SYNTHR – Advanced cross-chain infrastructure

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I. Premise

A. Multi-chain landscape

While blockchain technology is gaining popularity, the number of chains is also increasing, with each chain serving its unique purpose, such as privacy, scalability, or vertical specialization. Each of these chains has its own community, culture, protocols, memes, and NFTs. Today's users want to explore these opportunities in a manner that is exceptionally capital-efficient and extremely secure.

B. Poor user experience

Navigating the multi-chain landscape requires you to deal with multiple assets, bridges, wallets, and other cross-chain liquidity solutions before you can even interact with your application. Current bridges and conventional cross-chain solutions suffer from a wide variety of challenges, such as unpredictable slippage and unreliable security protocols. The result is a poor user experience, a factor that negatively affects large-scale consumer crypto adoption. While atomic swaps, GMPs, intent-based bridges, and omnichain AMMs have emerged as potential solutions, none of these are able to positively affect the user experience in a comprehensive manner.

C. Scripting an abstract future

Our mission is to create the largest consumer crypto ecosystem, one that enables you to explore every chain and every opportunity that comes with it. We're doing this by completely reinventing the way we look at cross-chain technology from the ground up. We're creating advanced cross-chain infrastructure that enables you to experience a borderless ecosystem. We're focusing on borderless, or omnichain applications, exceptional capital efficiency, and extreme security. When you are in the SYNTHR ecosystem, you are everywhere. The future is abstract.

II. Product

A. Advanced cross-chain architecture

SYNTHR's cross-chain infrastructure gives you access to SYNTHR's zero-slippage omnichain liquidity, in addition to the GMP aggregator that aggregates multiple independent consensus layers, the oracle aggregator that aggregates multiple high-quality pull and push price feeds, and various other support components. The protocol enables you to create borderless, or omnichain, applications and transfer value between chains in a manner that is exceptionally capital-efficient and extremely secure.

1. Exceptional capital efficiency

SYNTHR's zero-slippage omnichain liquidity, the most important component of SYNTHR's cross-chain infrastructure, utilizes omnichain syASSETS to perform zero-slippage cross-chain swaps. The protocol enables you to earn real yield by providing liquidity to SYNTHR's zero-slippage omnichain liquidity. This requires you to add high-quality short-tail and yield-bearing liquid assets as collateral, mint omnichain syASSETS, and preserve a 150% minimum c-ratio. Omnichain syASSETS also enable you to access #BUIDLonSYNTHR protocols and hold your liquidity in synthetic alts, BTC, RWAs, or stables.

a. Architecture

SYNTHR's zero-slippage omnichain liquidity rests on the protocol's light chain-main chain architecture and omnichain global debt pool. The main chain aggregates cross-chain state changes, ensuring gas-optimized and trustless cross-chain synchronicity. The omnichain global debt pool aggregates cross-chain collateral and debt balances, enabling you to mint omnichain syASSETS.

It utilizes synthswap, the protocol's native zero-slippage DEX, in addition to the GMP and oracle aggregators, to burn and mint omnichain syASSETS, enabling you to perform zero-slippage cross-chain swaps.

b. Real yield

- **Farm syASSET/ASSET LP tokens:** SYNTH rewards

- **Liquidate undercollateralized users:** SYNTH rewards

- **Mint omnichain syASSETS:** syUSD rewards

- **Time-lock SYNTH for veSYNTH:** SYNTH and syUSD rewards

2. Extreme security

- The GMP aggregator aggregates multiple independent consensus layers to validate cross-chain messages, ensuring democratic, guaranteed, and trustless finality. This creates an iron curtain between the core contracts and relayers, preventing collusion between them. The protocol also conducts regular audits, provides comprehensive insurance, and runs bug bounty programs.

- The oracle aggregator aggregates multiple high-quality pull and push price feeds, ensuring front-running mitigation, MEV protection, reduced latency, and swap efficiency.

3. Support components

- AI-powered delta-neutral vaults utilize the hedge and stability pools to earn a delta-neutral, risk-free yield. The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality, while the stability pool earns a risk-free yield by liquidating undercollateralized users.

- The dynamic peg protection mechanism, or DRASR, utilizes the long and short-farm vaults to maintain parity between DEX and oracle prices. The long-farm vault utilizes its deposits to buy omnichain syASSETS on DEXs and farm syASSET/ASSET LP tokens, while the short-farm vault utilizes its deposits to mint omnichain syASSETS and sell them on DEXs. The protocol utilizes automated arbitrage bots to perform the buy and sell transactions.

