PlayChip: The Universal Gaming Token

A Blockchain Enabled,

Sports Community & Gambling Ecosystem

PlayChip Foundation Ltd.

Sydney, Australia

Version 2.0 August 2018

Abstract

The PlayChip Foundation Ltd is developing its PlayChip to be at the centre of an incentivised, blockchain-enabled, sports community, and gaming ecosystem. Following the implementation of the blockchain enabled PlayChip, holders of the PlayChip will be able to seamlessly transfer funds between the various sites accepting the token through the PlayWallet. They will be able to buy and sell the token directly via our partnered exchange, the PlayXchange. The PlayChip will also be available to trade on other major international exchanges. This will provide a degree of control and security in a manner not seen before in online gaming.

The PlayChip is designed to be secure, scalable, and fun, as well as include features to incorporate fairness into PlayChip transactions and the partner gaming platforms, allowing it to become the gaming token of choice globally.

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1 Introduction

The PlayChip Ecosystem is being developed to capitalize on market opportunity characterized by the following:

- currently no global solution for online gaming platforms to load and cash out gaming chips using reliable and timely methods for transfer to location and location currency.
- currently no solution for movement of gambling funds in a transparent manner, where commissions for gaming and money movement are clearly recorded.
- currently no crypto blockchain solution for gaming funds that incorporate trust and transparency of a blockchain based technology.
- currently no integration to third party gaming environs and third-party crypto exchanges via application programming interfaces (APIs), and blockchain technology.
- need for flexibility in global online gaming to comply with variable regional gaming regulations.
- need for global online gaming that utilises crypto tokens to meet various regional security regulations, and as they develop.
- currently no solution for uniform KYC and AML process, and then input as common set data for backend processes for jurisdictional regulation.
- currently no solution to utilise token metadata or Smart Contracts for current and future regulation applicable to online gaming.

The goal is to design the PlayChip Ecosystem to address these market issues and prove global token of choice for online gaming. The PlayChip Ecosystem should benefit consumers by incentivizing longer play, bigger prizes, and better odds. As the Ecosystem is based on crypto technology it will facilitate instant cash outs and provide greater trust and transparency in the holding and movement of funds.

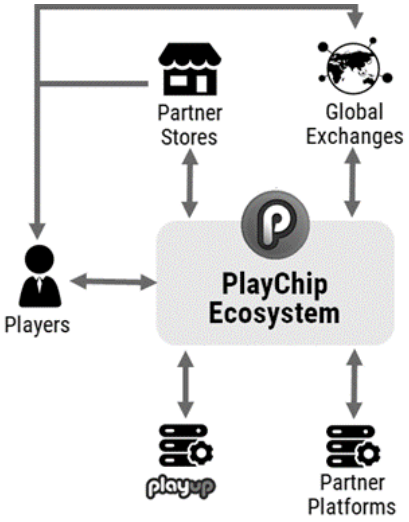

Figure 1 – PlayChip Ecosystem

In delivering PlayChip to gamers, the PlayChip Foundation and partners will benefit by access to global audiences and greater liquidity. The development of the Ecosystem, with well-defined interfaces and operating processes, will lower operating costs and allow game providers access to other services such as seamless online shopping.

2 PlayChip Ecosystem

The PlayChip Ecosystem integrates participants to enable operation (Figure 2). Each participant is described below:

- Players – online gamers globally use their smart device and PlayChip to access all services offered by the PlayChip Ecosystem.
- Partner Gaming Platforms – providers of online gaming experiences integrated into the PlayChip Ecosystem to provide additional services to PlayChip Ecosystem users.
- Global Crypto Exchanges – partner global crypto currency exchanges that allow players and investors to trade

PlayChips and exchange to local currency as and when they choose.

- Partner Stores – that offer products or services to users of the PlayChip Ecosystem by accepting payment in PlayChip currency.

The PlayChip Ecosystem is the engine that drives this innovative gaming platform. The componentry is described below.

The development of the PlayChip is a natural progression for the dynamic and ever-evolving gaming industry. Due to the 'trustless' nature of Smart Contracts, and speed and autonomy of blockchain networks, it is envisioned that the majority of industries will adopt a blockchain-enabled payment system in future. The PlayChip Ecosystem aims to be at the forefront of change hence investment in blockchain technology to drive its solutions.

The choice of public blockchain technology for the Ecosystem player interface and "off-net" technology choice for the gaming platform interface is based primarily on a need for higher transaction speed in backend processes. Blockchain technology is evolving rapidly, however not yet ready for a stable backend solution. Thus, the PlayChip Foundation has chosen the architecture in Figure 2 for the first release of the PlayChip Ecosystem.

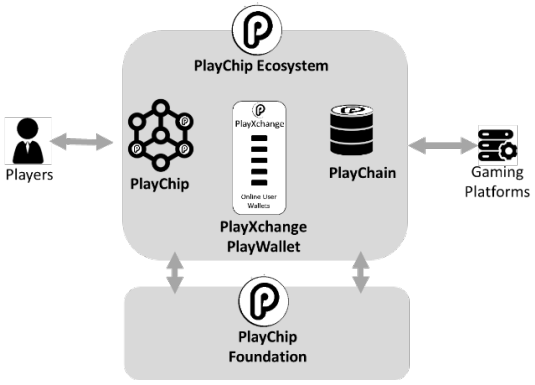

Figure 2 – PlayChip Ecosystem Components

As blockchain technology transaction speed and scalability increases then PlayChip Foundation will reassess ability to include blockchain technology into the backend systems. This would be seamless to Players, and offers potentially more insight into the mechanics of the PlayChip Ecosystems via blockchain explorers.

