REAPCHAIN

White Paper
Ver 0.9

Table of Contents

01 Who is ReapChain?

The Fourth Industrial Revolution has been advocated during the World Economic Forum in 2016. It is the next industrial revolution with 'Intelligence' and 'Connectivity' as keywords. Blockchain was listed as one of the most important technologies of The Fourth Industrial Revolution together with the Internet of Things, artificial intelligence, and big data. It is expected that Blockchain will lead to the expansion of the big data market by strengthening control over individual data as well as data security in the Fourth Industrial Revolution where the collection and operation of large amounts of data become crucial[1].

Since the development of the first generation of Bitcoin, the second generation of Ethereum, and the third generation of EOS along with numerous main nets, blockchain is considered as a high growth potential technology. However, its use is limited as a cryptocurrency that proves the rights to owned assets. Because the blockchain operates based on a distributed network to secure transaction transparency and reliability, the relatively slow transaction processing speed and expansion problems[2] are limiting factors in boosting the blockchain-based industry.

ReapChain is not just trying to implement the main net for cryptocurrencies. ReapChain aims to implement the main net to solve the problems of the data processing speed and scalability of existing private and public blockchains and be practically used in various industries.

ReapChain presents the following mission and visions.

Mission & Vision

· Mission

ReapChain aims to establish a secure and transparent ecosystem of the blockchain industry for all the Decentralized Application (DApp) service providers by providing a practically usable blockchain.

· Vision

To solve the trilemma of blockchain by implementing a new hybrid blockchain with Shell-Core structure unique to ReapChain

· To implement a double-layered chain structure that connects with various main net protocols.

· To implement a real-time data processing algorithm for DApp through the pre-confirmation process of a transaction.

· To implement a decentralized algorithm through the PoDC consensus structure.

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[1] Lee, J.Y. & Woo, C.W. (2018). Prospects, limitations and implications of blockchain technology. *FUTURE HORIZON*, (38), 12-15.
[2] Ibid, 12

To implement various types of middlechain tailored to the characteristics of each industry through ReapMiddlechain.

· To establish a blockchain by blockchainifying the end-to-end section through the middlechain that is specialized in the IoT industry.

· To establish a development environment in which the non-professionals of the blockchain can easily develop DApp.

ReapChain defined the problems of DApp and the main net using the existing blockchains as the following four problems, and these four problems confirm the validity of ReapChain's mission and vision.

· The four problems

1) The security vulnerability of private blockchain
2) Problem of real-time data processing speed
3) Problem with different technical characteristics of the main net required by various industry-related DApps
4) Problem in developing DApps without specialized technology for blockchain

As a solution to the four problems, ReapChain provides the main net protocol specialized for each industry through ReapChain's unique blockchain-based technology innovation to overcome the limitations of existing main net protocols. Also, ReapChain implements a practically usable main net protocol that can solve the scalability and versatility problems that DApps are struggling to solve. ReapChain selected the IoT industry as the first step in applying the developed protocol. Starting with the IoT industry, ReapChain as a blockchain applicable to all industries will play a leading role in popularizing the blockchain technology and creating a new blockchain-based business model.

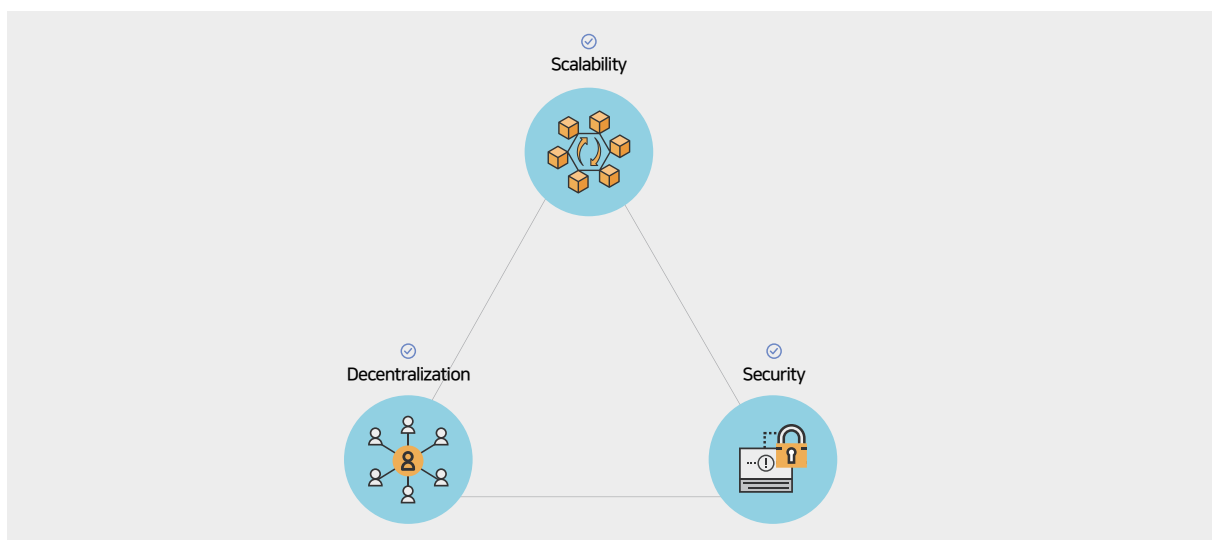Such innovation is possible because ReapChain possesses the unique blockchain structure, shell-core structure, the new consensus process, pre-confirmation, and ReapMiddleChain which can be customized according to the characteristics of individual industries. It is the ReapChain protocol's core philosophy to realize practically usable blockchain for all industries with ReapChain's unique technology.

02 Why ReapChain?

2-1. Limitations of Blockchain Technology

Bitcoin, the first-generation blockchain, first introduced its blockchain technology to the world in 2009 and showed its potential as a currency through a distributed ledger. To further enhance the practicality of the blockchain technology, Ethereum, the second-generation block chain, released the Smart Contract and showed a new direction for the blockchain. Despite technological advances such as Smart Contract, Ethereum also had a few limitations such as slow consensus speed and heavy network load. To solve the problems of Ethereum, EOS, a third-generation blockchain, was launched. Although EOS was developed through PBFT(Practical Byzantine Fault Tolerance) consensus algorithm to solve the problem of slow consensus speed and heavy network load, it doesn't fundamentally solve the scalability and processing speed problem that arise as the number of applications increases.

Vitalik Buterin, who developed Ethereum, and many IT professionals agree that the three most important technical aspects when applying blockchain technology to real business are security, decentralization, and scalability. Buterin has named the current situation, the Trilemma of Blockchain that requires three characteristics of blockchain technology to be secured at the same time, but only two of the three characteristics are satisfied due to technical limitations[3]. For the commercialization of the blockchain, resolving problems regarding the transaction's slow processing speed and blockchain's scalability is required. To solve the problem, a private blockchain is rapidly spreading, but security issues are always being raised because of the limited number of nodes on the private blockchain when verifying the reliability. In other words, private blockchains are not resolving the Trilemma of Blockchain same as the existing public blockchains.

[Figure 1. Trilemma of Blockchain]

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[3] Vitalik Buterin Lays Roadmap for Ethereum Visa Levels Quadratic Sharding [Website]. (2017, November 25). Retrieved from https://www.trustnodes.com/2017/11/25/vitalik-buterin-lays-roadmap-ethereum-visa-levels-quadratic-sharding

2-2. ReapChain's Development Directions

1) Solving Trilemma of Blockchain

Although various private blockchains are being developed to solve the scalability problem of public blockchains, it is impossible to obtain multiple nodes due to the characteristic of private blockchains. As a result, it dilutes the concept of decentralized ledgers, making the security vulnerable and decentralization difficult, which also negates the meaning of data sovereignty. To overcome the limitations, ReapChain implemented a hybrid blockchain with a Shell-Core Structure. By flawlessly combining scalability-specialized private blockchains and public blockchains which guarantee decentralization and security with ReapChain's inherent chain structure, Shell-Core Structure, we solved the Trilemma of Blockchain.

2) Upgrading Real-Time Data Processing Speed

Applications of the existing legacy system operate by sending and receiving data through servers in real-time. Especially payment, IoT, and game industry-related applications on legacy systems require real-time data exchange. However, on existing blockchains, processing data in real-time is impossible because they establish transparency and reliability of transactions through accomplishing consensus among all network participants.

