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mikuga Japan Co., Ltd.

E-mail: contact@mikuga.co.jp

Abstract

Based on the democratic idea originally possessed by blockchain technology, we created a human application in which communication of completely new usage and settlement system are fused.

We have developed a solution platform called the Kyvalion to aim for a more flexible and happier integration of individuals and communities.

The keyword of the new ideal society with the Kyvalion is "balanced reciprocity."

It will contribute to a healthy and democratic development of a collective society by quantitatively visualizing the basic economic concept of "exchange," "reciprocity," and "distribution" between people or people and communities, introducing a completely new token economy were using blockchains.

As for blockchain technology, the next-generation rootstock is adopted. By fusing off-chains into on-chains and having them freely move between each other, the platform optimized for tokens used for reciprocity is made available.

Our token economy ware will spontaneously generate a good reciprocal form, revitalizing the current inflexible communications in communities such as companies. As a result, the truly democratic utilization of human resources and distribution of information will be possible in all groups and organizations, creating a society in which individuals may be able to realize the pleasure and happiness in their unique presence and satisfaction at work.

Furthermore, it can also direct excessively unbalanced financial capitalism in the proper direction.

Project Name - 「The Kyvalion™」

The Kyvalion is a truth and principle of the universe revealed by Hermes Trismegistus said to have been lived during the ancient Atlantis era. Known as a wise man, a god, and the founder of alchemy, astrology, and mind reading, Hermes often appears in the Old Testament as Melchizedek, the teacher of Abraham, the founder of Judaism, Christianity, and Islam.

We named our project, the Kyvalion, as we thought the blockchain technology, a significant intelligence of mankind that was attained in the 21st century, would lead to the happiness and growth of human beings at higher dimensions as shown by the Kyvalion.

1. Introduction

The possibilities of blockchain technology are currently being explored around the world.

Focusing on genuine democracy, a major characteristic of the blockchain's technological philosophy, we planned to utilize this as a medium for communication tools that can activate all communities to the fullest extent.

Applicable communities include corporate organizations, regional communities, NPOs, short and long-term event projects, activities of all commercial and non-profit organizations such as committees. By matching social networks between community members and various features using blockchain with token transmission/reception function of on-chain and off-chain, reciprocity for exchanges in work versus remuneration, information versus information, information versus remuneration, information versus products (see 6.1) will be established. We are convinced that essential democratic collaboration will be achieved, where individual motivation and community objectives are matched at a high level.

This is the world where decisions will be automatically adjusted by placing priority on the enthusiastic individual motivation for action rather than seniority by a centralized authoritarian management.

The blockchains whose judgment is left to individuals in a distributed network are suitable for structuring a true democratic system. Through these circumstances, we have completed the token economy ware, which is a platform for revitalizing all community organizations.

2. The Foundation of Developing Blockchain

The blockchains on this system adopts rootstock, which is expected to be highly utilized in the next generation. By integrating off-chains in on-chains and having them freely move between each other, the tokens will be effectively and freely utilized.

As we know, rootstock is a next-generation blockchain system gathering attention with the smart contract feature introduced in Etherium and can realize the transparency of the Bitcoin blockchain at the same time.

(See the rootstock white paper : https://www.rsk.co/)

The platform which rootstock is based on can lock or unlock a part of the block by adopting 2Waypeg. This enables on-chains (engraved in the public blockchain) and off-chains (interactions between users; not engraved in the public blockchains) moving from/to each other. Therefore you can use them according to your needs. Since it can be used as a part of the remuneration by transferring privately generated tokens to the public, it is possible to create a good reciprocal form for the community and individual.

Rootstock has provided test net since April XX, 2017; however, mikuga Japan has been preparing the implementation of this system after obtaining permission to conduct test operations about a year ago.

3. Original Token "KTC™"

The token used for the Kyvalion™ service operation is called "KTC (Kyvalion™ Token Coin)" and issued with the following specifications.

Item	Description
Issuance Amount	5,000,000,000 tokens (determined at contract deployment)
Distribution Standard	ERC 20 Token Standard
The Minimum Transaction Unit	1 token. Values with decimal fractions are not transferable. However, each wallet defines decimal positions of one token on display. *1
Transaction Approval Time	Approximately 15 seconds
Transaction Fee	Approximately 1 to 2 yen
Inflation/Deflation Support	Revaluation (denomination rounded up) is available to a user only one time.
Manageable items available to a user	Updating or renewing of contracts, executing redenomination, adding or deleting the users on the list, setting up the maintenance system, and transmitting SBTC/implementation tokens under each contract. Confiscating and freezing token assets owned by users is not available.
Token and Exchange	Since the system is supported by 'approve/transferFrom,' which allows transferring our original tokens from other contracts, exchanges will take place through a third party.

Functions available during system failures	During system failures, all the functions, excluding the reference mode or other related modes for the maintenance, can be turned off or restarted. Self-inspection to find inconsistency of the data is presumably operated in off-chain. Contracts solely implement the following two tasks, either self-inspection or recording the transaction log data.

*1 Each wallet service has slightly different display formats. There is a time when the minimum transaction denomination of one token may appear as 0.01 or 0.001 on balance sheet reported on the wallet. Each user has an arbitrary right to determine numeric notation. However, please note that there are cases where the system inputs a default value in the placeholder by referring to the contract data.

4. Denomination

The minimum denomination of this token is one coin.

A token denomination at the time of revaluation can be modified to take a measure for a rise in transmittable value on one coin, which is the minimum tradable denomination.

