PLEASE NOTE:

The mathematical formula cited in this white paper is intended only to illustrate the concepts it represents, not to derive the formula. For a more rigorous derivation and proof process, please refer to the original technical paper.

Please note that research is ongoing, and we will continue to publish further academic papers in the future. We also reserve the right to release revisions to this white paper.

DISCLAIMER:

DEXG tokens are not intended to constitute securities in any jurisdiction. The white paper does not constitute a prospectus or offer document of any sort, and is not intended to constitute an offer of securities or a solicitation for investments in securities in any jurisdiction.

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Preface

In 2018, the Flowchain Foundation released a white paper titled “The Tokenized Hardware Whitepaper”, which depicted the blueprint of real-world hardware tokenization.

In the white paper, DEXToken – a decentralized digital asset trading platform – was first proposed.

Following the release of the initial whitepaper, we promptly learned that in order to realize DEXToken’s vision, evaluating the token price would be vital. Therefore, Flowchain began to address this topic with mathematicians, economic chiefs, and blockchain experts.

In mid-2019, the Flowchain Foundation established the Tokenomics Research Center and started to conduct research into systematic token price valuation methods.

Later that same year, the Flowchain Foundation published an academic paper titled “Volatility effect on the adoption and valuation of tokenomics” at the SAC ’20: Proceedings of the 35th Annual ACM Symposium on Applied Computing Conference. The paper combined blockchain networks, economics, game theory, and economic models to propose a universal token price valuation method, and thereby provide a preliminary solution.

In 2020, observing the upsurge of the DeFi movement, we quickly recognized the importance of the Automated Market Maker (AMM) concept for decentralized exchanges.

Ultimately – with this white paper’s release – Flowchain proposes the Speculative AMM algorithm. This algorithm provides the cryptocurrency world with a brand new approach to AMM that provides the foundation of a genuinely decentralized exchange.

---


Centralized exchanges (or “CEX”) have all of the conventional centralized order-book trading mechanisms. By contrast, decentralized exchanges (or “DEX”) use smart contracts on-chain. For various transaction methods of both CEX and DEX, "price" is an essential factor. As cryptocurrencies are built on open blockchain networks, the formation of the "moderate price" is determined by free-market trading. To what extent blockchain network properties also determine cryptocurrency prices became an interesting research topic for Flowchain.

To this end, Flowchain established the Tokenomics Research Center in 2019. The center convened mathematicians, economic chiefs, and engineering teams devote to studying blockchain network properties and their influence on token prices.

In March 2020, the center published a paper to the ACM Digital Library. This paper has become the theoretical basis of the DEXToken protocol. At the same time, we determined that the Automated Market Maker (AMM) is the most reliable way to realize the results of this research; thus, we proposed the Speculative AMM.

This paper provides an overview of the DEXToken protocol (or “DEXToken”) proposed by the Flowchain foundation. The DEXToken protocol comprises two subsystems: (i) Speculative AMM and (ii) Off-Chain Issuance. We also propose that the DEXToken Governance token (or "DEXG") serves as the community governance token for the DEXToken protocol. Mainly, DEXG token ensure token liquidity and benefits DEXG holders (or “Stakers”) by rewarding them a portion of the DEXToken exchange profits. We propose that the transaction fees of the Speculative AMM generates these profits.

Subsequently, the Speculative AMM is expected to support off-chain derivatives; thus, it requires an issuable token technology that can issue secondary tokens.
Introduction

Speculative AMM can establish pricing-power, and thus it can create a next cryptocurrency ecosystem. Using a brand-new AMM algorithm, unique trading mechanism based on its algorithm, and with the DEXG community force, we will regain reasonable pricing and generate wealth.

1920s – The Great Depression

Centralized Finance (or “CeFi”) is susceptible to over-speculation. Looking back at the 1920s (known as the Jazz Age), it is clear that it was an era of excessive financial speculation, in which greedy bankers and politicians used their power to influence trading rules.

Everyone who holds cryptocurrency should consider whether the power to control the market should be held by a minority.

The lessons of the Great Depression – and each recession since – suggest that consolidating absolute power to formulate transaction rules and form excessive speculation to a select few leads to financial losses for the majority. This issue is an important reason why decentralized finance and decentralized exchanges must exist.

History is not far from us, because it is all history repeating itself - the present cryptocurrency market is just like the 1920s.

Over-Speculation

Speculative and arbitrage trading are part of the free market. We believe that this is the free market’s normal state, and that this phenomenon should be considered positive. Speculative and arbitrage trading can also provide liquidity for the free market.
However, there is over-speculative trading behavior in the cryptocurrency market, which causes excessive price fluctuations. As mentioned in the previous section, over-speculation leads to investor losses. These losses are often manifested as abrupt and unanticipated changes in market prices that make it practically impossible for investors to respond.

From an economic point of view, a cryptocurrency needs a suitable trading mechanism, however the current CeFi market transaction mechanism is not well-suited for cryptocurrencies. This conclusion is supported by the concepts of volatility and over-speculation as described in the previous section.

