

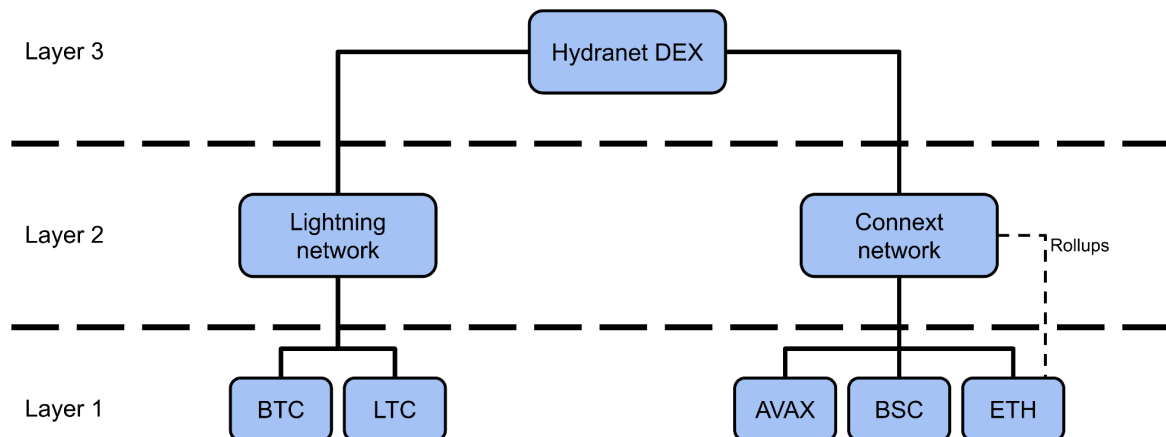
# Hydranet DEX Wiki



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# What is the Hydranet DEX and how does it work?

The Hydranet Decentralized Exchange (DEX) is a Layer 3 trading platform pioneered by Hydranet DAO. It combines Layer 2 off-chain solutions, such as the Lightning Network and the Connex Network, to enable cross-chain trading of fundamentally different cryptocurrencies. Trades are executed fast, cheap, and most importantly, trustless, as all users are always in control of their funds. Use this informative page to learn more about the distinctive features of the Hydranet DEX and how it works!



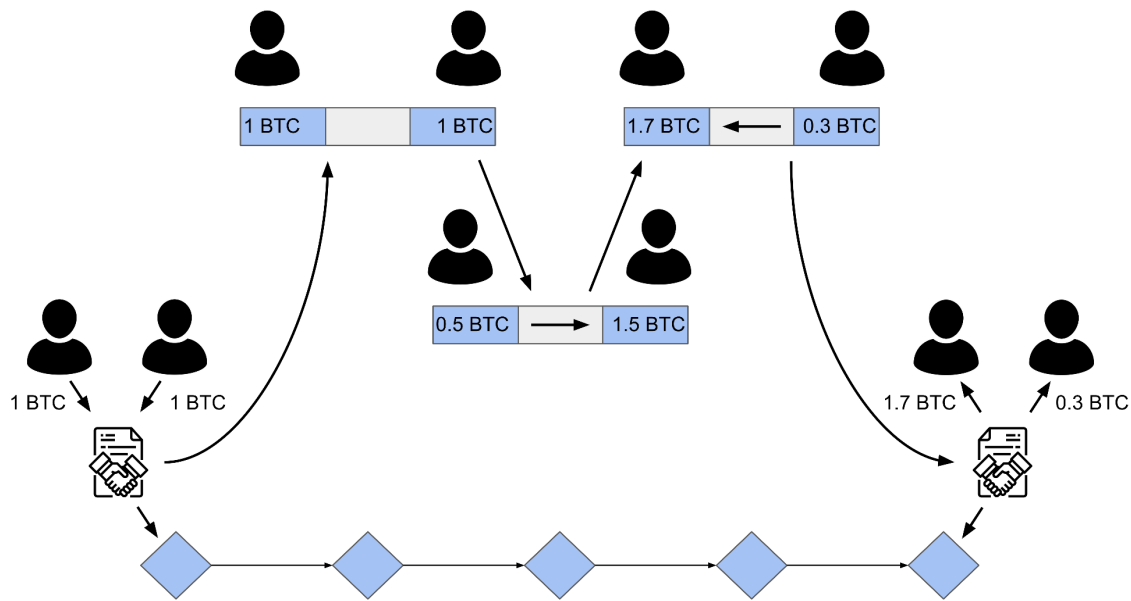
## The basics of Layer 2 off-chain trading

Before we delve into how the Hydranet DEX works, we need to understand the basics of off-chain trading. Off-chain trading makes it possible to cluster dozens of trades into only a few on-chain transactions. The Bitcoin and Ethereum blockchains both have their own off-chain technologies being worked on by several different actors. The fundamentals of both technologies are however principally the same.

To trade off-chain, there must exist a payment channel (state channel for Ethereum) between two transacting parties. This payment channel is created by the two parties depositing funds into a multi-signature contract. Since the contract runs entirely on the blockchain there is a network fee associated with this operation, but the two parties will always remain in custody of their funds.

With an open payment channel, the two parties trade by sending signed instructions on how to claim the funds (all, or parts of it) locked in the multi-signature contract. The instructions require no confirmation by the blockchain and are therefore virtually instant and feeless.

If any of the two transacting parties run out of funds but want to trade more, the trader can simply increase the capacity of the payment channel by locking more funds in the multi-signature contract. When either party is done transacting, the payment channel is closed and settled on-chain. The latest state/balance of the payment channel is then sent to the multi-signature contract to unlock each party's rightful share of the total funds locked in the contract.