Since Mapping Protocol, used to control the balance system, operates by the sequence element of 10^23 or higher, it does not allow the entire data scanning, and what is more, any modification to the storage area is possible at a transmission Tx. Though all the users' balance data should be comprehensively updated and stored in case of revaluation, the system sequentially updates the balance by the transaction made by the users afterward.

Even when there is no transaction after redenomination, both the previous and the new balance management data is stored at all times so that the users can accurately refer to them at any moment.

In case there is no referable balance information available in the storage area after the redenomination, the value used for calculation at the time of revaluation will return after examining the previous data storage area.

On the other hand, the actual data will be processed and transferred according to the time stamp information, when a transmission Tx is transmitted either as a source or as a destination.

Redenomination is a process where a user can take countermeasures against an unexpected denomination rise or fall.

Revaluation is a one-time opportunity available for a user.

Once the revaluation is in effect, a transmission is regarded as an EVM or minor program specification while processed sequentially, and all the data normally sent before or after the revaluation, and sent to execute it co-exists in the same block, which will create confusions and prevent the system from running

self-inspection. At the time of the redenomination, the system automatically enters the maintenance mode while the functions are shut down to protect the system.

• Redenomination execution flow

1. Prior notifications sent to the users.

2. Any token contract suspended during the maintenance mode.
(Any transmission process during this mode will be unavailable due to errors.)

3. Wait for 'confirmation time' (12 block elapsed (#1)) until the #2 process is fully confirmed.

4. Establish your revaluation denomination.
(The denomination is modifiable any number of times as long as before the #4 execution.)

5. Implement the revaluation.
(Once implemented, the revaluation value cannot be modified or canceled.)

6. Wait for 'confirmation time' (12 block elapsed (#1)) until the #5 process is fully confirmed.

7. The maintenance mode canceled.

5. Side chain:About 2way-peg

Currently, cryptocurrencies such as Bitcoin are frequently utilized either as a means of speculative investment or as a simple payment method. However, our blockchain, as of a core technology among cryptocurrencies, is designed with highly developed technology for the purpose of a true democratic usage. We have researched and developed to seek for its alternative usages other than payment methods by docking the system with the Ethereum's smart contract, while still maintaining its high-level security.

Bitcoin blockchain has been known to have difficulty introducing any new functions to its system. Conventionally, it was possible to send data only in one direction (one-way peg) from the main chain. However, now the users can send data from the side chain to the main chain. The side chain is the one to expand functions of blockchains including Bitcoin. Equipped with the side chain, users can also add smart contract functions like Ethereum to Bitcoin. Such improvements have made it possible to reduce transmission handling fees and shorten block approval time. Since these side chains can be designed freely, their flexibility should allow users to extract full potentials of Bitcoin.

On the other hand, 2way-peg is used as a bidirectional peg to operate blockchains and side chains. As a result, users can transfer Bitcoin to side chains, and do vice versa. 2way-peg enables both the main chain and the side chain currencies to go back and forth. This system allows users to close deals swiftly and execute smart contract in the side chain by using main chain currencies.

2way-peg has two major advantages.

First, it has resolved the problems typical to Bitcoin and significantly improved such cases as approval time in transactions, and small-amount transactions and transfers (micro payments). We have successfully expanded the potential functionality of Bitcoin such as adding smart contract functions.

Second, it is possible to issue your own cryptocurrency in the side chain. In a similar case, there is a unique currency called XCP from Counterparty. This is a system where once Bitcoins are sent to an unusable Bitcoin address, they receive XCP according to the number of burned Bitcoins. However, through this method, it is impossible to reverse any XCP cryptocurrencies to Bitcoin after the currencies are processed. The side chain system, by way of 2way-peg, makes it possible to rescue and return such cryptocurrencies to where they belong. Furthermore, 2way-peg will continue to solve further problems that Bitcoin faces and drastically improve environments of Altcoin's liquidity.

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6. Objectives and Principles of Development

Keyword: Reciprocity. Token economy. Circulation. Co-creation. Diversity. Networked Organization.

6.1-1 [New Reciprocity to Open up a New Aspect of Capitalism]

Reciprocity is the fact that things are mutually exchanged between people or a system derived from that.

As if to play catch, naturally having "things" move from/to "senders" and "recipients" mutually and symmetrically.

The best examples of reciprocity are labor reimbursed for salary, events such as marriage and funerals, or the mutual celebration of birthdays or anniversaries.

All of these gifts, donations, or money that mutually goes back and forth can be referred to as reciprocity. Naturally, when time and space changes, the sender and recipient shall alternate between each other.

Reciprocity, together with exchange and redistribution, is one of the concepts that represent phenomena occurring in the primitive economy by sociologist and cultural anthropologist, Marcel Mauss and Karl Polanyi. Reciprocity existed before the market economy was established and was the basic economic relationship of human groups which has existed since ancient times.

Reciprocity is a basic system without having to mediate money to maintain the relationship between human groups as well as their economy since goods and the emotions or obligations attached to them circulate.

In other words, "reciprocity" is a fundamental concept that promotes give-and-take in the activities of money or service between groups, to create good interdependent relationships.

When reciprocity works property, people can maintain a good balance of self-esteem and contribution to others, to realize a stable and satisfying mental state. Reciprocity can be a lubricant to increase the degree of happiness in the society as a whole.

However, appropriate circumstances of reciprocity are becoming hindered in the financial world today that has developed to too high a level .

