ryucoin

WHITEPAPER

TABLE OF CONTENTS

TABLE OF CONTENTS

Abstract

Ryu Coin is a token designed exclusively to facilitate real-money tournaments using everyday video game competitions, where users will have the opportunity to win real-money prizes when competing against others in tournaments.

Online, real-money tournaments are an emerging market. The new ability of users to win money playing their favorite games will enhance the gaming experience in a wide variety of games across multiple platforms. Developers will be attracted to the new stream of passive income through increased engagement and expanded user base that Ryu Coin will offer.

Our product is the Ryu ecosystem, a proprietary system that allows users to play real-money tournaments in real time on online multiplayer games. All entry fees and prizes[1] that are paid in this ecosystem will use our NEP-5[2] token, Ryu Coin. The Ryu ecosystem will have three parties working to ensure its success: gamers (also referred to as "users"), developers and arbitrators. Gamers will pay a variable entry fee for each tournament to ensure the operation of the network. The fee will help Ryu and game developers maintain continuous development and the integration of new games into the Ryu ecosystem. It will also incentivize arbitrators to keep the ecosystem safe, where users who have staked a significant amount of Ryu work to ensure that matches take place fairly.

Blockchain technology offers numerous advantages over conventional solutions, primarily stemming from decentralization. Every tournament will be secured by a smart contract on the NEO network — making the transactions immutable, transparent and distributed. Payments to both gamers and developers will be made within thirty minutes of a match ending. Our dispute mechanism creates a semi-decentralized trust network — see Dispute Mechanism for more details.

---

1   This white paper uses terms like "entry fee, prizes, payouts," etc.. Ryu will comply with all applicable federal, state, and local laws and regulations regarding gaming and will not facilitate illegal gambling.
2   https://github.com/neo-project/proposals/blob/master/nep-5.mediawiki

BACKGROUND

The video game industry has seen tremendous development in recent years, resulting in a breeding ground for innovation and a potential to expand revenue opportunities for developers. The video game market reaches every demographic in much of the world. In the U.S. alone, 65 percent of households are home to at least one person who plays three or more hours of video games per week, contributing to a consumer spend in 2016 of $30.4 billion[3].

Technology and innovations in improved user experience are the main drivers of the industry. According to a Goldman Sachs's report, public equity valuations for digital gaming are up 150% over the last 3 years due to a growing casual gamer demographic along with advances in technology[4]. Broadband growth is allowing access to digital downloads and enhancing user experience. Additionally, this growth is driven by the expansion of eSports which, according to a Business Insider report, now has around 400 million viewers globally[5]. The outlook for digital gaming is even more promising with technology advances in AI, VR and cloud computing.

The world of eSports and online gambling is expected to build on already steady growth for the next five years. The online gambling market in 2016 was approximately $41.8 billion[6]. Real-money tournaments would create synergies with these two industries, increasing user engagement in video games.

Market Research

Our launch comes as the gaming industry is moving away from single player gameplay and toward multiplayer matches. For example, Rockstar Games' Grand Theft Auto V, which is almost 5 years old, focuses on growing its online multiplayer mode. They recently announced that Grand Theft Auto V, which has been sold over 85 million times, had broken its online player count record[7]. Similarly, some games are moving to exclusively multiplayer, such as Rainbow 6 Siege which Ubisoft announced to have 25 million total players[8].

> The bottom line is the entire ecosystem around digital gaming is only getting better.
>
> **GOLDMAN SACHS**
> **Ryan Nolan, Managing Director Technology, Media and Telecom Investment Banking Division**

> Blockchain-powered solutions are the latest trend to shake up transactions and data for the entire sector.
>
> **FORBES**
> **How Cryptocurrencies And Blockchain Are Taking Esports To The Next Level, 2017**

3   http://www.theesa.com/wp-content/uploads/2017/09/EF2017_Design_FinalDigital.pdf
4   https://twitter.com/tictoc/status/942816827163283456
5   http://www.businessinsider.com/esports-popularity-revenue-forecast-chart-2017-3
6   https://www.statista.com/statistics/270728/market-volume-of-online-gaming-worldwide/
7   http://www.ign.com/articles/2018/01/10/gta-online-breaks-its-player-record-4-years-after-release
8   https://www.pcgamesn.com/rainbow-six-siege/rainbow-six-siege-player-count-2017

Background

With the shift in focus to multiplayer, developers are in search of additional ways to monetize their games. Numerous developers have tried selling loot boxes[9]. A loot box purchase awards a user with a random in-game item(s) that can range in value and, in some situations, be sold for money. Selling loot boxes is an incredibly popular tactic — popular multiplayer games such as Overwatch, FIFA and Star Wars Battlefront II sell loot boxes to players. However, the loot box model has received negative reactions from gamers and regulators alike, as Belgium and the Netherlands have ruled certain loot box systems to be illegal[10]. This backlash is reason for developers to search for alternatives to the loot box system.

The freemium model[11] of games — amassing a large user base and offering in-game microtransactions to generate revenue — is gaining popularity. Ryu is well positioned to thrive in any video game with that model.

Early successes have proven the model works even for big game companies. Epic Games' recent hit Fortnite is a free-to-play third person shooter game with large scale, multiplayer matches. It has been downloaded over 45 million times[12]. As a free game, Fortnite is one of the few console games to make money exclusively through in-app purchases. In April 2018 it made almost 300 million in revenue[13].

Gaming and Blockchain

The token economy has already manifested itself in gaming, providing compelling evidence of the viability for blockchain implementation in the industry. DMarket, an ERC20 token (a standard on the Ethereum Blockchain that is equivalent to NEP-5 on NEO), describes itself as "a blockchain-based cross-game universe for turning virtual items into real assets[14]." Following a successful token sale, DMarket is now partnered with major players like Unity Technologies, the creator of the Unity Game Engine which reaches over 770 million players and was used to build 34% of the top 1000 free mobile games[15]. The game studio Machine Zone[16] is developing Satori[17], powered by Hashgraph[18], to move into a new multiplayer experience that can bring hoards of people into multiplayer games, such as Mobile Strike and Game of War: Fire Age, which each have millions of daily users[19].

