Via Portal Submission

<div align="right">September 28, 2023
MGEX Submission No. 23-54</div>

Mr. Christopher Kirkpatrick
Secretary of the Commission
Commodity Futures Trading Commission
Three Lafayette Centre
1155 21st Street NW
Washington, DC 20581

RE: Listing New Product for Trading by Certification Pursuant to CFTC Regulation 40.2

Dear Mr. Kirkpatrick:

Pursuant to Section 5c(c) of the Commodity Exchange Act ("CEAct") and Commodity Futures Trading Commission ("CFTC") Regulation 40.2(a), the Minneapolis Grain Exchange, LLC. ("MGEX" or the "Exchange") hereby certifies that the following attached Rules containing the terms and conditions and governing the trading of Bitcoin Futures Contract, as well as the product itself, comply with the CEAct and the CFTC regulations promulgated thereunder. MGEX further certifies that notice of pending product certification with the CFTC and a copy of this submission (other than those exhibits for which confidential treatment has been requested) have been posted on the MGEX website at the following link: http://www.mgex.com/regulation.html.

Attached as exhibits to this submission are the following:

1. Chapter 85 Rules, which include all Rules related to the terms and conditions of the Bitcoin Futures Contract, and which were approved on September 28, 2023 (Exhibit A). MGEX is not aware of any substantive opposing views with respect to this filing.

2. Bitcoin Futures Contract Specifications (Exhibit B).

3. A brief overview of the Bitcoin Futures Contract and a concise explanation and analysis of its compliance with applicable core principles and CFTC regulations (Exhibit C).

4. Information about the Bitcoin Futures Contract and its development, a detailed cash market description, an analysis of the economic justification for the Bitcoin Futures Contract, and other information demonstrating that the Bitcoin Futures Contract is not readily susceptible to manipulation, as required by Appendix C to Part 38 of CFTC regulations (Exhibit D).

5. Methodology Guide (Exhibit E).

6. Deliverable Supply Analysis (Exhibit F).

7. Susceptibility to Manipulation Analysis (Exhibit G).

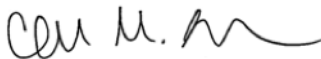8. Additional information regarding Information Sharing Agreements (Appendix).

MGEX is requesting confidential treatment of Exhibits F and G and the Appendix in accordance with Regulations 40.8 and 145.9. An additional redacted version of this submission is included as required by Regulation 40.8(c)(3).

In an effort to receive public and market participant feedback regarding the Bitcoin Futures Contract, the Exchange published the proposed product Rules and contract specifications on its website on August 3, 2023 and issued a memo to Clearing Members seeking feedback on such Rules and/or contract specifications, as well any other aspect of the trading and clearing of the product. As of the time of this submission, no concerns have been received.

MGEX intends to list the Bitcoin Futures Contract, as well as the TINI Bitcoin Futures Contract, for trading on the CME Globex® platform as soon as possible. Should the Exchange determine a specific date, it will post notice of the launch date on its website.

If there are any questions regarding this submission, please contact me at (612) 321-7141 or cstuhlmann@mgex.com. Thank you for your attention to this matter.

Sincerely,

Carmen M. Stuhlmann
Associate Counsel

Enclosures

EXHIBIT A

Chapter 85
BITCOIN FUTURES

CHAPTER 85
BITCOIN FUTURES

85.1.   AUTHORITY.

Trading in Bitcoin Futures (base symbol 'BTF') may be conducted under such terms and conditions as the Board of Directors and/or the Exchange will determine, subject to the CEA and CFTC Regulations.

85.2.   SCOPE OF CHAPTER.

This Chapter is limited in its application to trading of the Bitcoin Futures Contract. Electronic trading, clearing, daily settlement, delivery of cash settlement, and any other matters not specifically covered in this Chapter will be governed by the MGEX Rules, or otherwise delegated to the Exchange to establish policies and procedures that implement the MGEX Rules. In the event the provisions of this Chapter conflict with any other MGEX Rules, those listed within this Chapter and as applicable to the BTF Futures Contract supersede such MGEX Rules outside of this Chapter.

85.3.   LUKKA BITCOIN REFERENCE RATE: DEFINITION.

The Lukka Bitcoin Reference Rate (the "Bitcoin Reference Rate") represents the price of bitcoin in U.S. dollars by aggregating trade data from one or more eligible trading venues during a one-hour calculation window. The final settlement price of the BTF Futures Contract is based on the Bitcoin Reference Rate at 4:00 p.m. London time on the Last Trading Day of the futures contract.

Any changes to the composition of the Bitcoin Reference Rate or eligible trading venues will be made in accordance with the reference rate methodology guide and announced publicly.

85.4.   CONTRACT TRADING UNIT.

The unit of trading will be the value of one (1) Bitcoin.

85.5.   MINIMUM PRICE INCREMENT.

Except as provided in this Rule, the minimum price increment in the BTF Futures Contract will be $5.00 , which has a value of $5.00 USD per contract.

For spread trades, the individual legs and net prices in the BTF Futures Contract may be in increments of $1.00, which has a value of $1.00 USD per contract.

85.6.   TRADING MONTHS.

The months available for trading in BTF Futures Contracts and the number of months available for trade at one time will be determined by the Exchange. See the BTF Futures Contract specifications for more details.

85.7.   TRADING DAYS AND HOURS.

A trading day is a Business Day on which trading of BTF Futures Contracts is permitted. Trading days are determined by the Exchange. The Hours of Trading for BTF Futures Contracts will constitute a single trading session for a Business Day.

Unless otherwise specified by the Exchange in relation to Exchange holidays, the Hours of Trading for BTF Futures will be 5:00 p.m. – 4:00 p.m. Central Time Sunday to Friday. A 60-minute break will take place each trading day beginning at 4:00 p.m. Central Time.

85.8. LAST TRADING DAY.

The Last Trading Day is the last Friday of the expiring contract month. If the last Friday of the contract month is not a Business Day in the U.S., trading terminates on the prior day that is a U.S. Business Day. Trading in the expiring contract month will terminate at 4:00 p.m. London time on the Last Trading Day.

85.9. DYNAMIC DAILY PRICE LIMITS.

BTF Futures Contracts will be subject to dynamic price fluctuation limits as set forth below.

A.   Dynamic Price Fluctuation Limits

At the commencement of each trading day, BTF Futures Contracts are assigned a price limit variant which shall equal 10% of the prior trading day's settlement price, or a price deemed appropriate by the Exchange, (the "dynamic variant"). During the trading day, the dynamic variant shall be applied in rolling 60-minute look-back periods to establish dynamic lower and upper price fluctuation limits as follows:

(i)   the dynamic variant shall be subtracted from the highest trade and/or bid price during a look-back period to establish the lower price fluctuation limit (i.e., trade and/or offer), and

(ii)   the dynamic variant shall be added to the lowest trade and/or offer price during a look-back period to establish the upper price fluctuation limit (i.e., trade and/or bid).

B.   Triggering Events and Temporary Trading Halts

If the lead contract month (as identified by the Exchange) of the BTF Futures Contract is traded, bid, or offered on the Electronic Trading System at a price below the lower or above the upper dynamic price fluctuation limit, it will be considered a triggering event which will begin a two (2) minute temporary trading halt in all contract months of the BTF Futures Contract and the TBF Futures Contract. Orders may be submitted, canceled, and amended during this period, but no matching will occur. If a non-lead contract month of the BTF Futures Contract is traded, bid, or offered on the Electronic Trading System at a price below the lower or above the upper dynamic price fluctuation limit, it shall be considered a triggering event which shall begin a two (2) minute temporary trading halt in that non-lead contract month of the BTF Futures Contract.

C.   Limits Following Temporary Trading Halt

Following the end of a temporary trading halt triggered by the lead contract month, the affected markets shall re-open simultaneously at the opening price as determined by the Exchange pursuant to Rule 3.7.5. in all contract months of the BTF Futures Contract and in all contract months of the TBF Futures Contract. When trading resumes, the dynamic lower and upper price fluctuation limits will be recalculated as described above.

