Konomi: Decentralized Money Market for Cross-Chain Assets

Konomi Foundation

Abstract

Konomi is a full suite asset management solution for cross-chain crypto assets. Using Substrate as the development framework, the network aims to support more assets in the Polkadot ecosystem. Users could manage their crypto holding positions, trade assets and earn interest through decentralised money market products. Konomi also issues its native network token in order to kick start liquidity and decentralised governance.

Background

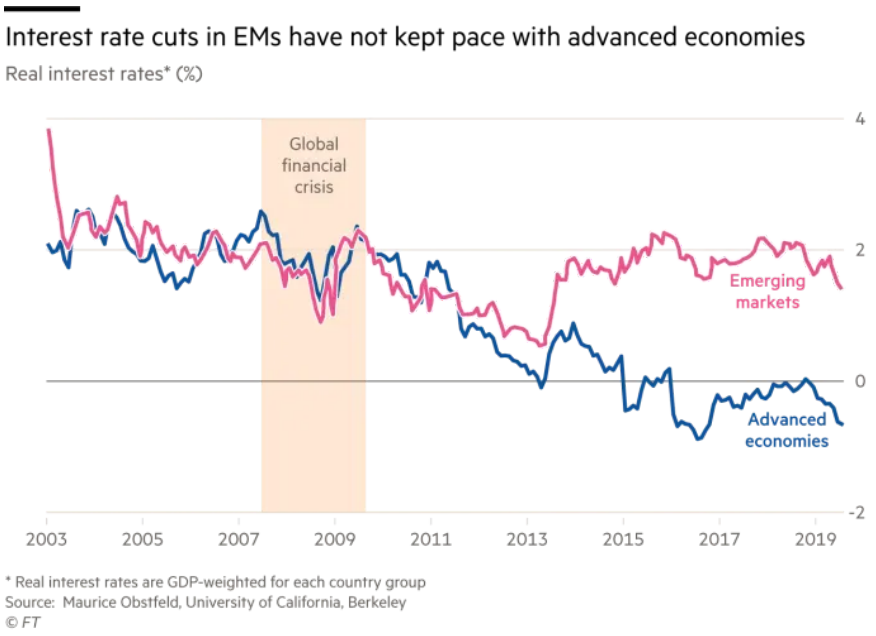
Since the Bitcoin white paper was published in 2009, researchers, entrepreneurs and investors have been trying to change the current fiat-money system and to create a digital currency that is decentralised, fair and easy to use. After years of development, the industry has evolved from digital cash to a vibrant ecosystem of decentralised applications. Noticeably, the term decentralised finance or open finance was brought to the market after the cryptocurrency bull run in 2017 and start to ramp up in volume in 2020. It broadly includes financial applications built using blockchain technology that are aimed to disrupt intermediaries in the traditional finance industry.

Decentralised finance (DeFi) changing FinTech

Decentralised money market protocols allow users to access high yield financial products without border

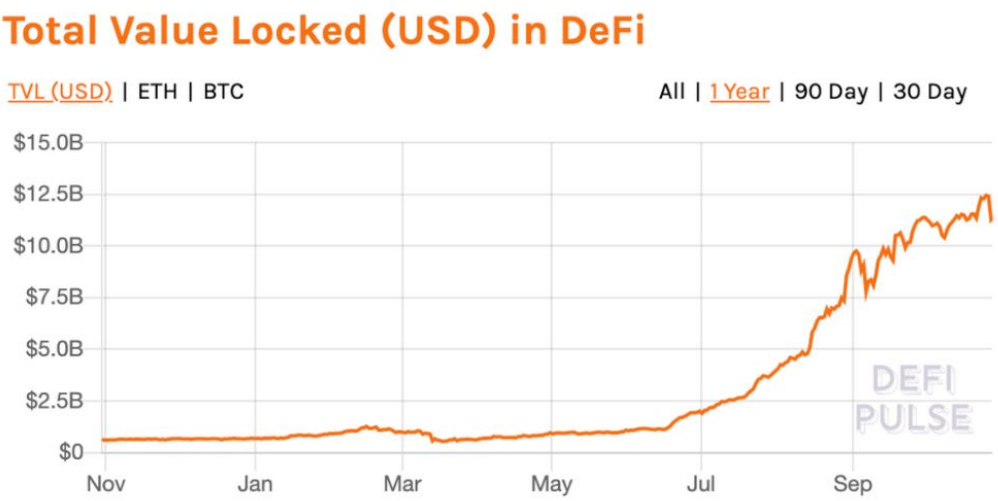
Global interest rates varies a lot across different markets. For instance, developed countries offer close to zero interest rates on saving accounts and that more complex financial market products are not accessible for average bank customers. However, it is hard to exploit different returns in the world of traditional finance due to restrictions in foreign currency exchange, account restrictions in equity markets and so on. As demonstrated in Graph 1, there are significant gaps between the interest rate in emerging markets and advanced economies after the global financial crisis, and that both are exhibiting a downward trend.

