SPARTAN PROTOCOL

Incentivized liquidity and synthetic asset generation for Binance Smart Chain.

Abstract

The Spartan Protocol is a liquidity protocol for asset exchange and synthetic asset generation on Binance Smart Chain. The foundation of Spartan is its liquidity pools, similar to Uniswap, but instead of a fixed-rate fee model it uses a liquidity-sensitive fee model similar to THORChain's slip-based fees. This ensures liquidity demand is always catered for, pool prices are resistant to manipulation and incentives are correct for sustainable minting of synthetic assets. Synthetic assets are minted by collateralized liquidity pool-shares, which are value-stabilised, yield-generating and can be instantly liquidated to protect against deleveraging spirals. The SPARTA asset is emitted via a programmatic supply-responsive algorithm that rewards participants and gives way to a sustainable fee market.

Introduction

Spartan seeks to solve several problems relating to liquidity and synthetic assets. Current automated market-maker (AMM) protocols are susceptible to price manipulation and value-extraction from arbitrage agents, which penalises liquidity providers. Current synthetic asset minting protocols such as MakerDAO and Synthetics use either illiquid collateral, or illiquid markets to liquidate collateral on, which reduces capital efficiency and makes the protocol vulnerable to deleveraging spirals. A deleveraging spiral occurs when the liquidation of a large position causes a depression in asset prices which in turn cause liquidations of more positions. This has happened on MakerDAO several times already.

Spartan attempts to solve this via an automated market-maker (AMM) protocol, but with the key difference of a single settlement asset and protocol-wide incentives to bootstrap liquidity. In addition, the underlying algorithm uses slip-based fees to drive value capture to liquidity providers, which has been discussed and researched at length by the THORChain protocol[1]. Spartan also attempts to solve the liquid creation of synthetic assets using collateralized pool shares instead of illiquid collateral, and link them to the pools such that positions can be deterministically priced and instantly liquidated. These ideas have first been researched and discussed by the Vader Protocol[2] team, which is a new protocol on Ethereum that attempts to achieve the same outcome.

[1] https://thorchain.org
[2] https://vetherasset.org

SPARTAN ASSET (SPARTA)

SPARTA is used as the common settlement asset in all pools such that they can all be linked and to sense the purchasing power of any asset in its system. SPARTA is initially distributed via a fair process of Proof-of-Burn, where participants elect to destroy their previous assets in return for a fair share of the initial 100,000,000 SPARTA. This is a sybil-resistant, fair and voluntary process which also creates an asset with unforgeable costliness. Since it is never acquired “for free” by users, such as in other liquidity mining strategies, it has a much more convincing ability to retain value. In addition, SPARTA is required as the base asset, as well as the collateral asset, so there is no incentive to dispose of it such as in other yield-farming strategies where the yield asset is dumped for the collateral that participants are incentivized to hold.

SPARTA has a maximum supply of 300,000,000 units, which it will never reach, via a supply-responsive asymptoting algorithm. In addition, a protocol-level fee burn (from swaps and liquidations) drives down the emission such that liquidity providers and asset-minters are paid a continuous emission. In a way, this drives value from those that demand liquidity to those that provide liquidity.

The remaining 200,000,000 SPARTA is issued to holders of SPARTAN Liquidity Pool Shares, based on how much SPARTA is locked. The supply curve starts at 30% annual emission, reducing to 3% after 10 years:

$$dailyEmission = \frac{\{300{,}000{,}000 - totalSupply\}}{emissionCurve}$$

SPARTANDAO

The Spartan Protocol has some aspects that can be influenced by governance, such as fee rates, time factors and an ability to upgrade some parts of the code. This is administrated by a simple contract that allows holders of liquidity token shares to lock up to prove their ownership of the system, then vote on proposals. Once a proposal is passed via majority opt-in, it enters short time-lock before being affected.

Governance is normally low-engagement, so Spartan attempts to solve this by coupling the distribution of incentives with the participation in the DAO. Members will primarily come for the incentives, but stay for the governance. Liquidity token shares are used, and not SPARTA directly, so that capital is always at-risk. This is risk-on governance, where poor governance will directly cause economic loss, and good governance will cause economic gain.

Liquidity Pools

AMM Model

The AMM model uses a liquidity-sensitive fee to maximise revenue for liquidity providers when demand for liquidity is high. This ensures that fees can both asymptote to zero during low demand, but also that during high demand, arbitrage agents have to give up more of their profits to liquidity providers. This counters the value-extraction that normally takes place in liquidity pools.

