POPCHAIN

Pan Entertainment Ecosystem

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The earliest technological inventions have two categories

Some arts were invented directed to the necessities of life; **others** to recreation.

The inventions of the latter are naturally always greater than the former.

— Aristotle 「**Metaphysics**」

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1. Introduction

Entertainment is an eternal topic of humankind seeking a better life. Especially, the digital content market is continuously recording an outstanding growth rate based on a highly developed network. According to Technavio's report released in 2016, the worldwide digital video content market size is expected to grow to $ 121 billion by 2020 and record an annual growth rate (CAGR) of about 26%[1]. Also, the recently emerging live broadcast market is anticipated to grow to about $ 71.7 billion by 2023, in Asia alone. As of 2017, the number of interactive live broadcast users worldwide exceeded 600 million, while the number of platforms went over approximately 1,000.[2] The live broadcast market is expected to surpass the movie market and become the next big entertainment market after the gaming industry.

Such numbers make it look as if everything in the world of entertainment is prospering smoothly and seems like it will continuously grow. However, there are questions being raised as below that have not yet received clear answers:

- Is the currently highly-developed entertainment industry really fulfilling the different desires of entertainment producers and consumers?
- Do individual live broadcasters have spontaneity and creativity?
- Do game players have interest in independently creating value?
- Are entertainment stars expressing dreams and ambitions enough through concerts and movie screens?

The current digital content distribution market has many unresolved problems, such as market monopolies by large content distribution platforms or enterprises, unfair hierarchical relationship structures for content creators, copyright issues from illegal content distribution, and qualitative deterioration of individual content due to intensified competition. The question is how the current digital entertainment industry can move in the right direction without changing the fundamental paradigm.

The blockchain technology which can provide transparency, reliability, and openness to the content distribution system can be a good solution to these series of problems. POPCHAIN Foundation seeks to solve the problems of digital content distribution markets by using blockchain technology and bring revolution to the content industry and to the general entertainment industry.

1.1 Current Problems

The digital entertainment industry has already formed a global market with a wide range of users. While the stress and anxiety of modern people are increasing day by day, leisure and entertainment are playing an increasingly important role as a means to solve them. The younger generation all over the world is strongly demanding for leisure entertainment like mobile internet / video / online games. However, as the level of demand increases and diversifies, the problems of the general entertainment industry are also on the rise.

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[1] Technavio, Global Digital Video Content Market 2016-2020 (2016)

[2] Infoholic Research LLP, Asian Live Stream Market: Drivers, Restraints, Opportunities, Trends, and Forecast, 2017-2023 (2017)

1.1.1 Lack of Value Circulation Mechanisms of the Traditional Entertainment Economy

Different entertainment platforms mostly form closed, independent virtual economic systems. For example, the game currency of game A can be exchanged for game items in game A, but cannot be used to purchase items in game B, nor be given as a gift to the broadcaster on the live broadcast platform C. Transactions across different countries, regions, or servers are impossible, and even if it is possible, it is very unlikely that value circulation will happen among different platforms due to high expense. In addition, on special occasions such as bankruptcy of an online game or a live broadcasting platform, users' virtual assets are most likely to become useless, which again undermines the value circulation.

1.1.2 Limited Market Accessibility for Producers due to Oligopolies and Monopolies

In fact, a small number of giant game and entertainment companies are the owners of a number of distribution channels, public channels, users and data resources, and the monopolization is getting worse. Such monopolization is resulting in scarce resources and therefore higher production and distribution costs for general producers. Small businesses and individual studios for which it is now impossible to secure funds and resources solely through excellent creativity and outstanding products are suffering from resource shortages and it is becoming increasingly difficult to introduce new works onto the market. As a result of monopolization of the market by large companies, relevant costs will eventually be imposed on common users and the price of the content that are used by common users will soar even more.

Platforms run by personal content producers also have many problems. Market competition is overheating and market corruption by existing popular producers is increasingly intensifying. In the case of YouTube, it is only focusing on managing existing popular producers, which makes it difficult for newer creators to generate revenues. While YouTube generates revenues from advertisements embedded in content, content creators share revenue through separate partnership agreements only when they have 4,000 hours of aggregate view time in 12 months and more than 1,000 subscribers, and this also can be made possible only under YouTube's screening. [3]

1.1.3 Destruction of the Ecosystem by Existing Large Entertainment Platform Vendors

In general, large content distribution platforms are dealing with high quality content produced on a large budget. For content creators, however, big budget content is a great loss if they fail to get widely distributed. Therefore, content creators often sign contracts with relatively unfavorable terms from the pre-production stage with large platform companies that have dominated the distribution chain. On the other hand, large platforms lose their customers if they fail to collect and distribute popular content. In order to supply popular content, they pour in a lot of budget or produce their own. Such competition for securing distribution networks give rise to indirect cost for content production, and consumers who want to enjoy content are the ones who must bear the cost.

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[3] Youtube, Partner Program, www.youtube.com/account_monetization?action_agreement=1 (2018)

1.1.4 Lack of Trust Mechanisms for Centralized Platforms

In the gaming industry, game account transactions, equipment transactions, game currency transactions, gold point card transactions, and various types of activation code transactions are actively demanded and the third party virtual game content transaction market is gradually growing. However, high transaction costs occur since the third-party transaction platform is completely independent from the game system, and many transaction disputes occur regarding seller's malicious cancellation after the content transaction and the inability to verify the ownership of game content. Meanwhile, some platform operators modify their video playback history, online game partner account numbers, etc. in order to benefit from recommending their internet stars, and improving the exposure and ranking of related e-sports athletes.

1.1.5 Inefficiency of Centralized Platforms with High Complexity

In the music industry, music producers are at the bottom of the industrial chain. While the number of channels is increasing, producers' income is getting lower. Many of the album copyrights of music producers are in the hands of big companies which are usually at the top of the industrial chain. Meanwhile, record companies and tour promotions companies have begun contracting with big production companies to maintain copyrights by trying to manage this complex mechanism and eliminate piracy. For example, one-third of employees of the Universal Music Publishing Group specialize in managing local royalties and copyrights in the global market.[4] The cost of managing royalties are increasing as the business is getting more complex, which is a direct burden to the producers. The current music industry is facing an important challenge to reduce the complexity and to simplify the key role of the record company in the ecosystem.

On the other hand, some consumers find a way to enjoy content without paying royalties using P2P services such as BitTorrent. Due to such illegal P2P services, content creators are suffering loss in their profit. In the case of HBO's popular drama "Game of Thrones," the number of illegal downloads is estimated to have reached 6 million in 2013, and it is hard to imagine how big the number of illegal downloads would be by now. [5]In 2015, the number of torrent movie files downloaded was estimated to be about 48 billion, and the damage cost was estimated to have reached $ 160 billion. The global music market also shrunk from $ 40 billion to $ 15 billion because of the illegal distribution of music through P2P servers.[6] Providing decentralized P2P services is desirable, but managing the copyrights within the current centralized system is a great burden as well as cost.

1.2 Mission Statement of POPCHAIN Foundation

"We are to accelerate the decentralization of digital content distribution and create a comprehensive entertainment operating system which fully rewards each entity to generate mutual synergies."

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[4] Universal Music Publishing Group, https://www.umusicpub.com/us/About-Us/Global-Admin.aspx (2017)

[5] Vaihav H. Vora, The Borderless Torrents: Infringing the copyright laws around the world (2013)

[6] BASCAP and INTA, THE ECONOMIC IMPACTS OF COUNTERFEITING AND PIRACY (2017)

POPCHAIN is a digital content distribution service platform based on blockchain technology which aims to create a new form of content sharing economic system that is 'live-streamable' and copyrights-protected,. Creators can present content in various forms such as text, pictures, music, video, and software on the platform, and can also build separate application programs using the platform's open source software. Copyright owners can set prices for content distribution and receive royalties every time a consumer makes a transaction even after the content has been distributed. Consumers can evaluate the content to autonomously manage the quality of the platform's content, gain additional benefits, and receive content recommendations through various algorithms. While copyright owners could not be properly rewarded for their contributions in the existing content distribution market due to illegal distribution of content or unreasonable contracts made with large centralized digital content distribution platforms, the POPCHAIN platform ("POPCHAIN Platform") can eliminate the unnecessary intermediate distribution phase, record all distribution channels, and connect copyright holder directly with consumers. In addition, it will reward all contributors participating in the network and is expected to create a new system that solves the existing problems of the digital content distribution system.

2. POPCHAIN, New Alternative for Content Distribution System

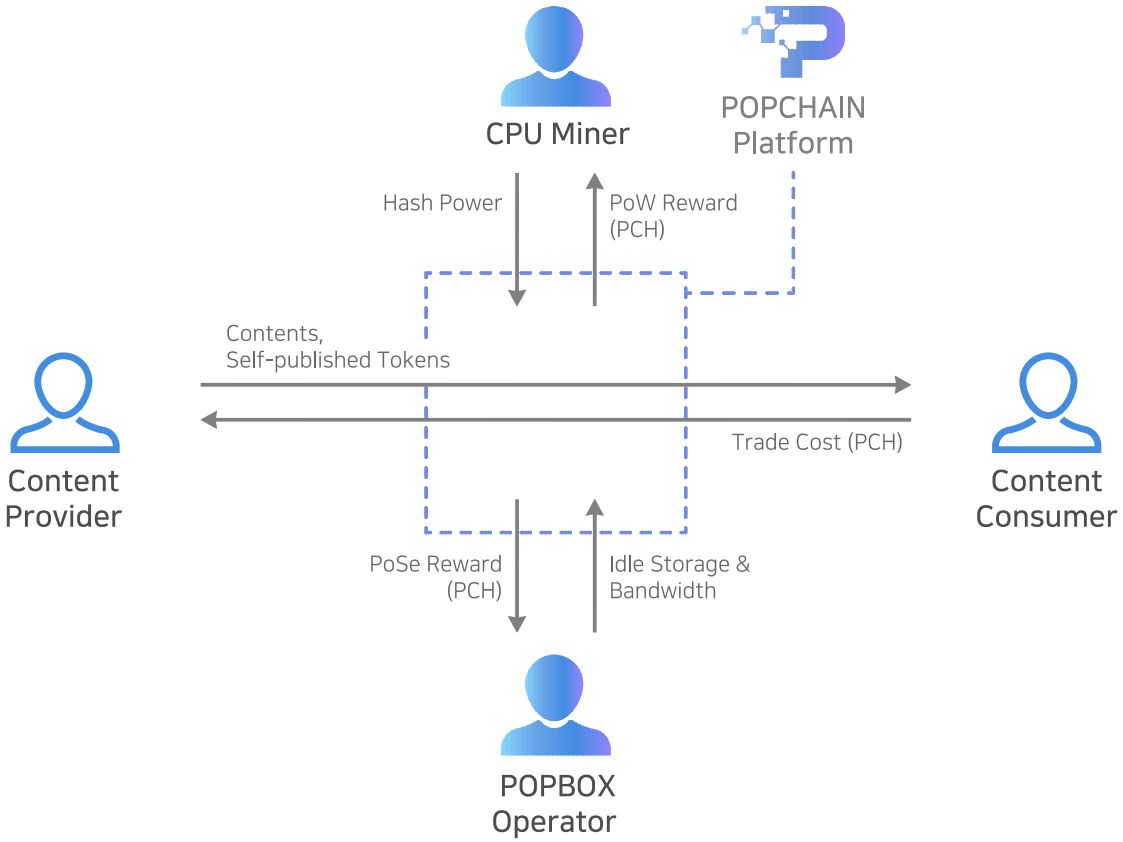
Problems of the existing content distribution system are as stated above. Projects using blockchain technology to solve such problems are under way, such as DECENT, Primas, Po.et, YOYOW, and Steem. However, the problems are not merely a technical problem but a result of overlapping and complicated issues such as conflicts from different interests among economic entities constituting the system. It is difficult to expect a complete solution without the fundamental innovation of the content distribution ecosystem.