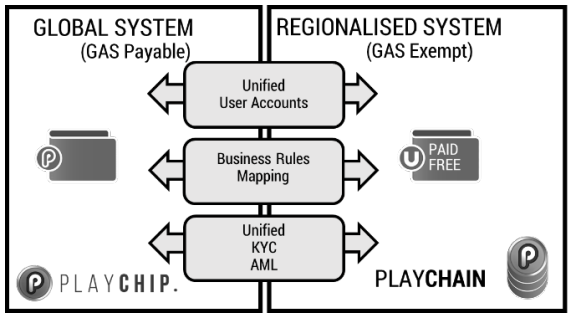

Figure 3 – PlayChip Ecosystem

The PlayChip Ecosystem combines two separate common element systems (Figure 3). Those elements have the following features:

- A system for global transfer of funds using the PlayChip and common PlayChip wallets, governed by cryptocurrency regulations.
- A common user account for PlayChip and gaming environs. Players must have an active account with tokens to participate in the PlayChip Ecosystem.
- A regional-aware system that allows PlayChip Foundation to respect regional gaming regulations whilst managing movement of PlayChips under its control.

As the global system initially utilises Ethereum blockchain [2], movements of PlayChip in this system will incur an Ethereum transaction costs described as GAS. In contrast the PlayChain is "off-net" and movements of PlayChip within the PlayChip Ecosystem are free from GAS. This is a further benefit of the initial technology choice for the PlayChain, however we expect cost to improve as Ethereum evolves.

It is envisioned that a Player will only carry out one 'Know Your Customer' (KYC) onboard process to satisfy global regulation and Anti-Money Laundering (AML) regulation. In other words, the same information is able to satisfy both gaming and crypto regulatory environs.

2.1 PlayChip

PlayChip is fundamental to the Ecosystem by providing a virtual currency for trading and gaming within the Ecosystem. The PlayChip is based on the Ethereum ERC20 token standard [3]. Global movements of the PlayChip are completed with the public Ethereum Blockchain.

Refer to token offering document [1].

2.2 PlayXchange

The PlayXchange is core to movement of tokens within the Ecosystem. It is optionally enabled to outside exchanges or directly to currency or services. The PlayXchange is tightly integrated into the PlayWallet.

2.3 PlayChain

PlayChain is the backend technology for immutability, trust, and transaction capability between gaming platforms, PlayXchange, and the PlayWallet. The PlayChain tracks movement of PlayChips within the PlayChip Ecosystem.

2.4 PlayWallet

The PlayWallet contains players PlayChips in a ready to access and easy to use application on their smart device. The PlayWallet is integrated into the gaming platforms.

2.5 Partner Game Platforms

The PlayChip Ecosystem is designed to support various game platforms and provide common services with the PlayChip. Currently the game platforms are either tailored to the local regions (via regional sports) or global sports. Increasingly, platforms are developed based on fantasy sports [1]. The PlayChip Ecosystem is game type agnostic however each game platform must conform to the Ecosystem interface and meet legal requirements to participate.

2.6 PlayChip Foundation

The PlayChip Foundation is established to protect and stimulate the PlayChip economy. The PlayChip Foundation will release a portion of PlayChips for public sale, and grant the residue to partners, affiliates, founders and advisors, who will seed the Ecosystem and stimulate growth where available. The PlayChip Foundation will operate the PlayXchange. The PlayChip Foundation will regulate existing coins in the market to preserve token value. In addition, the PlayChip Foundation will derive PlayChip revenue to ensure long-term viability via activities such as:

- Fees on some PlayXchange transactions,
- Fees for quick cash out facility,
- Interest fees for loaning PlayChips to new partners in the event they are unable to buy a pool to operate,
- Optional charge to partner for KYC and AML check service,
- Standard partnership distribution fees.

PlayChip Foundation transactions will be carried out on PlayChain or PlayXchange and reported with the same mechanism as the PlayChip Ecosystem described later in this document.

3 PlayChip Ecosystem Features

The key features that make for a compelling case for both Players and game providers to adopt PlayChip and its Ecosystem are described below.

3.1 Customer KYC

Both the crypto and gaming Ecosystem requires users to carry out KYC compliance. KYC compliance costs are increasing due to growing costs of transaction tracking software, staff training, and rarity of experts in a rapidly developing environment.

The PlayChip Ecosystem onboarding process will be used to unify KYC and AML process between crypto and gaming Ecosystems.

Customers who have applied for one set of games already have KYC stored making it easier to enter new games within the Ecosystem, reducing barriers to and costs of adoption.

Once the user details are entered, a strong identity and access mechanism is designed in the Ecosystem as a central identity engine to facilitate ongoing secure use and operation.

3.2 Customer Onboarding Process

Customers must have a PlayChip account with a balance of at least one PlayChip in order to enter the PlayChip Ecosystem. This requires correctly completed KYC and allows priming transaction values for later integrity checks.

A customer must first apply for a PlayChip account via the PlayXchange via mobile or web based portals, see Figure 4 *(1)*. Then they must obtain PlayChips via the PlayXchange or receive them via the blockchain from third party wallets *(2)*. Once they have satisfied these requirements the Player is eligible to select further preferences via the PlayChain *(3,4)* and once complete, they participate in partner gaming platforms *(5)*.

