FILANCE :
Decentralized Storage Layer Platform

FILANCE Foundation
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1. Introduction: Business Background

1.1 Toward Web 3.0 from Web 2.0

Modern people read the world through Facebook and YouTube, communicate with the people around them through SNS, and are practically surrounded by Internet services. The current Internet, which is closely intertwined with modern life, is called Web 2.0. Web 2.0 extends the concept of data generated by the first Web 1.0 to uncover the value of metadata and relationship data. Web 2.0 has become a relationship-oriented network that encourages the public to participate in the utilization of data through hashtags and recommended mechanisms in the indiscriminate production of data. As a result, SNS became the biggest hit created by Web 2.0.

Human-human communication created by Web 2.0 is developing into a semantic web service, where services directly fill the needs of individuals, through which humans and machines communicate directly along with technology. In the world of semantic web services that process data to create added value, data has become a commodity and an important resource in itself. Currently, most of the data on the Web is stored through enterprise cloud repositories or IDC centers. The enterprise cloud storage market is a heavily overloaded market with 80 percent of the total being occupied by giants such as Amazon, Microsoft, Google and Alibaba. These centralized entities are randomly prioritizing the data that is passed to users. Due to the soaring value of data, an appropriate alternative to prevent monopolization and control of data is urgently needed.

The concept of Web 3.0 has emerged to solve the problems of Web 2.0. To date, Web 3.0 is more of a social consensus to create a macroscopically better Internet ecosystem than a truly defined technology. Web 3.0's network is more resilient and resistant to physical failures. Web 3.0 does not deny the value of the data and refuses to monopolize, control and censor the data. The public expects Web 3.0 to provide personalized services that are more reliable, secure and ensure data sovereignty.

1.2 Blockchain: The Backend of Web 3.0

Bitcoin, the first blockchain developed into a digital payment system, is a proof of concept for a trust system without a trusted third party. Bitcoin has led people to believe that digital information can store and exchange values, and in the process, no one other than algorithms can be involved. On top of it, Ethereum showed that it was possible to create an algorithm-based e-commerce, or service, and called it a smart contract. As many people have added their visions to the future that Bitcoin and Ethereum have shown, the possibilities of the blockchain are expanding to Decentralized Identity(DID), Decentralized Finance(DeFi), and Decentralized Storage. Blockchain-based services are gradually creating a service ecosystem that is more reliable, safe and ensures data sovereignty.

As we saw earlier, the paradigm shift that the blockchain will bring is little different from what Web 3.0 is drawing. Web 3.0 will be realized by the blockchain and its utility will be demonstrated by Web

3.0. Blockchain will give the web environment greater reliability and safety, including fault tolerance and censorship resistance. As a result, Web 3.0 will be the web itself, which will be changed by the new value that the blockchain provides.

At this point, the blockchain is technically insufficient to replace Web 2.0 intact as a backend of Web 3.0. This is because the blockchain's data storage capacity is very limited to accommodate the enormous amount of data that the Web stores. Most blockchains consist of a structure in which all data is written together to the block within a transaction without a special data storage layer. As a result, the more data written to the block, the more data the nodes should send and receive, and the client should keep more data in memory for verification of the new block-all block data in Bitcoin, and the latest status of all accounts in Ethereum. In this environment, the performance of the blockchain is bound below the upper limit of data storage speed and physical performance of the storage space.

In order to improve the performance of the blockchain and expand the blockchain-based services, separation of the distributed ledger of the blockchain and the data storage layer is necessary. The separation of the data storage layer will make the performance of the blockchain sufficient to make Web 3.0 a reality and make the semantic web of Web 3.0 feasible through the blockchain. As a result, the data storage layer in the blockchain will work as a data layer for Web 3.0.

1.3 Decentralized Storage: Requirements for Data Layers

Although the blockchain structurally ensures complete security and safety of the data, this is limited only to the data inside the blockchain and not for the data from the outside. Since there are virtually no countermeasures against forgery of external information, the presence of the external data provider in the system becomes a security breaching point. Thus, in order to guarantee the security of the blockchain, every medium interacting with the blockchain must possess the same level of security to the blockchain, a matter of fact, it shall only be a blockchain itself. Likewise, the data layer of the blockchain should be a blockchain based decentralized storage system.

A decentralized storage must meet several conditions to ensure the security and safety of the blockchain. First, it must guarantee the confidentiality of the data. In decentralized storage, all data should be encrypted to ensure the owner's data sovereignty, and should be managed in the way that the confidentiality of the content and source of data itself is guaranteed. In addition, the retrieval of such data should be made only by due process of legitimate users. Secondly, decentralized storage must ensure the integrity of the assigned data. The storage network must be able to prevent forgery or loss of data while it is stored. Also, the storage network should be able to verify the soundness of the storage provider's operation while keeping the confidentiality of the assigned data. Finally, decentralized storage should provide sufficient convenience in the process of storing, retrieving and deleting the data.

1.4 Current Status in Distributed Storage

Currently, there are various distributed storage services in the market, some of which are oriented toward decentralized storage. Among them, the representative project is as follows.

• Siacoin

As the first practical decentralized storage service, Siacoin has a stable decentralized structure with no single point of failure, providing a rather affordable and fast storage. In the Sia network, users spend Siacoin to purchase storage space from storage providers, while storage providers spend Siacoin as collateral in each file contract. The storage provider must periodically submit proof of storage for assigned data and, if the evidence fails, deducts a fine from the collateral. The Sia blockchain forms a file contract between the users and the storage providers creating cryptographic hash from contract information.

At the Siacoin client-side, the user's data is divided into 30 pieces and individually encrypted before being distributed and stored in the network. To ensure the integrity of the data, the Sia network maintains redundancy of the assigned data, providing Byzantine fault tolerance. Since proof of work is the main feature of the Siacoin, which is an advantage of increasing the safety of the network and a disadvantage of lowering the scalability of the platform, newly joining storage providers must download and synchronize the whole Sia blockchain data.Although it has been five years since the service was launched in 2015, the level of activation is so low that total data usage is only 700TB.

• Filecoin

Filecoin is a distributed storage platform that introduces its own blockchain-based incentives on the proposed distributed system, IPFS (Inter-Planetary File System), to replace http in a centralized structure. In recognition of the possibility, the company attracted more than 60 billion won in investment from large venture capital such as Sequoia Capital and Union Square during its funding in 2017 and succeeded in raising nearly 300 billion won through ICO. Although it is currently in the testnet stage, it is expected to secure 200 PB of data storage.

In Filecoin, users can use Filecoin Tokens (FIL) to request the storage and retrieval of data. Networks mediate contracts between users and nodes which earns FILs by providing data storage service and data retrieval service under contract. The storage provider periodically generates cryptographic proof to prove the integrity of the assigned data The Filecoin network can verify the integrity of the data while conserving the confidentiality of the data by Zero-Knowledge Proof.

However, Filecoin network does not support data encryption at the client level and redundancy of data, so the assigned data is extremely vulnerable to damage and leakage. In order to ensure the data confidentiality and integrity in Filecoin, users must encrypt and encode their own data and keep the replica prior to using Filecoin DSN.

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- Storj

Storj is a protocol that collects extra data storage that individuals voluntarily provide and makes it into a dropbox-like cloud storage service. Unlike Siacoin or Filecoin, which requires payment of service fees through its own token, Storj has a payment system fixed in Dollars, which is legal currency. As with Siacoin, Storj guarantees the integrity of the assigned data by encrypting on the client-side and maintaining sufficient replicas within the network.

In the Storj network, however, data stored in the distributed network is connected to users exclusively by the Storj's service node that controls the network and can be a single point of failure. As a result, storj is more of a centralized service using distributed storage than a decentralized storage.

