



November 23, 2015

Mr. Brent J. Fields
Secretary
U.S. Securities and Exchange Commission
450 Fifth Street, N.W.
Washington, D.C. 20549

Re: Investors' Exchange LLC Form 1 Application (Release No. 34-75925; File No. 10-222)

Dear Mr. Fields:

Investors' Exchange LLC ("IEX" or the "Exchange") is pleased to respond to additional comments to the IEX application for registration as a national securities exchange (the "Application") submitted by two exchange operators: NYSE Group ("NYSE")¹ and Nasdaq, Inc. ("Nasdaq").² IEX previously responded to comments that were received before the comment deadline of November 6, 2015.³ We believe that many of the comments made by NYSE and Nasdaq are addressed in full or in part in IEX's first response letter ("First Response Letter"), and in each such case we reference the portion of that letter addressing the point raised. In addition, we have provided several appendices attached hereto, with reference information that we have compiled covering various aspects of the current U.S. equity trading landscape in order to provide further context on relative latencies that participants experience as a result of geographical distance or other factors, as well as summaries relevant to assessing the impact of exchange practices in contributing to overall market complexity.

Overview

Before responding to the particulars of the NYSE and Nasdaq comment letters, we believe it would be helpful to provide some context to understand why IEX is seeking to become a national securities exchange.

The following laws and regulations are most relevant to approving a national securities exchange:

- Section 6 of the Securities Exchange Act of 1934 ("Exchange Act") identifies the particular findings required with regard to the rules of the exchange and empowers the Commission to prescribe other rules for exchange registration "as necessary or appropriate in the public interest or for the protection of investors."

¹ See Letter to Brent J. Fields, Secretary, SEC, from Elizabeth K. King, General Counsel & Secretary, NYSE Group (November 12, 2015).

² See Letter to Brent J. Fields, Secretary, SEC, from Joan C. Conley, Senior Vice President and Corporate Secretary, Nasdaq, Inc. (November 10, 2015).

³ See Letter to Brent J. Fields, Secretary, SEC, from Sophia Lee, General Counsel, IEX (November 13, 2015).



- In Section 11A of the Exchange Act, Congress authorized the Commission to adopt rules to facilitate the establishment of a national market system to promote the public interest, the protection of investors, and the maintenance of fair and orderly markets.
- The Commission adopted Regulation NMS to strengthen the link between exchanges and other market centers for equity securities and in furtherance of the other goals of the national market system.

IEX believes that, within the context of this existing legal and regulatory structure, the dominant exchanges have adopted a set of practices that unduly focus on the speed of quoting and trading, and unduly rely on ever-increasing fees for both access and market data that their members are effectively required to pay in order to trade for themselves and to seek best execution of their customers' orders.

Within this same structure, IEX has chosen to adopt a model which is different in certain important respects, and which we believe is better designed, to protect investors and to ensure that they can receive the best prices available. These two core principles are at the heart of every decision that we have made in constructing our market and are also the driving force behind certain innovations we have created — the same innovations that the major incumbent exchanges are seeking to challenge or eliminate.

The main point of controversy raised by several commenters on IEX's Application involves our so-called "speed bump," which we refer to as the "POP" (for point-of-presence). The POP consists of coiled fiber equivalent to a prescribed physical distance of 61,265 meters (~38.07 miles) combined with the physical distance from IEX's point-of-presence in Secaucus to IEX's trading system in Weehawken, which results in a consistent latency for all participants of 350 microseconds to enter or exit IEX's trading system.

The POP provides 350 microseconds of latency to each inbound order to ensure that no market participants can trade on IEX in reaction to changes in market prices before IEX is aware of the same price changes, for the benefit of both IEX members and their customers.

The POP also provides 350 microseconds of latency to each message sent back to our members and market data customers (but not reports to the public consolidated tape) in order to ensure that an execution on IEX does not create information leakage or market impact while IEX members are attempting to obtain executions on other markets for themselves or their customers.

Why introduce latency and why is it currently 350 microseconds?

It is very important to understand that the POP is a response to disparities related to speed and technological capabilities that currently exist in the national market system. It is just one response to specific inefficiencies existing at this time. The POP is designed to be no longer than is necessary to address those specific inefficiencies and at the same time to operate well within the range of latency differences that presently exist within the national market system.

Accordingly, the POP may not be necessary or could be materially shortened if certain conditions were to change, for example if:

- Exchanges did not sell co-location services.
- Exchanges did not sell high-speed proprietary data feeds with speed advantages over public consolidated data.
- Exchanges did not sell low-latency technology used to access their markets.



- Exchanges did not sell other low-latency enhancements that drive the emphasis on speed in reaching exchanges.
- Exchanges were all located in the same facility.