ReapChain adopted the concepts of 'Temporary Ledger' and 'Permanent Ledger' from the securities industry to resolve the transaction processing speed problem. By adopting a pre-confirmation process in which the private blockchain consents on a transaction by transaction basis, 99.9% reliable transaction results are recorded in a temporary ledger and immediately provided it to DApp to process data in real-time, enabling the commercialization of the blockchain.

By making blocks for transactions processed in the temporary ledger on the public blockchain and recording them in the permanent ledger, the real-time processing of data can be made real without sacrificing security or decentralization.

3) Implementing Industry-Specialized MiddleChain

Because the technical characteristics of main net protocols required by DApps require vary from industry to industry, each industry needs specialized main net protocol. But to develop main net protocols for different industries can be very inefficient and can also lead to compatibility issues between protocols.

Reapchian provides ReapMiddleChain, a middle chain that is specialized for the characteristics of individual industries, making it easy for DApps to implement industry-specialized blockchain-based services. Also, by providing ReapMiddleChain with a single main net protocol, ReapChain supports the requirements of individual industries. At the same time, ReapChain solves compatibility problems by integrating multiple main net protocols. Ultimately, ReapChain expands the platform ecosystem into the data industry for open data sharing by unifying data from all industries with a single main net protocol.

4) Providing DApp Service Provider-Friendly Development Environment

Although developers use various languages such as java, c#, c++, and php to develop platforms, existing main net protocols are not compatible with such languages. As a result, for developers to develop DApp, they need to learn new the language and blockchain's structure used in main net protocols. The hassle is being pointed out as one of the obstacles to DApp activation.

ReapChain aims to achieve ReapChain's activation by offering ReapSDK, which supports the compatibility of various developing languages such as java, c#, and c++ and providing a DApp-friendly development environment so that developers without knowledge of blockchain can easily develop blockchain-based services.
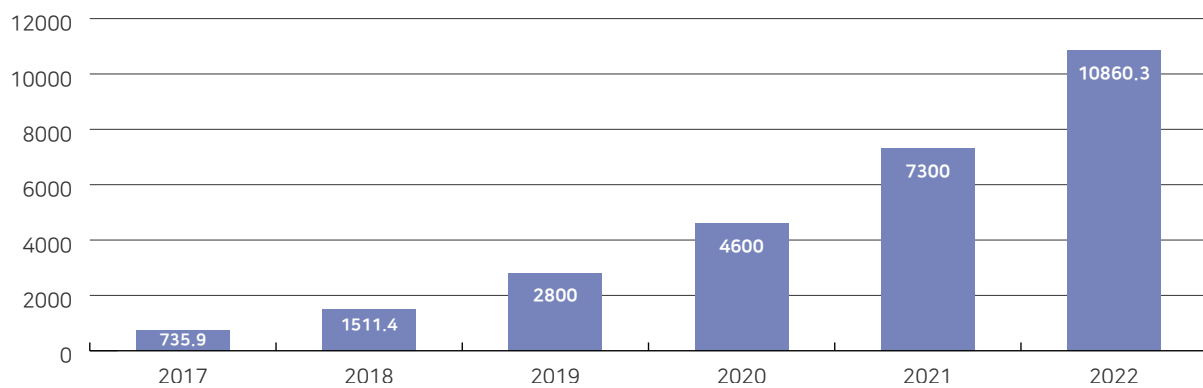
03 BlockChain in Global Market

Blockchain Global Market Size

According to the Worldwide Semiannual Blockchain Spending Guide of IDC(International Data Corporation), a global IT market analysis and consulting firm, the global blockchain market was worth $1.5 billion in 2018 and is expected to grow 76% CAGR to $10.9 billion by 2022.

Blockchain Market Forecast(IDC)   (Unit: USD mil)

Year	Value
2017	735.9
2018	1511.4
2019	2800
2020	4600
2021	7300
2022	10860.3

[Figure 2. Global Blockchain Market]

Since blockchain is very a rapidly growing market, there are big differences in market size estimates for each market research company. However, all research companies are agreeing about the blockchain market's growth potential and the steep growth rate.
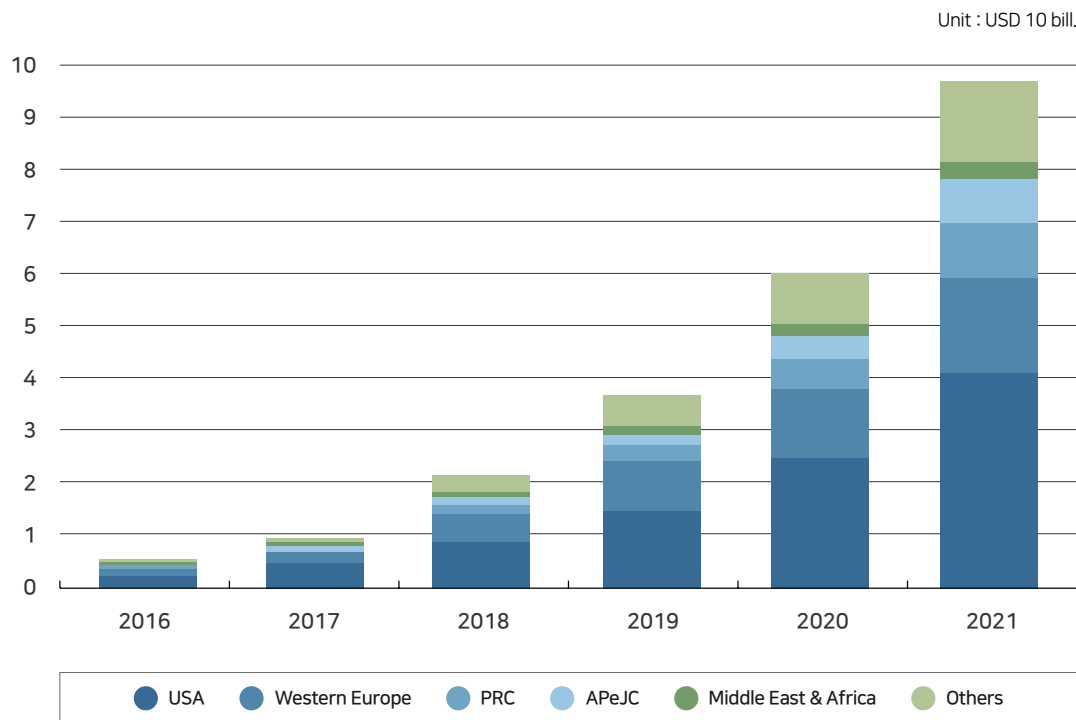
(Unit: USD mil. , %)

Research Firm	Base Year	Market Size	Forecast Year	Estimate	Annual Growth Rate
Market and Markets	2017	411	2022	7,683	79.6
IDC	2017	735	2022	10,860	71.3
Accuray Research	2016	210	2025	16,300	62.1
Statista	2016	210	2021	2,312	61.5
Market Research Future	2016	168	2022	2,000	51.0
Netscribes	2018	3,351	2023	19,900	42.8
Grand View Research	2016	604	2024	7,589	37.2
Average	2017	813	2023	9,521	58.4

Source: Study on the Impact of Employment in Blockchain Industry)

[Chart 1. Blockchain Market Forecast by Research Organizations]

By country, the United States has the largest blockchain market with 1.1 billion dollars in 2019, followed by Western Europe with 0.67 billion dollars, and China with 0.32 billion dollars.

Unit : USD 10 bill.

[Figure 3. Blockchain Market Forecast by Country]

In the service sector, the use of Blockchain as a Service (BaaS) is increasing. According to Bank of America, even if only 2% of servers become blockchain nodes, BaaS is expected to form a 7 billion dollar market. As the companies that can take the most advantage of the recent shift to BaaS, BaaS service providers such as Amazon, Microsoft, and Oracle, and blockchain-based online service providers such as IBM, Salesforce.com, VMware, Redfin, Zillow, and LendingTree are being mentioned[4].

