

Hedge Product Document

I. Overview

1.1 Reading objects

This article mainly describes the core function logic of the Hedge protocol and its implementation. This is intended for back-end developers and product participants.

II. Definition of system terms

Option contract: referred to as option. It refers to the transaction of buying and selling rights, which stipulates that the buyer of an option has the right to exercise the right to the seller of the option at a specific price at a specific time in the future. Options have two directions: call options and put options. The return is determined by the difference between the maturity target price and the strike price.

Perpetual contract: Refers to a futures contract with no delivery date, which uses capital costs to pull the near-term commodity price and the spot price (index price).

Out-of-the-money option: An option that has no intrinsic value. For example, a call option is purchased. If the contract price is less than the strike price, the option is an out-of-the-money option.

In-the-money option: an option with intrinsic value, such as buying a call option, if the contract price is greater than the strike price, the option is an in-the-money option.

DAO contract: referred to as DAO, a blockchain smart contract. In the Hedge system, the user's counterparty, regardless of options or futures, the user's counterparty is DAO. DAO provides infinite liquidity and settlement.

DCU Token: Hedge Protocol's tokens, there is no upper limit, and will be automatically issued or destroyed according to the settlement of the DAO contract and the user;

Margin: HEDGE pledged to the system when the perpetual contract is opened.

Option fee: the fee paid by the buyer of the option to the seller of the option, in DCU.

Open a position: buy an option or a perpetual contract, open a position can choose to open up and put two directions, the counterparty is DAO contract.

Closing a position: refers to selling the held option or perpetual contract, and the counterparty is the DAO contract.

Position: the number of options held or the amount of the perpetual contract.

