

Required fields are shown with yellow backgrounds and asterisks.

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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 *)

Filing by MIAX Emerald, LLC

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

Initial * <input checked="" type="checkbox"/>	Amendment * <input 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 *).

Proposal to amend Exchange Rule 531 to introduce the new service known as the High Precision Network Time Signal Service.

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 * Last Name *

Title *

E-mail *

Telephone * 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 (Title *)

By

(Name *)

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: 2021.11.19
09:13:47 -05'00'

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SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

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

Form 19b-4 Information *

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SR-EMERALD-2021-38- 19b4 (refile)

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(refil

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 (ref

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**

The Exchange provides a resilient and robust technology platform, deterministic functionality, transparent trading platform, and a culture of technological innovation to the U.S.

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

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 systems to the Exchange’s Global Positioning Satellite (“GPS”) clock⁶ 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 available to U.S. registered broker-dealers by two U.S. exchange groups⁷ and

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 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 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.”).

⁷ ICE Data Services offers a variety of timing solutions in its colocation centers, allowing market participants to effectively timestamp their order flow by synching their primary clock devices to the primary clock devices in ICE Data Services’ network. See ICE Global Network Timing Services, available at [Timing Services | ICE \(theice.com\)](https://www.theice.com/timing-services) (last visited November 9, 2021). A similar service is also offered by Nasdaq in its colocation

a service currently offered by at least two foreign securities exchanges.⁸

GPS network time is the benchmark by which most, if not all, Members use to synchronize their internal primary clock devices. Using the 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”).⁹ Coordinated Universal Time is the primary time standard by which the world regulates clocks and time.¹⁰

Today, the Exchange understands many Members attempt to sync their primary clock devices to the GPS clock. By getting the GPS signal through a GPS capable antenna, Members

centers. See [NIST Enables Precision Time-stamping of Financial Transactions](https://www.nist.gov/news-events/news/2014/12/nist-enables-precision-time-stamping-financial-transactions), by the National Institute of Standards and Technology, U.S. Department of Commerce, available at <https://www.nist.gov/news-events/news/2014/12/nist-enables-precision-time-stamping-financial-transactions> (last visited November 9, 2021), <https://www.tradersmagazine.com/departments/technology/nasdaq-launches-ultra-high-precision-time-stamping/> (last visited November 9, 2021), and <https://www.gpsworld.com/nasdaq-offers-precision-time-service-for-trading/> (last visited November 9, 2021).

⁸ A similar service is currently offered by Deutsche Börse Group and Nasdaq. 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-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 \(stanford.edu\)](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).

⁹ 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).

¹⁰ See <https://www.timeanddate.com/time/aboututc.html> (last visited October 5, 2021).

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, the Members' internal devices can be synchronized to within a few billionths of a second (nanoseconds) of one another. This is the same method the Exchange uses today to synchronize its primary clock device to the GPS network time, i.e., the Exchange gets the GPS signal through a GPS capable antenna. By using this method, however, measurement times of market events may oscillate by approximately 30 or more nanoseconds between the Member and an exchange.¹¹ This may, in turn, lead to incorrect latency measurements that may adversely affect a Member's time calculations in determining how long it took for their order or message to leave their systems and reach the trading center to which it was sent.

As stated above, 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 simply provides time synchronization signals to align the subscribing Member's clock to the Exchange's clock at the more acute nanosecond level. This will allow Members to timestamp messages or orders within their infrastructure and leverage various Exchange clock provided timestamp information to provide more precise network telemetry information to assess the health and efficiency of their network. The proposed Service would enable Members to more accurately

¹¹ See slide 11 -13 of "Wall Street Clock", by Seven Solutions, available at [White Rabbit synchronization use cases \(atis.org\)](https://www.atissolutions.com/whitepapers/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.").

synchronize their primary clock devices and/or timestamping devices to the Exchange's primary clock devices at the more accurate, sub-nanosecond level. The Exchange's primary clock currently feeds a time signal to the Exchange's timestamping devices and provides sub-nanosecond level synchronization using an enhanced PTP ("Enhanced PTP"). This sub-nanosecond time signal is used to synchronize the Exchange's network packet/order/message capture devices. Some Members may also currently utilize Enhanced PTP with their primary clock devices that feed their own timestamping devices at a sub-nanosecond level. However, despite the Exchange and some Members utilizing separate Enhanced PTP devices, the timestamps between the Exchange and those Members may still oscillate up to 30 nanoseconds due to GPS time precision limitations. 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, at a sub-nanosecond level, reducing or eliminating the potential for those timestamps to differ. The sub-nanosecond time signal would simply tell the Member the Exchange's time at a sub-nanosecond level at a particular point in time. Members may, in turn, use this time signal to calculate the time an order or message traveled between their network and that of the Exchange at a more granular sub-nanosecond level.