In the capitalist economy led by developed countries, the principle of competition is given the first priority, and as a result, numerical targets to win the competition is prioritized without waiting for the individuals' voluntary intention. For example, in corporate activities, the instructions and orders are given to employees from management, and in many cases they will have to follow such instructions or orders, making the freedom of intention and dignity of each worker remarkably unstable.

The excessive competition principle leads to a one-sided pursuit in the expansion of figures such as sales and profits, bringing an expansion of disparity in the economic society. The outcome is that the social structure consists of a very few wealthy people who possess most of the world's wealth, and a majority of the population is vulnerable and exposed to relative poverty.

Expansion and pursuit profit are a never-ending game, and the rules of such games are always decided by the winner or the one in power. Therefore excessive efficiency and rationalism are required in the working environment, making the workers dissatisfied and with lowered motivation.

It would be sad to waste all the employee's time with inefficient and irrational workflows simply because one employee’s motivation does not improve.

A decline in the motivation of labor puts a stop on the active communication in the company, resulting in a poor collaboration and communication between departments. The internal structure of the company becomes separated, rigid, and weakened. If performance worsens, then of course, compensation does not increase, leaving the employees unhappy.

Such decline in motivation and feeling of insufficiency have become a common problem for companies that have not undergone reforms from traditional market perceptions.

6.1-2 [Token economy - the most convenient form of reciprocity]

We thought the shortest way to solve the problem is to introduce the concept of token economy.

A token economy is an effective method used in the field of psychotherapy and preschool education.

It is used as a way to motivate new actions by giving stickers, stamps, or toy money notes when the target performs a desired behavior.

Methods in the field of psychiatry can also be effective if they replace activities of community work or economic activity of the general public. Whether the target is a child or an adult does not matter in terms of improving motivation.

By using tokens as a substitute for currency within communities such as a company, it is possible to increase the frequency of the desired behavior of the target. In other words, the token economy is the most convenient form of reciprocity.

Hence, the token economy that motivates employees' voluntary actions by the motivation of earning rewards, rather than instructions from the management, makes a healthy reciprocity system which is independent of the overall goal and profit supremacy.

This will drastically increase the motivation of each employee and revitalize the productivity of the organization.

In addition, we predict that it will bring a revolutionary effect which will solve the problem of economic disparities if you look at eliminating dissatisfaction with the company's compensation system in general.

By introducing the token economy ware of the Kyvalion into the workflow, the motivation and satisfaction level towards work will improve in all employees which facilitates advanced communication towards the objective of the entire company.

For instance, the opinion adopted by the company within the application used at the front of the ware will be given appropriate compensation defined in the rule.

Exchange of labor itself or reciprocity will take place in-house so that the imbalance of working hours between departments or individuals is resolved, and the problem of excessive working hours is alleviated.

In addition, if the employee has any special skills, he can provide the know-how in a training program even if s/he is not using such skills for his current work.

These rewards will be paid by the in-house currency circulated in the system. Employees who provide more labor value will be paid a completely different remuneration as compared to the conventional overtime or other allowance.

Of course, this is not an application only available to a single company.

It is a simple yet epoch-making system invention that can be utilized in all sorts of communities and organizations where people are organically involved.

This is the token economy ware, the core of our innovative blockchain solution.

6.2 [Circulation Workflow]

In a community organization such as a company, the success of projects in promotion and the active communication of the community members are critically relevant with each other. However, in reality, each work is often divided and much of the communication is one-sided from top to bottom of the hierarchy which lacks in appropriate feedback.

If you use the human body as an example, it is a state where your brain sends signals to your right hand, but your right hand makes a mistake, and the mistake is not registered by your brain. When the transmission network is divided, such problems in an organization tend to occur in reality. The response of the nerve that connects the brain and each organ that connects this division and issues a command for quick transmission is critical.

If individual organs are declining in function and are dying, we need to perform active nerve transmissions with other organs to improve the function of the body as a whole.

In terms of the company organization, the workflow should not be deemed completed with just one task completed or not, it should always be connected to the next step. The instruction by the supervisor will be executed by the subordinate, and any improvements that need to be made shall be returned to the superior to further improve the operation. The circulation of these workflows improves the quality of work lead to good products. This circulation is of course not limited to the organization within the company but also applicable to communication with customers and vendors. In work communication using token economy ware of the Kyvalion, it connects all the actions of the members in a chain reaction which pushes the business to a higher level of success.

Good communication and circulation of actions in the community are the key to resolving the stagnation of business operation and even inspires people.

6.3 [The End of the Competition Principle - from Competition to Co-creation]

The current capitalism values are raising profit as much as possible while taking advantage of others to take the initiative. Therefore, the employees are constantly put in a competition, where winning is the first principle.

However, a ever-growing market is just an illusion, and it has come to the point where we will need to move away from the idea where the pursuit of profit is the only purpose of a company.

This is because there is no economy that continues to grow endlessly, given that the resources on Earth are limited.

Hence, it is time for companies to find value in a strategy that does not focus only on growth.

It is a way of thinking where rather than competing for a piece the market pie, you are looking at creating a new market together.

This is the form of "co-creation" that the Kyvalion advocates.

It is the idea of creating together, rather than defining a clear winner and loser in the competition.

It affects the internal structure as well as the external value of the company.

In other words, employees who have been viewed as warriors to stay winning in the competition had been stripped of their value when their strength did not lead to victory.

This stripped the employees of their motivation and satisfaction in work.