Following the end of a temporary trading halt triggered by a non-lead contract month, the affected market shall re-open at the opening price as determined by the Exchange pursuant to Rule 3.7.5. and the dynamic lower and upper price fluctuation limits will be recalculated as described above.

D.   Temporary Trading Halt during Settlement Period

On each trading day, should there be a triggering event in the lead contract month of the BTF Futures Contract during such contract's closing period, there shall be a five (5) second temporary trading halt in all contract months of the BTF Futures Contract and in all contract months of the TBF Futures Contract. If a non-lead contract month of the BTF Futures

Contract, or any contract month of a TBF Futures Contract, experiences a triggering event during the BTF Futures Contract's closing period, there shall be a five (5) second temporary trading halt for that non-lead contract month or that contract month of a TBF Futures Contract.

Should there be a triggering event during the final settlement determination period in an expiring futures contract, there shall be a five (5) second temporary trading halt in that contract month.

On each trading day, should there be a triggering event in the lead contract month of the BTF Futures Contract during the (2) two-minute period preceding the close of trading, there shall be a five (5) second temporary trading halt in all contract months of the BTF Futures Contract and in all contract months of the TBF Futures Contract. If a non-lead contract month of the BTF Futures Contract, or any contract month of a TBF Futures Contract, experiences a triggering event during the (2) two-minute period preceding the close of trading of the BTF Futures Contract, there shall be a five (5) second temporary trading halt for that non-lead contract month or that contract month of a TBF Futures Contract.

85.10. DAILY SETTLEMENT PRICE.

The Exchange will calculate the daily settlement price for each BTF Futures Contract in the following manner for each Business Day. The settlement price will be consistent with the minimum price fluctuations of the contract.

A. The settlement price for the lead month will be determined by the volume-weighted average price (VWAP) of outright trades and applicable bids and offers made between 14:59:00 and 15:00:00 CT, also known as the "closing period," on the Electronic Trading System. For purposes of this Rule, the lead month will be determined by the Exchange and is generally the most active month. The lead month will change at the time when the daily volume and open interest in the contract month following the current lead month is greater than the daily volume and open interest in the lead month for two (2) consecutive business days. If there is no volume-weighted average price of the outright, then the last trade price is compared to the current bid/ask. If the last trade price is outside of the bid/ask spread, then the contract settles to the nearest bid/ask price. If the last trade price is within the bid/ask spread or if a bid/ask is not available, then the contract settles to the last trade price. If there is no last trade price available, then the prior settlement is compared to the current bid/ask. If the prior settlement is outside of the bid/ask spread, then the contract settles to the nearest bid/ask price. If the prior settlement is within the bid/ask spread or if a bid/ask is not available, then the contract settles to the prior settlement price.

B. All non-lead months are deferred contract months and settle based upon the volume-weighted average price of calendar spread transactions made in the closing period on the Electronic Trading System. If there are no relevant calendar spreads, bids and offers in those calendar spreads will be used in conjunction with settlements from any months where a settlement price has been determined to form an implied market in the contract to be settled. These implied markets, along with the outright bid/ask market for the contract, will be used to derive the best possible bid and best possible ask, and the contract will settle at the midpoint of the bid/ask spread.

C. Notwithstanding the above, if such settlement price is not consistent with the settlements in other months or with market information, or if the settlement was inaccurately determined, a new settlement price may be established at a level consistent with such other settlement prices or market information and a written record setting forth the basis for any modification of such settlement price will be prepared.

D. The Exchange may in its sole discretion modify the settlement price prior to the start of the day's final clearing process if the settlement price arose from data entry errors made by or on behalf of the Exchange, and modification of the settlement price is necessary to prevent market distortion. A written record will be prepared setting forth the basis for any modification. In addition, the Exchange reserves the right to change which contract month is the lead month when, in its discretion, doing so is in the best interest of the marketplace. If any such change to the lead month is made pursuant to this Rule, the Exchange shall provide notification to the public via the MGEX website or other means it deems effective

85.11. CASH SETTLEMENT.

Settlement of BTF Futures Contracts will result in the delivery of a cash settled amount on the Business Day immediately following the Last Trading Day.

The final cash settlement price of an expiring BTF Futures Contract will be the Bitcoin Reference Rate published at 4 p.m. London time on the Last Trading Day. In the event the Bitcoin Reference Rate is not publishable or published on the Last Trading Day, or for any other reason the final settlement price cannot be determined by MGEX, then final settlement of the expiring BTF Futures Contract is at the discretion of MGEX and may be deferred or postponed.

The Exchange makes no warranty, express or implied, as to the results of the final cash settlement price. Information included in, or used in the calculation of, the Bitcoin Reference Rate is obtained from sources believed to be reliable, but the Exchange does not guarantee its accuracy or completeness and will have no liability for any damages, claims, losses (including any indirect or consequential losses), expenses, or delays, whether direct or indirect, foreseen or unforeseen, suffered by any person arising out of any circumstance or occurrence relating to the Bitcoin Reference Rate or its calculation, or arising out of any errors or delays in calculating or disseminating such rate.

In the event of a hard fork, Bitcoin Futures Contracts shall continue to settle to the Bitcoin Reference Rate corresponding to the original token pair (e.g., BTC:USD). MGEX may, in its sole discretion, take alternative action with respect to hard forks as may be appropriate.

85.12. OFFSETS AND TRANSFER TRADES.

Positions reported as offsets and/or position change data must be reported to the Clearing House each day by the established deadlines and in a manner that meets the provisions of MGEX Resolution 2101.00.C. Positions that have been offset at the Exchange may not subsequently be re-opened at the Exchange.

Except by same day trade activity, existing BTF Futures Contract positions in an expiring BTF Futures Contract month may not be offset during the period beginning two (2) Business Days prior to the first Business Day of the expiring month and continuing through the end of the Last Trading Day of the expiring BTF Futures Contract ("Prohibition Period"). Clearing Members will be responsible for compliance with this requirement by their omnibus accounts. This prohibition also applies to transfer trades where no change in ownership is involved when the date of execution or exercise of the position being transferred is not the same as the transfer date. Such positions are required to be offset by trading. If such positions are carried on the books of different Clearing Members, the receiving Clearing Member is responsible for compliance with this Rule.

At its sole discretion, the Department of Audits and Investigations may permit an offset during the Prohibition Period via netting, transfer, or position adjustment. Such adjustments are permissible to correct a bona fide clerical or operational error for an amount less than five percent (5.0%) of the published open interest reported the same morning for which the offset will be reported by the Clearing Member's morning position reporting deadline. Moreover, such adjustments are only permissible if the Department of Audits and Investigations reasonably believes the offset will not adversely impact the market. Such permission does not prohibit the Department of Audits and Investigations from investigating or taking disciplinary action for any alleged violation of the Rulebook.

85.13. TRADE AT SETTLEMENT.

A Trade at Settlement ("TAS") is a transaction at a price equal to the daily settlement price, or at a specified differential above or below the daily settlement price. The TAS transaction price will be determined following execution and based upon the daily settlement price of the respective BTF Futures Contract month.

TAS transactions are permitted in the BTF Futures Contract as outright or spread transactions. TAS transactions are available for trading only during the regular Hours of Trading until 3:58 p.m. Central Time. However, TAS transactions in an expiring BTF Futures Contract are not permitted during the Last Trading Day.

The permissible price range for permitted TAS transactions is from zero to 25 ticks higher or lower than the daily settlement price. The permissible minimum increment for a TAS transaction is $1.00, which has a value of $1.00 USD per contract.

85.14. BLOCK TRADES.

For the purpose of this Rule, Block Trades are defined as large transactions that are privately negotiated off the Exchange's Electronic Trading System and can only be entered into by Eligible Contract Participants, as defined in Section 1a(18) of the Commodity Exchange Act.

Block Trades are permitted to be executed in the BTF Futures Contract, provided they are in accordance with the following provisions:

A.   A Block Trade must be for a quantity that is at or in excess of the applicable minimum threshold. Orders for different accounts may not be aggregated in order to achieve the minimum transaction size. The Block Trade minimum threshold in the BTF Futures Contract is 25 contracts.