The Service would operate as follows. As stated above, some Members may currently utilize Enhanced PTP with their primary clock devices that feed their own timestamping devices at a sub-nanosecond level. A Member may utilize these existing compatible clock synchronization device or install one within their network. This device is not provided by the Exchange and would need to be built by the Member or acquired from a third party. This device would be synchronized, via the HPNTSS, to the Exchange's primary clock device, and ultimately provide to them the Exchange's single view of the GPS clock time, at a sub-

nanosecond level, at a particular point in time. The Member's clock synchronization device would then be used to synchronize the clocks within the Member's computer and network infrastructure, as appropriate. This enables the Member to record certain times an order or message traveled through and leaves the Member's system at a sub-nanosecond level. The Exchange's computer and network infrastructure, synchronized via the HPNTSS device(s) records the times the order or message reached certain points within the Exchange's network/systems.

Members may use the proposed Service for numerous purposes. The proposed Service would allow Members to better understand the times at which their order or message reached certain points when traveling from their network to the Exchange allowing them to better understand the latency of their orders and messages when traveling between their network and that of the Exchange. The proposed Service will provide greater visibility into the latency between their network and the Exchange, which will allow Members to optimize their network, models, and trading patterns to potentially improve the timeliness of their interactions with the Exchange.

The Exchange believes the Service will provide Members with an opportunity to learn more about better opportunities to access liquidity and receive better execution rates. However, the utility of the proposed Service is not limited to evaluating the timeliness of Members' orders and may be used for other purposes, including, but not limited to the following use cases discussed below. 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. Therefore, Members may measure message

traversal times by comparing their message (e.g. order, quote, cancellation, etc.) timestamp to the Exchange's matching engine timestamp on acknowledgement messages (e.g. order acknowledgment, quote acknowledgment, cancellation acknowledgment, etc.). Members may also measure the time it takes for any message to be received by the Exchange's matching engine. Members may also measure the traversal times by comparing their message timestamp to the matching engine timestamp on the Exchange's proprietary market data feed messages and measure the time it takes for any message to be published to the Exchange's proprietary market data feeds by the Exchange's matching engine. Members may then use this information to further enhance their own systems to receive such communications in a timelier manner to verify that their systems are working as intended. Members may also use the Service for other purposes, such as determining compliance with certain regulatory requirements¹² and trading surveillance. Members may also utilize time synchronization to assist them in evaluating compliance with certain clock synchronization requirements.¹³

Specifically, the 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. For example, HPNTSS allows Members to precision timestamp a quote sent from their system to the very same quote timestamped by the Exchange and accurately measure the time delta between the

¹² 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 Miami International Securities Exchange, LLC ("MIAX"); and Financial Industry Regulatory Authority, Inc. ("FINRA") Rule 5320.

¹³ 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.

timestamps to less than one nanosecond.

The proposed rule text includes an example related to comparing a quote timestamps at a sub-nanosecond level. However, this example is included for illustrative purposes only and is one of many use cases in which the proposed Service may be used by Members. Additional examples of use cases are described above.

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 purpose of the proposed Service is to provide Members an additional, optional tool to aid in their synchronizing their systems with the Exchange's network to ensure more accurate clock synchronization and timestamp calculations.

As discussed above, Members may currently have their own GPS clock and synchronization devices that allow them to determine the timeliness and speed of their orders and messages. They may also currently have those GPS devices synchronized with the GPS clocks of other trading centers or other third parties that they engage with. The Exchange proposes to allow all Members to do the same here and synchronize their GPS devices with the Exchange's GPS clock. The Exchange simply proposes to provide the Service in response to Member demand for data concerning the timeliness of their incoming orders and messages that now wish to sync their own devices with the Exchange's GPS clock at a sub-nanosecond level. Again, the proposed Service is an optional product and no Member is required to subscribe to the Service to trade or participate on the Exchange.