POPCHAIN, as an alternative for the existing content distribution system, suggests contributions as well as a brand new reward structure for each economic entity through the platform along with the utilization of blockchain technology. Away from distributors-focused traditional content industry structure which has been dominating the content distribution network, POPCHAIN seeks to structure a profit distribution system that can further benefit content creators and consumers (users).

POPCHAIN ecosystem of POPCHAIN and its participants cycles through two axes: (1) a blockchain-based platform software POPCHAIN and (2) a set-top box hardware POPBOX for platform use. Technology on POPCHAIN system, such as Smart Push and the consensus mechanism, enables content consumers to access uniquely optimized content, while POPBOX allows POPCHAIN to store idle storage and bandwidth, which in turn increases the performance of the platform and rewards POPBOX operators with POPCHAIN CASH (PCH) as a means of trading within POPCHAIN, depending on the degree of contribution.

POPCHAIN CASH is used to purchase pay content distributed through POPCHAIN, and producers of high-quality content can make economic gains by selling them through POPCHAIN and acquiring POPCHAIN CASH. Other participants may also be compensated according to certain algorithms and other criteria, depending on the content and extent of the contribution to POPCHAIN. As such, POPCHAIN ecosystem will

circulate through the interaction among the participants and POPCHAIN Foundation will only engage in minimal activities such as maintenance and repair of the platform and will not be involved in actions such as imposing commissions for content distribution, therefore enabling efficient and fair content transactions between content providers and the consumers.



[POPBOX Ecosystem]

2.1 Platform Participation Categories

Participants of POPCHAIN Platform can be divided into Content Provider, Content Consumer, POPBOX Operator, and Entertainment Stars. POPCHAIN aims to overcome a number of obstacles that have existed in the Content/Entertainment Industry and provide each participant with the best opportunities and benefits through mutual synergy to provide an environment where everyone can benefit.

2.1.1 Content Provider

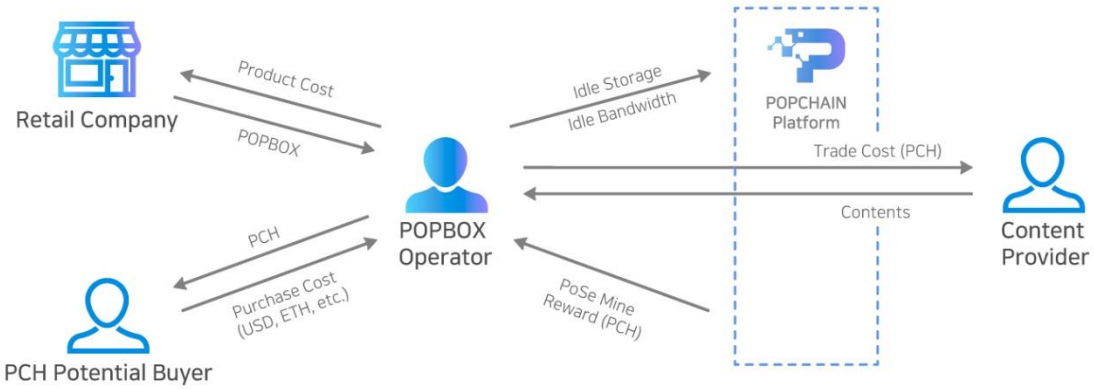
Content Providers can solve existing problems regarding dependence on large distributors and earn more profits by using POPCHAIN's decentralized platform. In addition, Content Providers can self-fund from platform participants including Content Consumer by issuing a unique token. Zero-fee, immediate content transactions on POPCHAIN Platform will inspire creative and enthusiastic content creators.

2.1.2 Content Consumers

Content Consumers can enjoy free content posted by content providers on the platform and use POPCHAIN CASH to conveniently and cost-effectively access a variety of entertainment resources, including copyrighted high-quality content. Also, POPCHAIN CASH can be rewarded according to the policy of the content provider for various activities such as game installation, comments on videos and movies, scoring live broadcasters, participation in game contests, and other qualifications.

2.1.3 POPBOX Operators

POPBOX Operators are special platform participants who allow POPCHAIN to utilize resources efficiently. They acquire POPCHAIN CASH as a reward for their support of the ecosystem by connecting their POPBOX to a network which provides POPCHAIN with resources including idle storage and network bandwidth, which, in turn, enables the storage and utilization of content on POPCHAIN.



[Structural Diagram of POPBOX]

2.1.4 Entertainment Stars

Entertainment Stars may be seen as Content Providers, but are different from general Content Providers in that they are the 'Stars'. They can issue tokens just for their fans and themselves through a POPCHAIN Smart Contract. Fans and Fan Clubs are then allowed to use the tokens when purchasing concert tickets or goods.
In addition, such tokens can be utilized as a unified means of trading in various online and offline activities between stars and fans around the world.

2.2 Features of POPCHAIN

POPCHAIN has the following characteristics that differentiate it from other content distribution systems.

2.2.1 Fair Reward System

Content providers have the opportunity to leverage POPCHAIN to produce, sell, and deliver content without being influenced by large distributors, creating more profits than through existing distribution channels. In a typical App Market, it is common to charge 30% of the revenue generated by a content provider as a platform fee[7], but POPCHAIN does not charge providers platform fees or other fees related to content transactions. In addition to the direct selling method, content providers can obtain additional benefits by issuing individual tokens based on POPCHAIN.

Direct trading through POPCHAIN is more advantageous for content providers in terms of liquidity in trading value. In a typical app market, the supplier is often paid after more than 30 days from the date of the settlement by a consumer, [8]and there is a risk that the content supplier may have a liquidity problem. However, transaction payments in POPCHAIN are performed in real time through POPCHAIN CASH. The content providers acquire POPCHAIN CASH at almost the same time as the sale, which prevents unpaid transaction payments.

2.2.2 Securing Transaction Transparency and Reliability

All transactions related to content or digital events are recorded on a public transaction ledger and anyone can access the content at any time through POPCHAIN. Specifically, it will secure transaction transparency and reliability by continuously generating and maintaining backup data to prevent loss, verifying integrity of the data by recording the hash value in the blockchain, and restoring the original data with backup data in case of forgery. In addition, the name of a file uploaded on POPCHAIN will be stored permanently.

Aside from the above, POPCHAIN uses an online P2P (Peer to Peer) method that connects consumers and suppliers directly, and therefore enables protection of personal information of parties to a transaction, common decision making, protection of individual rights and interests, etc.

2.2.3 Improved Network Speed and Reliability

The commonly used HTTP protocol has issues of low resiliency, hyper centralization, and latency. As such, POPCHAIN introduced IPFS (Inter Planetary File System) [9]for improved network speed and stability of data and content. Platform participants can deliver large files quickly and efficiently through POPCHAIN, and POPCHAIN can maintain a decentralized stable ecosystem even if some nodes are detached.

2.2.4 Platform Contribution and Reward System Provision through POPBOX

POPBOX is a core hardware that differentiates POPCHAIN from other blockchain platforms. POPBOX is a set-top box hardware that is used for using video content or watching live-streaming broadcasts within POPCHAIN Platform.
In general, a participant is required to be active on the blockchain platform to earn coins, such as buying

[7] Tech Republic, App store fees, percentages, and payouts: What developers need to know(2012)
[8] Tech Republic, App store fees, percentages, and payouts: What developers need to know(2012)
[9] Juan Benet: IPFS Content Addressed, Versioned, P2P File System(2014)

coins from ICO and other sources, creating and producing content and selling to other participants (a typical example is Steemit). This has served as an excessive burden to general users (content consumers) and resulted in becoming an obstacle for them to participate in the platform and related ecosystems.

On the other hand, POPCHAIN has built a system that participants contribute to the platform by purchasing POPBOX hardware, connecting it to a network, operating and maintaining it, thereby providing idle storage and bandwidth to POPCHAIN. Participants receive POPCHAIN CASH from the platform as a reward for these contributions, and POPBOX performs a similar function as a mining hardware. In other words, POPBOX not only provides its inherent functions (the use of POPCHAIN Platform), but also extends the range of participants that can contribute to the platform, thereby further stimulating the growth of POPCHAIN and transactions through POPCHAIN.

Such stimulation of POPCHAIN will increase the opportunity and frequency of content exposure, encouraging content providers to participate in the platform. This will increase the number of POPBOX installed and operated, which will increase available resources on POPCHAIN to provide a more seamless platform for participants, and thus will bring a virtuous circle of POPCHAIN ecosystem. In the future, we plan to make POPBOX functions (providing idle storage and bandwidth to POPBOX) available not only as a set-top box, but also through other electronics hardware such as an air purifier, which can further expand the scope of the POPCHAIN ecosystem.

2.2.5 High Scalability

POPCHAIN participants can utilize Side Chain technology support by POPCHAIN to implement diverse business models into the ecosystem. For example, popular idols and celebrities can issue their own tokens and choose to sell or distribute the tokens. In this case, the tokens can be used as a method to purchase concert tickets and merchandise, as well as to organize diverse activities such as offline activities and ticket exchanges. Supporting the issuance of tokens related to popular celebrities and other functions can have a positive effect on both (1) giving celebrities opportunities to absorb existing POPCHAIN users to be their fans, and (2) the expansion of the ecosystem from celebrities' participation in POPCHAIN Platform.

As described above, POPCHAIN Platform and the ecosystem can be extended not only to digital content and live broadcasts, but also to the entire entertainment space.

3. Market Value and Size of Related Industries

POPCHAIN Platform can be utilized for various businesses in the media and entertainment industry. As mentioned in the introduction, global digital video content market is expected to grow to $121 billion by 2020, and particularly live streaming market in Asia only is expected to grow to $71.7 billion by 2023.[10]
If POPCHAIN could acquire just 1% of this market and make a meaningful change in the industry through

[10] Technavio, Global Digital Video Content Market 2016-2020 (2016)

its business, then according to the above calculations, it will be possible to achieve $1.2 billion only with digital video content within 5 years. Moreover, decentralized applications ("DAPPs") on POPCHAIN Platform will not be limited to video content but can possibly be expanded to various fields such as music, game, image, pictures etc., thus the market size related to POPCHAIN could increase.

4. POPCHAIN Technical Details

4.1 General Operation System

POPCHAIN Platform in the technical aspect mainly constitutes of a 'General Operation System' and a 'Decentralized Application Program'. The General Operation System supports basic functions related to the platform such as smart contracts in the lower layer of the distributed application program that performs specific business functions in the system. The main elements constituting this include, but are not limited to, the following systems.

