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SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
Form 19b-4

File No. * SR 2021 - * 38

Amendment No. (req. for Amendments *) 1

Filing by MIAX Emerald, LLC

Pursuant to Rule 19b-4 under the Securities Exchange Act of 1934

Initial * <input type="checkbox"/>	Amendment * <input checked="" type="checkbox"/>	Withdrawal <input type="checkbox"/>	Section 19(b)(2) * <input checked="" type="checkbox"/>	Section 19(b)(3)(A) * <input type="checkbox"/>	Section 19(b)(3)(B) * <input type="checkbox"/>
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Pilot <input type="checkbox"/>	Extension of Time Period for Commission Action * <input type="checkbox"/>	Date Expires * <input type="text"/>
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Rule

<input type="checkbox"/>	19b-4(f)(1)	<input type="checkbox"/>	19b-4(f)(4)
<input type="checkbox"/>	19b-4(f)(2)	<input type="checkbox"/>	19b-4(f)(5)
<input type="checkbox"/>	19b-4(f)(3)	<input type="checkbox"/>	19b-4(f)(6)

Notice of proposed change pursuant to the Payment, Clearing, and Settlement Act of 2010

Section 806(e)(1) *

Section 806(e)(2) *

Security-Based Swap Submission pursuant to the Securities Exchange Act of 1934
Section 3C(b)(2) *

Exhibit 2 Sent As Paper Document

Exhibit 3 Sent As Paper Document

Description

Provide a brief description of the action (limit 250 characters, required when Initial is checked *).

Contact Information

Provide the name, telephone number, and e-mail address of the person on the staff of the self-regulatory organization prepared to respond to questions and comments on the action.

First Name *	Chris	Last Name *	Solgan
Title *	VP, Senior Counsel		
E-mail *	csolgan@miami-holdings.com		
Telephone *	(609) 423-9414	Fax	

Signature

Pursuant to the requirements of the Securities Exchange of 1934, MIAX Emerald, LLC has duty caused this filing to be signed on its behalf by the undersigned thereunto duty authorized.

Date: 02/18/2022
By: Michael Slade
(Name *)

(Title *)
AVP, Associate Counsel

NOTE: Clicking the signature block at right will initiate digitally signing the form. A digital signature is as legally binding as a physical signature, and once signed, this form cannot be changed.

Michael Slade Date: 2022.02.18 13:14:57 -05'00'

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SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

For complete Form 19b-4 instructions please refer to the EFS website.

Form 19b-4 Information *

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SR-EMERALD-2021-38- 19b4 (Amend

The self-regulatory organization must provide all required information, presented in a clear and comprehensible manner, to enable the public to provide meaningful comment on the proposal and for the Commission to determine whether the proposal is consistent with the Act and applicable rules and regulations under the Act.

Exhibit 1 - Notice of Proposed Rule Change *

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SR-EMERALD-2021-38 - Exhibit 1 (A

The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 1A - Notice of Proposed Rule Change, Security-Based Swap Submission, or Advanced Notice by Clearing Agencies *

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 2- Notices, Written Comments, Transcripts, Other Communications

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Copies of notices, written comments, transcripts, other communications. If such documents cannot be filed electronically in accordance with Instruction F, they shall be filed in accordance with Instruction G.

Exhibit Sent As Paper Document

Exhibit 3 - Form, Report, or Questionnaire

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Copies of any form, report, or questionnaire that the self-regulatory organization proposes to use to help implement or operate the proposed rule change, or that is referred to by the proposed rule change.

Exhibit Sent As Paper Document

Exhibit 4 - Marked Copies

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The full text shall be marked, in any convenient manner, to indicate additions to and deletions from the immediately preceding filing. The purpose of Exhibit 4 is to permit the staff to identify immediately the changes made from the text of the rule with which it has been working.

Exhibit 5 - Proposed Rule Text

Add Remove View

SR-EMERALD-2021-38 - Exhibit 5 (Ar

The self-regulatory organization may choose to attach as Exhibit 5 proposed changes to rule text in place of providing it in Item I and which may otherwise be more easily readable if provided separately from Form 19b-4. Exhibit 5 shall be considered part of the proposed rule change

Partial Amendment

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If the self-regulatory organization is amending only part of the text of a lengthy proposed rule change, it may, with the Commission's permission, file only those portions of the text of the proposed rule change in which changes are being made if the filing (i.e. partial amendment) is clearly understandable on its face. Such partial amendment shall be clearly identified and marked to show deletions and additions.

1. Text of Proposed Rule Change

(a) MIAX Emerald, LLC (“MIAX Emerald” or “Exchange”), pursuant to the provisions of Section 19(b)(1) of the Securities Exchange Act of 1934 (“Act”)¹ and Rule 19b-4 thereunder,² proposes to amend Exchange Rule 531, Reports and Market Data Products, to provide for the new service called the “High Precision Network Time Signal Service”.

A notice of the proposed rule change for publication in the Federal Register is attached hereto as Exhibit 1. The proposed amendment to the Exchange’s rules is attached as Exhibit 5.

(b) Not applicable.

(c) Not applicable.

2. Procedures of the Self-Regulatory Organization

The proposed rule change was approved by the Chief Executive Officer of the Exchange or his designee pursuant to authority delegated by the MIAX Emerald Board of Directors of the Exchange on January 28, 2021. Exchange staff will advise the Board of Directors of any action taken pursuant to delegated authority. No other action by the Exchange is necessary for the filing of the proposed rule change.

Questions and comments on the proposed rule change may be directed to Chris Solgan, Vice President and Senior Counsel, at (609) 897-8494.

3. Self-Regulatory Organization’s Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change**a. Purpose**

This Amendment No. 1 to SR-EMERALD-2021-38 amends and replaces in its entirety the proposal as originally filed on November 19, 2021. The Exchange submits this Amendment

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

No. 1 to clarify certain points and provide additional details, clarification, and justification regarding the proposal as well as make a non-substantive change to streamline the proposed rule text.

The Exchange provides a resilient and robust technology platform, deterministic functionality, transparent trading platform, and a culture of technological innovation to the U.S. options market. In keeping with its culture of innovation, the Exchange proposes to amend Exchange Rule 531, Reports and Market Data Products, to provide for the new service called the “High Precision Network Time Signal Service” (hereinafter referred to as “HPNTSS” or the “Service”).³ The Service is an optional product⁴ available to Members.⁵ In sum, Members would be able to utilize the proposed Service to synchronize their time recording systems to those of the Exchange at sub-nanosecond level accuracy for correlated latency measurements between the Exchange’s and the Member systems’ time measurements related to the same message or order. Time synchronization services are well established in the U.S. and utilized in many areas of the U.S. economy and infrastructure. The proposed Service is not novel to the securities markets and it is similar to other network time synchronization services currently offered by at least two foreign securities exchanges.⁶ The Exchange proposes to provide the

³ The Exchange also proposes to amend the title of Exchange Rule 531 to include the phrase “and Services” so the title would read as “Reports, Market Data Products and Services.”

