

BNC : : BNEX

# BNC Non-Fungible Token Ecosystem Index

Index Methodology

Version history

Version	Date	Update
1	2021-09-01	Initial methodology

1. Introduction	<b>4</b>
2. Constituent Assets	<b>5</b>
2.1 Non-Fungible Token Ecosystem Asset Criteria	5
2.2 Constituent Asset Criteria	6
3. Index Calculation	<b>7</b>
4. Reconstitution & Rebalancing	<b>7</b>
4.1 Schedule	8
4.2 Weighting	8
4.3 Capping	8
4.4 Free Float Supply	8
5. Asset Pricing	<b>9</b>
5.1 Eligible Pricing Sources	9
5.2 Reference Assets	10
5.3 BNC High Frequency Pricing	10
6. Governance	<b>12</b>
6.1 Index Oversight Committee	12
6.2 Periodic Review	12

## 1. Introduction

A non-fungible token (NFT) is a type of cryptographic token which certifies something unique and therefore not interchangeable. NFTs can be useful for any applications that require unique digital items such as digital art, digital-collectibles, and in-game items.

The Brave New Coin (BNC) Non-Fungible Token Ecosystem Index (BNEX) is a rules-based sector index designed to measure and track the real-time market performance of the largest protocols that provide infrastructure, gaming platforms, marketplaces and metaverses to the NFT ecosystem. The BNEX consists of **ten** eligible assets, weighted by **free-float market capitalization** and a **25%** cap, with a **quarterly** rebalance and reconstitution schedule.

The index is owned and administered by Brave New Coin under the principles:

Representative	The index should closely follow the target market and represent an adequate sample.
Transparent	The index should be transparent in its design and reproducible in its calculation.
Timely	The index should be computed as frequently as necessary to reflect price changes in the constituent assets.
Robust	The index should be robust to disruptions such as erroneous data or pricing source outages, and be resistant to manipulation.

## 2. Asset Eligibility Criteria

Cryptoassets must satisfy a set of eligibility criteria to be considered eligible for index selection. Determination of eligibility is made on 'Eligibility Day', 7 days prior to 'Weight Day', when asset constituents are selected from the list of eligible assets. Selection of eligible assets is at the discretion of the Index Committee based on the below criteria.

### 2.1 Sector Criteria

The sector criteria act as a classification for this particular sector.

Criteria	Details
1. Non Fungible Token Definition	Non-Fungible Tokens, or NFTs, are cryptographic assets that each represent ownership of something unique such as an in-game item, a digital piece of art, trading cards or real-world items like real estate, music, or videos.
2. NFT Protocol	Protocols that primarily contribute to the NFT ecosystem, including but not limited to infrastructure, gaming platforms, marketplaces and metaverses.
3. NFT Marketplace	In the context of an NFT "marketplace", this includes minting, issuance and trading of NFT's and collectibles (including NFTs linked to physical assets).
4. Governance and Utility	Upgrading protocol changes and control privileges are not held by a single entity. Native tokens of such platforms must allow for governance voting or similar utility.
5. Particular exclusions	The index does not consider: <ul style="list-style-type: none"><li>• privacy-centric assets</li><li>• physically-backed crypto-commodities</li></ul> as defined by the <i>BNC General Taxonomy for Cryptographic Assets</i> .

The above criteria are maintained within BNC's *General Taxonomy for Cryptographic Assets* by the BNC Research team. This is a uniform classification system for cryptographic assets spanning over 65 different qualitative data points including sectors, blockchain features and regulatory requirements. Find more information [here](#).

## 2.1 Crypto-asset Criteria

The crypto-asset criteria ensure only assets that meet a basic definition of a crypto-asset are eligible.

Criteria	Details
6. Permissionless	Open to anyone with an internet connection
7. Censorship Resistant	No third-party can stop a transaction
8. Immutable	No third-party can reverse a transaction
9. Counterparty Risk	No need to trust a centralised third-party to custody funds or validate transactions
10. Open Source	Users can develop on or modify the code
11. Programmable	Smart contracts can be coded for a specific task and self execute

## 2.2 Index Criteria

The index criteria impose a minimum standard of maturity and liquidity of asset constituents. These criteria also ensure the stability and robustness of the indices used to price assets.

Criteria	Details
1. Coverage	Have active tradable markets listed on at-least three different eligible pricing sources, across four unique markets (combination of eligible pricing source and reference asset), for the last 90 days.
2. Liquidity	Have an average daily trading volume that exceeded \$4 million USD across the eligible pricing sources and markets, for the last 30 days.
3. Data Availability	Access to reliable supply and free-float data.

