SwapLite

Whitepaper V1.1

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1. About

Decentralized Finance (or simply DeFi) refers to an ecosystem of financial applications that are built on top of blockchain networks. More specifically, the term Decentralized Finance may refer to a movement that aims to create an open-source, permission less, and transparent financial service ecosystem that is available to everyone and operates without any central authority. The users would maintain full control over their assets and interact with this ecosystem through peer-to-peer (P2P), decentralized applications (DApps).

SwapLite is a one-stop shop to help you put your DeFi Portfolio to work. It is a decentralized finance protocol built by traders and technologists,inspired by industry-leading protocols like Uniswap, 1inch.exchange and Yearn Finance.

2. Our Mission

Centralized exchanges, have been the backbone of the cryptocurrency industry for several years. They not only offer fast settlement times, high trading volumes but also continually pump liquidity. However, there's a parallel world that was being built in the form of trustless protocols. That was the inception of Decentralized exchanges (DEX) that required no middlemen or custodians to facilitate trading.

However, due to the inherent limitations of blockchain technology, it has been a challenge to build DEXes that meaningfully compete with their centralized counterparts. Knowing that most DEXes could improve both in terms of performance and user experience.

Our mission is to provide something revolutionary, a one-stop shop for simple yet highly efficient management of DeFi assets. SwapLite is set to become one of the most successful projects that's part of the Decentralized Finance (DeFi) movement on EtherLite.

3. The Need for DeFi – SwapLite on EtherLite

With the insurgence of various ground-breaking tech making waves in the space, it became rather mandatory for SwapLite to come out from the shadows and let the people truly benefit. SwapLite is making its mark with its distinct security andoperational protocols thus avoiding the errors made by its predecessors.

4. How to Use & Maintain

SwapLite moves ahead of the age-old architecture of digital exchange in which it has no order book. It simply works with a model called Constant Asset MarketMaker, which is a variant of a model called Automated Market Maker (AMM).

These reserves are funded by liquidity providers and anyone who deposits an equivalent value of two tokens in the pool can be a liquidity provider. These liquidity reserves are held by Smart contracts which are also known as the Automated Market Makers that traders trade against. Traders pay a fee to the pool that is then distributed to liquidity providers according to their share of the pool. Let’s dive into how this works in more detail.

Liquidity providers create a market by depositing an equivalent value of two tokens which can either be ETL and an ERC-20 token or two ERC-20 tokens. These pools are commonly made up of stable coins such as USDL, USDC, or, DAI, but it isn’t mandatory. In return, liquidity providers get “liquidity tokens,” proportionate to their share of the entire liquidity pool.

So, let’s consider the ETL/USDL liquidity pool. We’ll call the ETL portion of the pool “A” and the USDL portion “B”. SwapLite takes these two quantities and multiplies them to calculate the total liquidity in the pool “C”. The core idea behind SwapLite is that “C” shouldn't change. So, the formula for total liquidity in thepool is: A x B = C

So when someone purchases 1 ETL for 330 USDL from the USDL/ETL liquidity pool. So when this happens, they increase the USDL portion in the pool and decrease the ETL portion. Effectively, the price of ETL will rise since there is less ETL in the pool after the transaction, and we know that thetotal liquidity (C) must remain constant. This formulation is what manages the pricing. So ultimately, the cost for this ETL is based on how much a transaction shifts the ratio between A and B.

4.1. Adding and Removing Liquidity

4.1.1 Adding Liquidity

Adding liquidity requires depositing a pair which can be equivalent value of either ‘ETL and an ERC-20 token’ or ‘two ERC-20 tokens’.

The first liquidity provider to join a pool sets the initial exchange rate by depositing what they believe to be an equivalent value of two ERC20 tokens. If this ratio is off, arbitrage traders will bring the prices to equilibrium at the expense of the initial liquidity provider.

All future liquidity providers deposit ERC20’s using the exchange rate at the moment of their deposit. If the exchange rate is bad there is a profitable arbitrage opportunity that will correct the price.