⁴ A Member that chooses to subscribe to the proposed Service may discontinue the Service at any time if that Member determines that it is no longer useful or that alternatives better meet their business or system needs. The Exchange intends to submit a separate filing with the Commission pursuant to Section 19(b)(1) to propose fees for the Service.

⁵ The term “Member” means an individual or organization approved to exercise the trading rights associated with a Trading Permit. Members are deemed “members” under the Exchange Act. See Exchange Rule 100.

⁶ A similar service is currently offered by Deutsche Börse Group and Nasdaq in the Europe. See a description of Deutsche Börse Group’s Time Services, available at

Service in response to Member demand for tighter and more accurate clock synchronization options with the Exchange's network.

The U.S. Government's Global Positioning Satellite ("GPS") clock⁷ time signal is the benchmark by which the Exchange and most, if not all, Members use to synchronize their internal primary clock devices. Using the U.S. Government provided GPS time signals publicly available through the GPS network is a de facto standard for high precision time synchronization across geographically diverse locations. Typically, a GPS antenna serves as a time signal receiver and feeds a primary clock device the Coordinated Universal Time (referred to as "UTC") using Precision Time Protocol ("PTP").⁸

<https://www.deutsche-boerse.com/dbg-en/products-services/ps-technology/ps-connectivity-services/ps-connectivity-services-time-services> (last visited September 29, 2021), and a description of Nasdaq Nordic PTP Services, available at <https://www.nasdaq.com/docs/nasdaq-nordic-ntp-services-fs.pdf> (last visited November 9, 2021). See also slides 28 – 39 of "Precise Timing in Financial Markets", by Deutsche Börse Group, available at [White Rabbit in Financial Markets \(stanford.edu\)](#) (last visited October 4, 2021). See also slides 11 -13 of "Wall Street Clock", by Seven Solutions, available at [White Rabbit synchronization use cases \(atis.org\)](#) (last visited October 4, 2021).

⁷ For a description of the GPS clock, see Official U.S. Government Information About the Global Positioning System (GPS) and Related Topic, available at <https://www.gps.gov/applications/timing/> (providing that "[i]n addition to longitude, latitude, and altitude, the Global Positioning System (GPS) provides a critical fourth dimension – time. Each GPS satellite contains multiple atomic clocks that contribute very precise time data to the GPS signals. GPS receivers decode these signals, effectively synchronizing each receiver to the atomic clocks. This enables users to determine the time to within 100 billionths of a second, without the cost of owning and operating atomic clocks.").

⁸ A primary clock device is a precision parent clock that provides timing signals to synchronized secondary child clocks as part of a standalone clock network. The term "Coordinated Universal Time" is defined as the "international standard of time that is kept by atomic clocks around the world." See Merriam-Webster Dictionary, available at <https://www.merriam-webster.com/dictionary/Coordinated%20Universal%20Time> (last visited November 10, 2021). Coordinated Universal Time is the primary time standard by which the world regulates clocks and time. See <https://www.timeanddate.com/time/aboututc.html> (last visited October 5, 2021). "Precision Time Protocol" is a method used to synchronize clocks through a computer

The Exchange's primary clock currently feeds a time signal to the Exchange's timestamping devices within the Exchange's own network and provides sub-nanosecond level synchronization using an enhanced PTP ("Enhanced PTP").⁹ This Enhanced PTP time signal is used to synchronize the Exchange's capture devices with each other at a sub-nanosecond level. These capture devices are used to timestamp orders and messages as they travel through the Exchange's System.¹⁰

Time synchronization services are well established in the U.S. and utilized in many areas of the U.S. economy and infrastructure. Today, the Exchange understands many Members attempt to sync their primary clock devices to the U.S. Government provided GPS network. By getting the GPS signal through a GPS capable antenna, Members can synchronize their primary clock device to the GPS network time to within an accuracy of approximately 30 nanoseconds. From there, by using a PTP time synchronization protocol, Members can synchronize their internal devices to their primary clock devices. Through this method, Members' primary clock and internal devices can be synchronized to within a few billionths of a second (nanoseconds) of one another. Some Members may also currently utilize their own Enhanced PTP with their primary clock devices that synchronize their own timestamping devices at a sub-nanosecond level. The Exchange and those Members utilize separate Enhanced PTP devices.

Because the Exchange and Members independently access time signals from the U.S.

network. See also "IEEE-1588 Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems" available at <https://www.nist.gov/system/files/documents/el/isd/ieee/tutorial-basic.pdf> (last visited February 1, 2022).

⁹ Enhanced PTP is commonly defined as a precision time protocol that is at a sub-nanosecond level.

¹⁰ The term "System" means the automated trading system used by the Exchange for the trading of securities. See Exchange Rule 100.

government provided GPS network and synchronize those time signals with their own primary clock devices, measurement times of market events by the Exchange and a Member may oscillate by approximately 30 or more nanoseconds.¹¹ This may, in turn, lead to incorrect latency measurements that may cause a Member's time calculations of how long it took for their order or message to leave their systems and reach the trading center to which it was sent to be off by as many as 30 nanoseconds. This may impair the Member's ability to fully understand latencies within their own systems and whether they need to adjust their systems or trading models.

Under the proposed Service, Members would be able to synchronize their own primary clock devices to the Exchange's primary clock device, by receiving time signals from the Exchange via a 1 gigabit ("Gb") connection that is currently offered by the Exchange and utilized by Members and non-Members to connect to the Exchange's System.¹² The proposed Service simply provides Members with the Exchange's time signal at a sub-nanosecond level and nothing else. The sub-nanosecond time signal would tell the Member the Exchange's time at a sub-nanosecond level at a particular point in time. The subscribing Member may then use that

¹¹ See slide 11 -13 of "Wall Street Clock", by Seven Solutions, [available at White Rabbit synchronization use cases \(atis.org\)](#) (last visited October 4, 2021). See also [How Accurate is GPS for Timing, available at GPS.gov: GPS Accuracy](#) (last visited November 11, 2021) (providing that "GPS time transfer is a common method for synchronizing clocks and networks to Coordinated Universal Time (UTC). The government distributes UTC as maintained by the U.S. Naval Observatory (USNO) via the GPS signal in space with a time transfer accuracy relative to UTC (USNO) of ≤ 30 nanoseconds (billionths of a second), 95% of the time. This performance standard assumes the use of a specialized time transfer receiver at a fixed location.").

¹² The Exchange is not proposing to provide a new connectivity option to receive time signals via the proposed Service. The proposed Service is not a connectivity product and Members would only need to utilize an existing connectivity method offered by the Exchange to utilize the proposed Service. See Fee Schedule, Section 5, System Connectivity Fees, for information regarding 1 Gb connectivity.

time signal to synchronize their own primary clock to the Exchange's primary clock at the more acute sub-nanosecond level.