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4. Heo, J. (2018). Blockchain market outlook and company trends in major countries. MONTHLY SOFTWARE ORIENTED SOCIETY, (54), 37-47.
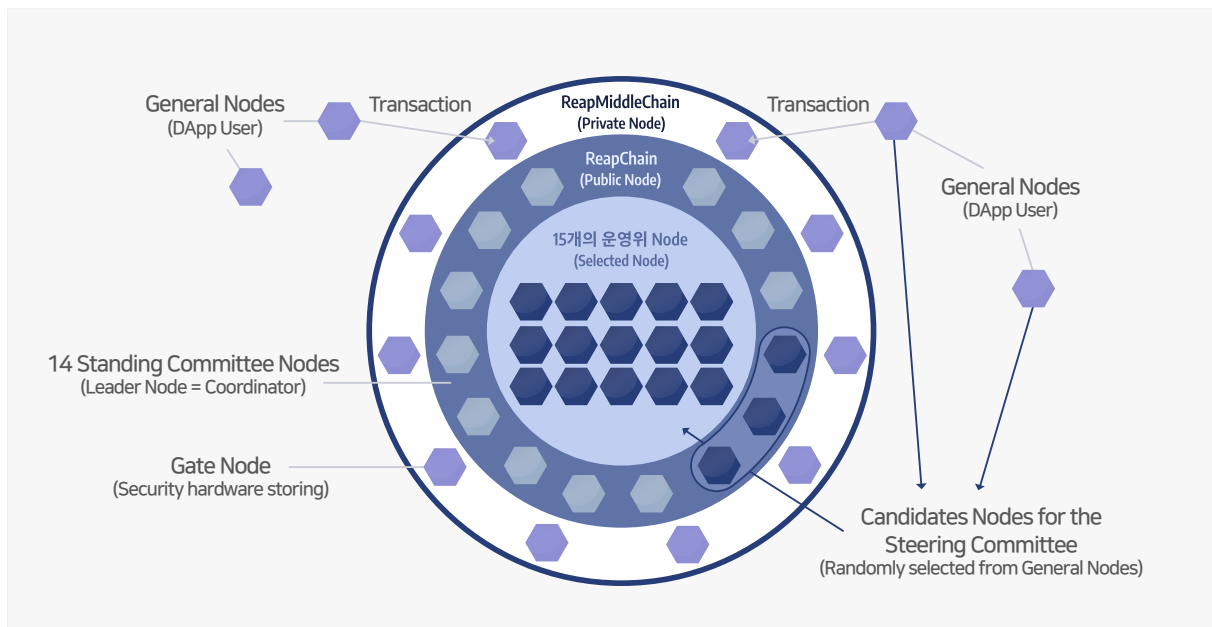
04 What is ReapChain?

ReapChain is a hybrid blockchain that solves the 'Trilemma of Blockchains' to enable the commercialization of blockchain and implements the blockchain based DApp services.

I ReapChain Protocol

4-1. Shell-Core Structure

Shell-Core Structure is a core of the ReapChain protocol that integrates a private blockchain and a public blockchain perfectly to form a double-layered chain. As shown in [Figure 4.] Shell-Core Structure places the private blockchain, ReapMiddleChain on the outer layer, and processes transactions first. Then the result from the processed transaction is provided to DApp immediately solving the commercialization problems of blockchains. The public blockchain is placed on the inner layer and blockchainifies the transaction results processed in the private blockchain using the PoDC consensus algorithm of ReapChain to solve the decentralization and security problems.
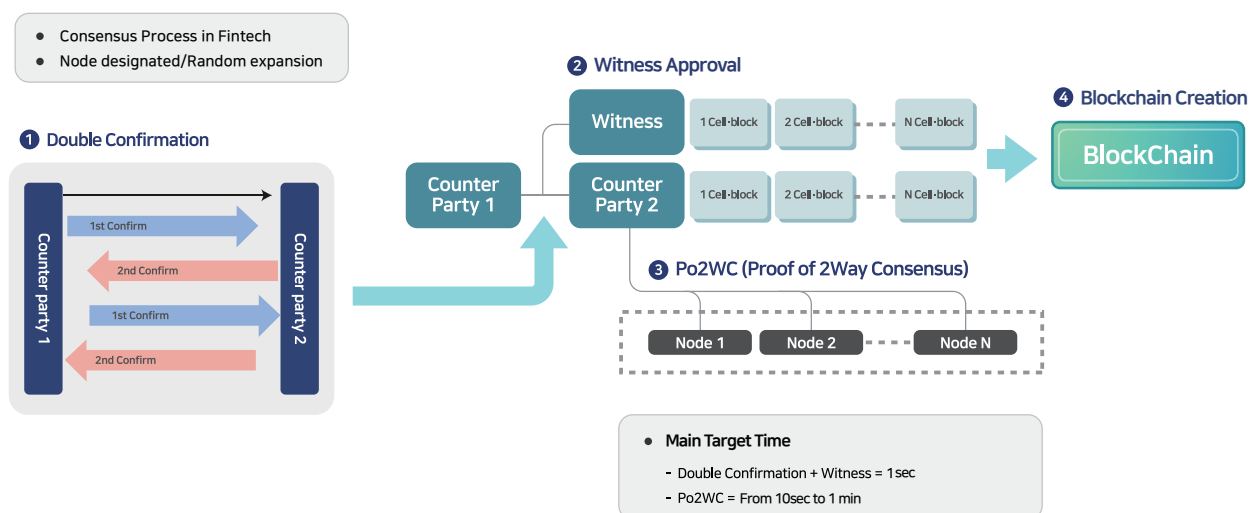

[Figure 4. Shell-Core Structure]

1) ReapMiddleChain

RepChain adopts the concept of 'Temporary Ledger' and 'Permanent Ledger' from the securities industry to solve the problem of the transaction processing speed.

ReapMiddleChain, a private blockchain, introduces the concept of a temporary ledger. When a transaction occurs, both sides of the transaction confirm the transaction twice (Double Confirmation) as shown in [Figure 5]. Then the consensus is reached through a Proof of Triple Confirmation process in which one of the 10 gate nodes is the witness. The consensus result is considered pre-confirmed as it goes through a Proof of Triple Confirmation process. The pre-confirmed result is considered 99.9% reliable data and is transferred to both sides of the transaction enabling fast transaction data processing. The pre-confirmed result is then made into a block on ReapChain, a public blockchain, and is recorded in permanent ledger.
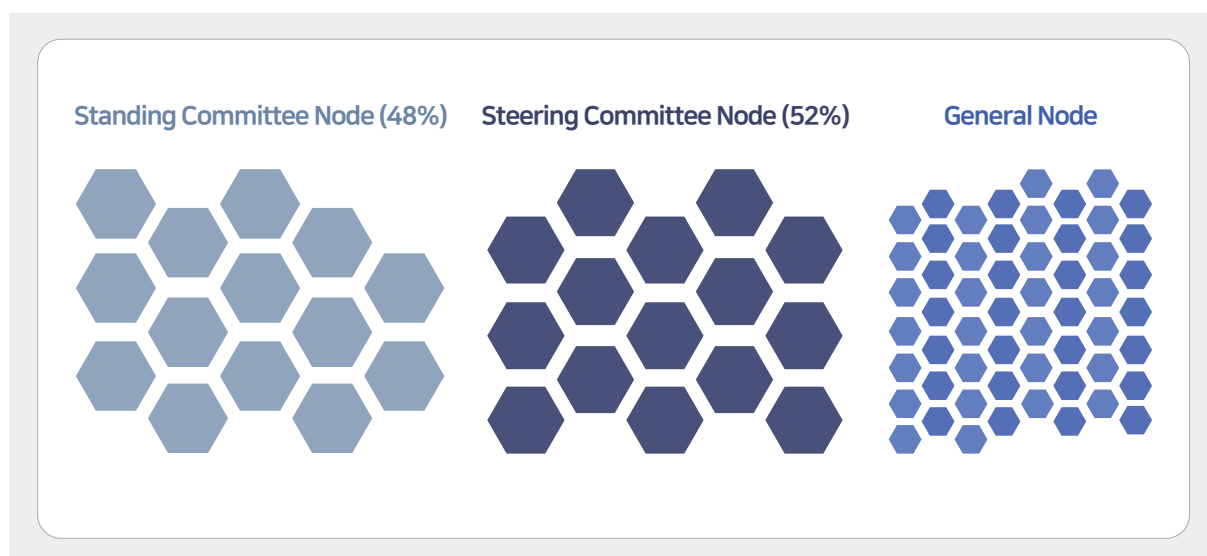

[Figure 5. Proof of Triple Confirmation Process]

2) PoDC(Proof of Double Committee)

The consensus algorithms such as PoW(Proof of Work), PoS(Proof of Stake), DPoS(Delegated Proof of Stake), and BFT(Byzantine Fault Tolerance) used in blockchains have limitations regarding delayed consensus, energy-consuming hardware computing structure, centralization by limited delegates, and vulnerability to a 51% external attack. To overcome such limitations, ReapChain developed a PoDC(Proof of Double Committee) consensus algorithm which improved DPoS and PBFT(Practical Byzantine Fault Tolerance) algorithm.