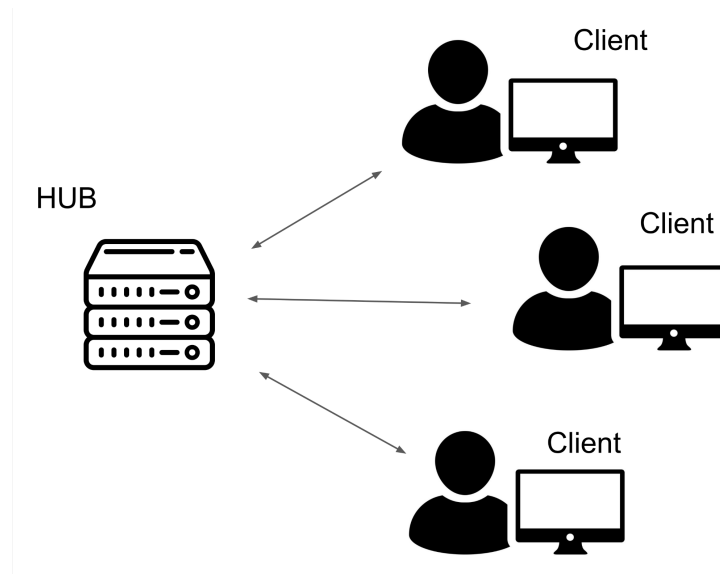
Although payment channels are typically opened between only two transacting parties, the parties can reach virtually anyone in the off-chain network. As long as you have your receiver's payment channel information, you can use other users' payment channels to route your transaction to your receiver. This way, you can avoid opening unnecessary payment channels and the cost associated with it. Consider the example in which both Alice and Bob have open payment channels with Charlie. Alice owes Bob 1 BTC and figures she could use the Lightning Network to wire Bob his funds. Alice and Bob do not have a payment channel open between them, but because both of them have open payment channels with Charlie, they can use Charlie to route their payment. Alice will send 1 BTC to Charlie, and Charlie will send 1 BTC to Bob. Charlie will not have to do anything, and will probably not be aware that Alice sent BTC to Bob via him.

So, in short, what are the benefits with off-chain transactions?

- Off-chain trades require no confirmation on the blockchain, which paves for fast and cheap trading while mitigating on-chain congestion.
- The transaction history of the payment channel will only be known to the transacting parties, which increases privacy. Only on-chain activities are publicly visible.

## The Hydranet DEX solution

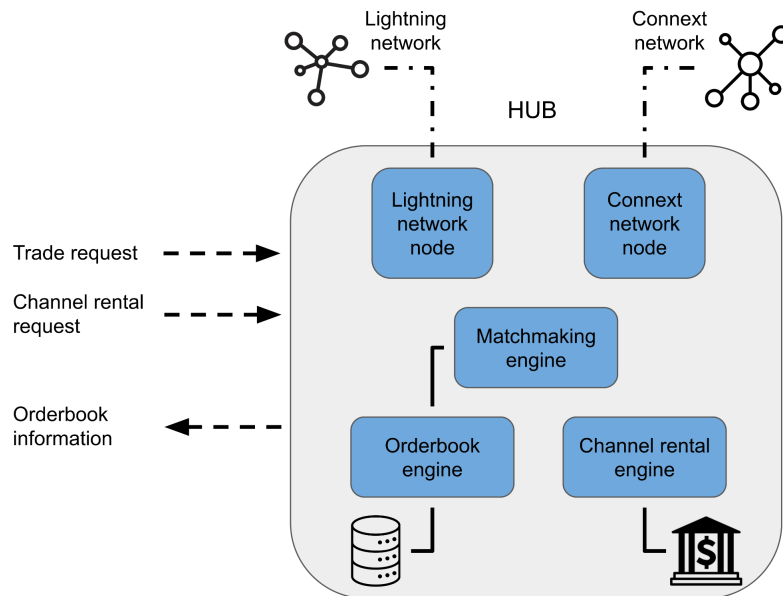
The Hydranet DEX consists of two types of communicating nodes; HUBs and Clients. While the Clients are what the traders interact with, the HUBs are the vital elements that enable Clients to trade.



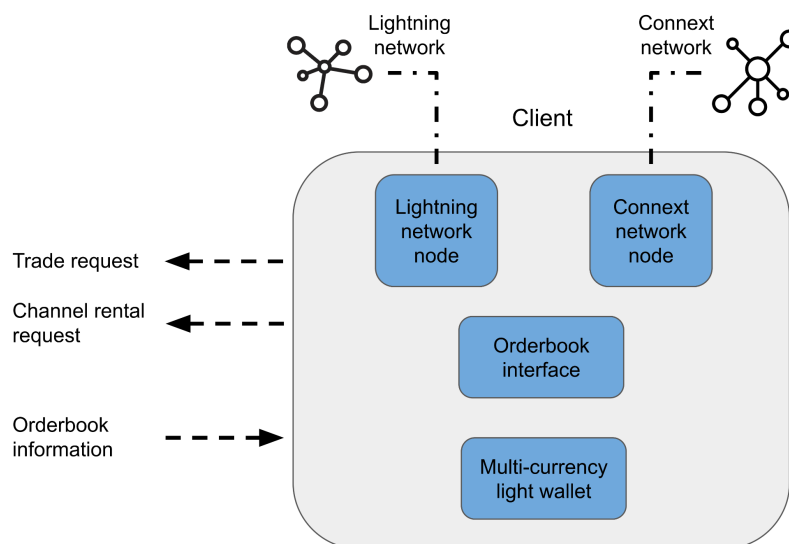
The HUB is a complex piece of technology, but is essentially nothing more than a matchmaker. A HUB includes the following main components:

- Lightning Network node
- Connex Network node
- Orderbook engine
- Matchmaking engine
- Channel rental engine

The Lightning and Connex nodes are the HUB's gateway into the Bitcoin and Ethereum Layer 2 off-chain networks. Without the nodes, it would not be possible to open payment channels to/from other traders in the off-chain networks. The orderbook engine tracks and controls the trade orders instantiated by the Clients in the Hydranet DEX. It stores and runs the Hydranet DEX orderbook locally, and forwards the information to the Clients in the DEX network. The Matchmaking engine is the functionality that matches two transacting Clients. When a Client creates a trade order, the Matchmaking engine scans the local database for a match. If a match is found, the Matchmaking engine connects the two transacting Clients, if not, the order is stored locally in the HUB's Orderbook engine and will be displayed on the Clients' orderbooks. Lastly, the Channel rental engine is used by Clients to open payment channels for the currency they want to receive. Remember, to open a payment channel, the user must deposit funds into a multi-signature contract. If the user lacks these funds (which is probably the case when the user wants to buy a specific currency for the first time), the user will not be able to open the payment channel. To solve this, the Clients in the Hydranet DEX can rent liquidity from the HUB to open a payment channel with which the Client can receive funds.