9   https://en.wikipedia.org/wiki/Loot_box
10   https://www.techspot.com/news/74321-belgium-finds-loot-box-systems-three-popular-titles.html
11   https://en.wikipedia.org/wiki/Freemium
12   https://www.pcgamesn.com/fortnite/fortnite-battle-royale-player-numbers
13   https://www.theverge.com/2018/5/24/17390004/fortnite-battle-royale-money-made-revenue-300-million-april-2018
14   https://dmarket.io/
15   https://unity3d.com/public-relations
16   https://www.mz.com/
17   https://www.satori.com/
18   https://bitcoinexchangeguide.com/hedera-hashgraph-satori/
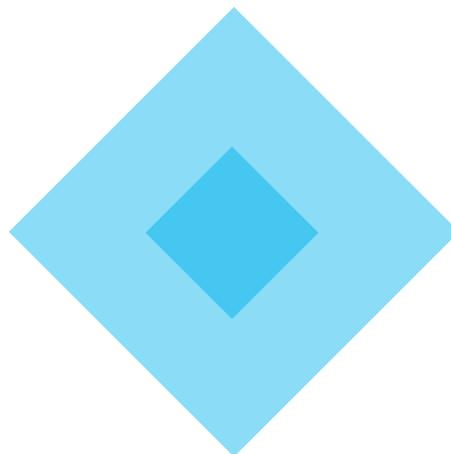19   https://www.mz.com/gamestudio#2

Competitive Landscape

The real-money tournament industry is an emerging market. The only company currently facilitating such tournaments , Skillz[20], reports a revenue run-rate for 2018 of $400 million, more than doubling their 2017 revenue[21]. It is partnered with 3000 game developers[22] and was listed as the fastest growing company of 2017 by Inc Magazine[23]. In addition to offering tournament services, Skillz also generates revenue through paid advertising on its platform[24].

Skillz has proven that the industry of online real-money tournaments is quickly growing despite how new it is. The introduction of blockchain technology will add significant benefits to gamers and developers alike, primarily through improved transaction times, lower fees and the introduction of decentralization to the network. Ryu would be among the first real-money tournament platforms utilizing blockchain technology to enter the market. Because of its early entrance into the field and its numerous technological advantages, Ryu will establish itself as an industry leader.

Similar platforms exist in the blockchain realm. PlayHall, an ERC20 token, seeks to allow for wagering on player-to-player video games of skill[25]. The cryptocurrency GameCredits[26] will offer Game.gg, which may potentially offer a wagering option on the platform as one of their features. GameProtocol[27], another currency focusing on helping game developers monetize their products, lists a wagering platform as one of their features. Additional platforms currently exist for other types of wagering, such as the currency Wagerr[28].

The growing popularity of eSports and the freemium model for video games created the market conditions that allowed early, unsophisticated real-money tournament systems to succeed. These market conditions, combined with the embrace of blockchain in other areas of the video game industry, are strong indications that blockchain-based real-money tournaments responds to a market need.

20   https://games.skillz.com
21   https://www.inc.com/darren-heitner/skillz-mobile-esports-platform-sets-new-run-rate-of-200-million.html
22   http://corp.skillz.com/press/
23   https://www.inc.com/inc5000/list/2017
24   http://corp.skillz.com/advertise/
25   playhall.io
26   https://gamecredits.com
27   http://www.gameprotocol.io
28   https://wagerr.com

Why Ryu

The Ryu ecosystem will improve gamers' experiences by providing an additional way for them to compete and have fun. Developers of all sizes can expect an increase in their user base, overall engagement and revenue. The new feature would allow indie developers access to a potentially deep-pocketed marketing budget along with a far reaching network of larger developers. An indie developer with a small user base would gain visibility from all users of Ryu Coin if it integrated our system into its game.

Ryu will have numerous advantages over current solutions. By leveraging blockchain technology, Ryu will offer three main benefits for real-money tournaments:

Depositing / Withdrawing

Users can immediately and directly deposit or withdraw funds without the approval of a third party. Users have sole control over their funds when not actively in the process of a tournament game.

The use of a smart contract will allow users to withdraw and deposit funds at will. There will be a 30-minute holding period after tournaments for any winnings to protect against fraud (see Dispute Mechanism section below). Funds will be available for withdrawal at every block. The NEO blockchain creates a new block approximately every 15-20 seconds[29]. Users will not be able to withdraw funds that are locked during a tournament.

This benefit is tremendous. While Skillz's users can withdraw their original money immediately, any money they win will be paid out in the form of a check arriving within **4-6 weeks**. Every withdrawal is processed manually.

> **From Skillz FAQ[30]:**
>
> For example, if you live in the U.S. and you deposited $10 with a credit card, then later withdrew $20, we would refund $10 to your card and send you a $10 check in the mail. If you live in another country and deposited $10 via PayPal, then later withdrew $20, we would send $20 to your PayPal account balance.

Because Ryu will not hold onto the actual currency, users will be able to withdraw funds without having to wait for approval. Complaints about withdrawals are present on Skillz's Better Business Bureau page[31] and previously on iTunes[32]. In addition to the ease of depositing and withdrawing, Ryu will charge as much as a 26% lower fee on every tournament. Skillz charges between 16% and 36% on tournaments while Ryu will charge as little as 10%.

---

29   Ryu Coin will comply with all government reporting for tax purposes depending on the state and country the tournament was played in which may require short delays in some instances due to identity verification.
30   https://skillz.zendesk.com/hc/en-us/articles/203685739-How-do-withdrawals-work-Will-I-receive-my-withdrawal-via-check-or-online-
31   https://www.bbb.org/greater-san-francisco/business-reviews/online-gaming/skillz-inc-in-san-francisco-ca-460331
32   https://itunes.apple.com/us/app/skillz-esports-for-everyone/id1050307596?platform=ipad&preserveScrollPosition=true (link removed)

Why Ryu

Trust

The trust is decentralized as all users have a stake in the system's successful operation.

The biggest issue with any current form of user-to-user online (or even in-person) real-money tournament is that it requires trust that the party you're playing with has the money for an entry fee and will pay it if they lose. Additionally, holding an entry fee requires the trust of an intermediary. With the Ryu Vault Smart Contract, that trust is not needed. The Vault collects the entry fee and awards the prize to winners[29]. No human interacts with, or holds, the entry fees[33]. This is further explained below in the Product Description section.

