

SYNTHR: Interoperable omnichain liquidity

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I. Introduction

While we're witnessing a rapid increase in the adoption of blockchain technology and decentralized financial applications, we are also seeing an upsurge in the number of blockchain networks. Multiple blockchains exist and will continue to emerge due to the need to address diverse use cases, scalability challenges, governance preferences, interoperability requirements, and regional considerations. However, for this multi-chain landscape to prosper and have any sort of large-scale retail adoption, we will need to provide users with an environment that enables them to move assets between different blockchain networks with the highest degree of security and capital efficiency.

A. Million blockchains

The potential for a million blockchains, although a theoretical concept, is a testament to the vast possibilities and scalability of blockchain technology. With advancements in blockchain development and the growing demand for decentralized solutions, the concept of a million blockchains represents a future where numerous networks coexist, each serving unique purposes and communities. This expansive ecosystem would provide unparalleled flexibility, allowing organizations, industries, and individuals to create and customize their own blockchain networks tailored to their specific needs. This decentralized landscape would foster innovation, enable interoperability between blockchains, and empower individuals with greater control over their digital assets and data. While the idea of a million blockchains may seem ambitious, it showcases the boundless potential of blockchain technology to revolutionize industries, reshape economies, and decentralize systems on an unprecedented scale.

B. Multi-chain conundrum

The multi-chain landscape offers a lot of opportunities for users to maximize yield, but it can prove to be a tricky environment to navigate, especially when it comes to migrating assets from one chain to another. Atomic swaps have over time emerged as the most efficient way to move assets between chains through increased security by eliminating the need for third-party custody of funds during the exchange process, unlike bridges. However, no atomic swap exchange is addressing the issue of value transfer in a comprehensive way.

Current atomic swap solutions can be fundamentally analyzed using the following framework:

- **Asset solvency:** High-quality liquid assets or illiquid native tokens? Liquid collateral ensures high solvency for the synthetic/wrapped assets being utilized for carrying out atomic swaps.

- **Consensus layer:** A native consensus layer or an aggregation of multiple independent consensus layers? Multiple independent consensus layers offer higher security and deter collusion between core contracts and validators.
- **Liquidity model:** Omnichain liquidity, conventional aggregation of fragmented pools, or a hub-and-spoke liquidity model? A synchronized pool of omnichain synthetic assets enables slippage-free cross-chain transactions and makes multi-chain liquidity provisioning LP-friendly.
- **Governance:** Trustless minting of synthetic assets or wrapped assets backed by a centralized vault of collateral? Decentralized governance ensures system transparency.
- **Support ecosystem:** Utility and quality of the ecosystem, if any, supporting the atomic swap implementation, such as external DEX operations, liquidations, etc.
- **DEX pairs:** Stable pairs, pegged-asset pairs, or regular asset pairs? Pegged-asset pairs have low intrinsic impermanent loss and slippage, making them capital-efficient and LP-friendly.

C. SYNTHR: Cross-chain value transfers

SYNTHR will use highly solvent and omnichain synthetic assets to power capital-efficient and secure cross-chain transfer of value and provide users, developers, and ecosystems with access to slippage-free interoperability and omnichain liquidity.

How will SYNTHR benefit users?

- Enable DEX aggregators to integrate with SYNTHR to perform low-slippage native-asset cross-chain swaps without using bridges.
- Enable developers to plug into SYNTHR's interoperable omnichain liquidity network to create seamless omnichain applications.
- Enable users to stake ETH, USDC, or USDT as collateral, mint highly solvent and omnichain synthetic assets, add them to liquidity pools on partner DEXs, and earn boosted APRs in the form of protocol revenue and farming rewards.

How will SYNTHR be different from other synthetic asset protocols?

- syAssets will be backed by ETH, USDC, or USDT as collateral, ensuring high solvency.

- SYNTHR will enable users to mint at a collateralization ratio of 150%, ensuring high capital efficiency.
- SYNTHR's gas-optimized omnichain architecture will enable the protocol to carry out on-chain tracking of multi-chain collateral and debt values, cross-chain liquidations, unify multi-chain collateral, and mint a fully backed omnichain syAsset on any chain against the total value of unified multi-chain collateral in a trustless manner.
- SYNTHR will use multiple independent consensus layers to validate all cross-chain communication to deter collusion between core contracts and relayers, ensuring the highest degree of security for cross-chain transactions.
- SYNTHR's non-cascading liquidation mechanism will ensure that all under-collateralized syAssets are burnt and removed from the system.
- SYNTHR will run external DEX operations to ensure that the DEX prices of syAssets remain pegged to their oracle prices, enabling the protocol to guarantee last-mile capital efficiency in its interoperable omnichain liquidity network.

D. SYNTHR: 24/7 access to global financial assets

One of SYNTHR's long-term objectives will be to advocate trustless access to global financial assets using highly solvent synthetic assets. Regulatory constraints currently prevent individuals from emerging economies from participating in developed market equities. These individuals are further burdened with lengthy KYC disclosures, a lack of asset custody and fractional ownership options, and high fees. SYNTHR will empower users from underserved regions to gain exposure to various international financial assets with full custody, slippage-free trading, a retail-friendly non-custodial UX layer, and 24/7 support.

II. Protocol specifications

SYNTHR will enable users to create and manage omnichain synthetic assets using oracles and general message passing protocols, provide in-situ yield-generating opportunities, and enable developers to plug into the protocol's interoperable omnichain liquidity network to create applications with omnichain use-cases.

A. Overall architecture

The protocol will start with users depositing highly liquid assets such as ETH, USDC, or USDT as collateral. By posting collateral, users will be able to mint synthetic tokens (syAssets) against their collateral at an average collateralization ratio of 150%. Synthetic assets will be issued against overcollateralized loans to ensure the robustness and solvency of the SYNTHR ecosystem. Synthswap, SYNTHR's native slippage-free DEX, will enable the trading of syAssets. Due to its lack of dependency on user-deposited liquidity, Synthswap will be able to achieve higher capital efficiency than traditional AMMs. Synthswap will power the trading of syAssets using the process of minting and burning syAssets with the help of on-chain oracles and a global debt pool. Synthswap, in conjunction with Nuclearport, will also facilitate omnichain CDP issuance and enable DEX aggregators to perform low-slippage cross-chain swaps, making SYNTHR composable with the overall DeFi ecosystem. SYNTHR will also offer the opportunity to generate yield externally by adding liquidity to syAsset pairs on partner DEXs or internally by leveraging the protocol's long-farm

