

Kanga Protocol Whitepaper

Kernel Agnostic Next Generation Assets (KANGA)

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Abstract

As at May 3rd, 2021 the Decentralized Exchange (DEX) Market has a \$9.35 Billion daily trading volume and is capturing market share from the Centralized Exchange Market which has a daily trading volume of \$210 Billion. Ethereum[2] is still the dominant decentralized platform. However, we are seeing the emergence of low cost trading chains capturing market share. Using 24 hour volume, 13 of the top 20 DEX's are either multi-chain or running on emerging chains such as Binance Smart Chain[4] and Huobi EcoChain[5].

Kanga protocol enables the custody, aggregation and exchange of digital assets. Kanga is written in Solidity and can be deployed on multiple platforms. We believe the emergence of low cost trading platforms including Binance Smart Chain, Huobi EcoChain and Polkadot[6] parachains[7] are ideal for Kanga Protocol. Our initial launch is targeted for Binance Smart Chain which has captured approximately 20% of the DEX daily trading volume and it's Decentralized Finance (DeFi) ecosystem is growing rapidly.

Kanga protocol provides the following benefits.

Traders get Fast, cheap trades with low slippage. Kanga runs on Binance Smart Chain with low gas fees further optimized by our Token Management Framework that reduces fees even when trading across multiple pools. Low slippage is provided by our pluggable Liquidity Pool offerings which moving forward will support stableswaps, price oracles AMM's and liquidity bootstrapping pools.

Liquidity providers receive high yield, capital efficient pools. High yield provided by the Yield Engine which allows unused tokens to earn additional yield by moving them into the best managed yield provider. Yield is further increased by dynamic fees which adjust to trading conditions.

Kanga token holders are provided with higher yield for staked tokens. Liquid Staking allows Token Holders to stake Kanga and receive Liquid-Kanga which can be further staked in other yield providers. Moving forward yield will be further increased by Yield Strategies as introduced by yearn to ensure tokens are staked in the highest yield provider.

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1 Overview

With the emergence of decentralized finance, a diverse financial ecosystem has been created using blockchain technology. This started with Bitcoin[1], which provided a decentralized value storage and remittance platform. Then, Ethereum's [2] EVM[3] enabled a programmable decentralized platform, paving the way for innovative decentralized financial(DeFi) models and applications. Recently, we have seen this vision evolve even further by the open source community through new platforms such as Binance Smart Chain[4], Huobi Eco Chain[5]and Polkadot[6] which provide secure low cost EVM compatible platforms for decentralized finance protocols. Automated Market Makers(AMMs) such as Uniswap[8], Balancer[9], and Curve[11] have been replicated and morphed into projects such as SushiSwap[13], MDEX[14] and PancakeSwap[15], providing a broader multi-chain, multi-asset DeFi ecosystem.

Kanga protocol is building upon this vision to provide additional benefits such as increased liquidity, lower slippage, lower gas fees, higher yield and more capital efficiency.

1.1 Opportunity

Kanga protocol is focusing on the inefficiencies in the following areas:

More efficient trades that allow token holders the ability to purchase and transfer their assets more easily. This will be provided by reducing the number of trades and settlements required when doing a swap and reducing gas fees by using a cost effective blockchain.

Greater liquidity is needed by Asset Custodians including new blockchain offerings and DeFi protocol developers.

Higher yield and efficient use of capital enables liquidity pools to function with less capital. This means that liquidity providers can more effectively deploy their capital allowing token holders to trade more efficiently. It also provides greater returns for asset custodians which can be reinvested to enable further iteration and improvement of the economic models and platforms they are building.

Better bonding curves can reduce the amount of slippage and impermanent loss when trading assets.

1.2 Solution

Kanga protocol addresses these opportunities with the following components:

- **Pouch:** groups all tokens for Kanga protocol's liquidity pools into a single pouch. This improves gas efficiency as multiple transactions across pools can now be settled in one streamlined transaction. The pouch also enables internal token balances to be stored rather than cashed out to the native token each time. This can be combined with dynamic fees for liquidity pools to provide fee optimizations. Finally, it provides a framework for

developers building scenario specific Automated Market Maker (AMM) logic which allows them to focus on the bonding curve specifics without having to worry about the complex token management tasks.