Should a fraudulent match outcome be reported in the Ryu ecosystem, any player will be able to report the match within 30 minutes of its completion and Ryu's Dispute Mechanism process will immediately begin to resolve the issue (see Dispute Mechanism).

Developer Benefits

Developers receive a passive income stream and are paid 30 minutes after every match.

Ryu will offer a new source of income for developers. Developers who integrate Ryu Coin tournaments into their games will receive commissions on players that enter Ryu tournaments. As described in the Product Description section, developers who simply integrate the Ryu API into their games will receive some of the commissions while those that act as a game starter will receive even more. Additionally, these payments will be processed by the Ryu Vault Smart Contract - which means that they can be paid within 30 minutes of a match ending, barring any disputes (outlined in more detail below in Product Description).

Skillz pays developers "within 45 days of the close of the month" with a minimum of $250 (if not reached it is rolled onto the next month until that developer reaches a minimum[34]). The smart contract will pay game developers after every match, with no minimum.

Developers will also have a stake in the success of the system. Ryu will provide each developer that joins the platform with 50,000 Ryu Coin staked in the Ryu Vault Smart Contract. 5,000 RYU will become available for the developer every year (see Game Developer Onboarding and API). Early developer adopters of the Ryu platform (those that join pre-token sale) will receive additional bonuses determined on a case by case basis.

Business Model

Overview

Ryu will operate through partnerships with game developers. While we plan on initially focusing on gamers in the United States, we plan to quickly expand to international markets.

We are taking a two-pronged approach:

1) Outreach and incentives for indie developers that would bring users for initial adoption
2) Outreach to big developers that would solidify mass adoption

There will be an entry fee on each tournament[35]. Ryu's catalogue of games will act as a marketplace where users interested in the real-money tournament platform can connect to new and exciting games.

Partnering with Developers

The Ryu Team is investing time and efforts into partnering with developers both locally and nationally, small and large. We are in the process of obtaining commitments from developers to implement the Ryu API into their games.

We will work with our developer partners to make the implementation of the Ryu API as seamless as possible. This process will involve a detailed guide to implementation, as well as Ryu support engineers working directly with the developers to answer any questions they may have. This onboarding process is further explained below in the Game Developer Onboarding and API section.

Through the token sale and the initial network effects that will result, indie developers and smaller developers will be able to market their game to a bigger audience on the Ryu ecosystem.

In addition to the fees developers will receive, we will likely allocate 10% of tokens minted to be distributed to our developer partners.

User Acquisition

We will acquire users in 3 ways. First, we will acquire users through participation in our token sale. Individuals who participate in our token sale will need to create a wallet, through options such as through O3 or Neon, and buy tokens to be used in the Ryu ecosystem through our token sale smart contract. We will also acquire users through a referral program. 10% of all tokens minted will likely be allocated to create this referral program. Users within a Ryu integrated game or through the Ryu Home Base App will have the ability to invite their friends via social media or SMS text. If an invited user joins, both users will get 1 RYU that must be used to pay an entry fee. Finally, we plan to advertise our product through twitch, MLG, reddit, our developer partners and other gamer-trafficked media sources to acquire new users.

---

35   The design of Ryu's system will be altered where appropriate according to business needs. Profitability models, fee structures, and prize pools are therefore subject to variation.

Business Model

Financials

Currently, eSports betting involves spectators wagering on matches between professional players. Chris Grove of Narus Advisors estimates the number of eSports betting customers at 15.4 million and total value of wagers at $29.8 billion by 2020[36]. This comes out to around $1900 per person per year. If we conservatively assume that players paying entry fees on real-money tournaments would be 5% as popular that would equate to an average of total spend of $95 per person per year[37].

Fee earned per user ($ USD)

User entry fee per year		$50	$95	$150	$300
Fee to Developer	4.00%	$2.00	$3.80	$6.00	$12.00
Fee to Game Starter	1.00%	$0.50	$0.95	$1.50	$3.00
Combined	5.00%	$2.50	$4.75	$7.50	$15.00

Fee game developer earns assuming $95 per user annual entry fee ($ USD)

Number of users playing		10K	100K	1M	3M
Developer	4.00%	$38,000	$380,000	$3,800,000	$11,400,000
Developer + Gamer Starter	5.00%	$47,500	$475,000	$4,750,000	$14,250,000

With the previous assumptions, smaller developers could see increased revenue of around $40,000 while larger games could even see increases of $10,000,000.

36   https://tinyletter.com/afletcher/letters/esports-iq-54-6-23-16
37   Note that, like all businesses, there is a risk that the company will not be profitable. All percentages are soley for the purpose of benchmarking plausible outcomes.

Product Description

Overview

The Ryu ecosystem will be comprised of six interacting parts: Ryu Coin, games, game servers, the Ryu Server, the Ryu Home Base App ("2FA App") and the Ryu Vault Smart Contract.


