Cryptops: Option Derivatives on Blockchain

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Cryptops exchange is a decentralized distributed blockchain technology that focuses on providing option derivatives for crypto assets. The options trading happens directly on the Cryptops blockchain without the need of any complex smart contract code. The cryptops blockchain uses a utility coin to provide for a verifiable fair and honest options market for crypto currencies

Introduction to Cryptops

The blockchain network described in this paper will provide a continuous options derivative market using decentralized distributed blockchain technology. Unlike some other crypto currency derivative markets it will not be possible for any entity to halt, freeze, rollback prices or otherwise completely disrupt the Cryptops network.

All trading actions are done directly on a layer 1 blockchain without the need of using a smart contract of any kind running on a different blockchain. This allows for all the actions that are traditionally done on a layer 1 blockchain including creating accounts, creating offers, accepting offers, offline signing of transactions, etc to be done directly on the Cryptops blockchain.

Traders using the Cryptops blockchain will be able to trade option assets without having to store their funds on a centralized exchange. All account balances are held directly on the decentralized Cryptops blockchain. Fairly ordered trade matching happens directly on the layer 1 Cryptops blockchain.

All entities can issue their own option assets

Due to the public decentralized nature of the Cryptops network it is possible for any entity to create their own option derivative assets and broadcast them to the blockchain. Obviously due diligence will need to be done by the user when selecting the option assets that are issued by various entities listing on the blockchain.

This open public platform is not limited to just vanilla options. Each entity is free to set the terms of the options contracts they offer. This makes it possible for more complex exotic option types such as barrier options, Asian options, and digital options. It would also be possible to offer something similar to employee options using features of the network to limit the availability to certain holders.

Ready for use now

The Cryptops public blockchain is currently fully functional and ready for any entity to use with the Horizon client facing API server available at `https://horizon.cryptops.exchange`. The development and testing of the blockchain has been ongoing for over 4 years now on the Cryptops test network. Container images for creating and running Cryptops nodes for both the test and public networks will be made available in the future. The full source code for the Cryptops core will of course also be made available.

A separate test network is also available for testing and developing on the Cryptops network with a client facing Horizon API server at

https://horizon-testnet.cryptops.exchange. All entities that are listing option chain assets on the main blockchain network are encouraged to also make them available with as similar characteristics as possible on the test network. This will allow traders to use the test network like a paper trading account that many of the legacy option exchanges provide.

Initially option chains will be provided for the Bitcoin (BTC) crypto currency by the founders of the Cryptops blockchain.

Cryptops Platform

The Cryptops blockchain network is a fork of the Stellar technology as provided by the Stellar Development Foundation (SDF) [1]. This allows the use of a tried and proven blockchain code base with very fast block settlement times making it suitable to the trading of option assets. The native token of the Cryptops blockchain is called COE.

[1] Stellar Development Foundation [https://www.stellar.org/foundation] (https://www.stellar.org/foundation)

Changes have been made to the upstream code to make the Cryptops network more suitable for the focused goal of providing an option chain derivatives blockchain. The first fundamental difference would be the total quantity of 1 billion native tokens (COE) on the Cryptops blockchain, this is only 1% of that on the Stellar network. Another notable difference would be the 1% interest and transaction fee sharing that occurs on the Cryptops network. The network starting date of January 2018 is also different than that of the Stellar network. Some other adjustable differences include transaction fees and account minimum balances, these changes are accomplished through the Cryptops node voting mechanism.

Network Performance

New blocks are created at a rate of about once every 5 seconds. The network is currently conservatively rated at about 1000 *Transactions Per Second* (TPS). With code improvements and advances in computer hardware the TPS should be capable of significantly more than that amount in the future.

Network Consensus

Consensus on the Cryptops blockchain is reached using a type of consensus protocol called *Federated Byzantine Agreement* (FBA). FBA was idealized in 2015 by Professor David Mazières of Stanford. Some of the key features of this consensus that are described in the SCP whitepaper [2] are:

[2] The SCP whitepaper https://www.stellar.org/papers/stellar-consensus-protocol.pdf, 2015

- **Decentralized control:** Anyone can be a validator in the network.