The Client is the trader's gateway into the Hydranet DEX. It is a downloadable desktop application that runs its own Lightning and Connext nodes for access to the Bitcoin and Ethereum Layer 2 off-chain networks. The Client mainly consists of a Multi-Currency Light Wallet (MCLW) and a classical orderbook. In the MCLW, traders can store their funds and control the on- and off-boarding of funds to the Lightning and Connext networks (opening and closing of payment channels). With funds on the off-chain networks, the trader can use the orderbook to trade with other Clients in the Hydranet DEX.

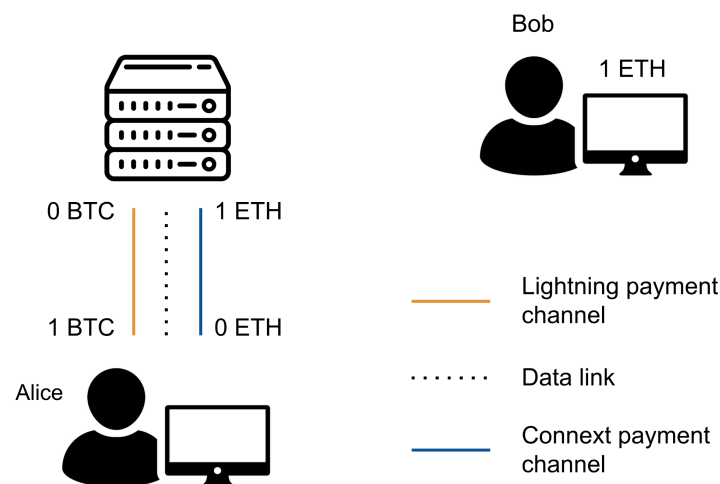


A trade executed on the Hydranet DEX is essentially the same thing as a transaction made on a payment channel, but with some help from the HUB. When two Clients match for a trade, the HUB connects these Clients and assures that both of them receive all necessary information about the other Client and about the trade order (Lightning channel ID, Connext channel ID, Client ID, order ID). When the Clients are connected, the HUB is not needed anymore, the Clients will manage the remaining steps of the trade by themselves. Safety

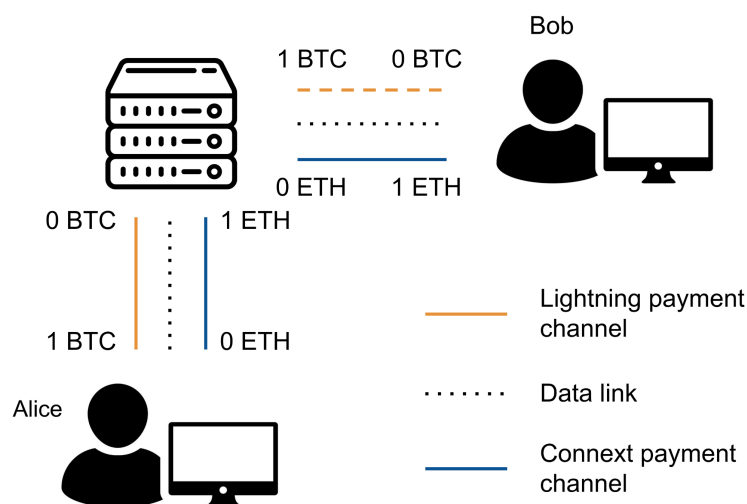
and protection from malicious acts becomes a relevant topic at this instance. Neither Client wants to end up in a situation in which they have sent funds to the other Client but not received any funds back. To ensure that this does not happen, the Hydranet DEX uses [hashed time-lock contracts](#) (HTLC) for the trades between Clients. A HTLC is a type of smart contract used for trading in decentralized payment systems. The two trading Clients will send their funds to the HTLC. The HTLC contains all the details about the trade and will only release the funds if the conditions for the trade are met. If either Client fails to meet the conditions, either by not sending the agreed upon funds to the HTLC or simply taking too long to send that agreed upon funds, the funds in the HTLC will be returned to its proprietors. This solution provides security for both Clients in the trade and enables trustless trading between them.

To get a better understanding of what happens when a trade is performed using the Hydranet DEX, you can study this fictive trading scenario:

Alice wants to trade her 1 BTC for 1 ETH. She is a long-time user of the Hydranet DEX and already has open payment channels with the HUB in the Hydranet DEX. Conveniently the states of her payment channels allow her to send 1 BTC and also receive 1 ETH. She is in no hurry with her trade and decides to place a limit order on the Hydranet DEX. When she places the order, her Client sends the information to the HUB. The HUB Matchmaking engine scans its local database for matching orders, but cannot find one. The information about Alice's order is therefore stored in the HUB's local database and is also forwarded to the Orderbook engine, which displays her order on the orderbook.



Bob, a Bitcoin fanatic, has miraculously found 1 ETH laying around in his wallet. He wants to trade this 1 ETH for 1 BTC and decides to try the Hydranet DEX for this operation. He downloads the Hydranet DEX Client, deposits his 1 ETH to the Client, and is now ready to begin his trade. Bob starts by opening a Connex state channel, which will allow him to send his 1 ETH. Since he wants to receive 1 BTC, he rents liquidity from the HUB and opens a Lightning payment channel. He navigates to the order book and finds the limit order placed by Alice. He decides to place a market order and completely fill Alice's order.



As Bob presses *buy* on his Client, the information is sent to the HUB. The Matchmaking engine in the HUB scans its local database and finds Alice's order. It's a match! The Matchmaking engine sends Alice's information to Bob and Bob's information to Alice (Lightning channel ID, Connex channel ID, Client ID, order ID), which allows their Clients to connect. Before the trade is executed, Alice's and Bob's Clients validate that the trade is correct (currency and amount). If nothing malicious with the trade is found, the Lightning and Connex transactions take place.

