

CROWDSWAP

Version 1

CrowdSwap, February 2021

Abstract

CrowdSwap is the **best-price-routing and aggregation protocol for decentralized finance (DeFi)**. It aims to reach mass adoption in crypto for every human being and overcome actual problems that reside from a fast-growing business space like DeFi.

CrowdSwap concentrates on providing the best prices for tokens across the DeFi space cross-chain.

CrowdSwap aims to get even people involved into the great crypto sphere. People who are already interested but can't afford the high transaction fees. People already in the space lack the knowledge needed to transfer tokens in the network or across network borders to other chains for better prices and transaction fees. For people who want to start trading but don't own cryptocurrencies yet and people who aren't allowed to sign up to centralized exchanges, CrowdSwap is the right place to start.

We strongly believe that crypto and DeFi should be a place of equality for every human being. That's the reason why we aim to get everybody on board.

1. Introduction

The crypto space itself has ever since allowed people to make life-changing gains. With decentralized finance (DeFi), the possibilities have increased a lot more. Every new project on the launch platforms, e.g., Polkastarter, did amazingly well afterward, sometimes reaching valuations of 100x or even more. In a bull market, everybody wants to trade these tokens that are available first on the decentralized exchanges (DEXes), e.g., Uniswap.

Lately, the popularity of this business has created some problems itself. Network traffic exceeded former expectations. And especially Ethereum had to suffer from high transaction fees. These high transaction costs gave other network providers the chance to step in. With lower prices, they can make up to Ethereum as the number 1 network. Different chains bring another dimension of complexity to the DeFi space. Now the amount of DEXes not only grows on ethereum, but it also spreads across all kinds of networks. The majority of users can't keep track of all DEXes anymore. Not to mention the overhead of transferring their coins and tokens across networks.

The future of DeFi is bright, and CrowdSwap believes in DeFi. The mentioned issues are to be solved to make DeFi a place of equality for every human being.

2. Problems

2.1. High transaction fees

As already mentioned in the introduction, the transaction costs on the Ethereum network are far too high for an exchange of tokens. Compared to central counterparties in the crypto environment, the transaction costs here are extremely high, amounting to many times the pure exchange fees. In some cases, the transaction costs exceed the \$100 mark, which often amounts to several percent of the exchange value. This has great impact on the prices of token as CrowdSwap always takes ancillary costs into account. The additional liquidity fees on the exchange markets, on the other hand, are only 0.3%.

From the overwhelming acceptance for DeFi, its popularity creates a problem in the Ethereum network that nobody can solve overnight. One reason for the high cost and low transaction per second (TPS) is the proof-of-work approach. The EIP-1559 will weaken the miners' position, but it remains to be seen whether this will reduce transaction costs significantly. Recently the Berlin hard-fork already reduced the transaction costs slightly.

Binance has seized the opportunity and created the Binance Smart Chain (BSC), an Ethereum clone that works based on proof-of-stake. BSC enables meagre transaction costs, which are sometimes less than one US dollar. The low transaction fees make Binance Smart Chain currently very popular and competitive.

2.2. Complexity

The DeFi area is not that easy to access, especially for newcomers to the crypto sector. First of all, you need a so-called wallet, technically a network address protected from third parties utilizing a password and a seed phrase. The construct is already very technical and too complex for most users on their own.

Here, however, we will look at another type of complexity, which is already evident on a small scale but will probably pose even more significant challenges for providers, their products and users soon.

We are talking about the ever-increasing number of DEXes, which will expand to other networks in the future, as the example of Binance Smart Chain shows. At this point, we can only name a few networks that already have or will soon have their first DEXes: Ethereum, Binance SC, Polygon, Cardano, Polkadot, Stellar, Solana, Tron, Neo, IOTA, Avalanche, Elrond, Zilliqa, Kusama, Harmony, XDAI,... The amount of DEXes multiplied by networks unveils the following requirements:

1. Not all tokens are to be exchanged on all DEXes and networks.

Knowledge of the various cryptocurrencies is the basis for successfully performing exchanges in the DeFi area. Taking any cryptocurrency, a user needs to know where to exchange it. This information alone is not always easy to find.

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2. The user needs a different wallet for each network.

If the user has found out which DEX swaps the token, this could be on a network on which the user does not have any collateral to exchange. First, the user has to create a wallet, buy tokens before exchanging is possible.

3. The user must transfer his tokens to another network.

Suppose the user has a wallet on the target network, but the tokens needed for the exchange are in a wallet on another network. In that case, the user must transfer the cryptocurrency via a so-called network bridge first.

Users who already found it difficult to get started will abandon DeFi Space at this point at the latest and turn to the conventional central exchanges. The complexity also goes hand in hand with user-friendliness.

Many people interested in crypto have difficulties even entering the stage. The barrier to entry is due to the nature of moving from fiat money to cryptocurrencies. There are currently only two options:

1. registration and KYC on a central exchange;
2. purchase of cryptocurrencies via credit card or bank account;
3. deposit ATM fiat -> crypto is transported to the wallet.

Since option 3 is subject to extremely high fees, we will not cover this case. However, there are barriers with the other two as well, which we describe now.

Option 1 has been the only option for most crypto users to get into crypto a few years ago. Broad interest in DeFi started in 2020. However, centralized exchanges like Binance, Coinbase among others, strongly oppose the decentralized approach of Blockchain. Besides, many also shy away from KYC procedures that require more and more identity features and insight into the financial situation.

Some countries have moved to block access to the central exchanges, thus preventing their citizens from this opportunity to enter the crypto scene. The ban of cryptocurrency exchanges is especially the case in countries where politically difficult circumstances prevail, and the national currency is often exposed to strong inflation.

Option 2 is to buy crypto by credit card or bank account through a so-called "fiat ramp on/off provider". These providers handle the sale of crypto usually quickly and transparently. However, there are also many scammers in this environment. The fees for such an exchange vary greatly.

CrowdSwap will rely on the "fiat ramp on/off provider" to enter DeFi. CrowdSwap will audit providers before a decision to integrate is confirmed to avoid the issues such as scams or overpriced fees. Criteria for inclusion in the CrowdSwap Ramp on/off program are:

1. fee structure,

2. transactions processed/historical performance,
3. publicity/perception,
4. cryptocurrencies offered,
5. ease of use of the solution,
6. integration effort.

2.3. User-friendliness

The great success of Uniswap and the like is undoubted because their users have been in the crypto environment for a long time and therefore gathered excellent knowledge about the technology. Some of the applications are very technical and leave beginners with many questions. For example, there is often no explanation of what a wallet is and how to obtain the first tokens. When you finally got some tokens after your research, you are actually supposed to perform conversions in the decimal range without being given any known auxiliary values.

Indeed, there are one or two solutions that are already a bit further along in this context, but the user-friendliness is by far not sufficient for global acceptance.

2.4. Transparency

Most DEXes focus on swapping from token A to token B based on their liquidity pools. CrowdSwap emphasizes transparency of the best route for the swap, the fee structure, and the swap side costs.

Only a consideration of all criteria will reveal the best price in the end. The concentration of one measure, on the other hand, obscures the overall cost. In section 3.1.1, we will go into more detail on the individual criteria.

The next chapter describes the solutions and products CrowdSwap wants to address to solve these challenges and problems.

