

# CFIX METHODOLOGY

Bloomberg cryptocurrency solutions

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## INTRODUCTION

The Bloomberg CFIX rate fixings are designed as reference points for Cryptocurrencies. As used in this methodology, the term "fixings" refers only to such Cryptocurrency fixing rates and not to any other rate, calculation or other information that may be related to, or associated with, such fixings that are made available by Bloomberg. Based on pricing provided by the Bloomberg Generic Price ("BGN") using Bloomberg's well-known data, technology and distribution platforms, CFIX is made broadly available to the investment community with the objective of providing Cryptocurrency fixings that are reliable, representative, and transparent for the Cryptocurrency markets around the world.

The fixing rates can be accessed on the Bloomberg Terminal via price source CFIX using a Cryptocurrency Ticker. For example: XBT CFIX Curncy <GO>

The Bloomberg CFIX is owned and administered by Bloomberg Index Services Limited ("BISL" or the "Administrator" and, collectively with its affiliates, "Bloomberg").

This document describes the CFIX methodology, which undergoes a formal review process at least once each year to ensure its design still promotes a representative and accurate measure of the markets the fixings measure. Any material changes from the previous version will be highlighted in the latest methodology document.

## FIXING RATE CONSTRUCTION OVERVIEW

The composition of the fixing rate is reconstituted by BISL on a regular basis pursuant to the procedures set forth in this methodology by Bloomberg CFIX product managers operating under the oversight of Bloomberg's Benchmark Oversight Committee ("BOC") and supervision of Bloomberg's Index Operating Subcommittee ("IOS"). Any material deviations or changes from established procedures are subject to review by the IOS. In addition, to the extent practicable, BISL may solicit stakeholder feedback, including by means of Cryptocurrency Advisory Councils. Once approved the deviation or change is announced publically and takes effect as soon as practicable possible following the announcement.

## CFIX INPUT DATA -BGN

CFIX uses Bloomberg's BGN as its primary input. The BGN is a sophisticated pricing algorithm that produces accurate indications of bid and ask quotes that are derived from multiple approved Cryptocurrency Pricing Sources.<sup>1</sup>

BGN prices are designed to track executable bid and ask input rates from a select subset of Bloomberg's Cryptocurrency Pricing Sources, which have met selection criteria such as pricing consistency, frequency, and quality. Pricing sources are anonymous to users and the sources themselves and the pricing sources change from time-to-time depending on the quality of data they provide. Each source is assigned a quality score based on numerous factors including update frequency and spike frequency. Price inputs are not limited to quotes from market making firms; rather, price inputs include quotes from any market participant whose quotes are executable on a pricing source's market.

Bloomberg undertakes a periodic review of the appropriateness of specific data used in the calculation and validation of the CFIX rates, including the BGN. This review is intended, among other things to assist in ensuring the CFIX rates are based on reliable and observable market data that reflect the economic reality of a given market.

CFIX does not have submitters or contributors that submit or contribute data for the purpose of determining CFIX or any underlying BGN and does not intend to include any in its fixings. There is no solicitation process to obtain underlying data, either by a panel or by polling, in the calculation of the CFIX. The BGN construction is designed to consistently produce levels without interpolation or extrapolation of input data.

In addition, as noted above, sources are anonymous to users and the sources themselves at each pricing point and the data received is ancillary to the source's primary purpose of soliciting Cryptocurrency transactions from the market. Also, CFIX only establishes fixings for Cryptocurrencies for which it has adequate quality data to produce a snapshot that is representative of the pairing being measured.

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<sup>1</sup> Approved Cryptocurrency Pricing Sources have, at a minimum, represented to Bloomberg that they have documented compliance programs that include, but are not limited to, Anti-Money Laundering (AML) and Know Your Customer (KYC) policies, and have provided Bloomberg with an organizational and/or ownership chart.

## BGN PUBLICATION HOURS

For Cryptocurrencies the BGN follows the FX market.

Open - Monday 7am Auckland.

Close - Friday 5pm New York.

Bloomberg is continuously reviewing and adjusting to these trading hours as needed.

## CFIX CALCULATION & PUBLICATION

- CFIX provides a simple average of the BGN Pricing Source for any given Cryptocurrency over a 15 min window between 4.00pm and 4.15pm EST.
- The CFIX generates the simple average of all the BGN tics within the window for the bid and ask separately and the mid is the arithmetic average of the bid and ask.
- The CFIX will price once a day and is published on the Bloomberg Terminal within 1 minute.
- The CFIX will publish Monday to Friday when the BGN is pricing and not currently over weekends.

In order for a BGN price to be computed for a Cryptocurrency, the Cryptocurrency must be priced by a minimum of two Pricing Sources.

Data from the Pricing Sources are the executable bid and ask prices and not executed trade prices.