In the PoDC consensus algorithm, 14 standing committee nodes and 15 steering committee nodes randomly selected from general nodes using quantum random numbers participate in the consensus process. Although the network is expanding as the number of participating node increases, only 29 nodes (14 standing committee nodes and 15 steering committee nodes) participate in the consensus process, maintaining the data processing speed of ReapChain. Of 29 nodes participating in the consensus process, the ratio of the steering committee nodes is maintained over 51% to ensure the fairness of the consensus process enabling decentralization.
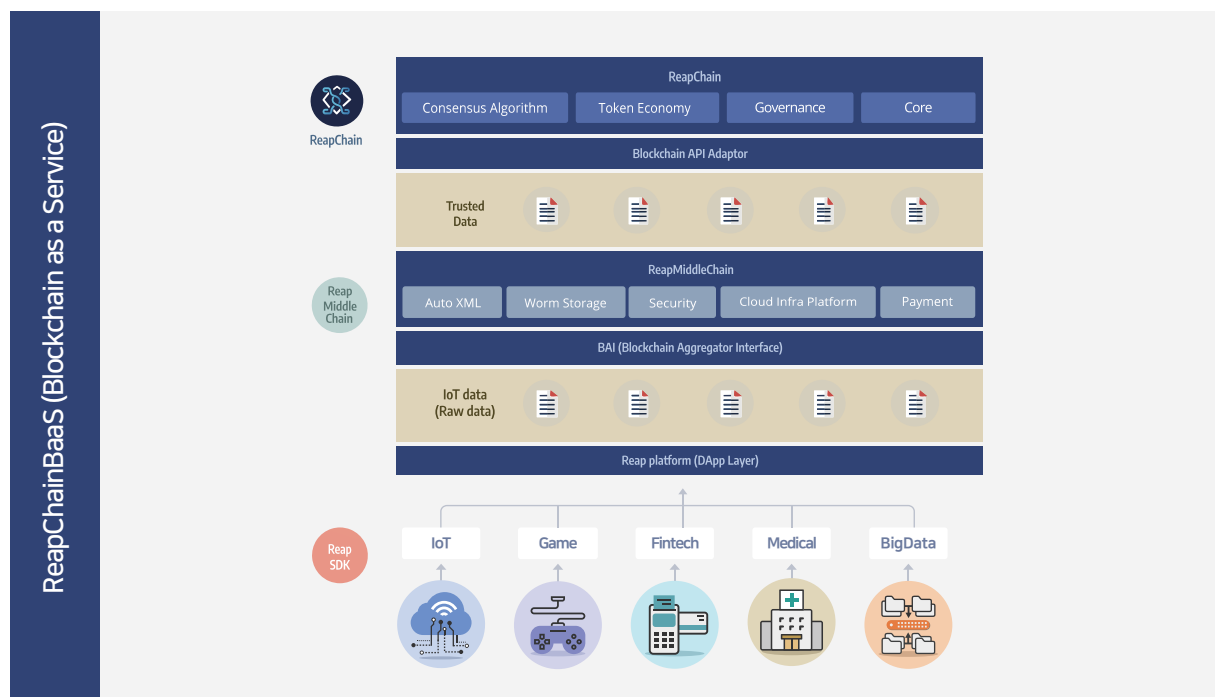

Standing Committee Node (48%)　　Steering Committee Node (52%)　　General Node

[Figure 6. PoDC (Proof of Double Committee]

4-2. ReapChainBaaS

BaaS (Blockchain as a Service) is a cloud computing platform that provides blockchain-based software development environment. Since ReapChain services are provided in the form of BaaS, it is easy and convenient to develop and operate blockchain-based services without new hardware adoption or architecture configuration.

ReapChainBaaS consists of ReapMiddleChain, ReapChain main net, and ReapSDK. ReapMiddleChain is responsible for real-time processing of DApp data and for linking with external modules. ReapChain main net enables data security and decentralization. ReapSDK is a tool for developing blockchain services for different DApp service providers. It enables to implement various blockchain functions such as the creation of the smart contract, the transmission of the token, inquiry of block, etc. on the blockchain network without special knowledge of the blockchain.

ReapChain will apply its unique IoT security technology, PID of things to ReapChainBaaS to provide ReapChainBaaS to the IoT industry that has been selected as a priority industry. ReapChain will eventually expand service areas of ReapChainBaaS to other industries to prove the generality of the ReapChain protocol.

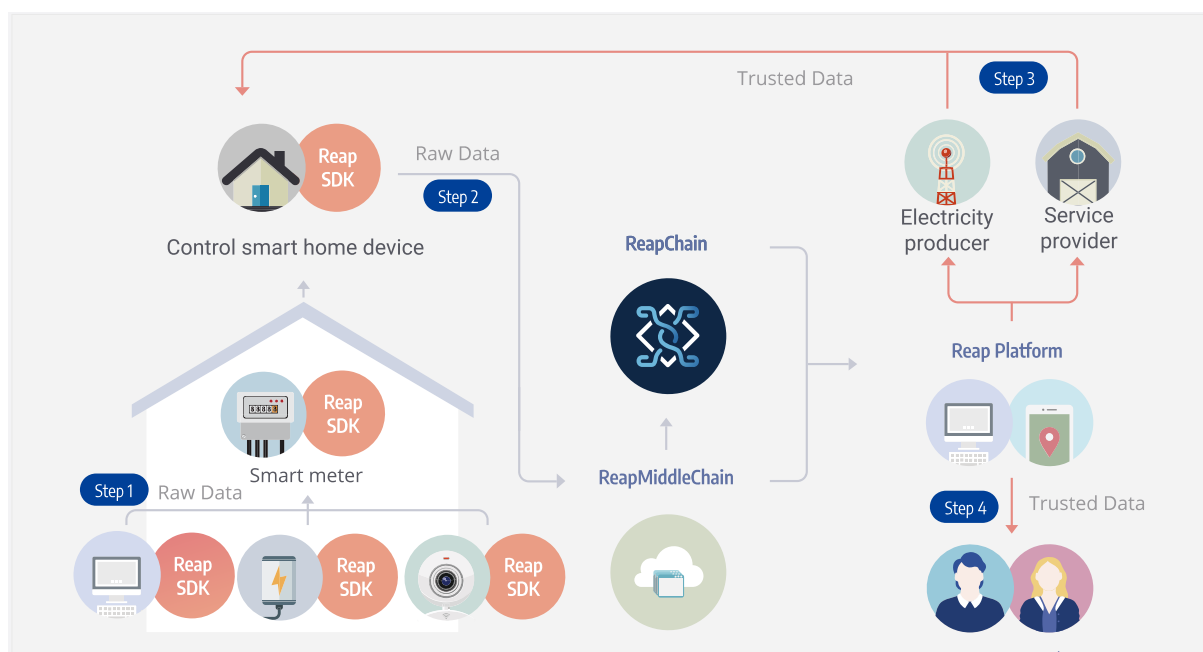[Figure 7. Configuration of ReapChainBasaS]

05 Where to Apply ReapChain?

The technical characteristics of middlechain and main net protocols required by DApps vary by industry. ReapChain offers middlechain that is industrially specialized and compatible with various main nets, making it easy for DApps to implement their blockchain-based services in various industries.