- **Yield Engine:** provides greater liquidity, higher yield and efficient use of capital. It represents the custodian of an Asset and allows them to manage the tokens they put into a lending pool. The Yield Engine can lend the tokens not currently required by the liquidity pool to, for example, a lending pool. This improves the pools and therefore the asset custodians yield by putting capital to work when it's not being used for swap liquidity.
- **Liquidity Pool Offerings:** on Kanga protocol can support multiple bonding curves which allows for the most efficient trading algorithm to be used in each liquidity pool for each scenario.

1.3 Use Cases

The following diagram gives an overview of the use cases that the protocol can support:

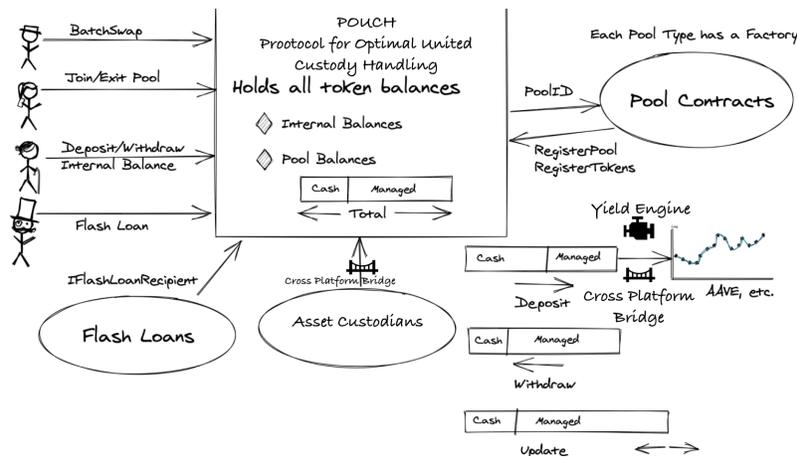


Figure 1: POUCH Functionality

1. **Token Holders, Traders and Arbitragers:** In addition to holding and swapping tokens, holders can combine multiple trades in a batch swap, provide liquidity by joining or exiting a pool, decide whether to leave their tokens in the POUCH as an internal balance or withdraw the assets back to the native token and create flash loans for arbitraging opportunities.
2. **Yield Providers:** Yield providers such as DeFi protocols like AAVE[17] can use their managed assets to provide liquidity. This reduces the amount of assets needed to be held in pools and increases their yield by augmenting

their existing fees with trading fees from the liquidity pools. Yield can be further increased by using more advanced yield strategies to improve yield similar to the strategies that YEARN [19] introduced.

3. **Asset Custodians:** Asset custodians are any entity which manages assets. These include Layer 1 blockchains, parachains, DeFi protocols, centralized exchanges and traditional financial institutions. All of these custodians can increase liquidity for their assets (tokens). They can also increase liquidity for their platform, either by bridging to POUCH or moving forward implementing a POUCH light client on their platform.

2 Kanga protocol

Kanga protocol is being launched on Binance Smart Chain[4] and moving forward can be deployed on any EVM compatible chain. It builds upon open source Protocols such as Uniswap v3 [22], SushiSwap[13] and Balancer v2[10] and is further enhanced with the following features:

2.1 Pouch

Protocol for Optimal United Custody Handling (POUCH) provides enhanced liquidity, better yields and gas efficiency.