B.   A Party shall not execute any order as a Block Trade for a customer unless such customer has specified that the order be executed as a Block Trade.

C.   The Block Trade is executed competitively at a price that is fair and reasonable with consideration to the prevailing market price of the BTF Futures Contract. The minimum price increment for a Block Trade in the BTF Futures Contract is $1.00.

D.   Block Trades will not trigger conditional orders or otherwise affect orders in the underlying BTF Futures Contract traded on the Electronic Trading System.

E.   Clearing Members must ensure that each side of the Block Trade is reported to the Exchange within fifteen (15) minutes (but in no case later than 4:15 p.m. Central Time) and in the manner specified by the Exchange. The reporting of each side of the Block Trade must include the: contract, contract month, price, quantity of the transaction including quantities for each leg, buy/sell side, CTI and Regular (House) or Segregated (Customer) indicators, account number, the respective Clearing Members, the time of execution, and any other information required in accordance with MGEX Rules.

F.   Each counterparty to a Block Trade must have a separate and independent bona-fide legal or business purpose for entering into the Block Trade.

G.   Parties involved in the solicitation or negotiation of a Block Trade may not disclose the details of such communication to any other party for any purpose other than to facilitate the execution of the Block Trade.

85.15. POSITION ACCOUNTABILITY.

The position accountability levels for BTF Futures Contracts are as follows:

A.   Ownership or control at any time of more than 15,000 contracts net long or net short in all BTF Futures Contracts and TBF Futures Contracts combined that in the aggregate would exceed the equivalent of 15,000 BTF Futures Contracts.

B.   Ownership or control of more than 5,000 contracts net long or net short in the expiring BTF Futures Contract and TBF Futures Contracts combined that in the aggregate would exceed the equivalent of 5,000 BTF Futures Contracts, commencing on the first Business Day of the month of the expiring contract.

C.   Ownership or control of more than 1,000 contracts net long or net short in the expiring BTF Futures Contract and TBF Futures Contracts combined that in the aggregate would exceed the equivalent of 1,000 BTF Futures Contracts, commencing at the close of trading (4:00 p.m. Central Time) three (3) Business Days prior to the Last Trading Day of the expiring contract.

For the purposes of this Rule, one TBF Futures Contract shall be deemed to be equivalent to one one-hundredth (.01) of one BTF Futures Contract.

85.16. AGGREGATION OF POSITIONS.

In determining whether any person has exceeded the position accountability levels, all positions in accounts for which such person by power of attorney or otherwise directly or indirectly holds positions or controls trading must be included with the positions held by such person. Such positions accountability levels will apply to positions held by two (2) or more persons acting pursuant to an expressed or implied agreement or understanding, the same as if the positions were held by a single person. The Exchange will follow the CFTC definition of aggregation and the procedures for aggregating positions as described in CFTC Regulations as applicable.

85.17. REPORTABLE POSITION AND TRADING VOLUME.

A.   Pursuant to CFTC Regulation 15.03 and Part 17, any open position level in the BTF Futures Contract at the close of trading on any trading day equal to, or in excess of, 5 contracts on either side of the market is required to be reported to the CFTC. All such positions will be reported in a manner and form as designated by the CFTC or the Exchange.

B.   Pursuant to CFTC Regulation 15.04 and Part 17, a volume threshold account that has trading volume in the BTF Futures Contract during a single trading day equal to, or in excess of, 50 contracts is required to be reported to the CFTC. All such positions must be reported in a manner and form as designated by the CFTC or the Exchange.

85.18. CONTRACT MODIFICATIONS.

Specifications are fixed for the duration of the contract month upon the first trade in that contract month. However, a change in any Federal law, regulation, ruling, directive, or order that conflicts with these Rules or specifications will become effective upon notice by the Exchange. Additionally, the Board of Directors and/or the Exchange are granted the authority to change contract specifications as it deems appropriate or necessary, or to conform to any other applicable law, rule, or regulation that conflicts with these Rules or specifications, for any unopened contract month, as well as change contract specifications for any contract month with open interest upon approval by the CFTC.

To maintain the purpose and viability of the BTF Futures Contract, the Board of Directors and/or the Exchange are granted the authority to change the MGEX Rules not directly affecting contract specifications

at any time and implement such change as may be determined.

85.19. EMERGENCIES.

In the event of an emergency, as determined by the Exchange, the Board of Directors will have the authority and power to follow the procedures described in MGEX **Bylaw 2.4.** The Board of Directors may delegate such powers as it deems necessary to the Executive Committee, Exchange Officer(s), or other Exchange employees.

An emergency may include, but is not limited to, events of Force Majeure, interference, interruptions, breakage of communication, accident, or any event or occurrence that is causing or may cause disruption in the marketplace.

Additionally, in the event of an emergency, the Board of Directors or its delegate(s) will have the authority and power to utilize such sources, means, or methods that it determines to be in the best interest of the Exchange and the market.

The decision of the Board of Directors, Executive Committee, Exchange Officer(s), or other Exchange employees as delegated, will be final and binding upon all parties. The Exchange will not be liable to any party because of actions and decisions taken in good faith.

EXHIBIT B

Bitcoin Futures
Contract Specifications

Contract Unit	1 Bitcoin, as defined by Lukka Bitcoin Reference Rate
Price Quotation	U.S. dollars and cents
Trading Hours	Sunday to Friday, 5:00 pm to 4:00 pm CT (A 60 minute break will take place each day beginning at 4:00 pm CT)
Minimum Price Fluctuation	Outright: $5.00 per bitcoin = $5.00 Transfer trades, TAS, and Calendar Spread: $1.00 per bitcoin = $1.00
Product Symbol	BTF
Listed Contracts	Monthly contracts listed for 6 consecutive months and 2 additional December contract months. If the 6 consecutive months includes December, list only 1 additional December contract month.
Termination of Trading	Trading terminates at 4:00 pm London time on the last Friday of the contract month. If the last Friday of the contract month is not a business day in the U.S., trading terminates on the prior U.S. business day.
Position Accountability	See Rule 85.15.
Price Limits	Dynamic Circuit Breakers use a +/- 10% price fluctuation limit that is reset continuously on a rolling 60 minute lookback window. A 2 minute halt is initiated if markets move 10% in that time.
Block Trade Minimum	25
Settlement Method	Financially settled
Final Settlement Price	For a Bitcoin Futures contract for a given delivery month, the Final Settlement Price shall be the Lukka Bitcoin Reference Rate published at 4:00 pm London time on the Last Trading Day.
Trade at Settlement Transactions (TAS)	Trade at settlement transactions (TAS) will be available during the regular trading session hours until 3:58 p.m. All TAS transactions will trade on the Electronic Trading System. All TAS orders will be required to be a day order, immediate or cancel order, or fill or kill order. Both single leg and calendar spread transactions are available for trading, however no block trades will be permitted in TAS transactions. TAS transactions in an expiring Futures Contract are not permitted during the Last Trading Day. TAS Range: Zero or +/- 25 ticks Minimum price fluctuation: $1.00
Settlement Currency(s)	USD

EXHIBIT C

Brief Overview of the Bitcoin Futures Contract

MGEX proposes to list and trade Bitcoin futures ("BTF Futures Contract"). The BTF Futures Contract will be cash-settled. Like all of the Exchange's current products, the BTF Futures Contract will trade on the CME Globex® trading platform and be cleared by the MGEX Clearing House. Additionally, MGEX will monitor and conduct regulatory oversight, surveillance, and enforcement as it does now for all MGEX contracts.

A thorough description of the BTF Futures Contract, as well as its design, are included in Exhibit D.

Concise Explanation and Analysis of the Product's Compliance with DCM Core Principles

The BTF Futures Contract meets the requirements of the CEAct and the CFTC regulations promulgated thereunder. Among other terms and conditions, MGEX Rules govern and provide for position accountability levels, reportable position levels, minimum price increments, trading months and hours, daily price limits, and a transparent settlement process.