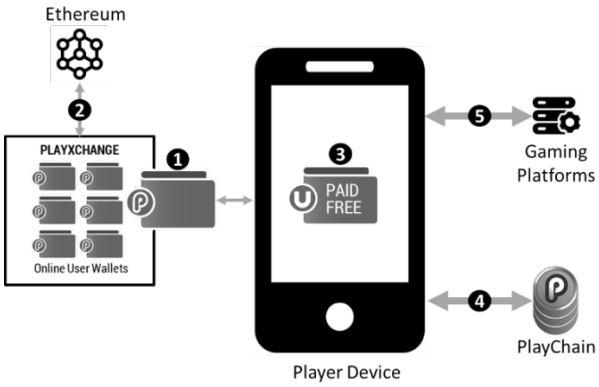

Figure 4 – On Boarding Process

There will be a one off process to convert existing PlayUp customers to PlayChip account holders. All new entrants must follow the above process.

3.3 Business, regulatory and customer checks

The PlayChain supports the ability for gaming platforms to carry out a number of pre-authorisation checks on players before they enter a game. These optional checks allow the games to query PlayChip balances, regional registration settings, client authorisations, time of day restrictions, preferred language, or any other client preferences. These queries arise in either the PlayXchange or PlayChain depending on information required and final implementation details.

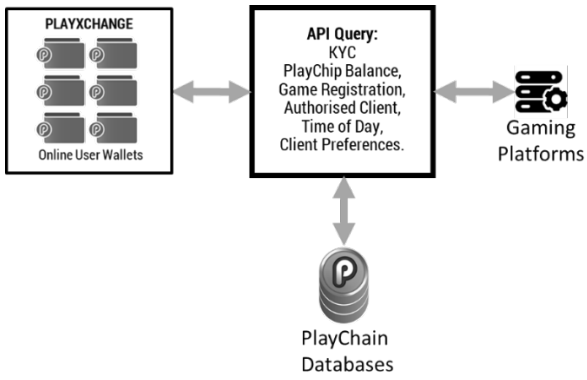

Figure 5 – Pre-Authorisation Checks

The ability to check the user wallet balance and associated KYC is essential before game play, and relies on information entered at PlayChip account creation, and movement of PlayChip balances in the PlayChain and PlayXchange.

3.4 Loyalty Schemes and Bonuses

The already sizeable and increasing PlayChip userbase will drive demand for the PlayChip token on the open market. It also allows development of alternate revenue streams for PlayChip Foundation via customer loyalty programs, partner and store programs, and third party marketing programs. The success of these programs will increase the desire to hold tokens and reduce the trading velocity of the PlayChip.

In addition to the above, bonus programs are planned to drive the desire to hold PlayChips. An example of this is a raffle where the PlayChip holdings are used as entries, encouraging players to hold more PlayChips to improve their chances of winning. To ensure fairness, the seeds to the random number generator are derived from a PlayChain interaction with the Ethereum blockchain that is explained later in section 4.

It is envisioned that long-term PlayChip holders are rewarded with reduced transaction costs or ability to participate in special “golden ticket events”. These events offer special PlayChip bonuses for a PlayChip token ID that meet the following conditions:

- Owning a specified number of sequential PlayChip IDs,
- PlayChip ID is a prime number,

- PlayChip ID matches the value paid out on a given day.
- PlayChip ID matches a chosen significant date.

These competitions, finalised via a Smart Contract, ensure fairness and transparency of the gaming environment. They also encourage movement of PlayChips within the PlayChain and open market in order for players to obtain the PlayChip IDs they desire.

The PlayChip IDs are allocated upon entry to the PlayChip Ecosystem, and recorded in the PlayChain. The generation method of unique IDs is covered in the following section. The IDs currently have no meaning in the Ethereum environ. The ID allocation encourages Players to keep their PlayChips in the PlayChip Ecosystem. In future the PlayChip will investigate the use of non-fungible tokens (ERC721) in the open market.

3.5 Provable Fairness and Integrity

The PlayChip Ecosystem has a fair and transparent transactional method allowing third parties to observe PlayChip operation and integrity. Figure 6 provides a diagrammatic explanation.

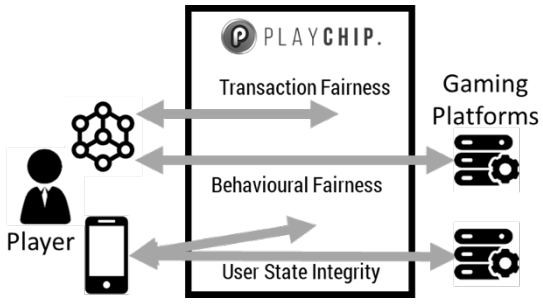

Figure 6 – Fairness and Integrity

- Transactional Fairness - logging of selected anonymised PlayChip transactions to Ethereum blockchain.
- Behavioural Fairness –logging of selected anonymised gaming actions to Ethereum blockchain.
- User State Integrity – comparing the PlayChain and PlayXchange to record on Player device.

The mechanisms to deliver these measures are covered in section 4.

3.6 Global Solution

The PlayChip will have application outside the PlayChip Ecosystem. It may be transferred on the Ethereum blockchain like other ERC20 tokens. This will allow Players to carry out the following functions:

- Transfer PlayChips to third party exchanges that support the PlayChip,
- Utilise supported exchanges to convert PlayChips to other crypto currencies,
- Utilise supported exchanges to convert PlayChips to other fiat currencies supported by that exchange,
- Move PlayChips to cold wallets that support PlayChips,
- Move PlayChips to supported online wallets,
- Spend PlayChips at PlayChip Ecosystem stores, or as a payment method on other exchanges.

3.7 PlayChip Future Roadmap

The utility of PlayChip will increase the evolution of blockchain technology. The following design changes to PlayChip are expected:

- When future blockchain transaction speeds are increased the PlayChain may be replaced with a blockchain equivalent. PlayChip transactions will strike directly onto an open chain improving transparency in the PlayChain.
- With the evolution of Smart Contracts the ecosystem business rules will be automated on behalf of the users, players, game partners, and the Foundation.