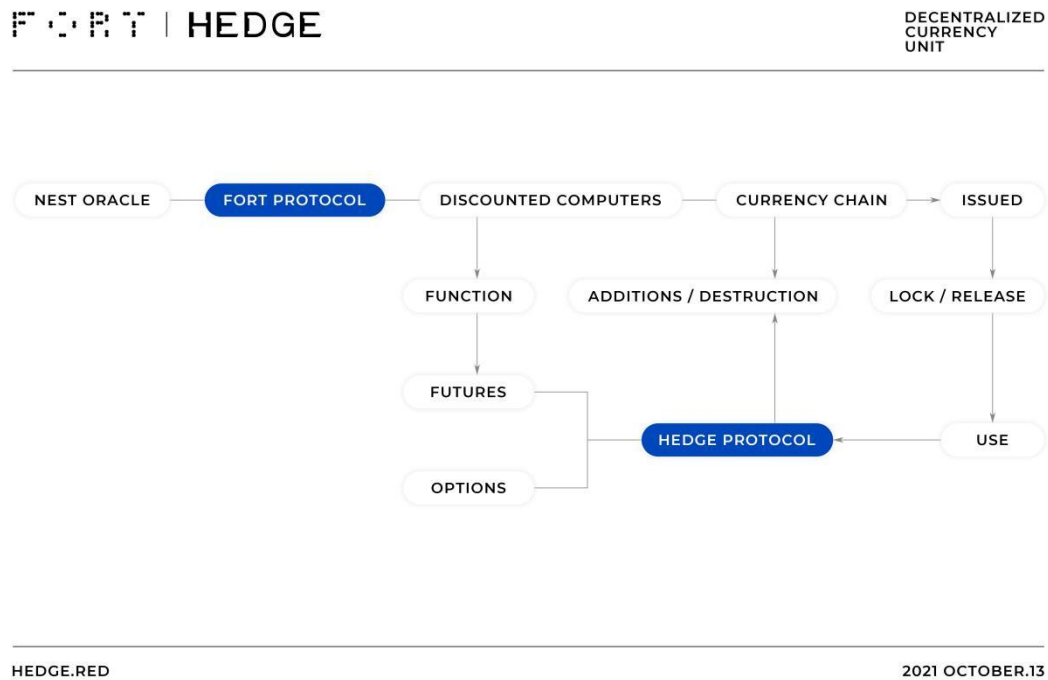
III. System Role

Role	Definition
Trader	Users who trade perpetual contracts and options in Hedge Protocol. Generally, it is a wallet address or smart contract.
DAO Contract	The counterparty of the trader. For the options module, the DAO contract acts as the seller of options; for perpetual contracts, when the user is long, the DAO contract generates a corresponding short position, and when the user is bearish, the DAO contract generates a corresponding call position.
Settler	The object of liquidation of the position of the perpetual contract is generally completed by a robot, and the liquidator can obtain the residual value reward after the liquidation.
Governor	The objects participating in the governance of the Hedge system, the holders of DCUToken, revise and upgrade the Hedge system by

initiating a vote.

IV. the system data model

4.1 System structure diagram



4.2 System operation process

- ① The user obtains DCU Token by participating in lock-up mining.
- ② Users can choose option coins to mint or buy leveraged coins, choose the bullish and bearish directions, and use DCU for payment.
- ③ After the transaction is successful, the DCU Token paid by the user will be locked into the DAO contract.
- ④ Users can settle with the system after the option expires; for perpetual contracts, users can sell at any time, and the NEST oracle machine will be called when the DAO contract is settled, and the user's profit and loss will be settled according to the price provided by the oracle machine. If the user makes a profit, it will automatically increase Send DCU to call the user address.
- ⑤ For perpetual contracts, when the position reaches 5% of the net assets, liquidation will be triggered. Any third party can initiate liquidation to the system. After the liquidation is successful, the leveraged currency will be destroyed and the liquidator can get a certain DCU reward .

V. options module

5.1 Introduction to Options

Hedge options are standard European-style options. European-style options are risky and fixed-income options that cannot be exercised in advance. During settlement, if it is a real-value option, the return will be calculated based on the difference between the spot price and the exercise price; if it is a virtual option The value of the option is 0.

DAO is the seller of options, and the user, as the buyer of options, can choose two directions: call and put; users can buy their options in the trading pairs supported by the system, and settle after the expiration of the option currency. Different from the traditional financial market, the premium for opening positions and the income from settlement are both DCU.

5.2 Purchase options

5.2.1 Option elements

Options are composed of the following 4 elements:

Option direction: two directions: bullish and bearish

Trading pairs: Currently the first version of the Hedge system only supports ETH/USDT

Exercise time: the user manually selects the date and time, the system will calculate the block number and save it in the contract

Exercise price: The exercise price set by the user can be set higher or lower than the current price;

5.2.2 Formula for opening a position

After the user selects the option currency elements, enter the amount to be purchased, the system calculates the amount of option currency the user is expected to obtain, the user enters the DCU into the DAO contract, and the user can settle with the system when the time is exercised. The formula for calculating the number of option shares obtained by users entering HEDGE is as follows:

$$V_C = S_0 e^{\mu T} (1 - \phi(\frac{d_1}{\sqrt{T}} - \sigma\sqrt{T})) - K(1 - \phi(\frac{d_1}{\sqrt{T}}))$$

$$V_P = K\phi(\frac{d_1}{\sqrt{T}}) - S_0 e^{\mu T} \phi(\frac{d_1}{\sqrt{T}} - \sigma\sqrt{T})$$

V_C is the number of call option coins;

V_P is the number of put option coins;

$\phi(x)$ is the standard normal distribution function

$$d_1 = \frac{1}{\sigma} [\ln K/S_0 + (\frac{\sigma^2}{2} - \mu)T]$$

K is the exercise price; σ is the volatility rate, obtained from the NEST oracle; S_0 is the current price; μ is the basic rate of return, the arithmetic mean based on historical data; T is the exercise time.

