LEDGER NODE

WHITE PAPER

VERSION 1

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1 Who is LEDGER NODE?

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 crucial1 .

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 problems2 are limiting factors in boosting the blockchain-based industry.

LEDGER NODE is not just trying to implement the main net for cryptocurrencies. LEDGER NODE 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.

LEDGER NODE presents the following mission and vision.

Mission & Vision

- **Mission**

  LEDGER NODE 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 LEDGER NODE

  - 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.

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

  - 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.

LEDGER NODE 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 LEDGER NODE 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, LEDGER NODE provides the main net protocol specialized for each industry through $LEN unique blockchain-based technology innovation to overcome the limitations of existing main net protocols. Also, LEDGER NODE implements a practically usable main net protocol that can solve the scalability and versatility problems that DApps are struggling to solve.LENChain selected the IoT industry as the first step in applying the developed protocol. Starting with the IoT industry, LENChain 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 LEDGER NODE possesses the unique blockchain structure, shellcore structure, the new consensus process, pre-confirmation, and LENMiddleChain which can be customized according to the characteristics of individual industries. It is the LENChain protocol's core philosophy to realize practically usable blockchain for all industries with LENChain's unique technology

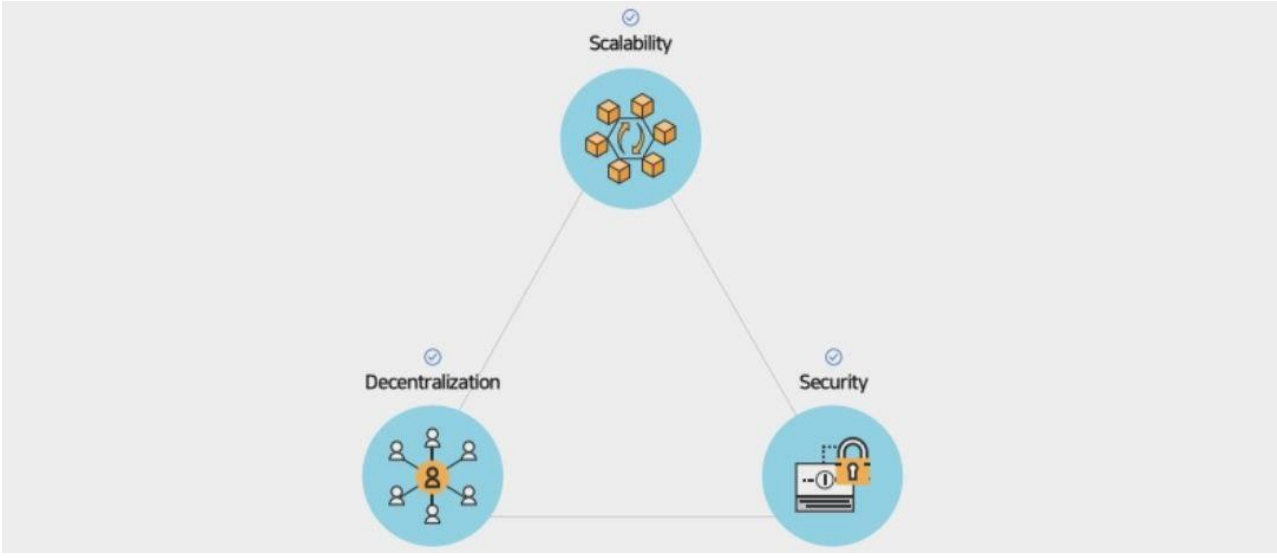
2 Why LEDGER NODE?

❖ 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 limitations3 . 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]

❖ LEDGER NODE 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, LEDGER NODE 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 LENChain'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 realtime is impossible because they establish transparency and reliability of transactions through accomplishing consensus among all network participants.

LEDGER NODE 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.

LENchian provides LENMiddleChain, 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 LENMiddleChain with a single main net protocol, LENChain supports the requirements of individual industries. At the same time, LENChain solves compatibility problems by integrating multiple main net

protocols. Ultimately, LEDGER NODE 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.

LEDGER NODE aims to achieve LENChain's activation by offering LENSDK, which supports the compatibility of various developing languages such as java, c#, and c++ and providing a DAppfriendly development environment so that developers without knowledge of blockchain can easily develop blockchain-based services.