vault, short-farm vault, and delta-neutral strategies powered by the hedge pool and stability pool. The long-farm vault will generate returns by providing liquidity to syAsset pairs trading on DEXs and through DEX LP incentivization programs. The long-farm vault will strategically deploy capital at times when earnings can be maximized. The short-farm vault will generate returns by taking advantage of the price arbitrage between a higher DEX price and the lower oracle price of an syAsset. Funds deposited into the short-farm vault will be used as collateral to mint syAssets at oracle prices, which will subsequently be sold on partner DEXs at higher prices, generating arbitrage profits for the vault depositors. Since the entire process will be managed by protocol-governed arbitrage bots, short-farm vault participants will only be required to add funds, while the allocation of funds towards the minting of different syAssets and the eventual distribution of profits in proportion to deposits will all be managed by the bots. The hedge pool will be used to implement delta-neutral strategies to hedge against debt appreciation. The debt pool may comprise assets that appreciate in value, negatively affecting the collateralization ratio for CDP holders. Therefore, to prevent liquidation risks, holders will have the option of depositing their syAssets into this pool to maintain parity with the debt pool. Lastly, users will be able to deposit syAssets into the stability pool to earn yield in the form of liquidated collateral. The stability pool will generate stable returns—while reducing tail risk—by collecting penalty fees from CDP liquidations. The stability pool will play a critical role in the liquidation process, acting as the primary participant in the process, bolstering protocol health, and decreasing insolvency risk during turbulent market conditions.

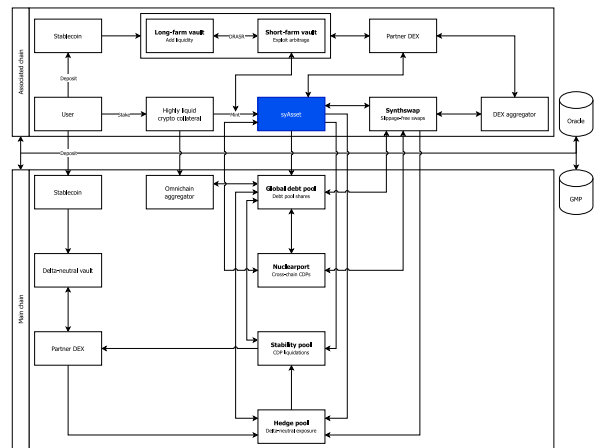


Figure 1: syAsset interacting with SYNTHR's omnichain ecosystem of modules.

B. syAsset CDPs

CDPs, or collateralized debt positions, are placeholder tokens that represent a form of collateral against which assets can be minted. In the case of MakerDAO, ETH is used as a CDP to mint DAI tokens. CDPs are useful for token holders who do not want to realize the sale of an asset but use its value for financing activities. A house, for example, can be put up as collateral with a bank to get a low-interest loan. CDPs are overcollateralized to protect lenders in the event the CDP's value falls below the value of the outstanding debt. Since the DeFi ecosystem does not have a credit score system, CDPs tend to have collateralization ratios of at least 150%. SYNTHR will provide an opportunity for its users to deposit ETH, USDC, or USDT as collateral and mint syUSD, trade it for other synthetic assets on the platform, lend syUSD, or deposit syUSD into vaults to earn passive yield.

1. Yield-bearing collateral

SYNTHR users will also be able to stake highly liquid, yield-bearing assets from some of the largest ecosystem projects as collateral, mint syAssets, and take advantage of several yield-generating opportunities within the protocol while continuing to earn yield on the collateral. For example, users will be able to deposit ETH/USDC Curve LP tokens as collateral to mint syUSD, then deposit the syUSD into the stability pool to earn yield, all while benefiting from the price appreciation of ETH and LP rewards on Curve.

2. Debt pooling model

The MakerDAO and Mirror Protocol approaches to synthetic assets involve the minting of synthetic assets against overcollateralized CDPs; however, the liquidity in both approaches is derived from users minting synthetic assets and depositing them into traditional AMM liquidity pools. The main problem with this model is the low capital efficiency of AMMs, due to which protocols like Mirror rely on inflationary tokenomics to incentivize liquidity providers, and this inflationary tokenomics comes at the cost of jeopardizing the longevity of the protocol. Synthetix v2 was the first to introduce the debt pool model, which utilizes the CDP model in a more efficient manner. When a user locks their CDP and mints sUSD, the user creates debt within the system, which the user is now a partial owner of. In this case, the debt is in the form of sUSD, which stays at parity with the US dollar. Debt pooling eliminates the need for AMMs by allowing sUSD to be swapped with other synthetic assets within the debt pool without any slippage. This enables traders to make unlimited swaps within the debt pool with a high degree of capital efficiency. But the debt pool model also has a few drawbacks. Since stakers of SNX become shareholders of the global debt pool, the volatility of debt can cause unpredictable changes to the collateralization ratios. This is because if trader A swaps sUSD for sETH, the debt pool now holds sETH, which is volatile; if sETH increases, then the debt pool's value relative to trader A's collateral SNX also increases, posing a liquidation risk. Furthermore, creating synthetic assets against assets that are not highly liquid poses a serious challenge. SYNTHR will take the Synthetix v2 model and build on it; users will not be limited to staking only one asset but will have the option of staking a wide range of highly liquid assets such as ETH, USDC, or USDT as collateral. These CDPs will then be used to mint synthetic assets on SYNTHR, such as syUSD, syBTC, syETH, etc. Placing highly liquid assets as collateral will greatly reduce liquidation risks and avert potential death spiral events akin to Terra (LUNA). This will also not force users to risk capital to buy an asset they might not want to hold. However, similar to the Synthetix v2 debt pool model, SYNTHR users minting synthetic assets will be issued debt pool share tokens, which will represent their share of the debt pool. An increase in the value of the debt pool may result in changes to the collateralization ratios and, in turn, the debt owed. This will be an important parameter for users to track since not meeting the 120% minimum threshold collateralization ratio will result in CDP liquidations. To solve debt volatility, SYNTHR will natively implement a hedge pool, which will mimic the composition of the entire debt pool. By using the hedge pool, users will be able to protect themselves against debt pool risks.

The debt pool shares to be issued or burnt when minting or burning syUSD will be calculated using the following formula:

$$\text{Shares} = \text{Total shares} \times \frac{\text{syUSD}}{\text{Total debt pool}}$$

Where *Total shares* represents all debt pool share tokens issued and *Total debt pool* represents the syUSD value of the debt pool at the time of minting or burning, to issue or burn a corresponding amount of debt pool shares.

