



CoinDesk Single Digital Asset Price Indices Methodology

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Introduction

Index Objective

The CoinDesk Single Digital Asset Price Index series (the “Indices”) provide USD-denominated reference rates for spot prices for digital asset tokens. The Indices leverage real-time prices from multiple exchanges to provide a representative spot price for each digital asset. Constituent exchanges are weighted proportional to their trailing 24-hour liquidity with adjustments for price variance and inactivity.

Additional Details

Given the potential for anomalies or manipulation at individual exchanges, constituent weights may dynamically adjust using CoinDesk Indices proprietary Constituent Weighting Adjustment Algorithm (CWAA). The algorithm is designed to calculate a real-time index which is an accurate and reliable reflection of the tradable market price of each digital asset using spot prices from multiple sources. The algorithm dynamically reduces the weights of individual exchanges with lower liquidity, inactivity and higher price variance. Please refer to the *Index Calculation* section for more details.

These indices were officially rebranded from TradeBlock to CoinDesk on April 20, 2021. There were no modifications to the index rules or historical data because of this rebranding.

This methodology was created by CoinDesk Indices (“CDI”) to achieve the Index Objective stated above. There may be circumstances or market events which require CDI, in its sole discretion, to deviate from these rules to ensure each Index continues to meet its Objective. This document should be read in conjunction with the CoinDesk Digital Asset Indices Policy Methodology.

Table 1 provides the list of indices as determined by CoinDesk Indices. This list may expand in the future at the discretion of CDI.

Table 1: List of Price Indices

Index Name	Ticker	Trading Pair	Launch Date
CoinDesk Bitcoin Price Index	XBX	BTC/USD	11/03/2014
CoinDesk Ether Price Index	ETX	ETH/USD	03/02/2018
CoinDesk Bitcoin Cash Price Index	BCX	BCH/USD	03/02/2018
CoinDesk Litecoin Price Index	LTX	LTC/USD	03/02/2018

Index Name	Ticker	Trading Pair	Launch Date
CoinDesk Cardano Price Index	ADX	ADA/USD	06/30/2021
CoinDesk Basic Attention Token Price Index	BTX	BAT/USD	03/17/2021
CoinDesk Ether Classic Price Index	ECX	ETC/USD	04/10/2017
CoinDesk Chainlink Price Index	LNK	LINK/USD	03/17/2021
CoinDesk Zcash Price Index	ZCX	ZEC/USD	03/02/2018
CoinDesk EOS Price Index	EOSX	EOS/USD	12/13/2018
CoinDesk Solana Price Index	SLX	SOL/USD	10/01/2021
CoinDesk Uniswap Price Index	UNX	UNI/USD	10/01/2021
CoinDesk Lumens Price Index	XLMX	XLM/USD	12/13/2018
CoinDesk Tezos Price Index	XTX	XTZ/USD	10/01/2021
CoinDesk XRP Price Index ¹	XRX	XRP/USD	8/23/2023

¹ XRX was initially launched on 3/2/2018 and then discontinued in Q1 2021. CDI maintained the index internally and re-launched XRX on 8/23/2023 with historical data back to 3/2/2018.

Eligibility Criteria

Exchange Eligibility

To be eligible, an exchange must first meet the Exchange Eligibility criteria outlined in the CoinDesk Digital Asset Policy Methodology. Category 1 and Category 2 exchanges are eligible for inclusion subject to a minimum of two Category 1 exchanges in each Price Index. For each Price Index, the following additional criteria are used to establish eligible exchanges.

1. Prior three-month trading volume (as measured in USD) on the exchange must represent a target minimum percentage of total trading volume across all eligible exchanges for the trading pair as follows:
 - a. For current contributing exchanges, the minimum percentage is 2.0%.
 - b. For non-contributing exchanges, the minimum percentage is 3.0%.
2. Must support USD-denominated trading for the single asset.

For each index, the list of exchanges that pass all eligibility criteria listed above form the Selection Universe.

Index Construction

Exchange Selection

All exchanges in the Selection Universe are included in the index subject to a minimum of three and maximum of eight contributing exchanges based on the following steps:

Step 1: Rank exchanges in descending order by three-month trading volume

Step 2: Select the two highest ranked Category 1 Exchanges (U.S. licensed exchanges) from Step 1. See the [CoinDesk Digital Asset Indices Policy Methodology](#) for a list of Category 1 Exchanges.

Step 3: If Step 2 results in fewer than two exchanges, the three-month trading volume requirement is relaxed for current contributing exchanges and non-contributing exchanges until two exchanges are selected.

Step 4: From the remaining list of exchanges, select the exchanges with the highest rank subject to a maximum of eight exchanges.

Step 5: If Step 4 results in fewer than three exchanges, the three-month trading volume requirement is relaxed for current contributing exchanges and non-contributing exchanges until three exchanges are selected.

If the exchange selection process results in fewer than two Category 1 exchanges or fewer than three exchanges overall, the Index Committee will determine the appropriate action.