However, in the concept of "co-creation," since the purpose is not only the pursuit of profit,

it will create a good open environment within the company.

There will be a good exchange of ideas and collaboration among employees, with communication not going only from top to bottom, where new and fresh ideas and methods are created.

6.4 [Diversity]

The Kyvalion's token economy ware that we offer has been useful for the truly effective utilization of human resources which has grown in the recent years.

When promoting a project, regardless of gender, academic background, work experience, or age, accepting diversity such as values and wider opinions will enhance productivity, where labor value and productivity of each employee will increase. Nonetheless, resistance to diversity will be present in companies without such culture. It is worthwhile to communicate using the token economy ware with full democratic function, rather than trying to accomplish this with top-to-bottom management.

In order to become a company that can adapt to society in a period where things are rapidly changing, diversity will be more and more critical as it is crucial to discover capable talent, stimulate innovative ideas, and optimize high response to the various and diverse needs of society.

6.5 [Network and Spherical Structure]

It is to transform the organization of a company from existing hierarchical pyramid structure to networked organization. By taking different opinions regardless of whether they come from superiors or subordinates and redistributing work duties, and by communicating with an equally balanced, flat network, fresh ideas can be adopted, and quick decisions can be made. A good example of such networked organization will be companies such as Google and Apple, and by using a chat app with the Kyvalion's blockchain technology, you can transform your own company structure similar to those groups. The future form of organization is not only flat but also should allow opportunities where an ordinary employee or a newly employed staff imparts their expertise to their superiors. In this context, the structure is not only flat but rather a spherical shape with upper and lower sides reversed.

7. Historical Background that Led to the Development

The economist Adam Smith claimed, "The invisible hand" about the favorable circulation of the economy in his book "The Wealth of Nations" (1776).

It is an assertion that it has the power and action to naturally realize balanced development if the market economy is freely released. If workers pursue higher wages, capitalists higher profits, and landowners higher rent, consequently the most efficient development is realized.

However, there is a prerequisite for his invisible hand to work properly. It is explained 17 years before “The Wealth of Nations.”

was written, in “The Theory of Moral Sentiments.”

According to “The Theory of Moral Sentiments,” humans are born with “propensity to truck, barter, and exchange,” and self-interest can be accomplished by providing things others want. In other words, it is under the assumption that labors are divided within society. Human beings are based on the understanding that they are selfish in one sense, but are animals that "care for others" at the same time. This is what Smith says.

Regardless of how selfish they seem, in human nature, there is some driving force to have an interest in the destiny of others and to try to make others happy. In terms of what humans can receive from it, there is nothing greater than the pleasure gained by looking at it.

Smith's indication "When roughly classifying human mental tendencies, self-love and compassion for others" shows an intrinsic insight that humans are social animals.

In order to form and maintain a society, particularly when parents, families, and corporate organizations, build as a society, it is necessary for members to agree on their hearts and emotions, that is, a collective sense of unity needs to be created. Smith called this “sympathy.”

What Adam Smith misjudged was the sympathy has been lost, for capitalism has developed, and the excessive competitions have been given top priority, where others exist only to overtake.

In fact, most companies are struggling to compete with their competitors in the same industry, and employees are also exposed to competition within the company. This is an idea dwarfed only by a very specific value that only those with more profit win.

As a result, the endless profit-pursuit game prevails, but it is obvious the individual happiness is hard to gain in such a situation when you look at happiness and satisfaction degree of life in developed countries.

Expansion of excessive inequality leads to an increase in the poor, creates hatred in those who become poor, and such anger will lead to the elimination of other companies whose reasons are not clear. This shows the background for the rising populism, nationalism, and conservatism in developed countries. However, separatism is a reaction to an evolving society, and it is self-evident that having all ethnicity, nations, and races merge is the ideal when considering overall profit.

Furthermore, the blockchains created by the advanced IT evolution of the 21st century are deemed to have a characteristic consistent with this purpose by their formation and the technical thought itself.

Blockchains based on the an individual fair decision in a distributed network, without being centralized, is suitable for building a true democratic mechanism.

Central administration is involved only when necessary. Basically, a decision is made by communication among individuals in the community involved in the network, and the interest of selfish movement and others elicit the best solution by the invisible hand.

In various communities, in order to realize the automatic adjustment function of the invisible hand, token economy ware based on blockchain technology, the core of the Kyvalion project, has been developed.

This would be a place to foster Adam Smith's sympathy integrating self-love and compassion for others, where a happier and more satisfying community will be complete by reciprocity, redistribution, and fair work exchange.

8. Overview of the token economy ware

The funds for returning the token economy to remuneration are provided from within the community. Therefore this will have a characteristic of redistribution.

At this time, Philosophy (philosophy that constitutes the organization), Exchange (fair trading), and Sharing (sharing and co-creation) will be present. All three elements will be required to have reciprocity executed soundly. By maintaining this balance properly, organizations and communities will achieve organic and democratic development.