The Exchange has reviewed the core principles for designated contract markets ("DCM Core Principles") and has determined that the product Rules comply with the requirements of such principles. Applicable DCM Core Principles include:

- *Core Principle 2 – Compliance with Rules*. MGEX is submitting Chapter 85 which sets forth the contract terms and conditions and governs the trading of the BTF Futures Contract. This chapter, as well as current MGEX Rules, serve to prohibit various forms of abusive trading practices or misconduct. The MGEX Department of Audits and Investigations has full authority and the ability to monitor the market and investigate and enforce the MGEX Rules.

- *Core Principle 3 – Contracts not Readily Subject to Manipulation*. The BTF Futures Contract is not readily susceptible to manipulation, as discussed at length in Exhibits D and G.

- *Core Principle 4 – Prevention of Market Disruption*. MGEX has the capacity and ability to monitor and prevent manipulation, price distortion, and disruptions of the cash-settlement process through market and trade practice surveillance and enforcement practices and procedures, including but not limited to applicable MGEX Rules and Information Sharing Agreements executed with spot exchanges. MGEX can create and maintain comprehensive and accurate trade reconstructions.

- *Core Principle 5 – Position Limitations or Accountability*. While MGEX does not believe the BTF Futures Contract is readily susceptible to manipulation, it has nonetheless adopted position accountability levels. BTF Futures positions are aggregated together with TINI Bitcoin Futures positions. These position accountability levels are codified in Rule 85.15.

- *Core Principle 7 – Availability of General Information & Core Principle 8 – Daily Publication of Trading Information*. The BTF Futures Contract terms and conditions, as well as trade volume and price information, will be disseminated to the public and posted on the MGEX website pursuant to DCM Core Principles 7 and 8.

- *Core Principle 9 – Execution of Transactions*. The BTF Futures Contract will be listed on the CME Globex® platform, and MGEX will clear all transactions.

- *Core Principle 10 – Trade Information.* In accordance with Exchange procedures, MGEX will record and save all trade information in accordance with CFTC regulations as part of an audit trail which will be fully accessible to the Department of Audits and Investigations for surveillance and enforcement purposes.

- *Core Principle 11 – Financial Integrity of Transactions.* MGEX will continue to comply with monitoring the financial integrity of clearing members and futures commission merchants, as well as ensuring the protection of customer funds.

- *Core Principle 12 – Protection of Markets and Market Participants.* Current MGEX Rules contain general and specific prohibitions against the abuse of the markets and market participants that will also apply to the trading of the BTF Futures Contract. MGEX will enforce its Rules and take disciplinary action against those harming the market or market participants.

The BTF Futures Contract and the proposed Rules are consistent with the CEAct and CFTC regulations, including DCM Core Principles. Additionally, all Exchange Rules that currently apply to market participants and the trading of other MGEX contracts will also apply to the trading of the BTF Futures Contract. The full MGEX Rulebook is available at https://www.mgex.com/regulation.html.

BITCOIN FUTURES CONTRACT ECONOMIC JUSTIFICATION/ CASH MARKET OVERVIEW

I.   Introduction

Bitcoin is a digital asset that was first created in 2008 and launched in 2009[1]. At the time of this submission, there are an estimated 19 million bitcoin in circulation[2]. Roughly 5 billion U.S. dollars of bitcoin is often transferred on blockchain each day.[3] Bitcoin is increasingly viewed and accepted by customers and merchants as a form of exchangeable value. Bitcoin can also be readily exchanged for major currencies and other cryptocurrencies.

It is important for Bitcoin investors to have a risk management tool to hedge against risk in the underlying spot market. The Bitcoin Futures Contract ("BTF Futures Contract") is a cash-settled futures contract that offers prospective traders a tool to hedge exposure from the Bitcoin cash market. The BTF Futures Contract will provide customers with a competitive venue in the futures market to hedge against risk in the underlying spot market.

II.   Lukka Bitcoin Reference Rate

The BTF Futures Contract is based on the Lukka Bitcoin Reference Rate (the "Bitcoin Reference Rate"), which is a reliable and accurate reflection of the underlying cash market. The Bitcoin Reference Rate methodology is transparent and publicly available on the Miami International Holdings, Inc. ("MIH") and MGEX websites. Furthermore, the Bitcoin Reference Rate is a customized rate, developed by Lukka exclusively for MIH; it is not the Lukka Prime Index.

The Bitcoin Reference Rate represents the price of bitcoin in U.S. dollars by aggregating trade data from one or more eligible trading venues during a one-hour calculation window. The final settlement price of the BTF Futures Contract is based on the Bitcoin Reference Rate at 4:00 p.m. London time on the expiration day of the BTF Futures Contract. The Bitcoin Reference Rate is governed by an independent Oversight Board (the "Oversight Board"), which is comprised of a minimum of five individuals jointly appointed by MIH and Lukka, Inc., serving four-year terms.

An overview of the Bitcoin Reference Rate construction is as follows:

- Executed transactions (with price and size) from eligible trading venues are consumed.
- The calculation window is sectioned into six equal time intervals, called partitions.
- For each combination of partition, eligible trading venue, and currency pair, a Volume Weighted Average Price ("VWAP") is calculated.
- Further, for each partition and currency pair, the median of these VWAPs by eligible trading venues is calculated.
- The Bitcoin Reference Rate for the currency pair is then calculated as the simple average of the pair's partition medians calculated in the previous step.

The Bitcoin Reference Rate supports both fiat (USD) and stablecoin denominated transactions (USDC and USDT) to allow for better price discovery by capturing greater transaction volume. The stablecoin quote currencies undergo a conversion to USD using a point-in-time specific exchange rate when calculating the reference rate.

To protect against systematic errors, market abuse, or other erroneous data, the Bitcoin Reference Rate employs a series of automated data quality filters and manual reviews. These data quality filters and manual reviews address missing data resulting from exchange outages, network failures, and other events that cause marked drops in volume; delayed data; invalid or erroneous data; and price anomalies and outliers.

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[1] https://www.bankrate.com/investing/cryptocurrency-statistics/ (accessed July 11, 2023).
[2] https://www.forbes.com/advisor/investing/cryptocurrency/what-is-bitcoin/ (accessed July 11, 2023).
[3] https://www.blockchain.com/research (Cryptoasset Investment Thesis) (accessed July 11, 2023).

In order to become an eligible trading venue from which trade data is aggregated for the Bitcoin Reference Rate, the following criteria must be met:

- Information Sharing Agreement (ISA) – The potential eligible trading venue must enter into an Information Sharing Agreement with MGEX, in a form that is acceptable to MGEX and complies with CFTC guidance and requirements;
- Reliable Underlying Market Data – The potential eligible trading venue must have reliable and timely underlying market data with sufficient liquidity, as determined by the Oversight Board;
- Technology – The potential eligible trading venue must have systematic access (application programming interface or API) to underlying market data that is available to Devexperts Inc., the calculation agent;
- Volume – The potential eligible trading venue must demonstrate average daily trading volume sufficient to meaningfully contribute to the Bitcoin Reference Rate calculation.
- Market Governance – The potential eligible trading venue must have sufficient market surveillance rules, regulations, policies, procedures, and monitoring in place to detect and prevent market manipulation in the underlying spot market. The eligible trading venue must maintain rules and policies against manipulative trading behavior. The eligible trading venue must have adequate Know-Your-Customer (KYC) policies and procedures and Anti-Money Laundering (AML) policies and procedures. The sufficiency of all such market governance requirements is determined by the Oversight Board.

At the time of this submission, the Bitcoin Reference Rate has two eligible trading venues: Bitstamp and Gemini. In a ranking of 226 Bitcoin spot exchanges, Bitstamp and Gemini have consistently ranked as two of the top-ranking spot exchanges based on trading volume, liquidity, and other critical measures during 2023[4]. Given their presence and market share in the Bitcoin spot market, a price derived from Bitstamp and Gemini reflects the broader market[5].

Statistical analyses indicate that the Bitcoin Reference Rate accurately reflects the underlying spot market. Using data from July 2022 through June 2023 to compare the Bitcoin Reference Rate on the final settlement date to the Lukka Global VWAP, which is another customized index developed by Lukka for MIH and which measures broader trading activity of bitcoin on certain selected large underlying spot markets throughout the world, on the same date, the average variation was only 0.062%. The largest variation from the final Lukka Global VWAP was 0.219%.