- Swarm

Swarm is a distributed data storage project pushed by the Ethereum Foundation to be a data layer of Ethereum's WEB 3 stack. Swarm is to be data storage similar to the IPFS of Filecointhat is integrated into Ethereum's compute layer, can be manipulated by Ethereum Virtual Machine and Ethereum smart contracts. Since Swarm is still a project under development, it is difficult to assess data confidentiality, integrity and ease of use until development is completed.

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2. FILANCE, Decentralized Storage Layer Platform

2.1 Vision of FILANCE Foundation

Distributed storage services have the potential to address the problems of data monopoly and control that Web 2.0 has, the limitations of performance in the blockchain, and the limitations of implementing DApp services at the same time. Despite its potential value and potential, distributed storage services have yet to overcome inherent limitations and are evolving slowly.

FILANCE is a project aimed at providing users with optimized distributed storage services for the popularization of IPFS and distributed repositories. FILANCE will provide a 1) FILANCE Decentralized Personal Vault for individual users, and 2) FILANCE Decentralized Storage Bridge for the service operator.

In the FILANCE Decentralized Personal Vault, users can safely store personal data on IPFS via a web browser. All data will be encrypted on the client by encryption keys linked to the user's secret key, as a result, the actual data will be protected from the operational principal. This will provide distributed storage services that ensure dropbox-level usability and complete data confidentiality, integrity and censorship resistance.

FILANCE Decentralized Storage Bridge is a service that connects public blockchain platforms with distributed data storage solutions for DApps that are already in service on existing public blockchain or that will be implemented in the future. In the FILANCE Bridge, DApps can naturally use all the functions provided by distributed data stores. The initial version of the FILANCE Bridge will be the bridge between Ethereum, the most practical DAPP platform now, and Filecoin, which has built the largest decentralized storage network now.

Through Decentralized Personal Vault and Decentralized Storage Bridge services, FILANCE aims to meet users' aspirations for distributed storage services and contribute to the spread of the IPFS ecosystem. To this end, FILANCE will accelerate the spread of the ecosystem by participating in a network of distributed storage services and operating directly nodes.

2.2 FILANCE Decentralized Personal Vault

As the realm of web services is expanding, individuals are producing more data to communicate with the web. Individualized web services are increasingly approaching sensitive and dangerous areas of information produced by individuals, but the space on the web where these data will be stored does not provide adequate safety. The Web-based cloud data store is a very centralized market, and limited regulations alone cannot prevent service entities from viewing personal data. Currently, there is no data storage solution for individual users to store their sensitive information-for example, a secret key in an Ethereum wallet or a copy of his ID card-with confidence.

FILANCE Decentralized Personal Vault (FILANCE DPV) is a solution for storing sensitive information

from individual users safely and conveniently. FILANCE DPV has three characteristics that traditional cloud storage or distributed storage solutions are not satisfied with. First, all services on the FILANCE DPV are convenient and safe to use in a web browser. Second, the FILANCE DPV will use the blockchain and IPFS technology to ensure the safety of the blockchain level in the process of storing and retrieving data. Thirdly, all user data will be encrypted at the client level in the FILANCE DPV, and the operating entity will not be able to look up that data.

The FILANCE DPV is technically divided into three tiers: user, blockchain and IPFS. The user owns the secret key required for data and service use and uses the service through the web browser. The user's secret key will be encrypted and stored by the PIN code in a non-reportable form within the device's browser storage. In order for users to use services such as inquiry, upload and download data, digital signature of the corresponding secret key is required through PIN code input. The user's data will be encrypted by a data encryption key operated by a secret key at the client level.

A blockchain is a layer in which the public key registered in the user's account, the data encryption key encrypted by that public key, and the address of the encrypted data uploaded by the user are stored in the form of transactions. In the FILANCE DPV, the blockchain stores only the clues and user activities needed in the data encryption process. As a result, the operator cannot monitor the actual data, so the confidentiality of the data can be kept intact.

IPFS is the end point where the user's data is encrypted and stored. Unlike HTTP, IPFS is a robust system with no single points of failure, making it easy for users to check the integrity of their data. In the FILANCE DPV, all users' data will be protected from forgery and loss by the reliability of the IPFS.

As a result, the FILANCE DPV service is a private service that provides both high convenience based on a web browser and safety and complete censorship resistance based on a blockchain and IPFS. However, to achieve both user convenience and the safety of the data at the same time, many transactions are inevitable in the course of use. To overcome the problem of service cost owing to the burden of gas charges and low service responsiveness in the public blockchain, the FILANCE DPV service will be serviced using its own private blockchain.

2.3 FILANCE Decentralized Storage Bridge

At this point, the link between DAPPs and distributed repositories in service on top of existing blockchain platforms will not take place quickly. This is because they are still not prepared for contact with existing blockchain platforms and distributed storage services. Among the existing distributed storage services, the only service that can be linked to the blockchain platform serviced by DAPP is Swarm, which is still being developed, and other services have failed to be implemented or have only plans yet.

The second reason why distributed repositories are not ready to use is the low usability of existing services. Most distributed storages currently in service are designed primarily to offer incentives to

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nodes that provide storage and to monitor their activities to maintain the network, not to give sufficient usability to users. For example, in order to use Filecoin, users must encrypt their data and maintain enough replicas to keep the data safely with their own hands.

The fact that the use of their own tokens is forced to use distributed repositories is also an inconvenience to users. This is because service costs change from time to time due to the inherently high price volatility of cryptocurrency. In addition, in the case of Siacoin or Filecoin, service costs fluctuate from time to time because it is the way users bid through the exchange when they request the storage of data. To operate services using such distributed repositories, one has to endure unforeseen operational expenditures.

In conclusion, from the perspective of a DApp service provider, using distributed repositories as data layers is not as easy, technically or economically, as existing Web services use commercial DB servers. At this point, in order for DApps and distributed data stores to interact, a bridging system that connects DApp platforms and distributed storages to interoperate is needed.

FILANCE is an inter-blockchain data access system between distributed storage services and existing public blockchain platforms. FILANCE is targeted to help every blockchains and DApps use distributed storage services freely. This means that FILANCE will solve the difficulties of using distributed storages as a primary data layer on its backend so that DApps can use distributed storage services as if using commercial DBs. In addition, FILANCE will interconnect blockchains platforms and distributed storage services securely and independently through its own gateway node. To keep the transparency and security of service during the interoperation, the interface between blockchain and distributed storage will be managed and protected by the FILANCE mainnet.

FILANCE ultimately aims to connect all blockchains with all distributed storage services, but considering the reality and efficiency of the services, it is necessary to focus on feasible goals. The first version of FILANCE will focus on building the bridge between Ethereum, currently the most practical DApp platform, and Filecoin, which has now built the largest distributed storage network. After successful building of Ethereum-Filecoin Bridge, FILANCE will support more blockchain platforms and distributed repositories sequentially.