### 3. Index Calculation

Publication of the index is made at irregular time intervals. Index calculation is triggered by changes in the price of its constituent assets, which could occur multiple times per second. The index level at time t, is calculated as:

$$index_t = \frac{\sum_{c=1}^C (P_{c,t} \times S_{c,p} \times CF_{c,p})}{\sum_{c=1}^C (P_{c,t-1} \times S_{c,p} \times CF_{c,p})} \times index_{t-1}$$

Where:

$P_{c,t}$  = the USD denominated price of constituent c at time t.  
Constituent pricing is sourced from BNC's *High Frequency Pricing* (HFP) service (section 5.3)

$S_{c,p}$  = the free float supply of constituent c for period p.  
Constituent free float supply is calculated by BNC Research (section 4.4)

$CF_{c,p}$  = the capping factor of constituent c for period p  
(section 4.3)

$C$  = the number of constituents in the basket

$index_{t-1}$  = previous index level

The formula is derived from the widely used “base-weighted aggregative” or ‘divisor’ method for calculating market capitalization weighted indices. These compare the current market value (the numerator) to some base market value (denominator) and multiply by the base index value. The base market value and base index value are often combined into a ‘divisor’.

$$index_t = \frac{\sum_{c=1}^C (P_{c,t} \times S_{c,p} \times CF_{c,p})}{\sum_{c=1}^C (P_{c,0} \times S_{c,0} \times CF_{c,0})} \times index_0$$

Instead of using a base value that is set at the start of the quarter, our formula uses the previous state for comparison. This reduces the algorithm complexity during rebalancing to remove any disruption and maintain milli-second accuracy.

### 3. Reconstitution & Rebalancing

The index is reconstituted and rebalanced quarterly (“a period”), on the 1st Wednesday of the rebalancing month. The constituent assets that comprise the index and their respective weightings are determined prior to this date, using each asset's free-float market capitalization. From this, an asset's average free-float supply and capping factor is determined and will remain constant throughout the period.

#### 3.1 Schedule

- **Eligibility Day:** after review, assets eligible for inclusion at the next rebalancing are announced, 7 days prior to the *Weight Day*
- **Weight Day:** constituent assets and their weights are calculated and disclosed, 7 days prior to *Implementation Day*.
- **Implementation Day:** Updated weightings are implemented into index computation on the first Wednesday of the rebalancing month, at 8:00 am UTC. If the implementation day falls on a public holiday, implementation will be delayed to the next business day.

#### 3.2 Asset Selection

Constituent assets are reconstituted prior to the end of each period on 'Weight Day', in preparation for the next period. The largest assets are selected from the eligible universe using an assets average free float market capitalization,  $MCAP_{c,p}$ .

Each asset's daily free float market capitalization is determined at 7:00 pm UTC by multiplying it's end-of-day price, by it's free float supply at the time of calculation. On 'Weight Day' the  $MCAP_{c,p}$  of each eligible asset is calculated as the simple average of the free-float market capitalization on the 5 preceding days inclusive of weight day. The average free-float supply for the period,  $S_{c,p}$ , is calculated here in the same way.

These assets are then ranked in descending order and the constituent assets are selected based on the *basket size*.

#### 3.3 Asset Weighting

Once the constituents assets for the next period are selected, their weightings can be determined. Each  $MCAP_{c,p}$  is converted to a percentage of the total  $MCAP_{c,p}$  across the selected assets. This is known as the uncapped weighting,  $W_{c,p}^{uncap}$ .

A capping process is then applied to determine capped weights and capping factors for each constituent asset. If any constituents's uncapped weighting,  $W_{c,p}^{uncap}$ , is greater than the *weight cap*, its capped weight,  $W_{c,p}^{cap}$ , is set to the weight cap and the excess weight is distributed proportionally to the other constituents.



Finally, the capping factor  $CF_{c,p}$  of constituent  $c$  for period  $p$ , is calculated as:

$$CF_{c,p} = \frac{W_{c,p}^{cap}}{W_{c,p}^{uncap}}$$

### 3.4 Free Float Supply

Constituent selection and weightings are reliant on accurate free-float supply data. Free-float supply represents the assets available to trade, and is calculated by subtracting an assets non-circulating supply from it's total supply. Examples of non-circulating supply are tokens that have been locked or burned, tokens in a community or founders reserve or those held in a corporate treasury.

Crypto assets have various distribution models and supply metrics. BNC operates and maintains multiple blockchain nodes and infrastructure for all major blockchains in the crypto space. Using this data, we are able to analyse and classify individual transactions, wallets, and entities in order to arrive at a true value for supply.

Once analysis and classification has been completed on transactions and supply movements for a cryptocurrency, a list of wallet addresses and balances are generated which can be subtracted from the total supply in order to compute the free-float supply.

### 3.5 Parameters

Parameter	Value
rebalance frequency	quarterly
rebalance months	Feb, May, Aug, Nov
basket size	10
weight cap	25%
notice period	7 days

## 5. Asset Pricing

The constituent assets are priced using BNC's High Frequency Pricing (BNC::HFP) service, which calculates cryptocurrency price indices in real time from the orderbooks of approved pricing sources. Where other BNC price indices rely on executed transactions (trades), due to its high frequency of calculation the HFP service uses only executable transactions (bids and asks).

