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Abstract

This document describes the architecture of the cross-chain liquidity pools (CCLP) and the sequence flow when using them. In a vast developing sector like decentralized finance (DeFi), we need fast cross-chain transactions of assets that meet high standards of security.

To achieve perfect user experience in DeFi cross-chain transactions have to feel like exchanging tokens on a single network. CCLPs help to decrease the complexity of a cross-chain swap, as the needed coins are already on the participating chains.

Furthermore, it should be easy to provide liquidity to these pools for everybody ensure the stability of this network. Every liquidity provider (LP) earns interest in the provided crypto currency. There is no need to provide both sides of the liquidity pool as seens with many other single chain LPs.

CCLP provides an easy mechanism to integrate the fast cross-chain automated swap solution into other projects.

1. Concept of the cross-chain liquidity protocol/pool

The CCLP is based on the concept of LPs as used in many DEXes. The difference lies in the characteristics and benefits of these pools. CCLP stands for Cross chain liquidity Pool. As the name suggests, the benefit is the exchange of crypto currencies across network boundaries. In addition, another difference to the well-known LPs is that only one asset is included in a CCLP.

CCLPs are created on the various networks to make the exchange of tokens fast, easy, secure and automatable. For example, the CCLP on the Ethereum network contains ETH, on the BSC BNB and on Polygon MATIC. It could also be stable coins or equivalents. For this document we stay with the coins of each network for better understanding. These CCLPs can now be used to exchange coins with each other. As liquidity is available on each network, there is no need to burn/create assets or to transfer them to pegged tokens in a cumbersome way.

The process envisages that a user wants to exchange ETH-BNB, for example. To do so, this user sends ETH into a CCLP and thus starts the process of transferring it into BNB. In order to determine the amount of BNB, a price Oracle is used, which determines the exchange ratio. A fee is charged for each swap, which goes to the liquidity providers. The amount of the fee depends on the networks involved. In addition, transfer and transaction costs are incurred, which are deducted from the transferred assets (gasless transactions) before the swap can be carried out.

1. Cross-chain swap process

The cross-chain swap is secured by the following procedure:

1. the user sends the transaction to the target CCLP

2. the target CCLP receives the transaction and responds with a hash to the transaction sent. At the same time fires an event with the given transaction

2b. The relayer receives the event from the target CCLP waiting to match the event of the start CCLP.

3. The user sends his ETH to the CCLP on the start network with the hash.

4.The CCLP generates an event with the hash and the signed transaction.

5. this event is received by a relayer network when the transaction is finalised (wait for transaction to get enough validations)

6. the relayer validates the contained transaction and hash and forwards them to the target CCLP by executing a commit that may only be initiated by a authorized relayer address. The execution can only be done, if there is consensus about the following information:

    1. Target and source transaction hash match

    2. source CCLP contains amount pending of source tokens matches the amount of source token from the transaction sent to the target CCLP

    3. addresses of both transactions match

7. The target CCLP validates the swap transaction using the hash and executes it.

The more validation a transaction has, the more certain its result can be considered. This value can be configured for the swap on execution. The higher this value, the longer the entire process takes, but it increases the security of the transaction.

2. Liquidity provider

Liquidity providers add their tokens to CCLP to earn interest on their collateral through the fees. This is not without risk, as has already been described from the numerous explanations of "impermanent loss".

Since CCLPs exchange with each other based on price oracles, a ratio is always formed that defines the exchange rate. It can happen that an LPR provides ETH at a ratio of 1:10 to another token. These are now exchanged until the tokens of the LPR now represent their value in other tokens. Should the LPR wish to withdraw the liquidity provided, the other tokens must be exchanged back into ETH and then paid out to the LPR. If the ratio between ETH and the other tokens is now 1:12, then the LPR will lose 20% on its liquidity regardless of the fees earned.

To ensure the stability and usability of the CCLPs, the pools should always have sufficient liquidity. For this purpose, recalibrations can be carried out at set intervals by a Watcher Smart Contract. However, the transfer and transaction costs here are borne by all LPRs. At the same time, this mechanism is also used if an LPR wants to take liquidity out of a CCLP and there is not enough liquidity available. In this case, the LPR bears the costs incurred. To avoid or at least reduce these situations, the following approach is preferred:

3. A way around impermanent loss?

A CCLP has information on deposited liquidity and current liquidity level. If the current liquidity is lower than the paid-in liquidity, swaps with this token as a starting point are offered more lucratively.