4.1.2 Liquidity Provider Tokens

Each liquidity pool consists of reserves of two ERC-20 tokens, and issues an ERC-20 liquidity provider token as a proof of proportional ownership of the underlying reserves;

a) Liquidity provider token holders are entitled to receive the swap fee paid by users who swap through their liquidity pools;

i) At launch, the entire amount of the swap fees (0.3% per swap) will be distributed to liquidity providers;

ii) SwapLite reserves the option to later re-direct a maximum of 0.05% per swap to fund the ongoing R&D of the protocol.

b) The swap fees will first go into the reserves of the respective liquidity pools. Users will receive their proportionate share when they return the liquidity provider token to redeem their share of reserves;

c) Liquidity providers are subject to impermanent loss should the prices of the tokens diverge from their original prices; they are suggested to take this into consideration, in comparison with expected share of fees and yield, before making a decision to contribute to a liquidity pool.

4.1.3 Removing Liquidity

Providers can burn their liquidity tokens at any time to withdraw their proportional share of ETL and ERC20 tokens from the pools.

ethWithdrawn=ethPool∗amountBurnedtotalAmount

tokensWithdrawn=tokenPool∗amountBurnedtotalAmount

ETL and ERC20 tokens are withdrawn at the current exchange rate (reserve ratio), not the ratio of their original investment. This means some value can be lost from market fluctuations and arbitrage.

Fees taken during trades are added to total liquidity pools without minting new liquidity tokens. Because of this, ethWithdrawn and tokensWithdrawn include a proportional share of all fees collected since the liquidity was first added.

4.2. Swapping Tokens

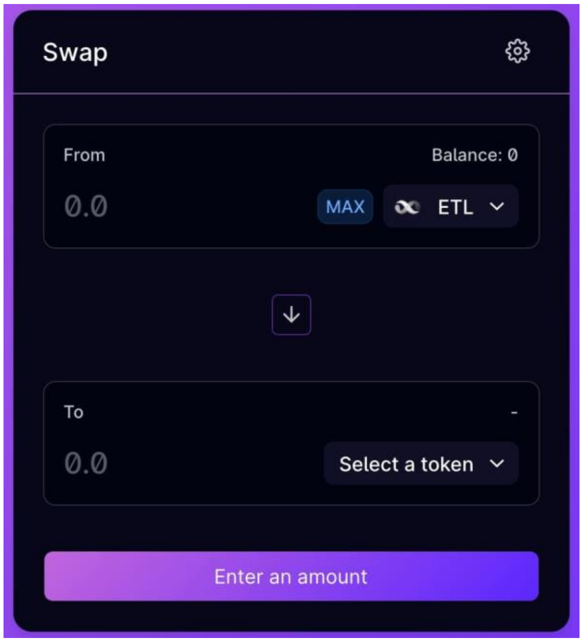
Users can swap between any two supported ERC-20 tokens by paying a 0.3% swap fee;

a) Direct conversion if there is a liquidity pool for the exact same pair and it offers the best price;

b) Routes trades across several liquidity pools if otherwise (e.g. DAI to ETL and ETL to LINK for DAI to LINK conversion, if there is no liquidity pool for LINK to USDL or if a direct conversion from LINK to USDL incurs a higher price)

4.3. Earning with SwapLite

Earning made quite easy. SwapLite gives swap fees to those providing liquidity. To add liquidity, a user needs to click on the tab called "Pool".



To understand liquidity, please refer to the section on providing liquidity. For each currency pair, e.g. TXL/ETL, there is a liquidity pool. The current ratio of assets that determines the current pricing.

When there is no liquidity, there is nothing to trade and no price can be determined. To maximize liquidity and trading opportunities, SwapLite offers everyone the ability to provide liquidity for liquidity pools. That means that anyone can lend their tokens to a liquidity pool. As an incentive, this persongets all the swap fees that are paid by swapping with the liquidity they provide. This way, there is the potential to earn a lot of $ per day by simply lending liquidity to the pool.

For the swap, the person swapping needs to pay a swap fee. This trading fee is currently 0.3% of the swap volume and is paid in the currency the person is selling. This trading fee is not paid to the exchange (as would be the case for centralized exchanges) but paid to the people who offered their tokens as liquidity for the liquidity pool.

Whatever the amount and you pay in, you are entitled to earn the swap fees generated by “your” tokens. You can withdraw your liquidity at any time but, as soon as you do, you stop earning swap fees. The ratio at which you withdraw from the pool is the current market price. So, if the value of TXL increased while your money was “working” in the liquidity pool, and the ratio USDL/ETL is 128.6:1 when you want to withdraw, then you would get back less TXL (which are worth more now) and more ETL (which are worthless in this case).