API

Game Server

Ryu Server

Smart Contract

2FA App
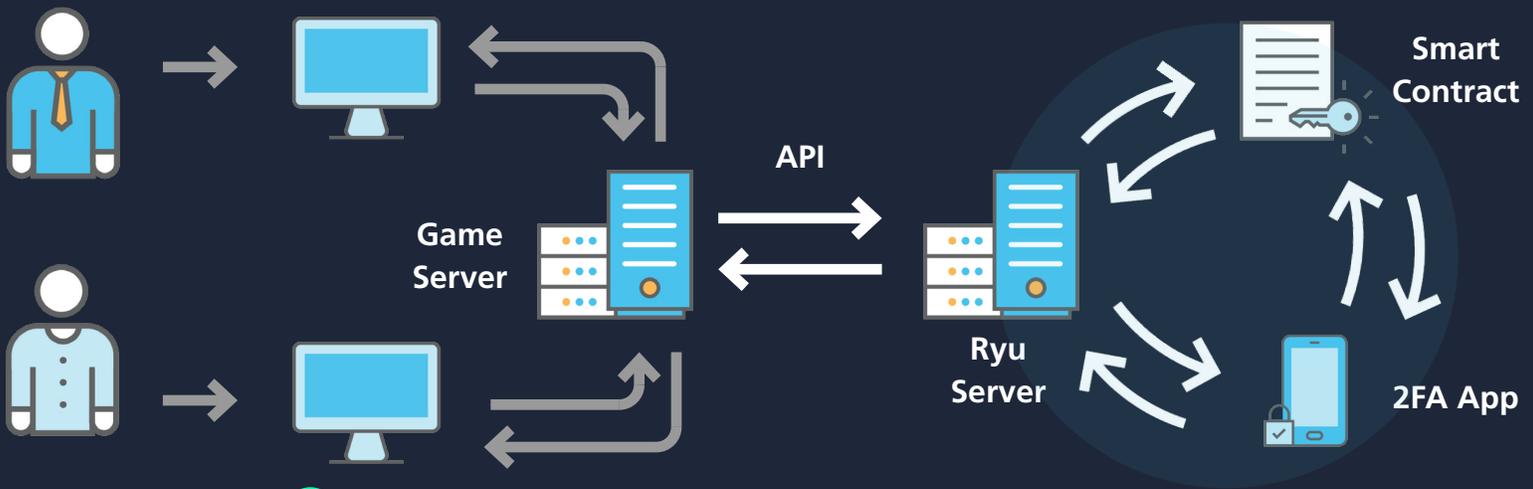
Overview Diagram Ⓐ

① Our token, Ryu Coin, will be used as an entry fee to real-money tournaments in video games. Ryu Coin will be a token built off of the NEO Platform and will conform to the NEP-5 standard. Users will purchase Ryu Coin initially through the token sale and afterwards through secondary exchanges. Ryu is working to be listed on both NEX and Switcheo.

② Games will not need to be modified and will interact with their corresponding game servers as normal.

③ Game servers will then be tasked with reporting the results of matches to the Ryu Vault Smart Contract, which can be done in two different ways:

Ⓐ The first scenario is more simple for the game developer. Game developers implement our simple API into their game to relay events to the Ryu Server. The Ryu Server will then run the more complicated blockchain-specific code to relay the events to the contract. While more simple, this option is more centralized, thus less desirable (see System Diagrams A).

Product Description
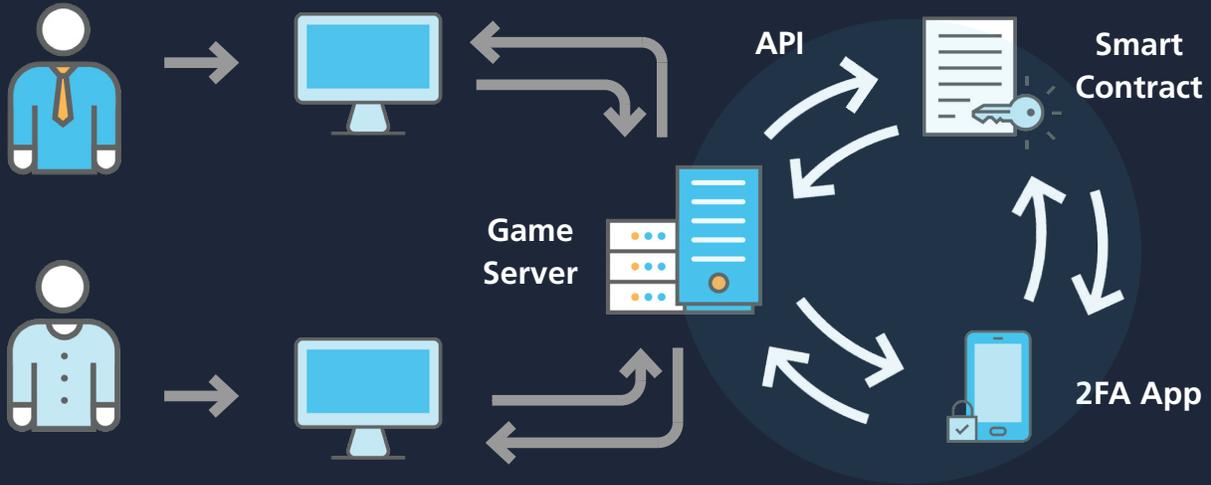
B The second scenario is slightly more difficult for the game developer, but further decentralizes the ecosystem. In this scenario, the developer takes on the role of the Ryu Server and is the match "starter." The game developer's server communicates directly with the blockchain and the Ryu Home Base App. Instead of calling the Ryu Server API, the developer will need to directly relay events. This would require more development than the previous option but would allow for multiple servers to report the data to the blockchain. As payment for taking up this additional work and for helping decentralize the system, starters receive a higher fee.

4 The starter sends a Two Factor Authentication ("2FA") request to the app and contract, relaying the responses as needed to the game server.

5 The smart contract is responsible for handling all of the logic behind distributing funds to the winners of matches based on the match events that are broadcasted to it.

Product Description

User Onboarding

Users will first create an account on the Ryu Coin website or in the Home Base App. If a user does not have a NEO wallet already, the user will need to create one. This can be done in numerous ways, such as through O3 or Neon. Users will also need to give Ryu access to their location in order to determine that they are in a jurisdiction that allows real-money tournaments (see Regulation and Compliance for more details) in order to gain access to using Ryu Coin.

To connect a wallet to an account, a user will log in to the Ryu Home Base App with their Ryu Coin website login credentials and then log in to the wallet. Ryu will store only public wallet addresses. A user will be able to transfer their Ryu Coin from their wallet to the Ryu Vault Smart Contract through the Ryu Home Base App.

Next, users will connect their Ryu accounts to the games that they want to play on. To connect they will sign onto their Ryu account in a login portal built into the game. Once connected, users will be able to pay entry fees on tournaments. Users will be able to pay as little as 0.00000100 RYU (10^{-6} RYU) at a time.

The game will match users with other Ryu Coin users in a tournament. Before the tournament begins, the Ryu App will send a notification to the users telling them that a match is being initiated. Users will use the Ryu App to approve the beginning of the tournament. Once all users have approved the tournament to start, the game server will be able to begin the tournament. The game server will also notify the smart contract when the tournament is over.