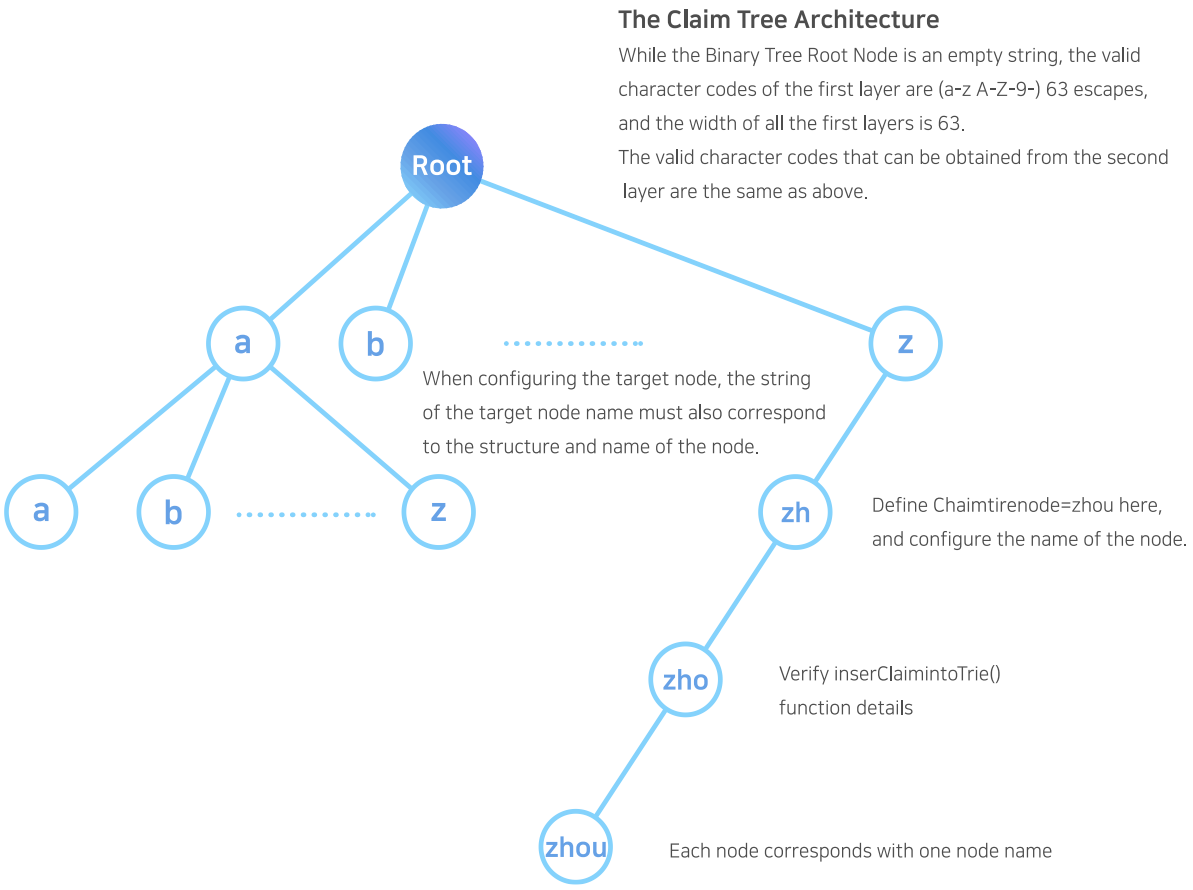
4.1.1 Master Node System

The Master Node[11] improves the stability, security and computing speed of the entire network and provides a stable Proof of Service (PoSe) data storage service so that general participants can easily build the POPCHAIN network. It can support more than 2,000 transactions per second, optimize data storage and processing, and maximize user satisfaction by utilizing various applications, including operating systems such as Linux / Windows / OS X.

4.1.2 IPDS (InterPlanetary Domain System)

A typical blockchain uses the 34-character string address, but it is problematic in that it is (1) difficult for users to memorize the domain and, (2) psychologically limits the public to access blockchain technology. POPCHAIN supports an efficient decentralized domain name resolution service through IPDS (Interplanetary Domain System) as below and increases accessibility to POPCHAIN of general users familiar with the existing HTTP protocol framework.

[11] Evan Duffield, Daniel Diaz, Dash: A Privacy-Centric Crypto-Currency (2017)



[The Claim Tree Architecture of POPCHAIN IPDS System]

4.1.3 PoW + PoSe Mixed consensus mechanism

POPCHAIN Platform uses Proof of Work (PoW) and Proof of Service (PoSe) mixed consensus mechanism.

PoW records the ledger and distributes profits according to a miner's workload. POPCHAIN employs a specific CPU mining algorithm, Cryptopop, and utilizes the advanced encryption standard (AES) algorithm and a uniquely designed additional algorithm and is thereby able to effectively combat a variety of various attacks. The algorithm is designed to allow more people interested in POPCHAIN to participate in mining.

1) Initialization of Work Memory

The work memory M is initialized in the following manner.

Input: x

Output: M

Intermediate variables: a and b are vectors whose length is 5 words, and a[c1:c2] represents c1: c2 bytes of them.

1. a=h0(x)

2. i cycles from 0 to |M|/16-1, // if |M|=2MB, it cycles 128k times.

2.1 M[16*i:16*i+15]=a[0:15];

2.2 t=reduce_bit(a[16:19],4);

2.3 a=ht(a[0:15]|i);

2) Modification of Work Memory Content

Input: M M [addr] indicates the byte of address addr.

Output: M

1. a=h0(inverse of M) r=0; // memory initialization must be all done before proceeding.
2. i cycles from 0 to C*(|M|/16-1) / total 2C|M| times random memory reads and writes.
2.1 seed (a [16:19]); // Initialize the random number generator.
2.2 j cycles through 0 to 15 // modify memory content and create a new hash function input.
2.2.1 addr=rand() mod |M|+reduce_bit(r,5)<< reduce_bit(r,4); // Create a random address.
2.2.2 t=M[addr];
2.2.3 M[|M|-addr]= t XOR a[i]; // Modify the work memory.
2.2.4 r=a[i]=t; //Modify
2.3 t=reduce_bit(a[16:19],4);
2.4 The byte array formed with a is sorted in ascending order.
2.5 a=ht(a[0:15]|i);

3) The final result is generated depending on work memory content.

Input: M

Output: y

1. y=h0(M[0:16]|0);
2. i cycles from 0 to |M|/16-1
2.1 t= reduce_bit(y[16:19],4);
2.2 y[0:15]=y[0:15] XOR M[16*i, 16*i+15];
2.3 y=ht(y[0:15]|i);

PoSe rewards users according to the amount and quality of service provided by the users. POPCHAIN implements PoSe algorithm through POPBOX. POPBOX not only (1) allows users to watch videos or other content on POPCHAIN Platform, but also (2) serves a function that provides idle storage and network bandwidth of the hardware for the purpose of content live broadcast by other participants, etc., and compensates the owner in return. This is a distinct characteristic of POPBOX that clearly distinguishes it from a typical set-top box. In PoSe, factors such as storage capacity, storage value, storage IOPS (or inputs/outputs per second), and network contribution can be considered in determining compensation and its extent.

4.1.4 Smart Push

POPCHAIN uses Smart Push in order to recommend customized content that correlates to various purposes. Technologies including source knowledge extraction and correlation method which has its basis on our deep neural network are implemented based on Entity Name Recognition and Entity Attribute Extraction regarding content, creators and other information.

POPCHAIN will recommend different users movies, live broadcast programs and online games according to their preference through Smart Push (1) collaborative recommendation method based on embedded

knowledge, (2) recommendation method through online real-time feedback, (3) mixed model method, etc. In addition, POPCHAIN will use the content vector space modeling technology to support collaborative recommendation method that integrates Comprehensive Knowledge Structure Features, Topic Features, Semantic Features, etc.

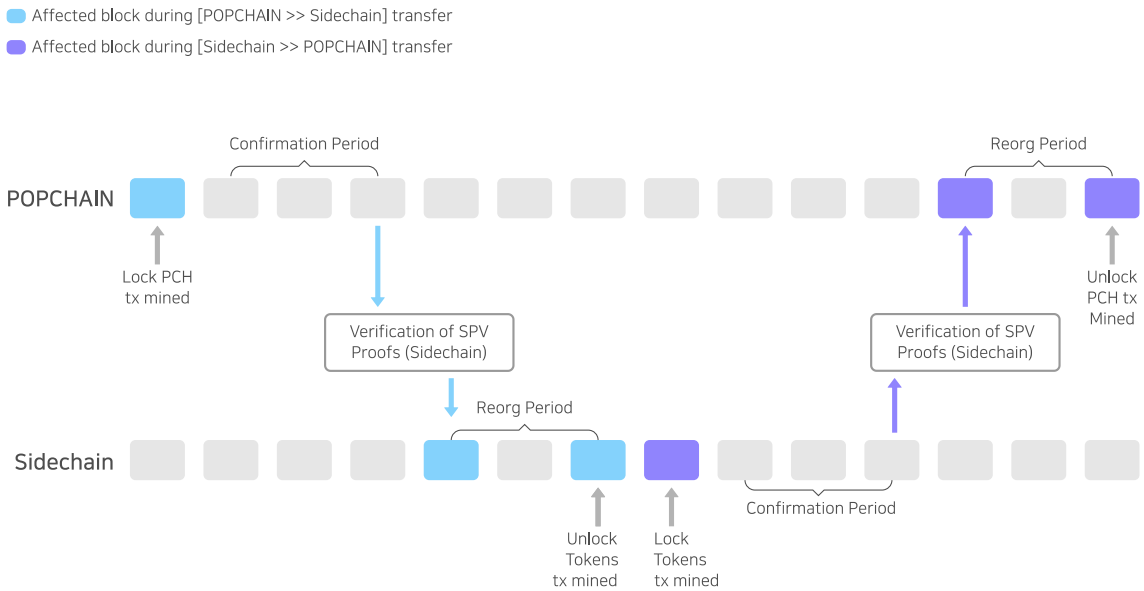
4.1.5 Side Chain

Side chain does not refer to any particular chain, but essentially refers to any chain that complies with side chain protocols and rules. The side chain protocol is a protocol that allows POPCHAIN CASH to be safely transported from POPCHAIN to other chains, and to be redirected from different chains to POPCHAIN.

The side chain protocol enables mutual exchange of POPCHAIN CASH between the main chain and a side chain through the Two-way Peg process as described below. All existing blockchains can be side chains of POPCHAIN if the above protocol is followed.

The Two-way Peg is divided into the following stages.

1) Lock PCH in the main chain by sending a lock transaction.
2) Wait for the lock transaction to be acknowledged to more blocks through a confirmation period.
3) Constrain PCH in the side chain and provide the SPV workload and output to its side chain address.
4) Confirmation period is to prevent double spending. After the confirmation period, the constraint transaction is repackaged into POPCHAIN block.



[Two-way Peg Guide Map of POPCHAIN]

All DAPPs on POPCHAIN Platform can create side chains and connect them to POPCHAIN as shown above. Side chains are independent system separate from POPCHAIN, therefore even though a problem occurs on a DAPP and its side chain, it does not affect POPCHAIN.