- The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality. The hedge pool also enables you to protect yourself against black-swan liquidations and price volatility risks.

- The stability pool ensures protocol solvency, performs non-cascading cross-chain liquidations, and preserves overall system health. The stability pool also enables you to earn a risk-free yield by liquidating undercollateralized users.

III. Protocol vs. other cross-chain liquidity solutions

- *AI-powered delta-neutral vaults utilize the hedge and stability pools to earn a delta-neutral, risk-free yield. The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality, while the stability pool earns a risk-free yield by liquidating undercollateralized users.*

- *The dynamic peg protection mechanism, or DRASR, utilizes the long and short-farm vaults to maintain parity between DEX and oracle prices. The long-farm vault utilizes its deposits to buy omnichain syASSETS on DEXs and farm syASSET/ASSET LP tokens, while the short-farm vault utilizes its deposits to mint omnichain syASSETS and sell them on DEXs. The protocol utilizes automated arbitrage bots to perform the buy and sell transactions.*

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- *The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality. The hedge pool also enables you to protect yourself against black-swan liquidations and price volatility risks.*

- *The main chain aggregates cross-chain state changes, ensuring gas-optimized and trustless cross-chain synchronicity.*

- *The omnichain global debt pool aggregates cross-chain collateral and debt balances, enabling you to mint omnichain syASSETS.*

- The omnichain global debt pool *utilizes synthswap, the protocol's native zero-slippage DEX, in addition to the GMP and oracle aggregators, to burn and mint omnichain syASSETS, enabling you to perform zero-slippage cross-chain swaps.*

- *The oracle aggregator aggregates multiple high-quality pull and push price feeds, ensuring front-running mitigation, MEV protection, reduced latency, and swap efficiency.*

- The protocol backs all omnichain syASSETS with high-quality short-tail and yield-bearing liquid assets as collateral with a 150% minimum c-ratio, ensuring high solvency.

- *The stability pool ensures protocol solvency, performs non-cascading cross-chain liquidations, and preserves overall system health. The stability pool also enables you to earn a risk-free yield by liquidating undercollateralized users.*

IV. **Protocol revenue distribution**

- **Buyback and burn SYNTH:** 10%

- **Liquidity providers:** 60%

- **veSYNTH holders:** 30%

V. **Protocol specifications**

A. **AI-powered delta-neutral vaults**

AI-powered delta-neutral vaults utilize the hedge and stability pools to earn a delta-neutral, risk-free yield. The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality, while the stability pool earns a risk-free yield by liquidating undercollateralized users. The AI-powered delta-neutral vault utilizes its deposits to buy syUSD on a DEX and swap them for hedge pool tokens. *The protocol backs all hedge pool tokens with syASSETS in proportion to the omnichain global debt pool composition and rebalances the hedge pool tokens every 2 days.*
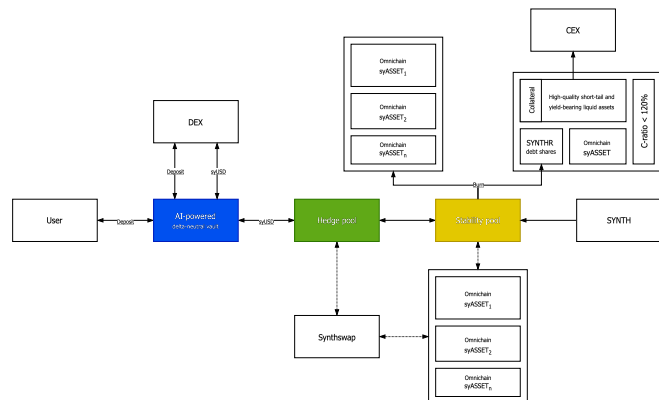
B. **Dynamic peg protection mechanism**