Some Members may currently have an Enhanced PTP clock synchronization¹³ device within their own network. This device is not provided by the Exchange. Other Members that do not currently have an Enhanced PTP clock synchronization device would need to acquire one from a third party vendor, of which there are several providers. The Member's Enhanced PTP device would then be used to synchronize the clocks within the Member's computer and network infrastructure, as appropriate, at a sub-nanosecond level. This would enable the Member to record certain times an order or message traveled through and leaves the Member's system at a sub-nanosecond level.

Members may use the proposed Service for numerous purposes. For one, the proposed Service would allow Members to more precisely measure latency between their network and that of the Exchange at a sub-nanosecond level. The proposed Service would allow them to better understand the times at which their order or message reached certain points when traveling from their network to the Exchange.

Members may use the proposed Service to analyze the efficiency of their network and connections when not only routing orders to the Exchange, but also when receiving messages back from the Exchange. These messages include communications regarding whether their order was accepted, rejected, or executed. Members may measure message traversal times by comparing their message's (e.g. order, quote, cancellation, etc.) timestamp to the Exchange's matching engine timestamp from the Exchange-generated acknowledgement messages (e.g.

¹³ An Enhanced PTP clock synchronization device captures time and coordinates time synchronization within a network at a sub-nanosecond level.

order acknowledgment, quote acknowledgment, cancellation acknowledgment, etc.).¹⁴ Members may then enhance their own systems to ensure that they are receiving such communications in a timelier manner and to verify that their systems are working as intended.

Members may then utilize these enhanced latency measurements to better analyze latencies within their own systems and use this analysis to optimize their network, models and trading patterns to potentially improve their interactions with the Exchange. In particular, Members may use these metrics to better assess the health of their network and that their systems are working as intended. For example, a Member may use this information when analyzing the efficacy of their various connections and whether a connection is performing as expected or experiencing a delay. A Member may then decide to rebalance the amount of orders and/or messages over its various connections to ensure each connection is operating with maximum efficiency.

Members may also use the proposed Service for other purposes, such as determining compliance with certain regulatory requirements¹⁵ and trade surveillance. Members may also utilize time synchronization to assist them in evaluating compliance with certain clock synchronization requirements.¹⁶

The proposed Service would be described under proposed Exchange Rule 531(c), which

¹⁴ The Exchange sends Members an acknowledgement message that their order or message was received by the Exchange. This acknowledgement includes the time of receipt at a nanosecond level.

¹⁵ See, e.g., Chapter III of the Exchange's Rules, which incorporates by reference Rule 301, Interpretation and Policy .02 (Just and Equitable Principles of Trade), of the Exchange's affiliate, Miami International Securities Exchange, LLC ("MIAX"); and Financial Industry Regulatory Authority, Inc. ("FINRA") Rule 5320.

¹⁶ See Chapter XVII of the Exchange's Rules, which incorporates by reference MIAX Rule 1707 (Consolidated Audit Trail Compliance Rule – Clock Synchronization Rule Violation); and FINRA Rule 6820.

would provide that:

HPNTSS is an enhanced Precision Time Protocol (“PTP”) Ethernet-based service for synchronizing device clocks to within sub-nanosecond accuracy of one another. HPNTSS enables Members to synchronize their internal devices to the same time as the Exchange devices with high precision. Tightly synchronized clocks enable the ability to correlate event timestamps from within their own systems to those within the Exchange’s network.

The Exchange does not propose to provide a new connectivity option to receive time signals via the proposed Service. The proposed Service is not a connectivity product and Members would need to utilize an existing connectivity method offered by the Exchange to utilize the proposed Service. The proposed Service simply provides enhanced time synchronization that may be utilized by a subscribing Member to adjust their own systems. The proposed Service is not a market data product or access/connectivity service and the Exchange does not propose to include additional connectivity options or modify existing connectivity options as part of this proposal. Members may continue to use their existing methods to connect to and send orders to the Exchange. The proposed Service will not include any trading data regarding the Member’s activity on the Exchange or include any data from other trading activity on the Exchange.

Changes to the Title of Exchange Rule 531

With the proposed change to add the new Service, the Exchange also proposes to amend the title of Exchange Rule 531, which is currently titled “Reports and Market Data Products.” With the addition of the Service, the Exchange proposes to place a comma after the word “Reports,” delete the word “and” in the current title of Exchange Rule 531, and add the phrase “and Services” after the phrase “Market Data Products”. Accordingly, with the proposed changes, the title of Exchange Rule 531 will read as follows: “Reports, Market Data Products and Services.” The purpose of this change is to provide clarity within the Exchange’s rules.

b. Statutory Basis

The Exchange believes the proposed rule change is consistent with the Act and the rules and regulations thereunder applicable to the Exchange and, in particular, the requirements of Section 6(b) of the Act.¹⁷ Specifically, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)¹⁸ requirements that the rules of an exchange be designed to prevent fraudulent and manipulative acts and practices, to promote just and equitable principles of trade, to foster cooperation and coordination with persons engaged in regulating, clearing, settling, processing information with respect to, and facilitating transactions in securities, to remove impediments to and perfect the mechanism of a free and open market and a national market system, and, in general, to protect investors and the public interest.

Trading technology in the U.S. market is constantly evolving and providing market participants with tools to increase speed and reduced latency opportunities. Today, the Exchange provides Members timestamp information in nanoseconds. The Exchange and its Members independently access time signals from the GPS network and synchronize those time signals with their own primary clock devices. Even though the Exchange and Members access the GPS network, this independent access may result in measurement times of market events by the Exchange and a Member to oscillate by approximately 30 or more nanoseconds.¹⁹ This time oscillation may cause a Member's time calculations of how long it took for their order or message to leave their systems and reach a trading center to be off by as many as 30 nanoseconds. For example, a Members may calculate a traversal time of 100 nanoseconds

¹⁷ 15 U.S.C. 78f(b).

¹⁸ 15 U.S.C. 78f(b)(5).

¹⁹ See supra note 11.

between its network and a trading center. However, due to oscillation between measurement times, that traversal time could range from anywhere from 70 nanoseconds to 130 nanoseconds. In today's market, such a potential inaccuracy in a Member's latency measurements is meaningful and potentially impactful to the performance of their trading strategies.

The proposed Service addresses this issue by enabling Members to synchronize their primary clock device with the Exchange's at a sub-nanosecond level. For example, the proposed Service would allow Members to precision timestamp a quote sent from their system to the very same quote timestamped by the Exchange and have confidence that the nanosecond time delta between timestamps is attributable to latency and not due to the current potential 30 nanosecond oscillation discussed above. The Exchange, therefore, believes the proposed Service promotes just and equitable principles of trade, removes impediments to and perfects the mechanism of a free and open market because it would allow latency sensitive Members to measure latency in a manner consistent with their trading behavior and the evolving pace of trading and technology in today's markets. Sub-nanosecond synchronization removes impediments to and perfects the mechanism of a free and open market because it would provide Members with a tool to assess and re-calibrate their systems at a more acute level that is in line with the increasing speeds at which today's markets operate.

