Syndr Protocol Whitepaper

version 0.4 | July 02, 2021 | Vyom Sharma | vyom@syndr.co

Abstract

This document describes **the most capital efficient Decentralised Finance (DeFi) protocol for issuing/borrowing synthetic assets** on a blockchain. **ERC20 Stablecoin holders can borrow synthetic assets by depositing their holdings (e.g. DAI, USDC, LUSD, aDAI, or cDAI) as collateral in a vault. Each vault is required to be collateralized at a minimum of 110% and all issued synthetic assets (called dTokens - derived tokens) can be redeemed for the underlying collateral at any time.**

Syndr Protocol can support the creation of any synthetic asset whose price feed is reliably available with an oracle including synthetic fiat & crypto-currencies, traditional equities, indices, and commodities. **Syndr generates income by offering and charging fees on conversions between the generated synthetic assets via an in-built synthetic exchange**. This fee is paid out to the original borrowers of synthetic assets on a pro-rata basis.

Syndr employs a **highly efficient instant liquidation mechanism** first introduced by the Liquity Protocol which is based on **incentivized stability pool deposits and a mechanism for redistribution of debt** from riskier to safer vaults. This novel liquidation combined with stablecoin collateral allows the protocol to offer stability at a much lower collateral ratio than possible with the current systems.

Introduction

Synthetic Assets and Competitive Landscape

A synthetic asset is a tokenized derivative engineered to simulate the price of another asset. These provide real-world exposure to the price action of an underlying asset without actually having to maintain its custody. Synthetic assets unlock accessibility by lowering the barrier of entry to a host of different assets.

Synthetic asset issuance protocols currently live on Ethereum (e.g. Synthetix, UMA) allow users to unlock some of the economic value of their tokens by minting fungible ERC20 synthetic assets while remaining fully invested. First launched in September 2017, Synthetix has emerged as the clear front-runner by almost all metrics like TVL(Total value of collateral locked), liquidity & the sheer number of synthetics now trading on the protocol.

Shortcomings of Synthetix

All synthetic assets issued via the Synthetix protocol are currently backed by SNX tokens (*ETH collateralized synths have been deprecated) and require significant over-collateralization to the tune of a minimum of 400 %. The protocol, at any point in time, has to account for the volatility in the market price of not only the issued synthetic asset but collateral asset also i.e. SNX tokens themselves. This over-collateralization in synthetix and high C-Ratio allows the protocol to absorb large price shocks but makes protocol positions highly capital inefficient as most SNX stakers tend to maintain a much higher collateralization ratio to avoid liquidations. Synthetix in its litepaper recommends maintaining an optimal C-Ratio of 750% below which staking participants are unable to claim fees from the synthetix exchange.

SNX token market cap itself poses barriers to total synthetic assets liquidity on its platform. A minimum C-Ratio of 400% means that at any time the total value of all synthetic assets issued by the protocol is always less than 25% of the total value of all the SNX tokens staked inside the protocol. For example, at an SNX market cap of $1 billion, Synthetix will only allow the creation of less than $250 million worth of Synthetic assets.

Another reason for high C-Ratio values is the liquidation mechanism that Synthetix applies to undercollateralized positions. Undercollateralized positions with a C-Ratio lower than the threshold get a time delay of 3 days before they get flagged for liquidation.

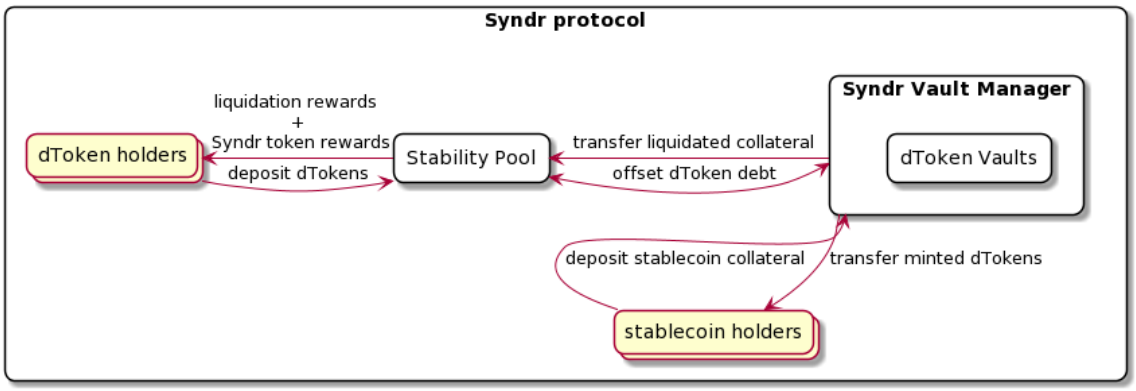
To summarise, synthetix protocol presents the following downsides:

- Capital inefficiency due to a high collateralization ratio.
- Only allows SNX denominated collateral.
- Time-delayed liquidations
- High Price volatility of collateral i.e. SNX

