



THE CHAINFLIX WHITE PAPER

VERSION 1.6 JULY 2019 - CHAINFLIX TEAM



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CHAINFLIX

The Blockchain-Driven
P2P Streaming
Service Platform

The Chainflix White Paper

Chainflix Engine Version 1.6

1. Summary of Business

The broadcasting market has been witnessing a dramatic change recently amid the spread of mobile devices, the emergence of online video platforms and web-based content.

With growing popularity of the online video content among viewers, complaints about the way the video service platform providers operate are also on the rise.

Such complaints include: entry fees charged on content producers, opaque profit-sharing structure, unreasonable advertising metrics, viewers' growing sickness of the unwanted ads indiscriminately flooding over even short video clips. The platform providers, on the other hand, are being plagued by heavy network and storage costs, as well as huge operation costs, required to maintain their own streaming services.

Chainflix project – through a blockchain technology combined with P2P streaming technology -- aims to solve this dilemma in current video media market by mitigating users' discontent and by reducing service providers' excessive costs.

Chainflix system has been designed to keep the operation cost down by utilizing users' storages on a P2P basis, and to mitigate users' dissatisfaction by adopting a user-led service structure.

In the Chainflix platform, coins are to be mined during the video-viewing process, and all participants in the system – content creators and activators, storage providers, viewers, operation participants and advertisers – are organically connected in a way to ensure user-oriented operation and fair distribution of blockchain-based and PoA algorithm-mined coins among the participants.

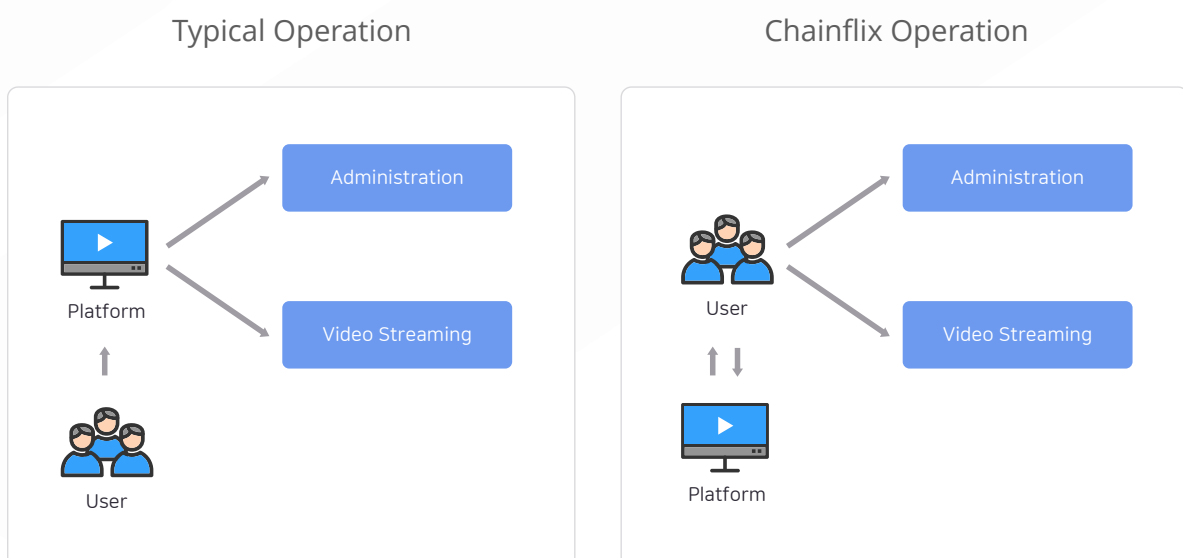


Fig. 1 Comparison of Platform Operation Schemes

2. Background of Service Introduction in Current Market Situation

2.1 Background of Service Introduction

Arguments are being made against the negative effects of the opaque settlement system on the content market. It is the user who uploads content such as articles, images, videos, etc. on social media, and it is again the user who watches advertisements on the same media, but it is the media or platform service providers who rake in the heaviest chunk of profits created on such media platforms. It is a high time we needed to devise a system to correct such discrepancy and reward the users who are de facto owners of such platforms, with the help of blockchain technology. The rationale behind such arguments go like that.

The block chain technology can be defined as a digital public book or a decentralized ledger in which all members, i.e., the nodes and peers, keep the same ledger. The decentralized ledgers simultaneously record transaction information and update themselves periodically whenever a new transaction occurs, using an encrypted scheme. That is why it is called a digital public book or a decentralized ledger with a high level of anonymity and transparency.

Blockchain technology has caught the eyes of the public altogether with the arrival of Bitcoin that operates a decentralized ledger network using the scheme of Proof of Work.

Bitcoin is the first of its kind under the name of cryptocurrency which was first implemented into the level of real use function in August 2008 on an unidentified P2P network by a pioneer named Satoshi Nakamoto. The Bitcoin network began its operation when the Bitcoin software was released in January 2009 based on Nakamoto's thesis.

Bitcoin has been in continuous operation since the first block, known as the "genesis block," was generated (mined) on January 3, 2009. It still works well, despite some programming bugs, without severe breakdown in the system.

Blockchain technology is a general purpose technology that represents the Fourth Industrial Revolution. When an user (miner) provides a solution to an encrypted algorithm (a mathematical formula and question) in a computer program and such a solution is approved as a normal block on the blockchain network, a certain amount of Bitcoin (number) is awarded to the user, which we call mining.

This blockchain technology provides a ledger in a decentralized, autonomous and open network. Bitcoin is the world-first traded numbers in a joint ledger and utilized as a transactions-recording means.

Unlike existing financial systems – including the credit card and payment services -- where all information about currency issuance, operation and financial transactions is concentrated and managed by centralized servers of the government and financial institutions, blockchain technology operates on a P2P and one-on-one basis within the above-mentioned blockchain framework and thereby has gained worldwide credibility owing to its proven function in enabling flawless financial transactions, including both issuance and operation, without the third party (middleman) intervention.

There is fast-growing interest in blockchain technology in this regard, and development efforts for its application are increasing phenomenally across both public and private sectors.

Still, it is ridden with problems that get in the way of its application in everyday use – the bottleneck problem in transactions-processing, the issues of privacy and mega-data storage, and the like. Chainflix, through years of extensive research and tests, has solved these problems and devised a proprietary PoA algorithm to utilize blockchain technology in daily life.

2.2 Current Market Situation

Juniper, a UK consulting firm, recently released a report that the market volume for digital TV, video streaming and OTT (Over-the-Top) services would rapidly increase to over \$100 billion in 2020, from \$64 billion in 2017.

The report's analysis indicates that companies like Netflix and Spotify based in North America and Western Europe will lead the OTT market expansion. It also predicts that North America and Europe will take the biggest chunk in global OTT market shares, at 33.5% and 31.7% respectively.

According to estimates by Juniper, the online video advertising market will grow to \$ 37 billion in 2020, more than 130% increase from 2017.

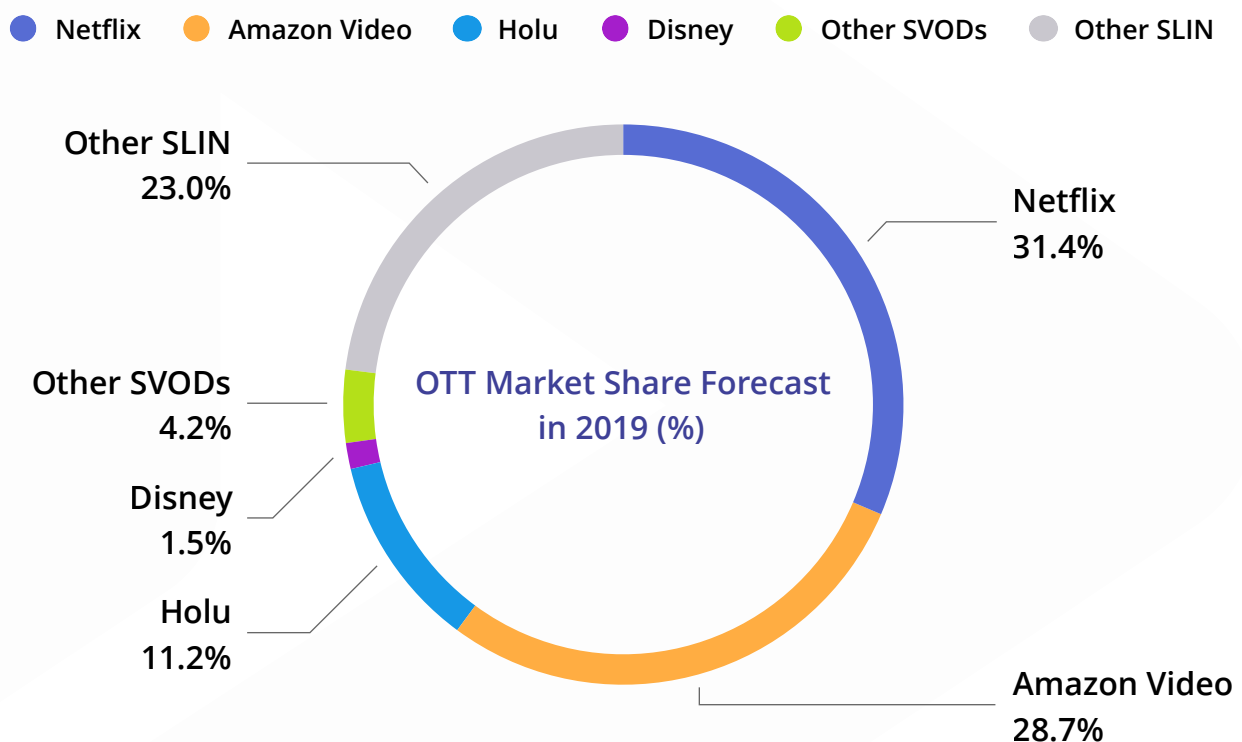


Figure 2. Leaders-to-be in the OTT Market / Source: OVUM

As OTT emerges as the key platform of the global media industry in such a short period of time, there has begun a competition between traditional media like Walt Disney and Time Warner and new players like Netflix and Amazon for content outsourcing on a large scale.