The proposed Service provides Members with the Exchange's time signal at a sub-nanosecond level. The time signal provided by the proposed Service could be beneficial in multiple areas, one of which is enabling Members to more precisely measure latency between their network and that of the Exchange at a sub-nanosecond level. The proposed Service would allow them to better understand the times at which their order or message reached certain points when traveling from their network to the Exchange through more acute sub-nanosecond latency

measurements. The proposed Service is, therefore, consistent with Section 6(b)(5)²⁰ of the Act because sub-nanosecond latency measurement would enable latency sensitive Members to more precisely calculate and thus better understand and manage their own latency.

Members may utilize these enhanced latency measurements to better analyze latencies within their own systems and use this analysis to optimize their network, models and trading patterns to potentially improve their interactions with the Exchange. The ability to more precisely measure network efficiency could provide Members with a set of metrics that allow them to better assess the health of their network and that their systems are working as intended. The Exchange anticipates that most, if not all, subscribers to the proposed Service would be those whose trading models are latency sensitive and primarily seek to remove liquidity. These Members may increase their volume of liquidity removing orders as a result of re-calibrating their trading models based on their use of the proposed Service. The increase in incoming liquidity removing orders may result in higher execution rates for Members who are less latency sensitive and primarily place resting orders on the Exchange's Simple Order Book²¹ and/or Strategy Book.²² The proposed Service may benefit those market participants who would receive greater fill rates, thereby facilitating transactions in securities and perfecting the mechanism of the national market system.

The Exchange believes providing this optional clock synchronization service to interested Members is, therefore, consistent with facilitating transactions in securities, removing

²⁰ 15 U.S.C. 78f(b)(5).

²¹ The "Simple Order Book" is the Exchange's regular electronic book of orders and quotes. See Exchange Rule 518(a)(15).

²² The "Strategy Book" is the Exchange's regular electronic book of complex orders and complex quotes. See Exchange Rule 518(a)(17).

impediments to and perfecting the mechanism of a free and open market and a national market system, and, in general, protecting investors and the public interest.

The proposed Service also protects investors and the public interest because Members may use the Service for determining compliance with certain regulatory requirements,²³ trade surveillance, and to assist them in evaluating compliance with certain clock synchronization requirements.²⁴

Additionally, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)²⁵ requirement that the rules of an exchange not be designed to permit unfair discrimination between customers, issuers, brokers, or dealers as it will be available to all Members who choose to subscribe. Use of the proposed Service would be voluntary and no Member would be required to subscribe to the proposed Service. The Exchange notes that the proposed Service would be an additional, optional tool for Members and some Members may not find it useful based on their business needs and trading activity. Members that choose not to subscribe to the proposed Service are free to utilize other time synchronization methods or services that may assist them in time synchronization of their systems at a more granular level. The proposed Service may not provide utility to all Members based on their business model, use of existing time synchronization methods, or reliance on other methods to test their system's performance to ensure it is operating as intended. For example, certain Members employ business models that are not latency sensitive, such as those that only enter resting liquidity on the Exchange's Simple Order Book or Strategy Book. In addition, the proposed Service may

²³ See supra note 15.

²⁴ See supra note 16.

²⁵ Id.

also not be useful for order routing firms that connect to the Exchange solely as part of their best execution obligations or to comply with the trade-through requirements under Chapter XIV of the Exchange's Rules.²⁶

Lastly, the Exchange believes the proposed changes to the title of Exchange Rule 531 promote just and equitable principles of trade and remove impediments to and perfect the mechanism of a free and open market and a national market system because the proposed rule changes will provide greater clarity to Members and the public regarding the Exchange's Rules. It is in the public interest for rules to be accurate and concise so as to eliminate the potential for confusion.

4. Self-Regulatory Organization's Statement on Burden on Competition

The Exchange does not believe that the proposed rule change will result in any burden on competition that is not necessary or appropriate in furtherance of the purposes of the Act, as amended. In this instance, the proposed rule change to offer the optional Service is in response to Member interest and requests for tools that would enable them to better measure traversal times between their network and that of the Exchange at a more granular level.

Intra-Market Competition

The Exchange does not believe the proposed Service will have an inappropriate burden on intra-market competition between Members that choose to subscribe to the Service and those Members that do not. The proposed Service would provide Members with the ability to synchronize their primary clock devices with the Exchange's primary clock device at a sub-nanosecond level, which they may then use to measure their network's efficiency to determine

²⁶ See Chapter XIV of the Exchange's Rules, which incorporates by reference Rule 1401, Order Protection, of the Exchange's affiliate, MIAX.

whether their systems are performing as expected.

The Exchange notes that the proposed Service would be an additional, optional tool for Members and some Members may not find it useful based on their business needs and trading activity. The proposed Service may not provide utility to all Members based on their business model, use of existing time synchronization methods, or reliance on other methods to test their system's performance to ensure it is operating as intended. In addition, the proposed Service may also not be useful for order routing firms that connect to the Exchange solely as part of their best execution obligations or to comply with the trade-through requirements under Chapter XIV of the Exchange's Rules.²⁷

Additionally, some Members may be able to enhance their own traversal time calculations without subscribing to the proposed Service by using other time synchronization methods or utilize some other services that may assist them in time synchronization of their systems. Members may also prefer to utilize or develop other methods that would enable them to determine whether their own primary clock device is recording time in close proximity to the primary clock devices of other market participants. Members may view these alternatives as more in line with their business needs or choose an alternative that is more compatible with their existing technology.

Inter-Market Competition

The Exchange does not believe the proposed Service will have an inappropriate burden on inter-market competition. The proposed Service will further enhance inter-market competition between exchanges by allowing the Exchange to expand its product offerings. The proposed Service would provide subscribing Members with a tool to assist them in recalibrating

²⁷

Id.

their own models and trading strategies to improve their overall experience on the Exchange, thereby potentially improving execution and order fill rates. This may improve the Exchange's overall market quality through increased liquidity and improved execution opportunities for resting orders, enhancing the Exchange's overall competitive position. The proposed rule change should enhance competition by promoting further initiatives and innovation among market centers and market participants as it concerns time measurements and synchronization among trading platforms.

Lastly, if the proposed Service is unattractive to Members, Members will opt not to subscribe to it. Accordingly, the Exchange does not believe that the proposed change will impair the ability of Members or competing order execution venues to maintain their competitive standing in the financial markets.

5. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received from Members, Participants, or Others

No written comments were either solicited or received.

6. Extension of Time Period for Commission Action

The Exchange does not consent to an extension of the time period for Commission action.