The trade is finished! Alice and Bob can now decide if they want to continue their trading journey on the Hydranet DEX or if they want to close their respective payment channels and unlock their funds from the multi-signature contracts.

## Why use the Hydranet DEX and how does it differ from other exchanges?

There are multiple reasons to use the Hydranet DEX. Today, cryptocurrency traders typically face a dilemma with security, privacy, and ease of use. To stay safe, traders can keep their funds in their self-custodial wallets but are then faced with a slow, unintuitive, and potentially expensive trading experience. The limited scalability of common blockchains, such as Bitcoin and Ethereum, is usually the underlying reason for these issues. Traders can turn to Centralized Exchanges (CEX) for a more seamless and cheaper trading experience, but at the expense of giving up custody of their funds. Major controversies happen and will continue to happen within the cryptocurrency industry. Keeping control of your funds is one way to protect yourself! The phrase "not your keys, not your coins" cannot be stressed enough!

The Hydranet DEX solves the "trader's dilemma" presented above. The Hydranet DEX offers an orderbook on which traders can place limit and market orders, and a built-in wallet in which they can safely store their funds and be in complete control of their private keys. All trades made on the orderbook are executed off-chain using well-known and established Layer 2 off-chain solutions. This makes them virtually instant, feeless, and private. The Hydranet DEX infrastructure furthermore combines different Layer 2 off-chain solutions to allow trades of fundamentally different cryptocurrencies, such as BTC and ETH. This makes

the Hydranet DEX the world's first true Layer 3 DEX. In short, the Hydranet DEX offers a trading experience as seamless and cheap as a CEX, and as private and secure as a DEX, trading nothing but native funds!

Except for the evident differences between the Hydranet DEX and other exchanges, there is one key feature that makes the Hydranet DEX unique. At other exchanges, all the computationally intensive operations are typically done at a single centralized place. Although the HUB in the Hydranet DEX is important for transaction handling, its main task is to be a mediator between the different Clients that exist in the Hydranet DEX. When two Clients are connected for a trade, the HUB is in fact not involved anymore. The trade validation and execution are done entirely by the Clients. Since a Client will most likely not do more than a few trades per second, combined with the Layer 2 off-chain solutions, the Hydranet DEX can theoretically scale indefinitely.



# The Hydranet DEX Client

*If you are opening the Hydranet DEX Client for the first time you will have to set a password for your wallet and backup the wallet's seed phrase. Make sure to choose a strong password and, as always, never share your password nor the seed phrase with anyone!*

*The menu in the Hydranet DEX Client gives access to the following 4 pages:*

*\*Portfolio*

*\*Wallets*

*\*DEX*

*\*Swap*

*You find the menu on the left-hand side after you have opened your Client.*

## Key concepts

Before further exploring the different areas in the Client, there are a few concepts that may appear continuously in the Client and in this description:

### **Payment (State) Channel**

Refers to an off-chain transaction channel, also known as a Payment channel (Lightning Network) or a State channel (Connext Network). A channel is opened between two transacting parties by locking funds on-chain via a multi-signature contract. The Hydranet DEX Client helps you with this process. The capacity of the channel is determined by the amount of funds the parties lock on-chain.

### **Rental channel**

To open a payment channel it is required to lock funds on-chain. Funds that you probably don't have when you intend to buy a certain currency. To enable you to open a payment channel you can rent funds from the HUB. This will give you an open payment channel with a can receive balance.

### **Can receive**

The amount that you can receive on your payment channel. To increase the amount you can rent liquidity from the HUB.

### **Can send**

The amount that you can send via your payment channel. To increase the amount, move more funds from your on-chain balance to your off-chain balance.