With areal expansion kicking into high gear, not only the in-house but also the outsourced production of content has become important as a means to set a specific content platform apart from others. Netflix, for instance, announced in 2018 that it would pour USD 7 billion in content sourcing only.

OTT companies are now responding quickly to the needs of mobile video service users for drama and movies with no worries about a data limit. This reflects a prediction that there will be an eightfold increase in global mobile data traffic between 2015 and 2020, and that video data traffic shall occupy 75 % of the total mobile data traffic. (CISCO, 2016)

Given that TV opened the first era of video content, the second era is currently being introduced by one-person broadcasting and OTT (Over-the-Top: Internet Video Streaming) service. This trend was perceived as being a phenomenon led by only a limited number of enthusiastic netizens even until two or three years ago, but it is now being so deeply entrenched in everyday life that more and more people are indulging in YouTube's one-person broadcasting and Netflix's OTT videos over their smartphones even when they are eating or on the subways.

Global OTT market is now led by the U.S. at 40% of market share. The average annual growth rate of the global and Asian market for the next 5 years is forecast at 15.5% and 18.4% respectively, with the Asian market to be driven by content while that of the U.S. pulled by advertising.

According to PwC data, the global online video market reached U.S. \$41.8 billion in 2016. It is expected to more than double to U.S. \$85.8 billion in 2020 (annual average growth rate at 15.5%).

OTT operators can be classified according to two criteria: 1) fee-charging system (advertisement vs. monthly subscription fee); 2) featured content system (video length: under 20 minutes vs. over 1 hour / format: real-time live video, web-only content, theatrical films, TV series, etc.) In most cases, however, the content is for free, and only 6% of the users actually pay for video services. This makes video platform service providers largely depend on advertising revenues.

Lately, video content service sites like YouTube, Ustream, Vimeo, etc. are expanding their turfs with rapidly increasing number of users. These users not merely log on to video content service sites for videos but also spread them over, through the sites' support functions to enable them to be shared to other web and social network services, on the one hand, and through the application programming interface (API), on the other.

2.3 Problems of the Market

The rapid growth of global OTT market brings various problems. Platform service providers are being plagued by overly high cost of operation, while content creators, advertisers and users like viewers are complaining about the one-way and arbitrary operation by the platform service providers.

Transparent handling for a fairer share of revenues, pursuant to the contribution made by content producers, has yet to be at work on the Netflix system, as with YouTube.

The U.S. entertainment industry, quite unhappy with Netflix's opaque practices in revenue settlement, has earnestly begun exploring into blockchain solutions. Of the U.S. content providers,

FOX has started to study blockchain within its own technology team and productions like Disney and HBO are carefully watching the trend as well.

Along with the opaqueness in revenue distribution, voices are also being heard about the need for compensation to participants with the help of blockchain technology.

It is the user who uploads content such as articles, images, videos, etc. on social media and even watches advertisements but it is such media or platform service providers who take almost all of the profits created on such media platforms.

When you post an article on Steemit, platform participants can click on a “Upvote” button which is similar to Facebook's “Like” button. Steemit distributes its own crypto-currency 'Steem Dollar' to the uploader as compensation, in proportion to the number of Upvotes received, with 75% of it to the writer and 25% to the recommender who clicked on “Upvote.”

The content traffic in Korean now accounts for about 30% of Steemit's total traffic, and Steemit's U.S. traffic is almost equal to that in Asia. South Korea accounts for 80% of Steemit's Asia traffic. One user has managed to attract 3,000 followers and earn KRW 22 million in revenue after one year of activities on Steemit.

It seems that the market is moving in this direction into the future – toward blockchain-driven interactive services in which clear exchange of compensation is assured according to fair contribution.

2.3.1 Disparity in Revenue-Sharing

As mentioned above, it is the user who provides content and who watches the advertisements but it is the platform service provider who takes almost all of the profits generated on the platform.

There is increasing discontent by content creators with the excessive appropriation of profits by video platform service providers and their opaque revenue-settlement systems.

There has been growing depression out of watching too heavy a load of ads for a free video. The thing is, advertising revenues only go to content providers and platform operators, alienating the viewers.

Viewers are bombarded with endless display of forced ads with no benefit whatsoever but free watching of short video clips.

2.3.2 Low Efficiency of Advertising

Advertising carried out by video platform operators fails to earn advertisers' trust. There are increasing complaints and doubts about the price-matching effectiveness of advertising. Even the YouTube, world's largest video-sharing site, is not free of this issue.

Google plans to overhaul its advertising policy responding to complaints from Unilever and Kellogg, its biggest advertisers, but advertisers are shunning YouTube's ad metrics data and asking for those provided by a third-party.

Advertisers wonder if they are paying for the advertising that never reach viewers. Kellogg has even withdrawn from advertising on YouTube.

2.3.3 Excessive Operation Cost for the Platform Providers

Video platform service providers are excessively paying for server hardware and network connection for stable streaming services, and on staff and overhead charges for platform administration.

Meanwhile, cloud computing has so far been largely evolving around developing server technology to offer users data storages or computing. Cloud system of this kind, so long as it is operated by a central server, is inevitably vulnerable to hacking.

3. Our Solution: Blockchain-Driven P2P Streaming Platform

Chainflix aims to solve these problems, which are detrimental to the growth of the video platform market, by a P2P (Peer-to-Peer)-based cloud service and a decentralized, proprietary PoA algorithm of blockchain technology.

Until recently, the main issue in P2P cloud storage has been the efficient and dispersed data storage for better data availability. Chainflix has been devised as a system in which such data availability from the P2P cloud storage could be guaranteed to the same level as achieved in a typical cloud system while coins are to be mined during video-watching via streaming.

Chainflix's compensation system has been designed in the way that service users, i.e., content creators, viewers, enhancers for content creation, storage donors and even administrative volunteers, are to be rewarded with coins mined in the system, as a device to reward the users even in early stages of the service in the absence of advertising.

The Chainflix design, incorporating reliable P2P streaming solutions into blockchain technology, ensures stable operation in both online and mobile environment, which drastically reduces the huge cost of service construction.

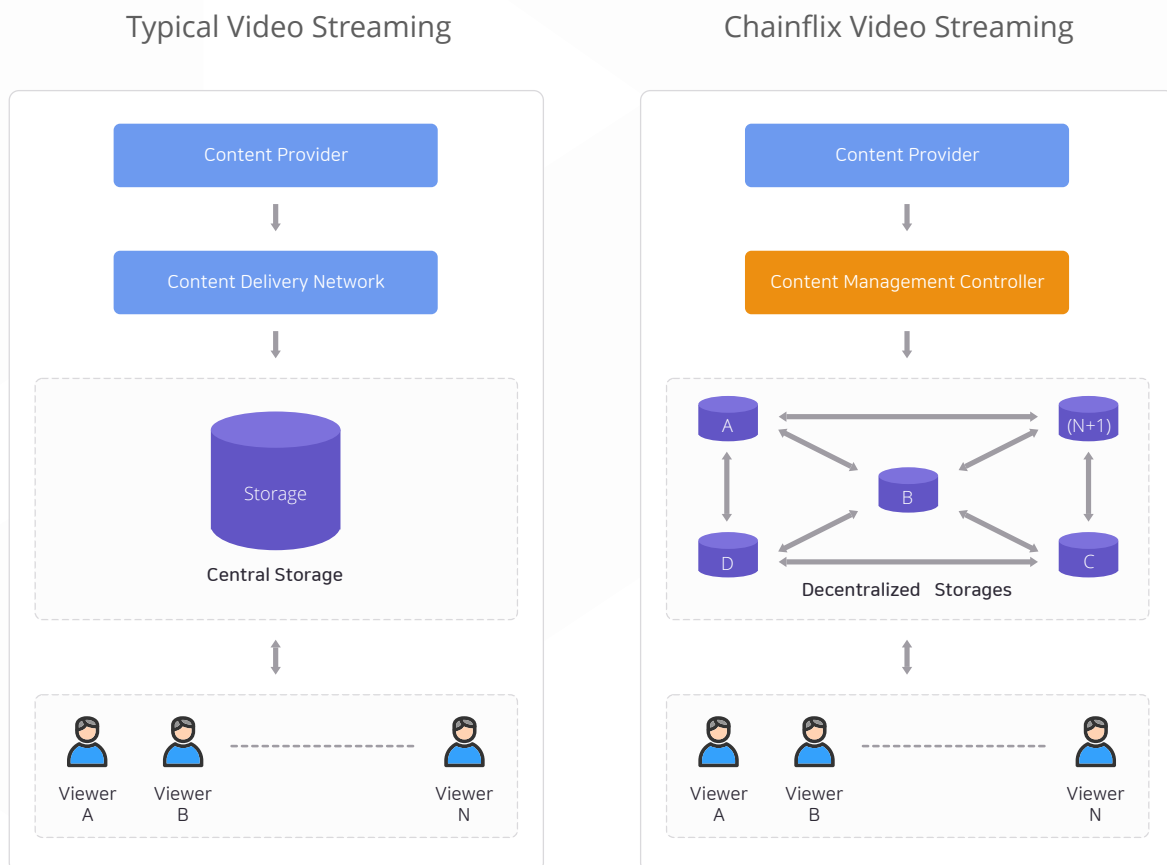


Figure 3. Comparison of Video Platform Operation

The Chainflix P2P cloud storage consists of a cloud management controller and storage donor pools. (Fig. 3)

Peers, i.e., storage donors, share a part of their storages with the Chainflix platform. Such storages are networked into the storage pool.

Content creators upload and store their content in the P2P cloud storage pool and viewers can access the pool and watch such stored video content via streaming.

The P2P storage pool is a virtual storage combining the storages contributed by peers into a network which links the peers in a meshed overlay structure.