The debt percentage and debt owed in the form of syUSD will be calculated using the following formula:

$$\text{Debt percentage} = \frac{\text{User balance}}{\text{Debt share total supply}}$$

$$\text{Debt owed} = \text{Debt percentage} \times \text{Total debt pool}$$

Let's consider the following example: There is \$50,000 worth of syUSD in the debt pool, which is owned by trader A, who also owns 100 debt pool shares, which represent 100% of the debt pool. Trader B locks his/her collateral and mints 10 syBTC worth \$50,000, assuming BTC is trading at \$5,000. In this scenario, trader B is also issued 100 debt pool shares since the value of syBTC is equivalent to the value of syUSD already in the debt pool. The total debt pool with a value of \$100,000, now contains 10 syBTC worth \$50,000 along with syUSD worth another \$50,000. There are a total of 200 debt pool shares with 100 shares owned by each. Based on the following calculations, we can see that traders A and B each own 50% of the debt pool and owe \$50,000 each to the debt pool.

$$\text{Shares} = 200 \times \frac{50,000}{100,000}$$

$$= 100$$

$$\text{Debt percentage} = \frac{100}{200}$$

$$= 50\%$$

$$\text{Debt owed} = 50\% \times \$100,000$$

$$= \$50,000$$

Let's assume that BTC increases in value and is now trading at \$10,000; the 10 syBTC in the debt pool are now worth \$100,000, which corresponds to a total debt pool value of \$150,000 (\$100,000 of syBTC and \$50,000 of syUSD). Now let's analyze the amount of debt owed by each of the participants. If trader B, who owns 50% of the total debt pool wants to leave the system, he/she can do so by burning only 7.5 syBTC out of the 10 syBTC owned by him/her. This is because trader B owes \$75,000 in debt, which corresponds to 50% of \$150,000, i.e. the revised total debt pool value, and because each syBTC is now worth \$10,000. This particular scenario leaves trader B with a profit of 2.5 syBTC. Trader A, the one holding \$50,000 worth of syUSD, suffers a capital loss of \$25,000 in the form of debt owed to the system. Since he/she too owns 50% of the total debt pool, trader A will either have to buy and burn \$25,000 worth of debt or risk getting liquidated and losing his/her collateral. The trader A situation is a common problem for synthetic asset protocols that use the debt pool model. SYNTHR will provide built-in debt pool hedging tools to help users protect themselves against debt volatility. Users will be able to deposit their syAssets into the protocol's hedge pool in exchange for hedge tokens. The hedge tokens are essentially debt mirror tokens, which will mimic the overall

composition of the debt pool by rebalancing themselves every 2 days. Unlike Synthetix v2, SYNTHR debt mirror tokens will be collateralized by syAssets. To take advantage of yield generation, the syAssets from the hedge pool will be deposited into the stability pool, providing the protocol with ad hoc solvency and profiting from the liquidations of unhealthy CDPs. Referring to the earlier example, when trader B's 10 syBTC increased the total debt pool by 50%, the debt mirror token too would have rebalanced itself to reflect the 50% increase in debt. If trader A had swapped his/her \$50,000 worth of syAssets for hedge tokens, the value of his/her hedge tokens too would have increased in value by 50%, or \$25,000, and to prevent liquidation, trader A could have simply sold his/her debt mirror tokens at a profit to top up his/her collateral or to pay the outstanding debt of \$25,000 to meet the c-ratio. Similarly, trader B may experience similar debt volatility challenges as a result of the increase in the value of debt as a result of the syBTC price rise. Such a situation may even subject trader B to incremental liquidation risks. Therefore, trader B can also use the hedge pool to eliminate directional risk. Since trader B minted syBTC, he/she is therefore synthetically long on BTC, and as a hedge, trader B can buy debt mirror tokens to hedge himself/herself against the price movement of syBTC. If syBTC falls in value, not only does trader B's debt become cheaper, but the debt mirror tokens become cheaper by an equivalent amount as well. And if syBTC increases in value, even though his/her debt becomes expensive, so does the value of his/her debt mirror tokens. If executed properly, traders will be able to mint syAssets, swap them for hedge tokens and earn rewards through various yield generation programs, all while taking no directional risk.

3. Stability pool, liquidations, and recovery mode

The stability pool will play a pivotal role in maintaining fiscal discipline and solvency within the protocol. The stability pool will make it possible to maintain full collateral backing of syAssets by repaying debt from the stability pool deposits. Stability pool depositors will earn a return on their deposits for providing liquidity to the liquidation process. The liquidation process will be enacted in the event the collateralization ratio drops below the threshold requirements and the user fails to top up his/her collateral or proportionally liquidate debt. All syAssets will be minted at a minimum initial collateralization ratio, or c-ratio, of 150%. However, in order to prevent liquidation, users will be required to maintain an absolute minimum threshold c-ratio of 120%.

Note: During recovery mode, the protocol will have the option of temporarily increasing the minimum threshold c-ratio higher than the usual 120% to improve the weighted-average c-ratio of the entire protocol.

The collateralization ratio will be calculated using the following formula:

$$\text{Collateralization ratio} = \frac{\text{Total collateral}}{\text{Total debt}}$$

Where *Total collateral* represents the total collateral staked by the user and *Total debt* represents the total syAsset issued against it. For example, \$30 of debt against \$100 of collateral will have a collateralization ratio of 333%. In the event of a liquidation, the underlying collateral will be liquidated, and an amount of syAsset corresponding to the outstanding debt, along with the debt pool shares, will be burnt from the stability pool's deposits. In exchange, the collateral from the liquidated CDP, minus a protocol liquidation fee of 10%, will be transferred and proportionally distributed to the

stability pool participants. Since liquidations will occur below the c-ratio of 120%, stability pool participants will receive \$120 worth of collateral minus a flagger fee, a liquidator fee, and a liquidation penalty for every \$100 worth of debt burnt using the stability pool deposits, making a risk-free rate of return on their deposits.

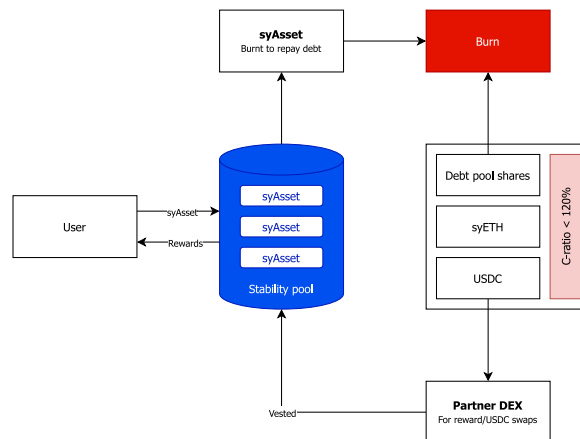


Figure 2: Stability pool liquidating an unhealthy syETH CDP backed by USDC as collateral.