Thus there is an opportunity to develop new trading technologies for cryptocurrencies while giving the cryptocurrency community the power to establish and govern trading rules.

Introducing Speculative AMM

As previously described, price fluctuations are the norm in the free market, however we have to solve the issue of over-speculation.

We propose a Speculative AMM as a method, which to mitigate the issue of over-speculation ‘smoothes out’ strong price fluctuations. In order to achieve this, a reasonable price valuation model must be proposed that is based on a robust economic and quantitative trading framework.

The price valuation model enables the blockchain network to determine the theoretical price (reasonable price).

The goal of Speculative AMM research is to provide a suite of solutions. The Speculative AMM is a universal model that can estimate the price of tokens, providing a scientific minting model for deflationary tokens.

Further, the Speculative AMM also solves the difficult problem of a comprehensive method of deflationary token staking rewards. This method will be adopted in the DEXG staking rewards.
Pricing power is an economic term representing the impact of a company's product prices on product demand.

Thus, if there are many competing products in the market, the ability of a company to price its products will be weak. For cryptocurrency, if the community has a strong demand for a token, the community will have strong pricing power. We found, however, that the community's pricing power in the cryptocurrency market is fragile.

In today's cryptocurrency market, "whales," exchanges, and speculators hold the majority of pricing power. The Speculative AMM establishes price valuation models based on the properties of a blockchain network: Users, transaction needs, platform utilization rate, interest rate, and other characteristics.

The decentralized exchanges established by the Speculative AMM can establish a reasonable price trading mechanism. When the community in the Speculative AMM's DEX has high liquidity, the DEXToken community can collectively have good pricing power on the network.
The DEXToken Liquidity Model

The DEXToken Liquidity Model consists of three layers:

**Decentralized Exchanges (DEX)**
Decentralized Exchanges provide facilities to deposit single tokens, multicollateral tokens and off-chain tokens.

**Staking Pools**
The Staking Pool is a basket of diversified digital assets. A reserved fund provides liquidity by staking collateral tokens in the Staking Pool.

**Speculative AMM’s tokenomics layer**
The Speculative AMM’s tokenomics layer reflects the circulating supply of tokens and can be utilized by a trading bot to create profits via arbitrage trading.

The Speculative AMM maintains price stability using a low-volatility token model and an arbitrage trading system, maintaining token liquidity and providing the off-chain capabilities of token redemption and user withdrawals.
The Volatility Effect

Speculative AMM is a price valuation model concerning the Volatility Effect. This section introduces volatility in the case of Bitcoin and stable coins.

Established in 2009, Bitcoin was the first popular decentralized digital currency⁴, and the Bitcoin network grew as an open-source community. bitcoinmarket.com, the first Bitcoin exchange, reported the Bitcoin price of $0.003 on the 17th of March, 2010⁵. By February 2011, Bitcoin had reached a price of $1.00, on par with the US dollar.

Between 2009 and 2013, most Bitcoin markets were traded in US dollars. However, Figure 1 shows that the market valuation reflects the high volatility of Bitcoin’s price over time⁶. For Investors this means that when cash flows are needed at a future date, selling Bitcoin has a higher chance of a shortfall, resulting in a risk of trading losses. Such a risk of losses due to high exchange rate volatility in the BTC/USD trading pair adversely affects interest in cryptocurrency of investors.

---

⁴ Satoshi Nakamoto. Bitcoin: A Peer-to-Peer Electronic Cash System
⁶ https://en.bitcoinwiki.org/wiki/Bitcoin_history
In June 2016, Tether\(^7\) described the possibility of building fiat currencies on top of the Bitcoin blockchain. Tethers are fiat-backed tokens that are fully reserved in a 1:1 ratio with the US Dollar to solve the high-volatility issue\(^8\). This is referred to as a stable coin. A stable coin can also be backed by a basket of assets (or “Pegged,” “Collateral-Backed”); a stable coin basket allows investors to reduce the volatility risk previously mentioned.

In sum, stable coins are cryptocurrencies designed to minimize cryptocurrency price volatility. However, some stable coin projects have been shut down for regulatory reasons. For example, the stable coin project Basis that raised over $100 million in funds was shut down in December 2018 due to US regulatory concerns\(^9\).

Thus, we believe that a “perfect token” should have such low volatility characteristics, and further that the properties of its blockchain network should determine its price change (volatility), so that price adjustments can be achieved via arbitrage trading. In theory, the DEXToken protocol can gradually develop DEXG to be a “perfect token.”

In conclusion, the DEXToken protocol and DEXG provide the benefits needed by next-generation cryptocurrencies to investors, stakers, and arbitrageurs.

---

\(^7\) [https://en.wikipedia.org/wiki/Tether_(cryptocurrency)]


Benefits

For Investors

The DEXToken protocol enables investors to avoid the risk of over-speculation losses. When cash flows are required at a future date, selling tokens has a low risk of fund loss. The DEXG token model implements a low volatility AMM model that ensures a low exchange rate volatility in crypto trading pairs.