3. Solutions and Products

All challenges set an essential course for the future and acceptance of DeFi. CrowdSwap is confident that these can be improved or solved with the following CrowdSwap products.

3.1. Best-Price-Search

The Search App searches for the **best price for a specific token pair in the complete DeFi Space**. The search takes place **cross-chain and is only limited by the integration of the different DEXes**. The best-price algorithm finds the best price for the token pair and considers all collateral costs. These costs are:

- Fees of the DEXes

- Transaction costs of the execution of the smart contracts (swap).

- Prices of the bridge transfer (network transfer).

The best price per token, including all collateral costs, is created and presented to the user in ascending order. The determination of the price bases on the following formula:

$$P(all)t = \frac{M(p + F) + C}{M}$$

The total cost price of a DEX is calculated from the number of tokens M multiplied by the token price p, added by the fees F of the DEX. The total is added by the cost C of the transactions for executing the smart contracts. Price per token is the result divided by the number of M.

The number of tokens M is determined from the exchange volume underlying the search. By default, this is set to \$500 but can be changed in the settings. The number of tokens is equal to the quotient of exchange volume V and price added with fees.

$$M = \frac{V}{p + F}$$

Where f is the product of price and fees as a percentage.

$$F = p * f\%$$

The search result display presents the user with a **clear ranking reduced to price** and shows the number of tokens the user will receive after an exchange to the exchange volume. Furthermore, the user can view price details for each total price to understand the pricing.

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Many DEXes use different functions of their smart contracts to execute the same TokenSwaps. Here, the internal routing is not always the same, resulting in higher transaction costs for the user. **CrowdSwap analyzes the smart contracts of the connected DEXes and always executes the swap via the most lucrative and shortest path.**

In addition to the price, the user also sees the percentage of ancillary costs in the swap volume. The overall price per token (including all ancillary costs) allows the user to quickly decide **which DEX is the most efficient for the desired swap.**

CrowdSwap determines the transaction costs by an empirical analysis of the on-chain data. Here, the mean values of all functions' gas consumption are determined and multiplied by the calculation's current gas costs.

$$T = \frac{1}{n} \sum_{i=1}^n x_i * G$$

G = current gas cost

The Swap Button allows the user to go directly to the CrowdSwap Swap App and execute the swap. The Swap Button is not active if the user does not own the needed requirements for trading. An inactive Swap button can appear if there is no wallet connected or not enough tokens are available for a swap. The lack of information for successful exchange includes network-related idiosyncrasies, which can differ a lot.

The Wallet Manager enhances the Search App features for the user even more. If the Wallet Manager connects before searching for the Best-Price, the search includes the wallet's information. The Wallet Manager's information allows the best-price algorithm to prepare the search result more intelligently for the user. The user gets swap options displayed on top, which are directly executable based on the wallet's information.

Example:

Alice wants to swap ETH for 1INCH. She enters this token pair into the search app. The result shows a DEX on Binance Smart Chain as the best price. Only in second place, she finds an option on the Ethereum network. Based on the information from Alice's wallet, the Search App has found BNB tokens in the BSC wallet and subsequently suggests this swap as the best, as the total cost per token is currently the cheapest.

Alice can also continue to swap her ETH for 1INCH and use the second option. However, she always keeps control over the best options in DeFi Space.

3.1.1 Transparency

Most DEXes focus on swapping from token A to token B based on their liquidity pools. CrowdSwap emphasizes transparency of the best route for the swap, the fee structure, and the swap side costs.

The best route for the swap is not always the one that the DEXes suggest as the best price. Many transactions of arbitrage traders show that there are more optimal routes in certain market phases, which have the most significant advantages for the user.

CrowdSwap transparently displays all routes of the compared DEXes. The best price algorithm ensures that the best route of each DEX is found. The goal is always the best price, including all additional costs. No other criteria, such as pool ratio, pool health, volume or TVL, play a role. Our focus is exclusively on the price advantage of our users.

The fee structure is not always easy to understand. While the DEXes display the fees, they are usually shown in token form rather than US dollars. These numbers bring confusion as to the magnitude of the costs. For swaps over multiple LPs, the fees of 0.3%, for example, accrue numerous times. I.e., for a value of 1000\$ over two LPs there is not 3\$ but 6\$. It also happens that different pools charge different fees. In the new V3 of Uniswap the prices go from 0.05% - 1%, depending on the pool. CrowdSwap always displays the fees of the swap in US dollars to be compared to each other.

The **swap charges** are not displayed on most DEXes because they are a network problem and not of the DEXes themselves. We agree with this only to the extent that it makes no difference on a DEX. However, if the user can choose, he would probably use the exchange platform with the lowest incidental costs.

Concerning the ancillary costs, we will only assume the transaction costs here. Considerable differences can arise due to different smart contracts. Furthermore, the tokens involved also influence the gas costs and thus on the transaction costs. Optimizing smart contracts can therefore lead to significant savings. Providers are working on this with varying degrees of success.

However, it is not always the case that the DEX with the higher ancillary costs also always have a worse price after CrowdSwap representation. Sometimes the pure swap prices are so reasonable that even higher ancillary costs still achieve the best overall price. So we take all costs into account to make sure the user is paying the best price per token.

With the Search App, CrowdSwap shows maximum transparency when comparing the best routes of different DEXes. The prices of the DEXes have been created based on the best routes from a provider perspective. On-Chain data analysis provides the exact ancillary transaction costs based on historical gas costs for the swaps across the routes shown. If CrowdSwap finds a better route, it offers an additional entry in the search results.

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3.2. Swap

CrowdSwap offers the possibility of swapping. Built on search, the transition to the Swap app is fluid and transparent. The user can transfer a search result to the Swap UI to get multiple options to trade. Experienced users can, of course, jump right into the Swap UI.

The first option is a direct swap based on the information in the search result. CrowdSwap makes it particularly easy and transparent for the user. The latter does not have to worry about the exchange's technical challenges but can receive his traded tokens.

Based on best price routing (BPR), **CrowdSwap takes care of all actions to successfully execute the swap and save on ancillary costs where possible.** The BPR considers the users' tokens and wallets on the different networks and automatically performs transfers to other networks when necessary. These features increase user-friendliness and reduce complexity significantly.

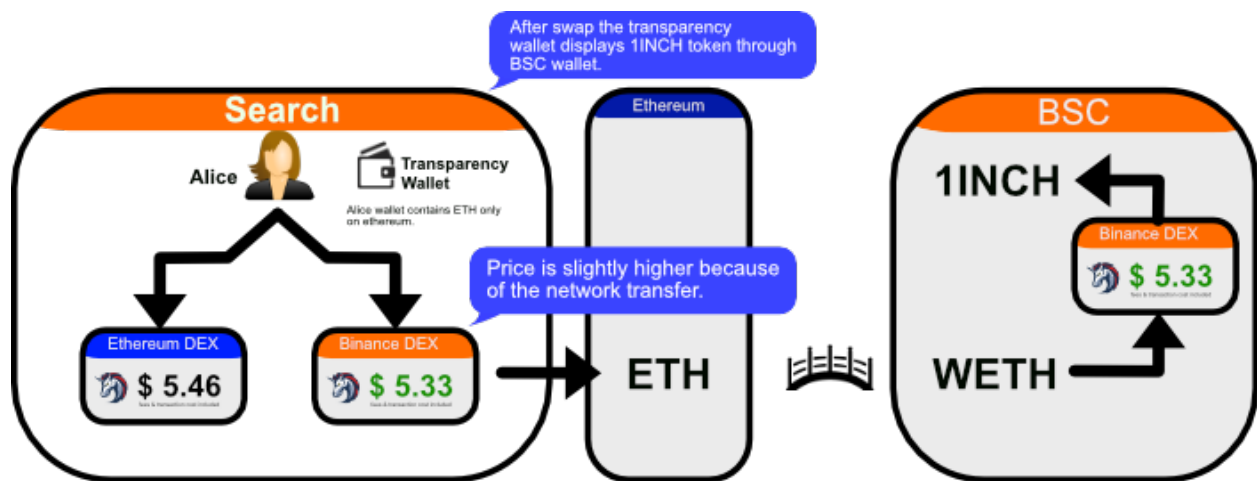


Figure 1: Cross-chain swap (ETH - BSC)

The second swap option is bulk swap. This option provides users with the ability not to exchange directly but to group to get better ancillary cost conditions.

