HYDRO

A coordination layer for decentralized exchanges

White Paper

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Abstract

Decentralized exchanges offer trustless non-custodial trading, improved transparency, and ability to share order books. Despite these advantages, decentralized exchanges today account for a negligible percentage of the overall cryptocurrency transaction volume. Reasons for lack of adoption include high technical barrier to entry, performance and usability issues, availability, and lack of incentives for coordination. Hydro is a middleware layer on top of an incentive system for decentralized exchanges.

Background

Problems and Challenges

1. Usability and performance issues

Completely on-chain decentralized exchanges are slower and more expensive than centralized exchanges. Empirical evidence suggests that the majority of users won't trade away significant degradation in performance for improved security.

2. Susceptibility to arbitrage

The off-chain maker, on-chain taker model performs better than purely on-chain exchanges. However, they are still susceptible to arbitrage, front-running, and order collisions.

3. Technical barrier to entry

Successful exchanges are often built and run by operation focused teams, for whom the technical difficulties of building a high performance hybrid exchange become a barrier to entry.

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Related Work

There are a multitude of projects related to decentralized exchanges. The landscape can roughly be represented by a decision tree with a few branching points:

1. Compatibility vs Scalability

Projects such as Bitshares can offer real-time, on-chain exchange. However, standalone solutions typically do not have the ability to trade assets on other blockchains with native efficiency. Hydro is designed to support at least ERC20 tokens on the Ethereum network.

2. Price Discovery Mechanism

Projects such as Kyber and Airswap offload the responsibility of price discovery to reserve managers, who themselves presumably rely on either set formulas or price oracles. Hydro is built to power decentralized exchanges that come with built-in price discovery mechanisms(i.e limit order matching engines).

3. Availability

Certain projects are completely reliant on future work to solve scalability and cross chain support. This discussion is limited to the subset of projects that works without (but can still benefit from) the arrival of technologies such as Raiden, Plasma, Cosmos, and Polkadot.

Hybrid Model

If we limit the scope of discussion to efficient, order book based solutions which work with the Ethereum network today, one solution that works is the so called “off-chain maker, on-chain taker/settlement” model. Etherdelta is one of the first implementations of such a hybrid model. 0x is an open protocol extracted from this model.

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Hydro Protocol

Hydro is designed around the following assumptions:

1. Canonical order schema

The elemental unit of an exchange is an order (i.e. buy or sell x amount at y rate). Decentralized exchanges can ether use a proprietary order schema, or an openly shared one. One advantage of having everyone use a canonical open order schema is that these orders can match against each other, resulting in cross-exchange liquidity sharing.

An additional concern is that the smart contracts used by decentralized exchanges have permission to hold and transfer assets, and could potentially contain loss-inducing bugs. A fragmented system at the order level increases the possibility of accidental loss or theft.

To help establish a canonical order schema, Hydro is built on top of the open order protocol 0x.

2. Incentive to share

An open order makes it possible to share liquidity. But it is not evident why decentralized exchanges would want to share liquidity. Open, permission-less orders are easier to arbitrage, and more likely to result in order collisions (more details on this later). Usability problems aside, it is unclear **why** the first batch of decentralized exchanges would give up their main barrier to entry and proactively help bootstrap potential competitors. Hydro introduces an incentive system that encourages decentralized exchanges to cooperate and share liquidity.

3. Common Framework

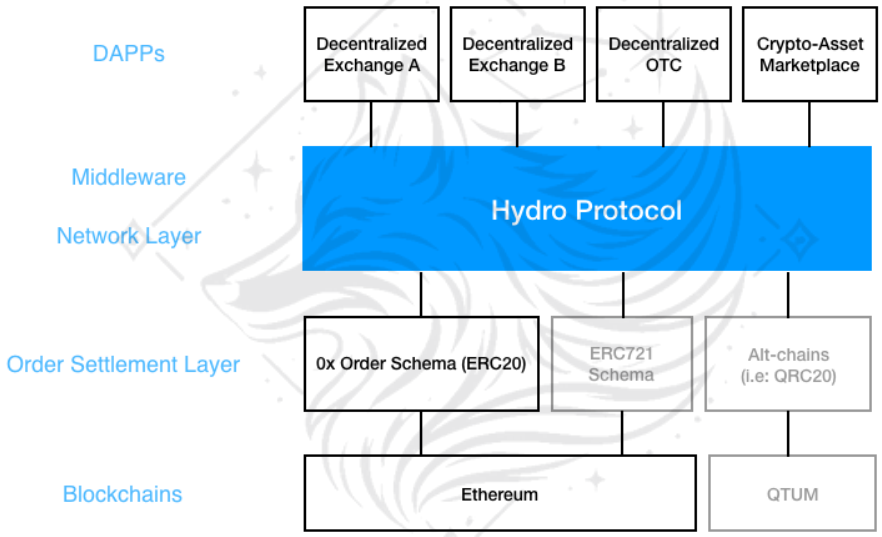
Although there are thousands of cryptocurrency exchanges with wildly different operating characteristics, they are quite similar in features and technical implementations.