Game Developer Onboarding and API

Ryu will work with game developers to integrate their games into the Ryu ecosystem. Developers' games will need to comply with a few requirements, including being deemed a game of skill (more details on the evaluation can be found below in Regulation and Compliance).

The review process includes Quality Assurance ("QA") checks, along with unit and integration testing with Ryu's NEO private net, an internal copy of the NEO blockchain running on Ryu's server. This ensures that everything functions well before a public release. A more detailed explanation of the review process will be released along with the alpha-version of Ryu Vault in Q4 2018.

Once a developer is approved, the Ryu team will begin working to integrate the API into the developer's game. Ryu support engineers will provide documentation for developers to guide integration. Developers that opt to be the game "starter" will be given resources for the custom blockchain-related code that is required; those that choose to use Ryu Server will be shown how to use the API. Regardless, support engineers will be available to speak with developers and walk them through the process every step of the way.

When the game is finished, the Ryu team will add the game to the Ryu Vault whitelist of approved games. Each game will receive a unique ID, and the developer will be able to select a wallet address to receive their share of the network fee for tournaments that are played on their game. This prevents fraudulent games from entering the network.

Product Description

As mentioned earlier, developers will be required to stake 50,000 RYU in order to be listed on the platform. The Ryu Team will provide this 50,000 RYU stake to developers in order to be listed. Every year, 5,000 RYU will be released from the smart contract to the developer without any restrictions. The slow release of RYU incentivizes developers to keep developing quality games for the community it has an interest in growing.

Ryu Server and Game Starter

The Ryu Server supplies an API for game developers to relay tournament events to the Ryu Vault Smart Contract. Communications involve not only both starting and ending tournament but also sending 2FA requests to users to join the match. Users respond to the match requests in the Ryu Home Base App.

Tournaments can be started by either developers listed in the whitelist or Ryu. When a developer takes up Ryu Server's role they receive an additional fee. This encourages the decentralization of the Ryu ecosystem by increasing the number of data sources.

Ryu Home Base App

The Ryu Home Base App serves a few purposes. Most importantly, it is used to prevent fraud - entry fees can only be paid by the users themselves. Users will need to login to their wallet in the Ryu Home Base App and manually accept a match request (or deny it if they do not want to participate in the match). The match only proceeds in the smart contract if the user verifies the match through the Ryu Home Base App.

Besides its ability for 2FA, the Ryu Home Base App is also where users can check their balance, withdraw their funds, view previous matches, file any disputes and vote on disputes (explained below in Dispute Mechanism). The Home Base App will be the central hub for users and is the primary method for users to interact with the Ryu Vault Smart Contract.

Ryu Vault Smart Contract

The Ryu Vault Smart Contract will have three primary roles:

1)   Handling deposits and withdrawals of Ryu Coin
2)   Handling tournament events and distributing funds accordingly
3)   Handling disputes

Users will be able to deposit funds simply by sending Ryu Coin to the contract from the Ryu Home Base App. Funds that are not locked in a tournament will be able to be withdrawn at any time from the Ryu Home Base App back to a user's wallet.

The contract keeps track of all matches taking place and allocates funds to the relevant parties (winners, developers, starters and Ryu).

If fraudulent tournament data is reported, users will have 30 minutes to initiate a dispute on the tournament. During this 30 minute window of time, the winnings from the tournament will be locked. Should a dispute be filed on the tournament, the winnings will be held until the dispute has been resolved. Each dispute will be handled within 24 hours. This is explained below in the section Dispute Mechanism.

Dispute Mechanism

Introduction — SchellingCoin Mechanism

In game theory, a focal point (or a Schelling Point) is a solution players tend to use to coordinate without communication. The economist Thomas Schelling famously asked: "Tomorrow you have to meet a stranger in NYC. Where and when do you meet them?" This is an example of a coordination game. The most common answer from participants was noon at Grand Central Station. Although there is nothing inherently better about that location, it is focal point because it is a traditional meeting place.

In 2014 Ethereum founder Vitalik Buterin proposed the idea of a SchellingCoin[38] that would provide an economic incentive to vote along with the majority. A simple mechanism would adhere to the following payoff table:

		Your Vote	
		Yes	**No**
Majority Vote	**Yes**	+0.1	-0.1
	No	-0.1	+0.1

The fundamental premise of a SchellingCoin mechanism has been used in a number of tokens including Kleros[39], TruthCoin[40], Augur[41] and Gnosis[42].

Our Dispute mechanism builds off a simple SchellingCoin mechanism. To account for scaling and a quick resolution of disputes, there are elements of centralization.

38   https://blog.ethereum.org/2014/03/28/schellingcoin-a-minimal-trust-universal-data-feed/
39   https://kleros.io/assets/whitepaper.pdf
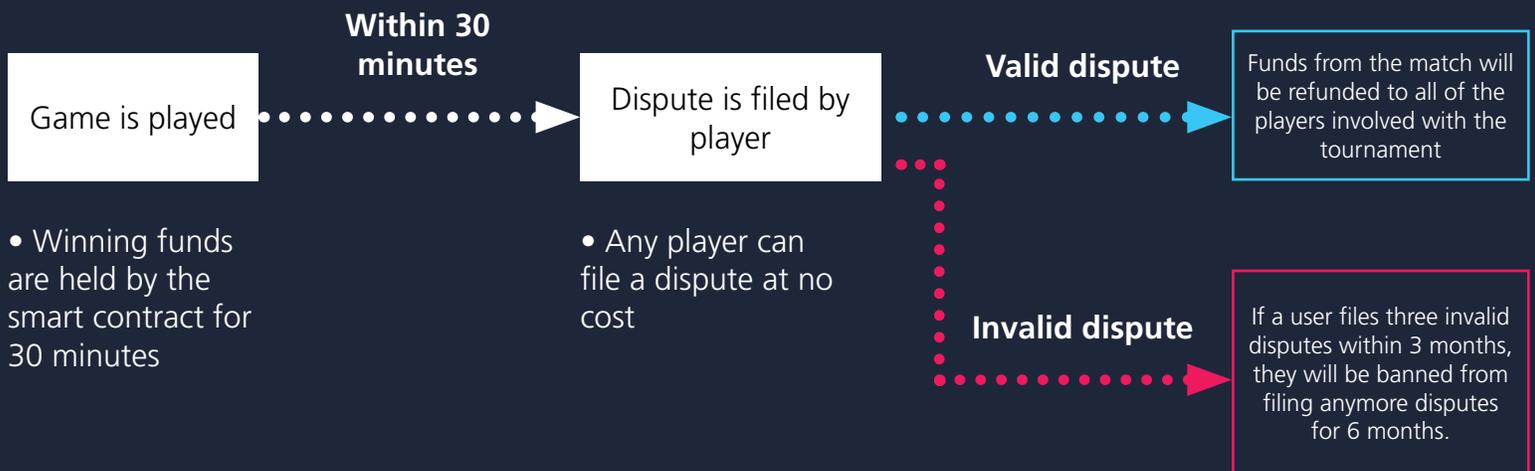40   http://www.truthcoin.info/papers/truthcoin-whitepaper.pdf
41   https://bravenewcoin.com/assets/Whitepapers/Augur-A-Decentralized-Open-Source-Platform-for-Prediction-Markets.pdf
42   https://gnosis.pm/resources/default/pdf/gnosis-whitepaper-DEC2017.pdf

