the address is by his/her associated secret key (private key or wallet passcode). Users are personally responsible for protecting the associated secret keys which will be used to sign transactions and prove their asset ownership. Users understand and accept that if his/her private key document or passcode are respectively lost or stolen, his/her SPE associated with his/her user account (address) or passcode will be unrecoverable and permanently lost. The best method for secure storage of log-in document is to store the secret key separately at one or several places and avoid using a shared computer for this purpose.

#### ✦ Risk of Hacking or Theft

There is a possibility that hackers, other entities or nations may attempt to interrupt Specium application or SPE function with any methods, including but not limited to DoS attack, Sybil attack, guerrilla-style attack, malware attack and homogeneity attack, etc.

#### ✦ Risk of Absence of Loss Insurance

Unlike bank account or accounts with other financial institutions, Specium account or related Blockchain network are generally without any insurance guarantee. For losses under any conditions, no public individual or public entity will provide insurance.

#### ✦ Risk of Core Protocols

Currently Specium platform is developed on the basis of Ethereum. In case of any defect, unexpected malfunction or attack to Ethereum, SPE or Specium platform may suffer a stop or loss of function in a manner hard to expect.

#### ✦ System Risk

There are risks related to neglected critical defects in open source software or large-scale failure of global network infrastructure. Though some of the risks may drop over time due to bug fixes and breakthroughs in computation bottleneck, other risks are still unpredictable, such as political factors or natural disasters that may interrupt part of the Internet or the global Internet as a whole.

#### ✦ Risks Due to Bugs or Cryptography Development

Rapid cryptography development and advancement of science and technology such as quantum computer may bring the risk of cracking to Specium platform, leading to possible SPE loss.

#### ✦ Risks of Insufficient Attention

There is a possibility that Specium application may fail to be used by a large number of individuals or entities. This means that the public do not have enough interest in developing and improving the relevant distributed applications. Such lack of interest may bring negative impact to SPE and Specium application.

#### ✦ Risk of Poor Acceptance or User Shortage

First of all SPE shall not be deemed as an investment target. Even if SPE may have some value after some time, such value can be very small if Specium is not accepted by the market and is therefore short of users. There is a possibility that due to any possible reasons, including but not limited to failure in business relations or marketing strategy, Specium platform and all the future marketing efforts supported with the raised fund may fail to achieve success. In such case, there will be few or no follow-up supporters for the platform. Of course, this will be very unfavorable to this project.

#### ✦ Risk of Application Defect

Specium platform may fail to provide normal service due to defects caused by known or unknown reasons (e.g. large-scale Node crash), and may even suffer loss of user SPE in a serious situation.

#### ✦ Risk of Application or Product Failing to Reach Their Expectation or Buyer's Expectation

Specium application is still under development stage, and major changes may be made before the launch of official version. The expectation or imagination by SPE itself or by buyers for the function or manner (including behaviors of participants) of Specium application or SPE may not be satisfied. Such situation may be caused by any analysis mistake or change of a single design, etc.

#### ✦ Policy Risk

Policy risk refers to the major changes in the government's securities market policies, or the introduction of important measures and regulations, such as GDPR policy, resulting in changes in the company's profits and investment returns, and thus the risks to investors. And the value of SPE will change with the fluctuation of the market.

#### ✦ Other Unpredictable Risks

Token which is based on cryptography is a fully new technology that has not been tested. In addition to risks already described in this White Paper, there are other risks that are not yet mentioned or not anticipated by the founding team. Also, other risks may come suddenly, or several risks mentioned above may occur in combination.

## 10.0 Reference

- (1) Bitcoin: A Point-to-Point Electronic Cash System Nakamoto Satoshi:

<https://bitcoin.org/bitcoin.pdf>

- (2) 2018 will change the world's four major technology trends. (n.d.). Retrieved March 25, 2018,

from [http://www.fortunechina.com/business/c/2018-01/11/content\\_300395.htm?id=mail](http://www.fortunechina.com/business/c/2018-01/11/content_300395.htm?id=mail)