Let's consider the following example: Trader A deposits \$120 worth of USDC as collateral. A c-ratio of 150% will allow trader A to mint up to \$80 worth of syETH, but trader A decides to only mint \$50 worth of syETH. Alongside syETH, a corresponding number of debt pool shares, worth \$50, are issued as well. Let's assume that trader A's debt pool shares (DPS) increase by 65% in value and that his/her corresponding debt is now worth \$82.50. If the protocol decides to go into recovery mode, trader A will face the risk of being liquidated for not meeting the minimum initial c-ratio of 150%.

$$\frac{\$120 \text{ worth of USDC}}{\$82.5 \text{ worth of DPS}} = 145\% \text{ C - ratio}$$

Let's suppose that the protocol does not go into recovery mode, resulting in trader A not partially liquidating his/her position or topping up his/her collateral, but the value of debt pool shares increases by another 22% to \$100.65. Since the c-ratio is now below the minimum threshold c-ratio of 120%, trader A's CDP will be marked for liquidation.

$$\frac{\$120 \text{ worth of USDC}}{\$100.65 \text{ worth of DPS}} = 119\% \text{ C - ratio}$$

As part of the liquidation process, \$100.65 worth of syAssets will be burnt from the stability pool to relieve the debt pool of bad debt, and \$108 worth of USDC will be distributed proportionally to the stability pool participants. Protocol liquidations will be triggered in the event the c-ratio falls below 120%. Since this is not a desirable state for the protocol, SYNTHR will have multiple layers in place to avert such a situation. One such measure will be the recovery mode, which will be used from time to time to improve the overall fiscal health of the protocol. During recovery mode, collateral top-ups and partial liquidations will be encouraged, and all CDPs, starting from the least collateralized, 120%, all the way up to 150%, will be marked for liquidation. Liquidations will continue until the protocol's weighted-average c-ratio reaches 130%; the regular liquidation process will consider a minimum threshold c-ratio of 120%.

Note: Stability pool rewards, vested over a 6-month period, will be given out in the protocol's native token. As a result, collateral from CDP positions will be swapped before distribution.

C. Oracles

Oracles are the backbone of DeFi because they allow conventional financial tools to be built on permissionless and censorship-resistant blockchains. At the heart of it all, smart contracts alone do not have the ability to pull data directly from sources outside of the blockchain (off-chain data). Oracles enable the sharing of information originating outside the blockchain with smart contracts in a permissionless and censorship-resistant manner. For instance, oracles can relay the price of oil traded on the CME futures exchange, allowing protocols to create synthetic assets that track the price of oil. Oracles are crucial to the lending and borrowing markets as well, as they're responsible for relaying asset collateralization data to the automated systems. Oracles are not just limited to feeding pricing data; they are also capable of feeding data pertaining to live events. Prediction markets use oracles to facilitate speculators' bets on real-world events. Will Trump win the 2024 election? Will the FED raise interest rates by more than 50 bps this month? Who will win the world cup this year? Oracles have limitless potential in the blockchain world because of how important it is for blockchains to interact with data that sits outside of the blockchain ecosystem. SYNTHR too will require truly decentralized oracles to be fully censorship-resistant, especially since some of the oracle services available today are centralized. Data feeds are intermediated by third parties known as validator operators. These operators manage validator nodes for a particular oracle service. Such oracle service providers can be Chainlink, Band protocol, Tellor, or Uma's optimistic oracle. Although each oracle service is unique, the underlying infrastructure is similar. Protocol node operators run validator nodes that pull data from external APIs and then push this data to smart contracts. Validator nodes are incentivized using reward tokens to provide accurate data. Providing incorrect data results in penalties in the form of rewards being slashed. Most oracle services can be controlled or censored since they are run by a small number of validators. Additionally, the SEC or the CFTC can legally force independent node operators to stop providing data feeds to prevent users from using certain protocols. To prevent censorship and manipulation of oracles, SYNTHR will only use truly decentralized oracle services to ensure a censorship-resistant and trustless DeFi ecosystem.

1. On-chain and off-chain assets

The most common application of oracles is to provide pricing information for on-chain assets to various DeFi protocols. Decentralized lending and borrowing protocols like Aave rely on Chainlink oracles to feed their smart contracts with the price of BTC from Coinbase, Binance, and CME Bitcoin futures; aggregating pricing information is important to deter manipulation. SYNTHR will use oracle price feeds in several scenarios, such as using ETH price feeds to determine the amount of syUSD a user will be able to mint by staking ETH as collateral, calculate and track the c-ratio of the CDP, and determine the amount of syUSD to be burnt by the Stability Pool in the event of a liquidation. Oracle price feeds will also be used to price and mint off-chain syAssets; for instance, to successfully price and mint syXAU, oracle validator nodes will be required to provide the price of gold from major derivative exchanges such as CME, COMEX, and ICE clearinghouses. In conclusion, oracles can be used for all financial assets, even the ones that are heavily regulated, such as stocks, currencies, bonds, ETFs, and commodities. However, since these assets are highly regulated, optimistic oracles may be used to avoid forced de-listing as a result of regulator intervention.

2. Debt pool tracking

SYNTHR will use oracles to track the size of the global debt pool as a sum of all assets issued across chains. This value will then be used to calculate the user's debt based on the debt pool shares owned. Oracles will form the foundation for the cross-chain functionality of syAssets by enabling the effective functioning of Nuclearport and the omnichain aggregator.

$$C: \text{Chain debt} = \sum_{i=0}^n P_i \times N_i$$

Where P represents the current price of the syAsset and N represents the total syAsset issuance on chain i .

$$G: \text{Global debt} = \sum_{j=0}^n C_j$$

Where C represents *Chain debt* on chain j .

Individual syAsset debt will be tracked by calculating the total issuance amount of the syAsset across various chains multiplied by its current market price.

$$S: \text{syAsset debt} = P \times \sum_{j=0}^n N_j$$

Where P represents the current price and N represents the total syAsset issuance on chain j .