4.1.6 Smart Contract

Participants can enter into smart contracts through POPCHAIN that are highly compatible with Ethernet virtual systems. A game studio in Bangalore, India, a content provider including famous movie and TV star in Seoul, Korea can all publish and distribute a self-token through POPCHAIN Platform and build a separate, unique, individual entertainment ecosystem that uses the token. In this case, the tokens can be exchanged with POPCHAIN CASH at a certain rate according to the smart contract.

4.2 System Architecture

POPCHAIN adopts a loosely coupled modular, encouraging more developers to participate in the ecosystem. Content providers can easily build their own platforms through a number of interfaces, such as a web interface, desktop, and mobile application, and operate services.

POPCHAIN implements the master node system in the Original Chain Layer to satisfy various entertainment requirements and improves the quality of network services by forming a stable back-bone network and optimizing data processing. POPCHAIN also uses a dedicated hardware POPBOX to acquire a large pool of cloud storage resources and provides storage space resources that can search addresses constantly and globally. Also, POPCHAIN adopts the PoW and PoSe mixed mining mechanism to prevent the POPCHAIN network from being misappropriated.

The system architecture of POPCHAIN mainly consists of 5 layers, and the details are as below.

4.2.1 Original Chain Layer

Each type of node of POPCHAIN performs roles as described below.

1) General Node
- Basic node of POPCHAIN which provides universal basic services such as mining pool and wallet.

2) Integrated Service Node
- When POPCHAIN CASH and POPCHAIN Tokens input/output to and from POPCHAIN ecosystem, Integrated Service Node provides services and records on Original Chain Layer.

3) Coin Transfer Node
- Requests the platform to provide coin transfer service.

4) Master Node
- Ensures stability of the entire POPCHAIN, resolves communication latency issues and improves transaction speed.
- Supports secure and fast payment functions such as instant tx and private send.

4.2.2 Network Service Layer

POPCHAIN provides network services as described below.

1) P2P Content Distribution Service
- POPCHAIN utilizes a P2P content distribution protocol similar to BitTorrent based on a blockchain account and enables sharing of entertainment data such as movies or video games, and supports upload services to each user.

2) Distributed Hash Table Indexing Service
- POPCHAIN uses the Distributed Hash Table (DHT) to construct the namespace of the user resource and realizes the DHT network node relationship mapping. DHT does not have a main node and it supports a distributed system based on [Key-Value] search function.
- Through this algorithm, DHT finds specific a node according to keywords and provides the node with services such as data storage and search.

3) Payment Service
- Transactions including live broadcasts, watching pay-per-view movies, entertainment star concert tickets and game equipment sales on POPCHAIN Platform are all treated as a single transaction and stored in the blockchain.
- Transactions including content upload and download may require commission according to the relevant DAPP.

4.2.3 Business Logic Layer

Business Logic Layer of POPCHAIN includes registration service, payment service, media-player service, coin issuance and reception service, data service, etc.

1) Registration Management Service
- Processes verification according to requests from POP Applications.
- Provides POPBOX activation service.
- Monitors POPBOX and records online login time and contribution, and sends the results to a comprehensive service node.

2) Payment Service
- Processes payments for the paid content through POPCHAIN CASH.
- Users' POPCHAIN CASH consumption is recorded in the database service, and the balance fluctuation is not recorded in POPCHAIN except when a user charges POPCHAIN CASH through POP Application.

3) Media Broadcasting Service
- Provides on-demand service within POPBOX through Media Broadcast Cluster.

4) Coin Transfer Service

- Calculates the logic according to the contribution through POPBOX and provides daily rewards. In addition, it records corresponding data on Database Service.

5) Database Service

- Provides data base services to other logic layers including main memory database (MMDB) cache.

4.2.4 Application Layer

Application Layer includes POPBOX, POP Application (POPAPP), and various mobile apps, and has certain functions such as the following.

1) POPBOX Hardware

- Installs a hardware drive (e.g. USB).
- Used in communication with embedded Android system and lower layer hardware.
- Used in communication with embedded application and upper layer application.

2) POPBOX Software

- Acquires POPBOX system information (e.g. POPBOX system version information, IP address, POPCHAIN address, etc.), and is operated in Android system.
- Connects to media broadcasting server and acquires media data and proceeds broadcast.
- Connects to POPBOX and sends its data information.
- Obtains instructions and installation information of POP Applications.

3) POP Application

- Scans POPBOX QR code, enters user information, submits it to the backend server, and uses it for registration.
- Manages coin transactions.
- Manages POPBOX and user information.

4.2.5 AI Service Layer

AI Service Layer processes each data and makes the base system more secure and stable (1) when the operation data of the Application Layer have both user behavior data and application behavior data, or (2) when it has to improve the efficiency of the Logic Layer operational data.

[Framework of AI Resource Creation and Distribution Effect Management]

The AI supportive function of the first generation of POPCHAIN (v1.0) mainly supports the entertainment resource creation management and content distribution effect management.

1) Content Creation Management

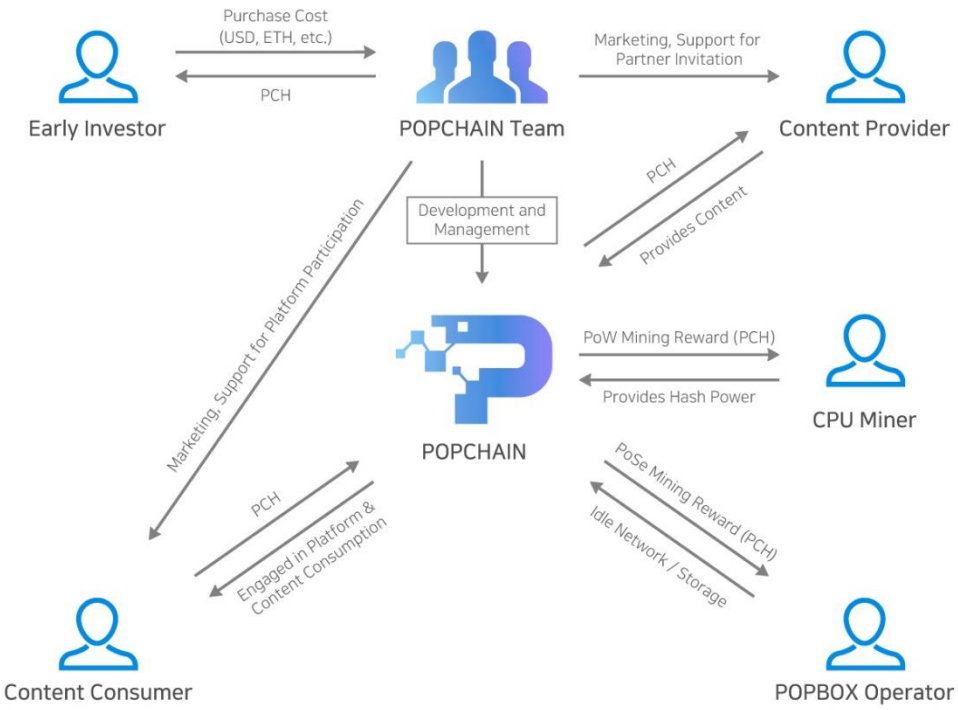
- Tracks in real-time popular sites and entertainment content, and quickly analyzes the content's authority, influence, appeal, game player behavior, and so on.

2) Content Distribution Effect Management

- Personalizes entertainment content through user access behavior (search order, live broadcast watch time, game online status, etc.) and mining users' point of interest and accurately makes recommendations to each participant.
- Selects and optimizes propagation paths based on knowledge maps, increases access frequency by combining related content, and improves user experience.
- Identifies and removes malicious nodes from the entertainment content distribution link to protect the rights and interests of real participants.

5. POPCHAIN Economy System

POPCHAIN uses POPCHAIN CASH as a currency of the POPCHAIN Platform. POPCHAIN CASH can be used in applications of various fields based on POPCHAIN and facilitates the entire ecosystem by giving fair value to content. As POPCHAIN CASH moves between the platform and participants, the cycle of the economy of the whole ecosystem takes place.



[POPCHAIN Economy Flow]

5.1 POPCHAIN CASH Acquisition Method

Platform participants can acquire POPCHAIN CASH within the platform through each method below.
Other pre-sale of POPCHAIN CASH (specifically, POPCHAIN Token that will be exchanged in a 1:1 ratio with POPCHAIN CASH) is described in another section. Any changes to POPCHAIN CASH will be automatically recorded in the ledger.

5.1.1 Provision or Sale of Content

Participants can obtain POPCHAIN CASH in exchange for publishing valuable content on the platform as a content provider and selling it to other participants (content consumers). The transaction conditions in such cases, such as the number of POPCHAIN CASH that can be obtained, are agreed upon by the parties of the transaction, and the platform is not involved in such agreement.

5.1.2 Token Issuance through Side Chain

Participants can publish their own tokens on POPCHAIN Platform and use the side chain technology to connect them to POPCHAIN CASH. A participant may sell the issued token to other participants and obtain POPCHAIN CASH in return.

5.1.3 POPBOX Management (=POPBOX Mining)

Participants can contribute to the POPCHAIN Platform by purchasing a POPBOX, connecting it to a network, and operating it to provide resources such as idle storage and network bandwidth. POPCHAIN rewards a certain amount of POPCHAIN CASH to the participants according to the nature and degree of the contribution through PoSe distribution method.

5.1.4 CPU Mining

POPCHAIN requires hash power to create and connect blockchains. Participants can provide hash power to the platform through PoW CPU mining using the general node. POPCHAIN provides participants with a certain amount of POPCHAIN CASH as compensation according to mining performance. Additional details in this regard will be given in a separate section.

5.1.5 Others

Other participants can contribute to POPCHAIN through community activities such as improving the encryption code based on the public API of POPCHAIN, or spreading POPCHAIN to potential participants. In this case, POPCHAIN can reward POPCHAIN CASH according to certain criteria.

5.2 POPCHAIN Token Launch

POPCHAIN Foundation issues an ERC20 based POPCHAIN Token prior to issuing POPCHAIN CASH. The issuing amount is 2 billion, which consists of (1) 30% sold to participants who wish to purchase through private pre-sale, (2) 15% for the establishment of POPCHAIN ecosystem environment and related project settlement, (3) and remaining 55% reserved within POPCHAIN Foundation. Pre-sale related matters are described in more detail below.

5.3 POPCHAIN Token Pre-Sale

5.3.1 Use Plan of Sales Fund

[Proceeds from the private pre-sale will be used as a seed fund to support the development of POPCHAIN Platform and the creation of a digital content circulation ecosystem. The detailed purpose of using the funds is as follows.