Graph 1



With the growth of crypto market capitalisation and the number of users, offering financial services for crypto assets now makes sense for companies. We have witnessed a significant surge in assets locked in DeFi protocols. It has been an exciting movement for DeFi asset to cross the US$10 billion benchmark from less than US$1 billion in less than six months- it demonstrated that there is real demand from users and that the current blockchain networks could support relatively large scale asset transactions.

Graph 2: Total Value Locked in DeFi quickly ramp up in the second half of 2020



Moreover, the interest rates offered for assets deposited in DeFi protocols are much higher than traditional fiat-based products because of vibrant trading opportunities in crypto. It is common to achieve APY above 6% through either centralised or decentralised service providers for holding in stablecoins.

Self custody for assets in a scalable way

Another important advantage that decentralised financial applications have over traditional banks is that they give back the custody of assets back to the users. Instead of using banks or other fund managers as the custodian facilities, users could now access various services without giving out control of the assets.

In countries where bank default risks are high, people would value the self-custody features. According to an article on CoinTelegraph, Bitcoin purchased with Argentine pesos has jumped 1028% since January 2018.

Polkadot is changing blockchain

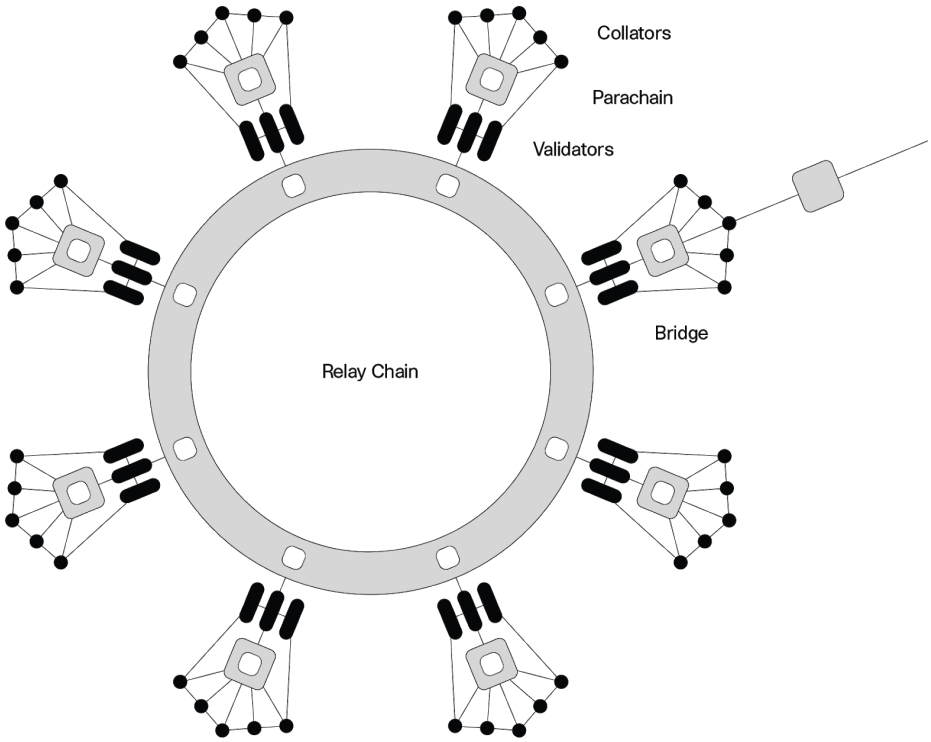
Better performance for applications

Currently, the majority of the assets in DeFi protocols are locked in Ethereum since it is the most widely adopted layer 1 protocol. However, the problem with Ethereum is the speed and cost for executing transactions. At peak, users need to pay more than US$10 for one single transaction on Ethereum and that each block would take ~7 minutes for a transaction to confirm. The limitations in performance restricted types of applications that could be built on the blockchain. Using Proof-of-Stake based consensus and the parachain design, Polkadot could process from 100 thousand to up to 1 million transactions per second. It certainly makes more sense for applications that aim to target a larger group of users.

Cross-chain feature to bridge different blockchains

Different from the current blockchain designs, Polkadot introduces relay chain and parachains structure so that the blockchains issued on the ecosystem communicate with each other in an efficient and secure way. It allows transactions of assets across different blockchains.

Graph 3: the architecture design of Polkadot



Introducing Konomi

Value Proposition

Konomi aims to provide a one-stop solution for users to manage their assets in crypto. Built on Substrate, Konomi believes that the DeFi 2.0 is going to be not only limited to Ethereum but to migrate to a more vibrant and diverse cross-chain ecosystem. To start with offering financial applications for assets in the Polkadot ecosystem, Konomi fulfils user demand in liquidity, money markets, more advanced trading products and also investing in new projects via DOT staking.