Introducing Syndr

Syndr aims to offer an alternative by offering the following key benefits:

- High capital efficiency due to a low collateralization ratio (110%)
- Collateral denominated in Stablecoins or yield-bearing stablecoins such as DAI, USDC, aDAI, LUSD, cUSDC, etc.
- Efficient, instant liquidations
- A hard price floor for all borrowed synthetic assets



Syndr Protocol

Comparison of synthetic asset protocols

Aa Protocol	# Collateralisation Ratio (%)	Accepted Collateral tokens
Synthetix	400	SNX
Deus.finance	2500	DEUS
mirror.finance	150	Terra

Protocol	Collateralisation Ratio (%)	Accepted Collateral tokens
Syndr	110	Stablecoins(DAI, USDC, aDAI, LUSD, cUSDC, etc.)

Protocol Mechanisms

Definitions

- dTokens - Synthetic Assets created via Syndr protocol. E.g. - dBTC, dETH, dTSLA, etc.
- dToken borrowers - People who deposit stablecoin collateral and mint new synthetic assets in the form of dTokens
- dToken traders - People who want to trade dTokens i.e. synthetic assets
- dToken vaults - dToken borrowers borrow dTokens by depositing their stablecoin collateral in dToken vaults. Every user has a different vault for every unique dToken they borrow. E.g. - a user who's borrowed some amount of dBTC and dAAPL has 2 different dToken vaults, one denoting their dBTC position and another denoting their dAAPL position.
- Net dToken debt - The number of dTokens borrowed
- Composite dToken debt - The number of dTokens borrowed plus dToken gas compensation to be paid out to liquidators in case of liquidations
- Internal Collateral Ratio (ICR) - For a given dToken vault, ICR equals the total value of collateral in that vault in USD divided by the total value of that vault's dToken composite debt in USD.
- Nominal Internal Collateral Ratio (NICR) -For a given dToken vault, NICR equals the total amount of stablecoin tokens in that vault divided by the total amount of that vault's dToken composite debt.
- Stability providers - People who deposit their dTokens in the stability pools in exchange for liquidation rewards
- Liquidators - People/Bots who monitor Syndr vaults and call the liquidate function on an undercollateralized vault in exchange for a pre-determined fee, denominated in dTokens.

Capital Efficiency and Stablecoins as collateral

Syndr issues synthetic assets in the form of fungible ERC20 tokens called dTokens (derived tokens) like dBTC, dETH, dAAPL, etc. All dTokens are backed by collateral denominated in stablecoins. We aim to enable DAI and LUSD as supported forms of collateral at launch, with support for USDC & other yield-bearing stablecoins coming shortly after.
To borrow dTokens from Syndr, a borrower must supply at least 110% of the current market value of the underlying asset in DAI or LUSD as collateral. This collateral is locked in a Syndr vault and the borrower must ensure that the collateral in their vault is always greater than 110% of the market value of the borrowed dToken at all times. In case the borrowed underlying asset appreciates in value causing the collateral ratio of a vault to fall below 110%, then this will make the vault subject to liquidations.

To avoid liquidation despite changes in the price of the underlying asset, it is highly recommended to keep the collateral ratio well above the 110% minimum. If liquidated the borrower loses 10% of the value of their Vault.

dToken Exchange

Syndr protocol acts as an automatic market maker for facilitating swaps between all available dTokens, say swap dBTC to dAAPL. This exchange is based on the current market price feeds for both the underlying assets. A percentage of fees is charged from traders seeking to exchange one dToken to another and distributed amongst the dToken issuers/borrowers.

Syndr's dToken exchange uses redistributions amongst 2 dToken systems to facilitate dToken swaps. Say someone wanted to swap their dBTC tokens for dAAPL tokens, this would involve the following steps -

- Charge a flat exchange fee, denominated in dBTC
- Burn the remaining dBTC tokens provided by the trader
- Reduce the burnt dBTC token debt as well as an equivalent amount of stablecoin collateral from all of the dBTC vaults in the system. This is done proportionally to every vault's collateral.
- Increase the equivalent amount of dAAPL token debt by minting new dAAPL tokens and redistributing stablecoin collateral removed in the last step, amongst all the dAAPL vaults in the system. This is also done proportionally to every vault's collateral.
- Issue the newly minted dAAPL tokens to the trader.

Liquidations

A vault's collateralization ratio can be defined as the value of collateral divided by the value of all issued dTokens. Syndr requires this ratio to be always greater than 110%. To ensure the dToken supply remains fully backed, Syndr employs a novel two-step liquidation mechanism. First introduced by the Liquity protocol, this liquidation mechanism is aimed at instantly liquidating undercollateralized positions. It can be triggered by anybody and can liquidate vaults in batches. There are two steps to the Syndr liquidation process -

1. Offset under collateralized vaults against the stability pool
2. Redistribute undercollateralized vaults amongst other borrowers.