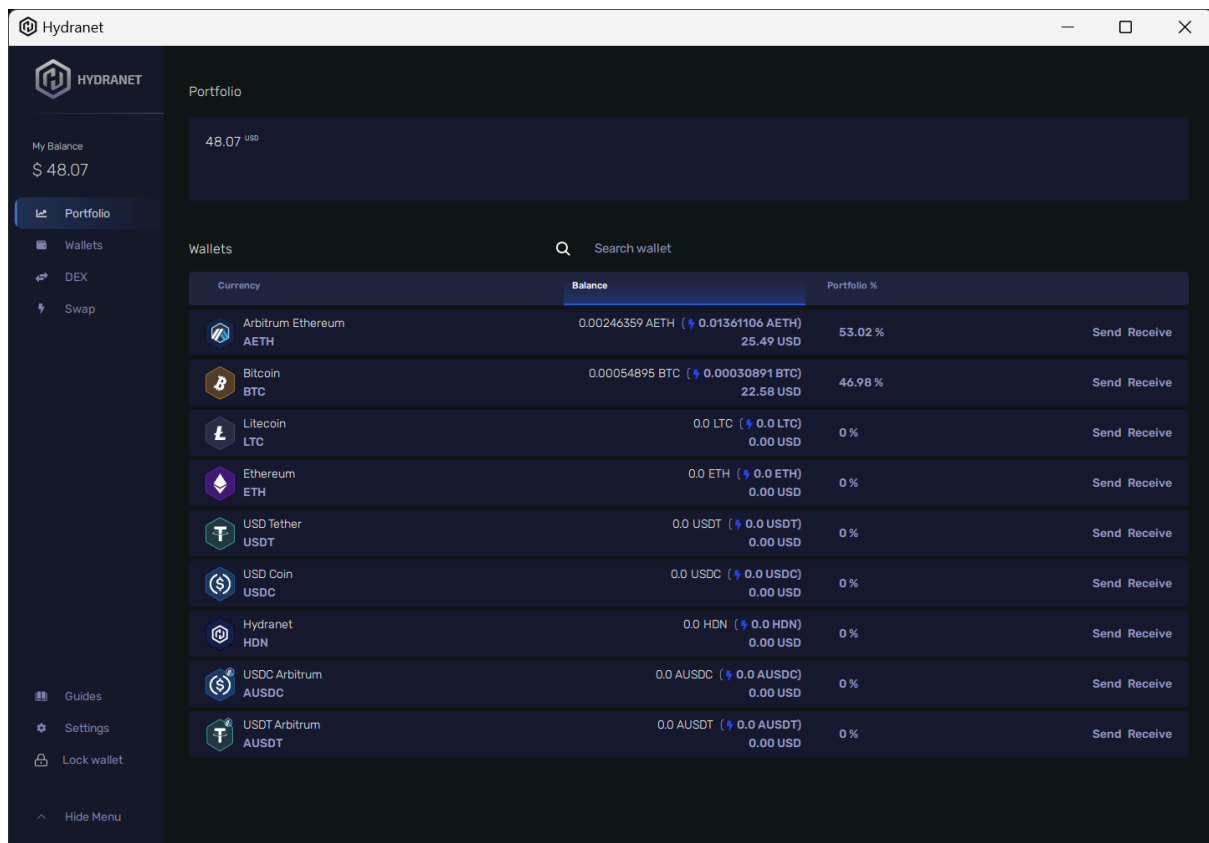
### **On-chain balance**

The amount you currently can spend on-chain (Layer 1).

### **Off-chain balance**

The amount you currently can spend off-chain (Layer 2).

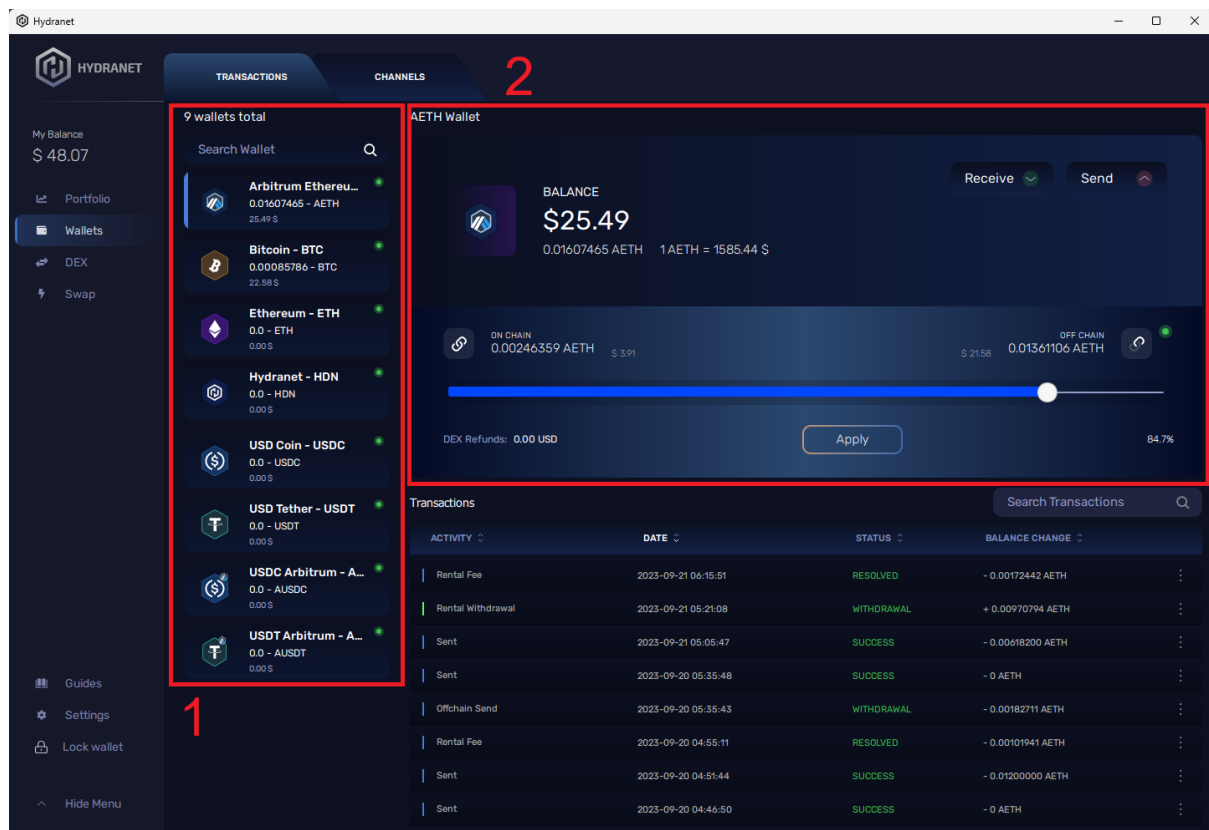
# Portfolio



In the Portfolio area, you can see your balance of all the currently supported coins and tokens in the Hydranet DEX. You can sort the currencies by their *name*, *balance*, or *portfolio fraction* by clicking on any of the topics. Your currency balance will be displayed in terms of your *on-chain balance* and *off-chain balance*, i.e., your spendable amount on-chain (Layer 1) and the amount you currently have in various payment channels (Layer 2). There are also *Send* and *Receive* buttons you can use to deposit and withdraw funds to and from your wallet. To hide your balance, you can simply click on the USD balance in the menu on the left side.

The wallet in the figure above has a total net worth of 48 USD. It holds aETH and BTC. Most of its assets are kept on-chain, however, 0,013 aETH and 0,0003 BTC are kept off-chain (the value inside of the parentheses). To hide your balance, you can simply click on the USD balance in the menu on the left side.

# Wallets



The Wallet page is used for the on- and offboarding of funds to the Lightning and Connex network (Layer 2). It includes two tabs, selectable at the top of the page; Transactions and Channels.

- 1) The displayed currencies are clickable. Toggle between them to control their on- and off-chain balances and to see their transactions. A light to the right of each currency name indicates the status of the off-chain network.

Green – Active

Orange – Chain Syncing

White – Not running

You will not be able to open any payment channels before the light has turned green.