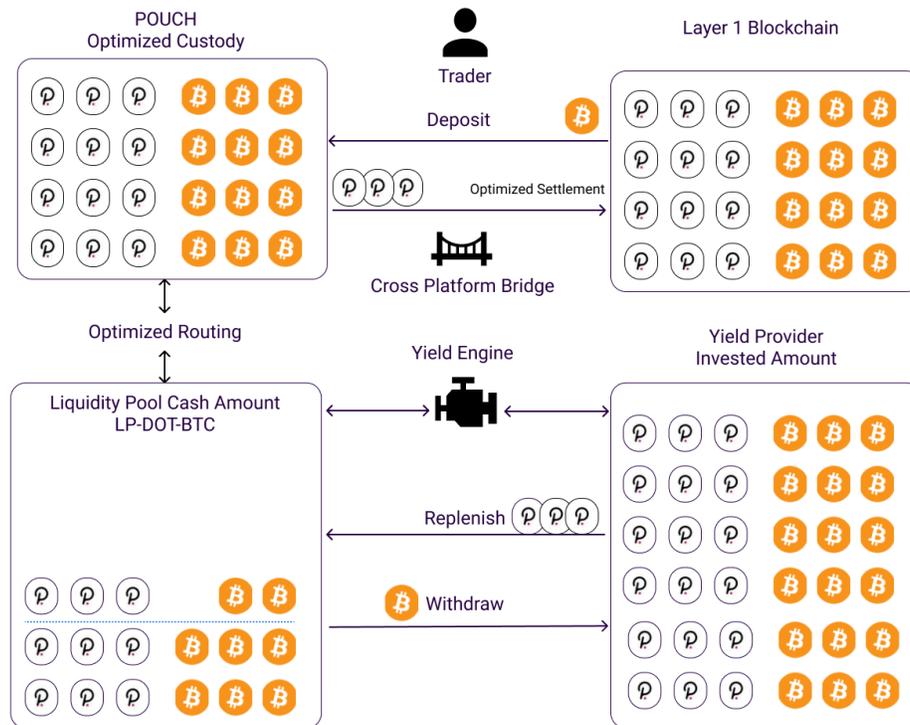


Figure 2: POUCH Yield Aggregation

The POUCH holds all balances of the Liquidity Pools for the protocol. It allows for a single interface point with all liquidity pools and abstracts away the underlying implementation resulting in a gas efficient platform and agnostic interface for the exchange of tokens.

Routing and Settlement: off-chain swap routing enables the discovery of the best value for swaps via the Optimized Ledger. This includes all Kanga

protocol Liquidity Pools and may be augmented with on-chain components for realizing discovery fees.

A sample trade flow is as follows:

1. Trader approves the Optimized Ledger to work as a proxy
2. Trader requests to swap one BTC for some DOT
3. The BTC is deposited into the Optimal Ledger (note: this optionally uses the Cross Platform Bridge if the assets come from another layer 1 platform)
4. Optimal Routing selects the most efficient swap route from multiple liquidity pools and executes the trade
5. The trader receives the DOT and then can either leave the DOT on the Optimal ledger or withdraw it using Optimal settlement (once again, if the funds are native to another layer 1 platform the Cross Platform Bridge will be used)

2.2 Yield Engine

The Yield Engine connects Liquidity Providers to Yield Providers. Yield Providers *invest* in a liquidity pool. However, rather than sending all the invested tokens to the liquidity pool, only the minimum amount needed for transactions are sent. The role of the Yield engine is to monitor the balance of the liquidity pools and replenish and re-balance them as needed.

The Yield Engine flow is as follows:

1. The Yield Provider (e.g. AAVE or Honza) "invests" a number of tokens into a liquidity pool.
2. The Liquidity Pool maintains a minimum threshold needed for trading, which is called the Optimal Liquidity Amount. The remaining "investment" tokens remain in the Yield Provider enhancing the yield for the Liquidity Pool.
3. When the number of tokens for any token in the pool drops below the Optimal Liquidity Amount, a re-balance is triggered (optionally using the cross platform bridge if needed).

Note: In the above scenario, BTC was traded for DOT thus triggering DOT to drop below its Optimal Liquidity Amount. Hence, DOT is replenished by the Yield Provider and BTC is withdrawn to balance the Liquidity Pool and continues to earn yield on the surplus BTC.

2.3 Yield Engine - Strategies

Yield strategies similar to those introduced by Yearn[19] and implemented in protocols such as sushi swap[13] can be added to the yield engine and increase yield for Asset Custodians. Features of V2 yVaults include:

Up to 20 strategies per yield engine: will increase the flexibility to manage capital efficiently during different market scenarios. Each strategy has a capital cap. This is useful to avoid over allocating funds to a strategy which cannot increase APY anymore.

Strategist and Guardian are the new Controllers: The Strategy creator (strategist) and a Guardian oversee strategy performance and are empowered to take action to improve capital management or act on critical situations.

Automated vault housekeeping (Keep3r network): harvest() and earn() calls are now automated through the Keep3r bots network. These 2 function calls are used to purchase new underlying collateral by selling the farmed tokens while moving the profits back to the vault and later into strategies. The keep3r network takes the heavy lifting of doing these calls and running with the gas costs in exchange for keep3r tokens. This approach unloads humans from these housekeeping tasks. **Note:** keep3r network[18] will be implemented as needed on emerging blockchains.