Therefore, the cash-settlement price of the BTF Futures Contract based on the Bitcoin Reference Rate is an accurate and reliable indicator of the value of bitcoin.

III.   Contract is Not Readily Susceptible to Manipulation

The BTF Futures Contract is not readily susceptible to manipulation. Cash settled contracts are particularly susceptible to manipulation in situations "in which the volume of cash market transactions and/or the number of participants contacted in determining the cash-settlement price are very low."[6] In the case of the BTF Futures Contract, the calculation methodology for the Bitcoin Reference Rate is calculated from a high volume of trades from two eligible trading venues during the calculation window[7].

Additionally, MGEX has developed robust methods to prevent the Bitcoin Reference Rate from being distorted by large off market outlier transactions. The calculation methodology of the Bitcoin Reference

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[4] https://coinmarketcap.com/rankings/exchanges/ (accessed July 11, 2023).
[5] *See* Exhibit G for analysis of eligible trading venues' volume and liquidity
[6] 17 C.F.R. § 38 Appendix C to Part 38 c(2)
[7] *See* Exhibit G for full analysis of eligible trading venues' volume and liquidity

Rate utilizes a combined time and volume weighting that is designed to make the rate resilient to potential distortion by outlier transactions or price anomalies. Specifically, this is accomplished through the following:

1. **Use of partitions.** The Bitcoin Reference Rate is calculated using six equally weighted 10-minute partitions. Having six partitions aids in immunizing the Bitcoin Reference Rate against outlier transactions since one or more outlier transactions occurring in any one partition will only have a limited effect on the Bitcoin Reference Rate.

2. **Weighting of partitions.** The six partitions are equally weighted—i.e., time weighted rather than volume weighted—which also minimizes the effect of outlier transactions on the Bitcoin Reference Rate.

3. **Medians.** The use of medians, rather than an average, to calculate the trade price for each partition greatly reduces the effect of any outlier transactions on the Bitcoin Reference Rate.

4. **Volume weighting of medians.** For each partition, the volume weighted median trade price is calculated from the trade prices and sizes of all relevant transactions. The volume weighting of each median (as opposed to simple medians) filters out potential high numbers of small, outlier trades that may otherwise impact a non-volume weighted median. Doing so assures that the Bitcoin Reference Rate will appropriately reflect large trades while the use of the medians would mitigate large outlier trades.

The Bitcoin Reference Rate is then calculated as the simple average of each partition median VWAP. The methodology employs a Percentage Deviation test to the set of VWAPs by eligible trading venues in the partition. Should any of the VWAPs deviate by more than a given threshold (currently set at 10% and defined in the Methodology Guide) of the median of the set, the associated VWAPs will be excluded from consideration in the partition.

Finally, a supplemental anomaly check will be conducted for the Bitcoin Reference Rate calculated at 4:00 pm London time each trade day. To ensure the Bitcoin Reference Rate reflects the broader underlying bitcoin market, a comparison between the final Bitcoin Reference Rate and the Lukka Global VWAP, which is another customized index developed by Lukka for MIH and which measures broader trading activity of bitcoin on certain selected large underlying spot markets throughout the world, as of 4:00 pm London time is performed. In the event that the Bitcoin Reference Rate deviates by more than 5% from the Lukka Global VWAP, a calculation failure occurs and the final Bitcoin Reference Rate will instead be calculated in accordance with the fall-back provisions detailed in the Methodology Guide, in which the Calculation Window moves back 1 hour or more until the Bitcoin Reference rate is within the given threshold of the Lukka Global VWAP. By doing so, MGEX monitors and ensures that the Bitcoin Reference Rate aligns with the broader bitcoin spot market.

The above measures ensure the Bitcoin Reference Rate has limited susceptibility to outlier prices or temporary price swings, and the types of outliers described above are disregarded.

Further insulating the BTF Futures Contract from manipulation are the eligible trading venues' monitoring and surveillance processes for their underlying Bitcoin markets. Bitstamp and Gemini prohibit all forms of market manipulation, including any activity that results in or is intended to (1) manipulate the price of a cryptocurrency or (2) manipulate a benchmark or the calculation of a benchmark. Suspected manipulation may trigger scrutiny or when warranted, the cancellation of orders.

Since 2018, Bitstamp has utilized the KRM22 Market Surveillance platform (formerly Irisium) to monitor for market abuse. The platform has market abuse and insider trading alerts calibrated for Bitstamp's market.

The system also provides Case Management capabilities, support alert investigation, and streamlined reporting. In addition, Bitstamp's order matching engine contains Volatility Control Mechanisms to reduce the extent to which manipulation or mistakenly placed orders could be impactful on market price.

Bitstamp's Market Surveillance team is responsible for monitoring for Insider Trading and Market Abuse from both employees and market participants, maintaining the Market Surveillance platform, reviewing generated alerts, and working with the Market Surveillance platform provider to periodically update the alert logic with reference to the cryptocurrency market. Documented policies and procedures govern the Market Surveillance Program and explain the process for monitoring, escalation, reporting and enforcement of market abuse cases. Any accounts involved in identified market abuse are subject to blocking, termination, and escalation to Bitstamp's Compliance team for reporting to applicable regulators. Market Participant rules related to market abuse can be found in the Bitstamp "Terms of Use" and all employees are required to sign a separate Insider Trading and Market abuse policy."

Gemini has an in-house Market Surveillance team that was purposefully built to mirror the market surveillance functions at a CFTC-registered DCM. The surveillance team has operational policies and procedures in place and reviews all Gemini trade data on a daily basis in an effort to prevent manipulative/suspicious trading activities and other market disruptions. These daily trade reviews are conducted using machine-learning software that is programmed to highlight potential spoofing, money passing, large price moves, front-running, wash trading, layering, and other various manipulative trading techniques.

Importantly, under the Information Sharing Agreements MGEX has executed with Bitstamp and Gemini, MGEX has access to trade information for the eligible trading venues' Bitcoin spot markets to aid in MGEX's own surveillance of its BTF futures market.

Further protecting its integrity, the Bitcoin Reference Rate is governed and overseen by an independent Oversight Board. The Oversight Board is responsible for conducting quarterly reviews of the Bitcoin Reference Rate and the Methodology Guide and consulting with industry participants as needed in order to keep the Methodology Guide current and relevant. The Oversight Board plays an integral role in the governance arrangements that ensure the continued integrity of the Bitcoin Reference Rate calculation, and it is governed by a board charter. The Oversight Board also reviews market data supplied by the eligible trading venues to ensure it is sufficient to accurately and reliably represent fair market value of asset prices and continues to be (1) based on prices that have been formed by the competitive forces of supply and demand in order to provide confidence that the price discovery system is reliable; and (2) anchored by observable transactions entered into at arm's length between buyers and sellers in the market for the asset in order for it to function as a credible indicator of current price.

Therefore, the Bitcoin Reference Rate is not readily susceptible to manipulation because the underlying cash market is highly liquid, MGEX has carefully considered and developed preventive methods to keep the Bitcoin Reference Rate from being manipulated and distorted, the eligible trading venues employ robust cash market surveillance systems, MGEX has access to spot market trade data to inform its own futures market surveillance, and an independent Oversight Board oversees the integrity, accuracy, and reliability of the Bitcoin Reference Rate.

IV. Volatility

While the price of Bitcoin can be highly volatile, MGEX has historically proven its ability to manage periods of prolonged volatility and spikes in volatility through its risk management of various asset classes in its

own markets, including SPIKES Futures and Hard Red Spring Wheat Futures, which can experience significant seasonal volatility. MGEX is also positioned to employ risk controls on the BTF Futures Contract, including dynamic daily price limits and margin levels that appropriately reflect the volatility of the Bitcoin spot market. MGEX also utilizes velocity logic functionality. The dynamic price limits combined with velocity logic functionality work together to prevent the market from moving too much, too fast. Moreover, MGEX has successfully managed clearing physically settled bitcoin futures for Bitnomial Exchange, LLC since December 2021 through the development of appropriate margin and risk models and thus has demonstrated experience managing the risks associated with cryptocurrency futures.

