Unit: Decentralized Borrowing Protocol

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Abstract

The Unit protocol allows users to obtain liquidity from a large variety of decentralized assets. The protocol increases borrowing efficiency by expanding the number of crypto assets available for collateralization, and asset holders can use the value contained in a diverse set of token holdings to mint the stablecoin $USDP. Here we propose optimized solutions for many aspects of a borrowing protocol. The liquidation mechanism stabilizes the entire system and provides economic incentives to liquidity providers. A stable borrowing rate with no issuance fees increases user confidence. An organic token economic model connects the growth of the protocol to token value flows. A flexible approach to oracles gives users the option to select their preferred data provider. These solutions can significantly increase the capacity of a borrowing protocol and provide higher utility for users.

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1 Introduction: DeFi, Stablecoins and Borrowing protocols

Decentralized finance (DeFi) plays an increasingly important role in the Ethereum ecosystem with the adoption of classic financial operations such as borrowing, lending, and various derivative issuance, as well as instruments with stable value(stablecoins) creation. DeFi is in the early stages of existence, and the overall efficiency and variety of decentralized services are low compared to the fiat financial world. However, the programmable and decentralized nature of such services provides the potential for massive growth in the coming years. Decentralized financial services have different purposes and functionality, but their token economic models are mostly weak(such as simple governance token economic models) and do not allow long-term value capture. The majority of their token value is based on speculation without sustainable organic drivers.

Stablecoins are an important driver in DeFi adoption and development. The rise of stablecoins can be explained by the long downtrend in the market. During the time crypto assets holders were looking for the ability to keep the value of their crypto without touching fiat currencies and later simplify their ability to move the value back from stability to volatile coins.

Centralized stablecoin platforms contain a risk of censorship, reducing their long-term viability. Some services also face problems related to questionable asset management practices and the possibility of off-chain assets being frozen or taken by governments. More “compliant” centralized services can blacklist addresses and freeze accounts, increasing transaction censorship risk.

Algorithmic stablecoins are backed by on-chain assets and traded mostly on DEXes (decentralized exchanges), increasing censorship resistance. The Maker protocol is the most well-known example. However, with Maker the protocol collateral choice is limited to a few assets, interest fees are unpredictable, and the focus on short-term peg sacrifices scalability. Recent decisions to add a centralized "compliant" stablecoin as collateral brings into question the decentralized nature of $DAI, as the stability of the decentralized system now relies on centralized government/business entities’ decisions.

2 Advantages of Unit protocol

2.1 Token collateral diversity

Many crypto holders own a diversified portfolio of assets, including a variety of capitalized and under-capitalized tokens. Popular liquid assets are easily sold on exchanges and holders can access instant liquidity without the need to borrow. However, less liquid assets are difficult to sell quickly, yet they represent a significant measure of value in the crypto asset world. Right now there is no way to borrow liquidity for such assets. This limits DeFi applications, funding, and usability.

Funding is critical for any financial ecosystem. In the classic financial system loans may be backed with a mix of assets, including assets with low liquidity that cannot be sold instantly. In the crypto financial system, there is an existing market with acceptable liquidity for most medium/low cap projects, but holders are unable to use these tokens as collateral. Unit protocol addresses this issue.

To manage possible risks and create a robust system, it is critical that the protocol can face extreme scenarios and still function as expected. To ensure functionality and resilience, we implement different architectural features that are described below, as well as a flexible approach for each token setting, such as collateral rate requirements, liquidation fees, and interest rates. Additional limitations are implemented to manage the token risks and reduce the impacts of a possible black swan event on the protocol.

2.2 Stable interest rate and 0 issuance fee

Currently, the most popular solution is the Maker protocol which implements stability fees (interest rate) for their $DAI stablecoin. This approach assumes that demand for loans can be regulated using debt service costs. For example, if $DAI is above $1 the stability fee can be very low, stimulating new loans and providing opportunities for arbitrageurs to sell $DAI, which stabilizes the price to $1. Based on historical data, the floating interest rate or “stability fee” does not provide an efficient peg management mechanism, as the $DAI stablecoin can be traded above or below the $1 price for months, even under active interest rate management and there is no way to be sure when $DAI will reach the $1 peg again.

Unit protocol utilizes a different approach which takes into account that the market can be self-regulated and ensures that the price of stablecoin reaches its peg. The fluctuation of interest rates creates uncertainty for the borrowers and limits the scalability of the system. Unit protocol lets users issue the $USDP stablecoin for a provided collateral. Instead of focusing on the stablecoin price, it focuses on the value of $USDP to ensure that it reaches the peg over time. This mechanism allows Unit Protocol to scale in the long run.