Opportunity in scaling up DeFi market with Polkadot

Inclusion for more current crypto holders

Even though DeFi has captured over US$10 billion worth of assets now, it is still less than 3% of the total crypto market capitalisation. This implies that most of the assets are not deployed now into financial products to earn interest. Main reasons include lack of cross-chain capabilities, centralised exchanges dominance and barriers in user experiences. Out of the top 10 cryptocurrencies by market capitalisation, seven projects have their own blockchain other than Ethereum and Bitcoin itself accounts for over 50% of the total market. Furthermore, centralised exchanges are still in dominance in terms of trading volume and asset in control. As Uniswap is becoming one of the largest exchanges by trading volume, its user experience for ERC20 assets are more similar or even better compared to its competitors. In terms of user experience, current DeFi applications have higher barriers for users since they need to manage their own private keys and sometimes the trading strategy could be confusing for users.

With the Polkadot ecosystem being more mature, native crypto assets could accrue more value to the ecosystem for the interoperability feature and to include more of the current crypto holders.

Support for more advanced financial products

Currently on Ethereum DeFi, most of the products are not very time sensitive. For instance, the reason why Uniswap could become adopted so widely is thanks to its simple automated market maker design. There is no need to get real time price for a certain asset, with the constant product rule, the protocol could calculate the price for trading directly. However, it is harder to support product derivatives that are time sensitive and rely on off-chain data input due to the speed of the Ethereum blockchain. However, the actual financial market size for derivatives products are much larger than spot trading.

With a better performance blockchain in place, there are more possibilities for smart contract developers to deploy more complex financial derivatives on-chain. It could help enlarge the total market size for DeFi as product varieties expand and more institutional players join the market.

Product Overview

Konomi is targeting crypto users that are looking into investing, trading and managing assets in an efficient way. It is currently deployed as an independent blockchain using the Substrate framework. At launch, it will support functions in trading, deposits and lending. As the Polkadot parachains are launched and that interchain communication protocols are live, Konomi could support more financial products specific to the Polkadot ecosystem.

Konomi platform is offered as a web application in the beta phase and will support mobile version for better user experience.