Dynamic rewards allocation for spread reduction, or DRASR, the protocol's dynamic peg protection mechanism, *utilizes the long and short-farm vaults to maintain parity between DEX and oracle prices. The long-farm vault utilizes its deposits to buy omnichain syASSETS on DEXs and farm syASSET/ASSET LP tokens, while the short-farm vault utilizes its deposits to mint syASSETS and sell them on DEXs. The protocol utilizes automated arbitrage bots to perform the buy and sell transactions.*
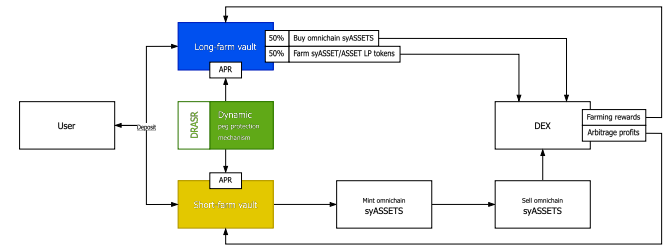
1. **APR formula**

$y = x + 0.3 \; for \; x \leq 3 \longrightarrow linear \; curve$

$y = x^2 \div 4 \; for \; 3 < x \leq 6 \longrightarrow quadratic \; curve$

$y = x^3 \div 10 \; for \; 6 < x \leq 10 \longrightarrow cubic \; curve$

$x = DEX \; price \; discount \; to \; oracle \; price \; bound \; to \; 0\% \leq x \leq 10\%$

$y = Long - farm \; vault \; APR \; bound \; to \; 0\% \leq y \leq 100\%$

2. $syASSET_{DEX \; price} > syASSET_{Oracle \; price}$

In this scenario, the dynamic peg protection mechanism decreases long-farm vault rewards, making long-farm vault farming less attractive. *The short-farm vault utilizes its deposits to mint omnichain syASSETS and sell them on DEXs,* exploiting arbitrage profits.

3. $syASSET_{DEX \; price} < syASSET_{Oracle \; price}$

In this scenario, the dynamic peg protection mechanism increases long-farm vault rewards, making long-farm vault farming more attractive. *The long-farm vault utilizes its deposits to buy omnichain syASSETS on DEXs and farm syASSET/ASSET LP tokens.* This is similar to perpetual funding rates.

C. **GMP aggregator**

The GMP aggregator aggregates multiple independent consensus layers to validate cross-chain messages, ensuring democratic, guaranteed, and trustless finality. This creates an iron curtain between the core contracts and relayers, preventing collusion between them. The GMP aggregator enables you to choose your preferred consensus layer, use more than one consensus layer, or select the most gas or time-efficient consensus layer to validate your cross-chain messages. This democratizes cross-chain finality and de-risks the protocol's dependency on one consensus layer.

D. **Hedge pool**

The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality, and swaps its deposits for hedge pool tokens. The protocol backs all hedge pool tokens with syASSETS in proportion to the omnichain global debt pool composition and rebalances them once every 2 days. *The hedge pool also enables you to protect yourself against black-swan liquidations and price volatility risks.*

E. **Light chain-main chain architecture**

A network of light chains houses all collateral and syASSET contracts; this enables you to add collateral and mint omnichain syASSETS on any chain. The main chain, on the other hand, houses the core contracts, execution logics, and omnichain global debt pool. The main chain also *aggregates cross-chain state changes, enabling gas-optimized and trustless cross-chain synchronicity.* An alternate design, such as the point-to-point design, updates chain-wise global debt pools after every transaction, making it gas-intensive. Off-chain computations can help save on gas, but that comes at the cost of censorship.

F. **Omnichain global debt pool**

Maker and Mirror Protocol enable you to add collateral, create overcollateralized CDPs, and mint wrapped assets. However, the liquidity for these wrapped assets comes from traditional AMM-based liquidity pools. The main drawback with this model is the low capital efficiency of traditional AMM-based DEXs, which is why protocols such as Mirror Protocol rely on inflationary tokenomics to incentivize liquidity providers. Synthetix v2 utilizes the CDP model more efficiently. It enables you to add SNX as collateral, mint sUSD, and perform zero-slippage swaps with a global debt pool as the counterparty. But the Synthetix v2 global debt pool model also has a few drawbacks; for example, the volatility in the SNX price can cause unpredictable changes to your c-ratio. *The protocol backs all omnichain syASSETS with high-quality short-tail and yield-bearing liquid assets as collateral with a 150% minimum c-ratio, ensuring high solvency.* This mitigates liquidation risks and prevents Terra-like events.
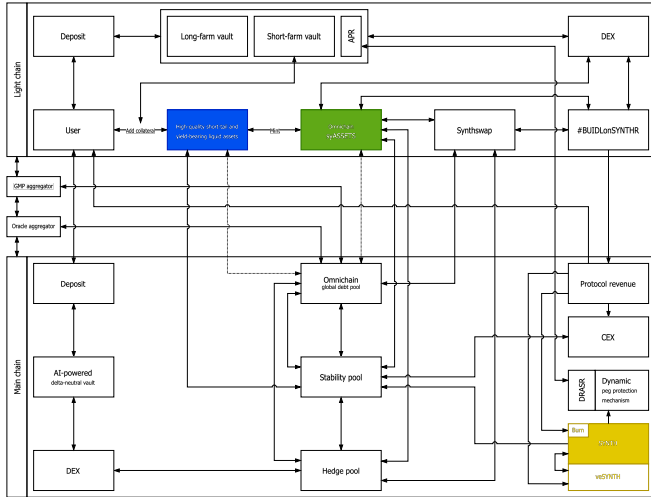
1. **SYNTHR debt shares**