For Stakers

DEXToken protocol allows stakers to deposit multiple assets based on the volatility of each asset. Additionally, the Staking Pool can ensure token liquidity by employing the Speculative AMM swap algorithm.

For Arbitrageurs

Speculative AMM allows traders to arbitrage transactions between the DEXToken Exchange and other exchanges.

For Quants

Quantitative trading algorithms do not need to use technical indicators as a basis and, in theory, do not require historical trading data.
The State of the Automated Market Maker

An Automated Market Maker (AMM) space is tailored for specific types of tokens. Our original research proposed a universal token valuation model for various token types and derivatives. Further, Curve\(^{10}\) and Shell\(^{11}\) have demonstrated a space for constant functions tailored for specific types of tokens\(^{12}\).

In 2002, the Logarithmic Market Scoring Rule ("LMSR") was developed, and is utilized by prediction markets. Uniswap\(^{13}\) first implemented the Constant Product Market Maker, which strictly keeps track of the latest market price under ordinary conditions. Constant product markets appear to act reasonably in practice despite their simplicity.

Instead of using known constant product functions, DEXToken's Speculative AMM utilized the Volatility Effect function proposed by the Flowchain Foundation. In practice, the Volatility Effect function does not need to reference the market price; thus, Speculative AMM does not depend on the on-chain price oracle.

In the following section, Table 1 provides an overview of popular AMMs, highlighting the features unique to Speculative AMM.

\(^{10}\) https://www.curve.fi/
\(^{11}\) https://shellprotocol.io/
\(^{12}\) https://medium.com/bollinger-investment-group/constant-function-market-makers-defis-zero-to-one-innovation-968f77022159
\(^{13}\) https://uniswap.org/
While the technical indicators and bar charts can identify price patterns, price model identification is based on trend analysis and figure charts in commodity markets.

However, crypto markets are inconsistent. Trend analysis essentially requires historical data, which varies in reliability from market to market. Therefore, commodity market price models cannot be adopted in crypto markets. As such, a token price model is required to address these issues to develop a speculative AMM price model.

Motivated by financial analytics for the volatile behavior of cryptocurrencies such as Bitcoin and Ethereum, we adopted the methods proposed in a recent paper published by Cong, Li, and Wang (2019). We adopted these methods in order to be able to consider and to use the price volatility process for token price.

The resultant pricing model does not adopt technical indicators; instead it employs the properties of the blockchain network itself.
User Base and Full Adoption

Accordingly, the study\textsuperscript{14} of Cong, Li, and Wang (2019) considers a time-varying volatility process and investigates the effect on tokenomics for token price valuation.

In the adopted model, our study shows that use of a user base adoption is highly correlated to the volatility of the market. The user base is calculated based on (i) total miners, (ii) total transactions, and (iii) total wallet address.

For example, when using the Ethereum Network, we assume that this is a full adoption case, so we can set $N_f = 1$.

Universal Price Valuation Model

The following model can show that the dynamics of the token price $P_t$ is determined by user base $N_t$, aggregated transaction needs $S_t$, platform productivity $A_t$, and total token supply $M$.

$$P_t = \frac{N_t S_t A_t}{M}$$

Furthermore, CoinMarketCap proposes that Circulating Supply is a better methodology than Total Supply to determine the token market capitalization. Therefore, we propose that the total token supply $M$ can be replaced with the token circulating supply $C_t$. Thus, the model becomes:

$$P_t = \frac{N_t S_t A_t}{C_t}$$

In summary, the Speculative AMM utilizes this model to determine the total amount of minted tokens that can be issued at a time. The DEXG holders can provide liquidity by depositing their DEXG tokens and other collateral tokens to the Staking Pool.

The model proposed by J. Chen, D.C. Lin, and C.H. Han\textsuperscript{15} describes the token valuation algorithm that the DEXToken protocol uses to provide token liquidity. This model shows that the dynamic of the token price is determined by user base $N_r$, aggregated transaction needs $S_r$, platform productivity $A_r$, and total supply $M$.

Adding the expected token appreciation $u^\nu$ and risk-free interest rate $r$ to this model, and under the condition of full adoption, setting $\alpha$ to a constant between 0 and 1, then:

\[
P_t = \frac{N_r S_r A_r}{M} \left( \frac{1 - \alpha}{r - \mu^P} \right) \frac{1}{\alpha}
\]

Furthermore, the mintable tokens have a circulating supply $C_t$ at time $t$. We have shown that $C_t$ should be used to replace the total supply in the above token price model. Thus, the market price of the DEXG token at time $t$ becomes:

\[
P_t = \frac{N_r S_r A_r}{C_t} \left( \frac{1 - \alpha}{r - \mu^P} \right) \frac{1}{\alpha}
\]

\textbf{Deflation Token Valuation Model}

This model considers the appreciation of the token and the risk-free interest rate (or "conditions"). In theory, if a deflation token is issued on the Ethereum Network, we can assume that neither of these two conditions will change. When considering inflation token valuation, one should factor any changes in the two conditions. In addition, off-chain issued tokens are a kind of inflation token, and these two conditions should also be included.