Processing reliable video streaming services is virtually impossible over the existing P2P schemes, so they only have been utilized as a technology tool for personal data exchange and personal cloud data availability. (Fig. 4)

Quite unlike this, the Chainflix system rather handles all the information in P2P cloud storages with a function labelled 'Cloud Management Controller.' The Cloud Management Controller administers connection status of each peer, links among the peers, available storage space, location of a video copy data storage, information of video data size, and the like. It also performs functions to request a video playback in storages and to disperse video traffics by categories through searching and connecting the peers which store the same videos as the requested one. (Fig. 5)

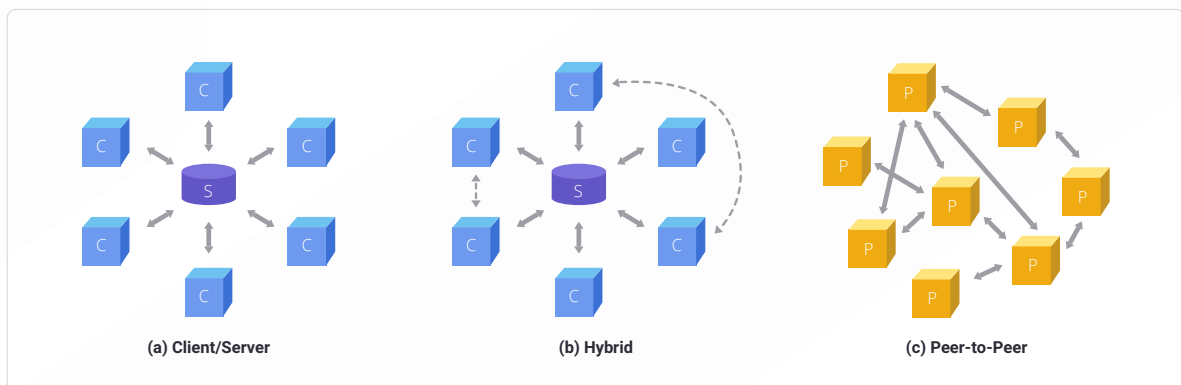


Figure 4. Existing Cloud Structure

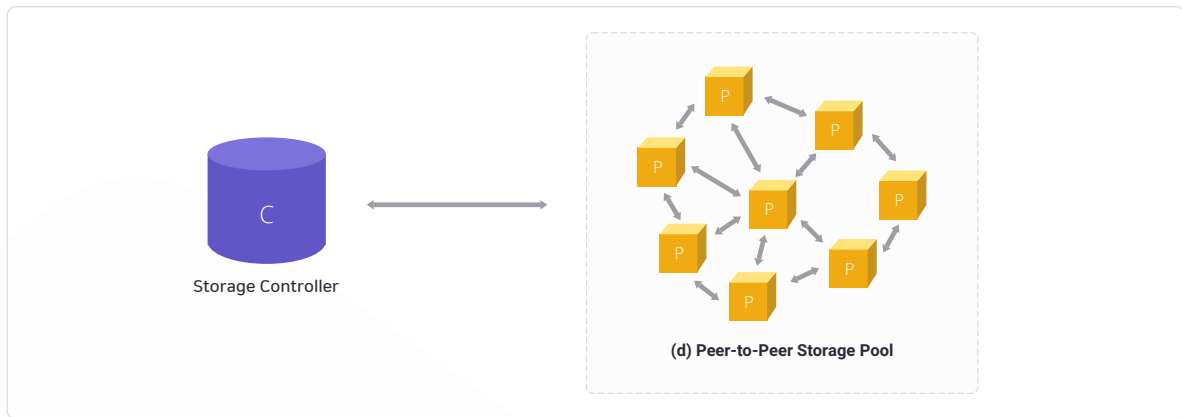


Figure 5. Chainflix Cloud Storage Operation Structure

It also enables instant playback of the streamed videos because other peers save the same data as the original one as shown in Figure 6.

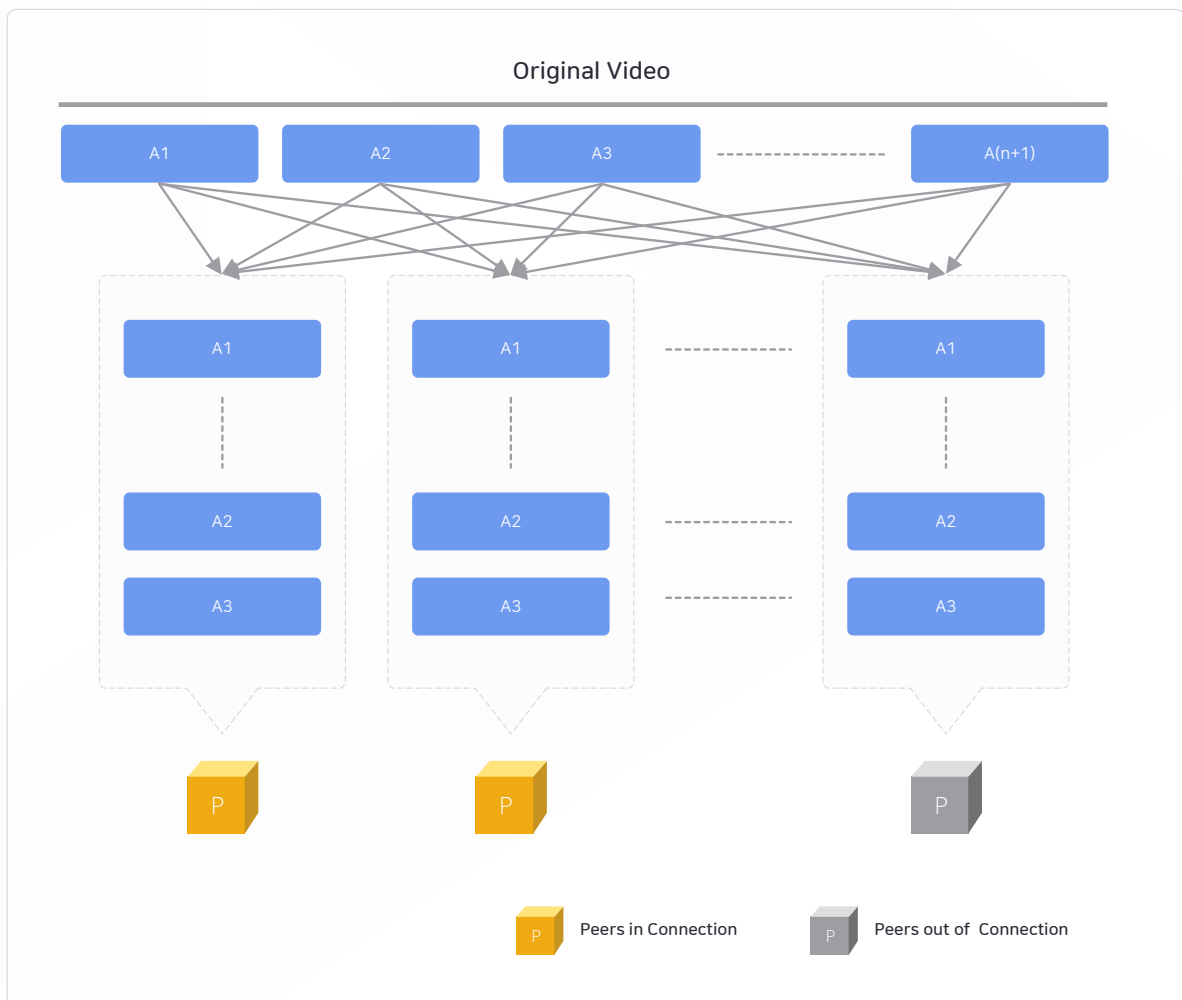


Figure 6. Chainflix Operation Structure

Chainflix presents a truly new user-oriented platform service model to reward users with profits made possible by significant savings in service operation costs through utilizing users' computing power into the said P2P streaming structure.

Further, as another tool of such profit return to users, Chainflix offers a first-of-a-kind media player that enables the users to make their own income by merely watching videos in a proprietary view-and-mine system (patent-pending: 10-2018-0055608)

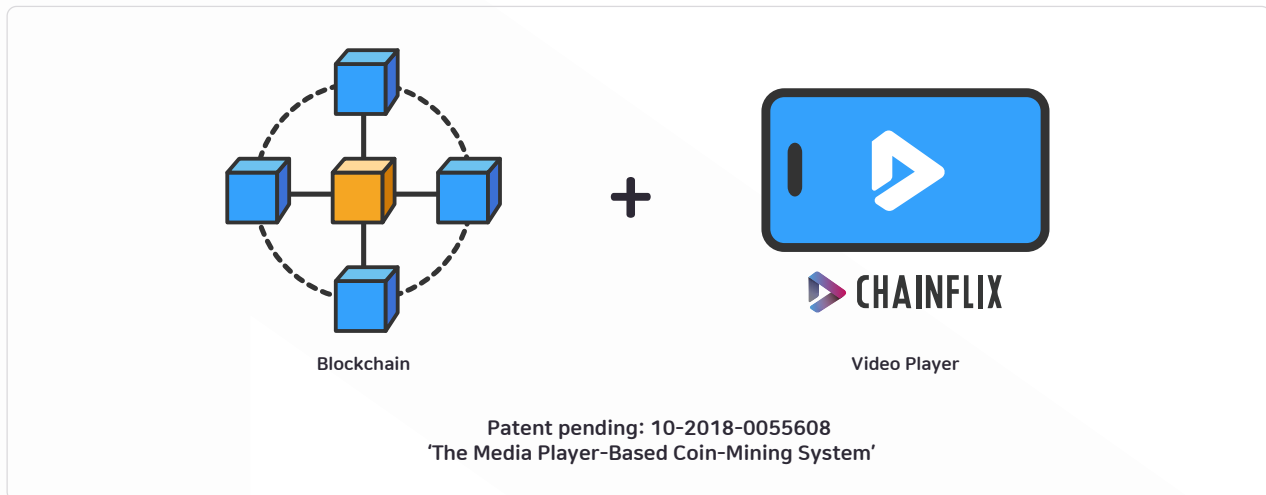


Figure 7. Chainflix Media Player

Content Creators, when they upload and distribute their video content, can decide the shares of the coins, mined by viewers' watching of such content they have uploaded, to be spread across participants, i.e., viewers and individual and organizational providers of subtitles, dubbing and other solutions.