Every time you mint omnichain syASSETS, you add to your debt balance. With every mint, you also receive a corresponding amount of SYNTHR debt shares, or SDS. SYNTHR debt shares, in addition to your debt share percentage, represent your ownership of the omnichain global debt pool. For all internal calculations, the syUSD values of your debt balance and the omnichain global debt pool are considered, and $syUSD == 1$.

a. **Chain-wise debt balance**

$$\sum Mint_i \times Price_i$$

$i = syAAPL, syAVAX, syBNB, \cdots$

b. **Omnichain global debt pool**

$$\sum Chain - wise\ debt\ balance_j$$

$j = Arbitrum, Avalanche, BNB\ Chain, \cdots$

Example

Trader A mints 50,000 syUSD worth $50,000 and receives 100 SYNTHR debt shares, and trader B mints 10 syBTC worth $50,000 and receives 100 SYNTHR debt shares. The omnichain global debt pool comprises 50,000 syUSD worth $50,000, 10 syBTC worth $50,000, and 200 SYNTHR debt shares.

- **Debt balance$_{Trader\ A}$**

$Debt\ percentage_{Trader\ A} \times Omnichain\ global\ debt\ pool = \$50,000$

- **Debt percentage$_{Trader\ A}$**

$SYNTHR\ debt\ shares_{Trader\ A} \div SYNTHR\ debt\ shares_{Total} = 50\%$

Based on our calculations, we can derive that traders A and B each own 50% of the omnichain global debt pool. Let's consider a scenario in which the syBTC price doubles and the 10 syBTC is worth $100,000. The omnichain global debt pool is now worth $150,000, and traders A and B each own $75,000. If trader

B wants to exit the protocol, he/she can simply burn 7.5 syBTC, equal to $75,000, and do so with a profit of 2.5 syBTC. However, if trader A wants to exit the protocol, he/she will have to buy and burn an additional $25,000 worth of syASSETS or risk liquidation. This is a common global debt pool problem, and the protocol enables you to utilize the hedge pool to mitigate it. Now let's consider another scenario in which trader A utilizes the hedge pool to swap his/her syUSD for hedge pool tokens; *the hedge pool mirrors the omnichain global debt pool.* Now if the syBTC price doubles, trader A's hedge pool tokens also rise in value, which trader A can use to settle his/her increased debt balance and exit the protocol. Trader B, who is synthetically long on BTC, can also utilize the hedge pool to mitigate the risk of unpredictable increases to his/her c-ratio. Traders A and B can also deposit their hedge pool tokens into the stability pool to earn a delta-neutral, risk-free yield.

G. **Omnichain syASSETS**

CDPs are placeholder tokens that represent a collateralized debt position. The collateralization of ETH to mint DAI is one such example. Overcollateralization compensates for the absence of credit ratings in DeFi and mitigates price volatility risks. Omnichain syASSETS are essentially omnichain CDPs. *The omnichain global debt pool aggregates cross-chain collateral and debt balances, enabling you to mint omnichain syASSETS. The protocol backs all omnichain syASSETS with high-quality short-tail and yield-bearing liquid assets as collateral with a 150% minimum c-ratio, ensuring high solvency. The protocol enables you to earn real yield by providing liquidity to SYNTHR's zero-slippage omnichain liquidity. This requires you to add high-quality short-tail and yield-bearing liquid assets as collateral, mint omnichain syASSETS, and preserve a 150% minimum c-ratio. Omnichain syASSETS also enable you to access #BUIDLonSYNTHR protocols and hold your liquidity in synthetic alts, BTC, RWAs, or stables.*