Bouncers and Guest lists: Yearn has created a unique development process for new vaults. All vaults are launched as Test Vaults (tyvToken) to start with. Test vaults have a cap and therefore their strategies do as well. Also, the Bouncer has a guest list of wallets which can interact by depositing and withdrawing funds in the Test Vaults. This approach prevents uninformed users from potentially losing funds in a not production ready product. Kanga Protocol will use test vaults before leveraging the strategy in yield engines.

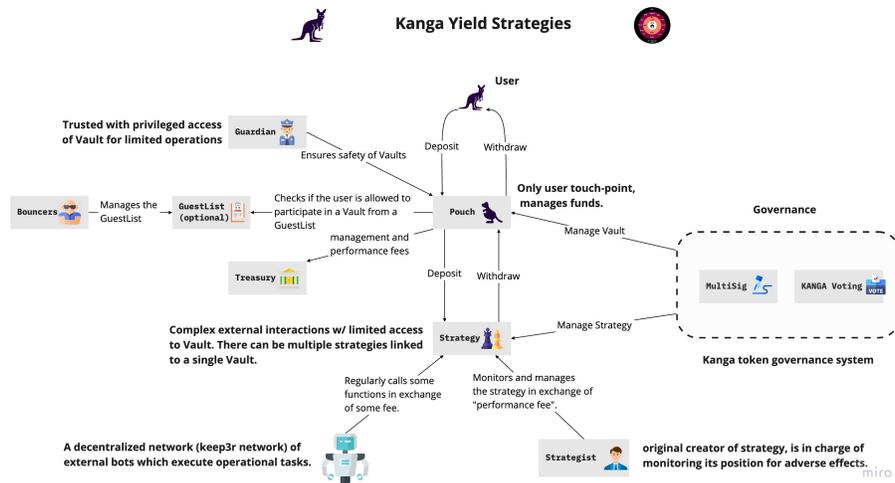


Figure 3: Yield Engine Strategies using Yearn Vaults

2.4 Liquidity Pool Offerings

When launching, Kanga protocol will start with a basic bonding curve. Moving forward, other bonding curves can be plugged in to POUCH to support different scenarios. These scenarios include:

Stable Coin Swaps: support the trading of pegged tokens. Examples of these are trading stable coins such as USDT, USDC, DAI etc. Another use case is for wrapped tokens such as wBTC. Protocols designed especially for stable swaps include Curve[11], Shell Protocol[20] and Saddle[21],

Below is an example bonding curve from Curve Finance[11] built especially for stable coins. Unlike the MultiToken Bonding curve that Kanga Protocol will initially support, their main design goal was to reduce slippage when trading stable coins which are pegged close to 1 USD. Thus, the invariant curve around 1 USD has very low slippage. The curve definition is given by:

$$An^n \sum T_i + D = ADn^n + \frac{D^{n+1}}{n^n \prod T_i}$$

where the sum of the initial balances for n tokens are

$$D = \sum_i T_i^0$$

Proactive Bonding Curve

Proactive Bonding curve, introduced by DodoEX[12], can be utilized when there are multiple stable coins in a liquidity pool that are pegged to different values. An example of this may be for international remittances where you may have kUSD and kEUR in a pool used for remittances between the United States and Europe.

Proactive Bonding Curve key concepts

Base and quote are two concepts that can be distinguished between in two easy ways:

- In a trading pair, the **base** is always the token before the hyphen, and **quote** after
- In transactions, price refers to how many **quote** tokens are needed in exchange for one **base** token

For example, in the ETH-USDC trading pair, ETH is the **base** token and USDC is the **quote** token.

The funding pool of PMM is described by four parameters:

- B_0 : base token regression target - total number of base tokens deposited by liquidity providers
- Q_0 : quote token regression target - total number of quote tokens deposited by liquidity providers
- B : base token balance - number of base tokens currently in the pool
- Q : quote token balance - number of quote tokens currently in the pool

Proactive Bonding Curve Pricing Formula

The Proactive Bonding Curve is plotted by the following pricing formula:

$$P_{margin} = iR$$

Where R is defined to be the piecewise function below:

$$\begin{aligned} \text{if } B < B_0, R &= 1 - k + \left(\frac{B_0}{B}\right)^2 k \\ \text{if } Q < Q_0, R &= 1 / \left(1 - k + \left(\frac{Q_0}{Q}\right)^2 k\right) \\ \text{else } R &= 1 \end{aligned}$$

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



Figure 4: Proactive Bonding Curve

Flexibility using k parameter

When k is 0, then naively sells or buys at market price, as shown by the flat, blue line. As k increases, the price curve becomes more “curved”, but,

consequently, liquidity becomes increasingly jeopardized because more funds are placed far away from market price and are thus underutilized or not utilized at all. When k increases to 1, the flat section near the market price is completely eliminated and the curve essentially becomes a standard AMM curve, which Uniswap uses.