Change to 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” in the title of Exchange Rule 531, and add the phrase “and Services” at the end.

Accordingly, with the proposed changes, the title of Exchange Rule 531 will be 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.¹⁴ Specifically, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)¹⁵ 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. This proposal is in keeping with those principles in that it promotes improved technology management and optimization by providing an optional Service to those Members interested in synchronizing their system’s GPS clocks and timestamps with those of the Exchange at a sub-nanosecond level. Additionally, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)¹⁶ 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

¹⁴ 15 U.S.C. 78f(b).

¹⁵ 15 U.S.C. 78f(b)(5).

¹⁶ Id.

Members who chose to subscribe. Members that chose not to subscribe to the proposed Service are free to utilize existing time synchronization methods described above or utilize some other services that may assist them in time synchronization of their systems at a more granular level.

Today, GPS clocks 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 30 nanoseconds.¹⁷ These precise time measurements are crucial to a variety of economic activities. Communication systems and financial networks all rely on precision timing for synchronization and operational efficiency. These benefits include precise synchronization of communications systems, financial networks, and other critical infrastructure, as well as improved network management and optimization, making traceable timestamps possible for financial transactions and billing.¹⁸ The proposed Service, therefore, perfects the mechanism of a free and open market and a national market system by providing an additional, optional tool for Members to further enhance their timestamp calculations at a sub-nanosecond level. The proposed Service is also not novel to the securities markets and it is similar to other network time services currently available to U.S. registered broker-dealers by two U.S. exchange groups and currently offered by at least two foreign securities exchanges.¹⁹

The Exchange believes the proposed Service removes impediments to and perfects the mechanism of a free and open market and a national market system by providing Members an optional tool that would enable them to better time synchronize their systems to the Exchange. The proposed Service would be beneficial in multiple areas, one of which is enabling Members

¹⁷ See supra note 11.

¹⁸ See [GPS.gov: Timing Applications](#) (last visited November 12, 2021).

¹⁹ See supra notes 7 and 8.

to better understand the latency of their incoming orders and messages. Members may also use the proposed Service to analyze the efficiency of their networks when receiving messages from the Exchange, such as whether their order or quote was accepted, rejected, or executed.

Members may also use the proposed Service to measure the time it takes for their message, such as an instruction to cancel a resting order, to be received by the Exchange's matching engine, not just at the outside wall of the Exchange's network. The proposed Service may also be used by Members to measure traversal times by comparing their message timestamp to the Exchange's matching engine timestamp, which is published on the Exchange's proprietary data feeds.

Members may then, in turn, measure the time it takes for a message or order to be published to the Exchange's proprietary data feed by the matching engine. Based on the above use cases, the proposed Service would facilitate transactions in securities by providing Members with an optional tool that enables them to further enhance their systems to send and receive such communications to the Exchange in a timelier manner and to verify that their systems are performing correctly.

The proposed Service is designed for Members that are interested in gaining insight into latency by providing those Members with an optional service to better calculate the time it took for their orders or messages to travel between their network and that of the Exchange. The Exchange believes providing this optional clock synchronization service to interested Members is 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 because it provides greater visibility into the latency of Members' orders, messages, and interactions with the Exchange. Members may use the proposed Service to optimize their models and trading patterns in an effort to yield better

execution results by better understanding the time their order left their network and was received by the Exchange. This would, in turn, benefit other market participants who may experience better executions when sending orders to Members that utilize the Service.

The proposed Service also enables Members to further enhance their own systems to send and receive communications to and from the Exchange in a timelier manner and to verify that their systems are working as intended. The proposed Service also promotes just and equitable principles of trade because Members may use the Service for determining compliance with certain regulatory requirements,²⁰ trading surveillance, and to assist them in evaluating compliance with certain clock synchronization requirements.²¹

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 use their existing methods to connect to and send orders to the Exchange. The proposed Service is simply a clock synchronization service, requested by Members, that would allow Members to better understand the time by which their orders travel from their systems to those of the Exchange. It is simply an additional, optional tool that Members may use to calculate time measurements at a sub-nanosecond level. 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.

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

²⁰ See supra note 12.