See the full methodology for BNC High Frequency Pricing [here](#)<sup>1</sup>.

### 5.1 Eligible Pricing Sources

To ensure transactions used in Brave New Coin pricing and indices are formed by the competitive forces of supply and demand, particular attention is applied to the quality of exchange venues from which these transactions are sourced. Qualified pricing sources must demonstrate the existence of an active market, consisting exclusively of bona fide, arms-length transactions.

Criteria
<b>Compliance</b> Show compliance with applicable laws and regulations, including but not limited to client money custody, anti-money-laundering (AML), know-your-customer (KYC) and money transmission regulations.
<b>Trade Surveillance</b> Transparent policies and evidence, such as a 'trading rulebook' and trade surveillance systems that monitor transactions for market manipulation or fraud, and prevent illegal trading practices.
<b>Operations</b> Exhibit a track record of uninterrupted customer deposits & withdrawals, identity verifications, wire transfers & payment methods, wallet maintenance, network upgrades and connectivity issues.
<b>Transparent Data Provision</b> Provide a stable REST and web-socket API for live and historical ticker, raw gapless trades and unaggregated order book data. Proof of solvency or reserves of hot and cold wallet addresses is also required to determine solvency.
<b>Arms-length transactions</b> Show no evidence of wash-trading. This criteria is determined using in-spread & volume sensitivity analysis. Qualified pricing sources must claim some 'cost-to-trade'; for example trading fees; and not employ any trade mining schemes or like practises.

Given that our pricing sources are third-party organizations operating in a volatile marketplace, the Index Governance Committee reviews its pricing sources quarterly to ensure adherence to the above criteria. Orders (bids and offers) are collected from pricing sources in real-time via a secure web-socket subscription. The index does not rely on submission.

<sup>1</sup> BNC High Frequency Pricing Methodology: <https://bravenewcoin.com/insights/bnc-high-frequency-pricing-methodology>

## 5.2 Reference Assets

After the eligible pricing sources have been selected, only markets on these exchanges which are quoted by one of the below reference assets can be used as inputs to our price indices.

Ticker	Name
USD *	United States Dollar
BTC	Bitcoin
ETH	Ethereum
USDT	Tether (USD)

\* preferred

## 6. Governance

### 6.1 Index Committee

The BNC Index Committee is responsible for the oversight and transparency of all aspects relating to the provision of benchmarks administered by Brave New Coin Limited. In the design, calculation and management of all indices in the series, the Index Committee adheres to IOSCO's Principles for Financial Benchmarks, as outlined in the BNC IOSCO Statement of Alignment.

The primary function of the Index Committee is to maintain orderly index calculation, manage periodic reviews, and to undertake regular review of the methodology to ensure that the index best measures the intended interest and continues to comply with applicable regulatory requirements.

The Index Committee is composed of five voting members with appropriate experience to provide effective review of the processes and procedures related to the creation and management of crypto-asset indices.

### 5.2 Periodic Review

The Index Committee meets quarterly to perform review procedures and ensure sustained and adequate representation of the interest being measured.

Review procedures undertaken at periodic meetings include but are not limited to:

- a. Assessing asset eligibility for inclusion or exclusion in the 'eligible universe'.
- b. The acceptance of reconstituted and rebalanced asset weights, as well as any additions / deletions.
- c. Review changes to asset circulated supplies and upcoming associated corporate actions.
- d. Motion material methodology changes or advise investigation where a methodology change is required.

Procedures that may require an extraordinary meeting of the index committee outside of the regular schedule:

- a. Corporate actions of constituent assets in the near future; their treatment and public communication.
- b. In case of asset delistings on multiple pricing sources, other pricing sources may need to be approved, or if the committee sees fit, removal of the asset from the index.
- c. To address the possible need for the cessation of the index.

### 5.3 Expert Judgement

The index is designed with the intent of minimizing the need for judgement or discretion in calculating and managing the index. However, certain circumstances may arise that demand an injection of expert judgement which is not covered in this methodology.

Such cases include, but are not limited to, the treatment of corporate actions, the recalculation of indices when a pricing dispute arises or changes to the methodology to better measure the interest. In the event that expert judgement is required, it will be performed by members of the Index Committee, and its application reviewed by the internal oversight function.

Brave New Coin (BNC) is a leading provider of market data services (aggregated pricing) and institutional grade indices (proprietary and bespoke) that are designed to track the most liquid areas of the cryptocurrency markets. Founded in 2014, BNC has built a strong reputation for independence, objectivity, robust processes and technical innovation.

For further information on BNC Indices please visit [bravenewcoin.com](https://bravenewcoin.com).