The currency balance below each currency name is the total balance of that currency, i.e., the sum of its on-chain and off-chain balances.

- 2) The currently selected currency balance will be displayed together with a slider. Use the slider to control your on- and off-chain balances for the selected currency. To increase your off-chain balance, simply drag the slider to the right and click apply. As you click apply, a small window will open, indicating that your payment channel is being funded on your request. When finished, the small window will close. To increase or decrease your off-chain balance you must first have opened a payment

channel to the HUB. More on this in the Channel tab section. The wallet in the figure above has 85% of its aETH balance off-chain. This amounts to approximately 0,013 aETH off-chain and 0,0025 aETH on-chain.

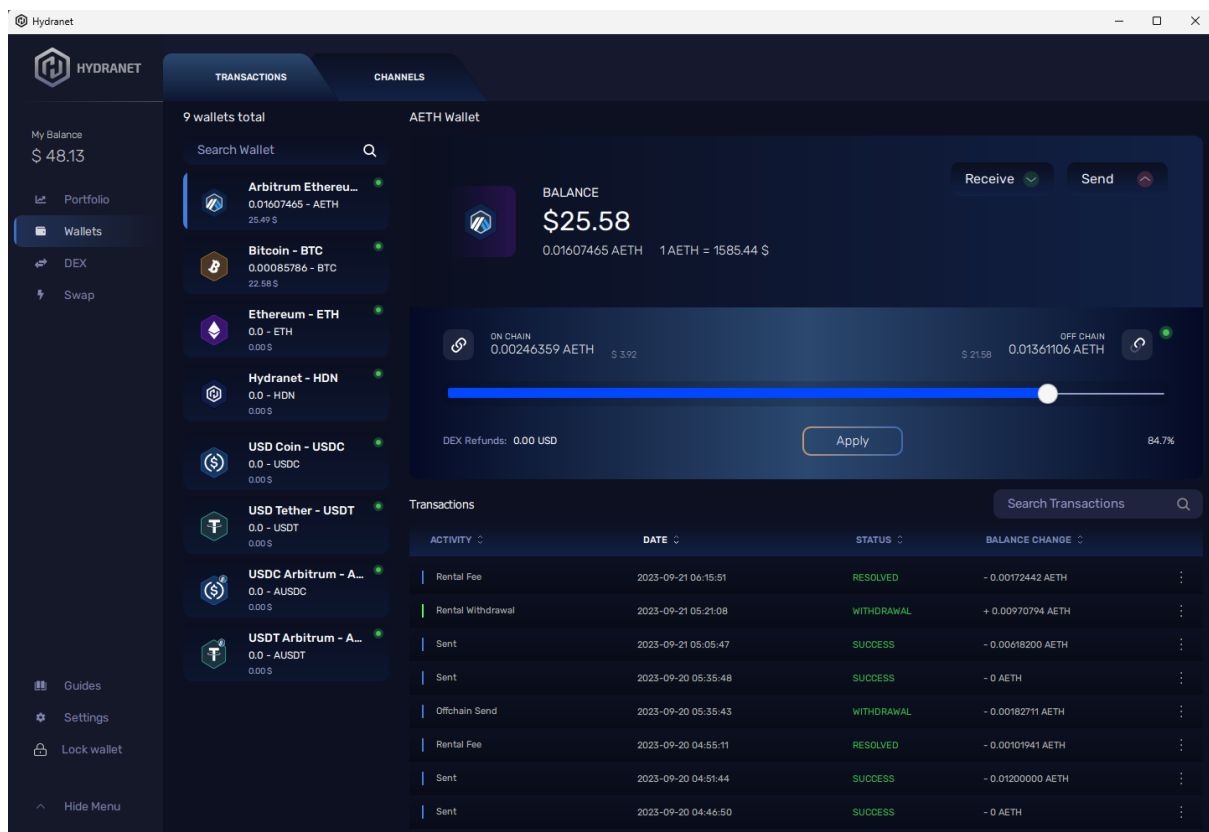
If you would want to deposit or withdraw coins/tokens from your wallet you can do this by clicking the receive/send buttons in the top right corner.

*Note: these are on-chain activities and are not related to the payment channels. You can deposit and withdraw funds from the Portfolio page as well.*

*DEX refunds* at the bottom left indicate the amount that the HUB will repay you for failed and/or canceled trade orders, maker fees, and discounted trading fees.

*Note: every time you trade on the DEX you will pay a trading fee. This trading fee is the same for all users regardless if you are a taker, a maker, or if you have a discounted trading fee. However, makers pay a smaller fee than takers, and if you have a discounted trading fee, you should clearly pay less than the standard fee. This is adjusted for with the concept of DEX refunds. The HUB will repay you the amount you should have gotten discounted.*

## Transactions tab



The Transactions tab displays all your transactions for the currently selected currency. You can sort the transactions by their *Activity*, *Date*, *Status*, or *Amount*, by clicking on the topics.

There are generally two types of transactions; on-chain transactions and off-chain transactions. However, these types of transactions can be displayed using different names depending on the currency. The reason for the differences between currencies is the underlying off-chain solution, i.e., the Lightning and Connex networks.

Some transaction examples you might encounter in the Transactions tab are:

- Sent
- Received
- Dex send
- Dex receive
- Open channel
- Close channel

You can get more information about the transactions by clicking on their row. This will open a new window, see the examples below. The information in the window will be different depending on if it's an on-chain transaction (left figure) or if it's an off-chain (right figure). On-chain transactions will be publicly visible in the same way as all other on-chain transactions. Your off-chain transactions will however only be visible to you. The Payment

hash is only an internal HUB reference that no one but you and your trading counterparty will have access to.