²¹ See supra note 13.

system's performance to ensure it is operating as intended. Nonetheless, the Exchange understands that some Members may view the proposed Service as critical in that it would assist them in better calculating time measurements of their orders at a sub-nanosecond level and further enhance their trading systems to perform with minimal latency as compare to other market participants that participate on the Exchange. However, the Exchange notes that use of the proposed Service will be on voluntary basis and no Member will be required to subscribe to the Service. Members may utilize existing time synchronization methods described above or utilize some other services that may assist them in time synchronization of their systems. Members may view these alternatives as more in line with their business needs or chose an alternative that is more compatible with their existing technology. As noted above, other Members may also not think the proposed Service is necessary or in line with their business need because they are not latency sensitive or have developed other methods to test and ensure that their network is operating as they intend.

Again, the Exchange notes that there is no rule or regulation that requires the Exchange to provide, or that a Member elect to subscribe to, the Service. It is entirely a business decision of each Member to subscribe to the Service. Members that do not chose to subscribe to the Service may avail themselves to other products that assist them in better calculating time measurements related to their messages or orders. The Exchange proposes to offer the Service as a convenience to Members to provide them with additional information regarding trading activity on the Exchange. A Member that chooses to subscribe to the Service may discontinue the Service at any time if that Member determines that the Service is no longer useful or that alternatives better meet their business or system needs.

In summary, the proposed Service will help to protect a free and open market by

providing an additional tool (offered on an optional basis) to the marketplace and by providing investors with greater choices. Additionally, the proposal would not permit unfair discrimination because the proposed Service will be available to all Exchange Members.

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. 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. As discussed above, other latency measurement tools are available to U.S. registered broker-dealers, alternative trading systems, and currently offered by at least two foreign securities exchanges.²² Like the proposed Service, these tools also provide market participants the ability to further enhance their systems to send and receive such communications to the Exchange in a timelier manner and to verify that their systems are performing correctly.

²² See supra notes 7 and 8.

Additionally, some Members may be able to enhance their own traversal time calculations without subscribing to the proposed Service by using existing time synchronization methods described above or utilize some other services that may assist them in time synchronization of their systems. Members may view these alternatives as more in line with their business needs or chose an alternative that is more compatible with their existing technology.

The Exchange does not believe the proposed Service will have an inappropriate burden on inter-market competition as similar services are currently available to brokers-dealers by at least two other U.S. exchange groups.²³ The proposed Service would therefore serve to enhance competition by allowing the Exchange to offer a time synchronization service that is similar to those currently available on other U.S. securities exchanges. 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

²³ See supra note 7.

action.

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

Not applicable.

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**

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

EXHIBIT 1SECURITIES AND EXCHANGE COMMISSION
(Release No. 34- ; File No. SR-EMERALD-2021-38)

November __, 2021

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 November ____, 2021, 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

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 systems to the Exchange’s Global Positioning Satellite (“GPS”) clock⁶ at sub-nanosecond level accuracy for correlated

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 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 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.”).

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 available to U.S. registered broker-dealers by two U.S. exchange groups⁷ and a service currently offered by at least two foreign securities exchanges.⁸

GPS network time is the benchmark by which most, if not all, Members use to synchronize their internal primary clock devices. Using the 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

⁷ ICE Data Services offers a variety of timing solutions in its colocation centers, allowing market participants to effectively timestamp their order flow by synching their primary clock devices to the primary clock devices in ICE Data Services' network. See ICE Global Network Timing Services, available at [Timing Services | ICE \(theice.com\)](https://www.theice.com/timing-services) (last visited November 9, 2021). A similar service is also offered by Nasdaq in its colocation centers. See [NIST Enables Precision Time-stamping of Financial Transactions](https://www.nist.gov/news-events/news/2014/12/nist-enables-precision-time-stamping-financial-transactions), by the National Institute of Standards and Technology, U.S. Department of Commerce, available at <https://www.nist.gov/news-events/news/2014/12/nist-enables-precision-time-stamping-financial-transactions> (last visited November 9, 2021), <https://www.tradersmagazine.com/departments/technology/nasdaq-launches-ultra-high-precision-time-stamping/> (last visited November 9, 2021), and <https://www.gpsworld.com/nasdaq-offers-precision-time-service-for-trading/> (last visited November 9, 2021).

⁸ A similar service is currently offered by Deutsche Börse Group and Nasdaq. 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://stanford.edu/~white) (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/synchronization-use-cases) (last visited October 4, 2021).