DEXG and many DeFi tokens are deflation tokens. Therefore, to simplify the model, we write \( P_tC_t = N_tS_tA_t \left( \frac{1 - \alpha}{r - \mu^P} \right)^\frac{1}{\alpha} \) as the average (or "mean", "\( \mu \)") of

\[
\left( \frac{1 - \alpha}{r - \mu^P} \right)^\frac{1}{\alpha} \implies \frac{1}{K}
\]

The value of \( K \) can be reasonably considered as a constant, say \( K = 1 \), thus the model can be further simplified by rewriting the price model as:

\[
K = \frac{N_tS_tA_t}{P_tC_t} = 1
\]

An off-chain token, a PoS blockchain token, and an ERC20 token can assume that aggregated transaction needs are \( S_t \rightarrow 1 \), and platform productivity is \( A_t \rightarrow 1 \). Thus, the dynamic price of the deflation DEXG token can be determined by the following model:

\[
1 = \frac{N_t}{P_tC_t}
\]

Speculative AMM utilities the above formula's inverse function to represent the order's quantity at price \( P_t \). Thus, the token price can be evaluated (or "forecast") as:

\[
P_t^{-1} = \frac{C_t}{N_t}
\]

In conclusion, to stake an amount of \( M_a \) DEXG tokens and \( M_b \) collateral tokens to the Staking Pool at time \( t + 1 \), the price of the deflation token \( P_{t+1} \) can be determined as:

\[
P_{t+1}^{-1} = \frac{C_t + M_a}{N_t + M_b}
\]

As previously mentioned, collateral tokens are required prior to staking DEXG tokens. To meet this requirement, the circulating supply of \( M_a \) can be regulated by \( M_b \), by setting \( M_a = \alpha M_b \). As such, the Staking Pool has a stabilized exchange rate, and the DEXToken protocol can use the Token Swap mechanism to exchange tokens. The exchange rate is explained in the next section. In conclusion, the Speculative AMM uses this proposed token model to achieve a stable coin token backed by a basket of assets.
From the perspective of regulation, for popular stable coins, such as USDT, TUSD, and DAI, the cost of maintaining a backing reserve and of legal compliance is high. These popular stable coin projects are obliged to maintain government licenses, financial audit reports, and the business infrastructure required by the regulator. Besides the maintenance cost, regulatory constraints are crucial, thus, the legal and regulatory risks are high.

The Speculative AMM could have some value as a speculative machine for cryptocurrency traders and arbitrageurs.

### Deflation Token Swap Function

Following the simplified deflation token valuation model derived above:

\[
K = \frac{N_t}{P_t C_t}
\]

We invert the model so that \( P_t^{-1} \) represents the price compared with \( C_t \); thus, the dynamics of the deflation token price can be determined by the simplified model, assume that \( K = 1 \):

\[
P_t^{-1} = \frac{C_t}{N_t}
\]

As previously mentioned, on depositing \( M_a \) deflation tokens and \( M_b \) collateral tokens into the Staking Pool, the price of the deflation token will become:

\[
P_{t+1}^{-1} = \frac{C_t + M_a}{N_t + M_b}
\]

A token swap operation should be executed at the next time period (or "Time Period") represented as \( P_{t+1} \) and the deflation token's swap function at time \( t \) is \( SWA \ P_t \). The token swap operation must be executed at the next price tick (or "Price Tick") represented as \( P_{t+2} \), thus, in accordance with the previous section, the exchange rate (the "Price") can easily be evaluated by the following equation.

\[
P_{t+2}^{-1} = SWA_{P_{t+2}}(M_b) = \frac{C_{t+1}}{N_{t+1} + M_b} (M_b) = \frac{C_{t+1} M_b}{N_{t+1} + M_b}
\]
The DEXToken Ecosystem
The DEXToken Ecosystem Explained

1. Universal Price Model
The Universal Price Model is the mathematical formula proposed in the research paper\(^\text{16}\).

2. Speculative AMM
Speculative AMM uses the Universal Price Model to automatically adjust prices through arbitrage trading. Speculative AMM will be adopted in both the DEXToken Token Swap Exchange and the Decentralized Exchange.

3. Off-chain computation
Off-chain computation can enable Speculative AMM with an off-chain computation technology, a world first for the AMM space.

4. AMM to Off-Chain Trust
A crucial aspect of the DEXToken ecosystem is that off-chain transactions can be verified and audited with an on-chain smart contract.

5. Staking
The DEXToken business model proposes that a portion of the exchange’s transaction fee profits will be rewarded to DEXG holders. DEXG holders can vote on the evolution of the Speculative AMM specification, and stake DEXG in pools for rewards.