The daily price movements of the Bitcoin Reference Rate are comparable with MGEX's Hard Red Spring Wheat futures contract ("HRSW") volatility levels. From the time period between July 13, 2022 and July 13, 2023, the average daily Bitcoin Reference Rate price move was 2.25%, and the average daily HRSW price move was 1.29%. For the time period between January 13, 2023 and July 13, 2023, the average daily Bitcoin Reference Rate price move was 2.17%, and the average daily HRSW price move was 1.25%. In the last 60 days of the same time period, the average daily Bitcoin Reference Rate price move was 1.83%, and the average daily HRSW price move was 1.65%.

While Bitcoin price volatility may appear high, the daily price movements of the Bitcoin Reference Rate are comparable to other MGEX products and the Exchange is equipped to manage volatility in all its markets.

V.   Customer Feedback

Over the course of two years, MIH engaged with roughly 25 potential market participants to receive feedback on the BTF Futures and TINI Bitcoin Futures Contracts to ensure the Contracts' terms and conditions reflect the underlying cash market and that the Contracts will perform the intended risk management functions. MIH received feedback from Market Makers, Clearing members, Futures Commission Merchants, Broker Dealers, and Hedge Funds. The outreach process yielded much support for the products, and there was ample demand from end users who wanted to have access to two different size contracts listed by MGEX.

Lukka Crypto Futures Reference Rates

Methodology Guide

Draft of August 22, 2023
Version 1.3

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Version Control

Version	Date	Rationale
1.0	01 November 2022	Initial creation of document
1.1	17 April 2023	MIAX revisions
1.2	12 May 2023	MIAX revisions
1.3	28 July 2023	Addition of calculation failure provisions

Introduction

This document provides detailed information regarding the Lukka Crypto Futures Reference Rates ("Reference Rates") methodology, policies and procedures. This document contains specific focus on the data inputs, calculation, quality controls, manipulation resistance mechanisms, governance, oversight and integrity of the bitcoin and ether Reference Rates. Lukka, Inc. ("Lukka") designed the Reference Rates and is responsible for publishing any changes to the Reference Rates or this Methodology Guide. Devexperts Inc. ("Devex") is the calculation agent for the Reference Rates and will calculate and disseminate the rates on behalf of MIH. The Reference Rates are customized rates, developed by Lukka, exclusively for MIH; they do not include the Lukka Prime Index.

The Reference Rates are calculated twice per day Monday through Friday; once at 4:00 pm London time and again at 4:00 pm Eastern time. While the Reference Rates are calculated twice per day, the methodology provides for unparalleled transparency into the construction of the rate and its underlying components. Each Reference Rate is intended to provide a credible price source to the marketplace by representing the U.S. dollar price of the underlying digital asset as of 4:00 pm London time and 4:00 pm New York time.

The main characteristics of the Reference Rates are as follows:

- Designed, governed and administered to protect against abuse or systematic errors
- Produced based on clear rules to be representative of the underlying digital asset
- Robust fallback procedures to provide for a level of reliability during periods of stress
- Frequent publication, allowing for ongoing pricing of any instruments referencing the rate

Finally, the methodology is meant to combat price anomalies to a high degree. This is achieved with several layers:

- Data Source Selection
  - Eligible Trading Venues (defined below) are vetted and approved by the Oversight Board (defined below) prior to inclusion in a Reference Rate.
  - Existing Eligible Trading Venues are reviewed by the Oversight Board on a quarterly basis (at minimum) for continued compliance with the requirements for approval as an Eligible Trading Venue.
- Data Type Selection
  - Actual executed transactions are used (as opposed to indicative price submissions used in other asset classes and marketplaces).
- Reference Rate Design
  - Inputs from a single market or multiple underlying markets, as determined by the Oversight Board.
  - Time weighting using partitions to limit the effect of large transactions on the final reference rate.

- ○ The use of the median Volume-Weighted Average Price ("VWAP") for a given partition.
- ○ Anomaly detection and handling.

Governance & Oversight

The Reference Rates have a multi-faceted architecture that combines a best-of-breed approach to the calculation methodology that seeks to ensure the highest quality inputs, sophisticated monitoring of the underlying market data, clearly defined standard operating procedures that provide mechanisms to handle escalations, and a governance structure that provides for regular oversight by the Oversight Board where adjustments are made in a prompt, but formally controlled manner.

The Reference Rate methodology is governed and overseen by the Oversight Board. The Oversight Board is comprised of a minimum of five (5) and maximum of nine (9) individuals. All such individuals are jointly appointed by MIH and Lukka. All individuals on the Oversight Board shall be familiar with the Reference Rates and the Methodology Guide. The Oversight Board conducts quarterly reviews of the Reference Rates and the Methodology Guide and consults with industry participants as needed in order to keep the Methodology Guide current and relevant. The Oversight Board plays an integral role in the governance arrangements that ensure the continued integrity of the Reference Rate calculation and is governed by a board charter.

Reviews

Eligible Trading Venues

The Oversight Board is committed to ensuring the quality of the underlying markets and their data sources provided by Eligible Trading Venues. It regularly reviews key performance indicators in quarterly Oversight Board meetings. Specifically, the approval of new Eligible Trading Venues, the suspension or discontinuation of existing Eligible Trading Venues, and the reinstatement of any previously suspended Eligible Trading Venues are determined by the Oversight Board. The Oversight Board also reviews market data supplied by the Eligible Trading Venues to ensure it is sufficient to accurately and reliably represent fair market value of asset prices and continues to be 1) based on prices that have been formed by the competitive forces of supply and demand in order to provide confidence that the price discovery system is reliable; and 2) anchored by observable transactions entered into at arm's length between buyers and sellers in the market for the asset in order for it to function as a credible indicator of current price.

Approval of New Eligible Trading Venues

A new Eligible Trading Venue is a source of underlying spot market data that has not been previously incorporated into a Reference Rate, but is considered for approval by the Oversight

Board as such because it is believed to add accretive value to a Reference Rate, usually in the form of increased coverage, increased quality, or increased depth of data, that adds desired resilience to the Reference Rate. In order to be approved as a new Eligible Trading Venue, such venue must meet the following requirements, all as determined by the Oversight Board:

- Information Sharing Agreement (ISA) – The potential Eligible Trading Venue must enter into an ISA with MGEX, in a form that is acceptable to MGEX and compliant with CFTC guidance and requirements;
- Reliable Underlying Market Data – The potential Eligible Trading Venue must have reliable and timely underlying market data with sufficient liquidity, as determined by the Oversight Board;
- Technology – The potential Eligible Trading Venue must have systematic access (application programming interface or API) to underlying market data that is available to Devex, the calculation agent;
- Volume – the potential Eligible Trading Venue must demonstrate average daily trading volume sufficient to meaningfully contribute to the Reference Rate calculation.
- Market Governance – the potential Eligible Trading Venue must have sufficient market surveillance rules, regulations, policies, procedures, and monitoring in place to detect and prevent market manipulation in the underlying spot market. The Eligible Trading Venue must maintain rules and policies against manipulative trading behavior. The Eligible Trading Venue must have adequate Know-Your-Customer (KYC) policies and procedures and Anti-Money Laundering (AML) policies and procedures. The sufficiency of all such Market Governance requirements are determined by the Oversight Board.

Once approved, a new Eligible Trading Venue will be incorporated into the calculation of a Reference Rate on an effective date determined by the Oversight Board. Such effective date will be publicly announced with sufficient notice to the market (typically, a minimum of one month).

Suspension or Discontinuation of Existing Eligible Trading Venues

The suspension or discontinuation of an existing Eligible Trading Venue may occur when the underlying market data of such venue has, in the opinion of the Oversight Board, deteriorated to an extent that it no longer adds value to the Reference Rate and no longer meets the above requirements for an Eligible Trading Venue. This includes, but may not be limited to, a decrease in one or more of the following:

- the quality of data (e.g., data is no longer reflective of actual market prices)
- the amount of data provided
- the frequency of data provided
- the reliability of the delivery (e.g., frequency of outages)

Suspension is considered when the deterioration is expected to be temporary with a clear path that is time bound to restore the quality. A discontinuation is considered when the deteriorated source has been ineffective in their communication regarding the

implementation of improvements. Previously suspended or discontinued Eligible Trading Venues are eligible to be reinstated but are subject to meeting the requirements of a new Eligible Trading Venue, described above. Any suspension or discontinuation will be publicly announced.