Dispute Mechanism

Game is played	Within 30 minutes →	Dispute is filed by player

Within 30 minutes

Valid dispute → Funds from the match will be refunded to all of the players involved with the tournament

Invalid dispute → If a user files three invalid disputes within 3 months, they will be banned from filing anymore disputes for 6 months.

• Winning funds are held by the smart contract for 30 minutes

• Any player can file a dispute at no cost

Dispute Mechanism — Overview

Overview

The Ryu Vault dispute mechanism will allow for the system to self-regulate data reporting and attempts at cheating. This will involves having various parties stake Ryu Coin in order to become arbitrators. This way, people with a significant stake in the success of the system will ensure that fraudulent parties will not be able to act freely. Arbitrators investigate any issues and vote to resolve them.

Ryu will also use entry fees to support and reward arbitration. Arbitrators will be paid with the RYU in this pool up to a cap that changes based on the size of the entry fee and number of users in the dispute.

The arbitrators will fall into these three categories: trusted, semi-trusted and non-trusted. Arbitrators will have a trustworthy rating. Each time they vote correctly it will increase by one and each time they vote incorrectly their trustworthy rating will be subtracted by one. New arbitrators will start as non-trusted with a trustworthy rating of zero.

Users will be able to initiate a dispute on any match that they have participated in up to 30 minutes after the match has ended. They must include evidence of the issue with the data reporting.

Disputes will be resolved by arbitrators within 24 hours of when they were filed. If the user who filed the dispute is unhappy with the resolution, they will have the option to file a "super dispute" within 12 hours of the original resolution. Super disputes will be resolved by trusted arbitrators (see section Super Disputes below).

25 points

Non-trusted

- +1 for correct votes
  -1 for incorrect votes

- Votes do not impact resolution of dispute

Dispute Mechanism — Arbitrators

Semi-trusted

- +1 for correct votes
  -1 for incorrect votes

- If trusted arbitrator did not vote, majority vote wins

Trusted

- Ryu Team or appointed by Ryu Team

- Dictates the outcome of disputes

Trusted Arbitrators

Trusted arbitrators will be comprised of the Ryu team and others who are appointed by the Ryu team. We will instruct all trusted arbitrators to operate under the assumptions that evidence and data are the most important aspect for making a decision and that users are innocent until proven guilty.

Initially, these users will be the ones to dictate the outcome of disputes - what they find to be true will be accepted. This initial centralized authority is needed to ensure a working dispute handling system at the launch of Ryu Vault. These appointed members will be comprised of early developer partners and exceptional semi-trusted arbitrators.

Semi-trusted Arbitrators

The next category of arbitrators is the semi-trusted arbitrators. These will be users that were at one time non-trusted and who voted the same way as the decided resolution a net 25 times — meaning that they have a difference of correct and incorrect votes that is equal to or greater than 25. Semi-trusted Arbitrators who vote incorrectly and move out of the net 25 vote range will be downgraded back to non-trusted.

Non-trusted Arbitrators

The last category is the non-trusted arbitrators. These will be new arbitrators who have not proven their track record. In order to become an arbitrator, one has to stake 50,000 RYU for 6 months in the Ryu Vault Smart Contract. While non-trusted arbitrators do not impact the resolution of a dispute, they are still rewarded by the system for participating, as outlined below in Resolution.

Dispute Mechanism

Investigation

Should a dispute be initiated, the Ryu network's arbitrators will investigate and resolve the issue. In order to file a dispute, users will need to provide evidence. Thus, the investigation involves having arbitrators review the evidence provided.

Acceptable evidence includes that which would establish cheating by a player, misreporting data or some Ryu ecosystem malfunction. For example, the evidence could be video footage of the match. Arbitrators will need to verify the authenticity of the supplied evidence and determine whether it should invalidate the match. Service issues, such as power outages, lagging or hardware malfunctions are not considered valid reasons to file a dispute.

Resolution

A dispute is considered resolved once a trusted arbitrator votes. Should a trusted arbitrator not vote on the issue then the network will check to see if semi-trusted arbitrators have voted.

The minimum number of semi-trusted arbitrators that must vote on a dispute is a function of the size of the entry fee and number of users in a match.

Entry fee (in RYU per user) × Users in Match	Number of Semi-trusted Arbitrators
(0, 10)	3
[10, 100)	5
[100, 1,000)	7
[1,000, 10,000)	9
[10,000, ∞)	The dispute is handled only by trusted arbitrators

Dispute Mechanism

A majority vote between the semi-trusted arbitrators decides the outcome of the resolution. If after 24 hours there is no consensus, the Ryu team will settle the dispute. As the network grows and more arbitrators become trusted, there will not be the need for the Ryu team to settle any disputes.