Varying interest rates create uncertainty for borrowers and limit the scalability of the system, so it is important to provide predictable loan conditions for the users. With Unit protocol, interest rates will remain stable on an untouched CDP(Collateralized Debt Position).

Adjusted interest rates only influence operations with a newly opened CDP, or CDPs impacted by operations that reduce collateral ratio (i.e. issuance of new $USDP or withdrawal of collateral). Other operations such as deposits of additional collateral for an already existing CDP or deposits of $USDP to reduce the current debt do not influence the interest rate.

There is no fee for opening a new CDP. Fixed fees for issuing loans are unnecessary, reduce usability, and may significantly limit short-term loan demand. Unit Protocol provides a 0 issuance debt fee, as well as a 0 close debt fee.

2.3 Efficient liquidation mechanism

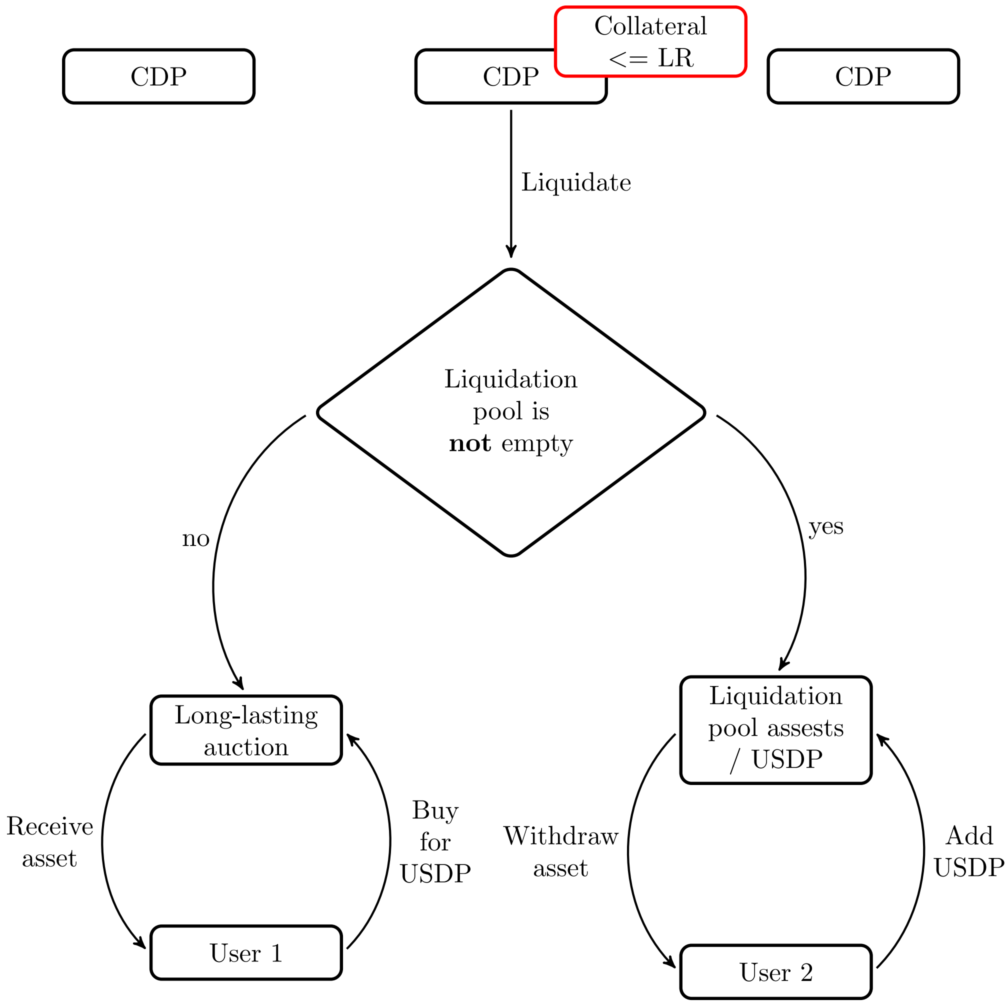
Unit Protocol creates an efficient liquidation process for the benefit of the whole system. If a user's collateral value decreases and collateral/debt ratio becomes lower than the liquidation ratio (LR), any participant can trigger position liquidation. The liquidation ratio is different for different assets based on their liquidity and market capitalization. This provides long-term stability and allows the implementation of a flexible risk approach for every asset.