Normally, k is recommended to be a relatively small value, such as 0.1, which could provide liquidity 10 times better than the standard AMM algorithm.

Liquidity Bootstrapping: similar to those provided by Balancer[23]. Has a contract that controls a liquidity pool, which contains the tokens and is used on the exchange. Unlike an immutable shared pool, smart pool controllers can change the parameters of the pool - but only in controlled ways. It is therefore less trustless than a shared pool, but does not require the complete trust of a private pool.

Liquidity Bands: give the opportunity to vastly improve the efficiency of the capital provided by Liquidity Providers. Liquidity providers (LPs) are given the ability to concentrate their liquidity by “bounding” it within an arbitrary price range. This improves the pool’s capital efficiency and allows LPs to approximate their preferred reserves curve, while still being efficiently aggregated with the rest of the pool. For a complete understanding of how Liquidity Bands will work, please refer to Uniswap v3 Core[22].

3 KANGA Token

Kanga's goal is to become a completely decentralized protocol.

3.1 KANGA Wealth Fund

Many blockchain protocols are solving the problem of both decentralized governance and long term sustainability using innovative approaches. One such approach is KANGA's wealth fund. Using a surplus of network and protocol fees, it will hold a mixture of digital assets in its reserve. These funds will be used initially to achieve sustainability and long term can be used to accelerate development, partnerships and ecosystem growth. Also, these funds could be used to fund additional platform roll outs which would have their own independent tokenomics.

3.2 Governance

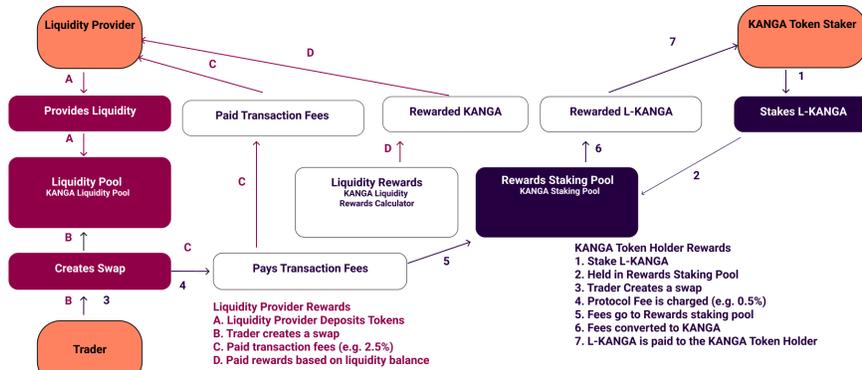
Initial governance may be a combination of trusted authorities voted in by the community [36][37]. This may then be further enhance with secondary governance token to vote on such things as Liquidity rewards[38]. Moving forward a robust governance modelling system could be further enhanced using capabilities similar to Polkadot [28] [25] [26] [27]to vote on proposals including which features are being developed grants to developers and funding of core protocol development using a treasury[31] [29] [30] [32].

3.3 Rewards Module

To ensure a robust set of high-value liquidity pools and growth of KANGA, we are building incentivization mechanisms into Kanga Protocol. They include both transaction fees and liquidity rewards for liquidity providers. These rewards are targeted to be delivered in KANGA tokens. Below is an overview of how each of the rewards types are created and distributed:

Liquidity Provider Rewards: A percentage trading fee will be charged on all transactions. These fees will be converted to KANGA and rewarded to the liquidity pool providers based on the % of liquidity they have provided relative to the pool and the total liquidity stored in KANGA. The fee structure will be refined but may be fixed at 0.3% similar to Uniswap[22] or defined at the pool level with a valid range of 0.0001% to 10% similar to Balancer[10]. Dynamic fees may also be implemented moving forward following the model published by Gauntlet [33].