D. Synthswap: Slippage-free swaps

Slippage is defined as the difference between the expected price of a trade and the executed price of a trade. In an order book system, slippage tends to be higher during periods of high volatility or if the financial product has poor liquidity and order depth. Slippage is a cost to the trader because he/she is either buying at a small premium or selling at a small discount to meet liquidity. While limit orders allow traders to circumvent this problem on centralized exchanges, traditional AMM-driven decentralized exchanges still face this issue. Slippage is a common problem with traditional AMMs based on the $X * Y = K$ model with liquidity bands ranging from 0 to infinity. These AMMs are capital inefficient because the liquidity of the trading pairs is spread across an infinite number of prices, which limits price discovery. The result of this inefficiency is high slippage for the user. SYNTHR will use the debt pool model to simultaneously mint and burn assets at oracle price feeds, enabling instant order execution and slippage-free trades. Unlike traditional AMMs, the debt pool model will allow high-volume trades to be executed without any volume or liquidity requirements. Synthswap, the protocol's internal slippage-free DEX, will allow users to swap syAssets using the process of simultaneous minting and burning of syAssets, i.e. swapping one form of debt for another, at oracle price feeds. SYNTHR's capital efficiency will attract large trading volumes to the platform, leading to an upsurge in trading fees for the protocol.

How will SYNTHR prevent front-running?

- SYNTHR will only use highly liquid collateral or short-tail assets to back all synthetic assets.

- SYNTHR will restrict syAssets to only highly liquid assets with mature markets.
- SYNTHR will aggregate price feeds from oracles, TWAP feeds from large DEXs, and direct price feeds from CEXs.
- SYNTHR will work with oracles that use an on-demand price update model instead of a push model, ensuring that every transaction will use a recent off-chain price instead of the last on-chain update pushed by the oracle itself, i.e. low-latency price feeds.

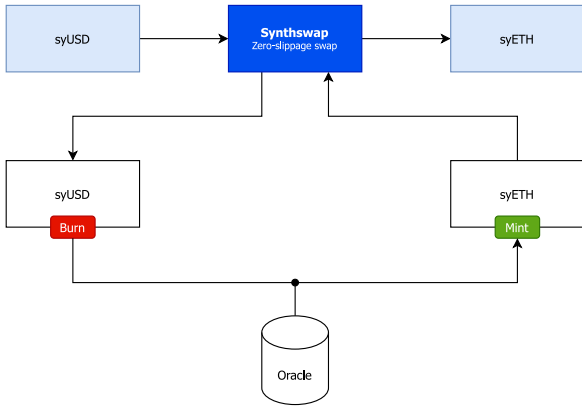


Figure 3: Syntheswap swapping syUSD for syETH using the ETH/USD oracle price feed.

E. Omnichain implementation

SYNTHR’s gas-optimized omnichain architecture will enable on-chain tracking of multichain collateral and debt values, allowing the protocol to unify collateral across all deployments and mint a fully backed syAsset on any chain in a trustless manner. This will help create omnichain CDPs, facilitate low-slippage cross-chain atomic swaps, and provide a more capital-efficient alternative to AMM-based bridges.

1. Main chain and associated chains

SYNTHR’s aggregator, core contracts, and execution logics will be housed on a gas-optimized main chain, and the collateral pools and syAsset contracts will be deployed across a network of associated chains. The main chain will be responsible for aggregating the values of collateral and syAssets across all chains and executing all state changes. It is this architecture that will enable the minting of a fully collateralized omnichain syAsset on any chain against a pool of distributed multi-chain collateral. Assessing alternative routes, a point-to-point architecture with the aggregator deployed on every chain, will require all aggregators to be updated after every transaction, making it gas-intensive to perform transactions. While off-chain computation of collateral and debt values is an option, it comes at the cost of trust censorship. SYNTHR’s split architecture will only require the aggregator on the main chain to be updated for every cross-chain transaction, creating a gas-efficient and trustless cross-chain transaction environment. The split architecture will also provide an added layer of security, helping the protocol localize risk by cutting off any compromised chain from the overall network.

2. Cross-chain communication

SYNTHR will create a modular cross-chain messaging architecture by aggregating multiple independent general message-passing (GMP) protocols to ensure democratized trustless valid delivery and secured cross-chain finality. This will enable users to choose their

preferred consensus layer, use more than one consensus layer, or select the most gas/time-efficient path for relaying cross-chain messages. The use of independent consensus layers will deter collusion, foster trustlessness, and de-risk the protocol’s dependency on one consensus layer.

3. Nuclearport: Omnichain CDPs

The Nuclearport module will leverage the omnichain aggregator to create omnichain CDPs against a unified pool of collateral as opposed to fragmented and siloed pools, providing users and DEX aggregators with a zero-slippage environment to bridge assets as opposed to AMM-based bridges that have intrinsic slippage. Users will be able to stake collateral on a source chain and mint the syAsset on a destination chain; the debt pool shares, and state changes will be managed on the main chain.

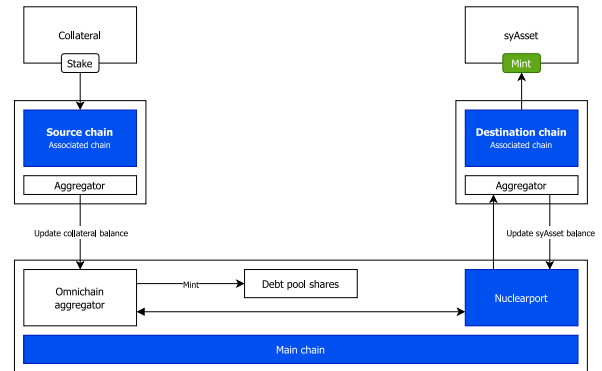


Figure 4: Nuclearport creating an omnichain CDP using a unified pool of collateral.

4. Composability and atomic swaps

SYNTHR’s omnichain implementation will enable cross-chain DEX aggregators to initiate and execute low-slippage native-asset swaps using Syntheswap’s atomic swap framework and the Nuclearport module.

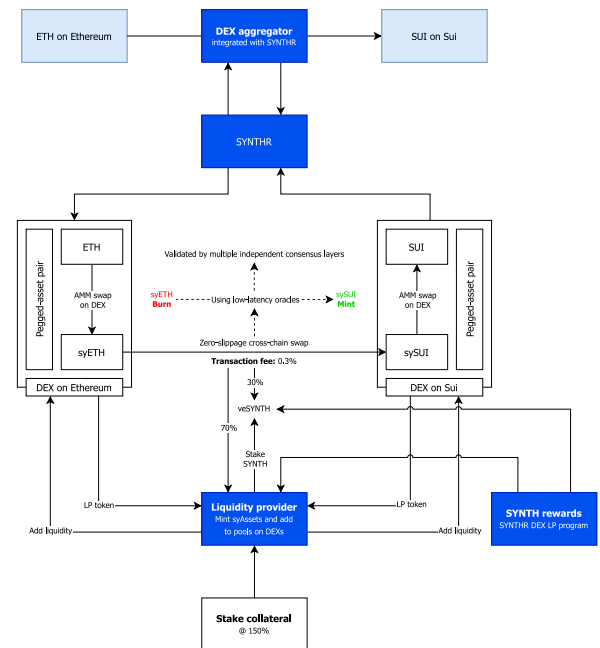


Figure 5: DEX aggregator executing an atomic swap between ETH and SUI.