7. Basis for Summary Effectiveness Pursuant to Section 19(b)(3) or for Accelerated Effectiveness Pursuant to Section 19(b)(2)

- (a) Not applicable.
- (b) Not applicable.
- (c) Not applicable.
- (d) The Exchange requests accelerated approval of Amendment No. 1 pursuant to

Section 19(b)(2) of the Act.²⁸ Amendment No.1 does not change the substance of the proposal with respect to the proposed rule or its purpose. Amendment No. 1 simply seeks to provide additional detail regarding the proposed rule change and justification regarding its consistency with the Exchange Act as well as make a non-substantive change to streamline the proposed rule text. The Exchange believes Amendment No. 1 does not make any material changes to the substance or operation of the proposed Service and, therefore, does not believe a full notice and comment period is necessary. The Exchange also notes that the proposal was already subject to a full notice and comment period and no comments were received. The Exchange proposes to provide the proposed Service in response to Member demand for tighter and more acute clock synchronization options with the Exchange's network. The purpose of the proposed Service is to provide Members an additional, optional tool to aid in them in synchronizing their systems with the Exchange's network to ensure more acute clock synchronization and timestamp calculations. As such, the Exchange believes it is appropriate for the Commission to approve the proposed rule change and Amendment No. 1 on an accelerated basis.

8. Proposed Rule Change Based on rules of Another Self-Regulatory Organization or of the Commission

Not applicable.

9. Security-Based Swap Submissions Filed Pursuant to Section 3C of the Act

Not applicable.

10. Advance Notices Filed Pursuant to Section 806(e) of the Payment, Clearing and Settlement Supervision Act

Not applicable.

11. Exhibits

²⁸ 15 U.S.C. 78s(b)(2).

1. Completed notice of proposed rule change for publication in the Federal Register.
5. Text of the proposed rule change.

EXHIBIT 1

SECURITIES AND EXCHANGE COMMISSION
(Release No. 34- ; File No. SR-EMERALD-2021-38)

February __, 2022

Self-Regulatory Organizations: Notice of Filing of a Proposed Rule Change by MIAX Emerald, LLC to amend Exchange Rule 531 to provide for the new service called the “High Precision Network Time Signal Service”

Pursuant to the provisions of Section 19(b)(1) of the Securities Exchange Act of 1934 (“Act”)¹ and Rule 19b-4 thereunder,² notice is hereby given that on February ____, 2022, MIAX Emerald, LLC (“MIAX Emerald” or “Exchange”) filed with the Securities and Exchange Commission (“Commission”) a proposed rule change as described in Items I, II, and III below, which Items have been prepared by the Exchange. The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

I. Self-Regulatory Organization's Statement of the Terms of Substance of the Proposed Rule Change

The Exchange proposes to amend Exchange Rule 531 to provide for the new service called the “High Precision Network Time Signal Service”.

The text of the proposed rule change is available on the Exchange’s website at <http://www.miaxoptions.com/rule-filings/emerald> at MIAX Emerald’s principal office, and at the Commission’s Public Reference Room.

II. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

In its filing with the Commission, the Exchange included statements concerning the purpose of and basis for the proposed rule change and discussed any comments it received on

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

the proposed rule change. The text of these statements may be examined at the places specified in Item IV below. The Exchange has prepared summaries, set forth in sections A, B, and C below, of the most significant aspects of such statements.

A. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

1. Purpose

This Amendment No. 1 to SR-EMERALD-2021-38 amends and replaces in its entirety the proposal as originally filed on November 19, 2021. The Exchange submits this Amendment No. 1 to clarify certain points and provide additional details, clarification, and justification regarding the proposal as well as make a non-substantive change to streamline the proposed rule text.

The Exchange provides a resilient and robust technology platform, deterministic functionality, transparent trading platform, and a culture of technological innovation to the U.S. options market. In keeping with its culture of innovation, the Exchange proposes to amend Exchange Rule 531, Reports and Market Data Products, to provide for the new service called the “High Precision Network Time Signal Service” (hereinafter referred to as “HPNTSS” or the “Service”).³ The Service is an optional product⁴ available to Members.⁵ In sum, Members would be able to utilize the proposed Service to synchronize their time recording systems to

³ The Exchange also proposes to amend the title of Exchange Rule 531 to include the phrase “and Services” so the title would read as “Reports, Market Data Products and Services.”

⁴ A Member that chooses to subscribe to the proposed Service may discontinue the Service at any time if that Member determines that it is no longer useful or that alternatives better meet their business or system needs. The Exchange intends to submit a separate filing with the Commission pursuant to Section 19(b)(1) to propose fees for the Service.

⁵ The term “Member” means an individual or organization approved to exercise the trading rights associated with a Trading Permit. Members are deemed “members” under the Exchange Act. See Exchange Rule 100.

those of the Exchange at sub-nanosecond level accuracy for correlated latency measurements between the Exchange's and the Member systems' time measurements related to the same message or order. Time synchronization services are well established in the U.S. and utilized in many areas of the U.S. economy and infrastructure. The proposed Service is not novel to the securities markets and it is similar to other network time synchronization services currently offered by at least two foreign securities exchanges.⁶ The Exchange proposes to provide the Service in response to Member demand for tighter and more accurate clock synchronization options with the Exchange's network.

The U.S. Government's Global Positioning Satellite ("GPS") clock⁷ time signal is the benchmark by which the Exchange and most, if not all, Members use to synchronize their internal primary clock devices. Using the U.S. Government provided GPS time signals publicly available through the GPS network is a de facto standard for high precision time synchronization across geographically diverse locations. Typically, a GPS antenna serves as a time signal

⁶ A similar service is currently offered by Deutsche Börse Group and Nasdaq in the Europe. See a description of Deutsche Börse Group's Time Services, available at <https://www.deutsche-boerse.com/dbg-en/products-services/ps-technology/ps-connectivity-services/ps-connectivity-services-time-services> (last visited September 29, 2021), and a description of Nasdaq Nordic PTP Services, available at <https://www.nasdaq.com/docs/nasdaq-nordic-ptp-services-fs.pdf> (last visited November 9, 2021). See also slides 28 – 39 of "Precise Timing in Financial Markets", by Deutsche Börse Group, available at [White Rabbit in Financial Markets \(stanford.edu\)](https://www.stanford.edu) (last visited October 4, 2021). See also slides 11 -13 of "Wall Street Clock", by Seven Solutions, available at [White Rabbit synchronization use cases \(atis.org\)](https://www.atis.org) (last visited October 4, 2021).