5.2.3 Constraints on buying options

Exercise time constraints: The minimum exercise time is 72 hours after the current time to prevent rapid market fluctuations, the NEST predictor price response is not timely enough, and users carry out risk-free arbitrage;

Waiting time constraint: If the user is pending in the transaction pool for too long, the contract will reject the transaction when the contract is executed, and the specific value is X minutes;

Price fluctuation constraint: The contract will call the oracle to obtain the latest price during coin minting. If the price differs by more than 10% from the price when the user's transaction is uploaded, the transaction will be rejected;

5.3 Option exercise

After the option expires, the user settles with the DAO, and the settlement formula is as follows:

$$E_c = \max\{(S_0 - K) * N, 0\}$$

$$E_p = \max\{(K - S_0) * N, 0\}$$

E_c is the return on settlement of call options; E_p is the return on settlement of put options; S_0 is the current price; K is the exercise price; N is the number of options;

After the settlement, if the user's income is positive, the system will send the corresponding HEDGE to the user's address.

6. Perpetual contract module

6.1 Introduction to Perpetual Contract

Hedge leveraged currency is ERC-20 Token. Each type of leveraged currency corresponds to different currencies and different leverage multiples. Users who hold leveraged currency enjoy multiple leverage gains and bear multiple downside risks. Users can choose between bullish and bearish leveraged currencies, use HEDGE for payment, and obtain the corresponding leveraged currency. As the price fluctuates, the balance of leveraged currency is constantly changing. When the balance is less than the liquidation balance, the first The three parties may initiate liquidation.

6.2 Elements of Perpetual Contract

The perpetual contract consists of the following 5 elements:

Trading pairs: currently supported currencies are ETH/USDT

Direction: bullish and bearish, where bullish is represented by "L" and bearish is represented by "S";

Leverage: 5 types of leverage of 1, 2, 3, 4, and 5 times are currently supported;

Opening price: refers to the price when the perpetual contract is opened, which is recorded in the contract

Margin net assets: When the change in margin net assets is less than 10, a third party can initiate liquidation;

6.3 Opening a Perpetual Contract

The user selects a certain type of leveraged currency (currency, direction, leverage factor), enters the margin, and then opens a position. The counterparty of the perpetual contract is HEDGE DAO, and the user puts FROT into the DAO contract.

6.4 Calculation of Margin Net Assets

HEDGE perpetual contracts use margin net assets for liquidation. The current position will generate unsettled profit and loss as the price rises and falls. The dynamic rate of return of the current position is calculated as follows:

$$r = \frac{S_t e^{-ut} - S_0}{S_0} * g$$

Where S_t is the price at the current moment, the price is derived from the NEST oracle machine, which is the price at the initial moment; g is the leverage multiple, u is the current asset historical rate of return, which is uniformly set by the system, and t is the time interval between the current moment and the opening time;

As the price of the currency fluctuates, the net assets of the margin also change at any time. The calculation formula is:

$$B_L = X(1+r)$$

$$B_S = X(1-r)$$

Among them, B_L is the net margin assets in the bullish direction, and B_S is the net margin assets in the bearish direction; r is the current position yield,

When the user buys the same leveraged currency again or sells part of the leveraged currency or transfers money, the contract will open a new position and will not be settled.

6.5 Perpetual contract settlement

Users can sell their leveraged coins to DAO and settle with DAO. DAO will call the NEST oracle to obtain the latest price and calculate the net margin assets of the current position. The user obtains the HEDGE balance as:

$$B_{Hedge} = B_{level}$$

Among them, B_{Hedge} is the user's last available HEDGE, B_{level} is the net assets of the

current position of the margin. After the settlement is completed, the system will destroy the leveraged currency and issue an additional FROT to the user's address;

6.6 Liquidation of Perpetual Contracts

For a perpetual contract position with a leverage factor of 1, there is no concept of liquidation, because the balance of net margin assets is always greater than 0; for a perpetual contract position with a leverage factor greater than 1, the liquidation conditions are:

$$B_{\text{level}} \leq a$$

Among them, B_{level} is the net assets of the margin of the current position, and a is the minimum retained balance of the set account, which is currently 10.

The liquidation can be initiated by any third party. After the liquidation is initiated, the position will be closed and the liquidator can obtain XX FROT rewards.