Viewers are awarded a part of coins they mine while watching videos, also get a portion of coins bought by the advertisers and paid under a smart-contract system for the advertising, as a reward for watching the pre-roll, targeted ads, etc. inserted in the videos they watch, can sell such coins on the coin exchanges or can choose to invest those coins in the future content creation project of the content producers.

Advertisers can place ads on Chainflix with coins that may be purchased on coin exchanges. They are assured of transparent advertising through detailed metrics provided to them.

Content Enhancers assume the supporter's role in creators' content production, say, by providing subtitles, dubbing, various solutions and DApps needed for the Chainflix Platform, and are thereby rewarded with mined coins.

Storage Donors offer storage space for saving content creators' video content and rewarded with mined coins.

Platform Operation Volunteers take the role of the marshal, in charge of content reporting and administration on the Platform and rewarded with mined coins.

Chainflix has devised a system in which content creators, viewers, content facilitators, storage donors and operation volunteers are allowed to participate with each assumed role and get fair income through the transparent distribution of revenues.

Chainflix is an Ethereum-base framework, consisting of the Chain Network and the Content Network. Chain Network, the actual blockchain-operated key core, conducts the role as a node to generate a block when a video is watched.

Content Network performs Ethereum's smart-contract functions for providing subtitles, dubbing and other platform solutions services.

The media player consists of multiple layers, including: Layer 1 playing back the original video; Layer 2 displaying translation or special effects; Layer 3 playing ads. Layers 2, 3 can be controlled by the smart contract scheme.

In early phases when there will be few advertisers and DApps on Chainflix, user compensation will be made primarily through coin-mining. More advertisers and DApps in later stages shall ensure better compensation on the platform.

Chainflix's video content is stored in the hardware space of the storage donors. When a storage donor offers such a storage via a router, however, it cannot be accessed from the outside users because the donor's hardware is allocated with a Private IP that changes every time the hardware is turned on and off, unlike the fixed Public IP of the router it is connected to. The viewer (Computer A) cannot reach the video content stored in the storage of a donor (Computer B) unless the viewer knows the Private IP and port number of the donor beyond its router.

Chainflix has solved this problem by adopting a technology called Hole Punching. Hole Punching makes connection between A and B possible in this case, even under their own private IP's.

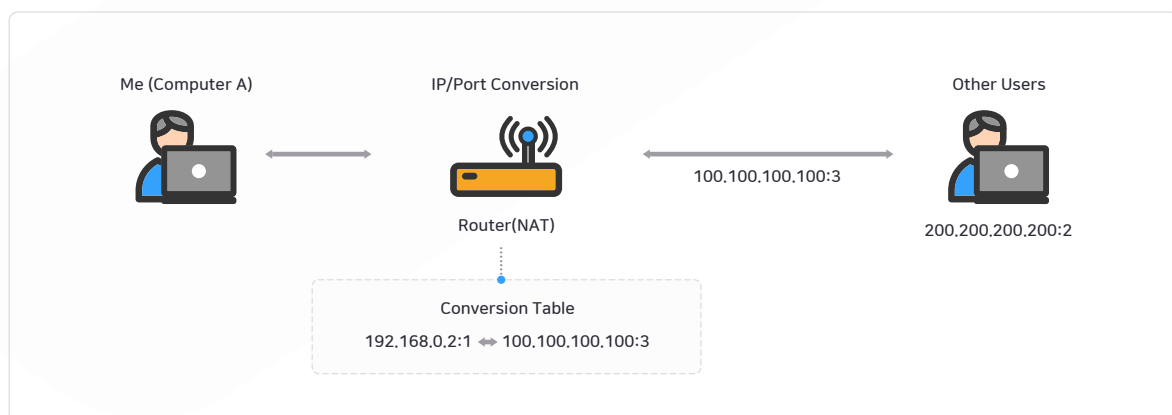


Figure 8. IP and Port Conversion on Router

Still, there is another technological requirement for seamless video streaming services over a P2P network: a technology to get over the bottleneck problem that occurs when video traffics flood or connections are jammed all at once into a certain video content. The said Cloud Management Controller (Storage Controller) is what Chainflix has devised to meet such a requirement.

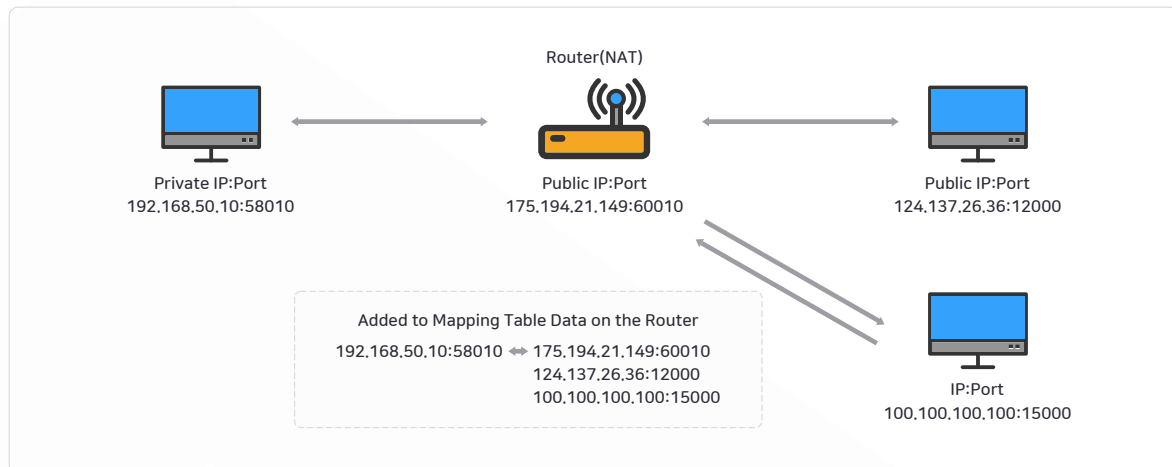


Figure 9. Mapping Table Data on the Router

Storage Controller takes control of personal storages of the users, and performs the tasks of traffic dispersion, storage recommendation and request, storage status check, block verification and compensation, and the like.

The existing P2P video streaming systems adopt a pool-based method in which peers, without knowledge of the content of data kept by other peers, request necessary data only after exchanging buffer maps with other peers. In the Chainflix P2P cloud storage structure, on the contrary, peers do not need to re-check the content of data stored in a certain peer, as the Storage Controller provides direct connection to the source peers that store certain videos to watch.

Storage Controller has been designed for fair data decentralization across storages, saving all videos in all storages and constantly checking the status of all storages.

It also designates a specific storage for a content creator when he or she registers and distribute a video. When a new storage is created, it randomly stores videos in that storage that are watchable within the country (region) where such a new storage is located.

The controller stores video content with ample reserve in the storage space for addition, removal and decentralization. The prioritization in space allocation favors the storages of the larger storage donors, except when such storages are being used in excess of a certain capacity limit.

The controller also checks the traffic by videos and has those with low traffic be automatically removed except for a couple of countries (regions) close to the set-up country (region), and constantly monitors the video's viewing record and records the storage's activation status.

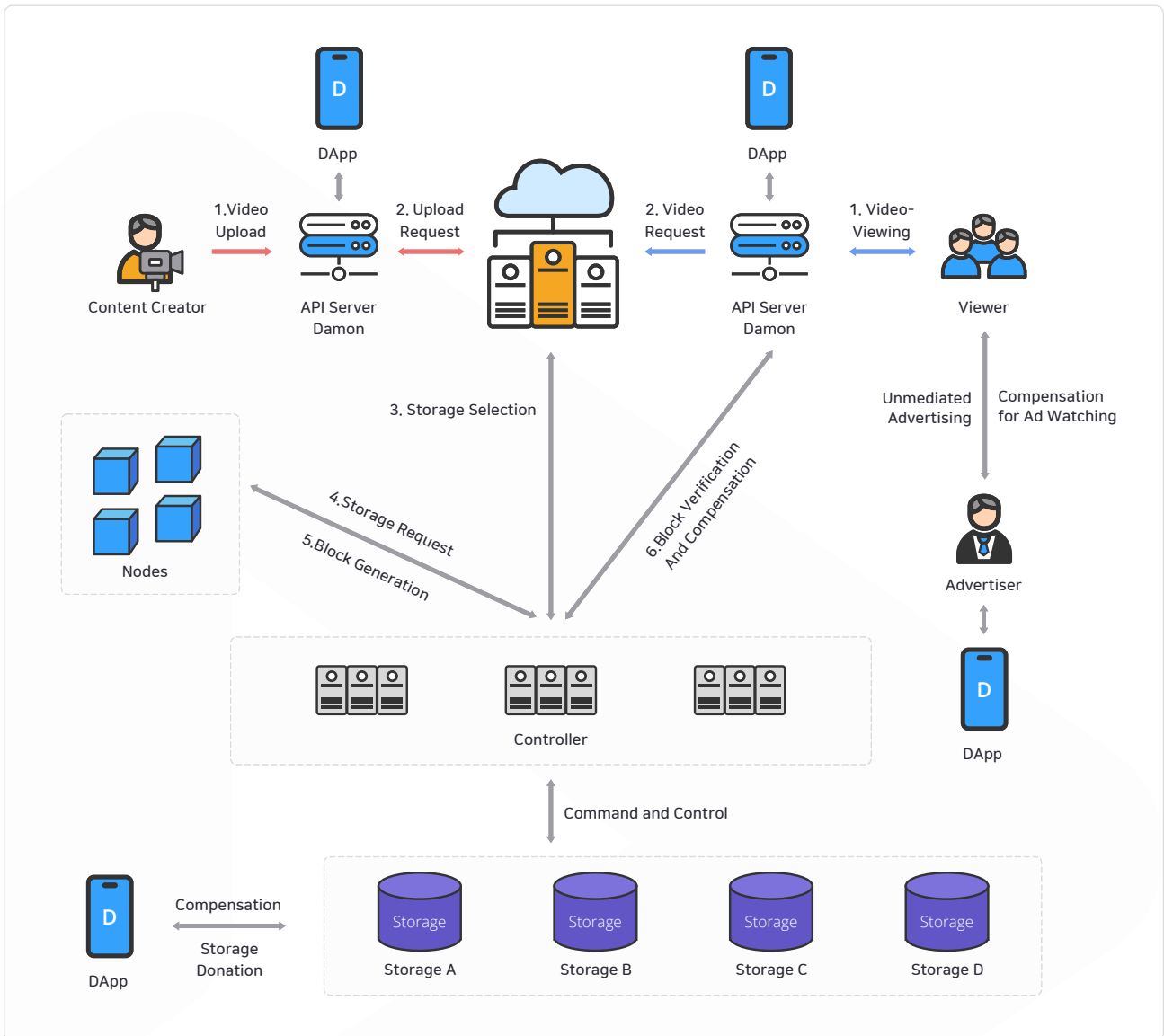


Figure 10. Chainflix P2P Platform Structure

Chainflix employs a different approach by devising a system where any user can mine coins when he or she watches videos on the devices used for such viewing – PC's, mobile phones, TV's, or whatever. This will solve the concentration issue in coin circulation, i.e., disparity in mined coins distribution favoring only the highest tiers of the coin market hierarchy, and ensure a more transparent service system through diversified mining infrastructure that engages as many general users as possible in coin mining.