The liquidation process is divided into 2 possible stages:

1. Sale undercollateralized loans to liquidation pool

2. System buyout of liquidated assets and sale them through auctions

The process can be represented in the simplified picture:



2.3.1 The liquidation pool

The liquidation pool aims to provide buy-side liquidity when some portion of debt becomes undercollateralized and subject to liquidation. Anyone can provide $USDP to the liquidation pool and receive up to 50% of total liquidation fees. Liquidated assets are sold at a discounted price relative to the current market price along with asset liquidity fees. Liquidated assets sold to the pool can be redeemed at any time by the liquidity provider. $USDP collected from liquidity providers post-liquidation will be removed from circulation and burned.

Liquidation fees differ for different assets in order to compensate buyers for the liquidity risks connected to a particular asset.

The system creates stability through these liquidity provisions. An arbitrage opportunity is created for liquidity providers, incentivizing them to add more liquidity to get a higher % of total paid fees. Stability increases by eliminating the need for a protocol to search liquidity for each liquidated CDP. Liquidation time is reduced to seconds, resulting in reduced market risk.

From the liquidity provider point of view, the liquidation pool interaction can be described as follows:

1. Users add $USDP to a liquidation pool.
2. Any undercollateralized CDP is triggered for liquidation.
3. The collateral from the CDP is sold at a discounted price to the liquidity pool(price = oracle price - 50% liquidation fees)
4. $USDP received from the sale are burned.
5. Users can do anything with their assets. For example, they can take advantage of an arbitrage opportunity by withdrawing an asset and selling at any exchange for a profit.

The Unit Procol uses many different tokens as collateral. Because it is inefficient to require a liquidity provider to select and interact directly with dozens of tokens, the liquidation algorithm implements a selection process mechanism. The goal of this process is to simplify the system and provide a rewarding, fair experience for every participant.

2.3.2 The buyout of liquidated assets and long-lasting auctions

If liquidity in the liquidation pool is not sufficient to satisfy the value of liquidated assets, Unit protocol moves to stage 2, asset transfer to long-lasting liquidity auctions. The price for these auctions starts at the price from the previous stage(current market price - 50% liquidation fees) and is reduced each week by 10% until the asset is purchased. Once an auction is finalized, collected $USDP is taken out of circulation and burned.

During sharp market swings, market liquidity can be very limited due to factors such as liquidity drawback, major exchanges shutdown, or even the inability to make a transaction due to clogged mempool and high transaction fees.

Slower liquidation can help to obtain the highest price for liquidated assets, significantly reducing the impact of possible cascade liquidations and black swan events. Maker's examples showed that due to a temporary lack of liquidity, fast liquidation can be much more dangerous and lead to the situation when liquidated assets were sold close to 0 prices. That situation could collapse the whole system, only the minting of additional $MKR and current token holder's dilution temporarily saved the situation. The approach worked because current investors were ready to provide additional $DAI for fresh minted $MKR and the $DAI amount lost was small compared to the overall Maker market cap. In a similar scenario, $MKR could lose most of its market value because the current $MKR market liquidity is too small to absorb the additional token issuance without significant drawdown.

If the system liquidates assets slowly, the amount of $USDP received from the sale and burned can be lower than previously issued $USDP, leading to a case where some $USDP is not backed. Though this is possible, significant economic incentives for the liquidity pool and different collateral ratio requirements for every asset (higher for more risky assets) make the probability of the situation extremely low. Even if it does happen, the impact will be very small relative to the market cap.

Future compensation from any income sources will be the subject of governance, but the approach cannot be systematic and increases the risks for the system overall, so it is expected that any slight short-term negative result will be absorbed by the market without long-term $USDP utility decrease.

2.4 Conversion value

Current liquidity pool architecture allows us to add new interesting features such as an ability to convert $USDP in the corresponding system token value. There are 2 sides to a liquidity pool: on one side is the $USDP used to buy liquidations, and on the other side tokens the pool receives post-liquidation. Contributors to the liquidity pool are free to do whatever they want with the discounted-price liquidated tokens they have received, but Unit Protocol has built-in features to help them manage the situation. If there is unbalanced liquidity (any difference in USDT value in the liquidity pool), users can swap $USDP to its relative backed value from already liquidated collaterals.

The process may look like this:

- User_1 swaps $USDP to $ETH from the liquidation pool.
- User_1 receives $ETH equal to $USDP value.
- User_2 who kept assets in liquidation pool, sells his assets to User_1, and receives $USDP back

Liquidation pool liquidity contributors(as User_2) exchange their unbalanced token liquidity and become balanced with $USDP for future liquidations. This requires no effort to complete the operation. It can be interesting for them because they do not need to sell the previously liquidated assets manually, and they can cover their unbalanced tokens position automatically and fix the premium.