Konomi Trade

Konomi Trade allows users to access liquidity for assets in the Polkadot ecosystem. It supports smart contract based liquidity protocols starting with constant product automated market makers. Users could connect decentralised wallets to the protocol and trade with immediate on-chain execution. Since the platform is decentralised, users could trade long-tail assets without any restrictions.

Konomi Lend

Konomi Lend is a decentralised money market protocol for users to borrow and lend assets. The product is currently based on a collateralized debt position model. It is an important milestone for crypto assets to have compound interest and this feature could incentivise users to hold the assets. DOT will be first supported as the default collateral, since it is the native currency in the ecosystem. As the parachain and para-thread auction is launched, there will be more room for innovation in financial products since projects will need to bid for DOT supporters in order to share the consensus in the Polkadot ecosystem. Komoni Lend also has the capacity to become an alternative solution for projects to raise DOT in exchange for their project tokens. For example, projects could accept DOT as a collateral to borrow the native tokens issued by new projects and receive interests.

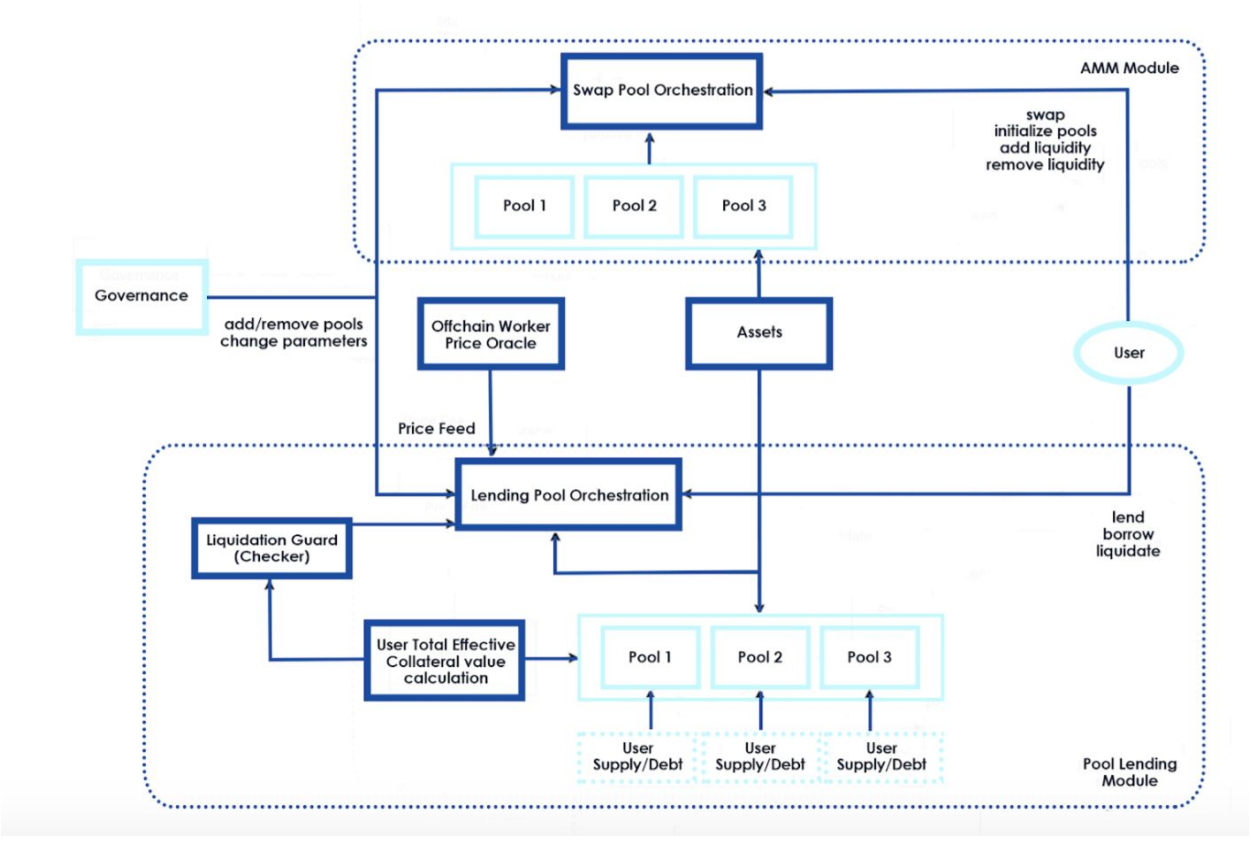
Konomi Wallet

Konomi Wallet helps to aggregate user positions in decentralised wallets and to manage the active positions in the different protocols. Just as a banking customer would find it troublesome to have several banks at the same time, it is difficult for non-professional users to keep track of positions in different DeFi protocols. It complements Konomi Trade and Konomi Bank to give users the one-stop experience to manage assets on DOT.

Implementation

Technical Design

System Architecture



Decentralised Trading Protocol

Konomi will support popular Automated Market Makers (AMMs) on Ethereum DeFi and apply to the case of cross-chain swaps in the Polkadot ecosystem. At the first phase, we choose the most commonly used constant product rules and proactive market making rules.

Generally the variables of the AMM are the reserve amount x_i of each token i. In the most commonly used model

$$\sum x_i = k \qquad (1)$$

K is the constant that is fixed. Since the price for a trading pair x_i and x_j is $-\partial x_i/\partial x_j = 1$ The two assets could always exchange for the same amount of each other. Similarly, for a token pair x and y, $x + Py = k$ then $-dx/dy = P$. We have got a fixed price AMM where you always need to

use the P amount of y token to get one x token. This formula is simple and efficient enough as seen on Uniswap in which the formula is generalized as

$$\prod x_i = k \qquad (2)$$