Mergers and acquisitions may result in changes to Eligible Trading Venues or eligibility. Any adjustments will occur after the action is determined to be final and generally in conjunction with the quarterly review process of the Oversight Board.

Methodology

Overview of Methodology

The Reference Rate methodology utilizes a combined time and volume weighting in order to provide reference rates that are resilient to outlier price movements while still being representative of the market.

An overview of the Reference Rate construction is as follows:

- Executed transactions (with price and size) from Eligible Trading Venues are consumed.
- The Calculation Window is sectioned into six equal time intervals, called partitions.
- For each combination of partition, Eligible Trading Venue and currency pair, a Volume Weighted Average Price ("VWAP") is calculated.
- Further, for each partition and currency pair, the median of these VWAPs by Eligible Trading Venue is calculated.
- The Reference Rate for the currency pair is then calculated as the simple average of the pair's partition medians calculated in the previous step.

Data Inputs

Executed transactions from Eligible Trading Venues are used as the sole inputs for the Reference Rates. As described above, trading venues are considered to be Eligible Trading Venues at the approval of the Oversight Board.

Stable Coin Pairs

Trading activity in any given crypto asset is often segmented across multiple pairs, where the given crypto asset is exchanged for a different "quote" or "counter" asset per pair. This quote asset can be a fiat currency, a fiat-pegged crypto asset (stable coin), or another crypto asset. With the majority of price discovery by volume occurring in the prior two, the Reference Rates consider both fiat (USD) and stable coin denominated transactions (USDC and USDT) in order to compute a benchmark rate that is representative of the market as a whole. For a single Reference Rate, stable coin quoted trades undergo unit conversion to the corresponding fiat currency (USD) using point-in-time venue specific exchange rates between the stable coin (USDC and USDT) and the tracked fiat currency (USD), allowing for further aggregation of the trades at parity.

Data Quality Controls

To protect against systematic errors, market abuse, or other erroneous data, the Reference Rates employ a series of automated data quality filters and manual reviews. The following section details these controls.

Missing Data

In the event of exchange outages, network failures, liquidity constraints or other events that would result in a marked drop in transaction volume to a degree that data sufficiency requirements are not satisfied, the finalized reference rate for the affected calculation will follow the codified fall-back provisions. More details around the conditions that trigger the fall-back are provided in the Contingency Measures and Fall-back Mechanism section.

Delayed Data

Any transactions that are not reported or otherwise made available from an Eligible Trading Venue by the end of the Calculation Window are disregarded in the calculation of the Reference Rate for that date.

Invalid or Erroneous Data

Eligible Transactions are defined as executed transactions from Eligible Trading Venues made during the Calculation Window in a relevant pairing that are properly reported. Eligible Transactions that are flagged as invalid or erroneous are disregarded from the reference rate calculation. Eligible Transaction are flagged as invalid if any of the following conditions are met:

- A deviation in format of the message renders the message unusable.
- The trade price is inadmissible (absent, non-numeric, or non-positive).
- The execution timestamp is future dated.

Price Anomalies & Outliers

Eligible Transactions are subject to further anomaly detection within the partition. The methodology employs a Percentage Deviation test to the set of VWAPs by Eligible Trading Venue in the partition. Should any of the VWAPs deviate by more than 10% of the median of the set, the associated VWAPs will be excluded from consideration in the partition.

A final supplemental anomaly check will be conducted for the Reference Rates calculated at 4:00 pm London time. To ensure the Reference Rates reflect the broader underlying bitcoin and ether cash markets, Devex will compare the final Reference Rates to the Lukka Global VWAP, which is another customized index developed by Lukka for MIH and which measures broader trading activity of cryptocurrencies on certain selected large underlying spot markets throughout the world, of the same underlying cryptocurrency as of 4:00 pm London time. In the event that a Reference Rate deviates by more than 5% from the corresponding Lukka Global VWAP, a calculation failure occurs and the final Reference Rate will instead be

calculated in accordance with the codified fall-back provisions. More details are provided in the Contingency Measures and Fall-back Mechanism section.

Calculation

The following quantities are defined and steps below enumerated.

- A set of M exchanges: $\{E_e\}$ with $e = 1,2,\ldots,M$
- A fixed-time calculation window: W
- N equal sized time partitions of the fixed window, W: $\{P_p\}$ with $p = 1,2,\ldots,N$
- The Volume Weighted Average Price (VWAP) of some asset for exchange e and time partition p: $VWAP^e{}_p$
- A fiat currency unit conversion function: $f_{conversion}$ whose domain is a set of VWAPs and output is a set of VWAPs.
- An outlier filtration function: $f_{outlier}$ whose domain is a set of VWAPs and output is a set of VWAPs.
- An exchange reduction function: $f_{exchange}$ whose domain is a set of VWAPS and output is an effective price (single float).
- A partition reduction function: $f_{partition}$ whose domain is a set of effective prices of the various available partitions and the output is the Reference Rate (single float).

Step 1. For some time T_b compute T_a by subtracting the fixed-time window W such that $W = T_b - T_a$ and $T_b > T_a$.

Step 2. Create a set of equally sized time partitions $\{P_p\}$ on the interval $[T_a, T_b)$ $\{P_p\} = \{[t_p, t_{p+1}) \mid t_{p+1} - t_p = \frac{W}{N} \ \forall \ p \in (1,N)\}$ where $t_1 = T_a, t_{N+1} = T_b$.

Step 3. Define and track the $VWAP^e{}_p$ for exchange E_e on the time partition P_p. Let V represent the set of all tracked VWAPs on all exchanges. $V = \{VWAP^e{}_p \mid e \in (1,M), p \in (1,N)\}$.

Step 4. For each time partition, P_p apply the fiat conversion function: $f_{conversion}$, outlier filtration function: $f_{outlier}$ and exchange reduction function $f_{exchange}$ in the provided order to the subset formed by fixing p, e.g. $V_1 = \{VWAP^e{}_p \mid e \in (1,M), p = 1\}$ and project away the exchange index: e.g. $\underline{V}_1 = f_{exchange}(f_{outlier}(f_{conversion}(V_1)))$. This operation serves to normalize the units of partition VWAPs and apply the outlier removal before further reduction. This result corresponds to the effective price of the time partition P_1.

Step 5. Construct the N-dimensional set consisting of all such reductions $PP = \{f_{exchange}(V_p) \mid p \in (1,N)\}$.

Step 6. Apply the partition reduction function $f_{partition}$ to set PP to obtain the Reference Rate: $R = f_{partition}(PP)$

Step 7: Repeat Steps 3 - 6, updating the set of all tracked VWAPs V using new transaction data between each repetition, until the process time exceeds the cut time T_b. The final result of Step 6 will be the finalized reference rate for the calculation window W.

Contingency Measures and Fall-back Mechanism

The Reference Rates are designed in a manner in which the methodology ensures a rate can be calculated at the designated calculation times. Should the data sufficiency requirements not be met within a given Calculation Window, a fall-back mechanism will be utilized.

Fall-back Provisions

The fall-back mechanism in the methodology is an iterative and recursive process. Should the data sufficiency requirements not be met by the end of a given Calculation Window, the process will extend the Calculation Window by one (1) partition until the data sufficiency threshold is satisfied. This fall-back mechanism will extend for up to two (2) days of prior data to achieve data sufficiency.

For example, if between 15:00:00 and 16:00:00, the data sufficiency requirement has not been met, the Calculation Window will expand to 14:50:00 (one ten minute partition). If the data sufficiency requirement is met with the addition of the new partition, the recursive process will end and the Reference Rate will be published. Should the data sufficiency requirement remain unsatisfied, an additional partition will be added and the Calculation Window will be expanded to 14:40:00. This process will continue until the data sufficiency requirement is satisfied.