H. **Oracle aggregator**

Oracles are the backbone of DeFi and enable the creation of permissionless and censorship-resistant applications. They enable contracts to access and utilize data originating outside them. For example, Aave relies on Chainlink for BTC prices from Binance, CME Bitcoin futures, and Coinbase; aggregation prevents manipulation. The protocol utilizes oracles to track collateral and debt balances across all chains. *The oracle aggregator aggregates multiple high-quality pull and push price feeds, ensuring front-running mitigation, MEV protection, reduced latency, and swap efficiency.*

I. **Specialized debt pools**

The protocol enables #BUIDLonSYNTHR protocols to utilize SYNTHR's zero-slippage omnichain liquidity, or syUSD, as a common settlement layer. While this enables you to spread your risk across different protocols, it also exposes you to unwarranted risk profiles. Taking a more modular approach, the protocol also enables the possibility of specialized debt pools. Each debt pool has its own chain preference, incentives, and risk profile. This enables you to localize your risk and provide liquidity to specific protocols based on protocol-specific markers, or $syUSD_n$.

J. **Stability pool**

The stability pool ensures protocol solvency, performs non-cascading cross-chain liquidations, and preserves overall system health. The stability pool also enables you to earn a risk-free yield by liquidating undercollateralized users. It liquidates users with c-ratios less than 120%. However, during recovery modes, it liquidates users all the way till 150% or even higher to improve the protocol's weighted average c-ratio and overall system health.

1. **C-ratio**

$120\% \leq 150\% \leq Collateral\ balance \div Debt\ balance \leq 200\% \leq 400\%$

$120\% = Liquidation\ ratio$

$150\% = Minimum\ c - ratio$

$200\% = Recommended\ c - ratio$

$400\% = Maximum\ c - ratio$

2. **Liquidation rewards**

- Earn SYNTH rewards proportional to your SYNTHR debt shares.

- Flag undercollateralized users to earn $10 worth of SYNTH rewards.

- Liquidate flagged users, after 8 hours, to earn $10 worth of SYNTH rewards.

Example

Trader A adds $120 worth of USDC as collateral, mints $80 worth of syETH, and receives a corresponding amount of SYNTHR debt shares. Let's consider a scenario in which the syETH price increases by 26.25% and the syETH in the omnichain global debt pool is now worth $101. Trader A's c-ratio drops to 119%, and he/she fails to add more collateral or burn some of the syETH. Once flagged, the stability pool burns $100 worth of syASSETS from its deposits, burns trader A's SYNTHR debt shares, and distributes SYNTH rewards equivalent to his/her debt balance in addition to a 20% liquidation penalty to the depositors in proportion to their SYNTHR debt shares. Trader A loses collateral equivalent to a liquidation penalty of up to 20% and his/her debt balance.

K. Synthswap

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. Limit orders on CEXs enable you to circumvent this problem, but traditional AMM-based DEXs still face this issue. Traditional AMM-based DEXs utilize the $x \times y = k$ model with liquidity bands ranging from 0 to infinity, limiting price discovery and resulting in unpredictable slippage. The omnichain global debt pool *utilizes synthswap, the protocol's native zero-slippage DEX, in addition to the GMP and oracle aggregators, to burn and mint omnichain syASSETS, enabling you to perform zero-slippage cross-chain swaps.* Synthswap, unlike traditional AMM-based DEXs, enables you to perform high-volume swaps without liquidity requirements.

1. Atomic swaps

SYNTHR's cross-chain architecture enables cross-chain DEX aggregators to perform low-slippage native asset swaps.
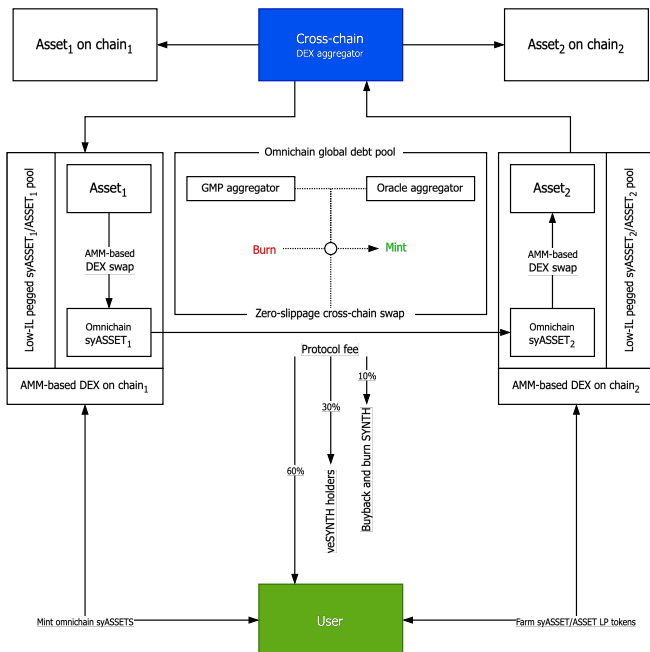
- A cross-chain DEX aggregator utilizes an AMM-based DEX to swap $asset_1$ for *omnichain* $syASSET_1$ on $chain_1$.