## CFIX COVERAGE

The Cryptocurrencies currently covered by the CFIX are only those against the US dollar (USD).

The following table lists those.

NAME	CODE	BLOOMBERG TICKER
BITCOIN	XBT	XBT CFIX Curncy
BITCOIN CASH	XBN	XBN CFIX Curncy
DASH	XDH	XDH CFIX Curncy
EOS	XEO	XEO CFIX Curncy
ETHEREUM	XET	XET CFIX Curncy
ETHEREUM CLASSIC	XTH	XTH CFIX Curncy
LITECOIN	XLC	XLC CFIX Curncy
MONERO	XMR	XMR CFIX Curncy
RIPPLE	XRP	XRP CFIX Curncy
ZCASH	XZC	XZC CFIX Curncy

## CFIX DISTRIBUTION

The distribution channels for CFIX are the Bloomberg Terminal, including the Desktop API and Data License.

Each of the fixings is a practical rate capable of replication in a real-world portfolio. The BGN inputs used in the fixings are available on the Bloomberg Terminal, including inclusion rules and methodologies.

The Administrator does not use, and does not plan to use, any third parties in data collection, computation or dissemination of the fixing. In the event it does determine to use such third parties, the Administrator will provide details of their function in the methodology and establish appropriate controls in its internal procedures.

## CHANGE IN METHODOLOGY

The Administrator will review the fixing rates at least annually to validate whether (a) their design continues to measure the intended markets, (b) the input data used remains sufficient, appropriate and faithful to the data hierarchy, and (c) the selection of fixing currencies continues to meet the goal of measuring only liquid and active markets. More frequent reviews may result from extreme market events, such as those described above under "Stress Events". Any resulting material change to the methodology will be reviewed at regularly scheduled IOS or BOC meetings (as applicable), or during emergency meetings in exigent circumstances, pursuant to their terms of reference.

In determining whether a change to this methodology is material, the following factors shall be taken into account:

- The economic and financial impact of the change;
- Whether the change affects the original purpose of the fixing; and/or
- Whether the change is consistent with the overall objective of the fixing and the underlying market interest it seeks to measure

The Administrator will also provide stakeholder notice and engagement regarding the proposed change, the scope and length of which will be informed by the nature of the change and stakeholder impact.

## STRESS EVENTS

If the BGN is unavailable due to unforeseen events, the CFIX will be calculated using the last available BGN. If BGN is unavailable for more than three consecutive CFIX Business Days, escalation to the IOS, as further discussed below, will be made to determine whether to cease pricing. Any such cessation will be subject to review by BISL's governance and oversight committees, as well as the transition policies of the Administrator.

## LIMITATIONS OF THE CFIX

The following is a summary of certain limitations associated with the fixing rates but is not meant to be an exhaustive list of all risks and limitations associated with use of the fixing rates. Though the CFIX is designed to be representative of the market it measures, it may not be representative of every use case. It is designed and calculated strictly to follow the rules of this methodology, and any fixing rate level or other output is limited in its usefulness to such design and calculation.

- The Cryptocurrency market is open 24 hours, 7 days a week, and 365 days a year, while the CFIX is published once per day Monday to Friday.
- There is ambiguity with the determination of Hard Forks for Cryptocurrencies and identification of the primary Cryptocurrency in such cases. A determination of which chain is considered primary will be made based on treatment by the Pricing Sources.
- There is inherent, though transparent, judgment in fixing rate construction, as outlined in this methodology. They are also designed for general applicability and not to address the individual needs of users. Bloomberg does not advise as to the usefulness of the fixing rates to a particular circumstance, and users are therefore encouraged to seek their own counsel for such matters. This methodology is subject to change, which may impact its usefulness to users. Though efforts will be made to alert users to any material changes in the methodology, not every individual user may be aware of them. Such changes may also significantly impact the usefulness of the fixing rates.
- Markets for Cryptocurrencies, as with other markets, can be volatile. As the CFIX is designed to measure these markets, the CFIX could be materially impacted by market movements, thus significantly impacting the use or usefulness of the information for some or all users.
- Certain Cryptocurrencies are less liquid than others, and even the most liquid markets may suffer periods of illiquidity. Illiquidity can have an impact on the quality or amount of data available to Bloomberg for the calculation, and may cause the fixings to produce unpredictable results.
- Given fragmented liquidity across many trading venues, deriving a fair valuation for a particular Cryptocurrency can be challenging, which could lead to unsettling volatility in the fixing rates. Depending on the liquidity level, trading volume, transaction fees, and other factors, a Cryptocurrency can be traded at different prices across different Pricing Sources making it difficult to know the value of a Cryptocurrency at a certain time.