5-1. IoT Industry

Commercially applying the existing blockchains to the IoT industry had limitations such as lack of reliable ID authentication and data verification system for individual devices, weak security issues for IoT devices, and real-time processing of large amounts of data. ReapChain can block unpredictable transactions from unauthorized devices to each IoT device, and verify and filter the forged data by utilizing its own IoT security technology, the PID of things technology. Moreover, by using private blockchain (ReapMiddleChain)'s consensus algorithm and indigenous data processing method, ReapChain can handle real-time processing problems of large amounts of IoT based data flexibly and efficiently. As a result, ReapChain can be used in various IoT industries such as distribution and logistics, smart homes, and smart grid.
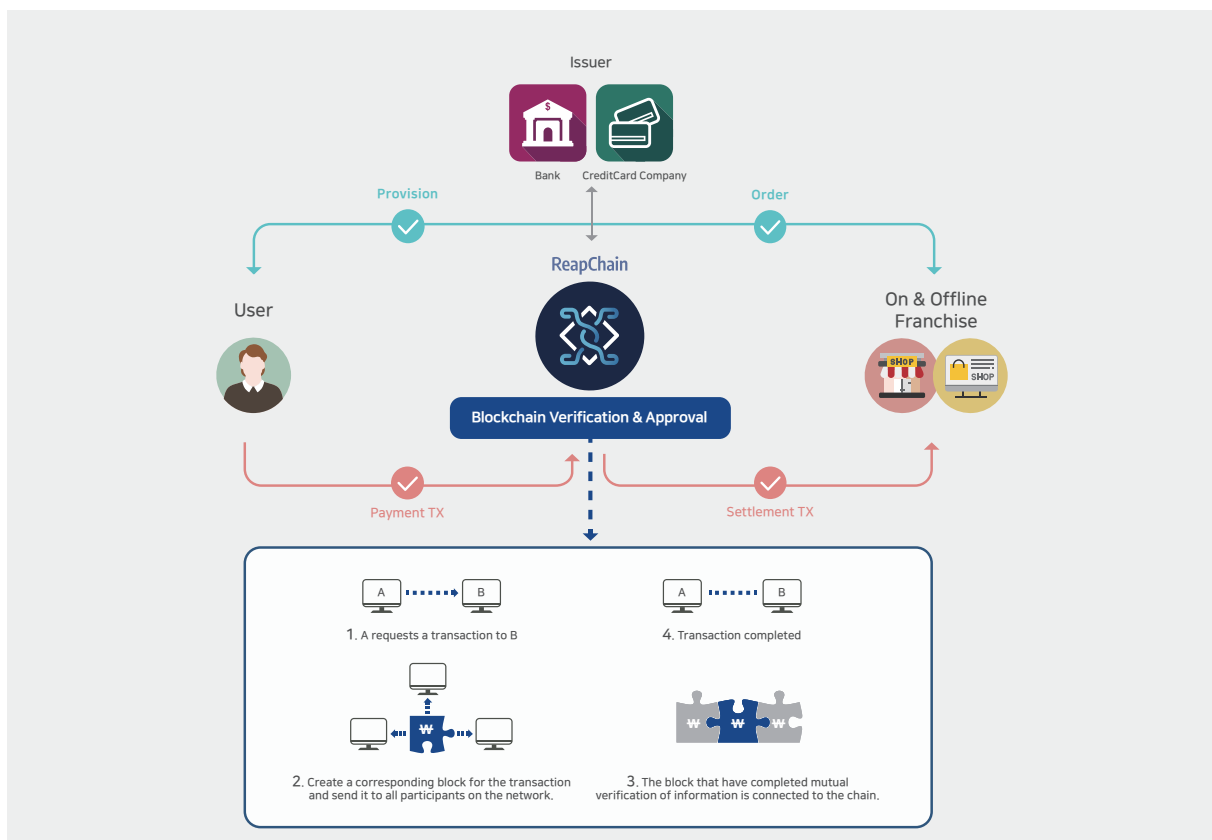

[Figure 8. ReapChainBaaS-based smart grid]

5-2. Fintech Industry

Globally, people who don't receive traditional financial services like banks, the so-called financially underprivileged classes, are estimated to be about two billion[5]. To those classes that can't use existing financial services due to lack of credit or financial infrastructure, financial services utilizing the concept of blockchain's decentralization are emerging as a solution. However, to apply blockchain to the Fintech industry such as payment service requires real-time processing of numerous transactions and resolution of security problems for privately owned assets.

ReapChain can be applied to FinTech industries such as payment, credit transaction, and remittance because it can process transactions quickly through Proof of Triple Confirmation consensus process on the private blockchain (ReapMiddleChain), and on the public blockchain (ReapChain) security and decentralization problems are solved by applying ReapChain's unique consensus algorithm, PoDC.
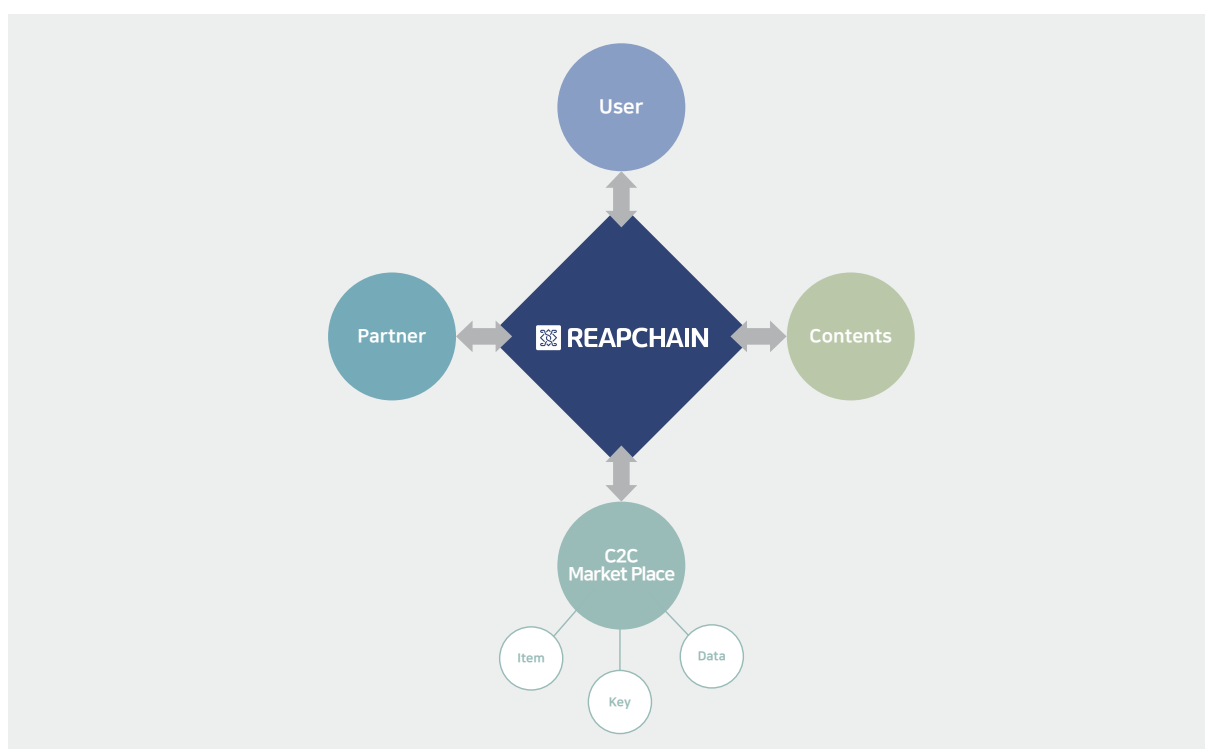

[Figure 9. ReapChainBaaS-based payment]

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[5] Koh, R. & Lee, Y.J. (2018). *Next Money*. DASAN Books.

5-3. Game Industry

The game industry has become a red ocean as a competition among service providers gets very fierce and competition has spread throughout the world. Blockchain can be a new growth engine for the red oceanized game industry.

Since the incentive system based on the cryptocurrency of the blockchain is easy to accept for gamers who are familiar with the concept of digital assets from game trading, the entry barrier of launching the blockchain technology to the game industry is lower than other industries[6]. Practically, however, the biggest impediment to blockchain games is processing speed. ReapChain makes it possible to apply blockchain to game services by increasing transaction processing speed dramatically through a unique consensus algorithm of the private blockchain, ReapMiddleChain. Furthermore, ReapChain allows real-time P2P transactions of Non-Fungible Token (NFT) items which can be an additional business model for game DApps by utilizing blockchain technology.
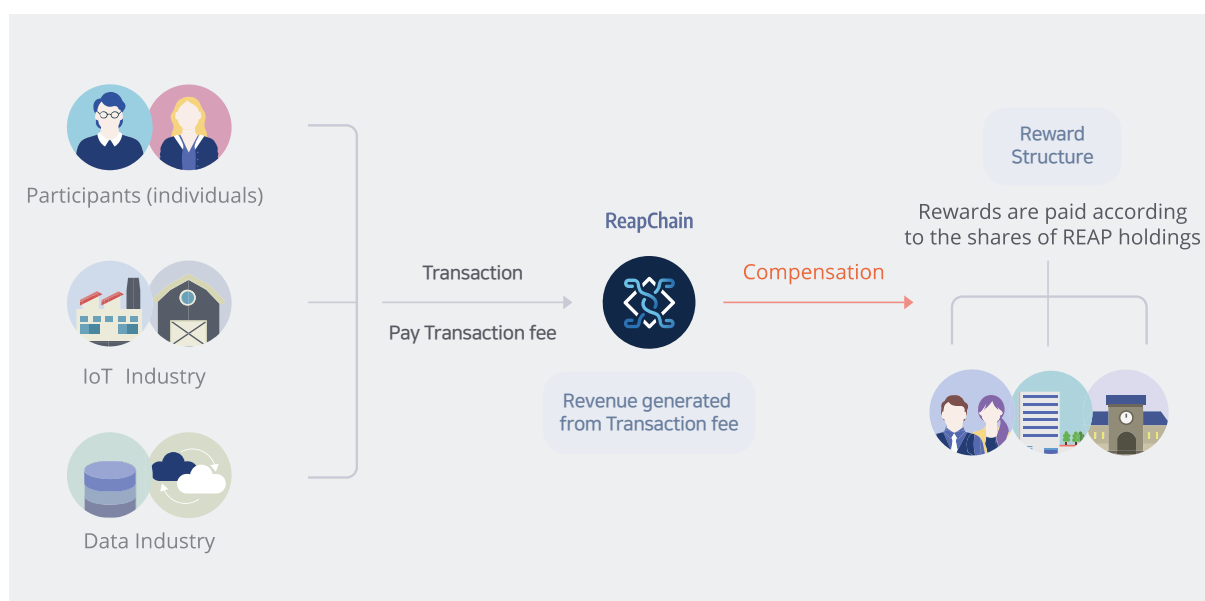