### Transaction Details

**Amount**  
- 0.00618200 AETH

**Fee**  
0.00001790 AETH  
= 0.03 USD

**Date:**  
2023-09-21 05:05:47

**Nonce:**  
7

**Status:**  
SUCCESS

**Confirmations:** 1000+

**Transaction Id:**  
0x72d16da7603d1821570201e3b9...

**Block hash:**  
28bc47693ad9a4b966c02b2ad21...

**Address:**  
0xB7F7D7b256AE7cE66C4A4e56a...

[Open in explorer](#)

### Connexx payment details

**Amount**  
+ 0.00970794 AETH  
= 15.45 USD

**Date:**  
2023-09-21 05:21:08

**Payment activity:**  
RENTAL WITHDRAWAL

**Transfer id:**  
0x62103bdfc5bd0664f50ecb0fb7...

**Status:**  
WITHDRAWAL

## Channels tab

The Channels tab in the Wallet page is used for HUB connection and channel rental operations. To trade on the DEX, your client needs to be connected to the HUB and have open payment channels.

At the top of the red box, there are three buttons:

- **New channel+**

Click this button to open a payment channel to the HUB. A new window will open. In this window, you can choose which HUB you want to connect with. Currently, there is only one HUB.

- **Channel rental**

Use this function to rent liquidity from the HUB to open a payment channel with which you can receive funds. What will happen is that the payment channel counterparty, the HUB, will fund the channel so that its capacity increases. This will be displayed to you as a *can receive* balance and allow you to receive funds in the selected currency.

There are two costs associated with a channel rental. One is the cost for opening and closing the channel, which is mainly based on the current network fees. The other cost is related to the rental of liquidity from the HUB. A fee will be charged for the liquidity rental. This fee is based on the amount you rent and how long you rent it.

You can adjust the amount of liquidity you want to rent and the time period for your rental in the channel rental window (opens when you press the Channel rental button) by displaying the advanced settings.

- **Backup / restore**

Recovery data of a payment channel can be saved by clicking the backup button. This backup can later be used to restore or force close a payment channel.

To get more information about your open payment channel, you can click on its row in the list of open payment channels. A new window will open, see the example below. The (Rental) Channel Details contain information about the total capacity of the payment channel, the current can receive and can send balances, payment channel ID, and more. The channel in the example below is a rented channel and has therefore an expiry timer shown under the topic *Rental time remaining*.

Rental Channel Details

Capacity:

0.01534620 AETH ( = 24.42 USD )

Can send:

0.01260237 AETH

Rental time remaining:

10 hour(s) 59 minute(s)

Status:

Active

Disputed:

false

Consensus Expiry:

Defund Expiry:

Last check:

2023/09/26 04:30

Dispute TX sent:

false

Defund TX sent:

false

Exit TX sent:

false

Channel Id:

0xB7F7D7b256AE7cE66C4A4e56a32F4D3FAF7...

Can receive:

0.00274383 AETH

Remote public key:

vector6VA65fXnGMeHyE9CMe3BUpCiAyMg9BS...

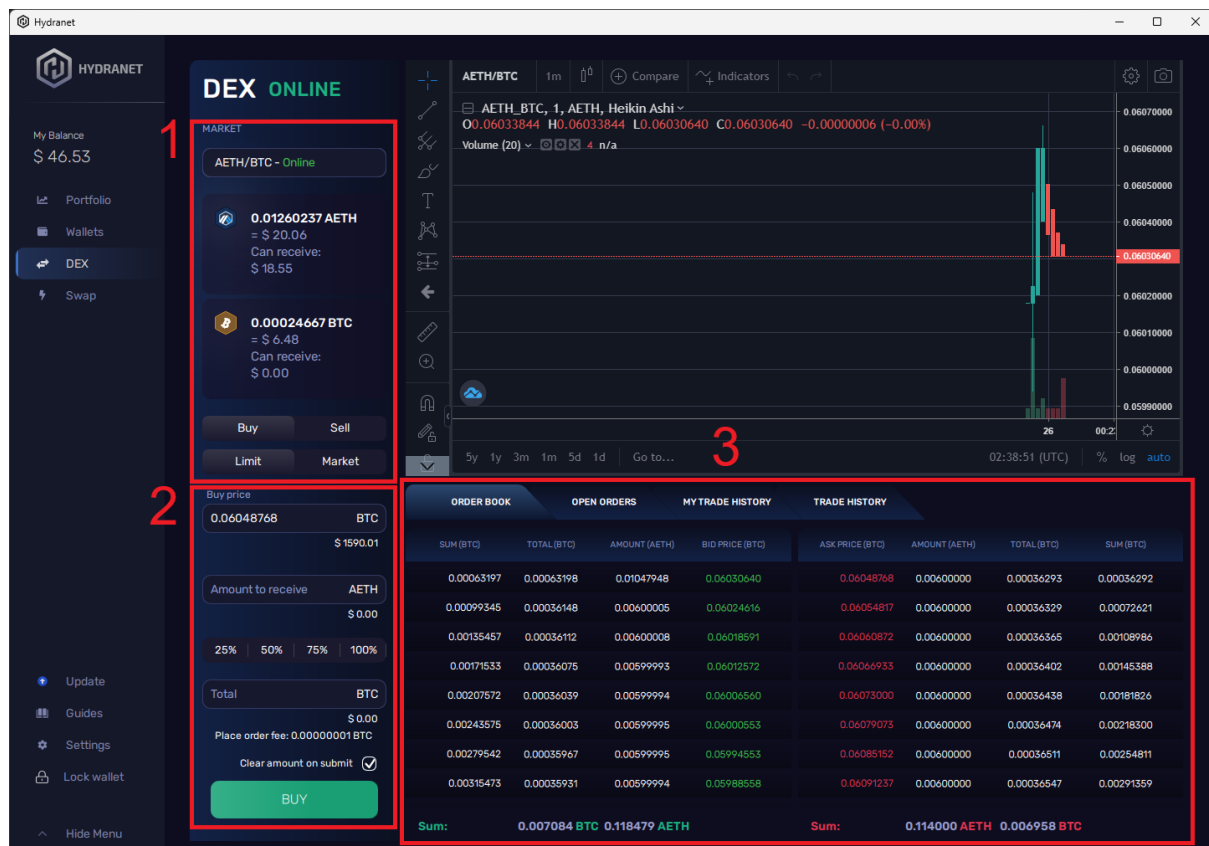


There are three dots on the far right of the row for your open channel. Clicking on them gives access to the following four alternatives