Exchange Weighting

Contributing exchanges are weighted proportional to their trailing 24-hour liquidity with adjustments for price variance and inactivity as described in Index Calculation.

Index Calculation

The Indices utilize the most recently available trade data from contributing exchanges using a dynamic lookback period based on exchange liquidity for each Price Index. The weighted-average Price Index is calculated and published approximately once every second.

Calculating single digital asset price indices represents unique challenges as various market participants do not adhere to regulatory oversight, market standards, or follow pre-set guidelines. This can lead to concerns around data integrity vis-à-vis exchange sources, including, but not limited to unintended errors, manipulated pricing feeds, and/or issues with reported trading volumes.

To account for potential data anomalies or lack of trading volume from an exchange, CDI's Constituent Weighting Adjustment Algorithm (CWAA) is designed to calculate a volume weighted price for each constituent exchange as well as adjust constituent weights in real-time to minimize the impact of localized exchange issues on calculated index levels. The following are key steps employed by the algorithm:

1. **Data Cleansing:** Before applying the index algorithm to real-time market data, all inputs are cleaned for duplicates, relevancy, and appropriateness.
2. **Binning Ticks:** Certain exchanges often process several trades within a short span of time, which may unduly influence the index value. By binning several ticks, the algorithm synthesizes the data into a single trade.
3. **Liquidity Weighting:** Exchanges with greater 24-hour liquidity are more heavily weighted in the index, increasing the ability to replicate the index. This also mitigates the impact of 'trade bursts' or movements during off-peak trading hours.
4. **Price Variance Weighting:** Exchange weights are discreetly adjusted in proportion to the variance of their respective prices from the mean price. As the price at a particular exchange diverges from the rest of the data points, its influence on the index consequently decreases.
5. **Time-based coefficient:** The algorithm penalizes inactivity on an exchange. If an exchange does not have new trading data after a certain period, its weighting is gradually reduced, until it reaches 0%.

The result of these steps may cause a partial or total reduction in the weight of the impacted contributing exchange(s). If this happens, the total percent weight reduced will be proportionally redistributed to contributing exchanges not impacted. As normal activity and trading resumes on the impacted contributing exchange(s), weights of all contributing exchanges will return to normal levels.

In the event of a market stress event or unresponsive input data from contributing exchanges, the algorithm will incorporate at least one input to calculate a benchmark value. In the unlikely event of no input data from all contributing exchanges, the index will default to the most recent value for which one or more inputs were present.

The Index Committee maintains discretion for re-evaluating and updating the algorithm based on market conditions to maintain the quality, reliability, and integrity of the indices.

Calculation Formula

$$IndexValue_t = \sum_{i=1}^N P_{i,t} * W_{i,t}$$

Where:

IndexValue_t = Index Value at time *t*

P_{i,t} = Price of trading pair (as calculated by the CWAA) on exchange *i* at time *t*

W_{i,t} = Weight of constituent exchange *i* at time *t* as determined by the CWAA

N = number of constituent exchanges

Index Maintenance

Index Reconstitution

Each index is reviewed on a quarterly basis during January, April, July and October based on data available up to and including the Reference Date. Contributing exchanges are reselected based on the rules described above. Any changes resulting from the quarterly review are announced two weeks in advance of the effective date and are phased in over a 24-hour implementation period. During the implementation period, the weights of additions will gradually increase from 0% to their target weight and any deletions will decrease from their current weight to 0%. Please see below for the reconstitution timeline including an example.

Activity Description	Timing	Example Reconstitution Timing
Reference Date for Input Data	First Friday of Quarter	1/7/2022
Announcement Date	Second Friday of Quarter	1/14/2022
Implementation Begins	Saturday at 4PM Eastern Time following Fourth Friday	1/29/2022
Implementation Complete	Sunday at 4PM Eastern Time following Fourth Friday	1/30/2022

In addition to the quarterly process, exchange constituents are monitored daily for potential anomalies and trading disruptions. Out-of-review monitoring, which would require index modification, only applies in extraordinary circumstances. Incident types that would require one or more index modifications are outlined in the CoinDesk Digital Asset Indices Policy Methodology.

Deletions

If a contributing exchange is removed from an index outside of the schedule reconstitution process its weight will be set to zero on the removal effective date and it will no longer contribute to index returns. The impacted exchange will be considered for inclusion at the next scheduled reconstitution if it meets the Eligibility Criteria.

In the event a digital asset is no longer pricing on at least three Eligible Exchanges the Index Committee will determine the appropriate action which may include termination of the impacted Single Digital Asset Index with prior notification, as outlined in the *CoinDesk Indices Policy Methodology*.

Additions

There will be no additions to the index between reconstitutions unless the constituent count drops below three exchanges. In this event, the Index Committee will review the eligible universe and determine the appropriate action.

Data Distribution

Real-time index values are calculated 24x7 and are available publicly at <https://coindesk.com/indices> and are also available to subscribers via REST, WebSocket APIs, and scheduled email updates.