Token Economy Wear

Philosophy

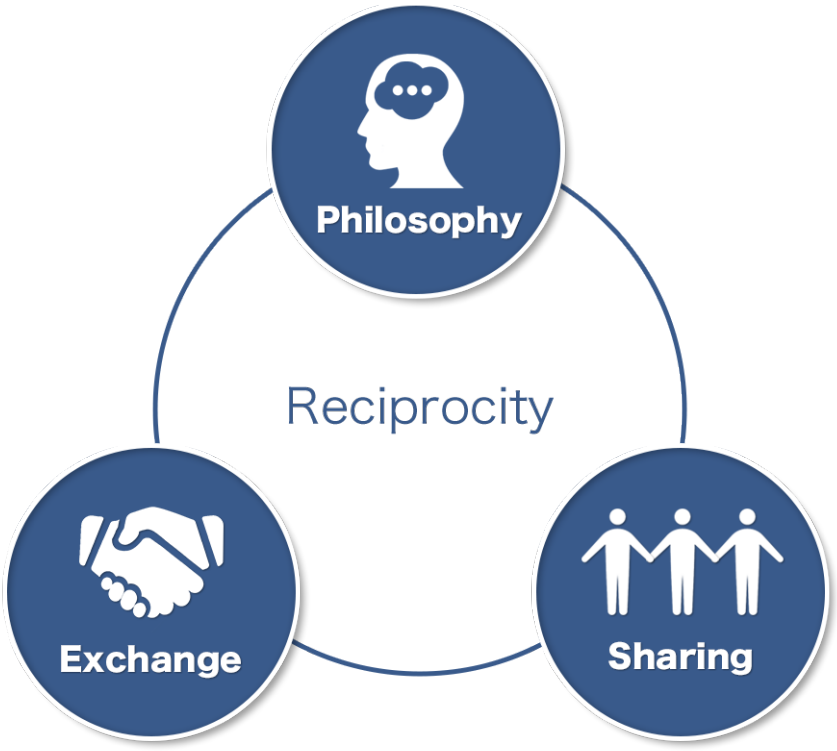
Exchange

sharing

Transparency

Firmness

Smart Contract



(Figure1)

- Friends feature of Users
- Create groups feature
- Wallet feature
- etc

Token economy ware covers all the features that already exist in conventional chat applications.

However, what we are aiming for this time is not a simple chat application as a communication tool. It is a comprehensive token economy ware to contribute to the revitalization of organizations, groups, and local communities.

There is a Create Group feature according to theme etc., as well as additional features are also available such as a feature that allows members in a chat group to easily make remittance while exchanging messages . In other words, a wallet feature is implemented that allows remittance and settlement.

Actually, the chatting app with wallet function has already existed in the past.

However, this is the very first attempt of an application that in a sense aims to create an off-chain (not inscribed in public blockchains between users) in the on-chain (inscribed in public blockchains) and to fuse them together.

By using this app in a community organization, as the concept of reciprocity is easily incorporated in the effective communication between individuals, more effective utilization of human resources and realization of the satisfaction of workers are achieved, and benefit to society becomes maximized.

Below are examples are utilizing the app.

Example 1. In an organization

It can contribute to effective utilization of human resources beyond departments within the company and the creation of work satisfaction.

In addition, it will lead to solving various problems related to the workload of each employee, which current companies face.

- Use in internal management system.

- Use internal chat system to increase efficiency and soundness of work

- Application process of in-house training fees or benefits

- Payment of above fees

- Use as outsourcing and matching tool for tasks between individuals

- Internal business/task auction

- Overtime work re-distributed by auctions from other departments

- Gather ideas or solutions for agendas and issues

- Provide good ideas in chat meetings for work improvement

- Convey knowledge and skills that the employee has but not utilized in the current work in a training program in the company

And many more...

Using this chat application makes it possible to communicate beyond the internal divisions of the company and beyond the hierarchical relationship. Moreover, the company will be activated as the ability of individuals will be demonstrated without limitation.

Any fees or expenses generated here will be paid in the internal currency set beforehand.

At the time of payment, it is an off-chain virtual currency, but a few times a year these will be interchanged with on-chains and be exchanged to cash.

In companies with employees only passively conducting jobs with instructions from superiors, where motivation tends to decline, this will restore their voluntary motivation for work. Naturally, work would be worthwhile, the employee will be more conscious about their participation to work, and their dignity will rise, resulting in improvement of management and increase of organizational performance in the company. In addition, it would be a great advantage for employees to earn extra income aside from their salary.

- Example Model

This application example is based on an example of internal currency issued in Disco Co., Ltd., who always is highly ranked in "Top Rewarding Companies" rankings.

Here, the internal currency is used in various situations such as request fee of work, of use of conference room, charges for delay in submitting their expense reimbursement forms, where each employee manages individual income and expenditure like a business owner. As a result, employees become sensitive to their own income and expenditure. With this system, it is told that there are employees who make 1.6 million JPY per year.

Example 2. Community Revitalization

If you think that the scale of a group called a company has grown, you can easily imagine applying the structure to local communities.

For example, it can be used for regional regeneration by issuing a local currency.

There have been gift certificates and currencies that can be used only in certain regions, but here again, the introduction of regionally limited virtual currencies with the utilization of on-chains and off-chains will expand more possibilities.

You may utilize this chat application for communication of businesses and shops to collaborate and cooperate with each other for regional regeneration. Possibilities are endless.

- Activation of shopping street and chamber of commerce.

- Local meetings for event planning.

- Promotion of urban development project team.

Example 3. Utilization in Certain Industries

(Details required)

Examples of utilization are endless in places where people gather to form a community, such as promotional meetings of a long-term project, non-profit organizations, companies, research groups in schools, seminars, group activities, or PTA activities.

In any scenario, the point is to realize co-creation that is not competition by forming healthy reciprocity.

9. Demand for centralized and distributed composite services

Blockchains are roughly divided into two types.