Purpose	Note
Costs of Marketing to Content Providers	Marketing activities for promoting partner participation for content supply and distribution
Costs of Marketing to Content Consumers	Marketing activities related to participation of individuals in the ecosystem and sales of POPBOX
Costs of Marketing for Other Ecosystem Construction	Marketing activities related to encouraging developers to build DAPPs on POPCHAIN Platform
Development Cost	Development of POPCHAIN Software and POPBOX (hardware)
Reserve Fund	Reserve fund for addition business development
Other Operation Cost	Foundation operational and cost including legal counseling fees and other administrative activities

5.3.2 Procedure and Method of Token Sale

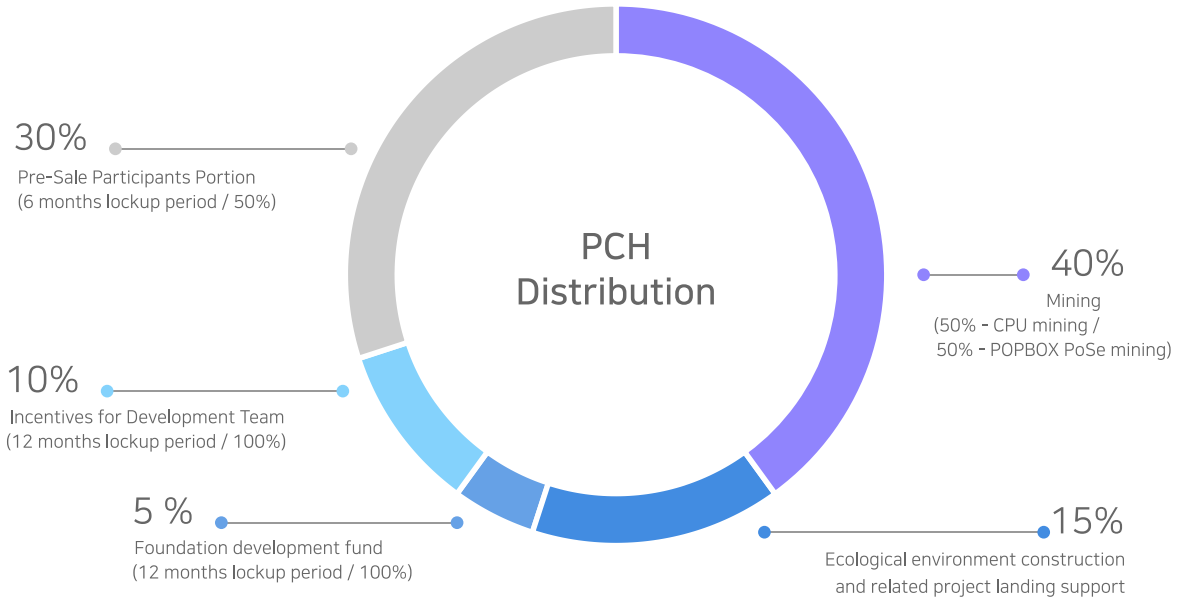
POPCHAIN Token sales are made through the Ethereum Smart Contract. Accordingly, the participant acquires POPCHAIN Token by transmitting Ethereum deposited in his or her electronic wallet to the electronic wallet designated by POPCHAIN Foundation performing the project and receiving automatic transfer in POPCHAIN Tokens to the participant's electronic wallet. Other detailed information on the procedure and method of POPCHAIN Token Sale is provided to the participants through the website.

5.4 POPCHAIN Token Conversion into POPCHAIN CASH

Once the first POPCHAIN ecosystem develops to a certain level, POPCHAIN Foundation plans to release a total of 2 billion separate coins (POPCHAIN CASH) based on a public chain independent from the Ethereum chain and exchange them with POPCHAIN Tokens at a 1:1 ratio.

The issued POPCHAIN CASH will be distributed as follows:

- 30%: Distributed to POPCHAIN Token Pre-Sale participants (6 months lockup period for 50% of the PCH distributed here)
- 15%: Support for POPCHAIN ecological environment construction and settlement of related projects (to prevent failure of decentralization due to exclusive content supply centered on specific providers and to encourage various content providers to enter the platform)
- 40%: Distributed as a Mining Reward (50% distributed for CPU mining and 50% for POPBOX PoSe mining)
- 10%: Distributed as Incentives for Development Team (12-month lockup period applies to all the PCH distributed here)
- 5%: Distributed for the purpose of Foundation Development Fund (12-month lockup period applies to all the PCH distributed here)



[POPCHAIN CASH Distribution Ratio]

6. POPCHAIN Use Cases

POPCHAIN Foundation has explored the issue of delivering value among different entities through a variety of digital content distribution systems. In the long term, POPCHAIN plans to provide an open, decentralized entertainment platform to various entities through a digital content distribution system. Also, various business models can be created on the POPCHAIN Platform through DAPPs. The following use cases serve to illustrate the possibilities for DAPP businesses by utilizing POPCHAIN.

6.1 New Form of Music Sites

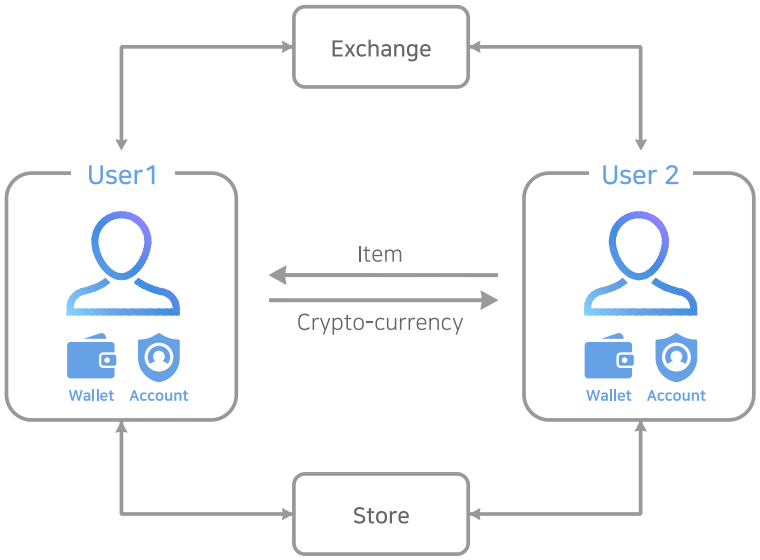
The smart contract of POPCHAIN can reduce the complexity of the music industry and simplify major roles of recording companies. Music producers can create a producer-centric model in POPCHAIN, and earn a reasonable return based on their production value. The revenue readily occurs when the users (listeners) pay with POPCHAIN CASH to share and appreciate the music.

These models regard producers as entrepreneurs and equal partners in terms of value, respect agreements, and regard them as indispensable parts of value creation. As such, the concept of comprehensive royalty was implemented to distribute profits equally not only to composers and performers but also to individuals in other professions such as engineers according to their contributions in the production process. In addition, the decentralized ledger of POPCHAIN ensures transparency by recording all the revenue generated by each music source, the time and size of the revenue earned, and the rate at which the revenue is gained. In addition, reputation points can be created at the addresses through address

transactions history and AI services on POPCHAIN, and producers can avoid contracting with certain partners who are below the standard reputation or lack funds in the ledger through the multi-signature smart contract.

6.2 Combination of Each Entertainment Service

Once an application that leverages the side chain of the POPCHAIN Platform is deployed, internal value delivery becomes very convenient. Each token is traded in a Two-way Peg format in POPCHAIN and the previously inefficient third-party trader can be eliminated. Transactions between a user and a shop (seller) or between two users can now be carried out with each token without an intermediate trader. For example, assuming that live broadcasts and games are connected through each side chain, users using each service can easily exchange live broadcast tokens and game tokens at stores and exchanges.



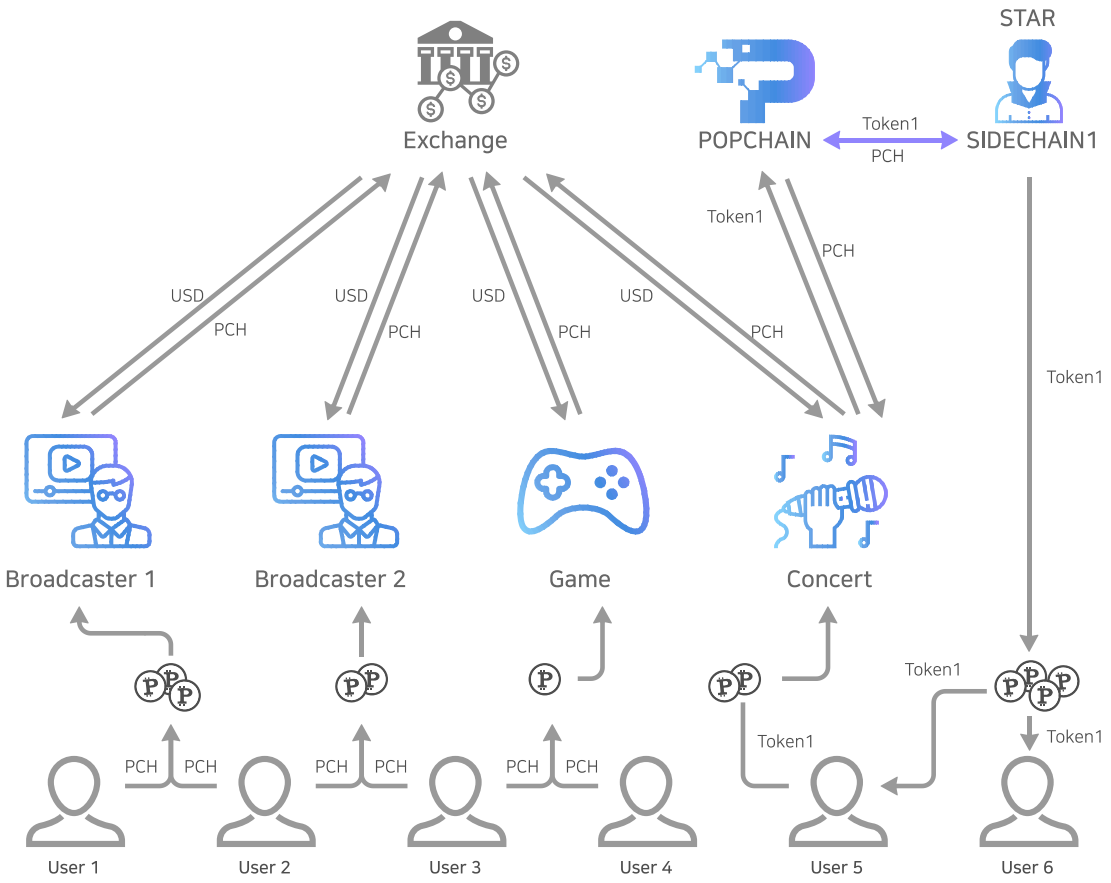
[Value Transmission among Applications]

6.3 Fan-Based Entertainment Business

Users can watch live broadcasts using POPCHAIN CASH. Broadcasters can convert POPCHAIN CASH obtained from the profits into key currency (fiat) and use it outside the POPCHAIN economic system. It can of course also be used for other users or fans. If the user is a gamer, it is also possible to purchase games using POPCHAIN CASH with other users. Some game users can sell the equipment gained from the in-game quests to other users and get POPCHAIN CASH. If some game masters have a good understanding of the game, they can respond to the game company's questions and suggestions, organize the game community, and vote for the game. After such proposal is adopted, the player can receive a certain amount of POPCHAIN CASH in exchange for participation in game ideas.