Such opportunities also represent the floor stabilization mechanism because it creates demand for $USDP if it is below its peg value.

2.5 Token economy model

The system has its own ERC-20 token $COL. Token $COL is used as additional collateral to any debt created in the system. Every CDP represents a set of 2 tokens: main collateral and additional collateral - $COL. Initially, it is planned that total collateral will have requirements to include at least 3% of $COL token minimum and the maximum for $COL is 5% of total collateral. The requirements will be the subject of governance and can be changed in the future. The main idea behind this economy is to organically connect the value of the token with the utility created by the system.

Let's take a look at the example using the $STAKE token:

Assume that a user has $30 value of $COL and $2000 value of main collateral $STAKE(xDai Chain). The token has acceptable market cap and liquidity[1] to serve as an example of main collateral. The token values are deposited as collateral in the system, the minimum requirement for $COL value is 3% and the maximum requirement is 5%.

The system needs to count the amount of utilized collateral that can be used for minting $USDP according to 2 restrictions described above.

First it is necessary to find maximum utilized main collateral $STAKE based on deposited $COL value. By the restrictions $COL has to be at least 3% of total collateral, so it is necessary to make an assumption that the current amount of $COL is the minimum possible % of $COL in the system and then find an upper utilization limit for main collateral $STAKE.

$$(mainUtilizeMax + col) * minCol\% = col \tag{1}$$

$$\Longrightarrow$$

$$mainUtilizedMax = col * \left(\frac{100\% - minCol\%}{minCol\%}\right) = \$970 \tag{2}$$

Looking at the opposite restriction, we assume that the main collateral $STAKE value is the lowest possible amount which satisfies the second restriction: $COL has to be maximum 5% of total collateral value.

The equation finds the maximum amount of utilized $COL based on the value of deposited main collateral $STAKE:

$$(main + colUtilizedMax) * maxCol\% = colUtilizedMax \tag{3}$$

$$\Longrightarrow$$

$$mainUtilizedMax = main * \left(\frac{maxCol\%}{100\% - maxCol\%}\right) = \$105.26 \tag{4}$$

[1] At this moment market cap is equal to ~$6m and daily trading volume is ~$8m

Then the system counts if there is any value above the limits and apply restrictions:

$$mainUtilize = min(main, mainUtilizedMax) = \$970 \tag{5}$$

$$colUtilize = min(col, colUtilizeMax) = \$30 \tag{6}$$

Total utilized collateral is a simple sum of separate collaterals:

$$totalUtilizeMax = mainUtilize + colUtilize \tag{7}$$

Liquidation ratio(LR) is the lowest possible collateral/debt ratio below which the position is subject to liquidation. Due to high volatility of crypto assets, if LR is used to count limits for new CDP, user's positions could become the subject to liquidation very fast and eventually it will lead to poor user experience. Therefore we implement Inicial Collateral Ratio(ICR) which is the collateral limit for new positions and allows to have additional margin of safety for opened CDP. ICR always represents higher or equal collateral requirements than LR.

Here we assume that ICR is 300%, it means that the user can borrow 33.33% of the value of provided collateral.

In this case, totalUtilizeMax is the maximum utilized collateral, therefore maximum \$USDP debt can be found from the equation:

$$maxDebt = \left(\frac{totalUtilizeMaxICR}{liquidationRatio}\right) = \frac{\$1000}{3} = 333.333 \tag{8}$$

If the user would like to use all \$STAKE value(main collateral) to mint \$USDP, he needs to deposit more \$COL - not less than 3% value of total collateral.

Additional collateral is not the only utility model for COL, it will be used as a governance token to manage important decisions in the system and adjust parameters. The main goal is to create a completely autonomous system governed by its users.

2.6 Flexible oracles selection

Unit Protocol needs collateral price data for system contracts. Unfortunately, there is no stable and 100% reliable solution for on-chain data receipt; each option has its own positives and negatives.

Several implementation options are planned for oracle data providers. Users will have the option to choose their provider as an advanced setting. It is planned to develop our own solution which gathers information from different sources and stabilizes the price data to avoid short-term squeezes and manipulation.

Since the Unit protocol needs price feed for many tokens, Chainlink solution can not be used for every token in the system, but can be partially used for the most popular list of tokens. Some users will prefer our oracle solution, but someone may have a different vision, with Chainlink they will have a choice.