Example:

Bob wants to buy 1INCH on Uniswap for \$500. When confirming the transaction cost in Metamask, he can't believe what he sees. Bob shall pay \$100 in transaction costs. He cancels the swap because he doesn't want to pay 20% of his trade volume in incidental expenses. In CrowdSwap, Bob can place his order in a pool, as shown in the search app. If the pool volume is large enough to reduce the transaction cost by at least 50%, the swap executes.

In the future, CrowdSwap will introduce more intelligent and user-friendly options of swaps, which we call smart swaps and fall into the premium services area. Many strategies are known from the stock market trading and charting world that work well in the crypto world. We will introduce our users to options of trading in a simple way. Here, we will dispense with any terminology such as limit and stop orders or indicators such as EMA200, RSI, MAC, among others.! We show the benefits of SmartSwaps through a transparent strategy dashboard.

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For example, one possible option is to activate a strategy called "Accumulation". As the name suggests, this strategy accumulates tokens at particularly favourable prices. We will announce more details about the smart swaps through our channels.

3.3. Atomic token transfer (ATT)

DeFi is developing as a **cross-chain space** soon, as mentioned at the beginning. A token transfer from network A to network B brings some challenges that need to be solved. Let's make a real-world example for this:

Example:

Bob wants to exchange his ETH on Ethereum wallet for CAKE on the Binance Smart Chain (BSC) network. To do this, he first needs to transfer his ETH into a wrapped form on the BSC network. Before we discuss the existing solutions, we highlight the general vulnerabilities that arise in exchanging messages and tokens between networks and the technical challenges of a decentralized nature.

3.3.1. Token inflation

Each coin or token is attributed to an owner. This owner determines the metrics such as maximum number, minting and burning. When cryptocurrencies are transferred from one network, they leave one network to be reused in the other. However, in doing so, the token's original metrics must be respected. It (which is a synthetic copy of the originating one) retains its initial value in the destination network. This process requires ensuring that the token is burned on the source network. However, this is not enough. At the same time, the wrapped token must be created on the destination network. Critical here is the consensus across network boundaries that the transaction is valid and successful. In the event of an error, all actions must be reversed.

3.3.2. Ownership

Besides the validators' consensus, another problem in this transaction is the execution of "Burn" and "Mint". In many smart contracts, only the owner can execute these functions, which is essential for security reasons. If only the owner can perform this operation, then CrowdSwap requires a transfer token for network transfers. The transfer token (CROWD token) represents **option 1** of the ATT.

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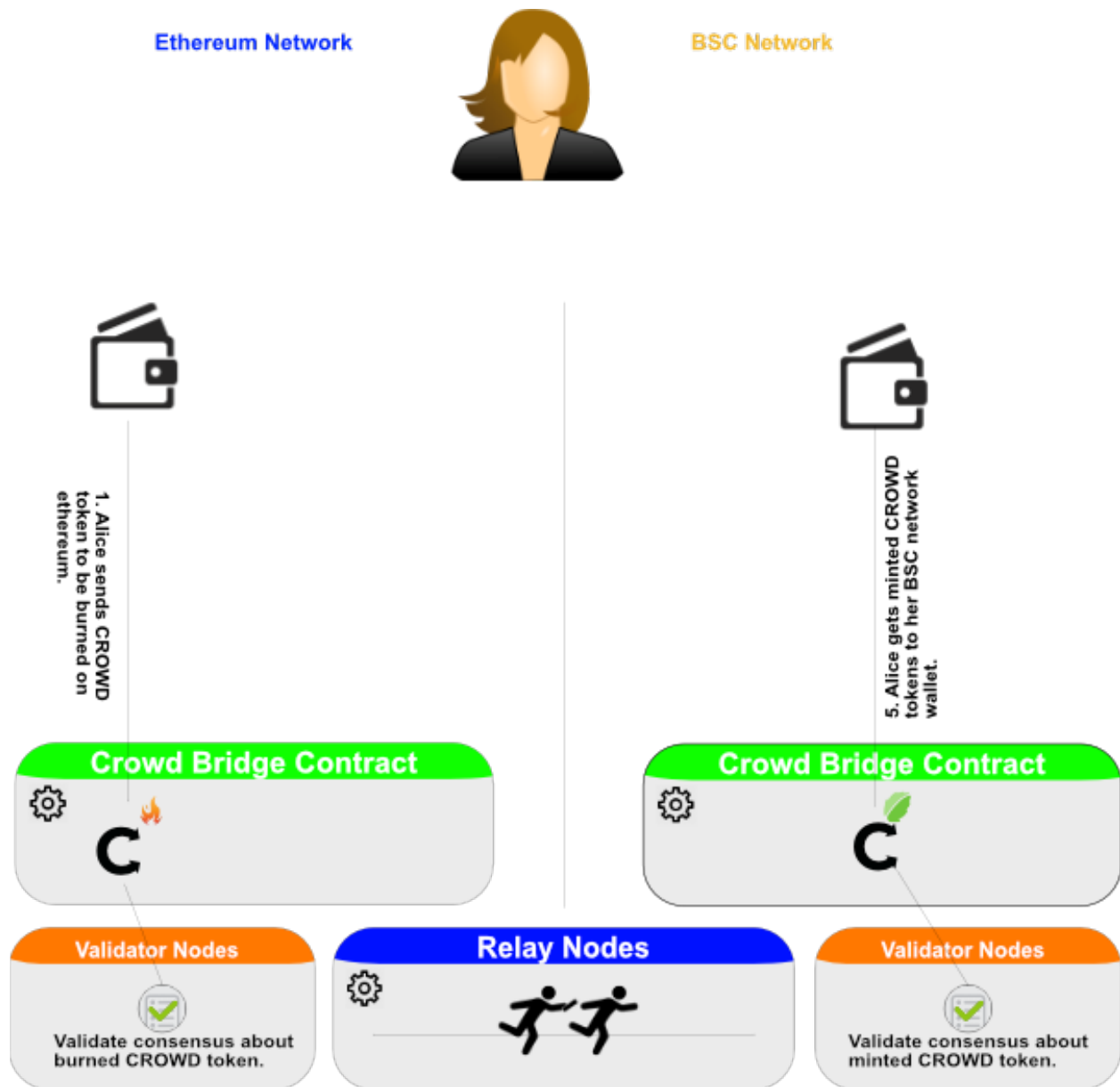


Figure 2: Crowd Token Bridge

As described above, tokens on a network are burned first. If there is consensus on this by validator nodes, relay nodes mirror this information (amount of burned tokens is included) to the destination network. There the corresponding amount is generated. Consensus about and relay of the collateral generation complete the process, which is ensured by the validator and relay nodes. If the process breaks off at any point, the tokens are generated again on the source network (rollback).