- Non-fungible tradeable tokens introduced to increase interest in specific PlayChip IDs.

In summary the first iteration of the PlayChip will utilise many different aspects of blockchain technology, and as the technology evolves more features may be applied to the PlayChain.

4 PlayChip and Ethereum Methods

In order for the PlayChip Ecosystem to meet its business objective the PlayChip must be designed to meet the following technical requirements.

4.1 Token Requirements

The PlayChip Token will be launched via an initial coin offering and be tradable on the PlayXchange and third party exchanges. At launch the PlayChip will be offered at USD $0.01 however as the PlayChip trades on the open market it will fluctuate to market demand. The PlayChip has the following design, which will improve with technological advances:

- Ability to fork to new standards,
- Migrate to new blockchains,
- Support joint front and backend blockchain solution,
- Enable bulk transactions,
- Possible carriage of fairness data on blockchain,
- Possible non fungibility to support global PlayChip IDs.

4.1.1 Transaction Timing and Scaling

The PlayChip Ecosystem is designed to support a variety of gaming platforms, each with their own performance requirements. Due to the nature of real time online sports, tight timing requirements are placed on transaction times of the PlayChain to ensure seamless user experience and system integrity.

At its initiation it is expected that the PlayChip Ecosystem must support over one million users. This is measured against existing Ecosystem users [1]. It will be designed to scale to two million users, to meet growth projection for the year ahead.

The transaction load on the PlayChain will vary depending on the time of day, significant events, and increasing game platform partners. It will be designed to scale to meet demand.

Blockchain solutions are challenged by this environment, but technology is rapidly evolving to increase transaction performance using sharding and sub-chains [5].

4.1.2 Transaction Options and Costs

It is intended that the PlayChain and PlayXchange will group transactions to the Ethereum blockchain to reduce average Ethereum GAS. This will allow PlayChip users to have a free or reduced cost cash out option.

Alternatively, if players wish for faster PlayChip transactions via the PlayXchange, the player may fund the transaction with PlayChip and complete it on the PlayXchange.

It is expected that blockchain evolution will provide reduced or no GAS. PlayChip may migrate to improved blockchain platforms if that is the case.

4.1.3 Portability

As blockchain technology evolves, PlayChip and PlayChain efficiencies will follow suit. Every effort will be made to improve efficiency with minimal redesign of the modular architecture. Additionally, due to the high adoption of ERC20 for current tokens, it is expected that future blockchain technology will be backward compatible to ERC20, or mechanisms developed to port or fork ERC20 tokens to future standards.

4.1.4 Availability

The PlayChip Ecosystem is designed to survive multiple single points of failure through advanced design principles. These includes the communication paths as well as server infrastructure.

4.1.5 Security

The PlayChip Ecosystem is being designed with a “defence in depth” approach with strong

boundary protection, identity and authentication services, internal intrusion detection and prevention services, and extensive integrated logging and management services.

Many of the integrity and fairness measures guard against cyber intrusion and data breach with identification of third-party alterations of transactional, behavioural, or user, data.

4.1.6 PlayChip Format

The ERC20 Token [3] has been chosen for the initial PlayChip implementation due to its widespread adoption and ease of handling in third party exchanges and wallets. Other standards were also considered, such as ERC 223 [4] for ability to back out transactions, and ERC 827 to carry data such as fairness inside the PlayChip. The development of non-fungible tokens (ERC721 [4]) is also of interest, allowing PlayChip to carry unique token IDs and assisting in development of loyalty bonuses for PlayChip holders.

The design decision is to stay with ERC20 until the other ERC standards have evolved to provide improved security, and backward compatibility with ERC20 for migration purposes. The PlayChip Ecosystem is intended to be rolled out in progressive phases between 2018, and 2020 [1].

4.2 PlayChain Blockchain Methods

4.2.1 Random Number Provision

A common native mechanism to seed random number generation is proposed for the PlayChip Ecosystem. It will rely on extracting hash values from blockchain transaction records and using them as seed for random number generation.

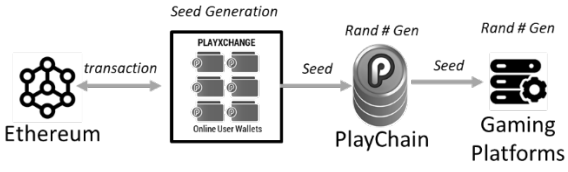

Figure 7 – Optional Random Number Seeding off Mershell Hash

The seeds will be available for use in the PlayChain and within the gaming platforms themselves. The random number mechanism has a range of proposed uses such as:

- Loyalty scheme rewards
- Golden ticket bonuses
- Integrity checks.
- PlayChip ID generation.

4.2.2 PlayChip ID Generation

The unique identification of PlayChips within the PlayChip Ecosystem is designed to support customer loyalty programs. There is currently no anticipated need for PlayChips held by the Foundation, or other non-player accounts, to require PlayChip IDs.