Precision Time Protocol (“PTP”).⁹ Coordinated Universal Time is the primary time standard by which the world regulates clocks and time.¹⁰

Today, the Exchange understands many Members attempt to sync their primary clock devices to the GPS clock. 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, the Members’ internal devices can be synchronized to within a few billionths of a second (nanoseconds) of one another. This is the same method the Exchange uses today to synchronize its primary clock device to the GPS network time, i.e., the Exchange gets the GPS signal through a GPS capable antenna. By using this method, however, measurement times of market events may oscillate by approximately 30 or more nanoseconds between the Member and an exchange.¹¹ This may, in turn, lead to incorrect latency measurements that may adversely affect a Member’s time calculations in determining how long it took for their order or message to leave their systems and reach the trading center to which it was sent.

⁹ 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).

¹⁰ See <https://www.timeanddate.com/time/aboututc.html> (last visited October 5, 2021).

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.”).

As stated above, 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 simply provides time synchronization signals to align the subscribing Member's clock to the Exchange's clock at the more acute nanosecond level. This will allow Members to timestamp messages or orders within their infrastructure and leverage various Exchange clock provided timestamp information to provide more precise network telemetry information to assess the health and efficiency of their network. The proposed Service would enable Members to more accurately synchronize their primary clock devices and/or timestamping devices to the Exchange's primary clock devices at the more accurate, sub-nanosecond level. The Exchange's primary clock currently feeds a time signal to the Exchange's timestamping devices and provides sub-nanosecond level synchronization using an enhanced PTP ("Enhanced PTP"). This sub-nanosecond time signal is used to synchronize the Exchange's network packet/order/message capture devices. Some Members may also currently utilize Enhanced PTP with their primary clock devices that feed their own timestamping devices at a sub-nanosecond level. However, despite the Exchange and some Members utilizing separate Enhanced PTP devices, the timestamps between the Exchange and those Members may still oscillate up to 30 nanoseconds due to GPS time precision limitations. 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, at a sub-nanosecond level, reducing or eliminating the potential for those timestamps to differ. The sub-nanosecond time signal would simply tell the Member the Exchange's time at a sub-nanosecond level at a particular point in time. Members may, in turn, use this time signal to calculate the time an order or message traveled between their network and that of the Exchange at a more granular sub-nanosecond level.

The Service would operate as follows. As stated above, some Members may currently

utilize Enhanced PTP with their primary clock devices that feed their own timestamping devices at a sub-nanosecond level. A Member may utilize these existing compatible clock synchronization device or install one within their network. This device is not provided by the Exchange and would need to be built by the Member or acquired from a third party. This device would be synchronized, via the HPNTSS, to the Exchange's primary clock device, and ultimately provide to them the Exchange's single view of the GPS clock time, at a sub-nanosecond level, at a particular point in time. The Member's clock synchronization device would then be used to synchronize the clocks within the Member's computer and network infrastructure, as appropriate. This enables the Member to record certain times an order or message traveled through and leaves the Member's system at a sub-nanosecond level. The Exchange's computer and network infrastructure, synchronized via the HPNTSS device(s) records the times the order or message reached certain points within the Exchange's network/systems.

Members may use the proposed Service for numerous purposes. The proposed Service would allow Members to better understand the times at which their order or message reached certain points when traveling from their network to the Exchange allowing them to better understand the latency of their orders and messages when traveling between their network and that of the Exchange. The proposed Service will provide greater visibility into the latency between their network and the Exchange, which will allow Members to optimize their network, models, and trading patterns to potentially improve the timeliness of their interactions with the Exchange.

The Exchange believes the Service will provide Members with an opportunity to learn more about better opportunities to access liquidity and receive better execution rates. However, the utility of the proposed Service is not limited to evaluating the timeliness of Members' orders

and may be used for other purposes, including, but not limited to the following use cases discussed below. 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. Therefore, Members may measure message traversal times by comparing their message (e.g. order, quote, cancellation, etc.) timestamp to the Exchange's matching engine timestamp on acknowledgement messages (e.g. order acknowledgment, quote acknowledgment, cancellation acknowledgment, etc.). Members may also measure the time it takes for any message to be received by the Exchange's matching engine. Members may also measure the traversal times by comparing their message timestamp to the matching engine timestamp on the Exchange's proprietary market data feed messages and measure the time it takes for any message to be published to the Exchange's proprietary market data feeds by the Exchange's matching engine. Members may then use this information to further enhance their own systems to receive such communications in a timelier manner to verify that their systems are working as intended. Members may also use the Service for other purposes, such as determining compliance with certain regulatory requirements¹² and trading surveillance. Members may also utilize time synchronization to assist them in evaluating compliance with certain clock synchronization requirements.¹³

Specifically, the Service would be described under proposed Exchange Rule 531(c),

¹² 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 Miami International Securities Exchange, LLC ("MIAX"); and Financial Industry Regulatory Authority, Inc. ("FINRA") Rule 5320.