Index Governance

The CoinDesk Index Committee provides ongoing oversight of the Indices and their Methodology. For more details on the Index Committee, please refer to the Index Governance section of the CoinDesk Digital Asset Indices Policy Methodology.

Appendix 1: CoinDesk Ether Total Return Index

Index Objective

The CoinDesk Ether Total Return Index (“ETXTR”) reflects the performance of a position in staked ether, comprising the daily price return of ether plus the daily rewards earned from the Ethereum network. ETXTR uses the CoinDesk Ether Price Index (ETX) to measure the daily price return of ether and CESRTM to measure the daily yield from staking.

The ETX methodology is described in this document, and the CESR methodology can be found [here](#).

Index Name	Ticker	Base Date	Base Value	Launch Date
CoinDesk Ether Total Return Index	ETXTR	09/15/2022	1498.40	10/18/2023

Calculation

ETXTR is calculated daily. At each calculation time t , ETXTR is calculated as,

$$ETXTR_t = ETXTR_{t-1} \times \left(\frac{ETX_t}{ETX_{t-1}} + \frac{CESR_t}{365} \right)$$

Where,

$ETXTR_t$ = ETXTR index value at 4pm Eastern Time on the day of calculation (t)

$ETXTR_{t-1}$ = ETXTR index value at 4pm Eastern Time on the day before calculation (t)

ETX_t = ETX index value at 4pm Eastern Time on the day of calculation (t) rounded to 2 decimals

ETX_{t-1} = ETX index value at 4pm Eastern Time on the day before calculation (t) rounded to 2 decimals

$CESR_t$ = CESR value on the day of calculation¹ using 6 decimal precision

Data Distribution

ETXTR is published by 6pm Eastern Time 7 days a week and is available publicly at <https://coindesk.com/indices>. Index data is also available to subscribers via REST API, and scheduled email updates.

¹ CESR is calculated using data ending at approximately 12:30pm Eastern Time. For more details on CESR, please refer to the CESR [Methodology](#).

Appendix 2: Data sources

This section describes data sources used to reconstitute, maintain, and calculate the Index. If data is not available for any reason from the sources described in this appendix, other data sources may be used.

Price data

Prices used to calculate the Indices are sourced from eligible exchanges.

Volume data

Volume data used to weight constituents are sourced from eligible exchanges.

Reconstitution Data

Trading volume is sourced from eligible exchanges.

Appendix 3: Methodology Changes

The table below provides a summary of modifications to this Methodology.

Effective Date	Prior Treatment	Updated Treatment	Material Change
11/1/2024	Reconstitutions occur on Sunday following 4 th Friday of Jan, Apr, Jul and Oct	Reconstitutions occur on the Sunday following the 3 rd Friday of Mar, Jun, Sep and Dec	No
10/1/2024	Minimum volume requirement for Eligible Exchanges: -Constituents: 4.0% -Non-constituents: 10% (fast entry) <u>or</u> 5% and included on the current watchlist	Minimum volume requirement for Eligible Exchanges: -Constituents: 2.0% -Non-constituents: 3.0%	Yes
4/1/2024	Only U.S. licensed exchanges are eligible for inclusion.	U.S. and non-U.S. licensed exchanges that meet eligibility requirements are eligible for inclusion subject to a minimum inclusion of 2 U.S. licensed exchanges	Yes
10/13/2023	n/a	Provided clarification footnote that the creation of the new watchlist for indices which require relaxation of the volume percentage requirement to ensure three contributing exchanges is based on the relaxed volume percentage used for constituents.	No
1/11/2023	Minimum volume requirement for Eligible Exchanges: -Constituents: 5.0% -Non-constituents: 6% and included on the current watchlist	Minimum volume requirement for Eligible Exchanges: -Constituents: 4.0% -Non-constituents: 10% (fast entry) <u>or</u> 5% and included on the current watchlist	No
1/11/2023	Contributing exchanges may drop below three between reconstitutions due to an unexpected removal.	In the event a contributing exchange is deleted between reconstitutions, a replacement exchange will be added if the contributing exchange count would otherwise drop below three.	No
4/1/2022	Discretion by Index Committee for the addition of new exchanges when the 5% target trading volume was initially met.	Incorporated standard buffers and a seasoning period for 3-month target trading volume for new exchange constituents.	No

Appendix 4: Document Revision History

Timing	Description
9/12/2024	See Methodology Changes Appendix for changes effective 10/1/2024 and 11/1/2024 which update the minimum volume requirement and reconstitution schedule.
4/1/2024	Annual Methodology Review. Updates included in Change Appendix as well as minor edits and clarifications.
10/17/2023	Addition of CoinDesk Ether Total Return Index Appendix
10/13/2023	Minor updates and clarifications
8/23/2023	CoinDesk XRP Price Index (XRX) re-launched and added to methodology.
7/21/2023	Minor updates and clarifications
1/22/2023	Annual Methodology Review. Updates included in Change Appendix as well as minor edits and clarifications.
5/4/2022	Minor edits
3/11/2022	Initial Version

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