[Figure 10. ReapChainBaaS-based Game]

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6. Impending Blockchain Game Era, No.1 Corporate Goal [Website]. (2020, June 26). Retrieved from https://m.post.naver.com/viewer/postView.nhn?volumeNo=28643977&memberNo=49631020&vType=VERTICAL
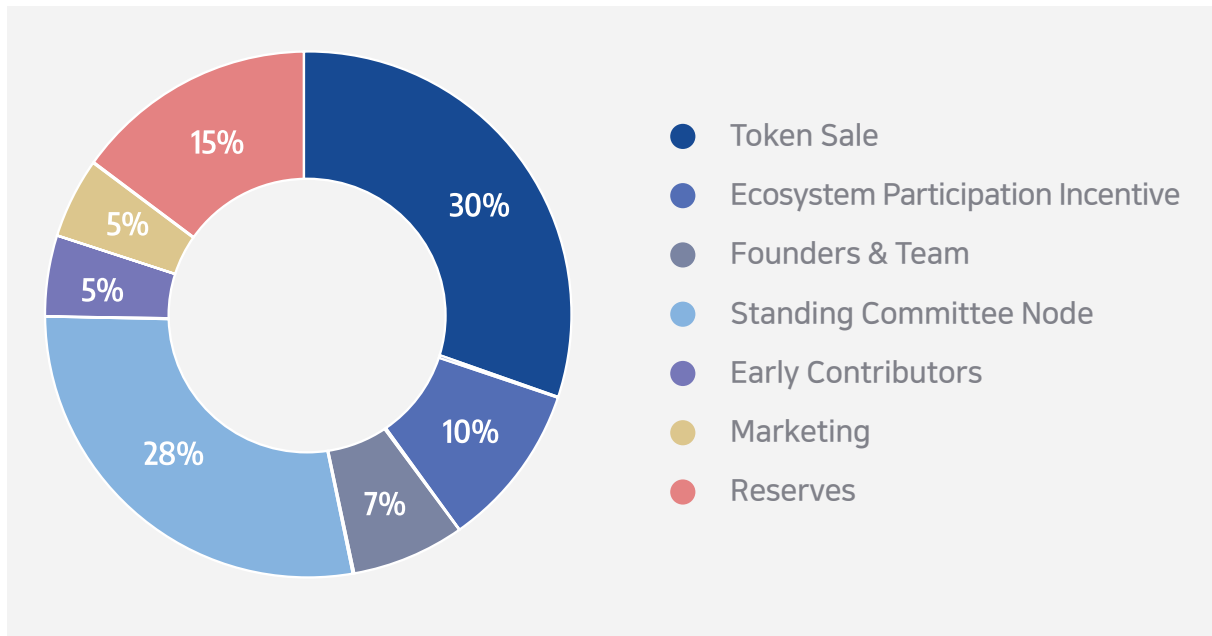
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06 ReapChain Token Economy

ReapChain provides economic incentives to the participants of the ReapChain network to encourage them to invigorate the ReapChain ecosystem voluntarily. In general, the nodes in which mine blocks get rewarded in the PoW(Proof-of-Work) system. In the PoS(Proof-of-Stake) system, participants get rewarded only by depositing cryptocurrencies over a certain amount. On the other hand, in ReapChain, anyone who holds REAP or just participates in the ReapChain ecosystem can be rewarded.

[Figure 11. ReapChain Token Economy & Reward System]

① REAP serves as a fuel in the ReapChain ecosystem. REAP is paid as rewards to holders of REAP who maintain the ReapChian network through transaction verification or block creation proportional to their shares from the accumulated transaction fee.

② Rewards are paid from gross transaction fee when one of two conditions is met. Rewards are paid at random when 100,000 to 110,000 blocks are created or are paid when the amount of accumulated transaction fee reaches 1 million REAP. If the accumulated amount of transaction fee exceeds 1 million REAP at the time of distribution, rewards are paid including the exceeded amount of transaction fee.

③ ReapChain pays rewards to REAP holders, standing committee nodes, steering committee nodes, and steering committee candidate nodes to invigorate the ecosystem of ReapChain. The allocation ratio of the rewards is 70% for REAP holders, 20% for the steering committee nodes and its candidate nodes, and 10% for the standing committee nodes. Double dipping is allowed.

I ReapChain Token Allocation

[Figure 12. Token Allocation]

1. Token Allocation

Total REAP issued: 4,900,000,000 REAP (4.9billion REAP)

Unit Price of REAP: 0.03 USD

- Token Sale 30%

  30 % of the total REAP issued will be sold with a lock-up period applied.

- Ecosystem Participation Incentive 10%

  10% of the total REAP issued will be distributed by 1% a year over for 10 years as incentives for participating in the ReapChain ecosystem. The payment will be made according to the contribution to standing committee nodes, steering committee nodes, and stake nodes when every 1.2 millionth block is created.

- Founders & Team 7%

  7 % of the total REAP issued will be allocated to founders and team members who contribute their effort to the success of the project. The token is distributed among founders and team members according to their contribution. Lock-up for 50% of the tokens allocated for founders and team members will be lifted after 12 months and the lock-up for the rest of 50% will be lifted after 24 months from the date of receiving tokens.

- Standing Committee Node 28%

  Since 2% of the total REAP issued is required to be selected as a standing committee node, 28 % of the total REAP issued will be allocated to the 14 standing committee nodes.

- Early Contributors 5%

  5 % of the total REAP issued will be allocated to Early Contributors who support our project from the beginning. The token is distributed among Early Contributors according to their contribution. Lock-up for 50% of the tokens allocated for Early Contributors will be lifted after 12 months and the lock-up for the rest of 50% will be lifted after 24 months from the date of receiving tokens.

- Marketing 5%

  5 % of the total REAP issued will be allocated to the marketing budget for various types of global marketing campaign to promote the ReapChain project. Lockup period for the allocated tokens for marketing will be determined for each marketing campaign.

- Reserves 15%

  15 % of the total REAP issued is for the corporate reserve. ReapChain will manage the corporate reserve to be maintained at 5% to 15 % of the total REAP issued.

2. Use of Proceeds from Token Sales

Proceeds from token sales will be distributed and operated as follows. (The allocation ratio will be calibrated according to priority considering the business condition.)