6. Products
At the product level, Flowchain will launch:

- Token Swap Exchange
- Decentralized Exchange with Fast Orderbook
- Staking Pool

---
Speculative AMM Techniques

Automated Market Makers have recently been proposed to algorithmically set prices in cryptocurrency markets. Previously, the Logarithmic Market Scoring Rule (LMSR) has served as a type of AMM for prediction markets.

In contrast to the traditional model, Uniswap proposed the Constant Product Function (CPF) for setting prices.

Going forward, Flowchain proposes the Volatility Effect Function for cryptocurrency markets. The Volatility Effect Function is a new and modern concept for setting prices.

<table>
<thead>
<tr>
<th>EXCHANGE</th>
<th>ORDERBOOK</th>
<th>AMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CeFi</td>
<td>Limit/Market/IOC/FOK orders</td>
<td></td>
</tr>
<tr>
<td>Uniswap</td>
<td></td>
<td>Constant product function</td>
</tr>
<tr>
<td>Balancer</td>
<td></td>
<td>Constant mean function</td>
</tr>
<tr>
<td>Curve</td>
<td></td>
<td>Hybrid of a constant sum and constant product function</td>
</tr>
<tr>
<td>DEXToken</td>
<td>Fast orderbook</td>
<td>Volatility effect function</td>
</tr>
</tbody>
</table>
Price Tick

The orders are queued by timestamp, and sent to Trade Engine in order. The trade engine calls the Speculative AMM to set the price (the "Output Price"), the Trade Engine then executes the order at the Output Price.

![Figure 4: Concept of PriceTicks](image)

The order is traded in the Staking Pool instead of the traditional orderbook. If the Staking Pool cannot fill the order quantity, the Trade Engine puts the order in the Orderbook for further quantity fulfillment. Then, the Speculative AMM reflects the price change and ticks a new price.

Exchange User Experience

Compared with the traditional orderbook, the DEXToken exchange only has a "Buy" button. The Speculative AMM sets the price; thus, the user only needs to input the desired quantity, and the order can be executed at a reasonable price.
AMM Algorithm Comparison

Each AMM algorithm has its own characteristics and different usage scenarios. It is beyond the scope of this white paper to comprehensively compare the advantages and disadvantages of each algorithm. Here we will describe the main characteristics of Speculative AMM and competing AMM algorithms to clarify the differences between each of them, and outline the uniqueness of the Speculative AMM.

The following figures show the smooth price variation curves of different algorithms. By comparison the Speculative AMM charts show a smoother variation than those of the constant product or hybrid market maker chart and constant sum market maker.

The left diagram shows that each order’s quantity will affect the token price and cause price slippage. The diagram curve shows that slippage will be raised exponentially by Constant Product and Hybrid Market Maker. Uniswap is recognized for using constant product market makers.

The left diagram shows that a constant sum market maker is a comparatively straightforward algorithm. It produces zero price slippage. However, this function does not provide infinite liquidity; thus, it is not suitable for decentralized exchange use cases.
The left two diagrams show that slippage is still raised exponentially by the volatility function of the Speculative AMM. However, it produces a smaller price slippage than Constant Product and Hybrid Market Maker. Thus, Speculative AMM is more suitable for decentralized exchange use cases.

Additionally, The volatility function of Speculative AMM is “token-specific.” There are two different volatility functions, one for inflation tokens and the other for deflation tokens. The previously mentioned AMMs do not have such token-specific functions.
Speculative AMM for Deflation Token

The previous charts are for the ideal situation, and they assume that the quantity of each order is the same; however, in the actual trading market this is not the case. Therefore, we present the following situations:

- **Constant Quantity Trades** - This situation does not happen in theory, and is based on hypothetical experimental data.
- **Large Quantity per Order Trades** - In a large-volume trading markets, most of the orders are for large quantities.
- **Small Quantity per Order Trades** - In a small-volume trading market, most of the orders are for small quantities.

The following in-depth analysis shows the corresponding charts, particularly for the Speculative AMM for deflation specific tokens.
However, in real-world situation, order quantities are inconsistent and unpredictable; thus, the quantity can be considered a random number. The following diagram shows the simulation results for case.
Figure 5 shows that the result is no longer a smooth curve but shows many zigzags without price fluctuations. This result demonstrates that the Speculative AMM can provide deflation tokens with a reasonable price conversion model and low volatility.
Governance Token

Governance tokens will be distributed using a fair distribution mechanism, providing 20,000 DEXG of initial liquidity to the community via Uniswap.

The initial liquidity ensures that the number of token holders can increase, which means that the holders' average number of tokens should be within a specific standard deviation.

Over time, additional liquidity will be distributed as per the following: (i) The Team, (ii) The Fundraising, and (iii) The Community. The liquidity will increase over time, theoretically reaching a maximum number of 200,000 circulating supply.