I.e. the CCLP gets a healthier liquidity base again and the costs now fall on the trader, who also benefits from the shortfall by the fees for this swap being significantly lower than would have been the case under normal circumstances. The process can be described as incentivising the stabilisation of CCLPs.

The advantage of CCLPs may be the execution time, depending on the configuration of the execution. However, the transaction and transfer costs are definitely lower than with the known HTLC variants.

Especially when using CCLPs between Layer-1 and Layer-2 networks, these advantages come into their own. The costs for the transfer from L-1 to L-2 are as follows

New profit model for AMM liquidity providers

Impermanent loss has always been a thorn in the side of liquidity providers, as it can have a very strong impact on fee profits if the performance of one token deviates extremely from that of the other. Many attempts to prevent this effect have failed, as it is an intrinsic problem of automated market makers.

CrowdSwap also takes a different approach for AMMs in the context of CCLP and optimises the use of a pool's liquidity. Similar to the approach of Auto Yield providers, CrowdSwap will create AMM pools that have a better use of liquidity and ensure that liquidity providers achieve better results with their funds than is currently the case in the AMM environment.

In LPs there is always a much higher TVL than the daily volume. This “dead” capital should no just stay unused. This capital will be added to lending pools to generate yield.

The focus lies on pools that have particularly lucrative options for secondary use. In the first step, we concentrate on stablecoins and native coins.

The yield goes into the liquidity pool daily. The daily conversion ensures that the liquidity provider gets their fair share of the profit. To boost the usage of these pools, we divide yield profit into “liquidity provider bonus” and “swap reward program”.

“Liquidity provider bonus” -> A significant percentage of the yield flows back into the liquidity pool, giving liquidity providers a bonus on top of the standard fee (e.g., 0.3%).

“Swap reward program” -> A small percentage of the yield flows into the reward program for traders. The liquidity from this pool pays a part of the users' fees. The payment reduces the costs on the pool from, e.g., 0.3% to 0.25% and gives the pool advantage over others.

CCLP pools are more attractive to users and liquidity providers.

2. Future improvements

Relayer Network

The Relayer Network will become a blockchain with the aim of managing the secure, fast and cheap exchange of coins and tokens across network boundaries.

Liquidity Pools

In addition to LPs, other options of liquidity sources will be considered in the future.

- Orderbooks
- Marketplaces
- Auctions

Security

The exchange of tokens between blockchains could be improved if the blockchains involved have or represent the same state in the short term (for the duration of the transaction).

In the meantime, we go with validators, block headers and consensus mechanisms to determine the state securely.

User experience

CCLP provides a way to exchange any token from network A with any other token from network B in the future. This will be as simple for the user as exchanging ETH for DAI.

The user will, to stay with the whitepaper example. select ETH on Ethereum, then CAKE on the BSC. In the background, the Dapp will execute the following requests.

1. request list of exchange options from ETH to BSC (ETH->BNB, ETH->BUSD).

2. best price routing check for included options (BNB/BUSD ->CAKE)

3. determination of best price for the swap (BNB-> CAKE)

4. determination of costs for transactions, transfer and CCLP

The result is displayed to the user on the interface. One click and the CAKE tokens have arrived in the user's wallet after the swap has been completed.

The options can be expanded as desired and can also be interesting for all providers of Auto Yield.

3. Use cases

1. One-stop shop for traders and liquidity providers

Traders profit from CCLP most, because they don´t have to compare the best opportunities by themselves anymore. With the use of the “swap reward program” traders get better LP fees. The built in cross-chain capabilities of CCLP will improve the user experience tremendously.

Example:

A swap between DAI -> ETH could be cheaper if done on polygon network. Even though there are additional costs for the cross-chain transfer. In the end might be cheaper than very high ethereum fees.

Liquidity providers profit from the optimized LPs that earn yield on top of the fees. In our studies this can increase the interest by sometimes 100%. No need for liqduidity providers to take their LP-token and put them to yield farms themselves. One-stop shop for liquidity providing.

2. Reduce fees on an ethereum L1 swap

With CCLP a swap DAI -> ETH on ethereum L1 can save a great portion of the fees if executed like this:

1. Transfer DAI (L-1) to DAI (L-2 Optimism, Arbitrum,…)
2. Swap DAI -> ETH on L-2
3. Transfer ETH (L-2) to ETH(L-1)

3. Find best price options on all networks

Taking the example from Use case 1, not only fees can be lower. The price of token vary a lot giving the trader arbitrage opportunities. Greater options for the best price algorithm to find profitable routes and aggregations.

CCLP *Cross-chain liquidity protocol/pool*

DeFi *Decentralized finance*