Seven, pledge mining

7.1 Introduction to mining

The user pledges the Token supported by the system to the mining pool and locks the warehouse to mine HEDGE. Pledge mining is divided into three stages:

Pledge period: Currently, users are allowed to pledge Tokens in the mining pool, and the lock time is different for different mining pools;

Receiving rewards: After the pledge period ends, users can claim HEDGE at this stage;

Receiving pledged tokens: After the lock-up period is over, the user can retrieve the previously pledged tokens. If the user does not retrieve the HEDGE of the mining reward at this stage, they can retrieve it together;

After the pledge period ends, the system calculates the mining rewards that users can obtain based on the number of tokens pledged by the user. The specific calculation is as follows:

$$R_{\text{fort}} = \frac{C_{\text{user}}}{C_{\text{all}}} * M_{\text{all}}$$

Among them, R_{fort} is the mining reward of the current user, C_{user} is the number of tokens

pledged by the current user, C_{all} is the total pledge amount of the current mining pool, and

M_{all} is the total HEDGE release amount of the current mining pool.

7.2 Mining Pool

Staking coin	Lock period	Total pool amount	Minimum staking amount	Maximum staking amount
NEST	1 month	200w	None	None
COFI	1 month	50w	None	None
nHBTC	1 month	50w	None	None
PUSD	1 month	50w	None	None
FOR	1 month	50w	None	None
NEST	2 year	3600w	None	None

8. Risk Warning

Users/smart contracts who use Hedge Protocol to trade perpetual contracts need to fully understand the rules of Hedge perpetual contracts, understand the differences between them and similar products on the market, and fully understand the following possible risks. Users without risk tolerance are not recommended participate:

1. Uncertainty risk of income: The calculation method of income of Hedge perpetual contract is different from the calculation method of perpetual contract of traditional centralized exchange. Hedge perpetual contract converts the future price of assets according to the historical rate of return Pricing. Therefore, after the user opens a position, the asset price increases by 100%, and the user's income is not 100%. In extreme cases, even if the asset price increases, your income may be negative;
2. Position liquidation risk: Hedge perpetual contract provides leverage of 1-5 times. When your leverage is greater than 1 times leverage, the price fluctuation of the underlying asset may cause liquidation.
3. DCU Token price fluctuation risk: Both the margin and the final profit and loss use DCU Token,

and DCU itself is also a highly volatile asset. In extreme cases, even if your perpetual contract position is profitable, it is due to the fluctuation of the DCU price itself. , May cause you to lose money based on the fiat currency.

External oracle risk: Hedge protocol's perpetual contract price comes from the NEST oracle. If the oracle is attacked or the price is abnormal due to other reasons, the system may experience settlement abnormalities, resulting in errors in the user's profit calculation;

Users/smart contracts who use Hedge Protocol to trade options need to fully understand the rules of Hedge perpetual contracts, understand the differences between them and similar products on the market, and fully understand the following possible risks. Users without risk tolerance are not recommended to participate:

1. Option pricing risk: Hedge Protocol option pricing is derived from the BS option pricing model. Unlike traditional option pricing methods, Hedge options are completely priced by algorithms, while traditional centralized exchanges are freely quoted by users. This pricing The method is a bold attempt and innovation, but it may also bring unknown risks;
2. DCU Token price fluctuation risk: DCU Token is used for royalties and the final profit and loss, and DCU itself is also a highly volatile asset. In extreme cases, even if your perpetual contract position is profitable, it is due to the price of DCU itself. Volatility, which may cause you to lose money in terms of fiat currency
3. External oracle risk: Hedge protocol's perpetual contract price is derived from the NEST oracle. If the oracle is attacked or the price is abnormal due to other reasons, the system may experience settlement abnormalities, resulting in errors in the user's income calculation;
4. Settlement time limit: After the exercise date is reached, if the user does not have manually settled options, there will be a certain period of settlement. Options that are still unsettled after this period will be marked as "expired", and settlement is not allowed.