5. The Technical Need-to-Knows

5.1. The Price Protocol

The marginal price offered by SwapLite (not including fees) at any given time t canbe calculated by dividing the reserves of any asset "a" by the reserves of asset "b".

$$p_t = \frac{r_t^a}{r_t^b}$$

Since arbitrageurs will trade with SwapLite if this price is incorrect (Including the overall amount of the fee), the price offered by SwapLite tends to track the relativemarket price of the assets which means that it can be used as an estimatedprice index. Some of the other forks in the DeFi space, are not safe to use like an on-chain price index, because it is simply very easy to manipulate.
For example, some other contract uses the current ETL-DAI price to settle a derivative. An attacker who wishes to manipulate the measured price can buy ETL from the ETL-DAI pool, trigger settlement on the derivative contract (causing it to settle based on the inflated price), and then sell ETL back to the pool to trade it back to the original price. This might even be done as an atomic transaction, or by a miner who controls the ordering of transactions within a block. However, SwapLite introduces an improvement to this index function by measuring and recording the price before the first trade of each block (or equivalently, after the last trade of the previous block). This price is more difficult to manipulate than prices during a block. If the attacker submits a transaction that attempts to manipulate the price at the end of a block, some other arbitrageur may be able to submit another transaction to trade back immediately after, in the same block. A miner (or an attacker who uses enough gas to fill an entire block) could manipulate the price at the end of a block, but unless they mine the next block as well, they may not have a particular advantage in arbitraging the trade back. Explicitly stating, SwapLite accumulates this price, by keeping track of the combined total of the prices at the beginning of each block in which someone interacts with the contract. Each price is weighted by the amount of time that has passed since the last block in which it was updated, according to the block timestamp. This means that the total added value at any given time (after being updated) should be the sum of the spot price at each second in the history of the contract.

$$a_t = \sum_{i=1}^{t} p_i$$

To estimate the time-weighted average price from time t1 to t2, an external caller can checkpoint the accumulator’s value at t1 and then again at t2, subtract the first value from the second, and divide by the number of seconds elapsed. (Note that the contract itself does not store historical values for this accumulator—the caller has to call the contract at the beginning of the period to read and store this value.)

$$p_{t_1,t_2} = \frac{\sum_{i=t_1}^{t_2} p_i}{t_2 - t_1} = \frac{\sum_{i=1}^{t_2} p_i - \sum_{i=1}^{t_1} p_i}{t_2 - t_1} = \frac{a_{t_2} - a_{t_1}}{t_2 - t_1}$$

Users of the protocol can choose when to start and end this period. Choosing a longer period makes it more expensive for an attacker to manipulate the TWAP, although it results in a less up-to-date price. One complication: should we measure the price of asset A in terms of asset B or the price of asset B in terms of asset A? While the spot price of A in terms of B is always the reciprocal of the spot price of B in terms of A, the mean price of asset A in terms of asset B over a particular period is not equal to the reciprocal of the mean price of asset B in terms of asset A. For example, if the USD/10ETH price is 1000 in block 1 and 3000 in block 2, the average USD/10ETH price will be 2000 USD/10ETH, but the average 10 ETL/USD price will be 1/150 ETL/USD. Since the contract cannot know which of the two assets users would want to use as the unit of account, SwapLite tracks both prices. Another complication is that someone can send assets to the pair contract and thus change its balances and marginal price without interacting with it, and thus without triggering an index update. If the contract simply checked its balancesand updated the index based on the current price, an attacker could manipulate the index by sending an asset to the contract immediately before calling it for the first time in a block. If the last trade was in a block whose timestamp was X seconds ago, the contract would incorrectly multiply the new price by X before accumulating it, even though nobody has had an opportunity to trade at that price. To prevent this, the core contract keeps a copy of its reserves after each interaction, and then update the index using the price derived from that of the copy of reserves rather than the current reserves.