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Hydro provides a set of middleware components to lower the cost of creating hybrid decentralized exchanges and marketplaces.

Scope

Hydro is a set of middleware components on top of an incentive mechanism. It resides between the DAPP layer and the order and settlement layer of the hybrid decentralized exchange stack (Figure 1).



(Figure 1: Hydro Protocol Scope)

Shared Liquidity Model

A crucial question for a decentralized exchange is *"who has permission to match an order?"* The typical answers lies on two extremes:

1. **Open**: Anyone can match an order

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The benefit of the open order model is that it enables the possibility of a global liquidity pool. The drawback is that open orders can only be canceled on-chain, and thus are more susceptible to arbitrage and order collision.

2. **Closed**: Only a single address (the exchange itself) can match an order

If the exchange has exclusive permission to match orders, then it can provide instant cancellation and protection from front-running. However, this type of order cannot be shared.

Hydro takes an intermediate approach: it manages a set of permission lists, each representing an alliance of exchanges that can share liquidity with each other. It also keeps a ledger of liquidity provided and taken for each actor in the system. In addition, Hydro provides pool membership and governance features, and handles the distribution of transaction fees.

Protocol Token (HOT)

On top of the liquidity ledger, Hydro distributes a protocol token periodically as incentive for providing liquidity.

1. Token Distribution

Hydro distributes HOT tokens to each account in the system periodically according to the follow formula:

$$(p * R) * tv / TTV$$

Where

p = A set percentage of tokens to distribute out of the reserve.

R = Remaining reserve of tokens

tv = Transaction volume provided during this period for current account

TTV = (Total transaction volume provided during this period by all parties)

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2. Token Usage

Tokens issued by cryptocurrency exchanges are typically some form of membership bonus, including reduced fees, airdrops, and VIP features. Although these tokens are technically decentralized in terms of ownership, they are economically centralized. The worth of the typical exchange token is completely tied to the business performance of the issuing exchange.

HOT is roughly equivalent to a decentralized version of such membership tokens. Users obtain tokens by providing liquidity, and can choose to stake tokens to a particular liquidity pool to obtain membership benefits.

Note that although Hydro's middleware layer provides the mechanism for membership benefits, it is left to the exchanges to decide on which benefits to offer. Equilibrium will come from competition over user loyalty.

3. Token Consumption

To prevent frequent jumping between pools and to replenish the token reserve, a frictional fee is charged for the following actions:

a) The act of joining a new liquidity pool for exchanges costs HOT tokens.

b) For individual traders, staking HOT tokens to join a pool (in order to receive benefits) is free, but a percentage is consumed on withdraw.

Note the distribution mechanism does not distinguish between normal traders and market makers. Liquidity providers receive HOT tokens in addition to what they earn from the spread. This a beneficial side effect, as any Hydro based exchanges inherit the ability to attract liquidity providers.

4. Justification for Existence

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The purpose of the Hydro protocol token is to act as a force in the formation of shared liquidity pools. The answer to “why not just use Ether” is that the value of these tokens is correlated with the total size of the Hydro liquidity sharing network.

DDEX

The Hydro team is building and operating a sample implementation of such a hybrid decentralized exchange. DDEX (Decentralized Digital Exchange) exists for the following purposes:

1) A showcase that hybrid decentralized exchanges are (barely) possible today, and will get better over time
2) Drive real world usage and feedback for the protocol layers
3) Bootstrap liquidity which can be used eventually in the formation of federated liquidity pools

Summary

Decentralized exchange protocols inevitably will become a cornerstone of the entire blockchain ecosystem. However, there are both technical and economical challenges on the path to widespread user adoption. Hydro provides an incentive layer and a time-saving middleware framework for operationally focused teams looking to build decentralized exchanges and marketplaces today.

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Appendix

https://github.com/0xProject/whitepaper/blob/master/0x_white_paper.pdf

https://blog.0xproject.com/front-running-griefing-and-the-perils-of-virtual-settlement-part-1-8554ab283e97

hackingdistributed.com/2017/08/13/cost-of-decent/

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