Another option is using smart contracts on both networks for the exchange, including freezing and releasing tokens. This solution works similarly to the one described above, but the tokens

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are not burned during the transfer. On the opposite side, wrapped tokens are created backed by real coins or tokens on their original public addresses. The Binance Smart Chain (BSC) Bridge provides an overview of these tokens as proof-of-assets for this purpose.

Option 2 of CrowdSwaps ATT uses an existing solution, as in the case of BSC Bridge. Unlike option 1, CrowdSwap loses control over the transfer options. In the case of BSC Bridge, there is a limit on volumes per day and address. Even if the sums currently on BSC Bridge seem sufficient, they depend on liquidity or proof-of-assets. These limits result in two potential problems for CrowdSwap when using such bridges:

1. The popularity can decrease, and with it, the deposited liquidity in the proof-of-stake.
2. On other networks, the deposited liquidity may be smaller and thus critically affect the transfer volume. Who provides the liquidity here? Are the incentives high enough?

Option 3: Atomic swaps represent another option. The concept is not new and is called a peer-to-peer network (P2P). There are participants on each side of the network who agree together to swap their tokens. Hash Timelock Contracts (HTLC)¹ ensure that no party can gain without sticking to the agreement.

Example:

Bob wants to transfer his ETH to the BSC network. Alice has BNB on the BSC network and wants to exchange it for ETH on the Ethereum network. Both will agree on the number of tokens for the exchange. Bob sends his ETH to an HTLC on the Ethereum network, Alice sends her BNB to an HTLC on the BSC network. Alice provides Bob with the public hash. Bob can now receive his BNB. By enabling Bob's HTLC, Alice now also gets the public hash and can receive her ETH. If Bob does not unlock within the time specified by the HTLC, both parties will get their money back.

¹ https://en.bitcoin.it/wiki/Hash_Time_Locked_Contracts,
<https://www.arxiv-vanity.com/papers/1801.09515/>

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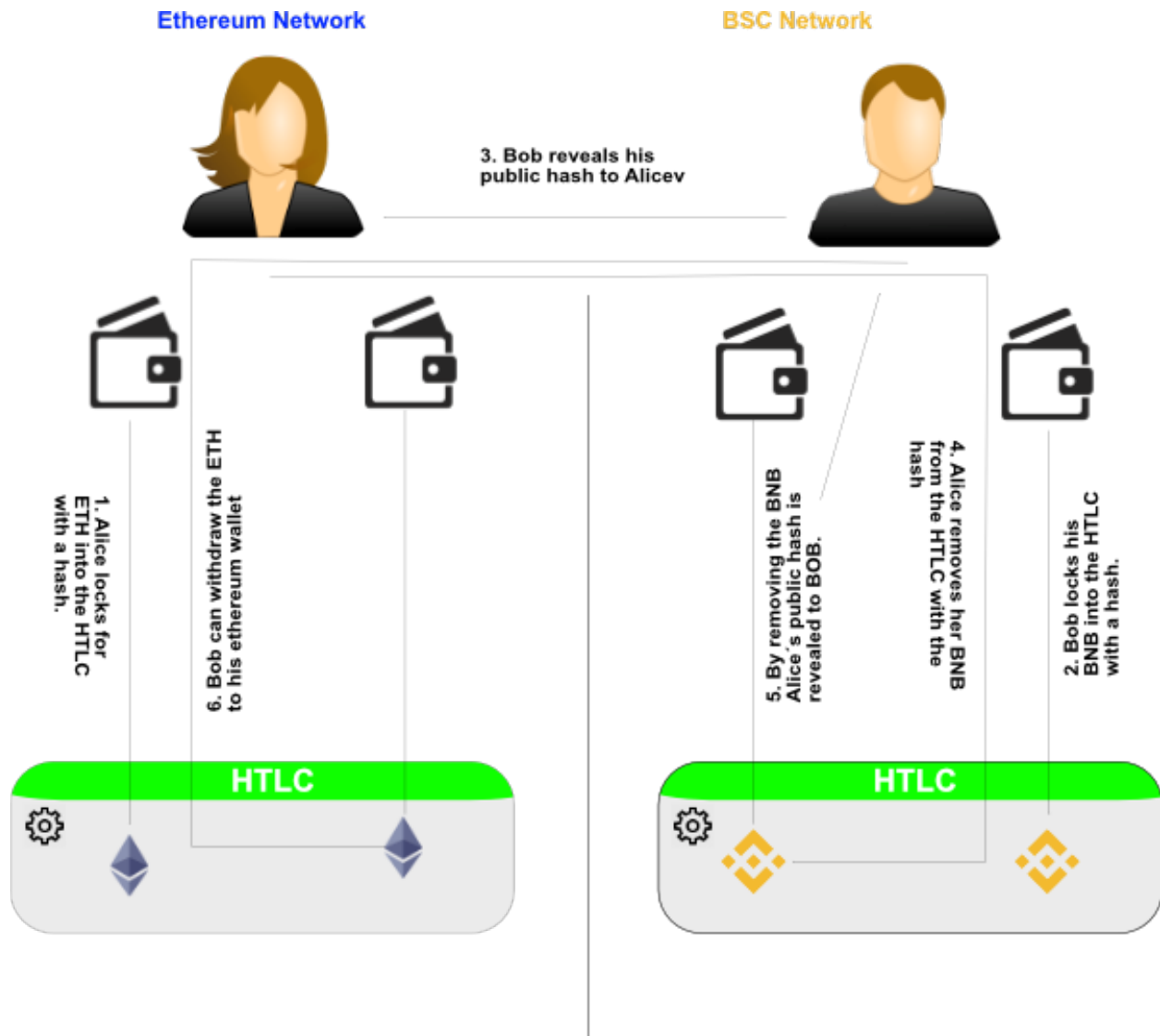


Figure 3: Atomic Swap (HTLC)

The concept can be extended to cross-chain LPs so that the network transfer can take place automatically. This concept creates marketplaces on various networks giving incentives with fees to provide liquidity for such a transfer. Atomic swap represents another option that does not require a consensus mechanism with independent players.

3.3.3. Duration

CrowdSwap's goal is to find the best price in the whole crypto universe and to be able to perform the swap easily and quickly.

While we can realize the best price finding and routing without significant effort, the exchange across network boundaries provides a new challenge that we have not yet considered. Namely time! In the dialogs of current DEXes, the information for a swap changes about every 5 seconds. In contrast, the scenarios described above for a transfer to another network can take several

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minutes. The time needed is partly due to the network's consensus mechanism and because the network providers want to limit the network swap. We assume that network providers will further reduce this duration in the future. However, CrowdSwap would like to go ahead here and show a way to overcome this hurdle.

Let's take the example from the beginning of the chapter.