Stability pool

The purpose of a stability pool is to help maintain system solvency by acting as a "shock absorber" for the bad debt from the liquidated vaults. All dToken holders can become Stability providers in Syndr by depositing their dTokens to the stability pool. Stability providers also earn in two ways - by continuously earning Syndr tokens during their entire term as stability providers and earning the collateral gain as a result of the liquidation exchange. Whenever a vault is liquidated, some amount of dTokens from the stability pool are burnt by the system to cancel the debt of the liquidated vault, and an equivalent of amount stablecoin collateral from the vault is transferred to the stability pool. As liquidations happen just below 110%, this exchange represents a net profit for the stability pool and stability providers as a whole. In a sense, the stability pool has essentially sold some of its dTokens at above their current market price.

Stability providers are free to withdraw all or part of their deposit anytime except when there are undercollateralized vaults in the system that can be liquidated. Stability providers who are also borrowers can choose to transfer the collateral gain to their vaults instead of paying it out to their Ethereum address.

Redistribution of undercollateralized vaults

Another mechanism for liquidating a vault is to redistribute its debt and collateral amongst other existing vaults in the system. This redistribution is done in proportion to the recipient vault's collateral amount. This means that vaults with a higher collateralization ratio will receive more debt and more collateral than those with a lower collateralization ratio.

Syndr tokens

Syndr tokens act as a common reward mechanism for all stakeholders in the Syndr protocol.
Syndr tokens are rewarded to -

- Borrowers/issuers of dTokens for creating dToken supply
- Stability providers for depositing dTokens in the stability pool

To encourage early adoption and bootstrapping growth, the issuance rate of Syndr tokens will decrease over time in order to encourage early adoption with dToken borrowers and stability providers.

Syndr can also be used for governance mechanisms such as selecting which synthetic asset to create and enable next.

dToken Redemption mechanism

All dTokens issued Syndr are fully redeemable at any time*. Syndr protocol allows a dToken holder to fully redeem their dTokens for the underlying stablecoin collateral based on the current dToken:USD rate. This redemption mechanism allows for direct arbitrage whenever a dToken is trading below its current market price, thus creating a hard price floor for every dToken.
Whenever someone wants to redeem a dToken, dToken is redeemed against the Vault(s) with the lowest collateralization ratio. For a vault owner, a dToken redemption has no economic effect on the vault owner as it represents a net neutral exchange of value.

*To protect Syndr from a bank run like situations, all dToken redemptions are paused if the total collateral ratio for that particular dToken within the system falls below 110%.

Price pegging mechanisms for Synthetic assets

The following mechanisms help ensure that the value of issued dTokens remains equal to that of the underlying assets:

- Arbitrage
    - If the price of a dToken falls below peg, an arbitrageur can redeem it for its underlying collateral at the current market price and pocket the difference.

    - A minimum collateral ratio of 110 % automatically creates a dToken price ceiling of 110% i.e. 1.1 * current price of the underlying asset. If the price of a dToken goes above this ceiling, it will open up an opportunity where an arbitrageur can borrow some dToken and then make a profit by immediately selling it.
- Schelling point - Schelling point is a game theory concept made famous by Thomas Schelling in his book, The Strategy of Conflict. Since Syndr will treat all dToken as always being equal to their underlying assets, we expect the users will view 1:1 dToken: underlying asset peg as Schelling point to which the system tends to return after temporary deviations. However as this mechanism is based on assumptions about market behavior, which is infinitely unpredictable, it only acts as a soft peg mechanism, not a hard guarantee.

CryptoEconomic Incentives for Stakeholders

Syndr allows for a wide range of synthetic derivative use-cases beyond simple swaps, and the following crypto-economic incentives list will expand as more products are deployed like options, futures, perpetuals, forex hedging options, etc.

The following summarises the economic incentives powering Syndr v1:

Incentives for synthetic asset borrowers

- dToken Exchange fees
- LP token rewards paid out by 3rd parties like Uniswap, Balancer, etc.
- Syndr token rewards

Incentives for stability pool depositors

- Collateral gain from liquidation exchange
- Syndr token rewards

Incentives for 3rd party liquidators

- A fixed % of collateral in the vault
- Gas Compensation - Fixed amount of a vault's dToken to cover for gas costs even in times of low network throughput

Potential Protocol Risks & Mitigation

Oracle prices

Syndr primarily uses Chainlink oracle price feeds which will update a dToken:USD price feed every 3 hours and whenever the price changes by more than 0.5%.
To mitigate oracle risk, such as in cases if chainlink oracle does not return an expected result or the latest price feed deviates more than 2% from the last available price, we tally the feed with a backup oracle provided via Band Protocol.

Conclusion

Syndr is the most capital-efficient protocol for synthetic assets on a blockchain. It enables censorship-resistant and direct global financial access by enabling anyone in the world to-

- Trade Synthetic assets
- Borrow/Issue synthetic assets against stablecoin collateral for 0% fees
- Build more DeFi applications for global assets on the top of Syndr Protocol