⁷ For a description of the GPS clock, see Official U.S. Government Information About the Global Positioning System (GPS) and Related Topic, available at <https://www.gps.gov/applications/timing/> (providing that "[i]n addition to longitude, latitude, and altitude, the Global Positioning System (GPS) provides a critical fourth dimension – time. Each GPS satellite contains multiple atomic clocks that contribute very precise time data to the GPS signals. GPS receivers decode these signals, effectively synchronizing each receiver to the atomic clocks. This enables users to determine the time to within 100 billionths of a second, without the cost of owning and operating atomic clocks.").

receiver and feeds a primary clock device the Coordinated Universal Time (referred to as “UTC”) using Precision Time Protocol (“PTP”).⁸

The Exchange’s primary clock currently feeds a time signal to the Exchange’s timestamping devices within the Exchange’s own network and provides sub-nanosecond level synchronization using an enhanced PTP (“Enhanced PTP”).⁹ This Enhanced PTP time signal is used to synchronize the Exchange’s capture devices with each other at a sub-nanosecond level. These capture devices are used to timestamp orders and messages as they travel through the Exchange’s System.¹⁰

Time synchronization services are well established in the U.S. and utilized in many areas of the U.S. economy and infrastructure. Today, the Exchange understands many Members attempt to sync their primary clock devices to the U.S. Government provided GPS network. By getting the GPS signal through a GPS capable antenna, Members can synchronize their primary clock device to the GPS network time to within an accuracy of approximately 30 nanoseconds. From there, by using a PTP time synchronization protocol, Members can synchronize their

⁸ A primary clock device is a precision parent clock that provides timing signals to synchronized secondary child clocks as part of a standalone clock network. The term “Coordinated Universal Time” is defined as the “international standard of time that is kept by atomic clocks around the world.” See Merriam-Webster Dictionary, available at <https://www.merriam-webster.com/dictionary/Coordinated%20Universal%20Time> (last visited November 10, 2021). Coordinated Universal Time is the primary time standard by which the world regulates clocks and time. See <https://www.timeanddate.com/time/aboututc.html> (last visited October 5, 2021). “Precision Time Protocol” is a method used to synchronize clocks through a computer network. See also “IEEE-1588 Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems” available at <https://www.nist.gov/system/files/documents/el/isd/ieee/tutorial-basic.pdf> (last visited February 1, 2022).

⁹ Enhanced PTP is commonly defined as a precision time protocol that is at a sub-nanosecond level.

¹⁰ The term “System” means the automated trading system used by the Exchange for the trading of securities. See Exchange Rule 100.

internal devices to their primary clock devices. Through this method, Members' primary clock and internal devices can be synchronized to within a few billionths of a second (nanoseconds) of one another. Some Members may also currently utilize their own Enhanced PTP with their primary clock devices that synchronize their own timestamping devices at a sub-nanosecond level. The Exchange and those Members utilize separate Enhanced PTP devices.

Because the Exchange and Members independently access time signals from the U.S. government provided GPS network and synchronize those time signals with their own primary clock devices, measurement times of market events by the Exchange and a Member may oscillate by approximately 30 or more nanoseconds.¹¹ This may, in turn, lead to incorrect latency measurements that may cause a Member's time calculations of how long it took for their order or message to leave their systems and reach the trading center to which it was sent to be off by as many as 30 nanoseconds. This may impair the Member's ability to fully understand latencies within their own systems and whether they need to adjust their systems or trading models.

Under the proposed Service, Members would be able to synchronize their own primary clock devices to the Exchange's primary clock device, by receiving time signals from the Exchange via a 1 gigabit ("Gb") connection that is currently offered by the Exchange and

¹¹ See slide 11 -13 of "Wall Street Clock", by Seven Solutions, available at [White Rabbit synchronization use cases \(atis.org\)](https://www.white-rabbit.com/white-rabbit-synchronization-use-cases) (last visited October 4, 2021). See also How Accurate is GPS for Timing, available at [GPS.gov: GPS Accuracy](https://www.gps.gov/gps-accuracy) (last visited November 11, 2021) (providing that "GPS time transfer is a common method for synchronizing clocks and networks to Coordinated Universal Time (UTC). The government distributes UTC as maintained by the U.S. Naval Observatory (USNO) via the GPS signal in space with a time transfer accuracy relative to UTC (USNO) of ≤ 30 nanoseconds (billionths of a second), 95% of the time. This performance standard assumes the use of a specialized time transfer receiver at a fixed location.").

utilized by Members and non-Members to connect to the Exchange's System.¹² The proposed Service simply provides Members with the Exchange's time signal at a sub-nanosecond level and nothing else. The sub-nanosecond time signal would tell the Member the Exchange's time at a sub-nanosecond level at a particular point in time. The subscribing Member may then use that time signal to synchronize their own primary clock to the Exchange's primary clock at the more acute sub-nanosecond level.

Some Members may currently have an Enhanced PTP clock synchronization¹³ device within their own network. This device is not provided by the Exchange. Other Members that do not currently have an Enhanced PTP clock synchronization device would need to acquire one from a third party vendor, of which there are several providers. The Member's Enhanced PTP device would then be used to synchronize the clocks within the Member's computer and network infrastructure, as appropriate, at a sub-nanosecond level. This would enable the Member to record certain times an order or message traveled through and leaves the Member's system at a sub-nanosecond level.

Members may use the proposed Service for numerous purposes. For one, the proposed Service would allow Members to more precisely measure latency between their network and that of the Exchange at a sub-nanosecond level. The proposed Service would allow them to better understand the times at which their order or message reached certain points when traveling from their network to the Exchange.

¹² The Exchange is not proposing to provide a new connectivity option to receive time signals via the proposed Service. The proposed Service is not a connectivity product and Members would only need to utilize an existing connectivity method offered by the Exchange to utilize the proposed Service. See Fee Schedule, Section 5, System Connectivity Fees, for information regarding 1 Gb connectivity.

¹³ An Enhanced PTP clock synchronization device captures time and coordinates time synchronization within a network at a sub-nanosecond level.

Members may use the proposed Service to analyze the efficiency of their network and connections when not only routing orders to the Exchange, but also when receiving messages back from the Exchange. These messages include communications regarding whether their order was accepted, rejected, or executed. Members may measure message traversal times by comparing their message's (e.g. order, quote, cancellation, etc.) timestamp to the Exchange's matching engine timestamp from the Exchange-generated acknowledgement messages (e.g. order acknowledgment, quote acknowledgment, cancellation acknowledgment, etc.).¹⁴ Members may then enhance their own systems to ensure that they are receiving such communications in a timelier manner and to verify that their systems are working as intended.

Members may then utilize these enhanced latency measurements to better analyze latencies within their own systems and use this analysis to optimize their network, models and trading patterns to potentially improve their interactions with the Exchange. In particular, Members may use these metrics to better assess the health of their network and that their systems are working as intended. For example, a Member may use this information when analyzing the efficacy of their various connections and whether a connection is performing as expected or experiencing a delay. A Member may then decide to rebalance the amount of orders and/or messages over its various connections to ensure each connection is operating with maximum efficiency.

Members may also use the proposed Service for other purposes, such as determining compliance with certain regulatory requirements¹⁵ and trade surveillance. Members may also

¹⁴ The Exchange sends Members an acknowledgement message that their order or message was received by the Exchange. This acknowledgement includes the time of receipt at a nanosecond level.

¹⁵ See, e.g., Chapter III of the Exchange's Rules, which incorporates by reference Rule 301, Interpretation and Policy .02 (Just and Equitable Principles of Trade), of the Exchange's

utilize time synchronization to assist them in evaluating compliance with certain clock synchronization requirements.¹⁶

The proposed Service would be described under proposed Exchange Rule 531(c), which would provide that:

HPNTSS is an enhanced Precision Time Protocol (“PTP”) Ethernet-based service for synchronizing device clocks to within sub-nanosecond accuracy of one another. HPNTSS enables Members to synchronize their internal devices to the same time as the Exchange devices with high precision. Tightly synchronized clocks enable the ability to correlate event timestamps from within their own systems to those within the Exchange’s network.