The first one is called “public chain,”

There are no specific administrators who control the chain, and its transaction ledgers are distributed and managed in the P2P network. Anyone can participate in the network at his/her will.

The other type is a centralized “private chain.” Its network administrator can decide which computer should enter the network. In this case, the whole blockchain is controlled by a specific administrator. The reliability of “private chain” accounts not for the structure itself but for what the administrator is as a controller of the chain. “Public chain” and “private chain” hold different fundamental ideas from each other.

“Public chain” is deemed “revolutionary” since ensuring trust has been made possible, which was once impossible on the Internet. The sole difference between the two chains is whether the nodes responsible for exchange approval are limited to the general public or to a specific party. The difference is also evident in two entirely different vectors as seen in “completely autonomous blockchain” and “blockchain suitable for centralized management.” While “public chain” is a model type which is fundamentally incompatible to the existing frameworks such as centralized authorities, “private chain” is used to promote efficiency without the existing frameworks being significantly altered. Therefore, there are greater possibilities that more firms and banks may adopt “private chain” in their systems. On the other hand, “completely autonomous blockchain” is highly likely to be developed and prevail while destroying the existing frameworks, and in the future, any intermediaries will be eliminated through decentralization.

Whereas the strengths of the public blockchain are based on “the safety in the absence of a central administrator and the continuation of its permanent services” due to full decentralization, those of the private blockchain are on “flexibility of authoritarian management, further ensuring privacy, and realization of absolutely high performance,” which can be achieved by administering their own specifications of computers and networks.

On contrary to the public blockchain whose prerequisite is to have nodes of the general public in participation, the private blockchain enables users to verify their own data and develop technology inside their own organizations, whose functions can be deepened for further usages. In the future, more and more implemented technology of these private blockchains will be applied to the public blockchains, which will help them improve as well. Though the private blockchain and the public blockchain have some differences in their directions, there is no doubt that they will continue to simultaneously complement each other to excel.

10. Utilizing blockchain in the sharing economy market

Every sharing economy has mediators, such as Airbnb in real estate and Uber in car services. However, there will be no more mediators when blockchain is utilized, which becomes a significant change for our economy. Blockchain enables both providers and users to automatically exchange their services while its reliability is kept intact.

La ‘Zooz have experimented on the services using blockchain to verify its practicality. They provide a system of decentralized transportation services that matches its users with common interests, one of

whom owns a car with unused seats available to others and another of whom searching for a ride traveling in the same direction. Providing available seats with high efficiency allows speedy transportation without wasting resources. Locks and keys play essential roles in order to realize a sharing economy when an unspecified large number of users share the same interests. “Smart Lock” using blockchain technology can solve various issues from the past. The smart lock is a system where when a borrower pays in electric money or Bitcoin, the transactions are automatically registered on the smart phone, and the same phone can unlock a door if he/she simply holds it up over the reader. Its technology is expected to serve many important purposes in car sharing, especially self-driving taxis in automatic operation systems. The same mechanism as the smart lock can be constructed and achieved through the Internet applications; however, due to the nature of the lock, such issues as security threats and high cost needed to be solved.

The use of blockchain can significantly reduce the smart lock cost. According to Slock.It, a German based firm, they quote, “As long as it is a thing that can be locked, you can easily lend and share anything, such as home, car, washing machine, bicycle and so on. Individuals and firms can easily make income from their assets.” The blockchain technology will surely bring revolutions to the sharing economy and become the infrastructure of the future society.

The market of the sharing economy has potential for high economic growths and will continue to expand anywhere from tens of billions of yen to hundreds of billions of yen. Our “Kyvalion” will be an optimal platform for the market of the sharing economy, using tokens and the smart contract without any centralized administrator.

11. Blockchain and Big Data

Most information systems have both business applications and databases. On the other hand, blockchains are referred to as distributed ledger technology. The database parts (ledger information) are shared as common data, and each system holds the same ledger information. In another word, the conventional world where each system has its own individual ledger information is now shifting to a new world where the systems are liked on the premise that common ledger information is shared among them.

In the food distribution, as an example, multiple producers and manufacturers currently manage their ledger information in their individual systems. Of course, they face difficulty linking their data bi-directionally and synchronizing their systems since their formats and management methods differ from system to system. However, if each company begins to share such information as manufacturing history by using blockchain, it will be much easier to have their data linked. Furthermore, if all the participating firms reach consensus at the time of updating ledger information, it will ensure the accuracy and consistency of their common data, and at the same time, they can develop traceability in the environment to prevent camouflage or tampering without bringing in a costly third party such as mediators. The blockchain technology will grow and potentially integrate with various fields in the future.

Medical/health care is another field where you can see such integration with the blockchain technology. In order to enhance genes, genomic research, and industry, there requires a greater amount of big data.

However, individual data are not only scattered but unstandardized, apart from the fact that the patient information is vulnerable to privacy issues. The U.S. startup, Nebula Genomics, considered a possibility whether the blockchain technology could be of any use.

At the moment, there is a genetic analysis company between the data owner and the buyer, who acts like a mediator. However, if the owner joins the blockchain-based network, the owner and the buyer can connect directly. Individuals who own data can also receive services such as having their genes analyzed by using tokens while preventing their data from being accessed by a third party.

12. Big Data Analysis by Deep Learning

Big data is another active IT field whose infinite potentials attract major IT firms, where research and development is steadily under way at a global level; therefore, not only IT firms but organizations, whose data-processing systems are crucial to their operations, such as manufacturers and healthcare industries, show equal interests in the potentials of AI. You may wonder why it attracts so much attention. That is because AI keeps evolving to a level at which it can process a large volume of data no humans can ever handle, for which reason such data is called big data.