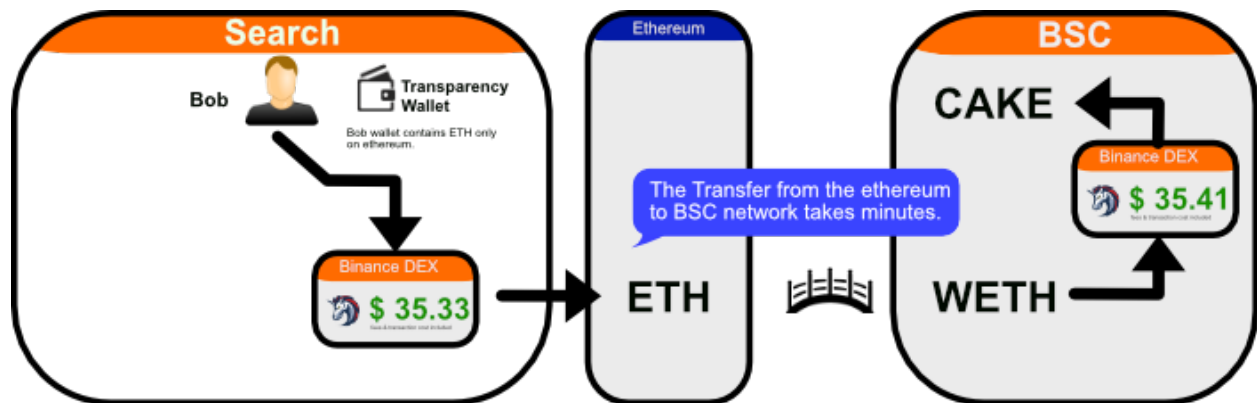


Figure 4: Reduction of Swap Duration

As already described, this attempt to perform a swap fails due to the duration of the transfer of tokens from Ethereum to BSC network. In the time it takes for the network transfer, the price has changed to Bob's disadvantage. We need a solution that significantly decreases the time it takes to deploy the tokens on the target network.

The solution must execute the swap option directly and simultaneously ensure that the collaterals involved remain accessible to the transaction owners and that no one involved can gain an advantage over the other party.

The user can execute the swap directly if he owns tokens on the target network. If this is not the case, a transfer must first take place. For this purpose, we make use of a tool known as liquidity pools (LPs). However, in our solution, the LP's pairs are not on a network.

Therefore, the process is bipartite, but also atomic following the findings from "Atomic Cross-Chain Swaps"². Bob transfers his ETH and destination token information into the HTLC smart contract of the CrowdSwap LP. Then an event is used to relay to the BSC network. CrowdSwap's liquidity pool transfers the corresponding number of BNB to Bob's wallet. This event ultimately performs the posting of ETH from the HTLC smart contract to the LP. If the transaction fails, Bob will receive his ETH back from the HTLC after expiring. **The transaction is therefore not advantageous or disadvantageous for any party and is self-contained.**

² Atomic Cross-chain swaps (Maurice Herlihy) <https://arxiv.org/pdf/1801.09515.pdf>

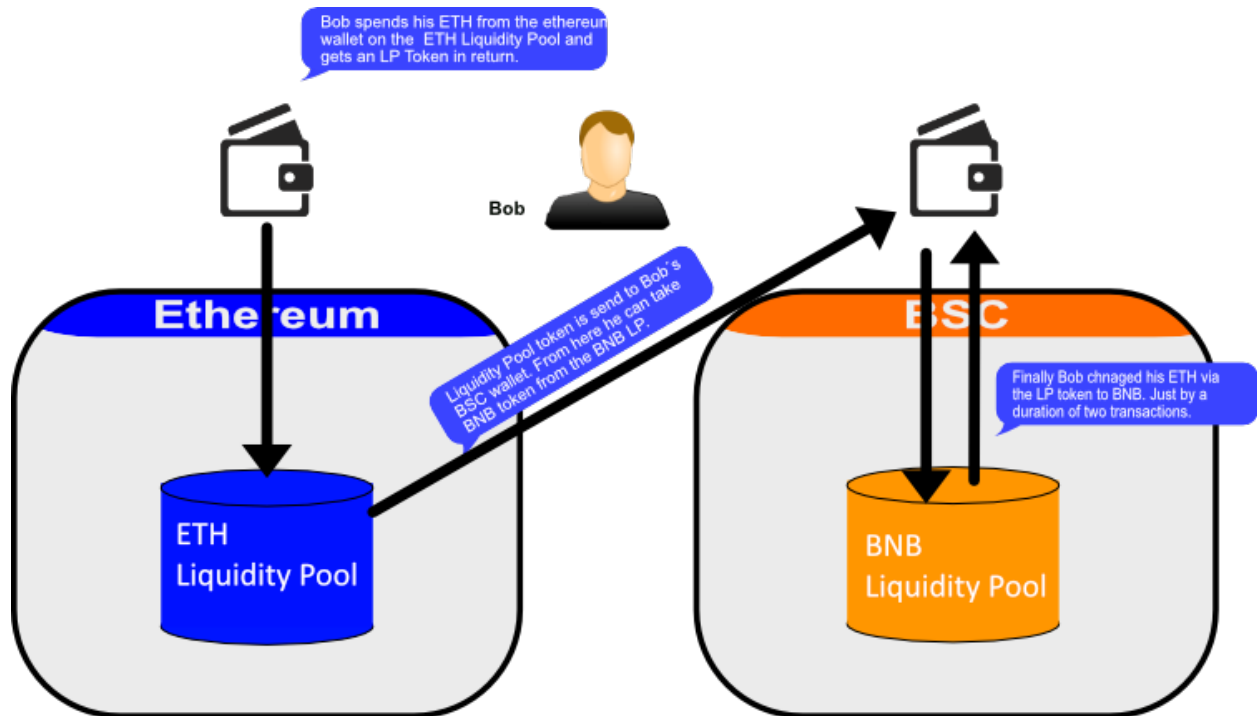


Figure 5: Token transfer zwischen Netzwerken mittels Liquidity Pools

For the definition of atomicity and the consideration of the different cases, we refer to the document "Atomic Cross-chain swaps"³. It describes the above points in detail and gives proof of their validity.

3.4. Wallet Manager

Based on the solution shown for swapping tokens across network boundaries, the required wallet's question naturally arises. If we go back to Alice's example from ATT, then Alice needs cryptocurrencies on the BSC network to benefit from the lower overall price. For experts and advanced users, it is no problem to configure the BSC network in the wallet app and switch it before the swap. However, this group would certainly also appreciate an improved intelligence of the best price discovery and routing.

We, therefore, envision an extension for existing wallets that allows CrowdSwap to access configured networks of all known wallets of a user. The result would return an optimal best price not only in search but also a simple swap afterwards.

The Wallet Manager represents the tokens that exist across all networks. The search utilizes this information to determine the best price for a swap.

³ Atomic Cross-chain swaps (Maurice Herlihy) <https://arxiv.org/pdf/1801.09515.pdf>

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Furthermore, avoiding unnecessary cross-chain transfers, which would cause further costs for the user.

The Wallet Manager is easy to configure and does not require proof of identity. However, the user also has the option of using name services to organize the different wallets.

3.5. Best Price Routing (BPR)

Best Price Routing (BPR) provides the basis for a lucrative swap and is the core of CrowdSwap. Based on on-chain data, the BPR always finds the best price. The best price is always calculated with all ancillary costs, as CrowdSwap attaches great importance to transparency.

How does the BPR find the best price?