In the case of a popular celebrity, a programmer can be employed with POPCHAIN CASH. If a programmer develops a side chain that includes a smart contract using the API interface provided by POPCHAIN CASH, he can issue his own token in the side chain of that star. Fans can use tokens to buy that star's concert

tickets in POPCHAIN and promote his or her products, food, clothing, games and electronic consumer products. These tokens can be distributed for free to star enthusiast fans in welfare form, or be purchased with POPCHAIN CASH by fans. If the token has enough influence, it can be applied to the virtual currency exchange, and the consumer can also buy it through the exchange.



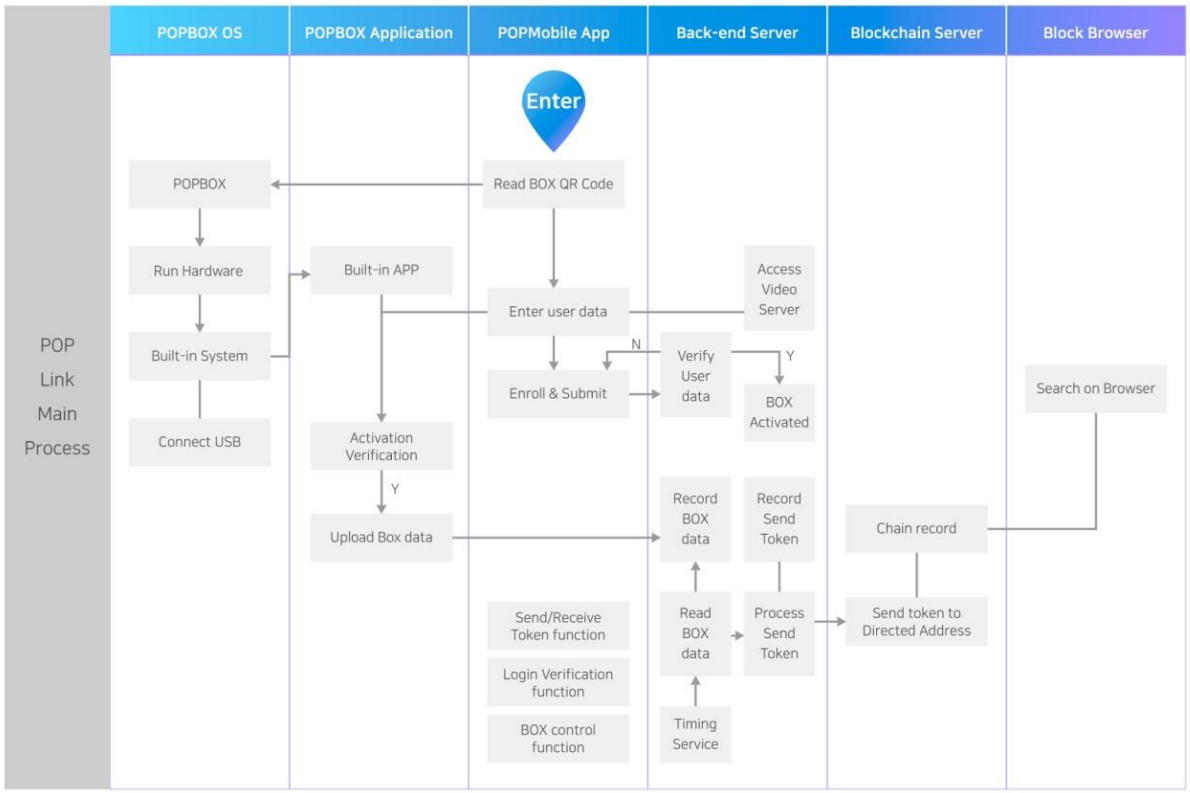
[Value Transmission of Fan-based Entertainment Applications]

6.4 User Application Use Scenario

User application scenario can be identified by assigning a basic framework. After a user downloads and initiates the POP Application, he or she scans the QR code on top of POPBOX. Then, when POPBOX and the POP Application are linked, he or she inputs the user information and submits the registration application.

The coin issuance and receipt service are processed through the relevant information recorded in the data service according to the regulation rules. The service contribution of POPBOX is calculated based on this information, and the coin issuing node dispatches a coin to each POPBOX.

The detailed framework is as follows:

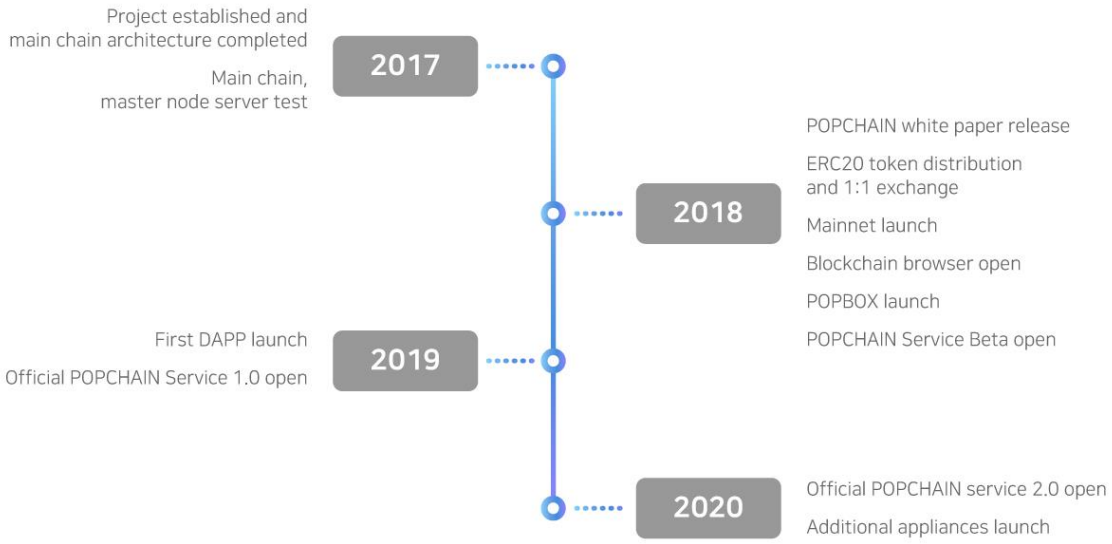


[Application Use Scenario]

7. Roadmap

7.1 POPCHAIN Platform Development Schedule

POPCHAIN Foundation plans to develop POPCHAIN Platform according to the schedule below.



[POPCHAIN Roadmap]

*Please note that this is a tentative plan based on our current situation, and it may be subject to change according to various circumstances despite the efforts of POPCHAIN Foundation.

7.2 Growth Vision of the Platform

POPCHAIN Foundation presents the following roadmap until rapid composition and stabilization of the POPCHAIN economic ecosystem is achieved. However, this operational roadmap is in regards to the time prior to the stabilization of the POPCHAIN Platform ecosystem. Once stabilized, the platform is expected to operate autonomously and truly achieve the state of a decentralized ecosystem.

7.2.1 Growth of Business Model

POPCHAIN aims to create a business ecosystem where content providers and consumers can trade what they value without paying any commission to intermediaries. POPCHAIN aims to build a new form of content sharing economy with a mixed consensus mechanism that not only features an ordinary PoW mechanism but also a PoSe mechanism, which is made possible by our unique hardware, POPBOX.

As a milestone to achieve this vision, POPCHAIN Foundation expects to launch the main chain and open

the blockchain browser by Q3 2018. POPCHAIN Foundation also plans to set the base for the ecosystem by launching POPBOX by Q4 2018, and the full-scale content distribution through POPCHAIN will be available after 2019.

POPCHAIN Foundation, in cooperation with our partners, is continuously seeking new business models that are different from conventional digital content platforms and plans to expand the ecosystem by encouraging development of various DAPPs and nurturing relevant communities.

7.2.2 Expansion of Side Chain

Live broadcasting and video distribution services can be provided through POPCHAIN Platform and the POPCHAIN ecosystem is expected to expand through the participation of content-related businesses, such as movies and dramas.

In addition, concerts and sound source business can be provided using side chains of each participant by producing celebrity-dedicated platforms and tokens based on fan communities. In addition, if the services related to webtoons and web-novels are also provided, then POPCHAIN Platform can be developed to cover the whole entertainment space, combining –gaming, live broadcasting, webtoons, music, and video content all in one platform.

8. Team Members

The POPCHAIN Team has gathered top-notch talent with a wide range of skills. The Team has broad-based development skills to develop blockchain technology with more than 10 doctors as leaders. Members of the development team consists of about 50 skilled programmers and algorithm engineers with backgrounds in blockchain, cryptography, Internet information security, big data, cloud computing, artificial intelligence, finance and management. Our business team is formed with people who have extensive experiences in successfully managing business in the entertainment sector. Business team is in charge of the overall service planning, marketing, and partnerships for expanding content supply and demand for constructing digital content distribution platform. The consulting team consists of scientists of advanced blockchain cryptography and related experts blockchain who jointly develop key technologies for the POPCHAIN Platform.

1) Zheng Yang, Founder & Development Team Director

Dr. Yang is currently research supervisor of algorithm design of the POPCHAIN development team. He got his PhD in System Engineering in 2006 from National University of Defense Technology in China. Prior to joining POPCHAIN, he worked at National University of Defense Technology College of Information System and Management in China as a lecturer from 2006 to 2012 and an associate professor from 2012 to 2017. During his career, he has participated in the research and development of multiple block chain projects and has a deep understanding of the combination of the block chain, contents distribution and big data analysis. Zheng Yang's main research focus is on computer vision, machine learning, etc., about which he has an extensive knowledge. He has participated in many fields such as digital media contents analysis,

cross-media contents retrieval, and big data video analysis. He has completed a number of national key scientific and technological research projects that have been highly evaluated and recognized by the government.

2) Liang Liang, Founder & Development Team

Dr. Liang is research supervisor responsible for product and economic model design of the POPCHAIN development team. He got his PhD in management science and engineer in 2006 from National University of Defense Technology in China. He has a wealth of experience supervising for technology research as a CTO of Shenzhen Best Service Tech & Service Co., Ltd. from 2008 to 2016. He also worked as a product manager at China Merchants Bank Personal Banking Department from 2002 to 2004 and an engineer at Hunan Zhuzhou Southern Aviation Power Machinery co., ltd. responsible for research on machinery model from 1995 to 2002. Dr. Liang's main research focus is on the field of information system integration. He has published multiple sophisticated papers. Over the same period, he has participated in several information system projects at both the national and provincial level. Recently, Dr. Liang has conducted in-depth research in system evaluation and optimization, system modeling, and blockchain finance, while gaining a wealth of experience in blockchain and system software design based on blockchain technology.

3) Will Sangwon Son, Founder & Business Team Director

Will Sangwon Son is the supervisor and director responsible for business development of the POPCHAIN team. He is currently also director of THE E&M, a main partner of POPCHAIN, which is pursuing various new content related businesses for POPCHAIN. He is a content network specialist as a Co-founder of Ars Praxia – formerly TREUM –, a Big Data & Social Network Analysis Company. He graduated Hongik University in Korea studying industrial engineering, computer engineering, and design and carried out various projects to generate synergy, collaborating with Samsung Electronics, Coca-Cola, Naver Corp., etc. As the director of THE E&M he successfully launched and operated 'Celuv TV,' which is the internet live broadcasting platform featuring Korean idol stars, and hip-hop MCN 'Red&Yella.' Through his wide experience, he has shown outstanding performance in planning and developing content platforms.