The Exchange does not propose to provide a new connectivity option to receive time signals via the proposed Service. The proposed Service is not a connectivity product and Members would need to utilize an existing connectivity method offered by the Exchange to utilize the proposed Service. The proposed Service simply provides enhanced time synchronization that may be utilized by a subscribing Member to adjust their own systems. The proposed Service is not a market data product or access/connectivity service and the Exchange does not propose to include additional connectivity options or modify existing connectivity options as part of this proposal. Members may continue to use their existing methods to connect to and send orders to the Exchange. The proposed Service will not include any trading data regarding the Member’s activity on the Exchange or include any data from other trading activity on the Exchange.

Changes to the Title of Exchange Rule 531

With the proposed change to add the new Service, the Exchange also proposes to amend

affiliate, Miami International Securities Exchange, LLC (“MIAX”); and Financial Industry Regulatory Authority, Inc. (“FINRA”) Rule 5320.

¹⁶ See Chapter XVII of the Exchange’s Rules, which incorporates by reference MIAX Rule 1707 (Consolidated Audit Trail Compliance Rule – Clock Synchronization Rule Violation); and FINRA Rule 6820.

the title of Exchange Rule 531, which is currently titled “Reports and Market Data Products.”

With the addition of the Service, the Exchange proposes to place a comma after the word “Reports,” delete the word “and” in the current title of Exchange Rule 531, and add the phrase “and Services” after the phrase “Market Data Products”. Accordingly, with the proposed changes, the title of Exchange Rule 531 will read as follows: “Reports, Market Data Products and Services.” The purpose of this change is to provide clarity within the Exchange’s rules.

2. Statutory Basis

The Exchange believes the proposed rule change is consistent with the Act and the rules and regulations thereunder applicable to the Exchange and, in particular, the requirements of Section 6(b) of the Act.¹⁷ Specifically, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)¹⁸ requirements that the rules of an exchange be designed to prevent fraudulent and manipulative acts and practices, to promote just and equitable principles of trade, to foster cooperation and coordination with persons engaged in regulating, clearing, settling, processing information with respect to, and facilitating transactions in securities, to remove impediments to and perfect the mechanism of a free and open market and a national market system, and, in general, to protect investors and the public interest.

Trading technology in the U.S. market is constantly evolving and providing market participants with tools to increase speed and reduced latency opportunities. Today, the Exchange provides Members timestamp information in nanoseconds. The Exchange and its Members independently access time signals from the GPS network and synchronize those time signals with their own primary clock devices. Even though the Exchange and Members access the GPS

¹⁷ 15 U.S.C. 78f(b).

¹⁸ 15 U.S.C. 78f(b)(5).

network, this independent access may result in measurement times of market events by the Exchange and a Member to oscillate by approximately 30 or more nanoseconds.¹⁹ This time oscillation may cause a Member's time calculations of how long it took for their order or message to leave their systems and reach a trading center to be off by as many as 30 nanoseconds. For example, a Members may calculate a traversal time of 100 nanoseconds between its network and a trading center. However, due to oscillation between measurement times, that traversal time could range from anywhere from 70 nanoseconds to 130 nanoseconds. In today's market, such a potential inaccuracy in a Member's latency measurements is meaningful and potentially impactful to the performance of their trading strategies.

The proposed Service addresses this issue by enabling Members to synchronize their primary clock device with the Exchange's at a sub-nanosecond level. For example, the proposed Service would allow Members to precision timestamp a quote sent from their system to the very same quote timestamped by the Exchange and have confidence that the nanosecond time delta between timestamps is attributable to latency and not due to the current potential 30 nanosecond oscillation discussed above. The Exchange, therefore, believes the proposed Service promotes just and equitable principles of trade, removes impediments to and perfects the mechanism of a free and open market because it would allow latency sensitive Members to measure latency in a manner consistent with their trading behavior and the evolving pace of trading and technology in today's markets. Sub-nanosecond synchronization removes impediments to and perfects the mechanism of a free and open market because it would provide Members with a tool to assess and re-calibrate their systems at a more acute level that is in line with the increasing speeds at which today's markets operate.

¹⁹ See supra note 11.

The proposed Service provides Members with the Exchange's time signal at a sub-nanosecond level. The time signal provided by the proposed Service could be beneficial in multiple areas, one of which is enabling Members to more precisely measure latency between their network and that of the Exchange at a sub-nanosecond level. The proposed Service would allow them to better understand the times at which their order or message reached certain points when traveling from their network to the Exchange through more acute sub-nanosecond latency measurements. The proposed Service is, therefore, consistent with Section 6(b)(5)²⁰ of the Act because sub-nanosecond latency measurement would enable latency sensitive Members to more precisely calculate and thus better understand and manage their own latency.

Members may utilize these enhanced latency measurements to better analyze latencies within their own systems and use this analysis to optimize their network, models and trading patterns to potentially improve their interactions with the Exchange. The ability to more precisely measure network efficiency could provide Members with a set of metrics that allow them to better assess the health of their network and that their systems are working as intended. The Exchange anticipates that most, if not all, subscribers to the proposed Service would be those whose trading models are latency sensitive and primarily seek to remove liquidity. These Members may increase their volume of liquidity removing orders as a result of re-calibrating their trading models based on their use of the proposed Service. The increase in incoming liquidity removing orders may result in higher execution rates for Members who are less latency sensitive and primarily place resting orders on the Exchange's Simple Order Book²¹ and/or

²⁰ 15 U.S.C. 78f(b)(5).

²¹ The "Simple Order Book" is the Exchange's regular electronic book of orders and quotes. See Exchange Rule 518(a)(15).

Strategy Book.²² The proposed Service may benefit those market participants who would receive greater fill rates, thereby facilitating transactions in securities and perfecting the mechanism of the national market system.

The Exchange believes providing this optional clock synchronization service to interested Members is, therefore, consistent with facilitating transactions in securities, removing impediments to and perfecting the mechanism of a free and open market and a national market system, and, in general, protecting investors and the public interest.

The proposed Service also protects investors and the public interest because Members may use the Service for determining compliance with certain regulatory requirements,²³ trade surveillance, and to assist them in evaluating compliance with certain clock synchronization requirements.²⁴

Additionally, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)²⁵ requirement that the rules of an exchange not be designed to permit unfair discrimination between customers, issuers, brokers, or dealers as it will be available to all Members who choose to subscribe. Use of the proposed Service would be voluntary and no Member would be required to subscribe to the proposed Service. The Exchange notes that the proposed Service would be an additional, optional tool for Members and some Members may not find it useful based on their business needs and trading activity. Members that choose not to subscribe to the proposed Service are free to utilize other time synchronization methods or services that may assist them in time synchronization of their systems at a more granular level.