¹³ 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.

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. For example, HPNTSS allows Members to precision timestamp a quote sent from their system to the very same quote timestamped by the Exchange and accurately measure the time delta between the timestamps to less than one nanosecond.

The proposed rule text includes an example related to comparing a quote timestamps at a sub-nanosecond level. However, this example is included for illustrative purposes only and is one of many use cases in which the proposed Service may be used by Members. Additional examples of use cases are described above.

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 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 accurate clock synchronization and timestamp calculations.

As discussed above, Members may currently have their own GPS clock and synchronization devices that allow them to determine the timeliness and speed of their orders and messages. They may also currently have those GPS devices synchronized with the GPS clocks of other trading centers or other third parties that they engage with. The Exchange proposes to allow all Members to do the same here and synchronize their GPS devices with the Exchange’s GPS clock. The Exchange simply proposes to provide the Service in response to Member demand for data concerning the timeliness of their incoming orders and messages that now wish to sync their own devices with the Exchange’s GPS clock at a sub-nanosecond level. Again, the proposed Service is an optional product and no Member is required to subscribe to the Service to

trade or participate on the Exchange.

Change to 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” in the title of Exchange Rule 531, and add the phrase “and Services” at the end.

Accordingly, with the proposed changes, the title of Exchange Rule 531 will be 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.¹⁴ Specifically, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)¹⁵ 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. This proposal is in keeping with those principles in that it promotes improved technology management and optimization by providing an optional Service to those Members interested in synchronizing their

¹⁴ 15 U.S.C. 78f(b).

¹⁵ 15 U.S.C. 78f(b)(5).

system's GPS clocks and timestamps with those of the Exchange at a sub-nanosecond level. Additionally, the Exchange believes the proposed rule change is consistent with the Section 6(b)(5)¹⁶ 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 chose to subscribe. Members that chose not to subscribe to the proposed Service are free to utilize existing time synchronization methods described above or utilize some other services that may assist them in time synchronization of their systems at a more granular level.

Today, GPS clocks 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 30 nanoseconds.¹⁷ These precise time measurements are crucial to a variety of economic activities. Communication systems and financial networks all rely on precision timing for synchronization and operational efficiency. These benefits include precise synchronization of communications systems, financial networks, and other critical infrastructure, as well as improved network management and optimization, making traceable timestamps possible for financial transactions and billing.¹⁸ The proposed Service, therefore, perfects the mechanism of a free and open market and a national market system by providing an additional, optional tool for Members to further enhance their timestamp calculations at a sub-nanosecond level. The proposed Service is also not novel to the securities markets and it is similar to other network time services currently available to U.S. registered broker-dealers by two U.S. exchange groups and currently offered by at least two foreign securities exchanges.¹⁹

¹⁶ Id.

¹⁷ See supra note 11.

¹⁸ See [GPS.gov: Timing Applications](https://www.gps.gov/timing-applications) (last visited November 12, 2021).

¹⁹ See supra notes 7 and 8.

The Exchange believes the proposed Service removes impediments to and perfects the mechanism of a free and open market and a national market system by providing Members an optional tool that would enable them to better time synchronize their systems to the Exchange. The proposed Service would be beneficial in multiple areas, one of which is enabling Members to better understand the latency of their incoming orders and messages. Members may also use the proposed Service to analyze the efficiency of their networks when receiving messages from the Exchange, such as whether their order or quote was accepted, rejected, or executed. Members may also use the proposed Service to measure the time it takes for their message, such as an instruction to cancel a resting order, to be received by the Exchange's matching engine, not just at the outside wall of the Exchange's network. The proposed Service may also be used by Members to measure traversal times by comparing their message timestamp to the Exchange's matching engine timestamp, which is published on the Exchange's proprietary data feeds. Members may then, in turn, measure the time it takes for a message or order to be published to the Exchange's proprietary data feed by the matching engine. Based on the above use cases, the proposed Service would facilitate transactions in securities by providing Members with an optional tool that enables them to further enhance their systems to send and receive such communications to the Exchange in a timelier manner and to verify that their systems are performing correctly.