- **Reconcile**  
This will force your Client to search for the latest payment channel state and refresh what is displayed to you in your Client.
- **Deposit**  
Use this alternative to deposit funds to your payment channel without using the slider.
- **Withdraw**  
Use this alternative to withdraw funds from your payment channel without using the slider.
- **Settle on-chain**  
This alternative will withdraw the funds from the payment channel and close it. For the Connex network payment channels, the withdrawal and closing of the payment channel will be done in accordance with the Connex dispute workflow. There are 3 phases in this workflow. The first phase locks the payment channel so that it cannot be used. The second phase unlocks the funds from the on-chain multi-signature contract. The third stage transfers the funds from the multi-signature contract to your wallet. The complete process will require you to wait 48h (10 minutes on testnet) and each phase will require you to send a Layer 1 transaction, but your Client will do this for you as long as you keep it open. Unless you suspect something malicious with your payment channel, there is no reason to settle the channel on-chain. You can always withdraw your funds from the channel without closing it.

Lastly, to the far left in the Channels tab, there are indications of your current *can receive* and *can send* balances.

# DEX



The DEX page is used for trading. It features a classical orderbook, but is unique in terms of its off-chain trade technology. Make sure that you have open and funded payment channels for the currencies that you want to trade.

- 1) Choose the market (trading pair) on which you want to trade. The selected market in the figure is aETH/BTC. To change the market, simply click on the display to get a list of all the available markets, then select one from the list.

If the status of the market is "Channel closed", you don't have the necessary payment channels open to trade on this market. Navigate back to the Wallet page to open and fund the necessary payment channels.

- 2) The DEX features both limit and market orders. Select the type of order you want to use, and whether you want to buy the currency or sell it.

If you don't have enough funds in your payment channels, this will be displayed to you above the buy/sell button after you have entered the amount you want to trade. Fund your channels via the Wallet page before you continue your trade.

**The trading fee will be collected when you place your order.** However, if you close an order prematurely, you will get the paid trading fee back via the mechanism called "DEX fee refunds".

3) Below the trade chart, you will find four tabs.

**Orderbook**

Displays all the currently open limit orders on the DEX. Press one of the orders to autofill the price, amount to buy, and amount to sell, in the fields to the left.

**Open orders**

Displays all your open orders.

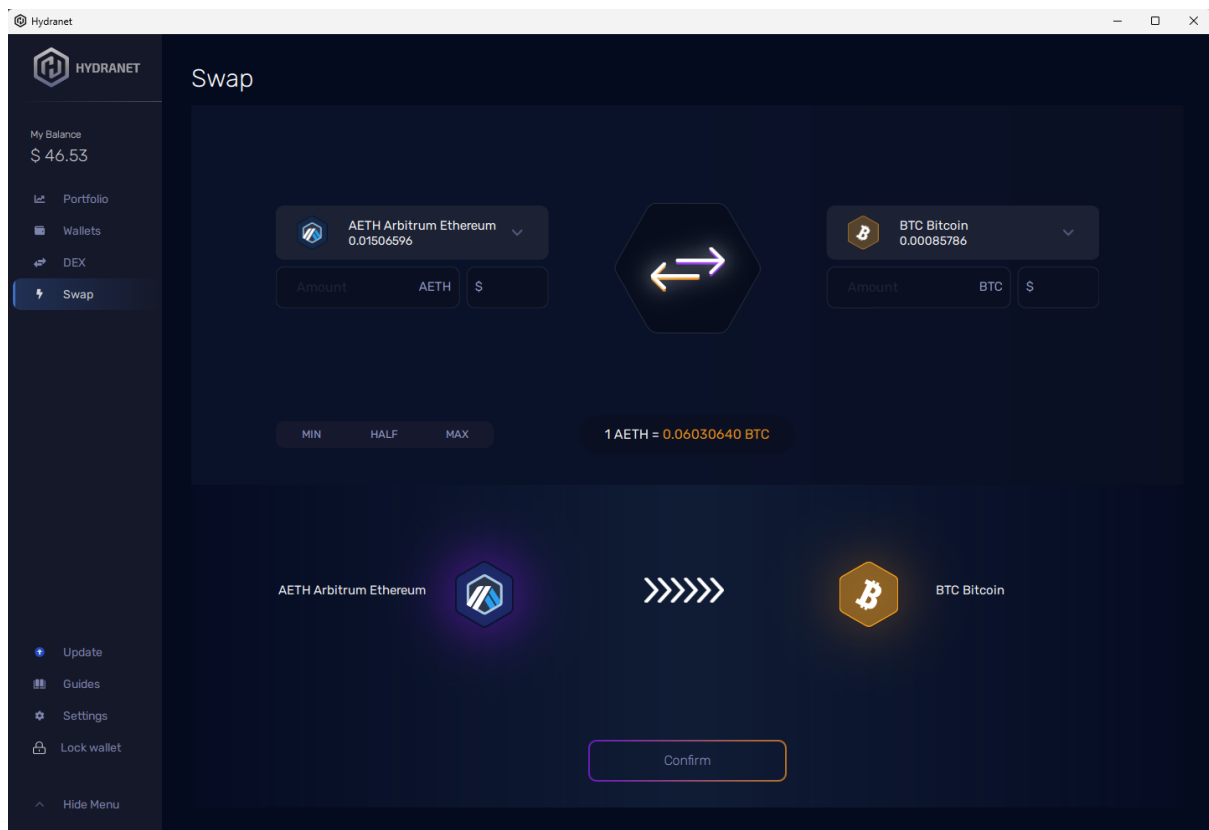
**My trade history**

Displays the trades you have successfully made on the DEX. This information is only visible to you.

**Trade history**

Displays all successful trades made on the DEX.

# Swap



The Swap page offers a Simple Swap User Interface (SSUI) for quick and easy trading without an orderbook. Choose which currencies you want to exchange and then simply click *Confirm*. The Client will automatically rent the required payment channels, find a matching order(s) on the orderbook, execute the trade, and lastly, close the payment channels again.