The on-chain data provide all the information it needs to find the best price. This data has the knowledge of the liquidity pools (LPs) of all connected DEXes. There are several ways to swap token DAI and UNI. The simplest solution would be to give DAI to the DAI-UNI pool and get UNI in return.

However, **the obvious is not always the best solution**. Other possibilities would be to swap across multiple LPs. The following examples have been frequently observed here in the past.

DAI -> ETH -> UNI

DAI -> USDT -> UNI

DAI -> USDC -> UNI

Why is that the case? And aren't there higher fees here?

To answer the 2nd question first. Yes! There are DEX fees associated with each pool. It is a concern for the DEXes and the LP-providers that swaps make heavy use of the LPs.

However, this is not the only reason. A route build of several pools might also be the cheapest and most stable. For this, one must know how LPs work. Here we refer to the Internet and the numerous sources on LPs and AMMs.

At this point, a small example should help. We assume that LPs always consist of 50% token A and 50% token B. For simplicity, let's take stablecoins DAI and USDC with an intrinsic value of 1 USD. When creating the LP, we need to deposit the same number of both tokens.

$$\text{Preise: } DAI = \frac{1000 \text{ USDC}}{1000 \text{ DAI}} = 1 \text{ USDC}$$

$$\text{Preise: } USDC = \frac{1000 \text{ DAI}}{1000 \text{ USDC}} = 1 \text{ DAI}$$

If we now make a swap e.g., 10 DAI/USDT. Then we get 10 USDT for it. The pool has changed and now has the following quantities and prices: 1010 DAI / 990 USDC

$$\text{Preise: } DAI = \frac{990 \text{ USDC}}{1010 \text{ USDC}} = 0,98 \text{ USDC}$$

$$\text{Preise: } USDC = \frac{1010 \text{ DAI}}{990 \text{ USDC}} = 1,02 \text{ DAI}$$

In addition to the quantities in the pool, the prices of the individual tokens also change. The behavior of price changes bases on the illiquidity of a pool. **This small example alone is the reason why an exchange via different routes can bring better results, even if this generates higher ancillary costs.**

However, our small example also provides the approach for the BPR. In our first swap, we still received 1 USDT for 1 DAI. However, in a second exchange, we would only receive 0.98 USDT. On the other hand, we now receive 1.02 DAI for our exchange of 1 USDT. We can take advantage of this added value in other DAI pools, since they probably still value DAI at 1USD. Thus, **the algorithm creates best price routings that guarantee users a more significant amount of tokens in the end.**

Finding the best routes is CrowdSwap's most crucial task. We start on separated networks with ethereum and binance smart chain. The goal is to find the best routing across all available networks.

3.6. On-chain data analysis

The significant advantage of decentralized finance is that the transaction data is openly available to everyone. On-chain data delivers essential insights, which CrowdSwap also uses and needs for its various functions and features.

Especially for best price routing, the information on liquidity pools is the crucial basis. Advantages can be achieved via these when exchanging tokens, which would be pure coincidence without the knowledge of this data.

Furthermore, CrowdSwap collects data on general anonymous user behavior, which will impact the various offers in the future. We already know that other use cases for CrowdSwap where on-chain data will extract an advantage for our users.

4. Business

CrowdSwap provides the simplified exchange of **tokens and coins at the current lowest price in the DeFi universe**. This service will impose a small brokerage fee on each user, assessed on the total volume of the exchange.

Furthermore, CrowdSwap offers a subscription plan that reduces the fees for each swap. This plan is exciting, especially for active users. Besides, CrowdSwap offers further premium services in the subscription, which are paid accordingly in Crowd Tokens.

CrowdSwap distributes fee profits to the chapter Fee Distribution - distribution scheme to the respective areas.

CrowdSwap also acts as a liquidity provider in the market to establish optimal swap conditions. For the cross-network swaps, CROWD are tokens or cross-chain LPs that CrowdSwap must initially service to facilitate third-party entry.

CrowdSwap will use the opportunities of the DeFi market itself to optimize profit through its platform. The trading strategies used will later be integrated into CrowdSwap as premium services, offering users further trading opportunities.

5. Architecture

The products described above combine to form an overall architecture, which we outline in this chapter. It serves as an overview, and we refer you to the individual chapters on the different architecture areas.

The figure shows the composition of the various components, as they are described in the individual chapters. For example, the Search App is based on the BPR layer, which is also responsible for best price determination. The Wallet Manager provides essential information for finding the best price for the user's initial situation using BPR. If the user does not own any cryptocurrencies yet, we will guide him through the onboarding process with the ramp-on provider's support.

For the swap itself, it may be necessary to transfer tokens from one network to another. CrowdSwap uses the atomic token bridge to achieve this. We implement different solutions of bridged and atomic swaps here to prepare for future scenarios.

The architecture describes the components that are currently in the scope of the project. We add additional features successively, which have already been touched upon in the chapters, such as simplified trading models or the consideration of on-chain data analysis to enhance swapping optimization, usability and user experience.

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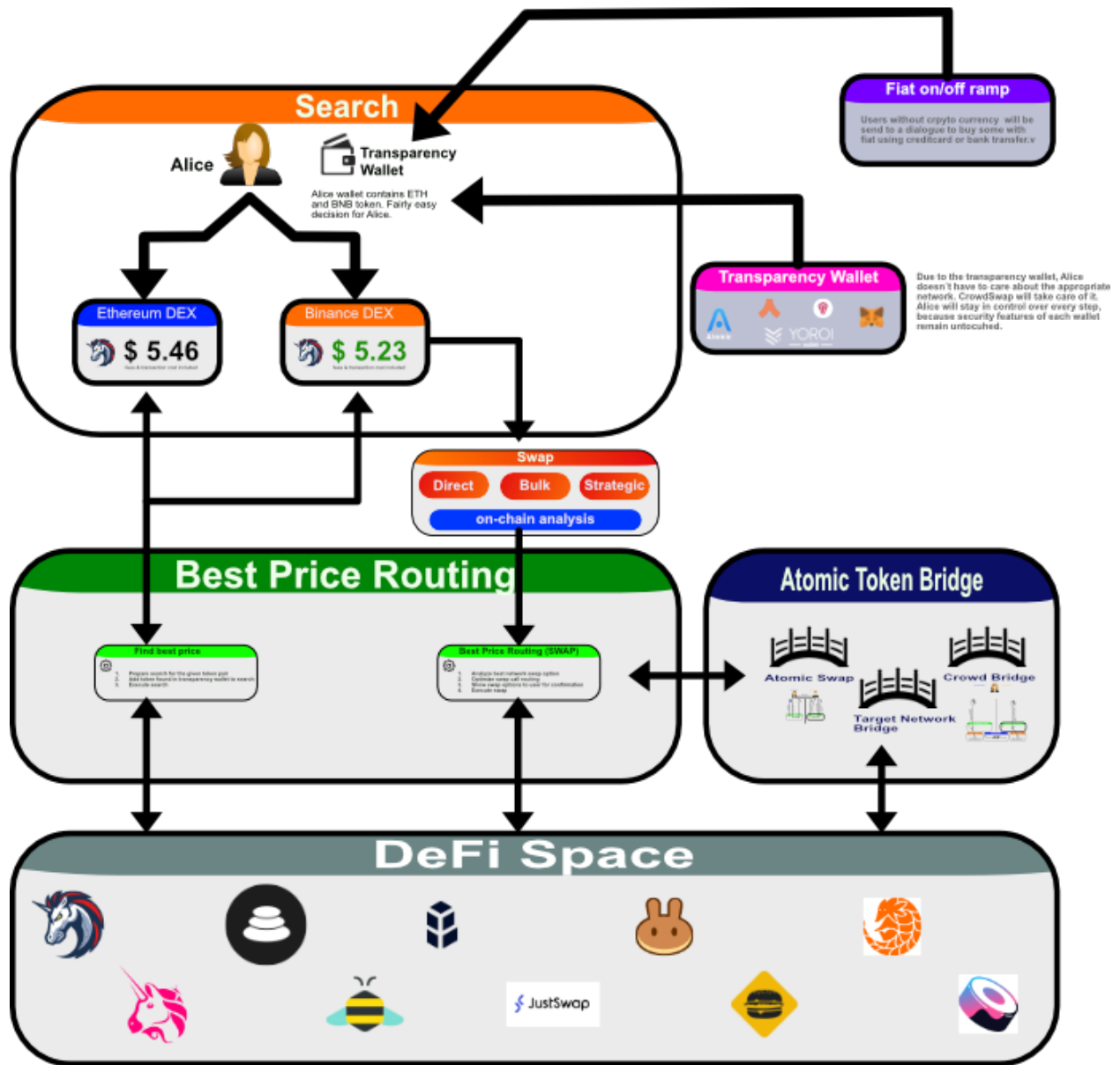