The algorithm (derived from THORChain[3]) is:

$$y = \frac{x*X*Y}{(x+X)^2}$$

x: input; X: Input Balance;
y: output; Y: Output Balance;

[3] https://docs.thorchain.org/how-it-works/continuous-liquidity-pools

Liquidity Pool Tokens

When staking, users are assigned an ownership of the pool, represented by a separate asset, given by the equation[4]:

$$units = \frac{(S+T)*(s*T+S*t)}{4*S*T}$$

s: sparta input; S: Sparta Balance;
t: token input; T: Token Balance;

When removing liquidity, users can claim their fair share of the pool in both assets, or unstake to one side, in which case, the following equation is used (derived from the Vader Protocol[5]):

$$asset = \frac{(s * A * (2 * T^2 - 2 * T * s + s^2))}{T^3}$$

s: share of units; T: Total Units;
A: asset balance on the side withdrawing to;

This is the same as unstaking symmetrically then swapping all of one side to the other. This method of unstaking is necessary to allow instant liquidations of assets such that they can cover unhealthy positions.

[4] https://docs.thorchain.org/roles/staking
[5] https://vetherasset.org

Synthetic Assets

Synthetic assets are assets that peg to the price of another asset. They are useful for lending, leverage and derivative markets. Fundamentally, there are three agents to cater for:

1) Those who wish to go short the asset, thus will mint it with their collateral, sell it and hope to buy it back for less.
2) Those who wish to go long the asset, thus will buy it, and hope to liquidate minters when the price goes up.
3) Those who wish to provide a market for the asset, and don't care if it goes up or down.

The Spartan Protocol solves for all three with the use of collateralized pool shares, instant liquidations and pool incentives.

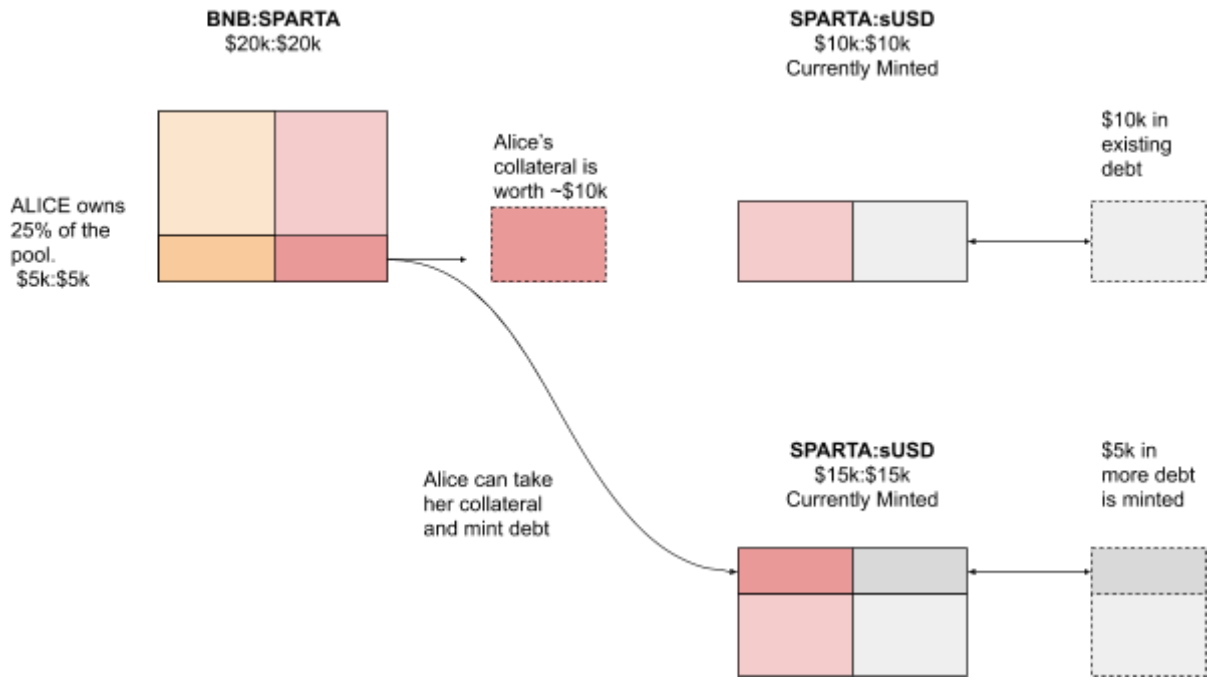
Creating Synthetic Assets

Anyone can create a synthetic asset that has an associated price feed. Price feeds can be both internal to the system, as well as external (such as using Uniswap TWAP price feeds[6]).