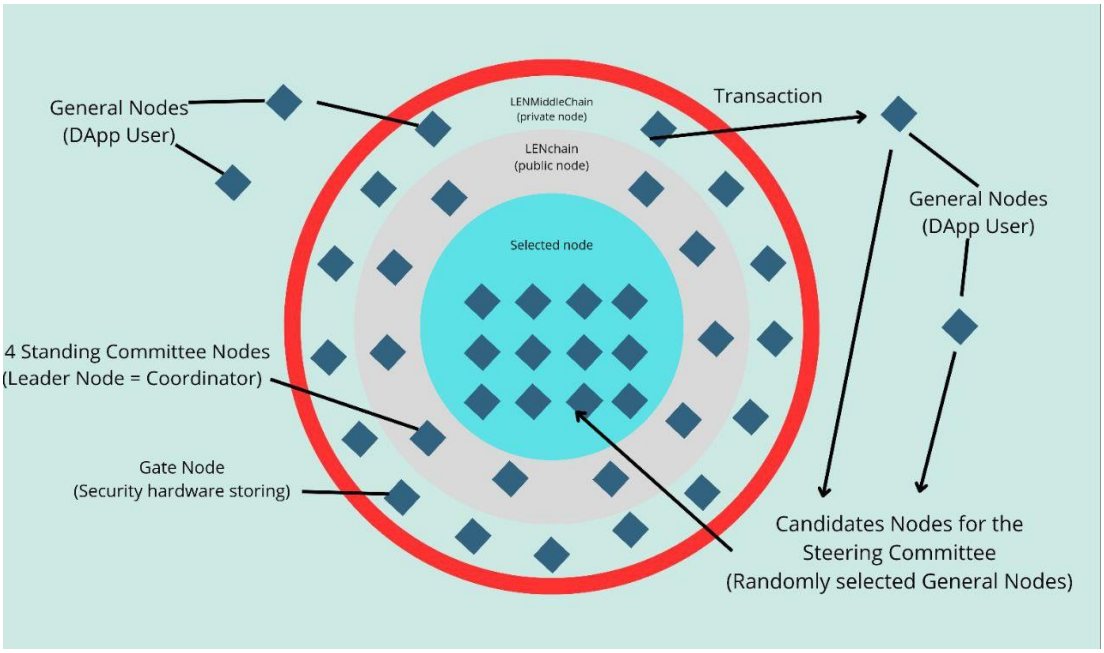
3 What is LEDGER NODE?

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

LENChain Protocol

❖ Shell-Core Structure

Shell-Core Structure is a core of the LEDGER NODE protocol that integrates a private blockchain and a public blockchain perfectly to form a double-layered chain. As shown in [Figure 4.] ShellCore Structure places the private blockchain, LENMiddleChain 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 LEDGER NODE to solve the decentralization and security problems.



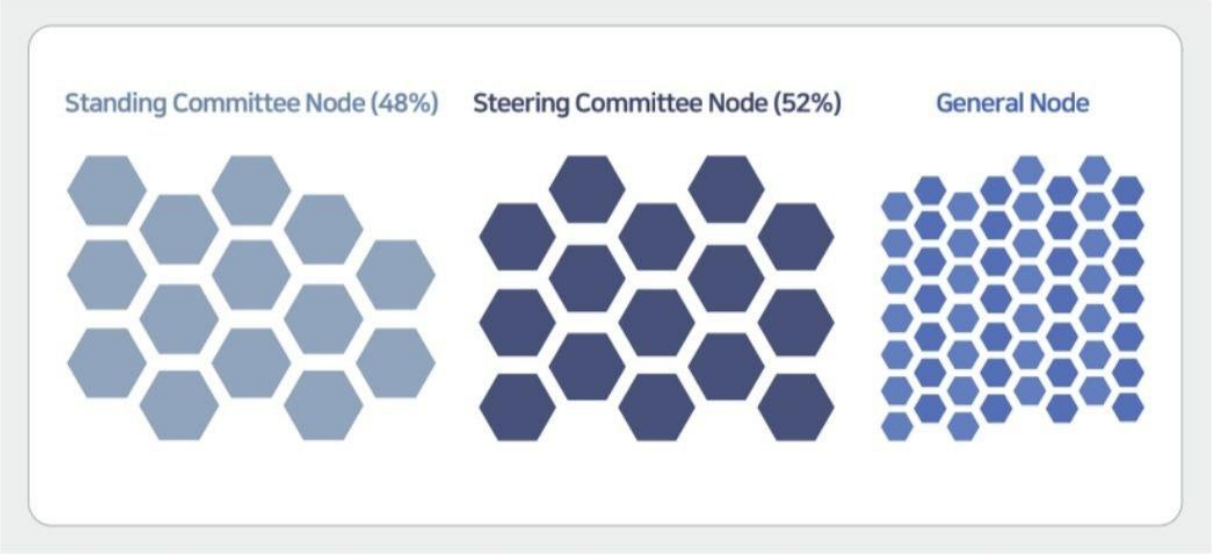
[Figure 4. Shell-Core Structure]

❖ LENMiddleChain

LENChain adopts the concept of 'Temporary Ledger' and 'Permanent Ledger' from the securities industry to solve the problem of the transaction processing speed. LENMiddleChain, 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). 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 LENChain, a public blockchain, and is recorded in permanent ledger.