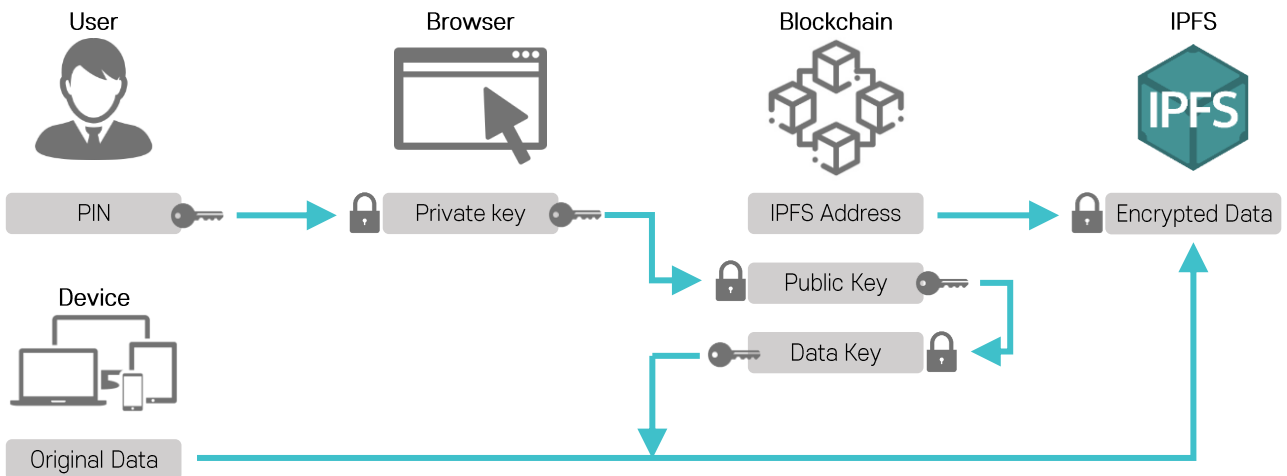≋ FILANCE

3. FILANCE System Configuration

3.1 FILANCE Decentralized Personal Vault

FILANCE users can store their personal data on IPFS via the Web browser using Decentralized Personal Vault service, FILANCE DPV. Users who have completed membership and KYC can create a FILANCE Blockchain account and register secret and public key pairs. Registered secret keys are stored in a non-reportable form within the user's web browser and are restored only by the user's PIN code authentication. The public key is registered with the data key that is encrypted with the corresponding public key on the Blockchain Mainnet account.

If a user connects through a new device, a new pair of secret key public keys can be registered in the system through KYC. In the FILANCE Blockchain, a user's account can have multiple pairs of public key secret keys, and the user can use the service simultaneously on multiple devices.

In the FILANCE DPV, all data is encrypted by the data encryption key at the client level and stored in the IPFS. In order to activate the data encryption key in the process of uploading or downloading data, the user must manually enter the PIN code to activate the secret key stored on the device. In the blockchain, only the user's public key, encrypted data key, user's activity record and IPFS address of transmitted data are stored in the form of transactions, and no actual data is stored.

As a result, users can use distributed repositories based on blockchains and IPFS via simple PIN codes instead of complex secret keys in Web browsers. All data is encrypted from the client and stored in the IPFS, and the operating entity and the blockchain have no idea about the actual data. In the process, the blockchain uses digital signatures to verify users' normal requests and prevent data leakage and falsification.

<FILANCE Decentralized Personal Vault Structure>

- Web browser

FILANCE DPV is a web browser-based service. Users can conveniently upload and download their data on the Web. All user activities on the Filter DPV will take place through the UX/UI equivalent to web surfing instead of the UX/UI on the inconvenient blockchain.

Users can register secret key public key pairs for the FILANCE Blockchain through KYC. The user's secret key will be stored in a non-removable form within that browser storage. The user's secret key will only be restored and used by the user's registered PIN code.

- FILANCE Blockchain

FILANCE Blockchain will record in the ledger all activities that occur during the user's use of the FILANCE DPV in the form of transactions. The user's public key and the data encryption key encrypted by the public key are also registered in the user's FILANCE Blockchain account. As users upload and download data, the data will be encrypted and decrypted by the corresponding data encryption key.
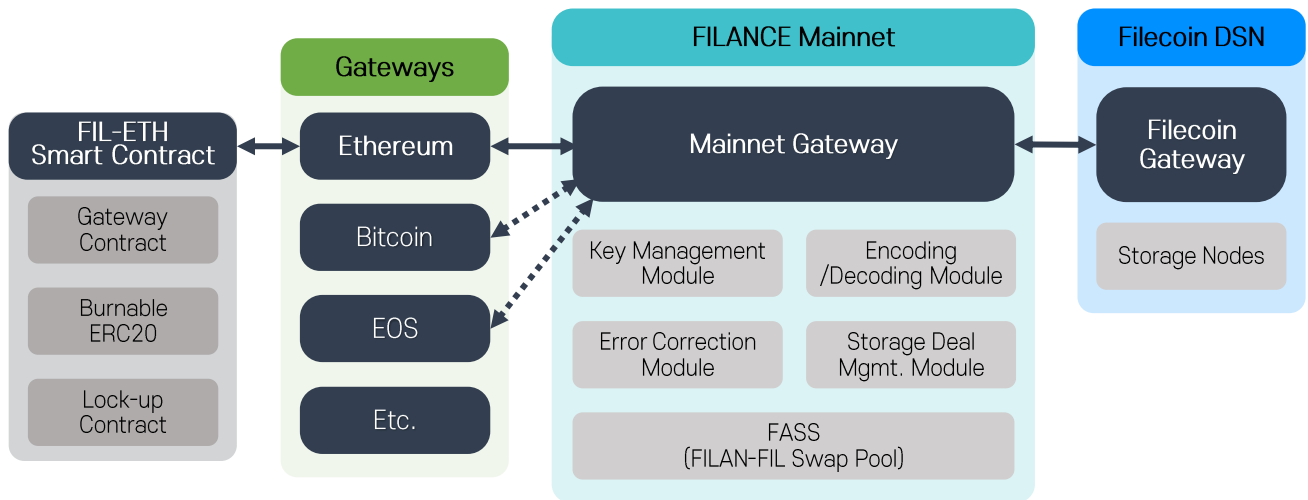
- IPFS

The user's data encrypted on the client is stored in the IPFS. The address of the stored data is registered in the form of transactions in the user's blockchain account. Depending on the development progress of FILANCE, IPFS of the FILANCE DPV service may use a file coin DSN or its own IPFS node or other distributed repositories.

3.2 FILANCE Ethereum-Filecoin Bridge

At the FILANCE Ethereum-Filecoin Bridge, users can access all services provided by Filecoin through FILAN, FILANCE's utility token. All intermediate processes in which the user's data is stored in a Filecoin network, including storage leasing, renewal, and recovery, will be automated through the FILANCE mainnet. In order to protect the confidentiality and integrity of the user's data and provide sufficient usability, FILANCE will provide a secure secret key management system, data encryption and error correction encoding and decoding services.

FILANCE plans to operate its own file coin nodes in order to link them with stable Filecoin and reduce long-term operating costs. FILs acquired by the FILANCE Foundation during node operations will be offered to FILANCE users for exchange through an auction. A portion of the data storage space held by FILANCE will be provided directly for the stable supply and demand of distributed repositories for users.

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<FILANCE Ethereum-Filecoin Bridge Component>

- Gateway

Unlike most existing blockchains, where only transfer records are stored on distributed ledger, Filecoin block records a variety of information related to data storage request, retrieval request, proof of storage and pledge of storage. This makes it a lot difficult to convey enough information to use Filecoin in the transaction of a legacy blockchain. Interworking with Filecoin requires that these differences be handled on their own and that the interface can be seamlessly. FILANCE gateway will relay the transaction from the public blockchain to the Filecoin network and y will strictly convert to Filecoin's transactions forms, forwarding the result to the public blockchain safely. This process will be secured through the independently operated FILANCE gateway nodes.

- Storage Deal Management Module

Using the Filecoin DNS service is a continuous and long-term interaction that requires periodic verification of data storage and data integrity. In Filecoin, when the data storage contract expires, it must be renewed through a new contract. if the storage is lost, the original data can be restored and contracted with a new storage provider. The FILANCE Storage Deal Management Module is a system that continuously manages storage contracts to use Filecoin and will reduce user inconvenience by automating the process of using Filecoin.