The minter must first be a liquidity provider and own liquidity pool shares. These liquidity pool shares are value-stabilised (they are the aggregate value of their underlying assets), yield-generating (they earn liquidity fees), and can be instantly liquidated (sold to one side), so make ideal collateral assets.

The mechanism to mint is to lock up pool shares and the "liquidity value" of the pool shares is the amount of synthetic asset that can be created. As an example, if liquidity pool shares worth $10k is locked, then up to $10k in a synthetic asset can be created, such as a synthetic stablecoin.

[6] https://uniswap.org/whitepaper.pdf



Instant Liquidations

The collateralization of debt is deterministic - it either has the correct amount of collateral, or it doesn't. This can be checked by its "Liquidation Value", which is the instantaneous value of the collateral including a slip-based liquidation fee. If it falls below, then it means the full position can be liquidated, but fail to cover its debt.

However, since when it is liquidated it incurs a slip-based fee, the collateral can actually cover its debt if just part of it is liquidated instead, since both the liquidation and liquidity fee is less. The difference between the amount of liquidated collateral and the debt that was required to be recovered is taken as the liquidator fee.

Positions are liquidated by simply calling a liquidation function, that sells the pool shares to SPARTA, then buys the asset in its own pool, then deletes it.

Liquidity Inertia

The phenomenon of slip-based fees thus allows positions to be partially liquidated to cover debt, returning the position to safety, but it also incentivises liquidators to

slowly liquidate. This can be seen that if a position was liquidated at its liquidation point all at once, there would be no liquidation fee. However, if it was slowly liquidated over many liquidations, the total sum of liquidation fees is much higher.

Driving Liquidity of Synthetic Assets

The last problem to solve is that synthetic assets need liquidity in creation and liquidity in liquidation. Spartan solves this by minting debt into its own pools, and by paying incentives for the holders of liquidity pool shares of synthetic assets to lock them up to earn rewards. Thus there will always be on-market liquidity of synthetic assets.

These liquidity providers do not care for the price action of the asset, just that they hope it is volatile and there are lots of minting and liquidation events.

Honouring a Peg

Synthetic asset prices stay pegged because of the nature of minting/redeeming of the synthetic asset against its price feed. If the price goes below then debt holders can mint more (more bang for buck), and if it goes above they can sell debt at a premium in order to reduce their own leverage. Thus they are regarded as the buyers and sellers of last resort. Because of this, and the ability for anyone to liquidate a position against the price peg, then assets should maintain pegs sufficiently.
Price pegs are sought from external sources, such as the Uniswap TWAP, because this prevents deleveraging spirals, where the liquidation of the underlying causes a depression in the price of the underlying, which in turn causes more liquidations. The Uniswap TWAP is resistant to manipulation primarily because it includes a time factor which makes sure information about markets is propagated widely.

Leverage

The minters of synthetic assets can achieve leverage by simply minting, selling it for more collateral, staking, then re-minting again. This should all be done in one action for simplicity. The closer to the liquidation point a minter goes, the more leverage they achieve, and the more likely they are to be liquidated. However, if they are short the underlying then they don't believe their debt will increase in value and they are safe.
Those who are long the asset, should then buy the leverage debt off those who are short and then wait for it to go up and value and liquidate the minter.

Those who are providing liquidity earn fees the entire time, from minting of debt, as well as from liquidations which are done without regard of the slip-based fees, since the liquidator does not need to hold any of the collateral.

Lending Markets

The system can provide a lending market by allowing anyone with any asset to deposit, before borrowing the assets off each other for a fee. If the value of the collateral behind a borrowed asset goes below its value, then the collateral can be liquidated to cover the debt. The fee is dynamic, seeking to achieve a minimum reserve ratio between any two assets.
There does not need to be any governance applied to the selection of which assets can be borrowed, since they are all liquid in their own pools, and all liquidations are done via the pools.

Users will lend and borrow assets to achieve a leverage long/short position on any asset, but this mechanism does not create any new units of synthetic assets, it just seeks to improve capital efficiency of existing assets.

Conclusion

The Spartan Protocol is wholesome and complete protocol that allows the safe growth of synthetic assets, lending markets and for all assets to be liquid and productive. A small amount of governance is necessary to manage the upgrading of contracts and the tweaking of some of the protocol's parameters. The governance process is at-risk such that there is a direct link between healthy and effective governance and the value of exposed collateral. The Spartan Protocol borrows ideas from Uniswap, THORChain, Synthetix, MakerDAO and Vader/Vether Protocol, but will be launched on Binance Smart Chain as its own separate protocol.