Field of Use	Allocation Ratio
Market Stabilization	40.0% (Buyback)
R&D	36.3%
Operations	11.0%
Marketing	10.0%
Capital Reserves	2.7%

3. Use of Platform Revenue

Revenues generated from ReapChain will be used for technical support, project promotion, and operation of ReapChain and its affiliated companies. Buyback can be executed using the revenue generated from ReapChain to stabilize the value of REAP when necessary.
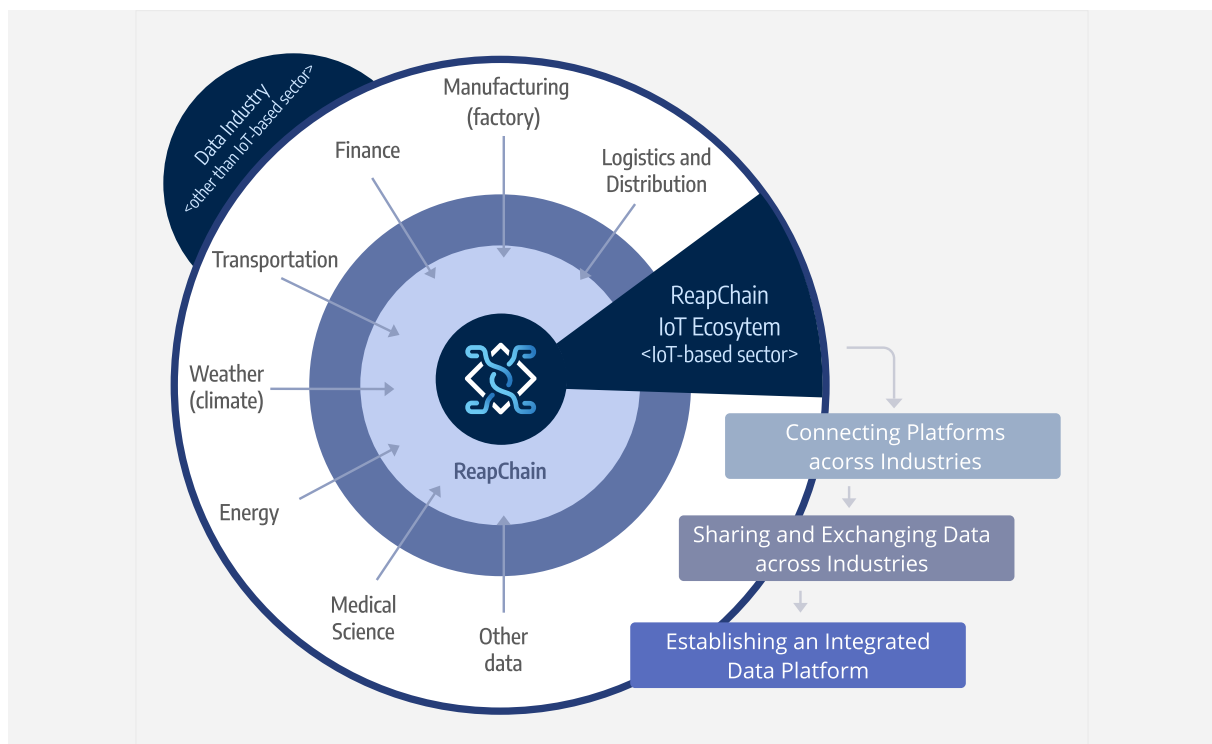
07 ReapChain Ecosystem

Starting with the IoT industry, ReapChain will realize a shared economy ecosystem in which blockchain-based DApp service providers and service users grow together through profit-sharing in industries such as FinTech and games.

Expanding the Platform Ecosystem into the Data Industry

'Data Economy' can be defined as the use of data as a catalyst for the development of other industries and the creation of new products and services. The concept of Data Economy is known to first appear in a 2011 report by The Gartner Group, an American IT research firm[7]. Various players such as companies, individuals, and the public sector will generate massive data in real-time and utilize it at the same time.

 Starting with the IoT industry, ReapChain will accomplish a blockchain-based data economy ecosystem that can share data generated and collected from various industries such as FinTech, games, distribution, and logistics on a single platform.

[Figure 13. Future plan of ReapChain]

[7.] The era of the data economy, capture data to gain hegemony [Website]. (2020, June 4). Retrieved form https://blog.naver.com/businessinsight/221989622310

08 Road Map of ReapChain

2022

4Q
REAPCHAIN Mainnet Performance Indicator Announced
Completion of advancement of middle chain for payment
Start NFT Marketplace Service

3Q
Mainnet officially opened
Started Reapchain-based NFT platform service

2Q
NFT Marketplace Construction
Advancement of middle chain for payment

1Q
REAPCHAIN-based NFT platform establishment
Started payment country service for small business payment system

2021

4Q
REAPCHAIN TestNet operation
REAPCHAIN-based simple payment "REAPPAY" official service
REAPCHAIN-based sales omission prevention system "Dream Tomorrow" official service

3Q
PID-based IOT logistics system open beta
REAPCHAIN-based simple payment "REAPPAY" open beta
REAPCHAIN-based sales omission prevention system "Dream Tomorrow" open beta
REAPCHAIN-based DID international standardization registration

2Q
Build service infrastructure scalability
REAPCHAIN-based simple payment "REAPPAY" closed beta test
REAPCHAIN-based sales omission prevention system "Dream Tomorrow" Closed Beta Test
Digital traditional market and delivery solution "JANGBODA" official service

2021

1Q
Establishment of commercial service environment and stabilization of operation
PID-based IOT logistics system closed beta test
REAPCHAIN Closed Beta Test
Closed beta test of digital traditional market and delivery solution
Establishment of commercial service environment and stabilization of operation

2020

4Q
Whitepaper Ver 1.0 released
Closed Beta Integration Testing
Build REAPCHAIN BaaS-based service infrastructure
Establishment of Microservice-based REAP Platform service infrastructure
Securing BM for spreading REAP Platform - Signed MOU with IoT device company
Securing BM for spreading REAP Platform - MOU with IoT platform service company

3Q
Whitepaper Ver 0.9 released
Alpha Integration Test
REAPCHAIN Beta (Ver 2.0) development and verification test
ReapMiddleChain Beta (Ver 2.0) development and verification test
Reap Platform & SDK Beta (Ver 2.0) launch and verification test
Reap Wallet (Ver 1.0) Open
Pre-Sale and exchange listing
Token Generation (TGE) and Distribution
MCU based object PID development

2Q
REAPCHAIN Alpha (Ver 1.0) development and verification test
ReapMiddleChain Alpha (Ver 1.0) development and verification test
Reap Platform & Reap SDK Alpha (Ver 1.0) launch and verification test
REAPCHAIN Token Sale - Private Sale 1st
REAPCHAIN Token Sale - Private Sale 2nd

1Q
REAPCHAIN MVP (Ver 0.8) Verification Test
ReapMiddleChain MVP (Ver 0.8) Verification Test
Whitepaper Ver 0.8 released
Seed Sale

2019

4Q

Reap Platform & Reap SDK (Ver 0.1) design and development

Smart Contract establishment and Reap Wallet (Ver 0.1) development

3Q

ReapMiddleChain (Ver 0.1) Design and Development

2Q

REAPCHAIN Mainnet (Ver 0.1) development

1Q

REAPCHAIN Mainnet planning and design

REAPCHAIN.Inc

09 ReapChain & People

Core Members

JAKE LEE
CEO

Graduated from Youngnam University in Mechanical Engineering

a member of the North Gyeongsang Youth Policy Committee.

a member of the Special Committee on Blockchain in North Gyeongsang Province.

Start-up, 13 years of Management in Fintech

SEUNGJONG LEE
COO

Department of Computational Statistics, College of Natural Sciences, Seoul National University

Adjunct Professor, Department of Computer Engineering, Korea Polytechnic University

Adjunct Professor, Department of Computer Engineering, Korea Polytechnic University Security IT-related and executive work at Samsung Electronics, Cellbig Co., Ltd., Mococo Co., Ltd., and Nemustech Co., Ltd. Line Plus Dev Rleation Lead

Outside Director, Korea Data Industry Promotion Agency

Member of Gyeonggi-do 4th Industrial Revolution Committee

Member of Gyeonggi-do Informatization Committee

Advisory member of Fair Trade Commission data portal establishment

KHAN KIM
CSO

New York University stern school of business

Columbia University MBA

Optima Consulting, LG Investment & Securities, LendLease, KPMG

SUHO KWON
CTO

Sogang University Computer Science, Operating System Lab.

Samsung Electronics, New Media Life, Samsung Techwin(Hanwha Techwin), SK Hynix, Pax Datatech

Present) Head of Education Center, KBIPA (Korea Blockchain Promotion Association)

Present) Head of ReapChain Research Center

More than 20 Years Experience in Embedded System Development and Software Quality Engineering

JAY YOO
CMO

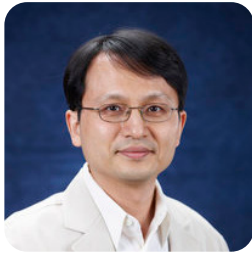University of Seoul, Ph.D. Candidate in Marketing Strategy

University of Minnesota (Twin Cities) MBA

Korea University B.A.