<table>
<thead>
<tr>
<th>NAME</th>
<th>DEXToken Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYMBOL</td>
<td>DEXG</td>
</tr>
<tr>
<td>CONTRACT ADDRESS</td>
<td>0xb81d70802a816b5dacba06d708b5acf19dcd436d</td>
</tr>
<tr>
<td>INITIAL LIQUIDITY</td>
<td>20,000</td>
</tr>
<tr>
<td>THEORETICAL MAX SUPPLY</td>
<td>200,000</td>
</tr>
<tr>
<td>PLATFORM</td>
<td>Ethereum / ERC-20</td>
</tr>
</tbody>
</table>
The following is the DEXG minting plan, including the minimum and maximum numbers. The staking reward and the community will determine the actual numbers.

<table>
<thead>
<tr>
<th>INITIAL LIQUIDITY</th>
<th>20,000</th>
<th>Minted when the contract is deployed at the pre-launch stage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEAM</td>
<td>2,000 - 20,000</td>
<td>An amount of 2,000 tokens will be minted when the project is officially launched, and the remaining number of tokens $S_{team}$ receives will be determined by comparing the number of staking rewards minted. $S_{team}$ will not exceed 20,000 or 10% of the final circulation supply.</td>
</tr>
<tr>
<td>FUND RAISING</td>
<td>2,000 - 20,000</td>
<td>An amount of 2,000 tokens will be minted when the project is officially launched, and the remaining number of tokens $S_{fund}$ receives will be determined by comparing to the number of staking rewards minted. $S_{fund}$ will not exceed 20,000 or 10% of the final circulation supply.</td>
</tr>
<tr>
<td>COMMUNITY</td>
<td>2,000 - 140,000</td>
<td>Staking rewards to DEXG holders.</td>
</tr>
</tbody>
</table>
## Lock and Vest

<table>
<thead>
<tr>
<th>Category</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL LIQUIDITY</strong></td>
<td>20,000</td>
<td>No lock.</td>
</tr>
<tr>
<td><strong>TEAM</strong></td>
<td>2,000</td>
<td>The initial 2,000 tokens will be minted and issued when the project is officially launched.</td>
</tr>
<tr>
<td></td>
<td>2,001 - 20,000</td>
<td>The remaining tokens minted will be subject to a two-year vesting period with a one-year cliff.</td>
</tr>
<tr>
<td><strong>FUND RAISING</strong></td>
<td>2,000 - 20,000</td>
<td>Some tokens will be added to the exchange liquidity and used for the exchange listing fee. Moreover, part of the funds will pay marketing expenses and benefit private investors. Those liquidities, including the investor's tokens, will not influence the price.</td>
</tr>
<tr>
<td><strong>COMMUNITY</strong></td>
<td>2,000 - 140,000</td>
<td>No lock.</td>
</tr>
</tbody>
</table>
Initial Liquidity Lock

Flowchain has locked **100%** of the initial liquidity for **two years**.

We cannot remove any liquidity of DEXG from Uniswap until then. This means that the DEXG/USDT trading pair is a safe trading pool resulting in a favorable trust score.

The POL score can be viewed at
https://unicrypt.network/uniswap-browser/pair/
0x0555F052DA0A50d39369B0f634855edc858Baa18
Staking Reward

Tokens are distributed in the form of Staking Rewards. The number of rewards will be determined and guaranteed through community consensus.

In order to ensure a certain reasonable liquidity is maintained, the Universal Price Model and Speculative AMM engine will solve this problem algorithmically.

Staking Reward Function

The number of tokens for staking rewards is determined by

\[ P_i C_i = N_i S_i A_i \left( \frac{1 - \alpha}{r - \mu^p} \right)^\frac{1}{\alpha} \]

In a total of eight rounds, the DEXG distribution will be completed. The advantage of the Speculative AMM model is that the larger the user base, the higher the price can be theoretically increased. At this time, to maintain price stability – that is, low volatility – liquidity is decreased.

Accordingly, after eight rounds of staking rewards, DEXG will obtain the final total supply and establish a community foundation.

Project fundraising and the launch of Speculative AMM products will follow. The detailed staking reward information and timelines will be officially released separately on Flowchain's official website.

For many DeFi token holders, although staking reward is an important issuance policy after completion of the staking reward, the actual use of the DeFi token is still a topic to be discussed. Regarding this, DEXG may be able to provide a proposal.
Maximum Supply Scenarios

As shown in the chart below, the supply of 200,000 is a theoretical value and will only occur in the Bootstrap stage. This is because at the beginning, the price is low, and the user base is insufficient.

With the successful launch of the initial liquidity distribution, a market price is generated as a sufficient user base emerges. Thus, according to the Universal Price Model mentioned above, the number of staking rewards will be reduced to maintain the market price of DEXG.