Let’s consider the following example of a user swapping ETH for SUI to illustrate the workings of atomic swaps:

- DEX aggregator will swap ETH for syETH on Ethereum.
- Synthswap will swap syETH for sySUI on Ethereum.
- Nuclearport will swap sySUI on Ethereum for sySUI on Sui.
- DEX aggregator will swap sySUI for SUI on Sui.

All the above steps will occur in a single transaction known as an atomic swap, resulting in reduced MEV and front-running attack vectors. SYNTHR's DEX LP program will incentivize users to fund pegged-asset pairs with low intrinsic impermanent loss on partner DEXs to ensure high liquidity for the syAsset/Asset pairs.

How will SYNTHR be different from bridges?

- **Slippage-free:** The core cross-chain transaction on SYNTHR occurs in a zero-slippage environment, unlike AMM-based cross-chain solutions that have intrinsic slippage.
- **Instant:** SYNTHR will work with multiple general message-passing protocols to offer instant and guaranteed cross-chain finality.
- **Secure:** SYNTHR will aggregate multiple general message-passing protocols to offer trustless valid delivery with the highest level of security.

How will Synthswap's cross-chain atomic swap implementation be different from other atomic swap protocols?

- **High solvency:** All syAssets will be backed by ETH, USDC, or USDT at a collateralization ratio of 150%.
- **Independent consensus layer:** SYNTHR will integrate with multiple independent general message-passing protocols to ensure gas-optimized trustless valid delivery and the highest degree of cross-chain security.
- **Omnichain liquidity:** SYNTHR will create a unified pool of synchronized liquidity by aggregating collateral across all chains, enabling the protocol to mint a fully-backed syAsset on any chain, eliminating the need to bridge assets to a hub chain to successfully carry out exchange transactions. This will render the core cross-chain transaction slippage-free. The protocol's omnichain architecture will also enable liquidity providers to provision leveraged liquidity across multiple ecosystems against collateral on a single chain.
- **Decentralized:** SYNTHR will enable anyone to stake, mint, and add liquidity to syAsset/asset pools on partner DEXs and earn a share of protocol revenue.
- **Support ecosystem:** SYNTHR's syAssets will be supported by an ecosystem of modules such as DRASR (dynamic peg-protection using long and short-farm vaults to ensure that the DEX prices of syAssets remain pegged to their oracle prices), stability pool (non-cascading liquidations), front-running prevention mechanisms, etc.

- **Pegged-asset pairs:** Pegged-asset pairs on DEXs have low intrinsic impermanent loss and slippage, making them capital-efficient and LP-friendly.

F. DRASR framework: Engineered price stability

The dynamic rewards allocation for spread reduction, or DRASR, is a framework designed to keep oracle and DEX prices at parity with each other. DRASR will dynamically toggle long and short-farm vault rewards to arbitrage DEX inefficiencies and reduce spreads between oracle prices and DEX quotes for syAssets, ensuring a high degree of capital efficiency during atomic swaps.

1. DEX price < Oracle price

The depositors of the long-farm vault will be incentivized as part of SYNTHR's DEX LP program to bring the DEX price of the syAsset back to parity. The long-farm vault will allocate half the deposits towards executing a large buy order on the DEX and subsequently depositing the other half, along with the newly purchased syAsset, into the DEX's liquidity pool to generate DEX LP farming rewards. The dynamic relationship of rewards to the discount is similar to that of perpetual funding rates, i.e. bringing synthetic perpetual futures prices back to parity with spot prices through the toggling of funding rates.

2. DEX price > Oracle price

The DRASR framework will disincentivize long-farm vault depositors by lowering long-farm vault APRs, consequently making short-farm vault APRs more attractive. The short-farm vault will generate returns by routing its stablecoin deposits to protocol arbitrage bots that will simultaneously mint and sell the syAsset on the DEX, bringing the DEX price of the syAsset back to parity with its oracle price. Profits generated from exploiting this arbitrage opportunity will be distributed to the depositors as rewards.

3. DRASR formula

The DRASR framework for the long-farm vault rewards will be represented by the following equations:

$$y = x + 0.3, \text{ with } x \leq 3$$

$$y = x^2/4, \text{ with } 3 < x \leq 6$$

$$y = x^3/10, \text{ with } 6 < x \leq 10$$

Where y represents the reward ratio in percentage bound to $0\% \leq y \leq 100\%$ and x represents the discount bound to $0\% \leq x \leq 10\%$. The chosen formula will split the reward rate into three parts. When the discount increases from 0% to 3%, the reward curve will increase linearly; if the discount exceeds 3%, the steepness of the reward curve will increase quadratically; and after a discount of more than 6%, it will increase cubically. The maximum reward rate will be achieved with a syAsset discount of 10%. The three-part split is designed to control token inflation by dynamically adjusting the reward ratios to counteract any syAsset price misalignments. While there won't be a need to incentivize price rebalancing through the issuance of large amounts of tokens during times of low discounts, incentives through token inflation will be required during times of steep discounts to avoid potential negative syAsset price spirals. The greater the syAsset price discount, the faster the increase in the steepness of the reward curve. For the course of 60 epochs, i.e.

60 months, 142 million SYNTH tokens (24.07% of the total supply) will be allocated for DEX LP incentives, including the long-farm vault incentive program. If there aren't any syAsset discounts for an entire epoch, the long-farm vault depositors will earn a reward of 0.3% of the tokens allocated for the epoch, and should the discounts increase, the DRASR mechanism will correspondingly increase the reward relative to the discount, limited to a maximum of 100%. All unutilized tokens from each epoch will be carried over to the next one.