KANGA Token Holder Rewards: a percentage trading fee will be charged on all transactions. These fees will be converted to KANGA and rewarded to the KANGA Token holders based on the percentage of KANGA they hold relative to the circulating supply, similar to the Sushi Swap design[34].



Note: KANGA Tokens may be staked for L-KANGA tokens to exploit the derivative value of the KANGA's fueling and powering more applications without sacrificing the security of the Kangaroo Protocol. L-KANGA may be used to provide liquidity to liquidity pools or yield farm in any onboarded DeFi Protocol.

Figure 5: KANGA Rewards Capabilities

When users make trades on the KANGA Exchange, a fee is charged. A percentage of this fee will be added to the KANGA Bar pool in the form of Liquidity Pool (LP) tokens for the relative pool. When the rewards are calculated, all the LP tokens are sold for KANGA (on Kanga Exchange). The newly purchased KANGA is then divided up proportionally between the xKANGA holders in the pool, meaning their xKANGA is now worth more KANGA. It will start as 1 KANGA = 1 xKANGA, but just like Liquidity Pool (LP) tokens the price of xKANGA will change over time depending on how many KANGA rewards are in the pool.

The above baseline can be enhanced to offer a rich ecosystem of staking and yield provisioning moving forward. Further research on reward mechanisms will be carried out as part of the implementation phase. They include

- **Protocol Fees:** set for each pool and adjusted dynamically. [35][39][40][33]
- **Withdrawal Fees:** charged when withdrawing liquidity from the pouch. [39][41]
- **Flash Loan Fees:** a small percentage of the flash loan amount. [39][41]
- **Governance Fees:** driven by a separate governance token [38]
- **Lending Fees:** Lending fees for liquidity providers [42]
- **Liquid Staking:** stake KANGA and receive L-KANGA [43][44][45]
- **Yield Stacking:** enable receiving yield from multiple sources [46]

3.4 Tokenomics

Kanga’s goal is to become a completely decentralized protocol. Below is an overview of the planned token allocation and vesting, subject to change.

Category	Percentages	Vesting
Team and Advisors	21.00%	10% 6 months after Public Sale remainder over 2 years released monthly
Seed	3.50%	20% at public sale and remaining over 1 year released monthly
Private Sale	4.00%	20% at public sale and remaining over 1 year released monthly
Public Sale	1.50%	Tiered Vesting
KANGA Operational	20.00%	20% 1 month after Public Sale remainder over 4 years released monthly
Ecosystem Grants	7.0%	20% 1 month after Public Sale remainder over 4 years released monthly
Biz Dev,Comm Building, Market	3.00%	20% 1 month after Public Sale remainder over 4 years released monthly
Additional Rewards	40.00%	up to 3% at public sale remainder as needed
KANGA Protocol	100.00%	

Figure 6: Kanga Token Allocations and Vesting

KANGA Token Distribution

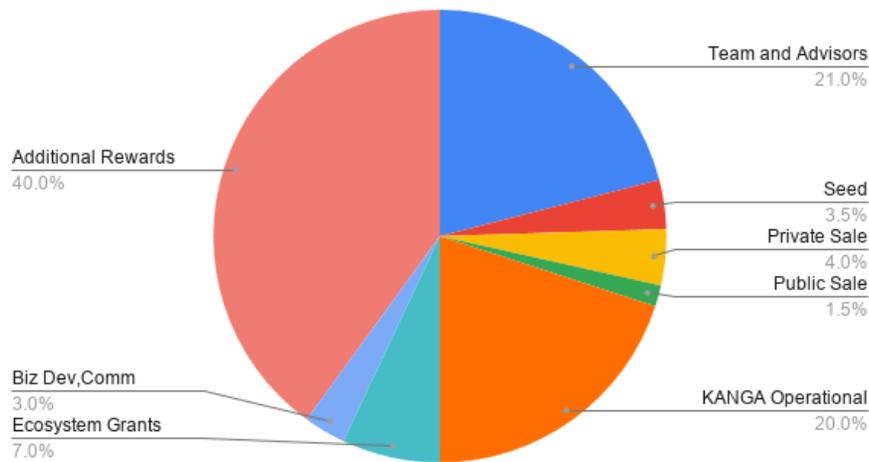


Figure 7: Kanga Token Distribution

4 Future Work

The vision for the Kanga Exchange is a multi-platform, multi-asset DEX. This will be accomplished in a phased roll out. The first phase is the launch on Binance Smart Chain[4]. This will give access to all assets on the Binance Smart Chain and optimized swap and yield functionality.