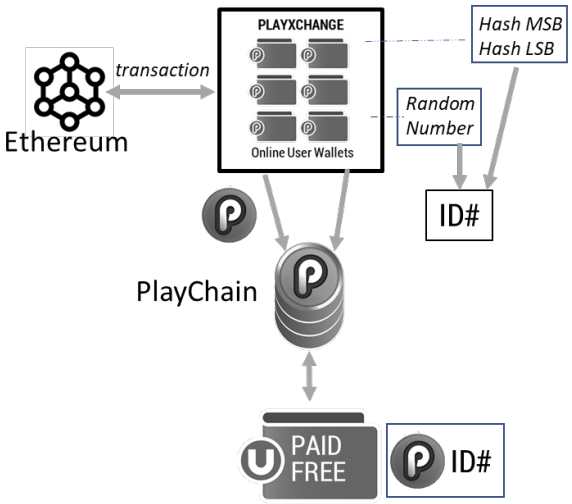

Figure 8 – PlayChip ID Mechanism

There are a few proposed ID creation methods. The simplest being a random number generator mechanism that generates numbers of a chosen length, checks them for uniqueness, then applies them to PlayChips held in Players wallets.

Alternatively, the PlayXchange may hold a combination of values taken from characteristics on the latest Ethereum or PlayChip transaction on the blockchain and implement unique IDs allocated to PlayChips when added to PlayChain user ledger.

A business decision by the Foundation will be made on whether PlayChips in the Players Free and Paid wallets have the same status in future

loyalty programs. However all PlayChips in the Ecosystem will have unique IDs.

4.2.3 PlayChain Event Logs

The PlayChain is able to keep immutable event logs. The event log will be implemented as a database. The log is likely to reside on a high performance blockchain in future architecture.

Apart from maintaining the log of all user and game transactions, the event log will act as a source of information for the PlayChain to measure statistics such as:

- Distribution of entry fees and winnings (Top 1%, 5%, 25%, 50%)
- User statistics (winners, break even, losers)
- Beginner user statistics (as above).

These statistics may be presented on a per game basis, per game partner, or the entire PlayChip Ecosystem. The statistics provide players unique insight to the gaming platforms they access via the PlayChip Ecosystem.

4.2.4 PlayChain Integrity Check

The PlayChip will ensure integrity of operation by maintaining the log as a secure record of transactions and publication to the Internet. The PlayChain also provides a mechanism to ensure the reports and logs are immutable, or if changes are made, they are easily detectible.

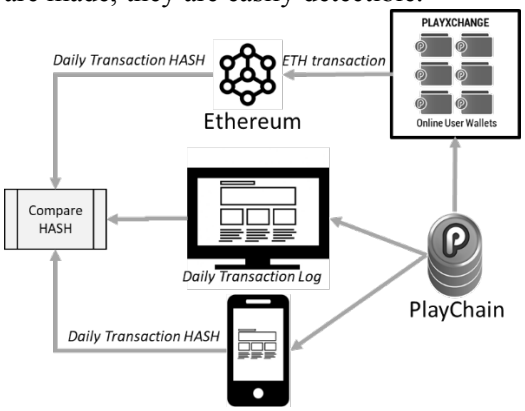

Figure 9 – Integrity of Transaction Logs

Regularly a hash of current records will be created and appended to a known Ethereum transaction. This may be compared to the same hash presented as part of the online presentation of records.

Viewers may see that the current records are unchanged, and they may go back in history to see whether results published remain the same (common hash) to those published earlier Any change to the database would result in a change in the hash value calculated and presented to the user.

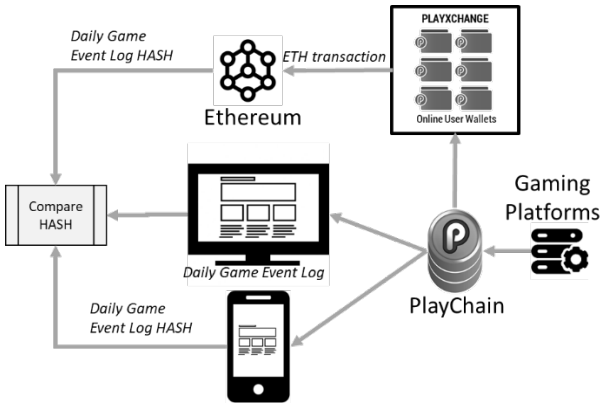

Figure 10 – Integrity of Game Logs

4.2.5 User and Game Hash Tagging

A similar check may be carried out on user records. A players' device may carry out a hash on user and registered Game IDs, latest transactions, wallet balances stored on the phone cache, and then check against information stored on PlayXchange and the PlayChain to check for record integrity.

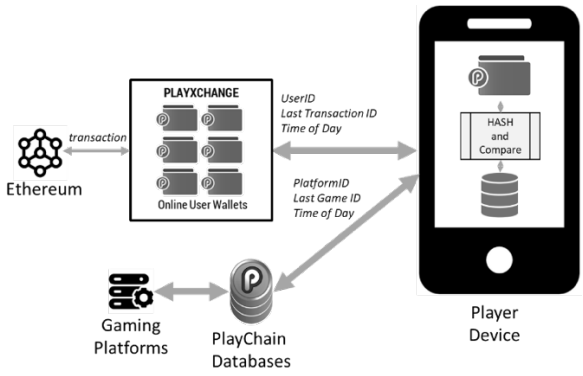

Figure 11 – User based PlayChain Integrity

This would not only determine whether the PlayChain had been comprised, but also whether other parties have used the PlayChip users' account on a different device.

5 PlayChip Ecosystem Design

The PlayChip Ecosystem comprises elements of online gaming and blockchain technology shown below in Figure 12.

5.1 Moving PlayChips to the Ecosystem

After the onboarding process described in section 3.2, Players will receive PlayChips from the PlayXchange in their PlayWallets.

Alternatively, PlayChips can be bought at third-party partner exchanges and sent to an appropriate third party wallet or their PlayWallet via the Ethereum network.