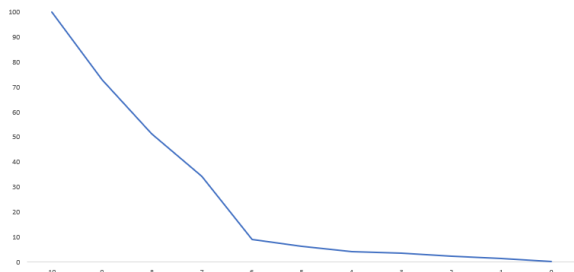


Figure 6: Long-farm vault reward percentages (y-axis) versus syAsset discount percentages (x-axis).

G. Vaults

Vaults will be an essential part of the protocol, serving as plug-and-play entry points to the overall ecosystem. Due to their user-friendly experience, vaults will play a critical role in onboarding the next billion users to DeFi. One-click vaults will enable users to seamlessly earn yield on their deposited assets.

1. Long-farm vault

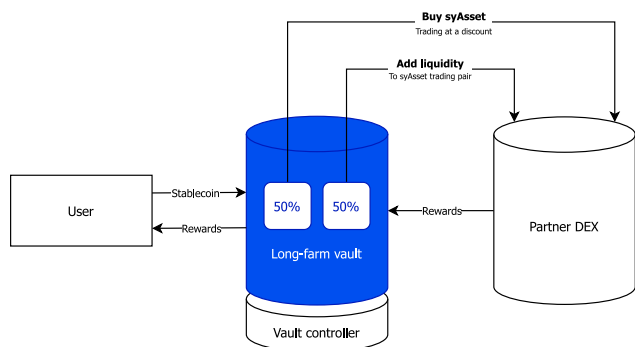


Figure 7: Long-farm vault providing liquidity on a partner DEX to generate returns for its depositors.

The long-farm vault will maximize capital efficiency by allocating capital to liquidity-starved syAssets. The DRASR framework will automatically adjust rewards so that there is always an incentive for the long-farm vault to allocate its deposits towards the most capital-deficient syAssets. By toggling incentive programs, the protocol will be able to achieve high pricing stability. Depositors of the long-farm vault will have 50% of their liquidity routed to partner DEXs to buy an syAsset trading at a discount to its oracle price. The remaining 50% will be used to add liquidity to the syAsset trading pair on the partner DEX. Rewards accumulated from trading fees will be distributed to depositors. Once the syAsset is brought back to parity with its oracle price, the long-farm vault liquidity will be pulled from the DEX LP position and converted back to stablecoins. This process will be repeated for all partner DEXs and syAssets to ensure capital efficiency across all syAssets trading pairs. Long-farm vault depositors will be rewarded in SYNTH tokens depending on the extent of the variation between oracle and DEX prices. The bigger the spread between the oracle and DEX prices, the larger the

SYNTH token rewards. The SYNTH token rewards, set to a maximum by the DAO, will dynamically reduce to zero once parity is attained.

2. Short-farm vault

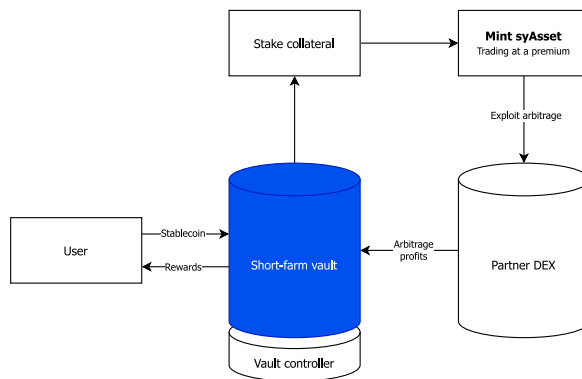


Figure 8: Short-farm vault exploiting arbitrage opportunities to generate returns for its depositors.

Like the long-farm vault, the short-farm vault will also help the protocol maximize capital efficiency and achieve price stability. At times, an syAsset may trade at a premium when the demand for the asset is higher than normal. The short-farm vault will seamlessly rotate liquidity to prevent premiums across all syAssets. By arbitraging syAsset premiums, syAsset prices will become more stable, and depositors will earn rewards as a result of keeping syAsset prices pegged.

3. Delta-neutral vault

Minting syAssets creates new debt, which, when subjected to volatility based on the price movements of the underlying assets of the debt pool, creates liquidation risks for debt pool owners. The delta-neutral vault will enable users to leverage yield-generating opportunities provided by the protocol without exposing themselves to any debt pool risk. Users will deposit stablecoins into the delta-neutral vault, which will swap the deposits for syUSD using a partner DEX. The syUSD will then be swapped, via the Synthswap module, for delta-neutral vault tokens that will mirror the debt pool composition. These tokens will rebalance every 2 days to mimic the composition of the global debt pool. These syAssets will then be deposited into the stability pool to generate returns from protocol liquidations.

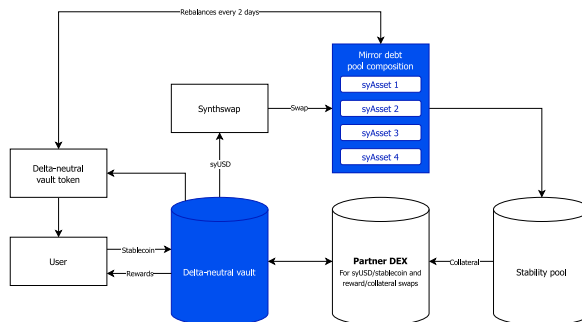


Figure 9: Delta-neutral vault mirroring the global debt pool and generating returns using the stability pool.

4. User-created vaults

Like Yearn vaults, user-created vaults will have the flexibility of parameter customization, enabling SYNTHR users to create and manage their own strategies to maximize returns. Users will have the

option of creating custom vaults with different syAsset mixes involving automated yield farming, lending, and borrowing activities to maximize the return on assets. These vaults will be able to interact with other vaults or modules, not limited to the SYNTHR ecosystem. Vault creators will also earn a performance fee from other users depositing funds into their custom vaults.

III. Governance and revenue distribution

The governance and revenue distribution models will be devised in such a way that all stakeholders benefit in a sustainable manner from the long-term growth of the protocol.

A. veSYNTH: Vote-escrowed SYNTH

The ve-model will enable token holders to time-lock their tokens in exchange for protocol revenues and governance rights.

The veTOKEN model will offer the following benefits:

- Encourage long-term-oriented decision-making.
- Greater incentive alignment across protocol participants.
- Improved supply and demand dynamics.

The weighted voting power of vote-escrowed time-locked tokens will be represented using the following formula:

Instead of voting with a token amount a , tokens will be locked in a voting escrow for a selectable lock time t_1 where $t_1 \leq t_{max}$ and $t_{max} = 4 \text{ years}$. After locking, the time left to unlock will be $t \leq t_1$.

$$w = a \times \frac{t_1}{t_{max}}$$

Where w , represents weight.