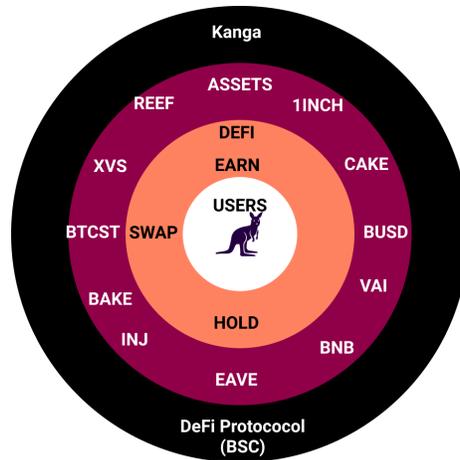


Figure 8: Kanga Exchange on Binance Smart Chain

The following phases include adding additional platforms such as Polkadot[6] and Huobi Eco Chain[5] and additional functionality. These may be done in parallel.

Additional Kanga protocol functionality includes multiple bonding curves, governance, an NFT marketplace, Price Oracles and Limit Orders.

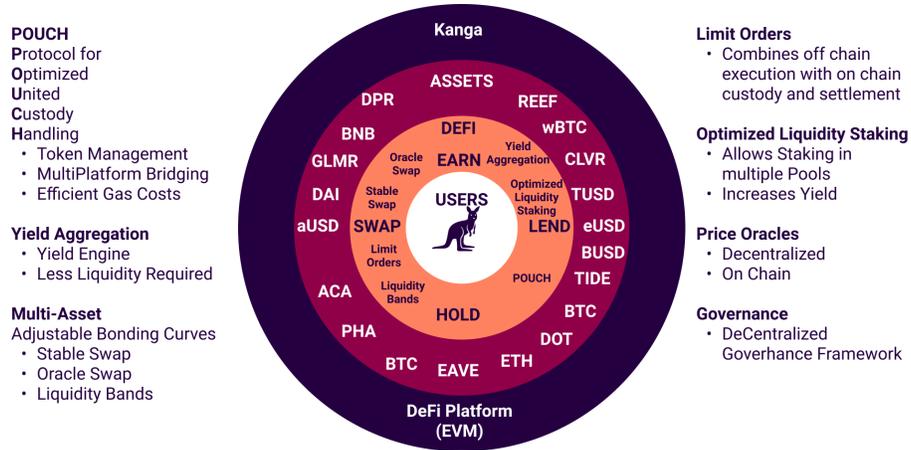


Figure 9: Kanga Exchange future Protocol enhancements

The additional Platform functionality includes Cross Platform Bridges which connect the systems together. Also, a Polkadot parachain has been prototyped and is being tested as a settlement layer. This would enable a settlement hub on its own dedicated trading chain and support a broad ecosystem.

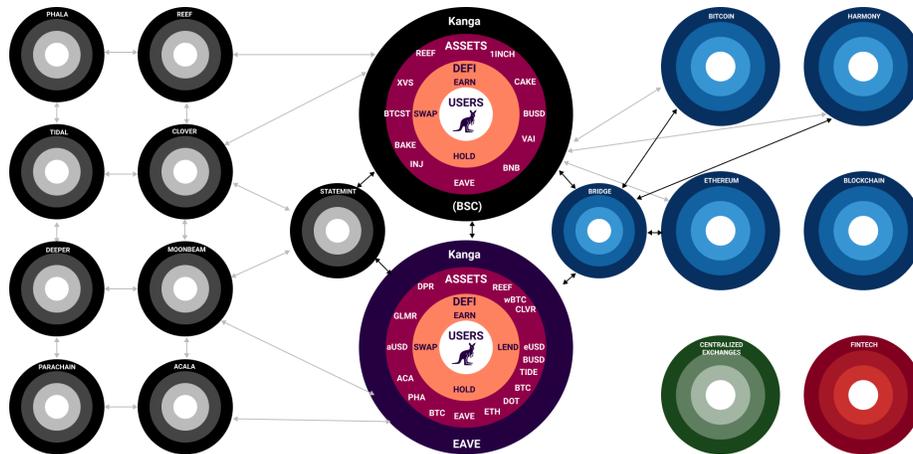


Figure 10: Kanga multi-platform Ecosystem

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