Appendix A shows the staking reward computation based on the price volatility function of the Speculative AMM.
Scenario A: Strong Community

IF:
- The DEXG community grows to more than a user base of **600 addresses**
- The initial liquidity offering’s ATH price reaches **$250**
- The subsequent community stays flat and **no longer grows**

THEN:
- The Staking Reward will be reduced to **48,000**
- The initial liquidity offering’s ATH price reaches **$250**
- The liquidity of Team and Fund Raising will be adjusted from the total of 20,000 to **8,500**
- After eight rounds of Staking Rewards, the Maximum Supply will finally be determined as **85,000**

Scenario B: Strong Community and Price

IF:
- The DEXG community grows to more than a user base of **600 addresses**
- The initial liquidity offering’s ATH price reaches **$250**
- The subsequent community **continues to grow steadily**

THEN:
- The Staking Reward will be reduced to **36,000**
- The liquidity of Team and Fund Raising will be adjusted from the total of 20,000 to **7,000**
- After eight rounds of Staking Rewards, the Maximum Supply will finally be determined as **70,000**
Estimated Final Token Metrics

Assuming that the ATH price continues to rise steadily over time (i.e. Scenario B), Table 2 below shows the changes in liquidity and the final total supply.

<table>
<thead>
<tr>
<th>TABLE 2: ESTIMATED FINAL TOKEN METRICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL LIQUIDITY</strong> 20,000 Mint at initial liquidity offering.</td>
</tr>
<tr>
<td><strong>TEAM</strong> 7,000 Mint 2,000 at project launch, and mint 5,000 at the end of staking reward rounds.</td>
</tr>
<tr>
<td><strong>FUND RAISING</strong> 7,000 Mint 2,000 at project launch, and mint 5,000 at the end of staking reward rounds.</td>
</tr>
<tr>
<td><strong>COMMUNITY</strong> 36,000 The total after all-rounds end is 36,000.</td>
</tr>
</tbody>
</table>
The table on the following page describes the theoretical change of total supply over time.

During the initial liquidity offering:

**IF:**
- If the ATH price is **$250** and the user base is **600**

**THEN:**
- the number of staking rewards tokens is **6,000**

**IF:**
- the ATH moves to **$300** and the user base increases to **700** because of the strong community

**THEN:**
- **5,833** staking reward tokens will be issued in Round 2

**IF:**
- the ATH continues to move to **$350** and the user base stops at **700**

**THEN:**
- **5,000** staking reward tokens will be issued in Round 3

...And so on. In the last round:

**IF:**
- the ATH continues to move to **$600** and the user base stops at **800**

**THEN:**
- **3,333** staking reward tokens will be issued in Round 3

In the last round, the supply of community accumulated to **36,094**. Thus, we burn **94 tokens** to get **36,000 multiples of a thousand**.

The token distribution of DEX finished at a max supply of **70,000**.
Estimated Final Token Metrics

Rules for Estimating Final Token Metrics

This model follows two important rules:

1. The number of tokens of each round cannot be greater than that of the previous round. If it is, the number of tokens in the previous round will be applied.

2. The staking model only references the ATH price at Uniswap. ATH price at centralized exchanges will not affect it because we trust the Uniswap’s on-chain market price.

The above demonstration shows a circulating supply of **70,000** with a steady price rise to **$600** across **800** active addresses, where the ATH increases by **$50** for each staking round.

With higher numbers of ATH and active addresses, the supply will be considerably less.
Off-Chain Tokens

Off-Chain tokens can be points, coupons, flight miles, or any fungible assets. Once these digital assets are tokenized, they can be issued and redeemed in an off-chain network. In the future, we hope that DEXG holders will mint off-chain tokens through staking.

Speculative AMM can obtain the price of off-chain tokens using the Universal Price Model.

How Off-Chain Minting Works

The DEXToken protocol can mint a number of off-chain tokens, and an on-chain smart contract can be used to regulate the circulating supply of off-chain tokens. Minting of off-chain tokens also takes place on a different smart contract.
The off-chain minting smart contract is executed by a signed message of the token issuer. In theory, off-chain minting is within an off-chain blockchain network, and the minting transactions should be submitted to the public blockchain network (the "on-chain" blockchain network) for issuing token rewards.

As such, DEXG is a utility token that can be used in an off-chain network. As a utility token, the DEXG token can also be offered to a market for attention, acquisition, or consumption. In order to support the DEXToken protocol, an off-chain issuable token technology is required to provide minted token redemption and user withdrawal capabilities.

Proof of Off-Chain Stake

The Virtual Blocks\textsuperscript{17} (or “off-chain blocks”) proposed by Flowchain can provide a new blockchain data structure designed to ensure real-time data transactions. The FLC miner in the Flowchain network can mine such virtual blocks and submit virtual blocks to the public blockchain for validation. Also, an on-chain staking contract will be deployed on the Ethereum network. Given DEXG as the collateral tokens and the FLC\textsuperscript{18} as the network utility tokens, then the proof of off-chain stake flow is as follows:

\textbf{FIGURE 8: PROOF OF OFF-CHAIN STAKE FLOW}

\textsuperscript{17} The Flowchain White Paper, https://flowchain.co/publication.html

\textsuperscript{18} Off-Chain Issuance of FLC Native Tokens, https://flowchain.co/flc-native-token.html
1. The staker deposit collateral and network utility tokens to the Stake contract.