3 Initial system architecture and MVP

The current paper describes the target concept of Unit Protocol which will be rolled out in several stages. The first stage of it is a minimum viable product with slightly simplified architecture. In the section, we would like to describe the differences between target and MVP versions.

The list of adjustments includes:

1. 0x protocol solution for liquidations
   (a) 0x protocol with limit orders will allow for faster implementation as we work towards stage 2 with liquidity pools for liquidation mechanisms that aggregate all liquidity.
2. Adjusted Uniswap price feed data as oracle solution
   (a) In the MVP stage we will also use an adjusted Uniswap price feed data as an oracle solution. Often Uniswap has limited liquidity, but the oracle system is decentralized, transparent, and easy to use. Obviously, it is not enough just to use last trade data since it can be manipulated easily. The system uses at least 2 data points to remove short-term movements impact, as well as some delay in time. It significantly reduces the probability of price manipulation even if liquidity at a particular moment in time is limited. In stage 2, we will incorporate multiple oracle providers as well as a custom developed solution which stabilizes all price data.

4 Current risks

Since Unit Protocol contains many experimental features, many aspects are still required to be researched and tested on real use cases and work environment. In this chapter, we would like to notice some of the potential risks and describe our thoughts and vision regarding them.

- Centralization risk

Our goal is to make Unit protocol fully autonomous, with community decision making using transparent and fair governance processes. However, to increase protocol development speed and react faster to environmental challenges, some initial decisions will be made in a centralized manner. This includes decisions about token listings and protocol variable adjustments.

- $USDP price shift risk (peg risk)

Unit protocol has several default stabilization mechanisms and in normal conditions, $USDP is fully backed by collateral. Regardless, there is a trade-off between protocol scalability and managing the short-term peg to $1. In this section, we describe stabilization flows and user motivation to execute specific actions.

Buy-side stabilization flows happen when users need \$USDP to execute actions inside the system. They may happen under the situations and help to keep the \$USDP peg of \$1:

1. When users cover their CDP
   (a) They buy \$USDP and return it to get the collateral.
   (b) The desire to cover a CDP can be connected with the collateral token market situation and the user's desire to get the collateral back.
2. When users put in the liquidation pool and exchange \$USDP for liquidation pool assets (earn liquidation fees)
   (a) They buy \$USDP because they want to receive liquidated assets for a discounted price
   (b) The motivation can be impacted by adjusting the size of liquidation fees.

Sell-side stabilization flow happens when users issue new CDPs and sell \$USDP for any asset with a price higher than \$1 to cover temporary market demand for \$USDP. If the price of \$USDP is below \$1, the seller takes a market risk because they will have to pay back \$USDP to get collateral back. If \$USDP is fully backed by collateral value, price stabilization flow in \$USDP will happen anyway in time.

Regardless of value backing, the market price of \$USDP mostly depends on current market conditions. Changes in interest rates of other stablecoins can affect the price of \$USDP and stabilization cycles may last for some time.

- Collateral liquidity risk

Every asset has its requirements and liquidation fees are higher for low liquid assets because liquidity liquidation providers have to be compensated properly. High collateralization requirements for such assets ensure that the CDP has enough liquidity to cover the debt.

- Oracles risk

Oracles' risk is very important in DeFi. The problem exists because there is no stable solution, especially when a protocol needs on-chain data for a large number of tokens at the same time.

Reliable data is critical, but if a few sources can confirm a high level of overall security then it is reasonable to provide users with a choice of oracle best suited for them.

5 Future development of Unit Protocol

We have the long-term vision and plan for continued protocol development after the initial targeted implementation and will address protocol scalability.

It is not prudent to fully rely on Ethereum scalability plans and endlessly increased gas limit per block.

Likely there will be high demand for more advanced and reliable sidechain solutions which reduce the cost for stablecoins transfer without sacrificing security. In the future, the development will be extended to "ThePayCash" layer 2 payment system for the protocol and other stablecoins.

Based on the experience of classic finance markets, we see there is a huge demand for synthetic assets backed by stable and reliable architecture. Such architecture can be very similar for stablecoin or any other synthetic asset, so an application of the technology for different synthetic assets would be a very efficient way to scale. We will look into the synthetic use-case further once the stablecoin use case is proven and works as expected.

6 Conclusion

In this paper, we introduced our thoughts about the future of borrowing protocols and described Unit Protocol, an efficient and reliable borrowing solution for users. There are many challenges ahead and this version of the whitepaper may not represent the final state of the system. We will update our community with details about changes, ideas, and improvements as they arise.