- A cross-chain DEX aggregator utilizes an AMM-based DEX to swap *omnichain* $syASSET_2$ for $asset_2$ on $chain_2$.

- Synthswap utilizes the omnichain global debt pool to swap *omnichain* $syASSET_1$ on $chain_1$ for *omnichain* $syASSET_2$ on $chain_2$. The omnichain global debt pool burns *omnichain* $syASSET_1$ on $chain_1$ and mints *omnichain* $syASSET_2$ on $chain_2$.

All the above steps occur in a single transaction, known as an atomic swap, resulting in *front-running mitigation, MEV protection, reduced latency, and swap efficiency.* syASSET/ASSET LP token farming rewards incentivize users to provide liquidity to low-IL pegged syASSET/ASSET pools.

2. Front-running mitigation

- *The oracle aggregator aggregates multiple high-quality pull and push price feeds, ensuring front-running mitigation, MEV protection, reduced latency, and swap efficiency.*

- *The protocol backs all omnichain syASSETS with high-quality short-tail and yield-bearing liquid assets as collateral with a 150% minimum c-ratio, ensuring high solvency.*

VI. Real adoption

One of the long-term objectives is to utilize omnichain syASSETS to advocate omnichain and trustless access to global financial assets. Regulatory constraints currently prevent users from emerging economies from participating in developed economy capital markets. The protocol enables 24/7 support, a retail-friendly non-custodial UX layer, and zero-slippage cross-chain swaps.

VII. Risk factors

A. Consensus layer risk

The GMP aggregator aggregates multiple independent consensus layers to validate cross-chain messages, ensuring democratic, guaranteed, and trustless finality. This creates an iron curtain between the core contracts and relayers, preventing collusion between them.

B. Insolvency risk

- *The hedge pool mirrors the omnichain global debt pool, ensuring delta neutrality. The hedge pool also enables you to protect yourself against black-swan liquidations and price volatility risks.*

- *The protocol backs all omnichain syASSETS with high-quality short-tail and yield-bearing liquid assets as collateral with a 150% minimum c-ratio, ensuring high solvency.*

- *The stability pool ensures protocol solvency, performs non-cascading cross-chain liquidations, and preserves overall system health. The stability pool also enables you to earn a risk-free yield by liquidating undercollateralized users.*

C. Oracle manipulation

The oracle aggregator aggregates multiple high-quality pull and push price feeds, ensuring front-running mitigation, MEV protection, reduced latency, and swap efficiency.

D. Security risk

The protocol conducts regular audits, provides comprehensive insurance, and runs bug bounty programs.

VIII. Trustless listing of omnichain syASSETS

The DAO utilizes governance proposals and voting to enable the trustless listing of omnichain syASSETS, allowing you to steer the protocol growth trajectory. Any new addition requires you to create a SYNTHR improvement proposal and vote with your veSYNTH. Approvals require a majority of yes votes and 30% quorum participation.

IX. veSYNTH rewards

Time-lock SYNTH for veSYNTH.

A. Base rewards

- **30% of protocol revenue:** syUSD rewards

- **Boosted syASSET/ASSET LP token farming rewards:** SYNTH rewards

B. **Bonus rewards**

- Bonus airdrops from #BUIDLonSYNTHR protocols.

- Bribes to influence governance proposals.

- Whitelisted spots in #BUIDLonSYNTHR presales.

C. **veTOKEN benefits**

- Encourages long-term decision-making.

- Improved supply and demand dynamics.

D. **Voting power**

$$SYNTH\ balance \times T \div T_{Maximum}$$

$$T = Current\ time - lock\ or\ selected\ time - lock$$

$$T_{Maximum} = 4\ years$$

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