5.2. ERC-20 Pairs

In most other DeFi forks, all of the liquidity providers that have exposure to ETL, suffer an impermanent loss based on changes in the prices of other assets that are relative to ETL. When two assets ABC and XYZ are correlated for example, if they are both USD stable coins liquidity providers on a SwapLite pair ABC/XYZ would generally be subject to less impermanent lossthan the ABC/ETL or XYZ/ETL pairs. Using ETL as a mandatory bridge currency also imposes costs on traders. Traders have to pay twice as muchin fees as they would on a direct ABC/XYZ pair, and they suffer slippage twice.

SwapLite will allow pool liquidity providers to create pair contracts for any two ERC20 tokens. A spread of pairs between arbitrary ERC20 tokens could make it somewhat more difficult to find the best path to trade a particular pair, but routing can be handled at a higher layer(either off-chain or through an on-chain mainframe or aggregator).

5.3. Flash Swaps

SwapLite Flash Swaps are similar to that of Aave Flash Loans, which allow you to withdraw all the liquidity of any ERC20 token from SwapLite without any cost, given at the end of the transaction you either:

- pay for the withdrawn ERC20 tokens with the corresponding pool/pair tokens
- return the withdrawn ERC20 tokens

If either of the above-mentioned conditions isn't met, the flash swap transaction will fail, and any other arbitrary execution involved in that transaction shall be reversed.

This is possible because flash swaps are atomic EtherLite transactions. Besides, you need to pay a small index fee to make flash swaps successful.

Between withdrawing a token from SwapLite and returning it, you can execute any arbitrary logic. In other words, you can transfer the withdrawn tokens to otherprotocols before returning the amount to SwapLite.

This is a very powerful feature because now you don't need any capital (other than the GAS fee) to benefit from the financial opportunities of any size. There are many use cases of flash swaps.

Arbitrage: SwapLite flash swaps democratize arbitrage by removing the capitalrequirement.

Debt Refinance: Let's say you have taken debt from another protocol at a 14% interest rate. However, yet another protocol only charges a 4% interest rate. In this case, you can now refinance your debt from the first to another protocol without paying the original debt.

To execute a flash swap you need to deploy a smart contract, hence you need some sort of technical ability. Besides, you always need to pay the Gas fee from your pocket even if the transaction fails.

5.4. Swaps Vs Transfers

Token swaps in SwapLite are an easy way to swap one of the ERC20 tokens foranother one.

For end-users, swapping is intuitive: a user picks an input token and an output token. They specify an input amount, and the index calculates how much of the output token they'll receive. They then execute the swap with one click, receiving the output token in their wallet immediately.

Swaps in SwapLite are different from trades on traditional platforms. SwapLite does notuse an order book to represent liquidity or determine prices. SwapLite uses an automated market maker mechanism to provide instant feedback on rates and slippage.

As we learned in Index Overview, each pair on SwapLite is underpinned by a liquidity pool. Liquidity pools are smart contracts that hold balances of twounique tokens and enforces the rules around depositing and withdrawing them.

These rules in the constant product formula. When either token is withdrawn (purchased), a proportional amount of the other must be deposited (sold), to maintain the constant.

Receiving tokens

As is probably clear from the function signature, SwapLite requires swap callers to specify how many output tokens they would like to receive via the amount
{0,1} Out parameters, which correspond to the desired amount of token{0,1}.

Sending Tokens

SwapLite pairs check their token balances at the end of every interaction. Then, at the beginning of the next interaction, current balances are differenced against the stored values to determine the number of tokens that were sent by the current interactor.

The takeaway is that tokens must be transferred to pairs before the swap is called (the one exception to this rule is Flash Swaps). This means that to safely use the swap function, it must be called from another smart contract. The alternative (transferring tokens to the pair and then calling swap) is not safe to do non-atomically because the sent tokens would be vulnerable to arbitrage.

5.5. Fees & Pricing

5.6.1. Fees

__Liquidity provider fees__

There is a 0.3% fee for swapping tokens. This fee is split by liquidity providers proportional to their contribution to liquidity reserves.

As mentioned in the whitepaper earlier, swapping fees are immediately deposited into the liquidity pool. This increases the value of liquidity tokens, functioning as a payout to all liquidity providers proportional to their share of the pool. Fees are collected by burning liquidity tokens to remove a proportional share of the underlying reserves.

Since fees are added to liquidity pools, the invariant increases at the end of every trade. Within a single transaction, the invariant represents token0_pool / token1_pool at the end of the previous transaction.