Should a Reference Rate calculation failure occur due to a deviation of more than 5% from the Lukka Global VWAP, the fall-back mechanism will result in the Calculation Window moving back one (1) hour until the Reference Rate is within 5% of the corresponding Lukka Global VWAP. For example, if the fall-back mechanism is triggered for the typical 15:00:00 to 16:00:00 Calculation Window, the Calculation Window will move to 14:00:00 to 15:00:00. If this resolves the calculation failure, the process will end, and the Reference Rate will be published. Should a calculation failure continue to occur, the Calculation Window will move back an additional hour, and this process will continue until the anomaly is resolved.

For the avoidance of doubt, the Lukka Global VWAPs used for these anomaly check purposes will be calculated based on the same Calculation Window as the given Reference Rate. If the fall-back mechanism shifts the Calculation Window of a Reference Rate to 14:00:00 to 15:00:00, for example, the Lukka Global VWAP of that cryptocurrency will also be calculated based on trades occurring from 14:00:00 to 15:00:00.

Any Reference Rate published utilizing these Fall-back Provisions will be marked with an asterisk (*) and publicly announced with the relevant Calculation Window used.

Data Sufficiency Requirement to Trigger Fall-back

Within a given Calculation Window, if either one of the following thresholds are not met, the fall-back mechanism will be invoked.

- At least one (1) Eligible Trading Venue with trading activity
- 50 Eligible Transactions collectively (excluding invalid and erroneous data as described above)

Expert Judgment

The Reference Rates are highly programmatic in nature, and as such, Expert Judgment is not part of the methodology. Fully automated processes may detect potential unusual conditions in the market that may require Expert Judgment to be brought in to determine if an unusual situation requires intervention. However, Expert Judgment, should it be needed, is an extremely rare occurrence.

Fork Policy

Individual digital currencies like bitcoin are largely based on consensus mechanisms, which are used to determine whether transactions made on the blockchain are valid. To operate the underlying network, any changes to these consensus mechanisms must be agreed upon by all parties for the current and future system to function. At times there is a divergence in which direction the network should proceed if groups disagree about a consensus change. This divergence can be called a "fork," which is similar to a network software update. Forks can be classified either as a Hard Fork or a Soft Fork depending on the materiality of their impact, as explained below.

Hard Fork Event Information

Definition: A radical change to a blockchain protocol that effectively results in two or more protocol branches.

Event Details & Criteria: A hard fork must involve an update to a single blockchain which requires all nodes or users to upgrade to the latest version of the protocol, making what would have previously been invalid transactions on that protocol valid (or vice-versa). In these scenarios, at least two branches of blockchain protocol always stem from the original.

Although it is often the case, both branches do not need to be "adopted" for an event to qualify as a hard fork. While many hard forks are the result of divergent views on protocol management in which the community must choose which branch to support, many are part of planned upgrades in a blockchain's development. In instances in which a network update is mandatory and may be classified as a hard fork, but the market displays a consensus around the continuity of a single asset (for example, the case in which a required network upgrade is initiated by an issuing entity and there is no continued activity on the legacy protocol), changes

to an asset can be reflected in its details rather than through the creation of a new asset record. However, the Oversight Board will always create a new asset record in scenarios in which activity on two distinct networks emerges from a hard fork.

Implications of a Hard Fork: In a Hard Fork event that results in a new coin or token being created on a separate chain (sometimes called a 'contentious hard fork'), a new token or coin will be created for the divergent chain (aka the "new asset"). This "new asset" will be treated separately and independently of the original asset on the original blockchain (aka the "old asset"). The "new asset" will only be added to the Reference Rate when it meets the stated criteria of the Oversight Board. The "old asset" will continue as part of the Reference Rate in the manner it was prior to the Hard Fork event and will have a consistent time series of pricing from the genesis of the "old asset" to current day. In some situations the "old asset" may change its name following the Hark Fork event. A rebranded name for the "old asset" will not constitute a change to the methodology unless the structure is materially altered, as determined by the Oversight Board.

Soft Fork Event Information

Definition: A minor change to a blockchain protocol where backwards compatibility with old nodes is retained.

Event Details & Criteria: Soft Fork events are common protocol update events in the blockchain space, with a defining feature being that a Soft Fork changes a protocol so that nodes will view previously valid transactions as invalid. Soft Forks only require a majority of nodes to follow this change, as opposed to a Hard fork in which all nodes must accept new rules in order to operate on the new protocol. If a fork maintains backwards compatibility with old nodes, the Oversight Board will classify it as a Soft Fork.

Implications of a Soft Fork: In a Soft Fork event, the "old asset" and the "new asset" are ultimately one in the same as Soft Forks do not result in a new divergent chain or newly created asset, as specified in the definition above. Therefore, pricing for the "old asset," as covered by the Reference Rate, will continue to occur as it was prior to the Soft Fork event.

Reference Rate Specifications

The following section includes the Reference Rate specifications.

Reference Rate Parameters

The below table summarizes the current parameters of the Reference Rates.

Parameter	Definitions
Underlying Data Source Count	Two (Bitstamp & Gemini).
Eligible Trading Venue	Two (Bitstamp & Gemini). Trading venues that have been approved by the Oversight Board.
Eligible Quote Currencies	The quote currencies that are admissible.
Dissemination	The frequency at which the reference rate is disseminated. 4 pm London, 4 pm New York
Eligible Transactions	Executed transactions of subject digital asset versus the Eligible Quote Currencies on Eligible Trading Venues made during the Calculation Window in a relevant pairing that are properly reported.
Calculation Window	The period of time that defines the admissible data points to a given calculation.
Partition Count / Partition Length	The number of partitions and partition length. For a given a Calculation Window and a Partition Count, a Partition Length will be determined or for a given a Partition Length, then Partition Count will be determined.
Calculation Method	The method in which the Reference Rate is calculated. Reference Rates are simple averages of each partition Median VWAP.
Partition Weight	The weight that is assigned to each partition. Reference Rates are equally weighted.
Fall-back Provision	The behavior of the methodology that is used should a data sufficiency threshold not be met.
Standard Deviation Limit	The number of standard deviations used as the data cleaning threshold.

Reference Rate Methodology Parameters for Bitcoin and Ethereum Reference Rates

Quote Currency	Calculation Window	Partition Count / Partition Length	Calculation Method	Late Reported Trades?	Outlier Deviation Threshold	Partition Weight	Eligible Trading Venue
USD, USDC, USDT	60 Minutes	6 / 10 Minutes	Simple Average of each Median VWAP	No.	10%	Equally Weighted	Two (Bitstamp & Gemini)

Appendix I

Key Terms

The below section is a glossary of key terms.

Term	Definition
Anti-Money Laundering Compliance	Programs that are employed to prevent illegally obtained assets as legitimate.
API	Application programming interface.
Calculation Window	The period of time that defines the admissible data points to a given calculation.
Eligible Trading Venues	Trading venues approved by the Oversight Board to be used as a market data source for the calculation of the Reference Rates.
Expert Judgment	Refers to the exercise of discretion by the Oversight Board with respect to the use of data in determining Reference Rates.
Fair Market Value	The price that would be received to sell an asset in an orderly transaction between market participants at the measurement date.
Know Your Customer (KYC)	The process in which the customer is verified, including identity.
VWAP	Volume-weighted average price.

Appendix II

About Lukka

Founded in 2014, Lukka serves the most risk mature businesses in the world with institutional data and software solutions. Lukka bridges the gap between the complexities of blockchain data and traditional business needs. Its customers include both Traditional and Crypto Asset Exchanges and Trading desks, CPA & Accounting Firms, Fund and Financial Auditors, Fund Administrators, Miners, Protocols, individuals, and any other businesses interacting with crypto assets. All of Lukka's products are created with institutional standards, such as AICPA SOC Controls, which focus on accuracy and completeness. Lukka is a global company headquartered in the United States. For information about Lukka, visit https://lukka.tech/.

For more information on Lukka and their product governance please visit: https://lukka.tech/trust-center/.