which means that the product of each token's reserve amount remains constant. For a two token pair X and Y, (2) becomes

$$xy = k \qquad (3)$$

Price $-dx/dy = x/y$ is changing corresponding to the reserve of both sides. In the case of Uniswap, this model is also specific about the ratio of each asset pair to be equal. In order to be more generalized about the implementation, the weightage of each asset could be generalized and to create the curve as a particular N-dimensional surface

$$\prod x_i^{w_i} = k \qquad (4)$$

where w_i is the normalized weight of x_i.

Despite the simplicity of this model, there are limitations of the model that makes it prone to impermanent loss for liquidity providers. In this model, the price in the market is never anchored in the process and that it is possible for the pool to be drained out of one asset, which would cause it to lose all liquidity.

Therefore, the proactive market making approach proposed by DODO exchange is more effective in terms of reducing impermanent loss. It introduces external price oracle to move the AMM curve, it is described by four parameters for a pool composed of a base token and a quote token:

B_0 : total number of base tokens deposited by liquidity providers

Q_0 : total number of quote tokens deposited by liquidity providers

B: number of base tokens currently in the pool

Q: number of quote tokens currently in the pool

The price curve is:

$$P_{margin} = iR$$

and is consist of two parts:

- $R = 1 - k + (B_0/B)^2 k$ when $B < B_0$
- $R = 1/\left(1 - k + (Q_0/Q)^2 k\right)$ when $Q < Q_0$

i is the market price provided by an oracle, and k is a parameter in the range (0, 1).

Decentralised Money Market

Konomi offers a money market protocol to support borrowing and lending for the assets on Polkadot. In terms of interest rate calculation, it is mostly based on the supply and demand side of the pool.

Similar to the implementation of Compound protocol in Ethereum, the interest rate is calculated on a per-block basis:

$$Index_{a,n} = Index_{a,(n-1)} * (1 + r * t)$$

The market's total borrowing outstanding is updated to include interest accrued since the last index:

$$totalBorrowBalance_{a,n} = totalBorrowBalance_{a,(n-1)} * (1 + r * t)$$

As a portion of the accrued interest is retained as reserves, determined by a reserveFactor

$$reserves_a = reserves_{a,(n-1)} + totalBorrowBalance_{a,(n-1)} * (r * t * reserveFactor)$$

The pool lending module enables users to get access to a variety of supported pools. They may deposit collaterals into these pools and gain lending interest. If they have enough collateral, they may also borrow other assets with some interest fees. Price feeds (by off-chain workers) will ensure that the debts are in healthy condition, otherwise a liquidation process is triggered.