- (3) The world's most valuable resource is no longer oil, but data. (2017, May 06). Retrieved March 25, 2018, from <https://www.economist.com/news/leaders/21721656-data-economy-demands-new-approach-antitrust-rules-worlds-most-valuable-resource>
- (4) Splunk makes machine data accessible, usable and valuable to everyone. (n.d.). Retrieved March 25, 2018, from [https://www.splunk.com/en\\_us/resources/machine-data.html](https://www.splunk.com/en_us/resources/machine-data.html)
- (5) Mobile phone users in Japan 2013-2020 | Statistics. Retrieved March 25, 2018, from <https://www.statista.com/statistics/274672/forecast-of-mobile-phone-users-in-japan/>
- (6) In China, Time Spent on Mobile Internet Continues to Grow. (2017, April 20). Retrieved March 25, 2018, from <https://www.emarketer.com/Article/China-Time-Spent-on-Mobile-Internet-Continues-Grow/1015693>
- (7) «The NIST Definition of Cloud Computing» by Peter Mell & Timothy: <http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf>, <https://www.nist.gov/>
- (8) IoT. (2018, March 16). Retrieved March 25, 2018, from [https://en.wikipedia.org/wiki/Internet\\_of\\_things](https://en.wikipedia.org/wiki/Internet_of_things)
- (9) Morgan, J. (2017, April 20). A Simple Explanation Of 'The Internet Of Things'. Retrieved March 25, 2018, from <https://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#4e6a14951d09>
- (10) Luigi Atzori, Antonio Iera, Giacomo Morabito. The Internet of Things: A survey. Computer Networks. 2010.
- (11) Libelium World. (n.d.). Retrieved March 25, 2018, from <http://www.libelium.com/libelium-smart-world-infographic-smart-cities-internet-of-things/>
- (12) «ETHEREUM: A SECURE DECENTRALISED GENERALISED TRANSACTION LEDGER » by GAVIN WOOD <http://yellowpaper.io>
- (13) Japan: Mobile phone internet user penetration 2022 | Statistic. Retrieved March 25, 2018, from <https://www.statista.com/statistics/309013/japan-mobile-phone-internet-user-penetration/>
- (14) Internet of Things units installed base by category 2014-2020 | Statistic. Retrieved March 25, 2018, from <https://www.statista.com/statistics/370350/internet-of-things-installed-base-by-category/>
- (15) Sizing Up the Internet of Things. (n.d.). Retrieved March 25, 2018, from <https://www.comptia.org/resources/sizing-up-the-internet-of-things>
- (16) Ericsson sees global smartphone subscriptions almost doubling by 2022. (2016, November 15). Retrieved March 25, 2018, from <https://www.reuters.com/article/us-smartphone->

[subscriptions/ericsson-sees-global-smartphone-subscriptions-almost-doubling-by-2022-idUSKBN13A0SS](#)

- (17) 2016 U.S. Cross-Platform Future in Focus. (n.d.). Retrieved March 25, 2018, from <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2016/2016-US-Cross-Platform-Future-in-Focus>
- (18) Japan: Average daily mobile device usage parents and teens 2017 | Statista. Retrieved March 25, 2018, from <https://www.statista.com/statistics/758124/japan-average-daily-mobile-device-use-parent-teens/>
- (19) Gordon, K. (n.d.). Topic: Mobile internet usage worldwide. Retrieved March 25, 2018, from <https://www.statista.com/topics/779/mobile-internet/>
- (20) The Business of Data Brokers [Infographic]. (2015, February 19). Retrieved March 25, 2018, from <https://onlinemba.unc.edu/blog/data-brokers-infographic/>
- (21) 79.0% of respondents felt personal information was leaked Retrieved March 25, 2018, from [http://zqb.cyol.com/html/2017-12/05/nw.D110000zgqnb\\_20171205\\_1-07.htm](http://zqb.cyol.com/html/2017-12/05/nw.D110000zgqnb_20171205_1-07.htm)
- (22) The problem of leakage of personal information of Chinese netizens is serious.. (n.d.). Retrieved March 25, 2018, from [http://www.xinhuanet.com/yuqing/2016-05/17/c\\_128989867.htm](http://www.xinhuanet.com/yuqing/2016-05/17/c_128989867.htm)
- (23) Glikman, P., & Gladys, N. (2015, October 13). What's The Value Of Your Data? Retrieved March 25, 2018, from <https://techcrunch.com/2015/10/13/whats-the-value-of-your-data/>
- (24) Burgess, M. (2018, February 16). What is the Internet of Things? WIRED explains. Retrieved March 25, 2018, from <http://www.wired.co.uk/article/internet-of-things-what-is-explained-iot>
- (25) IoT Security Market Report 2017-2022. (n.d.). Retrieved March 25, 2018, from <https://iot-analytics.com/product/iot-security-market-report-2017-22/>
- (26) Standard Deviation [https://en.wikipedia.org/wiki/Standard\\_deviation](https://en.wikipedia.org/wiki/Standard_deviation)
-