Once resolved, users will have 12 hours to file a super dispute on the ruling (see section below for more details). If there is no super dispute filed, all arbitrators will have their trustworthy rating adjusted when a resolution is met. Arbitrators that voted correctly on the dispute (for the decided outcome) will increase their trustworthy score by one while those who voted incorrectly will decrease their rating by one. Those that did not vote will not be affected. Regardless of the outcome, all of the arbitrators that voted for the correct outcome will split the appropriate amount of RYU from the pool as follows:

> **Voting arbitrators will be paid 2 RYU for each correct vote on a dispute. If there is not enough RYU in the pool in order to pay each arbitrator 2 RYU, the remainder of the pool will be split equally.**

If a dispute is determined to be valid, the funds from the match will be placed on hold for 12 hours to allow time for a user to file a super dispute. Should a super dispute not be filed, the RYU will be refunded to all of the players involved with the match. If a user files three invalid disputes within 3 months, they will be banned from filing anymore disputes for 6 months.

Super Disputes

Super disputes exist to prevent fraudulent activity from semi-trusted arbitrators. If a user files a dispute and is unhappy with the resolution of their dispute, they then have 12 hours to file a super dispute. To prevent misuse, filing a super dispute will cost 10 RYU. The trusted arbitrators then investigate the dispute. There are three possible outcomes:

1) The trusted arbitrators conclude the super dispute was invalid.
> **RESULT:** The user who filed the super dispute is banned from the Ryu system for 3 months. That user forfeits their 10 RYU.

2) The Ryu team reaches no conclusion.
> **RESULT:** The user is refunded their 10 RYU and not banned from the system. No further action is taken.

3) The Ryu Team concludes the super dispute was valid
> **RESULT:** The user is refunded their 10 RYU. The semi-trusted arbitrators who voted for the fraudulent result will have their trustworthy score dropped by the (match's users) × (entry fee). The correct distribution of Ryu Coin from the match will then take place.

Why NEO?

We chose to develop Ryu Coin on the NEO blockchain for numerous reasons, primarily because of its quick transaction times, cheap GAS fees and easy development platform. The NEO blockchain publishes a new block every 15-20 seconds, meaning Ryu Coin transactions will be that quick. Additionally, transactions are finalized after only one block, so users will not have to wait for multiple block confirmations when using the system.

Currently, the entry fees and transactions in the Ryu ecosystem do not incur a fee by the NEO blockchain. This is due to the fact that the first 10 GAS per transaction is free. This benefits gamers and developers alike, allowing for more users to afford to use the system. In contrast, the Ethereum blockchain could have gas fees up to $4 per tournament (at the time of this white paper's publication), making it impractical for Ryu.

The NEO platform allows for development of smart contracts in popular languages such as Java and Python. Without having to learn an entirely new language like Ethereum's Solidity and with extensive documentation by the City of Zion[43], development on NEO is incredibly streamlined.

NEO is also one of the most energy friendly blockchains around. Thanks to the dBFT (delegated Byzantine Fault Tolerance) consensus model, it does not depend on a proof of work algorithm to reach consensus and thus is much more environmentally friendly and energy efficient[44].

Deploying a contract onto the NEO blockchain's MainNet (the production blockchain, as opposed to the TestNet or PrivateNet), requires a significant amount of Gas - over $10,000 as of the publication of this white paper - which creates an ecosystem where only the most serious dApps (decentralized applications) are created. We believe that this will reduce the risk of the network becoming clogged by applications such as CryptoKitties[45], a virtual cat trading game based on the Ethereum network.

43   http://cityofzion.io/
44   https://steemit.com/neo/@basiccrypto/neo-s-consensus-protocol-how-delegated-byzantine-fault-toleranc -works
45   http://www.bbc.com/news/technology-42237162

Regulation and Compliance

Ryu Blockchain Technologies is committed to strictly adhere to all relevant regulations and laws. This applies to both Ryu Coin as a cryptocurrency and as a platform for real-money tournaments. Another reason Ryu chose use the NEO blockchain was because of NEO's focus on regulatory compliance[46] — such that they have a strong focus on users' digital identity (their electronic fingerprint). We are working with our lawyers to ensure Ryu Coin is not classified as a security.

Gambling Regulations

To begin, the use of Ryu Coin will only be available in the U.S. in states that allow real-money tournaments by the participants in contests of skill. GPS location will be determined through the 2FA app before the start of a match. If using the desktop app, location will be determined through its IP address. Through the mobile 2FA app, their location will be determined through the device's GPS capabilities. Each location that Ryu Coin will be available in will be determined on a case by case basis. We plan to expand to international markets and will do so based on local laws and regulations.

Definition of Games of Skill

Ryu Coin tournaments will be available in the U.S. only in states where entry by participants of the game being played falls outside the state definition of gambling and is instead regulated as a contest of skill with an entrance fee for participants. Jurisdictions have different ways of measuring whether a game is one of skill or one of chance. The ways used to decide are the Predominance Test, the Material Element Test and the Gambling Instinct Test[47]. The Predominance Test, which is the most common, is that if a game is 51% chance then it is a game of chance. The Material Element Test varies by state. Alabama, Alaska, Hawaii, Missouri, New Jersey, New York, Oklahoma and Oregon all use the Material Element Test. In some states, chance will be a material element if a chance event can thwart the exercise of skill. The Gambling Instinct Test is more subjective, as it asks whether the game in question appeals to the player's "gambling instinct."

When determining whether a game is a contest of skill for purposes of state law, Ryu Coin will apply state-specific tests as appropriate, whether that is the Predominance Test, the Material Element Test or other state provisions carving out an exception to state gambling laws for contests of skill.

U.S. Federal Regulations

The Unlawful Internet Gambling Enforcement Act of 2006 ("UIGEA"), 31 U.S.C. § 5361 et seq., prohibits any person engaged in the business of betting or wagering (as defined in the Act) from knowingly accepting payments in connection with the participation of another person in unlawful Internet gambling.