PlayChips sent to the PlayWallet involve sending the PlayChip through the PlayChip Foundation merchant wallet supported by the PlayXchange, which allocates the PlayChips to corresponding user gaming wallets in the PlayChain. Due to the business rules in the gaming environ there will be wallets directly supported by the PlayXchange ie User Hot Wallets. These wallets may transact to the Ethereum chain, and may be seen as a standard exchange hot wallet.

Players who have PlayChips in their user hot wallet may transfer PlayChips via the PlayXchange to their corresponding integrated PlayChip gaming wallets in the PlayChain to engage in online gaming within the PlayChip Ecosystem.

Players may convert their PlayChips to fiat currency or other cryptocurrencies directly from their third-party wallet through third-party exchange, or from their PlayWallet through the PlayXchange. PlayChips located in the gaming wallets have a number of mechanisms to transfer out to other wallets with different timing and cost implications.

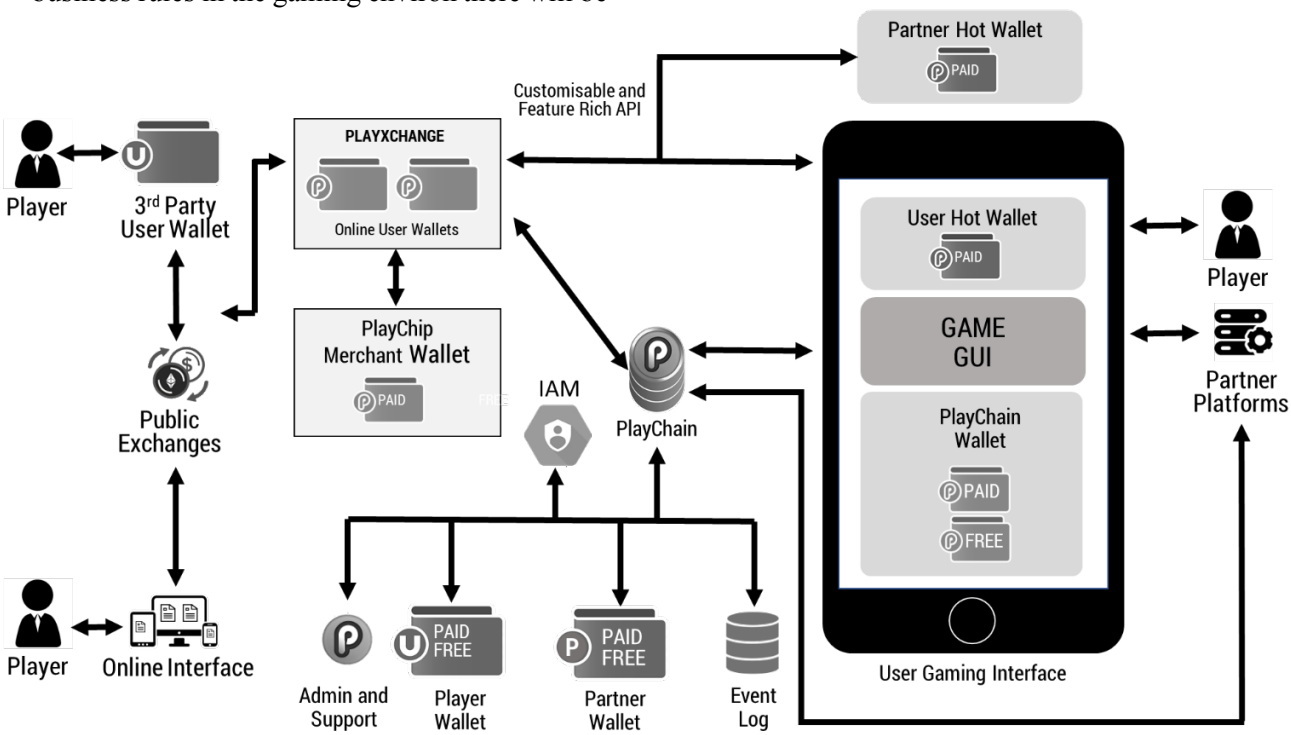

Figure 12 – High Level Design

two ledgers in the gaming wallets for differentiating tokens in the pay-to-play and free-to-play gaming environs. Alternatively, PlayChips located in third party user wallets may be transferred to equivalent

5.2 PlayWallet Functionality

The PlayWallet is the term given to the unified interface that provides users a common view of their balances, allows different feature sets depending on user sophistication, and provides an

ability to move between wallet and game environments seamlessly.

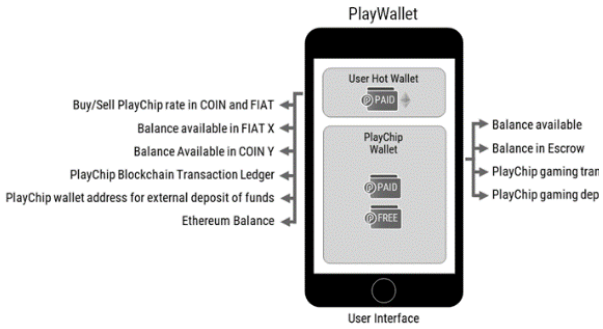

Figure 13 – PlayWallet Overview

A PlayWallet is comprised of a 'PlayChip wallet' used for gaming and an optional user 'hot wallet', which allows users to transact directly with Ethereum through the PlayXchange. These are different feature sets of the same PlayWallet.

The PlayWallet is integrated into the PlayXchange and PlayChain and able to be used on Apple IOS and Android devices. In all wallets, the users' PlayChip balances, transactions, and deposit addresses are standard features. As the user hot wallet is more transactionally focussed it will contain more details around currency conversion rates like a conventional exchange-based wallet. The PlayWallet will be more focused around integration into the gaming environment and rules involved in moving chips in and out of the game interfaces. For example, as PlayChips are placed into a game, they will move into an escrow ledger until the results of the game are known. PlayChips are then moved out of escrow back into the wallet or remain in the game wallet ledger. The actual movement of PlayChips between wallets is carried out by the PlayXchange and PlayChain.