- While Pricing Sources supported by Bloomberg undergo a diligence process, many Pricing Sources have only recently initiated trading and do not have significant trading histories. As a result, the pricing of Cryptocurrencies and the inclusion of such Cryptocurrencies in the BGN may be subject to certain risks not presented by regulated stock and commodity exchanges. For example, risks related to the liquidity and price histories.
- Only Cryptocurrencies trading in US dollar on eligible Pricing Sources are eligible, subject to inclusion criteria.
- BISL may determine to cease publication of the CFIX. BISL maintains internal policies regarding user transitions, but there is no guarantee an adequate alternative is available generally or for a particular use case.

The provisions and procedures set forth in this methodology grant a significant degree of discretion by the Administrator, in a number of respects. BISL may exercise this discretion as it determines to be most appropriate. Furthermore, this methodology does not address all possible issues relating to the fixing rates, related rates and any omissions or exceptions may be addressed as deemed to be appropriate. In addition, this methodology and any other provisions or procedures relating to such fixing rates may be amended at any time.

## **BENCHMARK OVERSIGHT AND GOVERNANCE**

### **Benchmark Governance, Audit and Review Structure**

- The IOS provides direct governance and is responsible for the first line of controls over the creation, design, production and dissemination of benchmarks, including the CFIX.
- The oversight function is provided by the BOC. The BOC is independent of the IOS and is responsible for reviewing and challenging the activities carried out by the IOS. In carrying out its oversight duties, the BOC receives reports both from the IOS as well as Legal & Compliance members engaged in second level controls. It also receives and reviews the results of any internal or external audits as a third line of defense.

On a periodic basis (no less than quarterly), the IOS reports to the BOC on governance matters, including, but not limited to, any client complaints, the launch of new benchmarks, cessation of any benchmarks, operational incidents (including errors & restatements) and the results of any advisory councils or other stakeholder engagements. In addition, any governance or control-related issues that arise in the performance of the IOS's duties that are deemed significant, persistent, unable to be resolved and/or worthy of escalation, including issues which may have the potential to incur material risk are escalated to the BOC.

### **Internal and External Reviews**

Fixing rate administration is subject to Bloomberg internal compliance function which periodically reviews various aspects of Bloomberg's businesses in order to determine whether such businesses are adhering to applicable firm-wide policies and procedures, and assess whether applicable internal controls are functioning properly. In addition to the compliance function, Bloomberg may from time to time appoint an independent external auditor with appropriate experience and capability to review adherence to benchmark regulation. The frequency of such external reviews will depend on the size and complexity of the operations and the breadth and depth of the benchmark use by relevant stakeholders.

## **STAKEHOLDER ENGAGEMENT**

BISL is engaged with its users through various channels, including via help desks, sales personnel and direct communication with business personnel. To help ensure the fixing rate remains an accurate representation of the Cryptocurrency markets, it endeavors to meaningfully incorporate these engagements into improvements in processes and service. Prior to any material change that might meaningfully impact users, BISL consults more broadly with stakeholders, where appropriate, before a recommendation is presented to the IOS for approval. This concept of shared ownership enables BISL to produce the most relevant indices and helps ensure responsiveness to user needs.

## EXPERT JUDGMENT

The CFIX methodology is a fully automated process designed to produce the most consistent and transparent fixing while reducing the intervention of expert judgments, from attaining input prices to CFIX calculation to publishing. Certain judgments are made by Bloomberg in creating the BGN input to CFIX.

BGN pricing is created from a list of eligible Pricing Sources, which are determined at Ticker level, based on a number of factors like liquidity and price quality in the context of the market they are pricing. If pricing or other data are anomalous pursuant to pre-set filters and alerts, Bloomberg evaluators examine the data, and may choose to remove or add sources according to the quality of data provided. Filters, price age-out (typically set to 30 seconds), minimum number of sources (typically set to 2) or other settings of BGN may also be adjusted over time according to market conditions to improve pricing.

Expert judgments are also applied to determine the degree of liquidity in a market, or whether there is an active market at any given time for a Cryptocurrency. This may affect the determination of whether to rebuild and publish a fixing that failed to publish.

BGN regularly monitor pricing to help ensure the use of multiple Pricing Sources for each price. Additional sources are also evaluated if available to add robustness and diversity to pricing. If other sources are not available, BGN may discontinue pricing until additional sources can be added. In no event will CFIX take a BGN price that is from a single source. Also, BGN will not produce a price, and CFIX will not produce a fixing, that can be reverse engineered.

BISL may use expert judgment with regards to the following:

1. Fixing rate restatements
2. Extraordinary circumstances during a market emergency
3. Pricing or other data interruptions, issues, and closures

When expert judgment is required, BISL undertakes to be consistent in its application, with recourse to written procedures outlined in this methodology and internal procedures manuals. These procedures detail the steps in decision making and the hierarchy of data to be used. Material exercises of expert judgment are reviewed by senior members of the BISL benchmark and compliance teams. BISL also maintains and enforces a code of ethics to prevent conflicts of interest from inappropriately influencing fixing rate construction, production, and distribution, including the use of expert judgment.