Ryu Coin tournaments will not be considered betting or wagering under the Act. Under the Act, betting or wagering includes "the staking or risking by any person of something of value upon the outcome of a contest of others, a sporting event, or a game subject to chance, upon an agreement or understanding that the person or another person will receive

---

46   https://www.investopedia.com/tech/china-neo-cryptocurrency/
47   http://scholars.law.unlv.edu/cgi/viewcontent.cgi?article=1070&context=glj

Regulation and Compliance

something of value in the event of a certain outcome." Because Ryu players will be competing for prizes (1) by paying entry fees rather than risking money, (2) based on their own performance rather than a contest of others, (3) in games of skill rather than chance, (4) in games which are not sporting events, (4) where prizes will never be awarded based on the outcome of a single match, and (6) only in states where such activity is legal, playing for Ryu Coin will not be unlawful Internet gambling under the UIGEA

Other sources of federal regulation include the Illegal Gambling Business Act of 1970 ("IGBA"), which prohibits the operation of a gambling business that is illegal according to the law of any State. Because Ryu Coin will ensure that it operates only in states in which its business operations are legal under state law, Ryu Coin will not violate the IGBA.

U.S. State Regulations

Many states expressly exclude offers of prizes in legitimate contests of skill from their definitions of illegal gambling or betting, even where the contest has an entry fee. Georgia, for example, makes an exception for "[a]n offer of a prize, award, or compensation to the actual contestants in any bona fide contest for the determination of skill, speed strength or endurance." Ga. Code Ann. § 16-12-20(1)(b).

Ryu Coin will be available only in those states where (1) real-money tournaments where winnings by a participant based on the player's own performance are explicitly legal, and (2) state law allows the operation of a business that records these tournaments.

Some states also regulate games of skill in addition to games of chance. For example, California has detailed disclosure requirements for contests of skill where the participants are not physically present. Cal. Bus. & Prof. Code §§ 17539.1, 17539.3(f). Ryu Coin will comply with those state requirements.

Non-U.S. Gambling Regulations

Many countries outside of the U.S. have looser gambling restrictions than inside the United States. While Ryu will only be used for real-money tournaments on games of skill, online poker, for example, is legal with a license in many countries across Europe including France, Germany, Greece and the United Kingdom. Ryu will comply with all relevant regulations in every country where users use its platform.

Operations

Business operations and development will initially be run out of the United States as we plan to partner with U.S. based game developers and be compliant with U.S. laws first. As we establish the legality of our platform in other countries, we will begin to allow users from these locations to use the Ryu ecosystem. Once we have integrated Ryu into a few games, we plan to expand operations internationally.

Asia has stood out as a good region to expand to for numerous reasons. The average cost of software development is significantly lower in Asia - with the average salary in Tokyo at around $54,000/year[48], $41,000/year in Seoul[49] and about $23,000/year[50] in Shanghai. These are all significantly lower than both Boston, MA with an average of $100,000/year[51] and Seattle, WA with an average of $118,000/year[52]. Asia is also home to numerous NEO economy related projects, including O3 Wallet based out of Tokyo, the Switcheo decentralized exchange based out of Singapore and even NEO itself based in Shanghai. An office in Asia would position us in some of the largest cryptocurrency markets in the world, as Japan, China and South Korea are some of the largest adopters of cryptocurrency[53].

Additionally, numerous large game developers are present in Asia such as Bandai Namco, Nintendo and Nexon[54]. These game developers would be great potential developer partners. Asia is also home to four times as many gamers as North America and could be a great location to find additional users of Ryu Coin[55]. The eSports industry is also rapidly increasing in Asia and could see wide adoption of the Ryu ecosystem[56].

48   https://www.glassdoor.com/Salaries/tokyo-software-engineer-salary-SRCH_IL.0,5_IM1071_KO6,23.htm
49   https://www.glassdoor.com/Salaries/seoul-software-engineer-salary-SRCH_IL.0,5_IM1103_KO6,23.htm
50   https://www.glassdoor.com/Salaries/shanghai-software-engineer-salary-SRCH_IL.0,8_IM999_KO9,26.htm
51   https://www.glassdoor.com/Salaries/boston-software-engineer-salary-SRCH_IL.0,6_IM109_KO7,24.htm
52   https://www.glassdoor.com/Salaries/seattle-software-engineer-salary-SRCH_IL.0,7_IM781_KO8,25.htm
53   https://medium.com/@TheElementGrp/south-korea-and-japan-will-grow-to-dominate-cryptocurrency-d02490a93390
54   https://www.statista.com/topics/2196/video-game-industry-in-asia/
55   https://www.statista.com/statistics/293304/number-video-gamers/
56   https://newzoo.com/insights/articles/global-esports-market-report-revenues-to-jump-to-463-million-in-2016-as-us-leads-the-way/

Team

Founders

Ross Krasner
Chief Executive Officer

Front-end developer with a background in marketing and communications, overseeing business strategy and marketing efforts. Has worked at LinkedIn in New York as an Editorial Assistant Coordinator and as a speechwriter for the Mayor of Chicago.

Wyatt Mufson
Chief Technology Officer

Full-stack and mobile developer in charge of the design of Ryu's system. Worked at Amazon as an SDE doing full-stack development and at Grubhub as an iOS developer. He has published numerous iOS apps to the App Store.

Noah Lisser
VP Partner Relations

Oversaw partner relations and outreach. He studied Neuroscience at Northwestern and has worked with Northwestern sports medicine as an assistant trainer for the football team.

Advisors

Asaf Meir
CEO at Solidus Lab

Shimon Mazor
VP Product at Solidus Labs

Tony Wilkins
Mentor at the Junto Institute

Nick Fujita
City of Zion Contributor

Paul Hsu
CEO Decasonic

Roadmap

November 2017 — Ryu Coin venture initiated

January 2018 — Ryu Blockchain Technologies LLC is formed

February 2018 — Advisors added to project, development of NEP-5 contract commences

March 2018 — Demo game completed. Ryu API service completed. Ryu Home Base App and Vault Smart Contract development commences

Q2 2018 — Developer reachout and forming partnerships begins

Q3 2018 — White paper completed. Ryu Vault Smart Contract completed. Token sale announced

Q4 2018 — **Ryu Vault deployed to NEO MainNet. Token sale takes place**

Q1 2019 — **Ryu Coin service launches on initial set of games. Ryu Coin listed for sale on exchanges**

Q2 2019 — **Team expansion and launch of service on expanded set of games**

Timeline subject to change

![ryucoin logo]

team@ryucoin.com

medium.com/ryu-coin

@OfficialRyuCoin

r/RyuCoin

facebook.com/ryucoin

Telegram Channel

Mailing List

ryucoin.com