So far, we have accumulated an enormous amount of data in variety of forms for the purpose of business and private use. In particular, social networking services “SNS” has prevailed, allowing users to post their texts, pictures and movies on the Internet. Big data has proved to be effective, and has been exponentially increasing. You can easily imagine that if these big data are to be collected and analyzed, new applications useful in business should be found. However, we used to find such an action almost impossible to accomplish since it would be both extremely time-consuming and beyond our technological capacity to handle the volume of data.

Deep learning is a state-of-the-art AI function, developed as part of machine learning research, which makes it possible to process and take advantage of big data. Deep learning is a relatively new technology designed to imitate the working of a human brain, and contrary to any conventional AI function, the computer itself learns and recognizes information patterns at a cognitive level. It is a case where “without our having to give any instructions, by feeding databases into the network, AI finds what is necessary, and recognizes and divides the targets.”

In 2012, the news ‘Google’ AI identified cat pictures’ surprised the world. Using a deep learning algorithm, Google built a neural network of AI whose system was then fed with millions of YouTube clips. The artificial brain, without any help, controlled its neural network, learned on its own and obtained the patterns of what was visually recognized as cats. After this success, deep learning research has produced various successful results. In 2015, AI achieved a breakthrough in image recognition, gaining a lower rate of erroneous detection in contrast with human results. In another word, in the field of image recognition, AI may be superior to human abilities. In 2016, deep learning studies reached a significant milestone when Google AlphaGo defeated the top player.

The very innovation significant to deep learning is in its ability to autonomously find concepts and patterns by reading big data. The more data is processed, the more accurate image recognition will be. There is no doubt that deep learning should propel a various fields of businesses into a higher and more sophisticated stage.

13. Chat application with crypto currency wallet function "LooP"

We have developed a communication application that was equipped with crypto currency wallet function for smart phones as an example of the platform. (Supported OS: iOS, Android Corresponding currency: KTC, BTC（BIP32）, Ether（ERC20） updated sequentially)

The application can be used on-chain and off-chain separately. Although the fee will be charged for each transaction with external wallets, it is realized that the fee of

sending and receiving tokens is completely free and carried out immediately because sending and receiving currency on the chat window is executed off-chain.

▼Application functions

Item	Description
Security	MT Proto V2
Supported OS	iOS, Android
Functional overview	Chat (1 vs. 1 , group) Crypto currency wallet
Chat functions	Text message Location information Image files Movie files Sending token Stamp
Token transmission fee	In chat: free Crypto currency (BTC etc.): Commission according to market price
Wallet security	Pass code, pass phrase, and other items conforming to terminal security

14. Encryption Technology “MT Proto V2”

Our application “LooP” for Android is now available, which enables you to send cryptocurrencies as smoothly as you do with text or pictorial data. With this chat application in use, anyone can send and receive our “KTC” cryptocurrencies with the same ease as messages, photos and files. “LooP” uses MTProtoV2.0, an encryption technology also used in “Telegram,” an application known for its high security in the industry. Irrespective of a type, all the chat messages will be encrypted.

MTProto is an encryption protocol to encrypt the users’ response in the Telegram messaging system. This protocol was developed by Nikolai Durov and other programmers at Telegram. It consists of combined elements: the Diffie-Hellman protocol used to securely exchange 2048-bit RSA cryptographic keys between two devices over a public channel, and AES (IGE mode), a symmetric-key algorithm for encryption based on a number of hash functions. MTProto provides end-to-end encryption by way of optional key verification. Now MTProtoV1.0 is deprecated and is being phased out. On the other hand, MTProtoV2.0 was upgraded to specification, and the actual differences between the two versions are as follows;

- In regard to byte array, only 0..15 padding bytes were used in the encryption process of MTProtoV1.0; however, 12..1024 random padding bytes are used to fit in MTProtoV2.0 so that the length is dividable by 16 bytes.

- Previously in the encryption of MTProtoV1.0, the msg_key (message key) was calculated separately from the lower 128 bits of SHA1 in the data obtained at the prior step. On the other hand, the current msg_key is calculated as 128 bits, the middle of SHA256 of the data obtained at the previous step. 32 bytes are added to the front of the shared key.

- In MTProtoV2.0, aes_key (AES key) and aes_iv (AES initialization vector) are calculated as follows. (The key is a shared key acquired at the time of a key generation.)

```
msg_key_large = SHA256 (substr (key、88 + x、32) +平文+ random_padding) ;
msg_key = substr (msg_key_large、8、16) ;
sha256_a = SHA256 (msg_key + substr (key、x、36) ) ;
sha256_b = SHA256 (substr (key、40 + x、36) + msg_key) ;
aes_key = substr (sha256_a、0,8) + substr (sha256_b、8,16) + substr (sha256_a、24,8) ;
aes_iv = substr (sha256_b、0,8) + substr (sha256_a、8,16) + substr (sha256_b、24,8) ;
```

- In MTProtoV2.0, the message of the sender in the secret chats is x = 0, and x = 8 is in the message in the opposite direction.

MTProtoV1.0, originally designed with encryption technology for Telegram messaging, has not been very popular among many encryption engineers, due to several reasons including vulnerability to IND–CCA attack. Abnormal hashing, key generations or exchange protocols were also found in the process of creating the application, which makes it unorthodox. In addition, MTProtoV1.0 was not exactly produced by the engineers of credibility in the Infosec community.