There are no restrictions.

- **Low latency:** Consensus can be reached in a few seconds.
- **Flexible trust:** Participants are free to decide what other nodes they trust, without any restrictions.
- **Asymptotic security:** Digital signatures and hash families are used in a way to protect the network even against immensely high computing power.

Current Network Fees and Minimum Requirements

The list below briefly describes the current fee structure that is being charged for some common operations and the minimum account balances that must be maintained for each active account on the Cryptops network.

- **base fee** Is currently set at 0.01 COE per operation, this is used to pay for transaction fees.
- **base reserve** Is currently set at 10 COE per account, this is the minimum balance that must be held in the account. Also curtain actions will require that the *base reserve* amount to be held in the account for each action.

Changing the Network Characteristics

Some fundamental aspects of the network can be changed by individual nodes voting on to agree to that change. The change works by the same consensus process as described in Network Consensus. The *base fee*, *base reserve* and the maximum *transaction set size* can changed by using the consensus voting method. There are also other network software version changes that can be made to support fixes and new features.

API Library

Most applications will probably interact with the Cryptops network using Horizon, a RESTful HTTP API server. Horizon provides a way to submit transactions, check accounts, and subscribe to events. Because HTTP is used, you can communicate with Horizon using a web browser or simple command line tools like cURL.

Because Cryptops is a fork of Stellar technology, many of the various language SDK's tooling should also work with Cryptops needing only minor adjustments. The most notable changes would be changing the network passphrase [3] and the Horizon server location [4]. Centralized exchanges that have an integration with the Stellar network should be able to easily integrate with the Cryptops network as well.

[3] The main network passphrase is "Cryptops Public Network ; January 2018" and the test network passphrase is "Test Cryptops Network ; January 2018".

[4] There is a Cryptops Horizon server located at horizon.cryptops.exchange and for the test network at horizon-testnet.cryptops.exchange

Cryptops Coin (COE)

The native coin of the Cryptops network is called COE. The Cryptops network was started with a total of 1 billion COE with the network starting date of January 2018. This is a locked total amount and other than the built in inflation rate of 1% per year it can not be increased. All the fees that are associated with using the network are paid using this utility coin and shared to all qualifying users of the Cryptops network.

COE is a collateralized coin that will be backed by other crypto currencies. Because of this feature there are not any kind of give-aways or airdrops of the coin planned for the future.

The total amount of the interest gained and the fees charged for using the network are shared and redistributed to all accounts that qualify. In order for an account to qualify to receive these fee and inflation redistribution it must have at least a total of 0.05% (50,000 COE) of the total supply voting for it. This can be aggregated from other accounts on the network to meet the minimum requirements. Nominating an account is done through setting an appropriate option on the account and this can be done using the Cryptops laboratory [5].

[5] The Cryptops laboratory allows for many of the operations to be performed on both the test and public networks located at laboratory.cryptops.exchange

COE Distribution

The current distribution of the 1 billion total COE is as follows.

- **83.7%** will be available for purchase by the public. This amount will be used as reserves to provide the liquidity for trading, the distribution of the exercised option settlements and to keep open obligations balanced.
- **12.8%** is held by 6 of the original Cryptops founders and each individuals portion of this amount is time locked at a rate of no more than 10% per year.
- **3.5%** to be distributed in developer build challenges and promotions. The distribution of this portion will be decided on by all Cryptops users.

The Cryptops Exchange option market for BTC

The founders of the Cryptops network will be implementing an options market for the Bitcoin (BTC) crypto currency. This implementation will include both put and call options at various strike prices. Weekly, monthly and quarterly option chains will be provided. Also a front and a back series for each of the option chains are planned.