- Key Management Module

The management of secret keys is a chronic difficulty that greatly lowers the usability of the blockchain. To enhance user convenience, FILANCE will provide its own secret key management system. FILANCE users can safely manage their secret keys regardless of the access device. In FILANCE, the user will generate a secret key for each device and register its public key with the FILANCE network. The secret keys of each device will be encrypted, stored, and managed to prevent leakage. Users can register a new public key by proceeding to KYC through the FILANCE Foundation only if they lose the key.

- Encoding / Decoding Module

Protecting data sovereignty in the Filecoin DSN involves the inconvenience of encrypting and decrypting data to be stored by users themselves. To avoid this inconvenience, FILANCE will be equipped with a system that automatically encrypts and decrypts the user's data. The FILANCE Encoding and Decoding Module will generate a data encryption key based on the public key of the user device registered with FILANCE and automatically encrypt the data. The generated data keys are encrypted with each public key registered by the user, allowing users to restore their data from any device.

- Error Correction Module

Because repositories are always exposed to physical damage, additional measures are needed to prevent data corruption. In general, it is common to keep a replica of the data to prevent data corruption or to encode data with extra redundancy so that it can detect and defend against data corruption.

The FILANCE Error Correction Module will automatically encode data with extra redundancy using forward error correction code to prevent damage while the user's data is being stored in the Filecoin network.

- FILANCE Blockchain

FILANCE will form a connection between Filecoin and public blockchains on its own mainnet to protect the security of the blockchain. The FILANCE mainnet will be a complex system that can deliver Filecoin's transaction information based on the Bitcoin's address system and Ethereum's data structure. The FILANCE Foundation is currently developing a blockchain that blends Bitcoin's UTXO data structure with Ethereum's account data structure and agrees on a Proof of Stake, based on Ethereum's address system.

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3.3 FASS (FIL-FILAN Automated Swap System)

FILANCE will provide a token swap service for FIL and FILAN to share the benefits from operating the Filecoin node with FILAN holders. In the swap system named FASS (FIL-FILAN Automated Swap System), users can pay for FILAN and take FIL provided by FILANCE. FASS wil be a uniform-price auction based system to provide FIL's purchase incentives to FILAN holders fairly and equally.

- A Uniform-Price Auction

A uniform-price auction is a type of auction used primarily in the issuance of bonds and is suitable for selling a fixed number of identical items to several people at an identical price. Potential buyers bid for the quantity and price they want. Once all bids are completed, the auctioneer assesses the winning bid. The highest bid is first considered and then sequentially lower bid is considered until all units will be sold. All successful bidders will purchase the goods at the identical uniform price as the lowest successful bid price, regardless of the actual bid price.
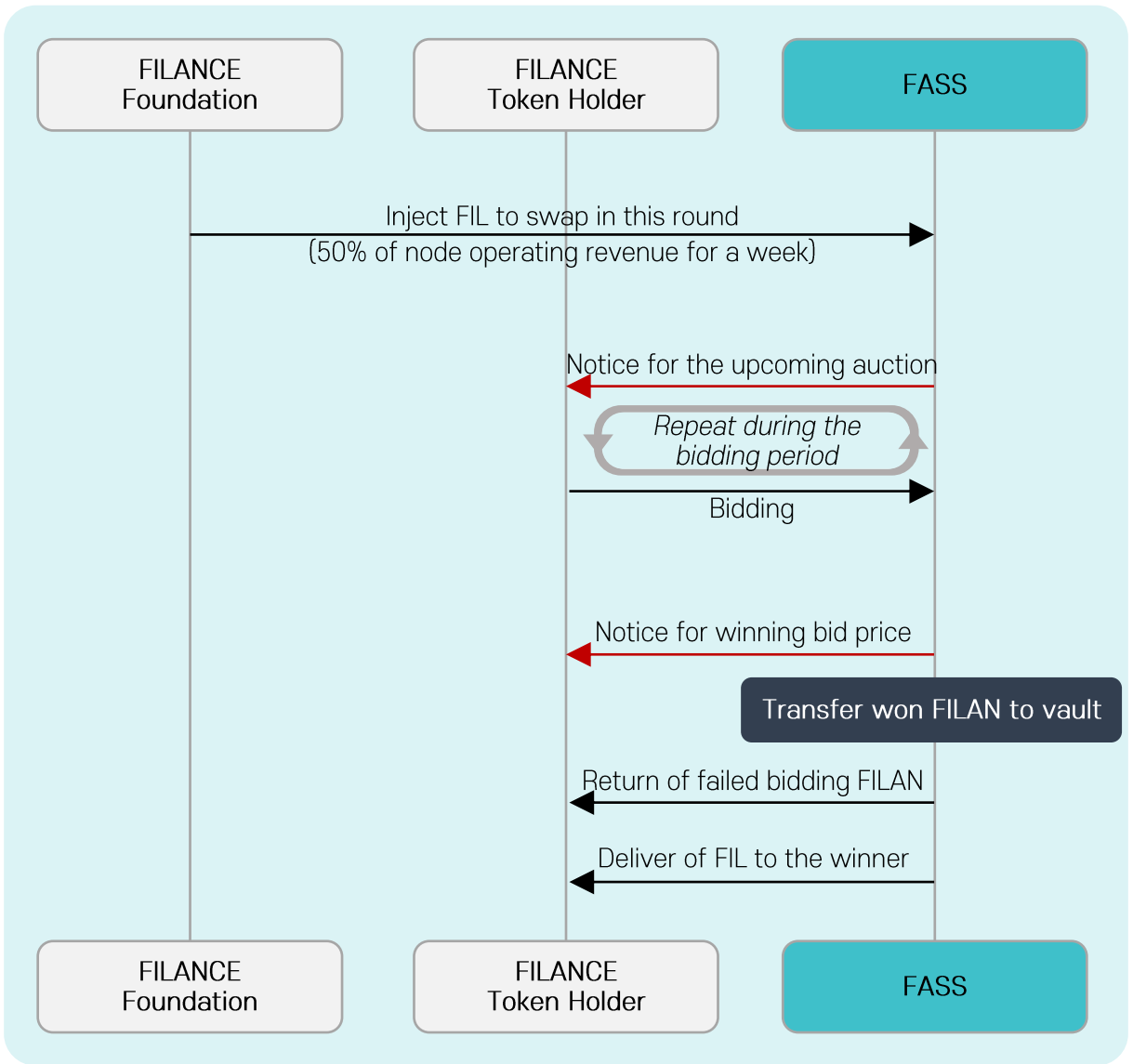
A uniform-price auction is a fair auction method in which all winning bidders pay the same price regardless of quantity. It is also a safe way of selling without any dependency on outside price information to determine the selling price. Uniform-price auctions allow FILs to be sold fairly to all winning bidders at an appropriate price, depending on market logic, while avoiding Oracle problems in the blockchain.

- System Overview

FILANCE will provide users with 50% of their weekly mined FILs via the FASS system. Users can bid for FILs using FILAN. When the auction is completed all the successful bidder gets FILs at the uniform price. The failed bidding FILAN will be returned to the bidder and the FILAN acquired by the system will be moved to the reserved wallet for reinvestment and kept locked. The entire process of token swap over FASS will be transparently and fairly based on smart contracts.

- Operation Process

1) The 50% FILs of node operation revenue injected into the FASS, then announce.
2) FILAN holders can bid freely for a fixed period of time.
3) Once the bid is completed, the winning bid price and the winning bidders are assessed based on a uniform-price auction.
4) Send FIL to all successful bidders and return the failed bidding FILAN to the holder.
5) Transfer FILAN gathered in the system to a reserve wallet.