4) Jin Lim, Founder & Business Team

Jin Lim is responsible for business development strategy in the POPCHAIN team, and also currently a senior manager of THE E&M. He graduated Yonsei University in Korea, majoring in business administration. From 2013 to 2016, he worked at Samsung Electronics Consumer Electronics Division, responsible for establishing global communication strategy and creating various marketing communication promotion materials. Working at strategy department in THE E&M from 2016, he supervised the investment strategy and managed corporate value management of the company. In 2018, he initiated new content platform brand strategy along with business growth strategy utilizing blockchain technology. Through his career he has extensive experience in the software and hardware aspects of global content.

5) Hansin Kim, Co-Founder & Business Team

Hansin Kim is responsible for Asia business in the POPCHAIN team, and also currently a senior manager of THE E&M. He graduated Chung-Ang University, majoring in business administration. After graduation, in China, he developed and operated his own business in various industries. He also gained professional

knowledge and insight developing career at Ncrew Entertainment and Hanyou Korea, both game publishing companies. Working in THE E&M from 2016, he performed the key role in concluding partnership agreement with large platforms and content providers including Baidu in China and DMM in Japan. Through managing overseas business, he is actively building his presence in the global content market.

6) Stephen Wang, Technical Director

Stephen Wang is the technical director of POPCHAIN development team. He graduated from Peking University majoring in software engineering in 2009. He is also the co-founder of TalentWalker developed in 2008 and has developed Happy Farm, China's first H5 game, which accumulated over 10 million users on platforms including Mocospace and Gree. The social games Happy Kitchen and East Village were then launched on renowned platforms such as Renren, Taobao, Facebook, Nate and Mixi, and accumulated approx. 50 million users. He has worked as a researcher in Lenovo from 2008 to 2009 and Microsoft Asia Institute in China from 2009 to 2010. He has also won the Best New Artist Award in 2007 BAFTA ONCE TO WATCH AWARD.

7) Neil Han, Product Manager

Neil Han is the product manager of the POPCHAIN Team. He got his master degree of software engineering in Peking University in 2008. He is also the co-founder of OraStream (the world's first self-adaptive High Fidelity Streaming Media). He worked as the director of product management in Snyppit, the first video content sharing APP in Southeast Asia, from 2013 to 2014. From 2014 to 2015, he served as Senior Director of Engineering in a Korean company, SK Planet, and was responsible for developing the Southeast Asian version of Dianping of China. From 2015 to now, he has been working for Twilio Inc. (NYSE Listed) and is now the Chief Technical Officer for the Asia Pacific region. He is also providing technical advice to many leading Internet companies in Asia.

8) Tim Leon, Architecture Designer

Tim Leon is the architecture designer of the POPCHAIN Team. He earned his master degree of computer software engineering in both Peking University and Nanyang Technological University in 2008. He has more than 10 years of experience as a specialist in the Internet of Things and the smart hardware area. He also won multiple Best of CES in the US CES Awards. He worked in Microsoft Asian Engineering Academy as a design technologist and co-founded TalentWalker in 2008. From 2012 to 2014, he was involved in research and development of social video content as a senior web developer at Tencent. From 2014 to 2015, he was a technical director at CocoaChina, Chukong Technologies. Now, he is the VP of Software at Cassia Networks, Inc. from 2015.

9) Vladimir Zhitov, Financial Consultant

Vladirmir Zhitov graduated at the Law Institute of Irkutsk State University in 2002 majoring in civil law. He is currently the CEO of VLV GROUP LLC since 2015. He has extensive experience in banking management and financial knowledge systems. He was the general manager of various branches of Russia's MDM Bank from 2008 to 2015. Before, he worked at ALEMAR Open Co., Ltd. of the Russian Federation from 2004 to 2008 and Sberbank from 1998 to 2004. He has successfully processed risk management related to bank branch management and gained deep knowledge in national policies and bank characteristics while working in various regions.

10) Kononov Vasilii, Technical Consultant

Kononov Vasilii is the CEO of EN-SS Limited who graduated Irkutsk State University in 2007. He has extensive work experience as an engineer-developer of REA, leading specialist at CJSC 'Energy Technologies' from 2011 to 2014 and LLC Security Office 'SOKRAT' from 2005 to 2011. He is currently senior designer at Rock Miner and is a very talented hardware engineer responsible for the development and design of the mining equipment. Since 2013, he has participated in the research and development of the first generation 110nm and second generation 40nm mining machines of early Bitcoin industry, and is known for his rich, deep knowledge about cryptography.

11) Sebastian Bitzen, Technical Consultant

Dr. Sebastian Bitzen studied engineering and graduated RWTH Aachen University in 2015. He has extensive programming experience in C++ and Java and a specialty in software architecture. He is currently a leading software developer at XGraphic GmbH since 2007. During his work experience, he also worked for IMR-Institute of Mechanical Engineering of the extractive industry as a research engineer from 2009 to 2014.

12) Thomas D' Alonzo, Legal Consultant

Tom is a senior management and legal adviser of POPCHAIN. He has a PhD in Law from University of Denver. He has been the chief executive and director of the MiMedx group since March 2007. From May 2006 to April 2007, he was the CEO of the DARA bioscience company. From 2000 to 2007, he served as an independent consultant. Previously, he was the president and chief operating officer of PPD, a research and development service provider for global pharmaceuticals and biotechnology from 1996 to 1999. Before joining PPD, Tom served as president and CEO of GENVEC, a clinical biopharmaceutical company, from 1993 to 1996. From 1983 to 1993, Tom worked for Glaxo (formerly GSK). After a few promotions, he became the president of Glaxo. Tom is currently acting as director of many companies, such as Amarillo, BioDelivery science and Salix pharmaceuticals.

13) Dean Xu, Community Operations and Management

Dean Xu is responsible for community operations and management in the POPCHAIN Team. He graduated at Huaqiao University (Quanzhou, Fujian) Department of Tourism Management in 2014. He is currently vice-chairman of Chinese Culture and Economic Exchange and Development Association and is operating cross-straits exchanges tourism business since 2014. He has served as a manager at ZHONGANBAOQUAN.

14) Sheldon Shu, Software Development Engineer

Sheldon Shu is a software development engineer responsible for platform application development of the POPCHAIN development team. He graduated Changsha University majoring in construction management in 2008. He built his IT-related job experience as a professional python engineer since 2009 in various enterprises and has participated in the development of several large-scale projects. Specifically, from June 2009 to December 2010, he worked at Guangzhou Bishigu Technology Co., Ltd., responsible for research and development of image recognition and search engines. From February 2011 to June 2012, he worked at Beijing Chaoxing Digital Library Guangzhou Branch to develop Chinese full-text search. From August 2012 to November 2015, he was a senior python engineer at Guangdong Food and Drug Administration for food and drug supervision and circulation.

15) Leonard Cao, Software Development Engineer

Leonard Cao, majoring in software development, got his bachelor's degree from Hunan University in 2016. He is a software development engineer, loves the software development industry and knows the flask web framework well. He is mainly researching on the combination of blockchain technology and existing technologies and has been working in the POPCHAIN development team since June 2016.

16) Jim He, Front-end Engineer

Jim He, majoring in software engineering, earned a bachelor's degree from Hunan University in 2016. He is a front-end engineer with 2 years working experience of front-end development. He participated in the development of blockchain content distribution platform and information service platform. He has a great enthusiasm on blockchain and front-end technology and has been working in the POPCHAIN Team since June 2016.

17) Charles Yang, IOS Engineer

Charles Yang is an IOS programmer of the POPCHAIN development team. Majoring in machinery, he earned a bachelor's degree from Hunan Institute of Science and Technology in 2009. He built his career as an IOS engineer working in Shenzhen Xiuyuanqiusuo Network Technology from July 2012 to August 2016 and in Hangzhou Ankang Education Co., Ltd. as a senior IOS engineer from 2016 to 2017. During his work experience, he developed IOS apps on education system, IM, store information and blockchain wallet. He has great interest in blockchain technology.

18) Jack Chen, Front-end Engineer

Jack Chen got his degree in computer information management from Hunan Vocational College of Engineering in 2006. He is a front-end supervisor, once participated in the front-end development and management of large-scale projects. From 2012 to 2013, he was a front-end engineer at Guangdong Zhongbai Electronic Technology Co., LTD., responsible for web design front-end development. From 2013 to 2015, he worked at Guangdong Xinkuai Press, and worked in Yingshida (China) Co., Ltd. rest of 2015. From the end of 2015 to 2017, he worked at Sany Heavy Industries Co., Ltd., where he managed the team of front-end engineers and front-end development for information. Since 2017, he has been working in the POPCHAIN development team making use of his skills in Node.js and Javascript developing mobile clients, and rich practical experiences in blockchain, including his experience in building blockchain browsers, mining pools, etc.

19) Joshua Zhong, Android engineer

Joshua Zhong, majoring in Java, graduated from Hunan Software Vocational Institute in 2015. He is an Android engineer, having nearly five years of experience in Android application development. He has participated in the development of large-scale e-commerce platforms, blockchain projects, and blockchain wallets. From 2015 to 2017, he was a software engineer at Hunan Licheng Information Technology Co., Ltd. and he has written android code and developed APPs working in Wanzhonghe Network Technology Co., Ltd. in 2017. He is familiar with their working principles and has a great passion in blockchain technology and is now working with the POPCHAIN development team since November 2017 to develop android mobile application.

9. Partners

9.1 Primary Partners

Key partners include POPCHAIN's business operations partners and partners for hardware expansion. The E&M, which operates an Asian contents business, operates live broadcasting platforms called CELUV TV and POPKON TV, and maintains the closest cooperation with POPCHAIN to expand into various content businesses. In addition, POPCHAIN maintains a blockchain marketing alliance with Block Insight. We are also collaborating with TTbT on the development of mining equipment and the PoW encryption method, and we are in-depth discussions with roobo on the development of PoSe related products such as POPBOX.

9.2 Celuv TV Content Providers

9.3 THE E&M Global Business Partners

10. Disclaimer

10.1 General Disclaimer

This white paper provides an overview for those who are interested in the POPCHAIN Platform, POPCHAIN Token, and POPCHAIN CASH (POPCHAIN Token and POPCHAIN CASH collectively referred to as "POPCHAIN Token" or "Token") about the business model, technology, and team. This white paper is written on an as-is basis at the time of it was written and the POPCHAIN team do NOT guarantee the accuracy or completeness of any of its content, including the conclusions, schedule, and performance of the project according to the roadmap. (Please refer to the end of the Disclaimer for the risk factors and its description). This white paper may be subject to change in accordance with the policies and decisions of the POPCHAIN Team, and the final version takes priority over any previous versions.

The information or analysis contained in this white paper should NOT be construed as a recommendation for you to participate in this project. This white paper does NOT constitute investment advice nor does it constitute a solicitation for investment in securities or financial instruments. You should consult with experts to provide advice on matters other than the contents of this white paper including with respect to various risk assessments, application of related laws, and the imposition of taxes.

You will be solely responsible for all damages, losses and expenses resulting from the decisions you make by using or referring to this white paper, and the POPCHAIN team will NOT be held responsible for any such damages, losses or expenses.