The proposed Service is designed for Members that are interested in gaining insight into latency by providing those Members with an optional service to better calculate the time it took for their orders or messages to travel between their network and that of the Exchange. The Exchange believes providing this optional clock synchronization service to interested Members is 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 because it provides greater visibility into the latency of Members' orders, messages, and interactions with the Exchange. Members may use the proposed Service to optimize their models and trading patterns in an effort to yield better execution results by better understanding the time their order left their network and was received by the Exchange. This would, in turn, benefit other market participants who may experience better executions when sending orders to Members that utilize the Service.

The proposed Service also enables Members to further enhance their own systems to send and receive communications to and from the Exchange in a timelier manner and to verify that their systems are working as intended. The proposed Service also promotes just and equitable principles of trade because Members may use the Service for determining compliance with certain regulatory requirements,²⁰ trading surveillance, and to assist them in evaluating compliance with certain clock synchronization requirements.²¹

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 use their existing methods to connect to and send orders to the Exchange. The proposed Service is simply a clock synchronization service, requested by Members, that would allow Members to better understand the time by which their orders travel from their systems to those of the Exchange. It is simply an additional, optional tool that Members may use to calculate time measurements at a sub-nanosecond level. 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.

²⁰ See supra note 12.

²¹ See supra note 13.

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. Nonetheless, the Exchange understands that some Members may view the proposed Service as critical in that it would assist them in better calculating time measurements of their orders at a sub-nanosecond level and further enhance their trading systems to perform with minimal latency as compare to other market participants that participate on the Exchange. However, the Exchange notes that use of the proposed Service will be on voluntary basis and no Member will be required to subscribe to the Service. Members may utilize existing time synchronization methods described above or utilize some other services that may assist them in time synchronization of their systems. Members may view these alternatives as more in line with their business needs or chose an alternative that is more compatible with their existing technology. As noted above, other Members may also not think the proposed Service is necessary or in line with their business need because they are not latency sensitive or have developed other methods to test and ensure that their network is operating as they intend.

Again, the Exchange notes that there is no rule or regulation that requires the Exchange to provide, or that a Member elect to subscribe to, the Service. It is entirely a business decision of each Member to subscribe to the Service. Members that do not chose to subscribe to the Service may avail themselves to other products that assist them in better calculating time measurements related to their messages or orders. The Exchange proposes to offer the Service as a convenience to Members to provide them with additional information regarding trading activity on the Exchange. A Member that chooses to subscribe to the Service may discontinue the Service at any time if that Member determines that the Service is no longer useful or that alternatives better meet their business or system needs.

In summary, the proposed Service will help to protect a free and open market by providing an additional tool (offered on an optional basis) to the marketplace and by providing investors with greater choices. Additionally, the proposal would not permit unfair discrimination because the proposed Service will be available to all Exchange Members.

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. 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. As discussed above, other latency measurement tools are available to U.S. registered broker-dealers, alternative trading systems, and currently offered by at least two foreign securities exchanges.²² Like the proposed Service, these tools also provide market participants the ability to further enhance their systems to send and receive such communications to the

²² See supra notes 7 and 8.

Exchange in a timelier manner and to verify that their systems are performing correctly.

Additionally, some Members may be able to enhance their own traversal time calculations without subscribing to the proposed Service by using existing time synchronization methods described above or utilize some other services that may assist them in time synchronization of their systems. Members may view these alternatives as more in line with their business needs or chose an alternative that is more compatible with their existing technology.

The Exchange does not believe the proposed Service will have an inappropriate burden on inter-market competition as similar services are currently available to brokers-dealers by at least two other U.S. exchange groups.²³ The proposed Service would therefore serve to enhance competition by allowing the Exchange to offer a time synchronization service that is similar to those currently available on other U.S. securities exchanges. 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

²³ See supra note 7.

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: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.²⁴

Vanessa Countryman
Secretary

²⁴ 17 CFR 200.30-3(a)(12).

EXHIBIT 5

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

MIAX Emerald Options Exchange Rules

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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. For example, HPNTSS allows Members to precision timestamp a quote sent from their system to the very same quote timestamped by the Exchange and accurately measure the time delta between the timestamps to less than one nanosecond.

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