4. Chainflix Algorithm

Chainflix basically employs a dual blockchain algorithm – PoA (Proof of Authority) and PoV (Proof of View)

4.1 PoA (Proof of Authority)

PoA is a term first used by Gavin Wood, co-founder of Ethereum and Parity Technologies. It is a proving method normally used in private blockchains.

PoA designates a certain account as a Validator -- the validity checker -- that performs the validity-checking for transmissions and blocks. A method in which certain nodes with authority take turns generating blocks, it can reduce block time and prevent computing power waste that is one of the main shortcomings of POW.

Chainflix's blockchain network has adopted the PoA scheme because it would be necessary to reduce validity-checking time and assure quicker block-generation and transactions-processing in a private blockchain structure, given that there would not be a lot of Validator nodes taking part in the Chainflix blockchain network in early stages of service.

Category	PoW	PoA
Verifying Method	Proof-of-Work	Proof-of-Authority
Nodes	Mining, Transaction	Validator
Application	Geth	Parity
Compensation	Mining	None Due to Non-Mining
Block-Generation Time	10~20 Sec	2 Sec
Main Employer	Bitcoin, Ethereum, etc.	Private Blockchain
Features	Waste of Computing Power Low Transaction Speed	High Transaction Speed

Figure 11. PoW and PoA

PoA has the merit in being able to process thousands of transactions per second without sacrificing a considerable amount of memory and energy. PoW (Proof of Work), PoS (Proof of Stake) and PoA (Proof of Authority) all have own strengths and weaknesses. PoA has big advantages in terms of high transaction speed and expandability, while PoW and PoS is superior in decentralization.

Chainflix will start a PoA-driven service first, given its effectiveness of application in a private blockchain, and evolve it into a PoV (Proof of View)-based, genuine public blockchain of reward in later phases.

4.2 PoV (Proof of View)

4.2.1 Overview of PoV

When a viewer press the 'play' button to watch a video, both the video information encrypted in unique serial numbers and the accompanying decoding key are transmitted from Chainflix blockchain network to the viewer's device for the video to be watchable. This is Chainflix's PoV scheme and the proprietary View-and-Mine function is executed in this scheme.

View-and-Mine is Chainflix's own media player-based coin-mining system that constantly checks the nonce value of a viewer's node during the playback and allows block generation, in case of correct nonce value-matching, for coin reward.

Chainflix's PoV scheme is effective, along with the coin-mining function, in keeping track of viewing records, preventing traffic concentration in specific video content and virtually making malicious content tampering and hacking impossible.

In Chainflix's View-and-Mine system, a viewer has an opportunity to take part in the coin-mining pool merely by watching the video content.

Unlike other coin-mining systems, in Chainflix's View-and-Mine system coins are distributed among video creators, viewers, storage donors, and the like, according to predetermined dividend rates, instead of being monopolized by the miners.

The viewer has nothing to do but press the play button, which automatically triggers the mining process by an algorithm embedded in the media player. This process would not consume more than 10% of the additional hardware computing resource of the viewer who is just to be notified of block generation as it occurs during their video-watching.

4.2.2 Definition of Terms

Magnet: Unique identifier of the video

Video Information: The information including the Magnet, video title, creator and VideoCell ID but not the actual video data.

VideoCell: A piece of video sliced to 1-minute cells which is the minimum time unit to be sent from, received by, and managed on, our network. The user who downloads a 60-minute video will have a total of 60 VideoCells. A VideoCell is to be downloaded to just a single user at one time.

VideoCell ID: A distinct ID to identify the VideoCell

DownloadKey: A distinct code issued by the verifier to share videos. Users are issued of different DownloadKeys for different VideoCells. There is no duplication – double-issuance -- of DownloadKeys for each user and each VideoCell. If an user re-downloads a VideoCell after it has been deleted, he or she gets the same DownloadKey as acquired previously. Every VideoCell is transmitted in encryption by the DownloadKey

Hash Value: the hash function refers to a function that maps fixed-length data over certain data with certain length. The Hash Value means a fixed-length value derived from such a hash function. It is also called the hash code, hash sum, check sum, and the like.

PlayCode: A unique code that is received from a verifier, prior to the playing of the VideoCell, in exchange for the notification to the verifier of the start of the video playback.

Play Data: The data to record a virtual playback of a video, including PlayCode, VideoCell, AccountAddress, DownloadKey and Hash

AccountAddress: A unique wallet address for everyone using a Blockchain network.

4.2.3 Operation Structure

The Chainflix Platform consists of Chain Network and Content Network.

Chain Network is the key core of the platform operated on the actual blockchain technology to take the role of a node in generating blocks while watching a video. Content Network provides subtitles, dubbing and various services of solution providers through Ethereum's smart contract function.

4.2.3.1 Chain Network

Chain Network is where blockchain scheme is executed. Here, various transactions and smart contracts are implemented and the address information for the uploaded videos – or subtitles and dubbing files, graphic effects, advertising videos – is stored. Chain Network does not keep content per se, for fear of blockchain data explosion otherwise.

In typical P2P schemes, one can in no way decide whether a viewer has actually watched a video, making it impossible to give the viewer a transparent reward for the viewing. Chainflix has provided a solution to this through the said View-and-Mine function.

The video content files distributed over the Chainflix Network are loaded with powerful DRM functions, thereby are not to be duplicated per se, and coin-mining and reward in other methods than the Chainflix media player is impossible.

Such DRM functions include data directly related to mining and thereby enable PoV operation.

4.2.3.2 Content Network

The Chainflix media player (110 and 210), within the Content Network structure, is made up of multiple layers. Layer 1 plays back original videos. Layer 2 displays translation or special effects, distributors of which are to be rewarded with compensation predetermined at block-generation. Layer 3 plays ads being placed upon advertising payment which is to be subtracted against their viewing or clicking. The ads would not play once such payment has been exhausted. Layers 2, 3 are to be controlled through the smart contract scheme.

Multiple P2P users' devices (100 and 200) play back the video content from the Chainflix Content Network, exchange and share it with other users' devices – possibly including those of both the viewers and video creators – through that Content Network.

Such multiple P2P users' devices (100 and 200) may additionally contain the blockchain database (120 and 220) that stores blockchain data, on the one hand, and the video database (130) that keeps address information (own URLs) matching various video content – or subtitle files, dubbing files, graphic effects, video ads -- registered on video content service sites like YouTube, Ustream or Vimeo, on the other.

Chainflix may allow users of smart phones or low specification devices to get access to remote nodes. Such remote nodes enable such devices with a minimum capacity to perform the normal media player-based mining operation, as not every blockchain data is stored in each of such a device.

Each device, under the remote node function, keeps only its own transactions and contracts. For this function to work smoothly, a P2P user device (100 and 200) can choose to directly pre-set several remote nodes by continents at the start of the Main Net operation.

【Description of the Symbols】

100, 200: P2P Communication User's Device

110, 210: Media Player

120, 220: Blockchain DB

130, 230: Video DB

The media player-based coin-mining system is featured with a media player that allows the P2P viewers' blockchain-synchronized devices over the network, when they each download and play back at least one video and once such a video starts to play, to become nodes to generate a block that can be added to the blockchain, to participate in the verification and approval process for transactions among multiple users, and consequently to mine coins.

As mentioned above, the media player forms the core of the media player-based coin-mining system in which, during the video-decoding and displaying process of video playback, the View-and-Mine technology is employed to constantly check the node's nonce value during the viewing and allows block generation for the correct nonce value-matching.

P2P viewers' blockchain-synchronized devices, when they each download and play back at least one video and once such a video starts to play, become nodes to generate a block that can be added to the blockchain, to participate in the verification and approval process for transactions among multiple users, and consequently to mine coins.

Content Network also provides a cloud storage service for video content storing. Such cloud storages work on PC's only, and any user is eligible for the service with a consent to donate his/her computing power.

Cloud storages are controlled by the AI-based Storage Controller which mobilizes individual computing power and manages the video content stored in such individual computers.

The maximum capacity of a cloud storage may vary according to storage capacity of each computer. More advantages are awarded to the storage donors providing larger capacity.