The lending module has the following public extrinsic api for user

```
fn supply(origin, asset_id: T::AssetId, amount: T::Balance) -> Result;

// withdraw supplied assets
```

```
fn withdraw(origin, asset_id: T::AssetId, amount: T::Balance) -> Result;

fn borrow(origin, asset_id: T::AssetId, amount: T::Balance) -> Result;

 //repay borrowed assets with interest


fn repay(origin, asset_id: T::AssetId, amount: T::Balance) -> Result;
```

And also another public extrinsic api for arbitrager

```
// repay for target_user pay_asset_amount of pay_asset_id asset, get
get_asset_id asset with bonus.
fn liquidate(origin, target_user: T::AccountId, pay_asset_id: T::AssetId,
get_asset_id: T::AssetId, pay_asset_amount: T::Balance) -> Result;
```

The system has the following global parameters

```
liquidation_threshold: When the user's effective collateral rate is below
this, arbitrager may trigger liquidation process


supply_threshold: When user borrow some asset, he/she need to keep the
collateral rate above this
```

The key of the lending module is a set of pools (mapping from asset id). Each pool has the following fields:

```
enabled: a boolean to show if this pool (=asset) is supported. This will be
later determined by governance.

can_be_collateral: a boolean to show if this asset can be used as
collateral.

collateral_factor: when used as collateral, highly volatile asset may be
treated less than it's current market value. This is the factor.

asset: asset of the pool
```

```
supply: total user supply of the pool (that can be borrowed)

debt: total user debt of the pool (that is borrowed)
factor

liquidation_bonus: when liquidating this pool, the bonus of arbitrager can
earn.

total_supply_index: used to calculate accumulated interest. See below.

total_debt_index: used to calculate accumulated interest. See below.

last_update_time: timestamp of last update to the pool.
```

Whenever an asset is supplied or borrowed, its supply and debt index will be updated according to the accumulated interest since the last supply or borrow action.

```
total_supply_index = total_supply_index * (1+supply_interest_rate) *
time_passed;
total_debt_index = total_debt_index * (1+debt_interest_rate) * time_passed;
```

To track user's supply and debt considering interest, we use the following fields

```
amount: amount of the supply/debt

index: used to calculate user's accumulated interest. See below.

as_collateral: (only for supply) if the user use this asset as collateral
```

When user takes an action (supply, borrow, withdraw or repay), first calculate interest:

```
amount = amount * total_supply_index (or total_debt_index) / index
```

Then its index will be updated to the current total_supply_index or total_debt_index.

To calculate interest, we use a simple linear modal with the following parameters

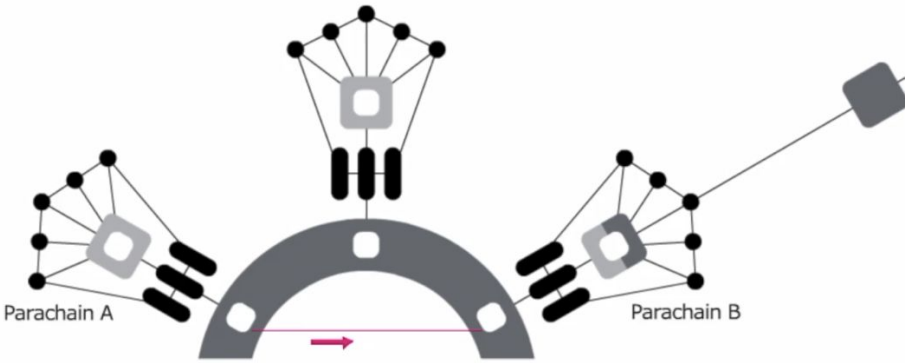
```
borrow_rate_zero, borrow_rate_optimal, borrow_rate_illiquid,
utilization_optimal
```