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<FASS Sequence Diagram>

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4. Business Structure

4.1 FILANCE's Own Filecoin DSN Node

In order to break away from the management style that continues to spend operating costs from temporarily attracted investments, FILANCE seeks to pursue sustainable management of the FILANCE Foundation with the benefits of building an economical Filecoin DSN node and contributing to the Filecoin ecosystem. FILANCE's own DSN node operation will provide the benefit of 1) better service quality and 2) lower service operating costs.

In order for users to use data storage or data retrieval services in the Filecoin DSN, they must go through a bidding process with nodes that provide data storage and data retrieval services at the verifiable market. This may result in a time delay between when the user requests the service and when the targeted data storage and retrieval is completed, And may result in failure to store or to retrieve the assigned data. FILANCE's own Filecoin DSN node will improve service quality by reducing time and cost spent on the Filecoin verifiable market and eliminating uncertainty in service response.

Filecoin states that users must pay a corresponding fee in FIL each time they use the service. This policy is likely to be invoked equally to the services currently provided as well as the upcoming services such as Filecoin-based smart contracts to be developed in the future. This means that the FILANCE platform must consume FIL directly to provide service. Considering the general price increase trend of mined coins with high value fluctuations and half-life unique to the crypto, this can be both an uncertainty in costs and a threat in service operation. FILANCE's Filecoin DSN node will minimize FIL consumption in the service operation by directly storing and retrieving user's data.

4.2 Expertise in Node Operations

In the Filecoin DSN, the user's data is segmented and stored in the node's physical data storage for each segment. When the sector is filled, the sector will store the converted replica through the sealing process. Sealing is a procedure for converting the original data to a unique verifiable copy that is associated with the public key of the storage node. For the allocated data, the storage node must repeatedly create a proof of replication to prove that it is keeping the correct data. The proof is recorded on the blockchain and verified by the network. In the process, if proof is missing or incorrect, the node will be punished for taking away some of the collateral.

Due to the sealing process, for the economically feasible node operation, it is necessary 1) to optimize sealing algorithm and 2) to maintain a stable system with extremely high uptime. Optimization of sealing algorithms is important because the key to the creation of the Filecoin block is to quickly complete the sealing process which is deliberately designed to take sufficient time. Therefore, in Filecoin node operation, the capability of the operating entity to research and to develop algorithms becomes crucial unlike conventional mining, which relies on the total amount of simple computing power.

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Unlike conventional blockchains that receive full compensation at the instant as the block is created and do not require additional management of the generated blocks and data, Filecoin periodically verifies the integrity of the allocated data. The reliability and uptime of the system must be as high as possible for the economics of Filecoin node operation, as the amount of collateral and penalties that a node must submit to store data are very large in comparison to the revenue it can obtain from storing the data. Based on the Filecoin space race results, an economically feasible Filecoin DSN node requires to transmit several billion bytes of data per second and to add up several hundreds TiB of storage each day. This much capability and scaleup actually correspond to a medium size IDC center system. It is almost impossible to achieve 100% of system uptime and data integrity on this scale.

In conclusion, to create economic feasibility through the Filecoin DSN node operation, a very high level of efficiency and stability must be achieved at the same time. To this end, FILANCE strongly believes that the expertise of the node operating entity is paramount and will entrust node operations to a trusted expert.
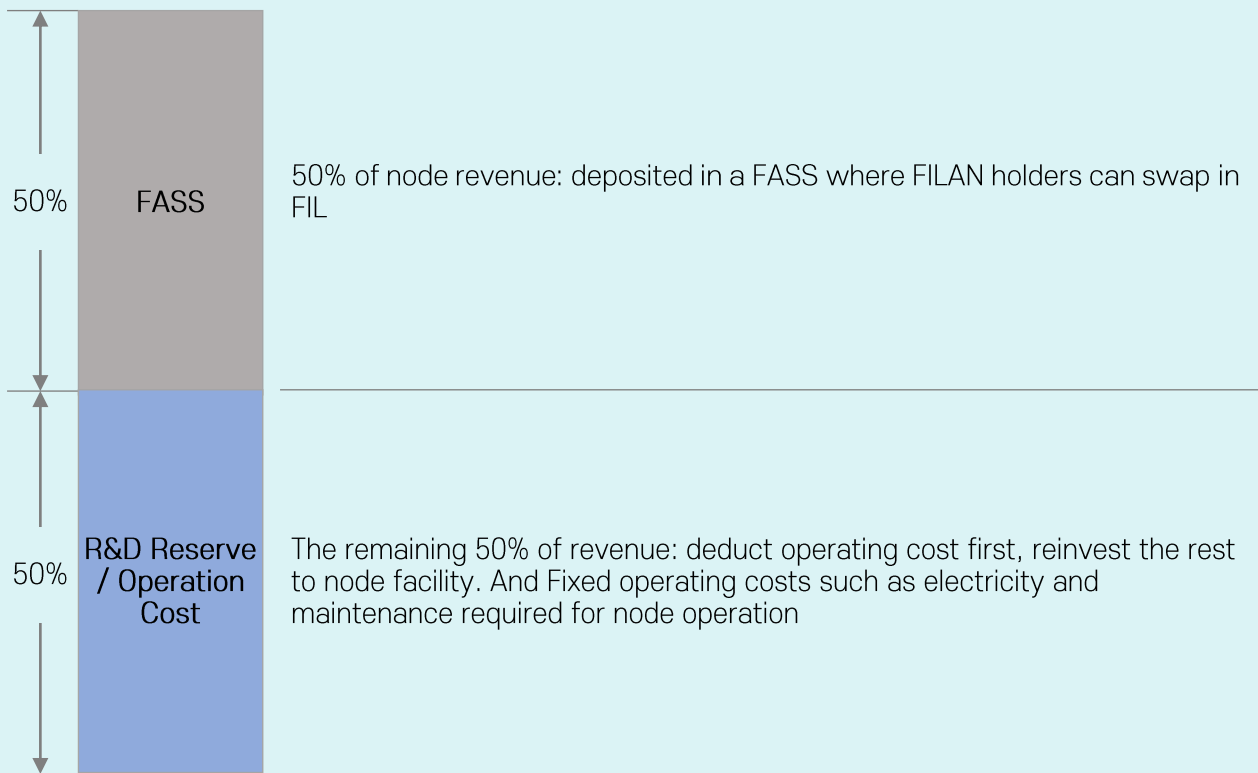
FilGen to run the Filecoin DNS node on behalf of FILANCE is Korea's top group of Filecoin experts, consisting of Blockchain mining experts, Field-Programmable Gate Array (FPGA) algorithm development experts and data recovery experts. FilGen is already developing optimized algorithms by sharing information with South Korea's Filecoin mining pools based on an algorithm that has proven efficiency in the Filecoin testnet mining program so-called 'the Space Race'. FilGen will pursue the highest efficiency of operating the Filecoin node by adding the country's high-quality electricity and fast network infrastructure to the world's best electronic components available only in Korea.

4.3 FILANCE Operating Plan

At this point in time, it is very difficult to accurately estimate revenue from node operations and operating costs. Instead, expected hash rates and cost are estimated from the result of "the Space Race" and currently running storage nodes in the ranking. Based on the data, the management policy currently being planned by the FILANCE Foundation is as follows.