Currently, Telegram (a message application) uses MTProtoV2.0 with SHA256, an upgraded version of SHA1, among other specifications as well. MTProtoV2.0 is safe against IND–CCA.

Mikuga Japan Co., Ltd. will continue to enhance the credibility of our services by using highly secured protocols.

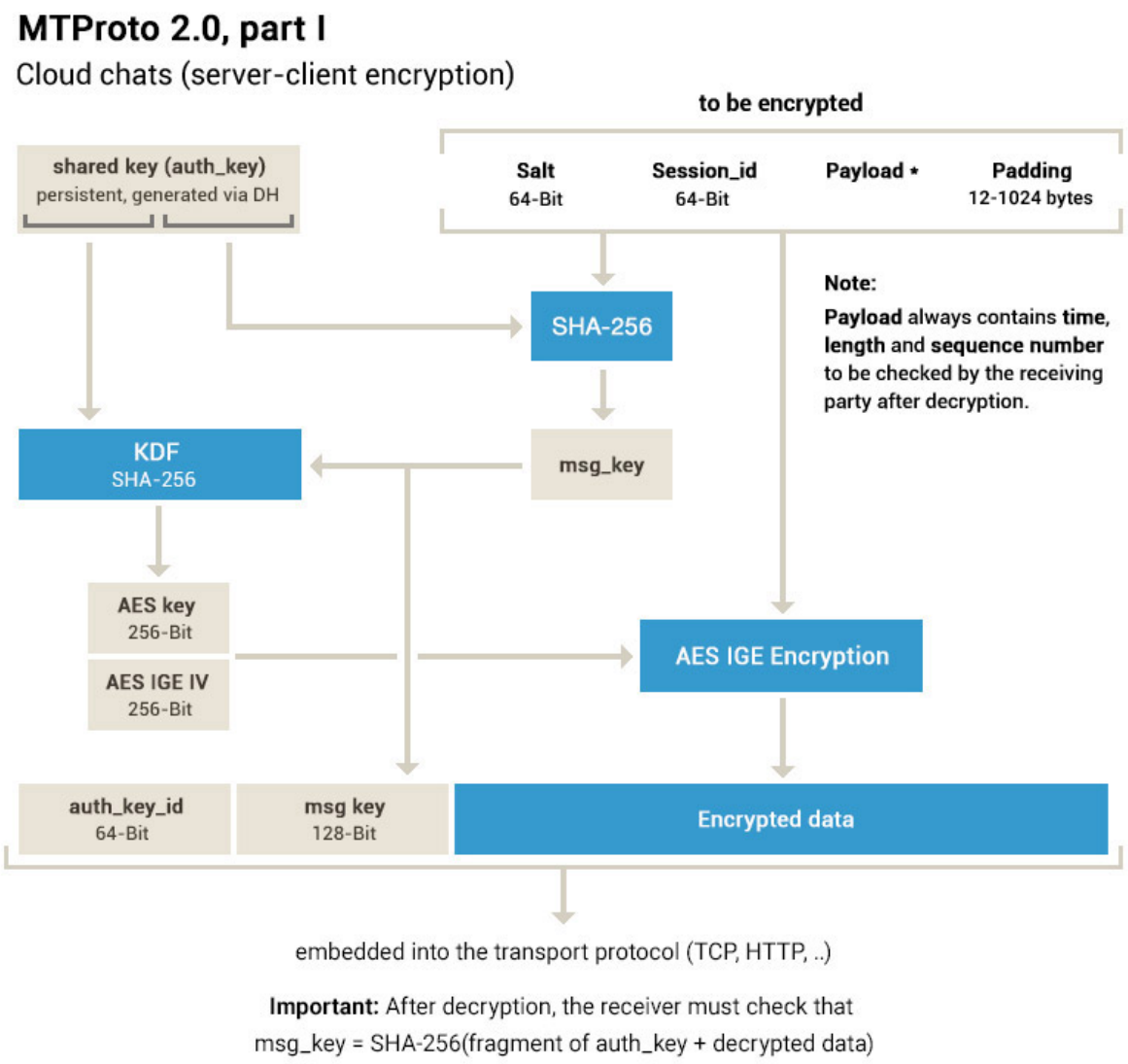


Figure. (reference:Telegram Core)

15. Summary

Token economy ware, the platform of the Kyvalion, is already at the stage in preparation for implementation.　Companies and regional organizations that use the platform in the purposes described in 5. have already been selected as candidates. The first release is planned in 2018. We will gradually expand the features and will bring new innovation to the blockchain usage model in the field of labor and communication.

At the same time, the solution of the Kyvalion enables companies/organizations to improve working environments and achieve the satisfaction of members through the use of token economy ware and to promote growth to a new stage of capitalist society.

In the book of Wisdom "Kyvallion," the word of truth is shown as "That which is below is like that which is above & that which is above is like that which is below."

As a rule governing the essence of the universe, physics, human spirit, the Kyvalion, transmitted from ancient Egypt to present, is said to be written in the Emerald Tablet, by the god Hermes Trismegistus said to exist in the Atlantis era.

However, since this fact has not been well-known to the public, there is a tendency for life to be controlled by the environment and those with power.

As written in the Kyvalion, the realization of the golden principle that all things cause, respond, and circulate with themselves, using our blockchain technology, is our the Kyvalion project.

As a concrete example, we will show you how the corporate entities will be reborn again with this benefit.