There are many community-developed tools to determine returns. You can also read more in the docs about how to think about LP returns.

5.6.2. Pricing

How are prices determined?

As we learned in Protocol Overview, each pair on SwapLite is underpinned by a liquidity pool. Liquidity pools are smart contracts that hold balances of two unique tokens and enforces rules around depositing and withdrawing them. The primary rule is the constant product formula. When a token is withdrawn(bought), a proportional amount must be deposited (sold) to maintain the constant. The ratio of tokens in the pool, in combination with the constant product formula, ultimately determines the price that a swap executes at.

How SwapLite handles prices?

In most other protocols, trades are always executed at the "best possible" price, calculated at execution time. Rather disconcertingly, this calculation is accomplished with either of the two formulas, based on whether the trade specifies an exact input or output amount. The difference between these two functions is very small, but the very existence of a difference increases its complexity. Initial attempts to support both functions in SwapLite proved inelegant, and the decision was made to not provide any pricing functions in the core. Instead, pairs themselves directly check whether the conditions are satisfied (including the fees) after every trade. This means that rather than relying on apricing function to also enforce the invariant, SwapLite pairs simply and transparently ensure their safety, nice separation of concerns. One downstream benefit is that SwapLite pairs will more naturally support other flavours of trades that may emerge, (e.g. trading to a specific price at execution time).

The SwapLite trades must be priced marginally. The good news is that the libraryprovides a variety of functions designed to make this quite simple, and all swapping functions in the mainframe are designed with this purpose.

5.6. Wrapping ETL

The platform for transacting with EtherLite's native asset, ETL, is different from the standard platform for interacting with ERC20 tokens. As a result, many other protocols on EtherLite do not support ETL, instead of using a canonical 'wrapped ETL' token, WETL. Every SwapLite pair included ETL as one asset, it made sense to handle ETL directly, which was slightly more gas- efficient. SF supports arbitrary ERC-20 pairs, it now no longer makes sense to support unwrapped ETL. Adding such support would double the size of the core code base, and risks fragmentation of liquidity between ETL and WETL pairs. Native ETL needs to be wrapped into WETL before it can be traded on SwapLite.

5.7. Meta Transactions for Pool Shares

The Pool shares mined by SwapLite pairs natively support meta transactions. Thismeans users can authorize a transfer of their pool shares with a signature, rather than an on-chain transaction from their address. Anyone can submit this signature on the user's behalf by calling the permit function, paying gas fees, and possibly performing other actions in the same transaction.

6. SLT Token

SLT, the SwapLite governance token

- Total supply of 1 billion SLT
- 60.00% to SwapLite community members 600,000,000 SLT
- 21.266% to team members and future employees with 4-year vesting 212,660,000 SLT
- 18.044% to investors with 4-year vesting 180,440,000 SLT
- 0.69% to advisors with 4-year vesting 6,900,000 SLT
- A perpetual inflation rate of 2% per year will start after 4 years, ensuring continued participation and contribution to SwapLite at the expense of passive SLT holders.

6.1. Governance Parameters

- Any address with more than 1% of SLT tokens supply can delegate to propose governance actions.

- Locked tokens can also be used to vote.
- The community can submit their votes during a 7 day voting period.
- 4% of SLT supply required to vote ’yes’ to reach quorum threshold.
- 2 day time lock delay on execution.

6.1.1. Voting

- SLT tokens can be delegated and used to vote through the governance portal.

- Token holders can either delegate their vote to others or even self-delegate.

6.1.2 Delegate

- Users can delegate his votes to ‘Delegatee’.
- Users can delegate to ‘1’ address at a time.
- The number of votes added to the delegatee’s vote count is equivalent to the balance of SLT in the user’s account.
- Votes are delegated from the current block and onward, until the sender delegates again, or transfers their SLT.

7. Yield Farming

- Yield Farms allow users to earn SLT while supporting SwapLite by staking LP Tokens
- Yield Farm APR calculation includes both the rewards earned through providing liquidity and rewards earned staking LP Tokens in the Farm. This helps in better reflection of APR
- Following are the pairs for yield farming. Means a user can stake these pairs to earn SLT

SLT/ETL

ETL/USDL

SLT/USDL

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