Figure 6: CrowdSwap Architecture (lite)

6. Tokenomics

Tokens are crucial to any project. At CrowdSwap, we have a fixed total supply of **100,000,000 CROWD tokens** that fund the CrowdSwap mission.

For the cross-chain transfer, we need liquidity in most cases (options 1 and 3 from 3.3. ATT). This liquidity will be provided mainly by third parties. At the start, CrowdSwap will use its own liquidity. The project's success requires investors who see CrowdSwap as a long-term investment. Due to the fees' distribution structure, **the CrowdSwap token is deflationary**, as every month, we burn a percentage of the fee income in CrowdSwap tokens. **For investors, this means further stability of your investment.**

Besides, **users can stake crowd tokens, for which the stakers receive a share of the profit** from the fees. Furthermore, the percentage of staked tokens is used in the Government process when CrowdSwaps asks all stakeholders to decide on voting, feature request, prioritization and changes. **We believe that the decision of many is always better than that of a few.**

Also, CrowdSwap offers value-added services that we outlined briefly in the Swap chapter of this whitepaper. More such services will also emerge in the Search App space. These premium services will be paid for via crowd tokens, offering everyone the opportunity to participate in these premium services at a low cost.

For stakeholders, the premium services are offered at a lower price and can be paid automatically from the staking revenues.

6.1. Initial Distribution

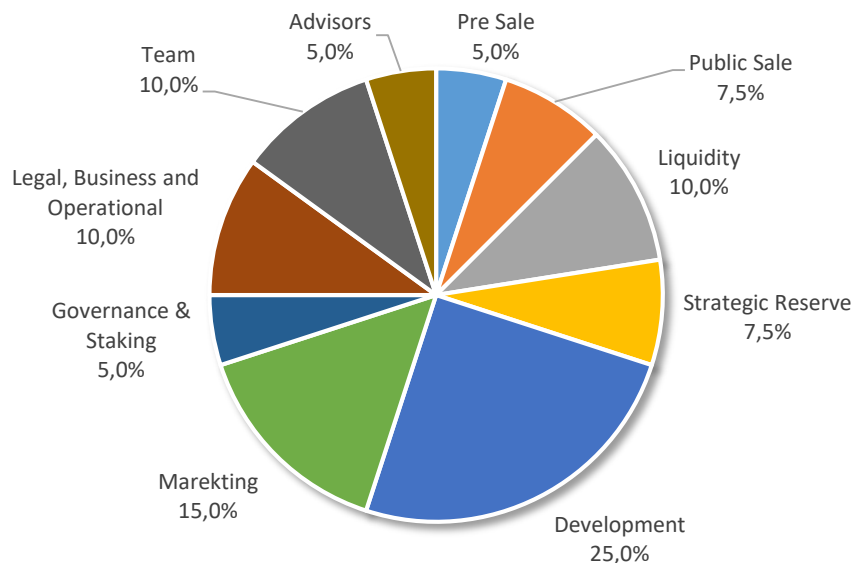


Figure 7: Token Distribution

CROWDSWAP

Every project needs money to be part of the change. At CrowdSwap, we aim to follow sales with vesting durations for the investors' pre-sale, team, and advisors.

Tokens bought in the pre-sale phase have to be kept for three months. 10% can be sold after this period and another 10% after six months. After one year of the treasury, owners can sell the tokens ultimately.

There are no restrictions for public sale tokens, in any case. They can resell directly after purchase. However, we believe that the CROWD token is a good investment.

There is also a three-month holding period for the team and its advisors. After that, the owners are allowed to dispose of 10% of the tokens freely. After another three months, the rate increases to 25%. With one year gone, a total of 65% can be disposed of freely. There is no longer a commitment to the holding period after two years.

You can find an overview of the CROWD token's free availability based on two years in this chart.

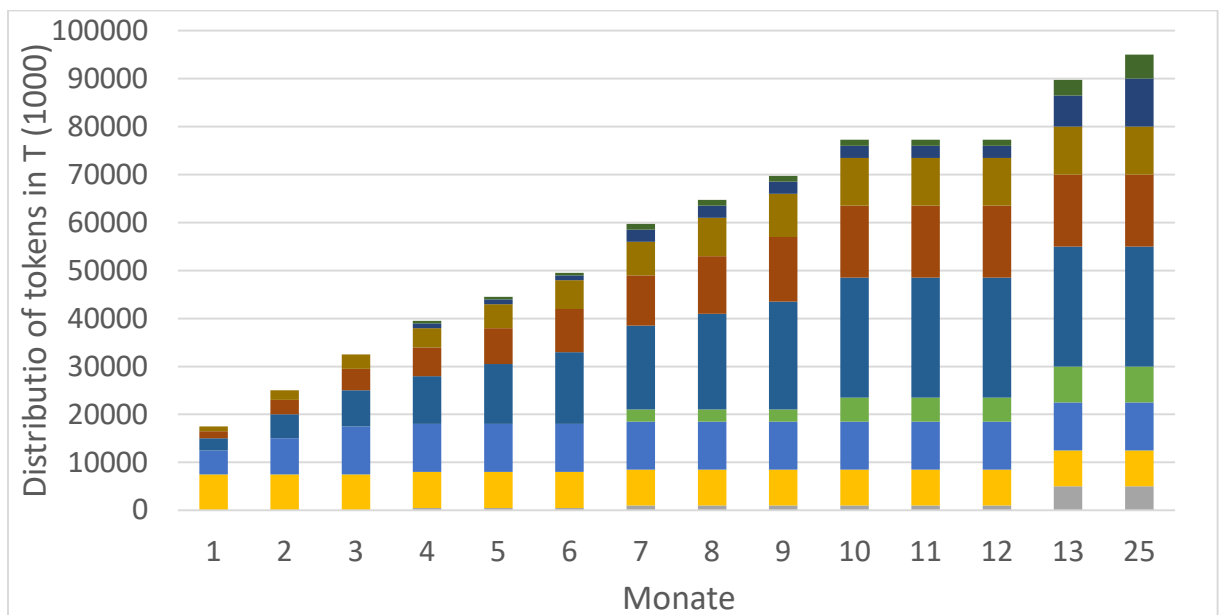


Figure 8: Distribution CROWD token over time

6.2. Development

Development is the heart of CrowdSwap and the place where people implement the project's goals so that everyone can benefit from it. For blockchain projects, in particular, talented, visionary and competent developers, are always hard to find. Even more critical for the success of a project is to keep the developers in the team.