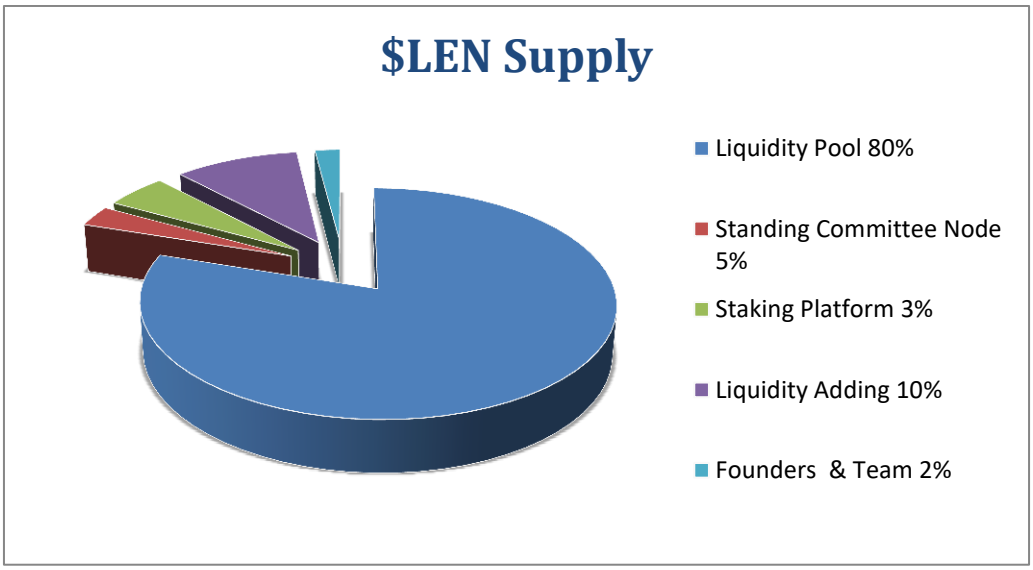
❖ PoDC (Proof of Double Committee) Consensus type

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, LEDGER NODE 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 LEDGER NODE. 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.



[Figure 6. PoDC (Proof of Double Committee]

4 LEDGER NODE Token Alocation



Supply Alocation

Total supply LEDGER NODE is 100.000.000.000 (100 billion $LEN)

- **Liquidity Pool 80 %**

  80 % of the total $LEN issued will be sold with a lock-up period applied.

- **Standing Committee Node 5%**

  5 % of the total $LEN issued will be allocated to the 14 standing committee nodes.

- **Staking Platform 3%**

  Staking also helps control coin inflation and increases the value of those coins in the market. Thus, crypto staking provides double benefits for coin holders, namely stable income and increased investment value growth.

- **Liquidity Added 10%**

  Liquidity is related to the activity of converting an asset into cash efficiently, quickly and practically. This is also related to the potential for significant and drastic price changes to occur during the buying and selling process.

- **Founders & Team 2%**

  2% of the total $LEN 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.

5 ROAD MAP of LEDGER NODE

Q 1

- LEDGER NODE Launch on Binance Smart Chain Network
- Organic Community Building
- Whitepaper V1 Released
- Website Release (V1)

Q 2

- Event for our project introduction
- Social media Released
- Usecase Design Planing

Q 3

- Dapp swap release
- Staking Platform
- Audit
- Community building

Q 4

- $LEN Testnet Build
- Release testnet
- Event testnet operation
- NFT Marketplace Service

Q 5

- Build Mainnet
- Mainnet Release
- Event Mainnet operation
- Token Generation (TGE)
- Audit

Q 6

- Huge Event Marketing
- Partnership Programm
- CG & CMC Listing
- CEX Listing

6 DISCLAIMER

LEDGER NODE is notifying a variety of risks to purchasers including the probability of occurrence of substantial loss relative to payments made for purchasing LEDGER NODE. 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 LEDGER NODE constitutes agreement to such purchasing of LEN 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 LEN, 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 LEN may be occurred. In addition, those Ethereum blockchain-related issues may incur material damages to LEDGER NODE

2. Privacy Risk: personal information of users is required for distributing and controlling LEN that are stored in users' digital wallets. Accordingly, those LENs 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 LENs.

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 LEDGER NODE by using any of the assaults stated above, and the success of the intended assault on a blockchain may badly damage the transaction of LEDGER NODE.

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

5. Force Majeure Risk: LEDGER NODE is still under development and LEN uses reasonable efforts for LEN 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 LEN, lack of interest in market and other similar situations may arise in the journey of developing. LEN, in this regard, shall be free from all the liabilities and compensation for damages such as on the decrease of LEN value as well as for liquidity loss arising from those factors