Equations:

```
utilization_ratio = total_borrow / total_deposit
borrow_rate_net1 = borrow_rate_optimal - borrow_rate_zero
borrow_rate_net2 = borrow_rate_illiquid - borrow_rate_optimal
if utilization_ratio <= utilization_optimal
    borrowRate = utilization_ratio / utilization_optimal * borrow_rate_net1
+ borrow_rate_zero
else
    borrowRate = (utilization_ratio - utilization_optimal) / (1 -
utilization_optimal) * borrow_rate_net2 + borrow_rate_optimal
depositRate = borrowRate * utilization_ratio
```

Cross-chain transactions

Konomi will use the Cross-Chain Messaging Passing (XCMP) feature to support cross-chain transactions of assets. XCMP requires a channel open between two parachains for message communication. In the sender parachain, messages will be dispatched and sent to the relay chains. Destination and timestamps will be included in the message so that it could be identified. The collator node on the receiving parachain will pick up this message since it would be constantly asking the network for new messages. If the validation is successfully done by the validators on the network, it would compress the block proposal as a hash and replace it onto the relay chain, such that the message between parachains are completed.

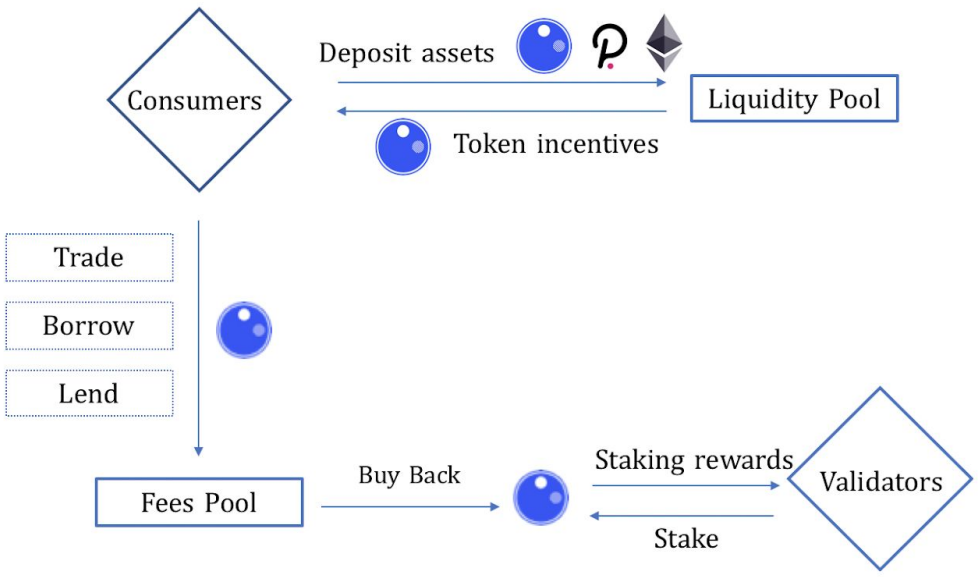


Future works

Konomi aims to bridge the gap between crypto and fiat world by offering an easy to use, high performance product for users to trade and manage their crypto assets. In the mid to long term, acquiring fiat-based customers and developing efficient cross-chain technology are the two strategic focuses. In terms of fiat to crypto gateways, there have been many licensed service providers but it is yet to achieve mainstream adoption. With regulated players eying in this space, there will be more users and more demand for DeFi products. Furthermore, we believe that cross-chain infrastructure is going to be an important building block for the crypto industry going forward. Current solutions for BTC and other assets to support Ethereum are either centralised or slow in speed.

Konomi Token

Konomi will issue a native token in the network to facilitate decentralised governance and to bootstrap early users. The token economics are designed so that users could actively participate in trading, providing liquidity and also sharing the upside in network value growth.



Token Utility

- Decentralised governance

  The design and implementation of the protocol would be determined by token holders. For parameters like pool staking fees, transaction fee burn, liquidity mining ratio, are initially set by the protocol itself; token holders could update the numbers and the smart

contract itself based on the voting process. In order to encourage users to participate in the process, there could be some profit set to reward the voting participants.