[Representative Figure]

Chart. 1

[Drawings]

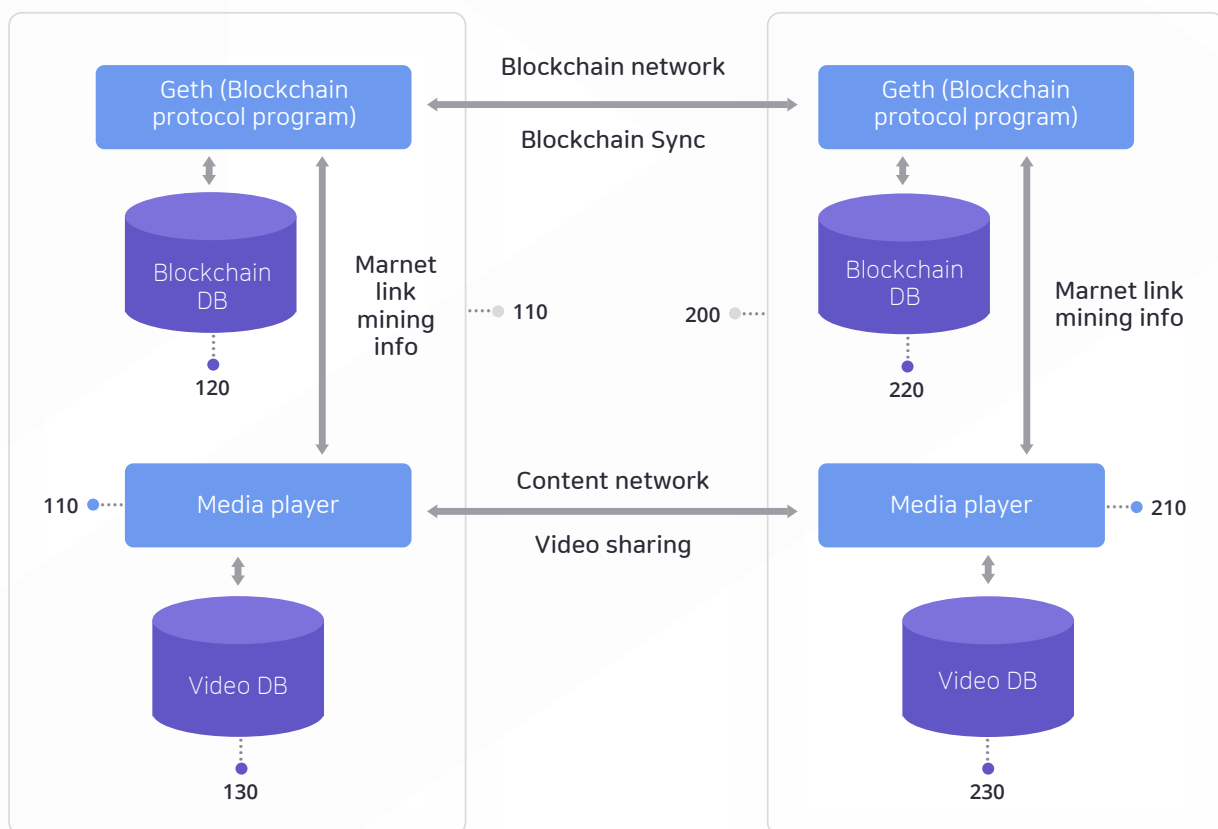


Figure 12. Chainflix Operation Scheme

4.2.4 PoV Algorithm

The content creators would split the video into 1-minute cells (VideoCell) and share them through P2P. When transmitting VideoCells, the key value is received from the verifier and get encrypted. The hash value of the encrypted VideoCell is transmitted to the verifiers.

Viewers who watch videos can share the content through P2P as with the content creators. New viewers can also download VideoCells, request play data to the verifier, decode the VideoCells, display them on the screen, and calculate the hash value.

A Nonce value with very low difficulty is computed by using a random constant and a hash value in the background. The Nonce value and Play Data are transmitted to the verifier when the viewing is completed on the VideoCells level. Encryption is performed in private keys at this time. The nonce value-calculation is deemed a failure if it takes 1.5 times more time than that of the video-playing time.

Verifier A stores the hash value generated at the time of P2P sharing and converts it into a database. A viewer-specific and unique PlayCode is issued, which shall not be re-issued per accounts for the same VideoCell.

The wallet ID and Play Data of the viewer are stored in a separate DB, and the PlayData is sent to other verifiers for synchronization. In addition, the validity of the nonce value per the Play Data received from the viewer is checked and, if the time difference between the transmission of random constant to the viewer and the reception of the nonce value is smaller than the VideoCell-playing time, the process is determined as being failed.

If successful, a block is generated (block compensation), and the video viewer information is stored in the block information. The generated block is sent to other verifiers as well for synchronization.

Verifier B stores the Play Data received from the verifier A in a separate database, checks block received from the verifier A and confirms the validity of the viewer information recorded in the block.

The block is deemed a normal one if it gets over 51% of the verifiers' votes on pass or fail. When a block is generated, compensation (coins) is put on to it and distributed among content creators, viewers, verifiers and sharers over the P2P network, by the rate of dividends.

The amount of compensation is recorded reflecting the half-life period to avoid the overpayment in per-block compensation. The block time is also recorded so that only a certain amount of compensation is set to be paid regardless of the block-generation time.

The verifier requests other verifiers to vote on the compensation for block generation, and execute the compensation – for content creators, viewers (users), verifiers, P2P content-sharers, supervisors, and so forth – at over 51% of the 'yes' votes.

As with Ripple and Stella, the verifiers are qualified on the basis of the following requirements:

- Ability to maintain fast internet connection
- Owning reliable network equipment
- Having a server with relevant performance.

The verifier, upon the receipt of the video distribution request from the content creator, records the specific code of the video, its total playing time, number of the VideoCells, the content creators, etc. in a blockchain through DAPP. The information registered as such can in no case be amended.

The supervisor of content creators is introduced to prevent content from being illegally registered. The information on the supervisors -- possibly associations or government institutions carefully chosen in each country -- is recorded in the blockchain.

The supervisor checks the identity of content creators and registers it as a user eligible for content distribution on the blockchain.

The supervisors will distribute the content after confirming that the account is registered as a content distributor at the time of content registration. If there arises a copyright issue with the content already distributed, the supervisors will have its playback discontinued.

Content creators, if they want to have their content listed, first have to submit to the supervisor their personal information as asked by the supervisor in charge who takes responsibility of protecting such personal information.

Personal information may differ from country to country and from organization to organization. Chainflix has no business in this, neither checking nor storing such information.

The Supervisor may have the authority to impose restrictions on any illegal content to be around in the future. The supervisor also gets coins at block generation, pursuant to the pre-set dividend rate.

Given the possible fraudulent use of POV's in which merely the hash value, in the absence of actual data (VideoCells) exchange, is transmitted to verifiers and pretended to have been downloaded by other users, Chainflix allows the nonce value for VideoCells to be calculated only once per account and on a regular cycle of time, say, every 10,000 block numbers from which the calculation is initialized for reset.

To prevent fraudulent uses, the verifier can reject the requests for encrypted key values or PlayCode information by each IP address.

Chainflix provides a coin-mining system based on a media player that mines coins when playing a video by communication between P2P communication viewer terminals.

Chainflix provides a media player-based coin-mining system which mine coins during the video playback by transmission between user devices in the P2P scheme.

In consideration of issues concerning the establishment and credibility of the consensus body in the initial phase, Chainflix devised a scheme in which the service can be carried out through the consensus body formation in nodes on its own network. In the longer term, it plans to achieve a transparent, public network-based operation by forming a trustworthy consensus body through affiliation and cooperation.

Chainflix is in preparation of various schemes to achieve the integrity of blockchain technology to protect the assets of all participants in its platform. Running a developers' community to entice active participation of the solution developers, and a report incentive system are examples of them.

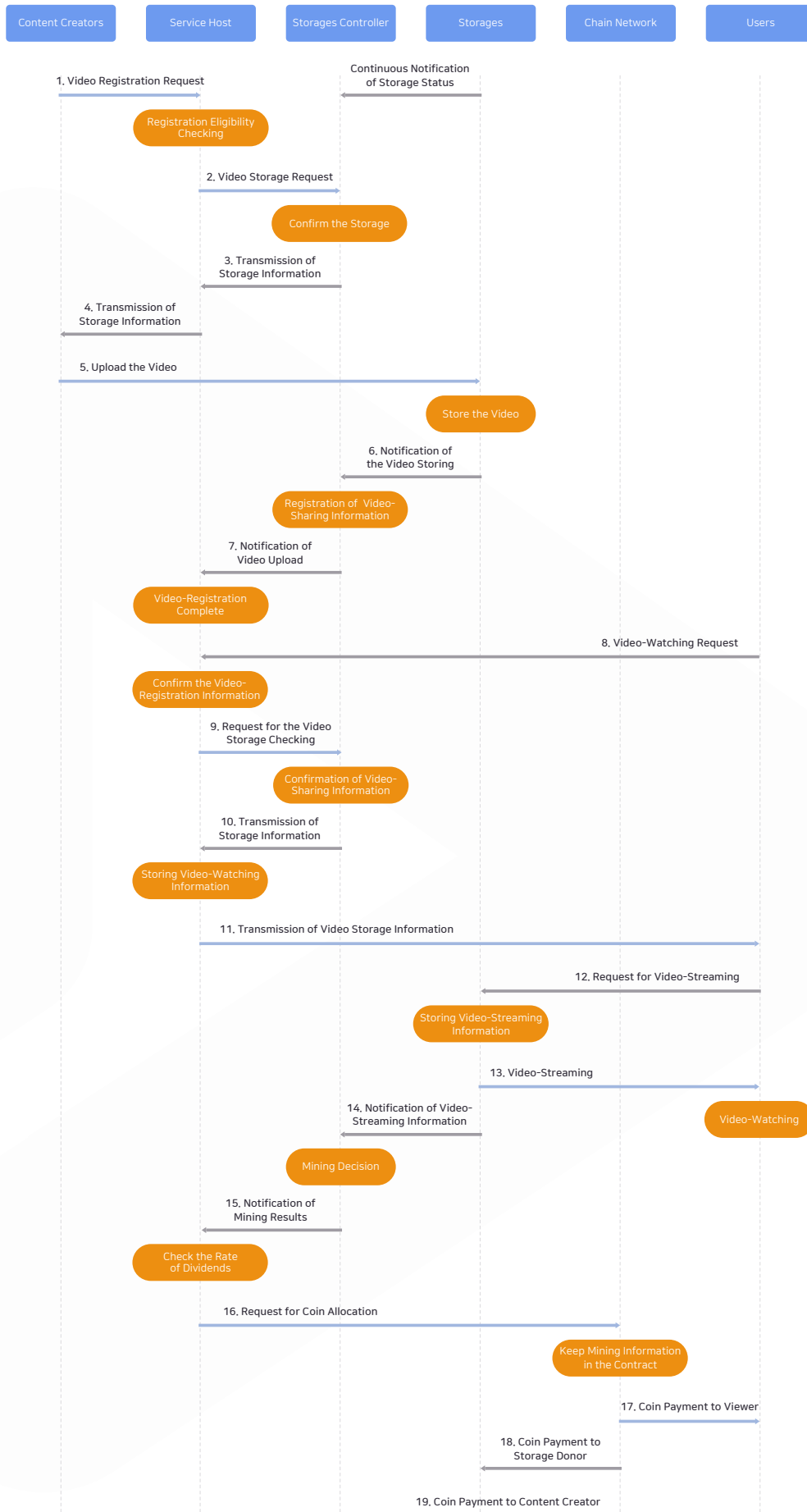


Figure 13. Chainflix Service Process

5. Chainflix Application

5.1 P2P Video-Trading

Chainflix's video P2P application program is a web- and app-based media player service provided to serve video content of the content creators.