2. The Stake contract sends a signed transaction to deliver tokens to the Regulation contract.

3. The Clearing House contract should condition the authenticity of the certificate.

4. The Clearing House emits an event and audits the wallet balance.

The deposited tokens are reserved in the Regulation contract. Thus, the Regulation contract is the wallet for the funds. Accordingly, stakers can withdraw their funds by sending a signed “withdraw transaction” to the Regulation contract.

Figure 8 presents that Stake contract has a regulation contract and a clearing house. The Regulation contract can act as a depositary for holding deposited tokens and provides the redeem and withdraw functions to support users' wallets.

Off-Chain Minting and Issuance

The Flowchain network is designed to enable tokens to be minted off-chain. Given the cFLC off-chain tokens as an example, the process of cFLC off-chain token minting and issuance is as follows:
1. A deposit of collateral and FLC tokens should be performed to proof stakes before minting off-chain tokens.

2. An off-chain issuance contract should be deployed in the Ethereum network for public auditing.

3. The off-chain issuance contract should issue new off-chain tokens. The off-chain issuance contract holds off-chain minted tokens.

4. The cFLC smart contract should provide a withdraw function to redeem and withdraw cFLC off-chain tokens.

Stakers can withdraw their cFLC tokens by sending a signed "withdraw transaction" to the cFLC smart contract, and off-chain issuance contract will update the circulating supply of cFLC tokens.

In sum, FLC and DEXG can increase their token values as be collateral tokens for minting various off-chain tokens.
Roadmap

AUGUST 2020
Initial Liquidity Offering

SEPTEMBER 2020
Staking Rewards

NOVEMBER 2020
Deflationary Tokens Speculative AMM

Q1 2021
Inflationary Tokens Speculative AMM

Q3 2021
Off-Chain Tokens Speculative AMM

Q3 2021
Derivatives Speculative AMM

2022
IoT Payments

2022
Online Payments
About the Flowchain Foundation

The Flowchain Foundation has three offices in Singapore, Taipei, and Shenzhen, which are responsible for different facets of the Foundation.

Flowchain Foundation is based in Singapore and is responsible for Flowchain community support and global marketing efforts, with Flowchain founder Jollen Chen as CEO. The office in Shenzhen with the management team Jin and Chalmers is responsible for business development in China. The office in Taipei is responsible for globally delivering Flowchain IoT and DeFi solutions.

The Flowchain Foundation has three offices responsible for the planning and supervision of the use of Flowchain digital assets and managing Flowchain working capital; the use of Flowchain working capital will be discussed by the Flowchain Foundation’s budget committee and will be based on integrity, openness, fairness, and transparency.
Conclusion and Vision

DEXToken and Flowchain are developing DeFi infrastructure, a theoretically perfect token, and a reasonable price model for exchange between tokens. We are not simply building a DeFi token; we are building a DeFi ecosystem.

As a private company, Flowchain is committed to developing DEXG for the long term. Flowchain will closely align with government policies and actively develop into a service provider for IoT finance, digital finance, and decentralized finance.

The development of blockchains and asset tokenization makes it possible for economics to use cryptocurrencies and digital asset tokens instead of national currencies. According to Gresham's law\(^\text{19}\), the "deflationary" token is a superior store of value.

Such deflationary tokens will not only grow their value in the long run but will also have low volatility in the short run. In the future, such tokens, including the DEXG token, may become popular collateral for smart banknotes.

*Please visit https://flowchain.co for whitepaper updates.*
## Appendix: Token Metrics - Bootstrap

<table>
<thead>
<tr>
<th>Over Time (ATH Price)</th>
<th>Initial Liquidity</th>
<th>Team Liquidity</th>
<th>Userbase (Addresses)</th>
<th>Community (Staking Rewards)</th>
<th>Final Max Supply</th>
<th>200000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch</td>
<td>30 210</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20000</td>
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<tr>
<td>Staking 1</td>
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<td>0</td>
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<tr>
<td>Staking 2</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>17500</td>
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<tr>
<td>Staking 3</td>
<td>30</td>
<td>210</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17500</td>
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<tr>
<td>Staking 4</td>
<td>30</td>
<td>210</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17500</td>
</tr>
<tr>
<td>Staking 5</td>
<td>30</td>
<td>210</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17500</td>
</tr>
<tr>
<td>Staking 6</td>
<td>30</td>
<td>210</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17500</td>
</tr>
<tr>
<td>Staking 7</td>
<td>30</td>
<td>210</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17500</td>
</tr>
<tr>
<td>Staking 8</td>
<td>30</td>
<td>210</td>
<td>0</td>
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</tr>
<tr>
<td>Final Mint</td>
<td></td>
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<td>Total</td>
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<tr>
<td>%</td>
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</table>