First, after the FILAN listing, FILANCE will deposit 50% of its FILs from operating the Filecoin node in the FASS pool every week from the point of operation of the FASS system. The deposited FIL will be exchanged for FILAN through voluntary participation of users and a uniform-price auction. After the auction is completed, the FILAN will be moved to the reserve token wallet and kept locked. Second, operating cost will be deducted priorly from the remaining 50 percent. Third, the rest, except for FASS system deposits and operating expenses, will be kept as a reserve for the development of the FILANCE system and for increasing the hash rate of FILANCE Filecoin DSN nodes by the decision of the FILANCE participants.[1]

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50%	FASS	50% of node revenue: deposited in a FASS where FILAN holders can swap in FIL
50%	R&D Reserve / Operation Cost	The remaining 50% of revenue: deduct operating cost first, reinvest the rest to node facility. And Fixed operating costs such as electricity and maintenance required for node operation

<Profit Distribution Model>

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5. Token Economy

The FILANCE Token (Ticker: FILAN) is an ERC20 token underlying the FILANCE ecosystem. It is available as a means of 1) paying for the services provided by FILANCE, 2) purchasing Filecoin provided by FILANCE through the FASS, and 3) exercising voting rights in the FILANCE decision-making process.

5.1 Base Currency for the FILANCE Service

All activities of the user during using the Filecoin repository should be preceded by the payment of FILs corresponding to the gas cost specified. A FILANCE user may pay a fee in FILAN, the reference currency of the FILANCE service, instead of FIL, for activities that occur during the use of the Filecoin repository.

- Service Fee

During the use of the Filecoin repository, all of the user's activities are propagated to distributed repositories in the form of blockchain transactions including corresponding fees. While using the Filecoin service through FILANCE, the FILANCE Gateway node pays instead of paying FIL directly to the Filecoin network by the user. Instead of using the improved data confidentiality, integrity, and convenience of the Filecoin repository provided by FILANCE, the FILANCE user will pay a 20% fee for the equivalent amount of FIL that is consumed whenever a transaction occurs. Transactions charged while the user is using the Filecoin repository are shown below.

FILAN	Filecoin
Storage of data	Put(data)
Renewing the use of stored data	Put(data)
Access to stored data (Download)	Get(Key)

- Deposit for High Capacity Data Storage

In the Filecoin DSN, the storage provider must deposit a FIL equivalent to the collateral each time 32 GiB is provided. The cost of collateral for the provision of storage is determined by the block creation compensation of the Filecoin network. FILANCE also has to pay pledges to the Filecoin network to provide the Filecoin storage space through its own DSN. Paying for collateral is one of the biggest expenses spent in a Filecoin DSN operation, which can in effect cause repeated malicious storage of meaningless data in the repositories to be virtually equivalent to a DDOS attack.

FILANCE will share with users the cost and risk of collateral payments needed to store large amounts of data. To prevent malicious attacks using the system's blind spots, only users who want to store large amounts of data will be required to bear some of the cost of storage creation collateral. In this process, the cost of collateral for personal use using less than 2TB of data is exempted to avoid the

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burden on individual users unrelated to the risk. Users who use more than 2TB of data are classified as high-capacity users and must deposit FILANs in their accounts at half the cost of collateral for the storage.

Deposits of users who are using more than 2TB in FILANCE are charged whenever a user uses 2TB of storage space, regardless of the actual Filecoin deposit that requires the security to be deposited every 32GiB. Unlike the 20% FILANCE Service Fee, deposits are converted to FILANs at the equal amount as the collateral costs required for 2TB of data repository in the actual Filecoin network without a separate fee.

$$FILANCE\ Pledge = \left(\frac{2TiB}{32GiB} \times Filecoins\ Current\ Sector\ Initial\ Pledge\ \times FASS's\ Exchange\ Rate \right)$$

The deposited FILAN will be kept unused or deducted at all. If the use is reduced below the additional deposit range, 100% of the FILANs equal to the reduced deposit are returned.

- Service Fee Billing and Payment Management via Personalized Wallet

FILANCE offers personalized wallet services to enhance safety and convenience in the process of billing and payment of service costs. A FILANCE user may deposit a certain amount of FILAN in a fee-paying address within a personalized wallet. Each time a usage fee occurs in FILANCE, a FILAN corresponding to that cost is automatically charged and paid deducted from that address. High-capacity deposits are similarly automatically deducted and returned for each 2TB unit at the address.

- Exchange Rate between FILAN and FIL

All service costs on Filecoin in the FILANCE service are charged in FIL and paid in the form of FILAN. This requires an exchange rate of FIL and FILAN that all users can relate to. The FASS is a kind of decentralized exchange only for FILAN and FIL, where exchange rates are determined by the demand and supply of FILANs and FILs from the perspective of FILANCE users. FILANCE believes that the exchange rate set by the FASS every cycle is the safest exchange rate agreed by the FILANCE users, and will use the FASS' most recent turnover rate to set service fees.

5.2 Exchange FILANs with FILs via FASS

In the exchange of FILAN and FIL in the FASS, the system does not provide any pricing information to the user. In the FASS, prices are generated purely by voluntary bids from users, solely by the principle of supply and demand. In the uniform-price auction-based FASS system, abnormal bids that are exorbitant or lower than the market price of FILAN are invalidated and all received FILs at the same price-market consensus. In the FASS system, the price of FILAN will be adjusted below the actual market value by participants' desire for economic benefits. As a result, the exchange rate of FILAN and FIL set in the FASS will be adjusted below the actual market value of FILAN, which will be applied fairly to all users using the FILANCE service.

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5.3 Governance Model of FILANCE

FILAN holders who have deposited FILANs in the system for more than a certain period of time can participate in FILANCE's decision through the exercise of voting rights. FILANCE will seek transparency and flexibility in operations by gathering opinions from participants in the FILANCE ecosystem in the process of setting operational policies. To help governance participants make rational decisions, FILANCE will transparently disclose the execution of funds, progress in development, and profits from service operations. Currently, major governance issues that the FILANCE Foundation estimates include 1) deliberating re-investment to increase the hash rates; 2) selecting the public blockchain platform to build gateways; 3) unlocking and funding tokens held as governance items.

• Reinvestment Review for Node Facility Expansion

Periodic reinvestment is inevitable in order to maintain the economics of the FILANCE itself in the long run in the Filecoin DSN, where the total hash power of the network will continue to grow. FILANCE will accumulate some of the node's operating revenues (50% of its total node operating revenue - operating expenses) as reserves for reinvestment. If such reserves are more than a certain size, the funds will be executed after collecting opinions from ecosystem participants on where and when the funds will be used through the governance system.
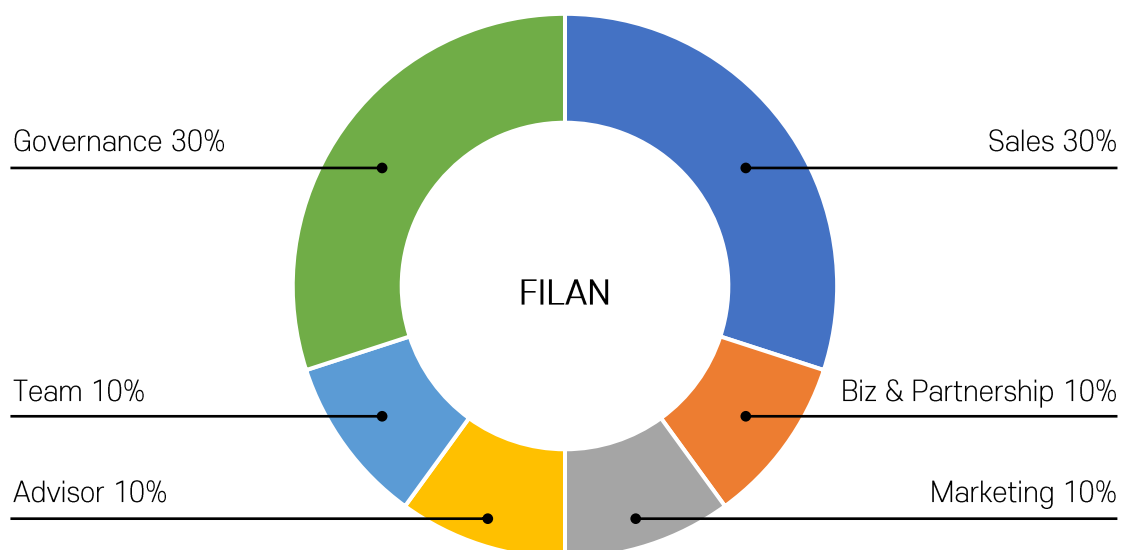
• Selection of Candidates for the Next Gateway Development