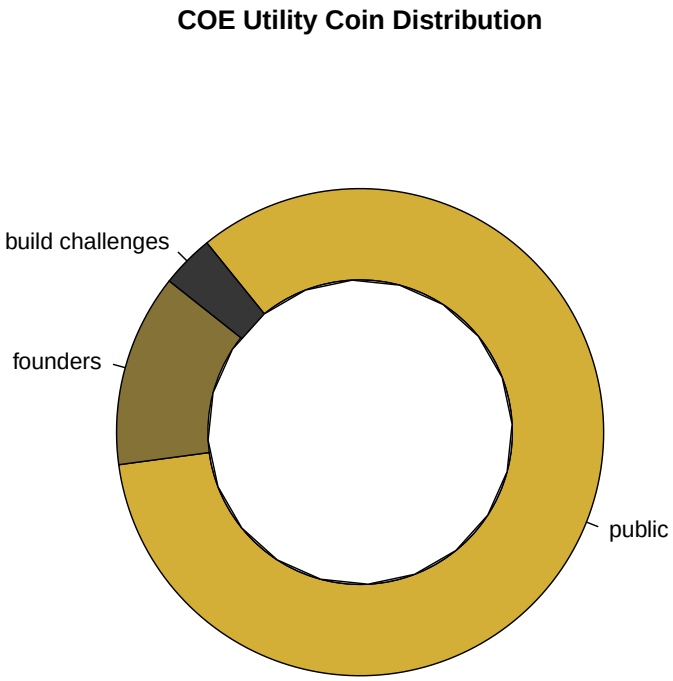

Figure 1: The distribution of the total 1 billion COE.

These option assets that will be provided directly on the blockchain are to be typically used by individual investors or companies to hedge their exposure or to simply speculate on the price movement of the underlying crypto.

Clarity in derivatives pricing

Because each new set of transactions that buy, sell or update the current price of the option contracts (a "block") is cryptographically linked to the previous block. This makes it extraordinarily difficult to change data stored in a blockchain and any such change would be readily detectable. Thus blockchains are widely considered to be immutable and thus can serve as a record of proof of ownership

The Cryptops exchange aims to provide transparency by providing an immutable record of all the option contract pricing history. This will be achieved by providing the values for all the option pricing variables at each change in the derivatives value and writing them to the blockchain. This is achieved by writing the calculated options greek values for the delta, gamma, theta and vega directly into the memo field using a simple packing method on each update of the options pricing. With this information it will be possible to verify the fair value pricing of each crypto currency option contract at any point in history by retrieving the past transaction data directly from the Cryptops blockchain. All of the immutable historic trade data will be recorded directly on to the Cryptops blockchain.

Obligations Always Fully Balanced

Actual crypto will be bought and sold on traditional high volume centralized exchanges. This is to always maintain a balance of the outstanding obligations, so that there will always be a sufficient amount to exercise the option assets and settle to the underlying crypto.

Option Pricing Model

The Black–Scholes formula is the pricing model that will be used to calculate the value of the options. This formula was chosen because it is very commonly used and there are various option pricing calculators freely accessible on the internet. With the use of these pricing calculators the *fair value* of the option asset can be determined.

Option Style

The European option style will be used for the option assets that are provided by the Cryptops founders. In short this simply means that it will not be possible to exercise the option assets until after they have expired. The option assets will be continuously available for trading up to the expiration time.

Exercising In The Money *option assets*

Option assets that expire *in the money* can be exercised and the underlying crypto currency will be received. Immediately after the *in the money* option assets have expired, offers to buy back these same assets paying in the underlying crypto currency will be placed on the order books.

While the exercising of option assets does not happen automatically it should be possible to use *path finding* to directly sell the expired *in the money* option asset for a different active asset. This could provide a mechanism to *roll* from one option asset directly into another with a later expiration date. The same mechanism could also be used to *roll* from a curently active option asset that is near expiration to one with a later expiration.

Conclusion

The Cryptops blockchain network aims to introduce disruptive decentralized finance technology to the crypto blockchain community. All buying, selling, creating and updating of the option assets happens directly on the Cryptops layer 1 blockchain without the need to involve the use any complex smart contracts. Distribution of an equal share of interest gained and all the network fees charged on the Cryptops blockchain are distributed weekly to all qualifying account holders. This distribution is paid using the native utility coin called COE.