The electronic coin wallet is installed in the media player, enabling functions like coin-trading and settlement.

Chainflix's Peer-to-Peer (P2P) scheme is equipped with a cloud computing model-based networking technology devised to overcome the unidirectional nature of the client-server environment employed in conventional Internet and the issue of single point of failure the users face when they are locked out of services due to server problems.

Such P2P's are categorized into two types: unstructured and structured P2P. Whereas the information on the whole network is managed by all peers (nodes) or concentrated in one peer in the unstructured P2P, Chainflix's structured P2P system adopts a scheme that lets each peer maintain and manage the entire network information, consequently complementing the shortcomings of the unstructured P2P system.

Chainflix is creating an ecosystem allowing more service participants to get involved in the core of media player technology.

It shares its program sources on Gethub for the producers of subtitles, dubbing and video service-related solutions to utilize them wherever needed, hoping that it could contribute to our philosophy of sharing and communicating with outside program developers for an open service operation.

Chainflix also enables a variety of multimedia services – resource-sharing, broadcasting and advertising – that conventional services have not been able to provide.

The Chainflix-mined coin, the currency circulated on the Chainflix Platform, is labelled CFX.

The CFX is issued in video-watching only, and its electronic wallet can be created by every user.

There will be no coin-issuance with no video playback or no viewer. In other words, no coin is to be issued with no view on the platform.

CFX is tradable to another CFX between users. Trading to other currencies is to be processed on the coin exchange planned to be listed in the future.

5.2 DApp

DApp is an acronym for Decentralized Application. There will be lots of DApps on the Chainflix network. In the early stages of our service when there are likely to be few DApps, we plan to offer an environment allowing for each DApp's own service operation within the Chainflix platform by creating an ecosystem as a whole.

The DApp world splits into two: on-chain and off-chain. Chainflix records users' comments, votes, chatting and tags in the central server in an off-chain scheme.

Recording all the data on on-chain causes data hypertrophy and hyper-slowness in traffic processing as every single comment is to be recorded on blockchain altogether and called out from it real time. Chainflix thus adopts a method to separately process transactions that do not need recording on the blockchain but require quick response in the central server for input and output.

We plan to have every kind of DApps -- pertaining to storage donors, advertising functions for the advertisers, production tools for content creators, service operation tools, and the like -- engage themselves into an ecosystem formation.

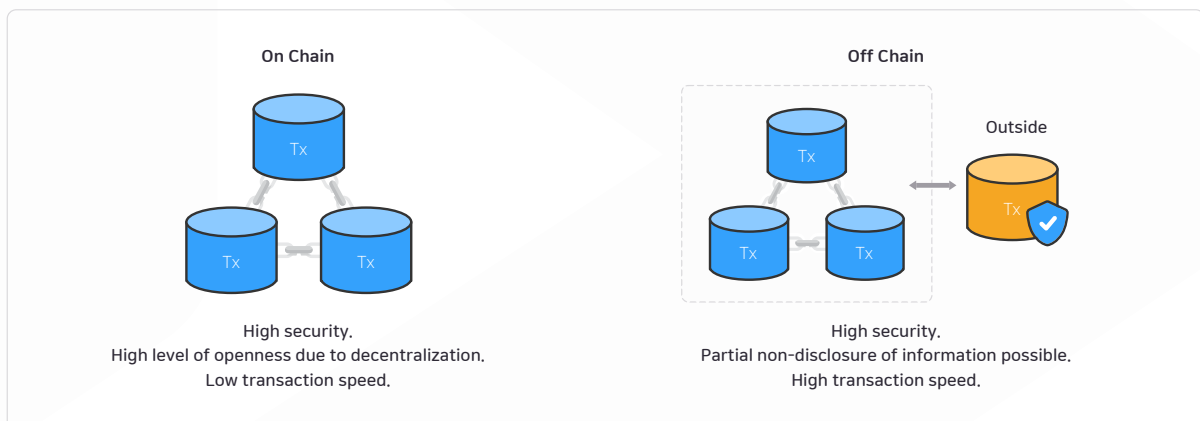


Figure 14. On-Chain and Off-Chain Comparison

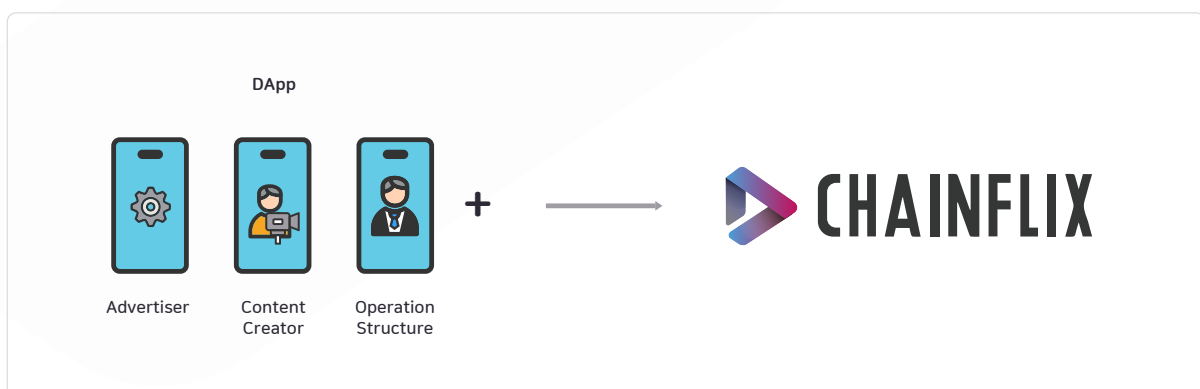


Figure 15. Chainflix DApp Composition

6. Team Structure



Jeong-seok, Oh / CEO & Founder

The CEO of Jampick, Oh is actively engaging in the blockchain community, providing technical consultations and giving advices all around the world. His stellar career of more than 20 years of experience in the business includes: main architect of coin design and development for a new and renewable energy firm of the U.S.A.; project head for the development of the mobile IT system for Kia Motors of Korea.



Seong-rok, Yoon / Senior Engineer

The director of development at Jampick. Yoon is an established expert in the world of game and blockchain. He led the strategic RPG business in 2012 when his game prevailed in 13 countries including the U.S. and Canada. He presently operates a coin-mining pool of more than 900 members. At Jampick, he sits as the mastermind in the development of blockchain core and application software.



Jung-su, Park / Technical Advisor

A blockchain core developer, Park has rich experience in coin-developing and service-launching based on PoA algorithm. He is currently in charge of core development for PoA and PoV based on Ethereum at Jampick.



John Bennet Wiggins / International Business Development Director

Wiggins is an experienced marketing specialist who provided extensive marketing and consulting services for world's renowned companies. Leading a team of program engineers developing patients-specific medical software for hospitals in the U.S.A., he is putting a lot of efforts in the global marketing of Jampick's blockchain business.



Phil-jeon, Park / Business Advisor

Park is a well-known marathoner in Korea for his 45 times of the full-course run, some of which was run on bare foot. He is a career specialist in the distribution industry, both in and out of country, currently working as the chairman of Tori International Group.



Chul-yong, Park / Partnership Advisor

A graduate of the Department of Theater and Film at Dongguk University, Park is an established entrepreneur in the entertainment industry in and out of Korea. He previously ran Miracle Entertainment and the MBC Academy Lifelong Education Center and now works as the CEO of Hollywood Tribute Korea, while serving as the Secretary General of the International Blockchain Promotion Foundation and the Chairman of Seoul Blockchain SME Venture Committee.



Sang-yup, Ryu / Financial Advisor

Ryu provides Jampick advices and expertise in blockchain-driven payment and FinTech solutions. He was in charge of the Eco-Service project planning for Samsung Electronics' consumer compensation sales. He also launched a global platform service based on entertainment celebrities' credit card, in cooperation with KBA and MBC of Korea. He is currently engaging in the development of utility coins relating to manufacturers' compensation sales at Blockworld Korea. He has done broadcasting and entertainer card business in cooperation with KBS and MBC as a global platform.



Sang-jae, Seo / Technical Advisor

A FinTech specialist and graduate of financial engineering at Yonsei University, Seo previously ran CnBridge and currently works as CEO of CryptoSquare and The Payx Foundation. He also serves as members of OBC (Open Blockchain Consortium) and The Korea Association of Blockchain respectively.