Present) ReapChain, General Manager

Present) SoongEui Women's College, Adjunct Professor

Former) 25 years of experience in marketing and strategy at Cheil Communications, Hyundai Corporation and Hyundai Motor Company

Advisors

HYEONSANG EOM

Ph.D. Computer Science, the University of Maryland at College Park (UMCP), Maryland (MD), USA, 2003

Distributed Processing and Computer/Embedded System

Computer System/Network/Application/Software Performance Engineering

Mobile Application/Middleware (Including Security)

15 years of experience at Seoul National University Professor Distributed Computing Systems LAB

TAEHONG KANG

Graduated from Soongsil University majoring in Electronic Calculation

Doctor of Computer Science at Soongsil Graduate School

Present) Professor of Soongsil University Graduate School of Information Science

Present) Vice President of ROBOPIA INVESTMENT INC., CTO

Former) Advisory Councilor, KOSCOM INC. Former) Vice President, DELIGHT CHAIN INC., CTO

Former) Director, Korea Information Processing Department

Former) Director of the Korea Information Science Society

Former) Director of the Global FinTech Industrial Development Center

CHULHO LEE

Present) Assistant Professor, Department of Business and Technology Management, KAIST

Ph.D. in Management Science, The University of Texas at Dallas, USA

M.A. in Business Administration, Pusan National University, KOREA

B.S. in Business Administration, Pusan National University, KOREA

Associate Professor, Department of Management Science and Engineering, Harbin Institute of Technology, China

Visiting Assistant Professor, Department of Management and MIS, Xavier University, USA

Economics of Information Security

Behavioral Economics of Privacy and Security

Empirical Study of Information Systems

SEUNGHUN HAN

University of Central Florida Finance Ph.D

University of South Carolina Statistics M.S

Present) Korea Advanced Institute of Science and Technology(KAIST) Faculty of Technology Management AACSB AOL (Assurance of Learning) Associate Professor

Present) Korea Information Sociology Society Director and Vice Chairman

Big Data, Economics, Science, and Technology Society, Council Member 2018 Excellent Lecture Award

Chairman of AACSB AOL Committee, Faculty of Technology Management

Steering Committee, Graduate School of Technology Management

AACSB Committee Member, College of Business Administration

Other Undergraduate Admissions Committee members, Additional TA Improvement Committee members, ICC Internationalization Committee member, Participated in the financial engineering minor program operation committee and Korea-Japan CAMPUS Asia project group

Research papers selected from 54 [Academic achievements of KAIST 2012]

HYUKJUN KWON

Soonchunhyang University, Department of Economics and Finance, Assistant Professor

Ph.D. in Information System, Yonsei University

Yonsei University Master of Business Administration

Present) KOMSCO Blockchain Advisory Professor

Present) Promoter and Steering Committee of the Korean Blockchain Society

Present) Vice President of the Korea Payment and Payment Association

Present) Director of the Korea Information Processing Society

Present) Director of the Korea Electronic Commerce Association

Present) Advisory Professor, Blockchain, Korea Insurance Development Institute

Present) Commissioner of the Korea Institute of Behavioral Sciences

Former) BK21 Senior Researcher (Yonsei University Graduate School of Information)

Former) Promoter of Korea Information Technology Convergence Society and Director of Industry-University Cooperation

Blockchain, Distributed Leger Technology Fintech,Token Economy VR and AI

CHEOLHWAN KIM

Graduated from Seoul National University in Electronic Engineering

Present) Professor at Hanyang University

Present) Advisor, International Genuine Management Association

Present) Advisor, AVI U Systems Co., Ltd.

Present) Consulting for Gdynet Korea

Present) Productivity Center Blockchain Lecture

Present) ICT Polytech Blockchain Lecture

Former) DACOM Distributed Transaction Processing Application Development

Former) Gigalink Founder (Network Equipment Development)

Former) Director, Intops (Russia, Israel New Technology Project)

Former) Israel MusicGenome / ExpoBee Korea Consultant

Former) K-ICT Mentoring Center, Korea Youth Entrepreneurship Foundation

Former) Korea Technology Venture Foundation Mentor

Advisors

HYUNWOO YI

Graduated from the Department of Law, Korea University

Seoul National University Graduate School of Law (Basic Law major)

Passed the 40th Judicial Exam

Completed the 30th Judicial Research & Training Institute

Aram Law Firm - ARAM

Law Firm - SOJONG

Law Firm - HUMAN

Law Firm - DONGIN

Law Firm (Limited) – DR & AJU

Present) Law Firm (Limited) - BARUN lawyer member

Present) Advisory Committee, Legal Advisory Group, International Investment Dispute, Ministry of Justice

Present) Member of the Legislative Analysis Review Committee

Present) Member of the Regulatory Review Committee of the Ministry of Employment and Labor

JONGWON KIM

Graduate from Department of Metal Engineering, Seoul National University

Present) Executive director of Korea Blockchain Industry Promotion Association

Former) CEO of Governtech

Former) Outside Director, Seoul Metro

HOSUP KAN

Certificate at Fashion Institute of Technology. NewYork

Drexel University. Philadelphia. Dept. of Fashion Design M.S

Sungkyunkwan University. Seoul. Dept. of Fashion Design B.S/Ph.D

Designer & Illustrator for Kokin Inc, Nicole Paris, DKNY(Donna Karan New York)

Creative Director for Amore Pacific Co.,Ltd. Men's Cosmetic 'ODYSSEY SPORT'

Fashion Director for SK stoa Co.,Ltd.

Mentor for Project Runway Korea Season 1~4

25 years of Experience in Professor, College of Design, Dongduk Women's University & Professor, College of Fine Art, Hongik University

Visiting Researcher of Harvard University,Boston

President in Korea Fashion & Culture Association

President in The Korean Society of Fashion Business

SUNGJIN KIM

Graduated from Busan University with a master's degree in computer science

A mentor specializing in Samsung Multicampus Blockchain and big data

Korea Communications Commission & TTA DMB/IPTV Technical/Service Standards Committee

ISO/IEC MPEG-2/4 International Standard Committee

28 years of experience in Media service platform at Samsung Advanced Institute of Technology, Pan Media and IT development, including digital twin and Blockchain.

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Investment Risk

ReapChain Inc. is notifying a variety of risks to purchasers including the probability of occurrence of substantial loss relative to payments made for purchasing REAP. This document does not provide any guarantee as to the accuracy of the information about the burden of risk or uncertainties enumerated hereunder.

Trading and holding of REAP constitutes agreement to such purchasing of REAP by purchasers who have recognized the burden of risk that is inherent as they stand, explicitly without any type of guarantees.

1. Blockchain Risk: transaction processing may take longer than expected or be nullified due to congestion in the blockchain system. Notably, a smart contract, intended to issue and distribute REAP, is based on Ethereum's blockchain technology. The Ethereum protocol may contain both weakness and vulnerability, and various bugs including a bug that causes loss of REAP may be occurred. In addition, those Ethereum blockchain-related issues may incur material damages to ReapChain Inc. and REAP purchasers.

2. Privacy Risk: personal information of users is required for distributing and controlling REAP that are stored in users' digital wallets. Accordingly, those REAPs stored in purchasers' digital wallets may be lost upon the exposure of personal information. Even worse, the exposure of personal information may allow the third party to have access to digital wallets for stealing REAPs.

3. Security Risk: like all other cryptocurrencies, Ethereum is also vulnerable to mining attacks such as a 'double-spend attack' or a '51% attack'. Hackers or other groups with malevolent intention may attack ReapChain Inc. or REAP by using any of the assaults stated above, and the success of the intended assault on a blockchain may badly damage the transaction of REAP and REAP itself.

4. Digital Wallet Compatibility Risk: users shall use a digital wallet that is technically compatible with REAPs for buying and storing them. Digital wallets that are not compatible may not allow users to access to the purchased REAP.

5. Force Majeure Risk: ReapChain is still under development and ReapChain Inc. uses reasonable efforts for ReapChain to develop and to stay to true to the source of the whitepaper. However, the details of the content including laws, design, technology, administrative regulations and others are subject to change for various factors. Irresistible events such as changes in the regulatory framework, required permission and license or in tax policies, and the emergence of a platform or open source that would have an adverse effect on ReapChain Inc. or ReapChain, lack of interest in market and other similar situations may arise in the journey of developing ReapChain. ReapChain Inc., in this regard, shall be free from all the liabilities and compensation for damages such as on the decrease of REAP value as well as for liquidity loss arising from those factors.