Starting with the Ethereum Filecoin bridging, the FILANCE Foundation will support the more bridges between blockchain platforms and distributed repositories sequentially. In the process, determining which blockchain bridge to establish first can be a sensitive issue. That's because 1) no matter which blockchain bridges are pursued, annual research development and money spending are needed from the start to the end, and 2) the community's desire for the gateway with distributed repositories may differ from the priority the FILANCE Foundation considers. Because the selection of the next development target is an important issue related to the finance and growth of FILANCE, in the process, the opinions of the participants in the FILANCE ecosystem should be fairly reflected. The selection of the next development candidate through the governance system will induce consensus among the FILANCE participants to prevent fragmentation of the network and encourage participation in the FILANCE ecosystem in the public blockchain community to promote the growth and development of FILANCE.

• Unlocking Governance Tokens

While FILANCE plans to preserve some of its revenue with reserves to maintain financial soundness and competitiveness of the project, this alone is not enough to respond when a crisis with the project's survival comes or when it sees an opportunity for the project to grow rapidly. To cope with these abnormal and uncertain situations, FILANCE will keep 30 percent of its total tokens in emergency funds. The unlocking and enforcement of these tokens will be limited only by the consent of governance participants for the development or survival of the project.

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5.4 Token Allocation

FILANCE Token[Ticker : FILAN] issues a total of 100,000,000 FILANs for use as follows:

- Sales [30%]

  30% of the total issued, 30,000,000 FILAN, will be allocated to Sales. All unsold tokens are incinerated permanently.

- Governance [30%]

  30% of the total issuance, or 30,000,000 FILAN, are locked for use by governance. With the consent of more than half of the FILAN holders voting by the governance system, it can only be used for the development and growth of the project and the Foundation cannot arbitrarily unlock the token volume.

- Marketing [10%]

  10% of the total issuance, or 10,000,000 FILAN, will be allocated for marketing purposes, and will be used for air drops and events to promote the project.

- Business & Partnership [10%]

  10% of the total issuance, or 10,000,000 FILAN, will be used to attract business and strategic alliances.

- Team [10%]

  10% of total issuance, or 10,000,000 FILAN, will be allocated for the members of the FILANCE Foundation.

- Advisor [10%]

  10% of total issuance, or 10,000,000 FILAN, will be allocated for the advisors who contributed to the development of the FILANCE project.

6. Vision and Roadmap

6.1 Vision

FILANCE is an inter-blockchain data access system that aims to connect public blockchain and distributed storage services using its own mainnet and improve the usability of distributed repositories. First of all, FILANCE will do its best to build bridges to link Ethereum, currently the most practical DApp platform, and Filecoin, which has now built the largest distributed storage network. To provide the improved usability through the FILANCE Ethereum-Filecoin Bridge, FILANCE foundation will develop a secret key management system, an automated data encryption system and an error correction encoding system.

The second challenge for FILANCE after service demonstration is stable operation. FILANCE will build its own Filecoin node and use the benefits for the sustainable management of the project. Filecoin obtained during this process will be provided to FILAN holders through the Smart Contract-based Automated Swap System called FASS(FIL-FILAN Automated Swap System).

In order to provide developers with prolonged high-quality distributed storage service, FILANCE will link various public blockchain platforms with distributed storage services and continue to improve the usability of distributed repositories. Once the construction of the distributed repository-based multi-chain ecosystem is completed, the next goal is to add additional functionality to the system to provide service scalability for DApps. At this point, clearly defining and specifying the additional features of the future FILANCE system could rather lead to a development load that delays the project's efficient growth, so this part will be carried out according to the natural flow of the market and the needs of users.

FILANCE will do the best to make every milestone in FILANCE to be a step toward a future where all DApps, the ultimate goal of FILANCE, are free to access distributed repositories without wasting any resources.

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6.2 Roadmap

Technology

- Testnet Dev. Phase 1
- Basic Token Transfer Transaction
- Account Management Transaction

2020.3Q

- Testnet Dev. Phase 2
- Decentralized Storage PoC
- Ethereum Gateway

2020.4Q

- FILANCE Testnet Release
- FASS Beta Service
- Decentralized Storage Beta Service

2021.1H

- FILANCE Mainnet v1.0
- FASS 1.0 General Availability (GA)
- Decentralized Storage 1.0 GA

2021.2H

- Expand Gateway Support Platform
- FILANCE Mainnet v2.0
- Decentralized Storage 2.0 Release

2022

- Expand Decentralized Storage Service
- Improve Continuous End User Usability

2023

Business

- Filecoin Node Prototype Ver.1
- Off-take Contract & Define Routing Standard

- Filecoin Node Prototype Ver.2
- Node Batch Stabilization & Extension
- Smart Workspace ver. α

- Establish FILANCE Alliance
- Private Cloud Security System
- FILANCE Miner Prototype

- New Asian Data-Center Extension
- Enterprise Private Hardware
- Enterprise Private Management Tools

- Filecoin Dapp Partnership
- Public Service Infra ver. α
- Multi-FPGA Mining System

- Compose Global Master Node
- FILANCE Public Minor
- Full Scale Data-Studio

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7. Team and Advisors

7.1 Key Members

- ### Heungjin Kim (CEO & CTO, Co-founder)

He is an expert in blockchain development who has worked on many projects related to blockchain. He serves as CEO and CTO of FILANCE Foundation and is in charge of overall design and development of FILANCE System. He graduated from Seoul National University with a bachelor's degree and master's degree in physics and completed a Ph.D. program at Korea University Graduate School of Information and Communication.

Carrer
- ScoutChain / CTO
- YosemiteX / Blockchain Development
- IRobo / RoboAdvisor Development
- Woowabros / O2O Brokerage system Development
- Nchovy / Network Security Control System Development
- Gruter / Hadoop Big Data Application System Development

- ### Juhyun Kim (CSO, Co-founder)

Based on his strategic and new business planning capabilities, he is a strategic expert who worked as a CSO in Blockchain-related projects. He is in charge of CSO of FILANCE Foundation and is in charge of business strategy and planning of FILANCE. He graduated from science in electronic electrical engineering at Hongik University.

Carrer
- LG Electronics SW Strategy Office / Strategic Planning
- Samsung Electronics Wireless Business Department / Mobile Phone Development
- GM Korea / PM in New Car Project Team
- ChainPartners / CSO
- PIBBLE / CSO

- ### Deukli Kong (COO, Co-founder)

Based on his experience in planning and operating a number of block chain services, he is in charge of COO of FILANCE Foundation and is in charge of operation of FILANCE. He graduated from POSTECH with a bachelor's degree in science in chemistry and a master's degree in Ferrous Technology at the university.