5.3 PlayChain Wallets and Ledgers

There are multiple types of wallets and ledgers within the PlayChain Ecosystem and this section explains their interaction.

The PlayXchange is a cryptocurrency exchange, comes with merchant wallets, and ability to allocate coins and tokens to internal ledgers which represent the user's allocation of assets on the exchange.

The wallets and ledgers aligned to the PlayXchange are:

- PlayChip Merchant Wallet – a hot wallet attached to the PlayXchange for receiving and sending PlayChips in and out of the PlayChip Ecosystem over the Ethereum blockchain. This wallet will be a multi-signature wallet requiring a multiparty process to send PlayChips. The wallet will be accessed via a web interface or integrated into an automated business process via an API.
- PlayXchange Wallet Ledger – an internal database of allocations of coins and tokens that are sent to the Merchant wallet and allocated to the correct destination address and user via an internal process. Each of these ledgers will have one or more blockchain addresses associated with the user ID. These ledgers will be used for both PlayChain Players and PlayChain Partners to transact PlayChips on the public blockchain.
- User Hot Wallet – an optional wallet interface for sophisticated players to buy and sell tokens directly via the PlayXchange. This option may not be implemented in the initial phase of the development of the PlayChip Ecosystem. The wallet will be primarily accessed via a mobile device interface but may optionally be accessed via a web interface that supports 2FA.

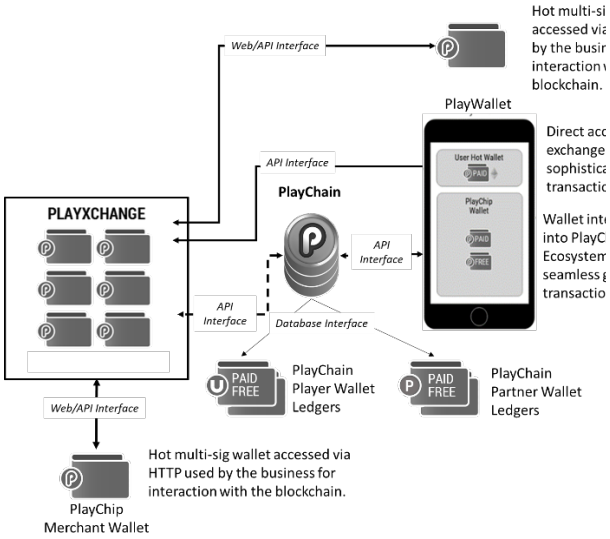

Figure 14 – PlayChip Wallets and Ledgers

- Partner Hot Wallet – a hot wallet attached to the PlayXchange for the purpose of partners receiving and sending PlayChips in the open market. This wallet will be a multi-signature wallet to require a multiparty process to send PlayChips. The wallet will be accessed via a web interface or integrated into an automated business process through an API.

The other types of wallets and ledgers are those which are reliant on the PlayChain:

- PlayChip Wallet – an interface for players to view information on their current holdings, transactions, addresses, market values, KYC information, credit card details, gateway tokens, bank account details, other cryptocurrencies. Additionally, Players may initiate purchases or cash out transactions through the wallet. The wallet is also tightly integrated into game interfaces so that Players may move from wallet to game interfaces seamlessly.
- PlayChain Player Wallet Ledger – a database ledger which contains the information presented by the PlayChip Wallet and other PlayChip user information. There will be a need to store amounts of both paid and free PlayChips. This ledger will also contain user preferences such as language, game registrations details, and a range of other player specific information.
- PlayChain Partner Wallet Ledger – during game play the PlayChips at risk are moved from the Player ledger to an escrow account. Winnings are then returned to the Player ledger or losses to the Partner ledger. All these transactions are handled by the PlayChain.

Players will have a unified view of their PlayChip activity from their mobile device. This unified view is described as the PlayWallet where two separate processes and interfaces support different features in the Ecosystem with transparency to the Player.

5.4 **PlayXchange**

The PlayXchange will support the following key functions:

- The PlayWallet via customised APIs that allow the PlayChip Foundation to increase the sophistication of the PlayWallet over time.
- Interfaces to the PlayChain to support the movement of PlayChips within the PlayChip Ecosystem.
- Interfaces with third party exchanges and wallets on Ethereum and other selected blockchains.
- The movement of PlayChips from the global Ethereum network into the PlayChain for gaming use.
- The PlayChip movement business rules to meet regional gaming and cryptocurrency regulation.

The PlayXchange will be supported with PlayChain Foundation infrastructure and designed to have high levels of integrity and resilience.

The PlayXchange will be responsible for managing the collection of player KYC and entry to the PlayChain so that both systems may report on AML and regional gaming regulation.

5.5 PlayChain and Game Interaction

Due to transaction scale and speed restrictions of current blockchain technology the initial implementation of the PlayChain will use database technology.

Players use their smart device as primary interface with the PlayChip Ecosystem, allowing play in games provided by the gaming partners.

Both the Game and the PlayWallet communicate with the PlayChain to ensure conditions are correct for the Player to participate in the game such as:

- Registered to Play
- Passed global and regional requirements (via KYC data),
- Sufficient funds (Free or Paid),
- Player preferences match.

All transactions on the PlayChain are retained in the event log and accessible by the PlayChip Foundation, PlayChip Partners, and players in order to ensure the ecosystem is open and transparent. Transparency will be enhanced with transactional and behavioural fairness mechanisms enacted by the Ecosystem and Ethereum chain.