Vote-escrowed tokenomics will allow token holders to time-lock their tokens for the following benefits:

- **Protocol revenue:** Access to real multi-chain yield.
- **Protocol governance:** Influence protocol c-ratios, gauge weights for DEX LP incentives, syAsset listing proposals, etc.
- **Additional benefits:** Boosted DEX LP farming rewards and bribes to influence protocol governance proposals.

B. Revenue distribution

SYNTHR's sustainable recurring revenue model will ensure that the protocol is well placed to absorb market shocks. The goal of the protocol is to be community-led and reward participants invested in the long-term success of the protocol.

The protocol's revenue distribution model will be as follows:

- 30% will be distributed to veSYNTH holders.
- 70% will be distributed to LPs.

Note: Revenue distribution rewards will be given out in the protocol's native stablecoin, syUSD.

C. Permissionless listing of syAssets

The establishment of the SYNTHR DAO will facilitate the permissionless listing of syAssets, allowing the community to vote on the inclusion of various asset classes such as equities, fixed income, FX, and more. Before initiating a poll, users will have the opportunity to discuss potential proposals on the SYNTHR forum page, fostering open dialogue and community engagement. Once a proposal gains majority consensus within the community, users holding veSYNTH will be able to submit and vote on SYNTHR improvement proposals (SIPs). These SIPs will serve as a means to suggest and introduce new syAssets into the ecosystem. Voting options will typically include yes, no, or abstain. For an SIP to be approved, it will require a majority of yes votes and a quorum threshold of 30% participation. Upon reaching the quorum threshold and achieving the necessary votes, the SYNTHR development team will collaborate with oracle service providers to establish price feeds, followed by the minting of new contracts with unique token addresses representing the syAssets approved by the DAO.

IV. Risk factors

SYNTHR recognizes that various external factors can impact the protocol's functioning that are beyond its control. However, to ensure a secure environment, SYNTHR will proactively establish essential frameworks to identify and mitigate potential threats. It will minimize vulnerabilities by diversifying the services it relies on and conducting regular audits. Additionally, SYNTHR will actively engage with DeFi insurance platforms to safeguard users from smart contract exploitation, fund losses, and de-pegging of assets.

A. Price feeds and market data oracles

SYNTHR recognizes the importance of reliable and accurate price feeds to ascertain the net present value of syAssets. As blockchain and cryptographic systems do not possess inherent knowledge of external factors like the S&P 500 price or the EUR/USD exchange rate, SYNTHR will rely on battle-tested oracles to communicate prices and market data. However, it is crucial to address the potential risks associated with compromised oracles, which could manipulate contracts. The oracle problem extends beyond financial contracts and has garnered significant attention for finding effective solutions. Companies such as Oraclize and SmartContract currently offer authenticated feeds using TLSNotary or Town Crier specifications, sometimes leveraging Intel SGX trusted hardware systems. Additionally, proposals for combining multiple authenticated data feeds have emerged; for instance, price feeds like BTC/USD may be obtained from multiple exchanges and weighted based on trading volume. While these technologies do mitigate the risk of oracle manipulation, there are still chances of counterparties tampering with the feeds by selecting only a few sources. Therefore, to further enhance security, SYNTHR may consider implementing Uniswap v3 time-weighted average price (TWAP) oracles for syAssets representing on-chain assets, aiming to diversify the oracles used.

B. Smart contract vulnerabilities, ecosystem risks, and de-pegging of syAssets

SYNTHR will utilize smart contracts to automate and execute various tasks, including lending, borrowing, staking, minting, burning, depositing, and withdrawing crypto assets, all in a trustless manner.

However, it's important to acknowledge that, like any software, smart contracts can potentially contain bugs, vulnerabilities, or exploits that may result in the loss of funds, despite rigorous audits, due diligence, and insurance measures. These vulnerabilities could even lead to the de-pegging of syAssets, causing them to deviate from their underlying assets. Moreover, during periods of extreme market volatility or unforeseen events, certain blockchain networks may experience congestion, which could impact critical infrastructure such as Infura, query services, APIs, and oracle services, potentially affecting the functionality of SYNTHR. Additionally, the utilization of syAssets by other protocols or decentralized applications (DApps) can introduce additional considerations. For example, if a DeFi bridge connecting different blockchain networks encounters an exploit, it could result in the de-pegging of syAssets.

V. Tokenomics

A drawn-out vesting schedule for both internal and external stakeholders will foster a culture of long-term value creation.

Total supply: 590,047,619

Seed and private rounds: 26.6%

- Cliff: 2-3 months
- Linear vesting: 12-18 months
- Initial unlock: 5-10%

Crowd sale: 2%

- Cliff: 1 month
- Linear vesting: 4 months
- Initial unlock: 15%

Team: 9.5%

- Cliff: 12 months
- Linear vesting: 24 months

Advisors: 3.4%

- Cliff: 3 months
- Linear vesting: 18 months

Farming, governance, staking, and trading rewards: 33%

- Linear vesting: 60 months

Legal, marketing, and operations: 13.6%

- Cliff: 6 months
- Linear vesting: 36 months

Exchange and liquidity partnerships: 3.4%

- Linear vesting: 9 months

Treasury: 5.9%

- Cliff: 1 month
- Linear vesting: 48 months

Bug bounty: 0.8%

Airdrop: 1.7%

VI. Roadmap

One of the primary objectives will be to implement a DAO-based governance model within 6-9 months after mainnet to enable the permissionless listing and trading of real-world assets (RWAs) on the platform.

Q1 2022

- Market research
- Business plan
- Core team

Q2 2022

- Website and socials
- Protocol architecture
- User flows

Q3 2022

- Whitepaper
- Smart contracts
- PR and marketing

Q4 2022

- Global debt pool
- Synthswap
- Nuclearport

Q1 2023

- Grant submissions
- Early adopter program
- Private testnet

Q2 2023

- Ecosystem partnerships
- Split-chain architecture

- syCREDITS program

Q3 2023

- Off-chain oracle
- GMP aggregator
- DEX aggregator

Q4 2023

- DEX LP farming
- veSYNTH
- Public testnet

Q1 2024

- Referral program
- Security audits
- Mainnet

Q2 2024

- Stability pool

- Hedge pool

- Vaults

Q3 2024

- Router API
- Perpetuals market
- Options market

Q4 2024

- DAO
- RWAs
- Grants program

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