Carrer
- ScoutChain / Blockchain Service Planning
- BaaS Store / Blockchain Service Planning

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7.2 Key Advisors

- **Donghoon Min (Business Advisor)**

As CEO of FILGEN, he is responsible for the business management and operation of FILGEN. He graduated from the Colorado School of Mines with a master's degree in applied physics and Ph.D. He possesses key technologies about electrical property analysis and Ultra Sensitive in-situ Magnetometer system and CNT pressure sensor.

Carrer
- Hyundai Electronics DRAM 2nd Laboratory / Researcher
- Daewoo Electronics TNA Laboratory / Researcher
- Samsung Electro-Mechanics Co. / Senior Researcher
- National Institute of Standards and Technology / Researcher
- Hanyang University / Research Professor
- Possible Energy Co. / Director of Research Institute
- A-cubes Co. / CEO

- **Joonhwa Lee (Technical Advisor)**

As a technical director of FILGEN, he oversees Filecoin node operation and system development. He graduated from Sungkyunkwan University and has a skilled knowledge about data recovery technologies, design and operation of mining hardware equipment.

Carrer
- Hard Factory Co. / CEO
- Technical Support for the Recovery of Hard Disk Data of the Sewol Ferry and Cheonan warship (Myung Information Technology Co.)
- Development and Operation of Modular Mining System, Self-Electric Equipment and Air Conditioning System
- Develop Immersion Cooling Mining System
- GPU Mining Program Tweak
- Develop Mining Algorithm FPGA

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Notice & Disclaimers

This Whitepaper may be amended from time to time without notice. This Whitepaper is intended to provide general information and is not meant to be exhaustive, comprehensive or authoritative. FILANCE Foundation accepts no liability in relation to the Whitepaper, or any reliance on the Whitepaper, and does not warrant the accuracy or completeness of the Whitepaper.

FILANCE Tokens may only be purchased pursuant to the FILANCE Token Sale – Terms of Sale.

The risks described below, and or other additional risks presently regarded to be immaterial actually materialize, the commercial viability of the FILANCE project and/or the FILANCE Ecosystem may be materially and adversely affected. These risk could result in the failure of the Token Sale, the destruction of the Tokens and/or the termination of the development or operation of the FILANCE project and/or the FILANCE Ecosystem.

Risk associated with the development and operation of the FILANCE project and/or the FILANCE Ecosystem:

The FILANCE project and/or the FILANCE Ecosystem are still under development and may undergo significant changes before they are released or implemented. While FILANCE intends for the Tokens and the FILANCE Ecosystem to function as described in the Whitepaper, FILANCE may have to make changes to various features or specifications of the Tokens or the FILANCE Ecosystem.

The FILANCE Ecosystem may fail to be adequately developed or maintained or may encounter difficulties during development or operation, including financial, resourcing and technical difficulties. This may create the risk that the Tokens or the FILANCE Ecosystem may not meet your expectations at the time of the Payment and may negatively impact the FILANCE Ecosystem and the Tokens, and the potential utility of the Tokens.

Since the Service involves the use, purchase or sale of images, this is applicable intellectual property laws and may create the risk of infringing other person's intellectual property rights. This may negatively impact the FILANCE Ecosystem and the Tokens, and the utility of the Tokens.

Risks arising from no governance rights: Tokens confers no governance rights of any kind with respect to the FILANCE project, the FILANCE Ecosystem and/or FILANCE. Accordingly, all decisions involving the FILANCE project, the FILANCE Ecosystem and/or FILANCE will be made by FILANCE at its sole discretion, including decisions to discontinue FILANCE's products or services, the FILANCE project and/or the FILANCE Ecosystem, to create and sell more Tokens for use in the FILANCE Ecosystem, or to sell or liquidate FILANCE. These decisions could adversely affect the FILANCE project and/or the FILANCE Ecosystem and the utility of any Tokens that you own, including the Tokens utility for obtaining the Services.

Risk of failure, abandonment or delay of the FILANCE project: The creation of the Tokens and the development of the FILANCE project and/or the FILANCE Ecosystem may fail, be abandoned or be delayed for a number of reasons, including lack of interest from the public, lack of funding, or lack of commercial success or prospects (e.g. caused by competing projects).

Risk associated with the Ethereum blockchain:

The Tokens, the Token Sale and/or the FILANCE Ecosystem are based on the Ethereum blockchain which is still in an early development stage and unproven. Any malfunction, flaws, breakdown or abandonment of the Ethereum blockchain may have a material adverse effect on the Tokens, the Token Sale and/or the FILANCE Ecosystem. Furthermore, developments in cryptographic technologies and techniques or changes in consensus protocol or algorithms could present risks to the Tokens, the Token Sale and/or the FILANCE Ecosystem, including the utility of the Tokens for obtaining the Services, by rendering ineffective the cryptographic consensus mechanism that underpins the Ethereum blockchain.

Risk of Ethereum mining attacks: As with other cryptocurrencies, the Ethereum blockchain is susceptible to mining attacks, including double-spend attacks, majority mining power attacks, "selfish-mining" attacks, and race condition attacks. Any successful attacks present a risk to the Tokens, the Token Sale and/or the FILANCE Ecosystem, including proper execution and

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sequencing of transactions involving the Tokens.

Risk of theft: The Ethereum blockchain may be exposed to attacks by hackers or other individuals that could result in theft or loss of ETH, or the Tokens, impacting the ability to develop the FILANCE Ecosystem.

Regulatory risks: It is possible that certain jurisdictions will apply existing regulations on, or introduce new regulations addressing, blockchain technology, which may be contrary to the Token and/or the FILANCE Ecosystem and which may, inter alia, result in substantial modifications of the FILANCE Ecosystem and/or the FILANCE project, including termination and the loss of the Tokens.

Risks associated with other applications: The FILANCE project may give rise to other alternative projects promoted by unaffiliated third parties, under which the Tokens will have no intrinsic value.

Risk of Loss of private key: The Tokens may only be accessed with a combination of private key and password. The private key is encrypted with a password. Loss of requisite private key(s) associated with your digital wallet or vault storing the Tokens will result in loss of such Tokens which will be unrecoverable and permanently lost.

Risk of hacking and security weaknesses: The Tokens, the Token Sale, the FILANCE Ecosystem (if and when developed) and FILANCE may be targeted by hackers or malicious groups or organizations who may attempt to interfere with the FILANCE Ecosystem or the Tokens and/or the Token Sale or steal the Tokens in various ways, including malware attacks, distributed denial of service, consensus-based attacks, Sybil attacks, phishing, smurfing and hacking. Furthermore, there is a risk that a third party or a member of FILANCE may intentionally or unintentionally introduce weaknesses into the core infrastructure of the FILANCE Ecosystem, which could negatively affect the FILANCE Ecosystem, the Tokens and/or the Token Sale, including the utility of the Tokens for obtaining Services.

Risks associated with taxation:

The tax treatment and accounting of the Tokens is uncertain and may vary amongst jurisdictions. You must seek independent tax advice in connection with purchasing the Tokens, which may result in adverse tax consequences to you.

Risks associated with volatility of ETH:

The value of ETH may fluctuate significantly over a short period of time as a result of various factors including market dynamics, regulatory changes, technical advancements, and economic and political factors. Due to such volatility, FILANCE may not be able to fund development of the FILANCE Ecosystem, or may not be able to maintain the FILANCE Ecosystem in the manner that it intended.

Technology risks:

The Tokens are intended to represent a new capability on emerging technology that is not fully proven in use. As the technology matures, new capabilities may dramatically alter the usefulness of the Tokens or the ability to use or sell them. The functionality of the Tokens is complex, will require enhancements and product support over time, and full functionality may take longer than expected. The full functionality of the Tokens is not yet complete and no assurance can be provided of such completion.

This white paper is for informational purposes only. The individual parts or the whole system described herein may change during the development process.

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