²² The “Strategy Book” is the Exchange’s regular electronic book of complex orders and complex quotes. See Exchange Rule 518(a)(17).

²³ See supra note 15.

²⁴ See supra note 16.

²⁵ Id.

The proposed Service may not provide utility to all Members based on their business model, use of existing time synchronization methods, or reliance on other methods to test their system's performance to ensure it is operating as intended. For example, certain Members employ business models that are not latency sensitive, such as those that only enter resting liquidity on the Exchange's Simple Order Book or Strategy Book. In addition, the proposed Service may also not be useful for order routing firms that connect to the Exchange solely as part of their best execution obligations or to comply with the trade-through requirements under Chapter XIV of the Exchange's Rules.²⁶

Lastly, the Exchange believes the proposed changes to the title of Exchange Rule 531 promote just and equitable principles of trade and remove impediments to and perfect the mechanism of a free and open market and a national market system because the proposed rule changes will provide greater clarity to Members and the public regarding the Exchange's Rules. It is in the public interest for rules to be accurate and concise so as to eliminate the potential for confusion.

B. Self-Regulatory Organization's Statement on Burden on Competition

The Exchange does not believe that the proposed rule change will result in any burden on competition that is not necessary or appropriate in furtherance of the purposes of the Act, as amended. In this instance, the proposed rule change to offer the optional Service is in response to Member interest and requests for tools that would enable them to better measure traversal times between their network and that of the Exchange at a more granular level.

Intra-Market Competition

The Exchange does not believe the proposed Service will have an inappropriate burden

²⁶ See Chapter XIV of the Exchange's Rules, which incorporates by reference Rule 1401, Order Protection, of the Exchange's affiliate, MIAX.

on intra-market competition between Members that choose to subscribe to the Service and those Members that do not. The proposed Service would provide Members with the ability to synchronize their primary clock devices with the Exchange's primary clock device at a sub-nanosecond level, which they may then use to measure their network's efficiency to determine whether their systems are performing as expected.

The Exchange notes that the proposed Service would be an additional, optional tool for Members and some Members may not find it useful based on their business needs and trading activity. The proposed Service may not provide utility to all Members based on their business model, use of existing time synchronization methods, or reliance on other methods to test their system's performance to ensure it is operating as intended. In addition, the proposed Service may also not be useful for order routing firms that connect to the Exchange solely as part of their best execution obligations or to comply with the trade-through requirements under Chapter XIV of the Exchange's Rules.²⁷

Additionally, some Members may be able to enhance their own traversal time calculations without subscribing to the proposed Service by using other time synchronization methods or utilize some other services that may assist them in time synchronization of their systems. Members may also prefer to utilize or develop other methods that would enable them to determine whether their own primary clock device is recording time in close proximity to the primary clock devices of other market participants. Members may view these alternatives as more in line with their business needs or choose an alternative that is more compatible with their existing technology.

Inter-Market Competition

²⁷

Id.

The Exchange does not believe the proposed Service will have an inappropriate burden on inter-market competition. The proposed Service will further enhance inter-market competition between exchanges by allowing the Exchange to expand its product offerings. The proposed Service would provide subscribing Members with a tool to assist them in recalibrating their own models and trading strategies to improve their overall experience on the Exchange, thereby potentially improving execution and order fill rates. This may improve the Exchange's overall market quality through increased liquidity and improved execution opportunities for resting orders, enhancing the Exchange's overall competitive position. The proposed rule change should enhance competition by promoting further initiatives and innovation among market centers and market participants as it concerns time measurements and synchronization among trading platforms.

Lastly, if the proposed Service is unattractive to Members, Members will opt not to subscribe to it. Accordingly, the Exchange does not believe that the proposed change will impair the ability of Members or competing order execution venues to maintain their competitive standing in the financial markets.

C. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received from Members, Participants, or Others

Written comments were neither solicited nor received.

III. Date of Effectiveness of the Proposed Rule Change and Timing for Commission Action

Within 45 days of the date of publication of this notice in the Federal Register or within such longer period (i) as the Commission may designate up to 90 days of such date if it finds such longer period to be appropriate and publishes its reasons for so finding or (ii) as to which the Exchange consents, the Commission shall: (a) by order approve or disapprove such proposed

rule change, or (b) institute proceedings to determine whether the proposed rule change should be disapproved.

IV. Solicitation of Comments

Interested persons are invited to submit written data, views, and arguments concerning the foregoing, including whether the proposed rule change is consistent with the Act.

Comments may be submitted by any of the following methods:

Electronic comments:

- Use the Commission's Internet comment form (<http://www.sec.gov/rules/sro.shtml>);
- or
- Send an e-mail [to rule-comments@sec.gov](mailto:to-rule-comments@sec.gov). Please include File Number SR-EMERALD-2021-38 on the subject line.

Paper comments:

- Send paper comments in triplicate to Vanessa Countryman, Secretary, Securities and Exchange Commission, 100 F Street, NE, Washington, DC 20549-1090.

All submissions should refer to File Number SR-EMERALD-2021-38. This file number should be included on the subject line if e-mail is used. To help the Commission process and review your comments more efficiently, please use only one method. The Commission will post all comments on the Commission's Internet Web site (<http://www.sec.gov/rules/sro.shtml>).

Copies of the submission, all subsequent amendments, all written statements with respect to the proposed rule change that are filed with the Commission, and all written communications relating to the proposed rule change between the Commission and any person, other than those that may be withheld from the public in accordance with the provisions of 5 U.S.C. 552, will be available for website viewing and printing in the Commission's Public Reference Room, 100 F Street, NE, Washington, DC 20549, on official business days between the hours of 10:00 a.m.

and 3:00 p.m. Copies of the filing also will be available for inspection and copying at the principal office of the Exchange. All comments received will be posted without change; the Commission does not edit personal identifying information from submissions. You should submit only information that you wish to make available publicly.

All submissions should refer to File Number SR-EMERALD-2021-38 and should be submitted on or before [insert date 21 days from publication in the Federal Register]. For the Commission, by the Division of Trading and Markets, pursuant to delegated authority.²⁸

Vanessa Countryman
Secretary

²⁸ 17 CFR 200.30-3(a)(12).

EXHIBIT 5

New text is underlined;
Deleted text is in [brackets]

MIAX Emerald Options Exchange Rules

* * * * *

Rule 531. Reports, [and]Market Data Products and Services

(a) – (b) **No change.**

(c) **High Precision Network Time Signal Service (“HPNTSS”). HPNTSS is an enhanced Precision Time Protocol (“PTP”) Ethernet-based service for synchronizing device clocks to within sub-nanosecond accuracy of one another. HPNTSS enables Members to synchronize their internal devices to the same time as the Exchange devices with high precision. Tightly synchronized clocks enable the ability to correlate event timestamps from within their own systems to those within the Exchange’s network.**

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