In addition to the entire team's intrinsic motivation, the project's success is also an essential cornerstone for its stability. The development budget ensures the best conditions for a successful project based on competence, flexibility and agility, and a low turnover in the team.

6.3. Governance & Staking

Everybody who is staking more than 5.000 CROWD tokens for at least one month is allowed to take part in governance activities that can be subject to various topics, e.g.:

- Fee distribution,
- Feature request,
- Roadmap changes.

6.4. Marketing

One of our goals is to bring more people into crypto. The barrier to get involved is increasing as this sector moves forward at a high pace. CrowdSwap not only has an easy-to-use UI for newbies in the space, but we also want to spread knowledge and inform people about unique new possibilities. The marketing portion is well defined to secure our mission. Our fees guarantee that our marketing budget is always healthy.

6.5. Legal, Business Operational

A great effort in many different areas needs to be organized and valued. This part of the distribution secures the functioning of the project.

6.6. Advisors

Advisors play a significant role in every project. They are the ones who question everything, who are sometimes annoying to no end, and yet have precisely the same goal. They secure the success of the project. At the same time, the advisors push the project through their participation. The performance of the advisors is entitled to a rightful part in the success.

6.7. Team

The team has put much time, commitment, and hardship into the project in the past. The team should contribute to the further development of CrowdSwap for as long as possible. The token distribution to the team ensures that CrowdSwap has the happiest team members.

6.8. Sales

Sales is divided into two categories pre and public sale. The pre sale phase is for investors, who want to get in early. Mostly these are venture capital companies or private investors that are in the crypto space for a long time and know what to look out for 5 million tokens are available for the pre sale phase.

Public sale will happen through a launch pad partner to ensure that everybody can get their share at a fixed price. After the launch pad offering CrowdSwap will provide liquidity on the decentralized exchanges. At this point in time the price of the CrowdSwap token is defined by the market. 7.5 million tokens are given to the launch pad sale.

6.9. Liquidity

10 million tokens are reserved to provide liquidity on the different networks. Due to the cross-chain approach, we need to provide sufficient liquidity on not only the ethereum network. Crowd Tokens are utilized to drive the atomic token transfer to other networks.

6.10. Strategic Reserve

Strategic reserve as its name says is kept for opportunities that might arise on the path CrowdSwap is going. We have seen many issues come up that nobody thought about a couple of years before. This sector is moving very fast and the unexpected happens more often than not. But this is not only true for issues, the strategic reserve might also come in handy to fund interesting projects, that improve CrowdSwap's features.

6.11. Fee Distribution

6.11.1. Fees

Without fees, this project would not survive very long. **CrowdSwap takes fees on every transaction, ensuring that the overall costs must a lot be cheaper than a swap at, e.g., Uniswap.** Finding the best prices, including fees, is one of our main goals.

If users hold CROWD tokens, these can reduce fees significantly.

6.11.2. Burn

With the revenue of the fees, **CrowdSwap is burning 10% of the CROWD tokens**. The burning of tokens supports the token's **price stability and secures investment and attractiveness** in the CrowdSwap project. As mentioned in the beginning, we aim to give people the chance to make life-changing profits. See the diagram below for the distribution of the fee revenue.

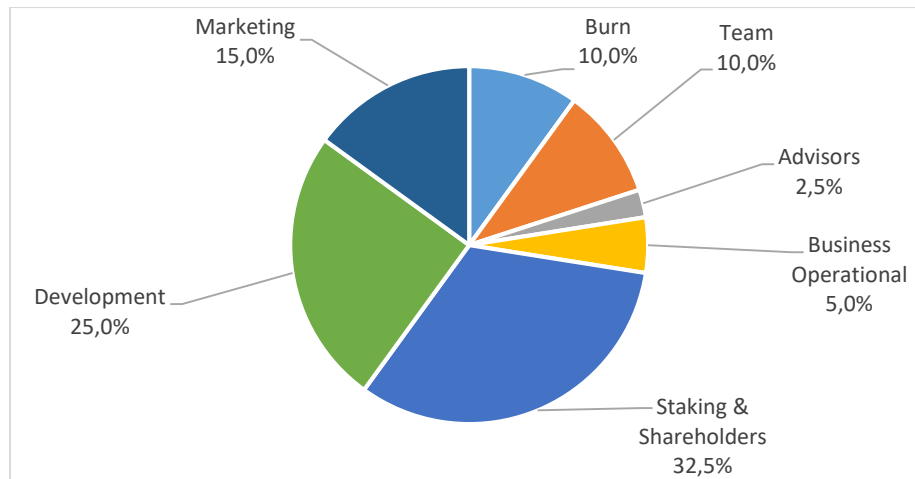


Figure 9: The distribution of the fee revenue is subject to change as part of the governance system.

6.11.3. Development, Marketing and Business Operational

As with the token distribution, we have also stuck to the percentage values here. Only Business Operational receives 5% instead of 10% because we assume that we can reduce the costs significantly over time. On the other hand, in the area of development and marketing, we see the reinvestment of revenues as an immediate increase in the value of CrowdSwap.

6.11.4. Advisors and Team

The advisors and the team will continue to take on critical tasks after the start of the project and ensure the success of CrowdSwap. For this purpose, we distribute a total of 12.5% of the revenues to these parties.

6.11.5. Staking & Shareholders

The most significant part of the distribution goes to the stakers. 32.5% of the fees are distributed based on a daily settlement and presented as interest in CrowdSwap. We project the interest to an annual percentage rate that changes daily.

7. Partnerships

Partnerships secure our mission goals to a great extent. Without DEXes, CrowdSwap had no place to exist. We embrace partnering with any project trying to achieve our goals. CrowdSwap needs to adapt fast to new situations and circumstances. With partnerships, we reach our goals more quickly. We planned a strategic reserve for alliances already.

One of the first partnerships to be made is the integration of a fiat on-ramp provider. This partnership helps CrowdSwap to onboard everyone that has access to a banking account or credit card. No need to do additional KYC on central exchanges.

8. Roadmap

Q2 - 2021

- MVP CrowdSwap Search & Swap
 - o Ethereum DEXes
- Website Launch

Q3 - 2021

- Search & Swap
 - o Integration of more Ethereum DEXes,
 - o BSC network DEXes
- Best Price Routing
- Token Launch
- Wallet Manager

Q4 - 2021

- Atomic Transfer Bridge Integration
 - o Crowd Token Bridge
- Staking CrowdToken
- Start on-chain data analysis

2022

- DAO Governance
- Integrate Ramp on/off provider
- Trading Strategies (Premium service)
- Integrate on-chain
 - o best price analysis and user-friendliness
 - o market predictions (Premium service)

CrowdSwap

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