Gaming events will be carried through REST APIs to the gaming platforms in a similar manner to the operation of the existing platforms. The existing game graphical user interfaces (GUI) will be integrated into the PlayWallet as part of joining the PlayChip Ecosystem. Additionally, our operational partners will interface with the PlayChain to allow for the movement of PlayChips between user wallets and gaming platforms.

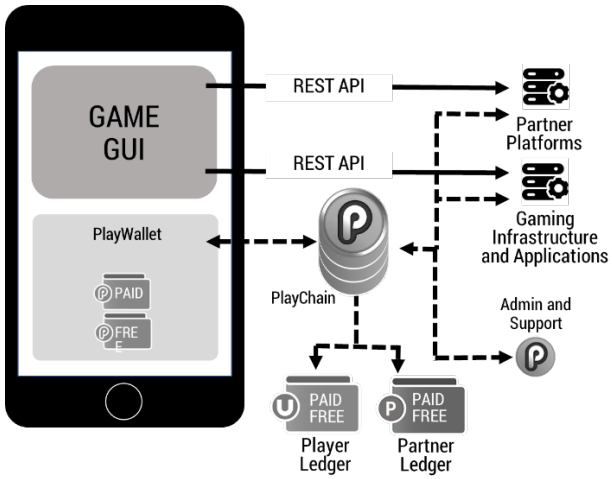

Figure 15 – PlayChip Game Partner Interaction

The PlayChain provides the support mechanism for the wallet, ledgers, and transaction logs, and is an integral part of the gaming process and compliance regime.

In addition to normal system maintenance and support tasks, the PlayChain administrators will be able to access the event log and query transactions in order to resolve customer transaction disputes, as is required by law. Once appropriate technology becomes available, this could become another task that could be performed by oracle masternodes on a proprietary blockchain.The Players' PlayWallet will also have the facility to show individual users transaction logs as well so that Players are equally well informed on the status of past and active games.

5.6 Centralised Identity Mechanisms

Central to the PlayChip Ecosystem is an Identity and Access Mechanism (IAM) [6] that provides security on who may or may not access physical devices, software services, and administrative roles. It will also provide the engine behind the 2FA and multi-signature processes implemented for higher value transactions or more sophisticated Player accounts. Future solution flexibility consideration may include other identity and access methods such as biometrics, hardware, and tokens.

Architecture for mobile application identity is being considered to integrate support to the overall PlayChip security architecture.

6 PlayChip Future Architecture

Wherever possible, blockchain design principles are being integrated into the current backend design for future transition to a seamless blockchain enabled backend.

Examples are:

- Separate wallet/ledger architectures
- Using ERC20-like APIs wherever possible.
- Designing processes around immutable records (fairness and integrity methods, audit trails, PlayChip IDs)
- Integrating logic into blockchain variables (random number seeds)

In order for future architecture to support blockchain technology in the backend and become an integral part of the PlayChip and game platforms, blockchain technology will need to advance in performance and scaling.

The initial approach applied to Ethereum scaling is to perform as many transactions off-chain and use the blockchain sparingly – this is why the PlayChain is designed as it is today.

The second common approach relies on a future third generation Ethereum implementation of sharding [5], where the Ethereum state machine is segmented and processed separately in parallel with other segments. This increases scalability at the cost of security and decentralisation. It is also predicted that this approach may reduce GAS as less work is required per shard.

An alternate approach for the backend design is to use a completely new blockchain technology designed specifically for high speed transactions. Examples of these under consideration are:

- EOS – has a target 6000 tps [7],
- High Performance Blockchain – has a target of 1,000,000 tps and no transaction fees [8].
- Quarkchain – target 2000tps [9],
- Ziliqua – 2400tps [10].

To put this into context, the PlayChain is estimated to need to support 3-5000tps for a 2 million user base, including surge demand. These numbers are implementation dependent, and development of the first iteration of the PlayChain will help refine this requirement.

The PlayChip Foundation will also consider implementing a consensus chain for bets that trusted third party data feeds cannot verify. In this instance, oracle masternodes will serve as the consensus agents of the betting smart contract, verifying the outcomes of the bet and enacting the payouts via Smart Contract. This could be performed by the PlayChain (once suitable technology becomes available), or a secondary blockchain.

The PlayChip Foundation will continually assess these technology options in order to keep the PlayChip at the forefront of blockchain functionality, whilst preserving the ease of use, and integrity of the overall Ecosystem. The PlayChip and PlayChain will be migrated as and when technology improves.

At this early stage the solution is based on a next generation Ethereum or the ERC20 token, but could be migrated to an entirely new chain technology suitable for high volume gaming transactions. The migration would resemble the process completed by EOS and TRON [11]. This approach will allow introduction of benefits of consensus and Smart Contracts to the PlayChain, where it makes sense, and allows the PlayChip and PlayChain to remain at the forefront of the industry.

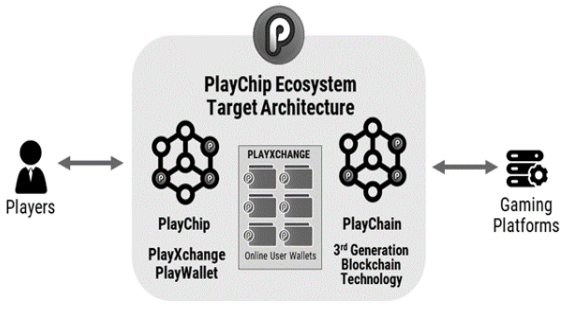

Figure 16 – Future PlayChip Ecosystem Architecture

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