- User incentives

  As a decentralised product, getting liquidity is crucial for the user experience and platform adoption. Therefore, a large proportion of the Konomi tokens are reserved to encourage users to add liquidity to the platform and to use the products. By depositing assets to the protocol, users could automatically market make for the protocol.

  In designing the user incentives, the protocol also takes into consideration the long term sustainability of the token. As there are more liquidity mining programs launched by DeFi protocols, users tend to participate in those programs in order to earn tokens rather than to fulfil their true needs. In the meantime, as more tokens are generated, there is continuous selling pressure to the network if no strong use case is designed to create demand for the token. Therefore, in designing the liquidity mining program, priorities would be given to long term supporters and market makers for the protocol.

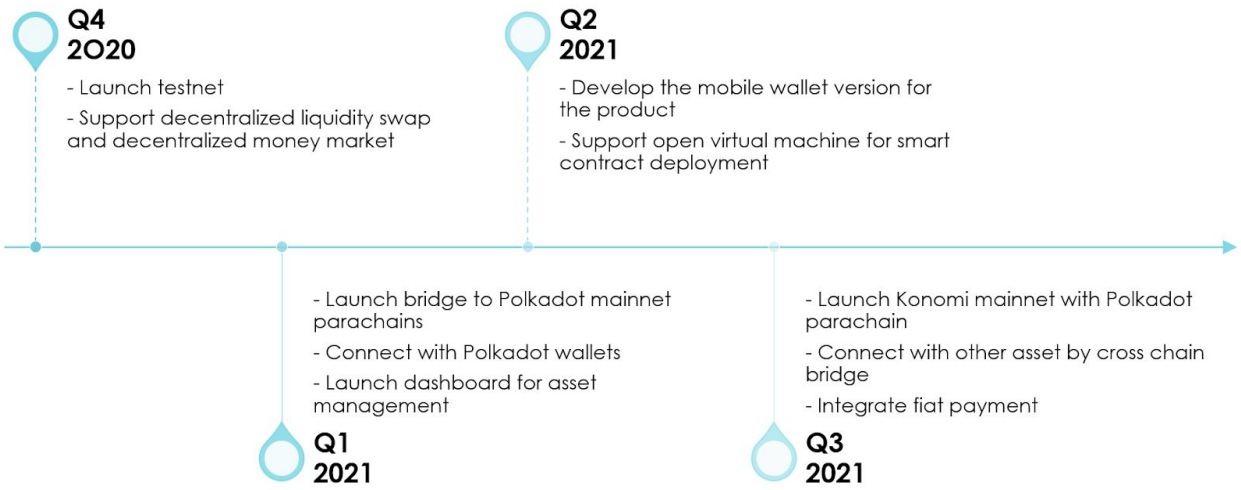
- Asset staking

  Konomi token could be staked to participate in the base layer consensus and earn system rewards. It is also the staking currency to share platform revenue and ensure that the debt positions are safe.

Token Distribution

There will be 100M KONO tokens at the launch of Konomi Network and it's a fixed token supply. 25% of the tokens will be distributed through token sales; 18% of the tokens will be used for marketing and linear vesting for 24 months; 15% of the tokens will be reserved for ecosystem development and partnerships; 12% of the token s will be reserved to the foundation; 15% of the token will be distributed through incentive plan to users who participate in the network; 15% will be reserved to team and advisors who support the project.

Development Roadmap



Q4 2020:

- Launch testnet
- Support decentralised liquidity swap and decentralised money market

Q1 2021

- Participate in Polkadot parachain auction
- Connect with Polkadot wallets to offer the DeFi products in the wallet
- Launch dashboard for asset management

Q2 2021

- Develop the mobile wallet version for the product
- Support virtual machine for smart contract deployment

Q3 2021

- Launch Konomi mainnet with Polkadot parachain
- Connect with other parachain assets by XCMP
- Integrate fiat payment gateways