This white paper contains information about third parties and publications. POPCHAIN team does NOT guarantee the accuracy or completeness of such information, and assumes no obligation to update, modify or alter this white paper, even if such information changes.

This white paper has NOT been reviewed or approved by regulatory authorities and the publication, distribution, and dissemination of this white paper does NOT imply that this white paper complies with all applicable laws or regulations. The publication, distribution, and dissemination of this white paper may be prohibited or restricted under applicable laws and regulations. In addition, regulatory authorities may restrict the sale, possession, use, and retention of POPCHAIN Token, and these regulatory actions may affect the sale and use of POPCHAIN Token.

POPCHAIN Token has no other purpose other than its use in the POPCHAIN Platform set out in this white paper, and its value and functionality are not guaranteed. POPCHAIN Token is not a security or investment product, and the possession of POPCHAIN Token is NOT to be construed as claiming distribution or repayment of profits, etc., to the POPCHAIN team, nor shall it be construed as having any intellectual property rights.

Purchasing Token involves significant risks. You may lose all or a substantial portion of the fund you used to purchase Token, and POPCHAIN team makes NO warranties on the purchase price or the value of

POPCHAIN Token. When you refer to this white paper to purchase POPCHAIN Token, be sure to fully understand and accept these risks.

The information contained in this white paper may be translated into other languages from time to time, or used in communication with multiple participants. Please note that any changes or misinterpretations in this translation or communication process may exist and that it is your responsibility to verify the white paper with the highest priority, [Korean White Paper], posted on the website.

POPCHAIN Team notices and explains the risks as follows. POPCHAIN Team does NOT testify or guarantee in any form or content with respect to any of the risks described by the POPCHAIN Team, and the following risks are solely responsible by the POPCHAIN Token Buyer and the POPCHAIN Platform participants.

10.2 Forward Looking Statements

This white paper includes information about future plans and their implementation ("Future Plan"). These Future Plans are expressed using words or phrases such as "can," "will," "expectations," "anticipate," "goals," "predictions," "intentions," "plans," "seek", "believe", "potential", "continue", "to be," etc., and are based on the assumptions and analysis considered reasonable by POPCHAIN Team in light of the experience, current situation, and prediction of future development. However, its content cannot help but contain risks and uncertainties, and the actual result and outcome of the realized project may differ from the intended Future Plan.

10.3 Risk Factors

The POPCHAIN Platform and POPCHAIN project that include POPCHAIN Token ("POPCHAIN Projects") have the following risks, and POPCHAIN Team will try its best to overcome these risks to make POPCHAIN Projects successful, but cannot guarantee the success of POPCHAIN Projects.

10.3.1 POPCHAIN Token Related Risks

1) POPCHAIN Token can be considered as securities.

POPCHAIN Token is designed as a utility token for various use on POPCHAIN Platforms as described in this white paper. However, digital tokens are being scrutinized by a number of regulatory agencies around the world, including the Securities and Exchange Commission (SEC), and POPCHAIN Token may be considered securities in many countries, including the United States. In this case, depending on the content of the securities laws, holding more than a specific amount of POPCHAIN Token or transferring POPCHAIN Token may be restricted, and certain conditions or restrictions may apply to the sale of POPCHAIN Token, or related businesses that facilitate the exchange or transfer of POPCHAIN Token.

2) POPCHAIN Token or Token Sale Agreements may be required to be registered as a security under applicable law.

POPCHAIN Team has not received comment from regulatory authorities in all countries on whether POPCHAIN Token and Token Sale Agreements constitute securities. Accordingly, there is a possibility that POPCHAIN Token and Token Sales Contract may be regarded as securities according to the judgment of the relevant regulatory authority. In such case, POPCHAIN Team may take certain actions depending on the circumstances, including registering POPCHAIN Token as securities, delaying the launch of POPCHAIN Platform, or reconfiguring the platform, and may abandon the release of the POPCHAIN Platform and end the sale of Token.

3) There may not be an active market for POPCHAIN Token transactions even after the Token Sale.

POPCHAIN Tokens are not currently traded in the open market. Even if POPCHAIN Token is traded through a crypto-currency exchange in the future, there is no guarantee that the open market for POPCHAIN Token to be active and persistent. The sale price of POPCHAIN Token does not reflect the market price of the Token, and in some cases the price of POPCHAIN Token in the market may be lower than the Token's selling price. POPCHAIN Tokens are not currencies issued by central banks, national or sub-national institutions, nor are they backed by real assets or credit assets. Transactions involving POPCHAIN Token are determined by agreement between market participants, and no one is obligated to buy POPCHAIN Token from a POPCHAIN Token holder.

4) Additional sales of POPCHAIN Token may have a negative impact on the market price of POPCHAIN Token.

POPCHAIN Token not sold in the token sale may be subsequently issued or sold. These additional sales can negatively impact the future transaction price of POPCHAIN Token through the increased supply of POPCHAIN Token, resulting in a decline in market price.

5) The value of POPCHAIN Token may decrease or be lost.

Potential consumers, such as individuals and businesses, may not use POPCHAIN-based platforms and POPCHAIN Tokens, or be less aware of them, even after the launch of POPCHAIN Platform. In addition, POPCHAIN Platform may not be released or completed, or may become inoperable. In this case, the value of POPCHAIN Token can significantly decrease or be lost.

6) Digital assets are highly volatile.

Digital assets are small in scale and highly volatile and show considerable fluctuations in price and volume. Micro / macro factors on the market can cause rapid changes in the value of digital assets, which can affect the value and volume of POPCHAIN Token.

7) Legal remedies for infringement of digital assets are limited.

Digital assets based on blockchain may not be able to exercise effective legal remedies in the event of infringement due to the nature of the technology, and the absence of the structure and related systems. A buyer may not receive a valid legal remedy if the right to POPCHAIN Token is violated by a third party.

8) POPCHAIN Token may be lost due to the loss of a private key to a digital wallet.

If a private key is not accessible due to loss, destruction or corruption of the private key, the POPCHAIN Token holder may not be able to access blockchain based digital assets and POPCHAIN Platform will not be able to restore the private key.

10.3.2 POPCHAIN Project Risks

1) POPCHAIN Project may be shut down due to external factors.

Unexpected external factors may cause the POPCHAIN Project to experience issues that can result in the shutdown of operations or the disbanding of the POPCHAIN Team.

2) POPCHAIN Project belongs to a new industry that is in the process of development.

The industry that POPCHAIN project plans to enter is in constant development, and there is uncertainty about its development potential. Unlike with an existing industry, a new industry entails insufficient business experience and the POPCHAIN Team will face difficulties in analyzing future business prospects and the risks and challenges of its business activities.

3) The delivery of information related to POPCHAIN Project may be restricted.

Information provided by POPCHAIN Team regarding POPCHAIN project, POPCHAIN Token, or POPCHAIN Platform may be insufficient or difficult to understand. In addition, timely notification of material changes in the future may not be available. POPCHAIN Team does NOT have the obligation to provide up-to-date information on the progress of the POPCHAIN Project and the POPCHAIN Platform (including progress and milestones).

4) Purchasers do NOT have the authority to control POPCHAIN Team and POPCHAIN Platform, and POPCHAIN Team also has limited rights to POPCHAIN Platform after the release of the POPCHAIN Platform.

POPCHAIN Platform is built in decentralized form. As such, the POPCHAIN Team has limited control over POPCHAIN Token and POPCHAIN Platform for a period of time. However, a POPCHAIN Token purchaser does NOT have rights to POPCHAIN Team whatsoever regardless of form or content, including any claims or voting rights.

5) Competitive networks may exist or emerge in the future that will provide the services that are the same or similar to POPCHAIN Platform services.

Competitive networks that implements services that are substantially similar to POPCHAIN Platform may exist or emerge in the future, leveraging the same or similar code / protocols as the POPCHAIN Platform, which can have a negative impact on the POPCHAIN Project.

6) There is a risk of IP infringement.

A third party may file a lawsuit or claim against POPCHAIN Team for infringement of intellectual property rights, and such disputes could have a negative impact on the POPCHAIN Project.

7) The regulations on blockchain technology can be strengthened.

The risk of government regulation on the blockchain related industries has recently been increasing. Depending on government regulation and the extent of regulation on the blockchain industry, the related companies will be greatly affected directly or indirectly. POPCHAIN Team strives to comply with all applicable laws and regulations and ensure stable operation to the extent permitted by law to ensure the sound development of its blockchain technology. However, future regulations may have a negative impact on the POPCHAIN Project. Also, if regulatory measures are taken against POPCHAIN Token, significant time and resources may be spent to respond.

8) There is a risk related to privacy.

As storing and transmitting the user's personal information through the POPCHAIN Platform is possible, there are risks of security issues, including risk of leakage of personal information from cyber terrorism, etc. POPCHAIN Team will take security measures, such as blocking unauthorized access to the database, but infringement on personal information can occur for a variety of reasons. This can lead to legal and financial losses, loss of trust, such as a decline in reputation of the POPCHAIN Platform and POPCHAIN Token, and can have a negative impact on the POPCHAIN Project.

9) Information about token users, buyers and holders may be disclosed.

POPCHAIN Team may disclose personal information of the Token users, Token purchasers, and Token holders to government agencies and their affiliates and other third parties when required by law / regulation, administrative agency or court order.

10) Technical defects may exist.

POPCHAIN Platform is based on software and network, which may be subject to errors. This can be caused by a number of factors, such as network-related instability that cannot be controlled by POPCHAIN Team, policy changes, access blocking, telecommunication operator errors, technical connection failures, as well as technical defects of POPCHAIN Token and POPCHAIN Platform itself. These errors can have a negative

impact on the POPCHAIN Platform and POPCHAIN Token.

11) POPCHAIN Team, POPCHAIN Token, and POPCHAIN Platform are at risk of hacking or other misconduct.

As POPCHAIN Platform is an online service, it is vulnerable to hacking, malware, and viruses. In particular, attacks against POPCHAIN Team, POPCHAIN Token, and POPCHAIN Platform can be attempted by a hacker, or other organizations in a variety of ways, including denial of service attacks, Sybil attacks, spoofing, smurfing, and malware attacks.

12) There are risks associated with Smart Contract technology.

Smart Contract technology is still in its early stages of development and its application involves significant risks associated with operations, technology, regulatory and finance. Smart Contract technology may not be appropriate for its intended purpose and may result in technical problems or loss of POPCHAIN Tokens due to defects, vulnerabilities or other causes that may be inherent in the Smart Contract.

10.3.3 Entertainment Content Platform Market Risk

1) External factors can make the content platform market itself difficult.

The content platform market can be affected by a variety of external factors. Government regulation in particular can be the most powerful external factor. For example, governments may take legal action, such as prohibiting distribution of content due to political issues or make content platforms more closed. To overcome this, the POPCHAIN Project will complete the platform through a blockchain and operate the business as closely as possible in compliance with each country's regulations. However, if a market downturn occurs due to unexpected external factors, the POPCHAIN Project may be adversely affected.

2) The content platform market is very competitive.

The content platform market is subject to fierce competition by many companies. POPCHAIN Project must compete with many other companies, including YouTube and other global content platforms, local content platforms from around the world, and the block-chain-based platforms that have been emerging recently. If existing businesses and new entrants encroach on the content platform market, the POPCHAIN Project may be adversely affected.