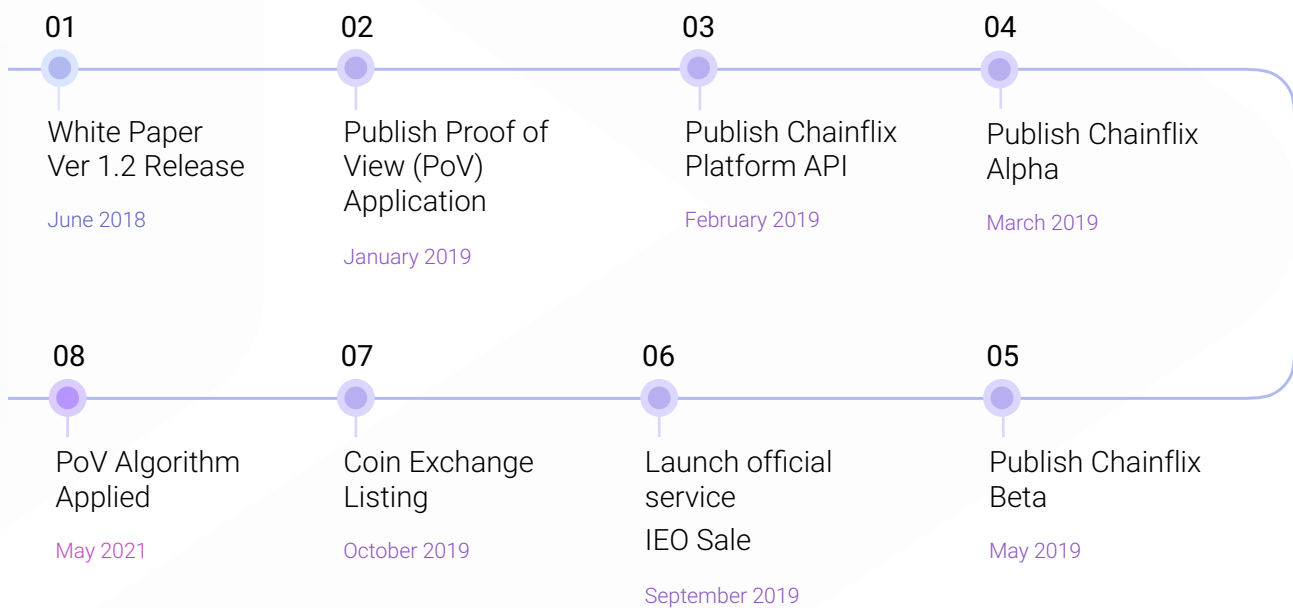
7. Roadmap

7.1 Future Plans for the Platform

Chainflix published the White Paper Ver. 1.2 in June 2018 and clarified its vision by making public its Proof of View (PoV).

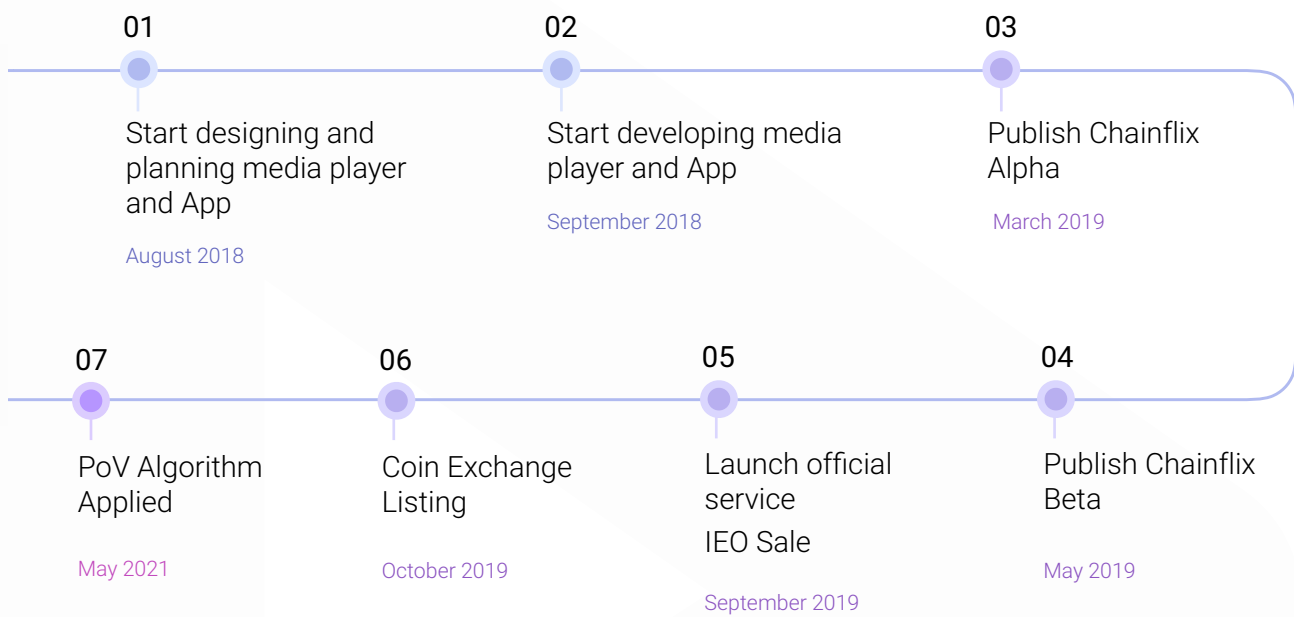
The API and SDK for application programs to be working in connection with the Chainflix Platform were developed in February 2019.

The Alpha and Beta Versions of the Platform were developed in order in March and May of 2019 respectively, to be followed by the release of the Full Version, through a test phase, at the end of September in 2019.



7.2 Future Plans for the App

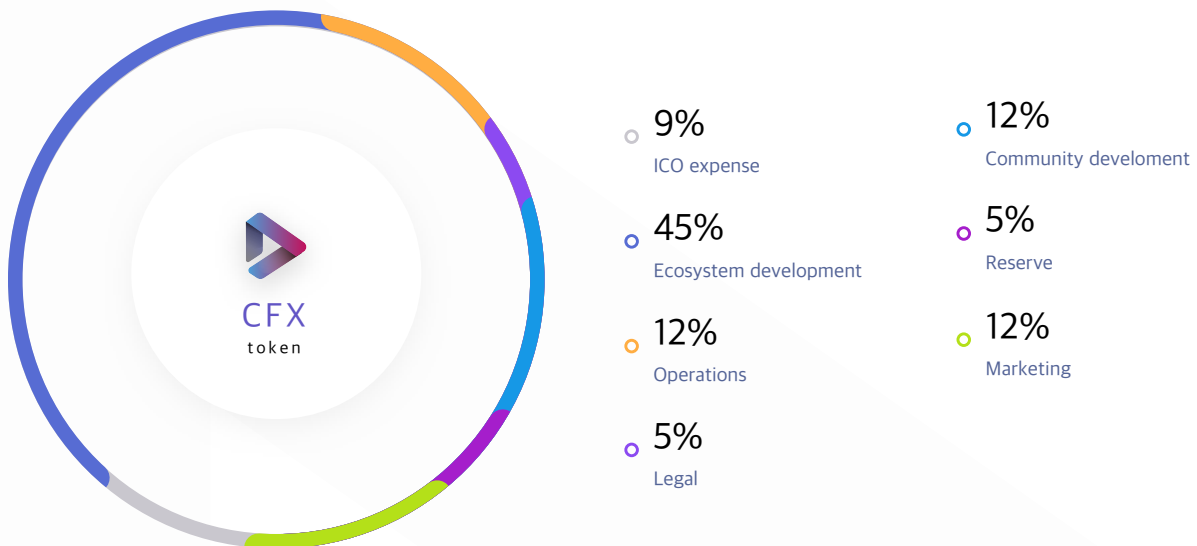
Chainflix is an open ecosystem in which everyone can develop own application program and connect it to the Chainflix Platform without limitations. Chainflix is planning on incentive schemes like bounty to encourage third party involvement and thereby further invigorate the Chainflix ecosystem.



The Chainflix platform is to be developed in accompaniment with application programs -- electronic wallet, web and App. All of these application programs are expected to be fully released in September 2019.

8. Token Model

8.1 Chainflix Token



[Funds allocation]

8.2 Coin Allocation

Symbol	CFX
Block Time	14.4 Sec
Block Compensation	90 CFX
Half-Life Period	45 CFX after 2,160,000 blocks (Approximately 1 Year)
Initial Issuance	6,000,000,000 CFX
Annual Issuance	197,100,000 CFX
Issuance in 1 Year after Half-Life Period	98,550,000 CFX
Total Issuance by Mining after 40 Years	4,040,550,000 CFX
Total Issuance after 40 Years	10,040,550,000 CFX

9. Partners



10. Conclusions

Given a harsh reality of the video content market in which platform service providers abuse their power over, and unduly exploit the profits at the expense of their users, Chainflix finds it imperative, and eagerly aims to, offer an alternative ground where the users can form their own ecosystem to ensure the autonomous and transparent settlement and allocation of revenues on the blockchain network, purely for themselves.

Content distribution has so far been in the grip of a group of huge distributors and platform service providers which take full control of the users' content consumption.

Chainflix, against this reality, proposes a new environment in which the content creators and users all over the world, at their own discretion and without being disturbed by unnecessary barriers in content circulations, can freely communicate and share content with each other, in a win-win fashion.

Keeping this aspiration in mind, Chainflix R&D team is making every effort to attain a maximum level of service reliability, security and transparency to assure seamless video streaming over a P2P network of individually donated storages.

11. Miscellaneous (Legal Considerations, etc.)

Chainflix (Chainflix, Inc. and its shareholders, employees and affiliates are referred to as Chainflix collectively here), writes this white paper solely for the purpose of providing specific information on this service and service team to those who have interest in, and affection for, the Chainflix platform.

This white paper is thus not intended in any way to encourage investment in Chainflix or the Chainflix platform.

Further, the Chainflix team provides this white paper 'as it is at the time of its writing' so that its content, including the conclusions, may not still remain valid in the future.

The Chainflix team makes no representations or warranties of any kind with respect to this white paper and assumes no liability for them. For example, the Chainflix team does not guarantee whether or not this white paper (i) is based on legitimate rights and does not infringe the rights of third parties, (ii) is commercially valuable or useful, (iii) is appropriate for achieving your specific goal (iv) contains no error in its content. The range of liability exemptions is definitely not limited to the above examples.

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