Bloomberg maintains an audit trail of any changes done on the BGN. The audit trail includes a description of the change, the time and date of the change, the value before and after the change and who made the particular change.

In addition, the audit trail and any changes made to CFIX are maintained on an internal ticketing system for a period of at least 5 years.

## RESTATEMENT POLICY

BISL makes every effort to provide accurate calculation of its fixing rates. However, to the extent a material error in calculated values is uncovered following its publication and dissemination, a notification will be sent to clients alerting them of such error and the expected date of a revised publication, if warranted. BISL considers the following factors to determine whether to restate. Not all conditions need to be present to warrant a restatement, and certain factors may be more determinative than others depending on the circumstances of the given error.

1. The relative importance of the data field impacted by the error
2. When the error occurred and when it was discovered
3. The number of indices or rates impacted
4. Whether the impacted indices or rates are linked to tradable products
5. The magnitude of the error
6. The burden of restatement on client re-processing relative to the impact of the error
7. The impact of the restatement on analytical tools



## RISKS

Unlike traditional stock and commodity exchanges, Cryptocurrency Pricing Sources face a number of risks, including but not limited to, distributed denial-of-service ("DDoS"), interruption of trading, hacking of user accounts, lack of standards and naming convention for symbols, unstable technological and legal environment (causing changes in fee structure, blocking of funds withdrawal, etc.). Suspension or disruption of market trading in cryptocurrencies may adversely affect the value of the fixing rates.

## GLOSSARY OF TERMS

Administrator: A benchmark administrator provides indices that are used in financial products and is responsible for all aspects of administration pertaining to the benchmark, including but not limited to calculation, maintenance, rebalancing, dissemination/distribution and governance.

Ask: The rate at which a market maker is willing to sell the Cryptocurrency. Also known as an offer.

Bid: The rate at which a market maker is willing to buy the Cryptocurrency.

BGN: BGN refers to Bloomberg Generic price. The BGN is a sophisticated pricing algorithm that produces accurate indications of quotes that are derived from multiple quality sources.

- In order for a Bloomberg Generic price (BGN) to be computed for a Cryptocurrency, the Cryptocurrency must be priced by at least two approved Pricing Sources
- The BGN algorithm calculates the BGN median bid and median ask prices for the Cryptocurrency
- The BGN mid-price is the average of the BGN bid and BGN ask prices

Data from Pricing Sources are the executable bid and ask prices and not executed trade prices.

Bloomberg Index Services Limited or BISL: Index provider and administrator.

Bloomberg: Bloomberg L.P. and its affiliates, including BISL.

BOC: Benchmark Oversight Committee.

CFIX: Bloomberg Cryptocurrency Fixing or CFIX is designed as a reference point for Cryptocurrencies. It is a simple average of the BGN Pricing Source for any given Cryptocurrency over a 15 minute window between 4.00pm and 4.15pm EST. The CFIX generates the simple average of all the BGN tics within the window for the bid and ask separately and the mid is the arithmetic average of the bid and ask. CFIX will price once a day and publish immediately after the pricing engine has computed the simple average. There may be slight variances in publication times, within seconds, due to a variance in tic volume per currency and the amount of machine time required to compute those. CFIX will publish Monday to Friday when the BGN is pricing and not currently over weekends.

Cryptocurrency: A cryptocurrency is a digital asset designed to work as a medium of exchange that uses cryptography to secure its transactions, to control the creation of additional units, and to verify the transfer of assets.

Executable: As opposed to an indicative quote, an executable quote can be dealt on.

Fiat Currencies: Fiat currencies are currencies that a government has declared to be legal tender, but is not backed by a physical commodity. The value of a Fiat currency is derived from the relationship between supply and demand.

Hard Fork: A hard fork occurs when a Blockchain protocol is radically changed, such that it becomes incompatible with older versions. In effect, participants taking part in transactions on the old Blockchain must upgrade to the new one in order to continue validating transactions in the new Blockchain. However, participants that do not upgrade may continue to support and validate transactions on the old Blockchain protocol separately. The result of this is that a Blockchain splits into two - hence the name 'hard fork'. If there are nodes permanently supporting the new chain, then the two chains will co-exist. Users that once held digital assets on an older Blockchain before the protocol change at a pre-specified Blockchain length will now also hold an amount of new coins on the altered Blockchain. This new Cryptocurrency has essentially been derived from an older Cryptocurrency as well as its associated Blockchain's transaction history. Hard forks are considered as new Cryptocurrencies.