IEX does not take the position that these existing practices should be prohibited. The relevant laws and regulations provide reasonable flexibility for exchanges to adopt practices that they determine are appropriate to meet the needs of their members. At the same time, we strongly believe that the existing standards governing exchanges also provide flexibility for an exchange to adopt a business model that is not premised on the sale of high-speed access, technology, and data and that instead seeks to provide, to the extent reasonably possible, a level playing field for all participants who use that exchange. We also submit that the public interest in and desire for the introduction of an alternative way of doing business as an exchange is amply demonstrated by the support we have received from institutional and retail investors, broker-dealers, electronic market makers, academics, and industry experts, many of whom have submitted comment letters in support of our Application.⁴

We believe that approval of IEX's Application is consistent with the standards previously applied in approving new exchanges, as well as the Commission's longstanding policy of supporting vigorous competition among exchanges and other market venues. This policy allows the free market to innovate and adapt in ways that can help to address market problems.

So, as we stated in our previous response letter, we believe that the question comes down to this: **Is there room in the national market system for an exchange to adopt any means, however narrowly drawn, to counteract the more pernicious aspects of speed-based trading?**

We strongly believe the answer is yes.

We now turn to the particular comments contained in the NYSE and Nasdaq letters.

Comments Concerning the POP

IEX's Quotations as "Automated Quotations"

Both NYSE and Nasdaq allege that IEX quotations will not constitute "automated quotations" under Regulation NMS and therefore would not constitute "protected quotations" under Rule 611 of the regulation. Both letters reference the same passage in the Commission release adopting Regulation NMS ("Adopting Release"), describing the term "immediate" as used in Rule 600(b)(3) as meaning that

⁴ See Letter to Brent J. Fields, Secretary, SEC, from Timothy D. Armour, Chairman, The Capital Group Companies (September 29, 2015); Letter to Brent J. Fields, Secretary, SEC from O. Mason Hawkins, CFA, Chairman and CEO et. al, Southeastern Asset Management, Inc., joined by Adelante Capital Management, Ariel Investments LLC, Becker Capital Management, Inc., The Boston Company Asset Management LLC, Brandes Investment Partners, Franklin Templeton Investments, Glenmede Investment Management, Greenlight Capital, Inc., Oaktree Capital Management, Pershing Square Capital Management, L.P., Sands Capital Management, Seawolf Capital LLC, SouthernSun Asset Management, and Teacher Retirement System of Texas (September 30, 2015); Letter to Brent J. Fields, Secretary, SEC, from Jeffrey M. Solomon, President, et. al, Cowen Group, Inc. (November 2, 2015); Letter to Brent J. Fields, Secretary, SEC, from Sal Arnuk and Joe Saluzzi, Themis Trading LLC (November 3, 2015); Letter to Brent J. Fields, Secretary, SEC, from Krishna Memani, Executive Vice President & Chief Investment Officer, et. al, OppenheimerFunds, Inc. (November 5, 2015); Letter to Brent J. Fields, Secretary, SEC, from Douglas A. Cifu, Chief Executive Officer, Virtu Financial (November 6, 2015).



“a trading center’s systems should provide the fastest response possible without any programmed delay.”

This issue was fully addressed in the First Response Letter.⁵ To summarize those points:

- The POP is a form of physical distance, similar to that imposed by all exchanges in establishing a point-of-presence.
- This design is not dissimilar to the coiled cable provided by the NYSE, Nasdaq, and BATS families of exchanges in their respective data centers. Those exchanges, however, coil cable within their data centers specifically to create equivalent distance for participants who have paid for the privilege of co-location, whereas IEX coils a longer length of cable in an attempt to create fairness for *all* participants.
- The only time standard established by Regulation NMS is one second (over 2,800 times greater than the duration of the POP), in the context of defining exemptions to Rule 611, the order protection rule.
- The operation of the POP in practice furthers the Commission’s stated objective in the requirements for automated quotations, i.e., that the public in general have “fair and efficient access” to the quotations. The POP also is consistent with the overarching stated goals of the regulation of balancing competition among markets and competition among individual orders.
- The POP provides an important choice for many market participants who cannot afford, or have no need, to pay for low-latency connectivity, technology, and market data sold directly by exchanges for millions of dollars per year.⁶

Further, as detailed below, data provided by IEX subscribers indicates that their average latency when routing orders to IEX and receiving reports back is comparable to that for other exchanges and in fact often less than the time required to receive reports from NYSE.

Moreover, the specific language cited by NYSE and Nasdaq against the POP does not support their position. The POP clearly is not a “programmed delay” any more than the coiled cables connecting to every other exchange’s matching systems could be considered as such.

Taken to the extreme, NYSE and Nasdaq’s interpretation of the language would suggest in effect that every exchange must allow any user to trade as quickly as the user’s technology and the laws of physics will allow, and that any decision to set a point-of-presence at *any* distance from an exchange’s matching systems and using anything less than the most sophisticated low-latency technology would be prohibited. Clearly, that would be an absurd result.

In sum, NYSE and Nasdaq, as support for their position, cite not to the regulation itself nor statements by the Commission as to the purpose they were attempting to achieve, because those sources give them no support. Instead the incumbent exchanges are clinging to one passage in a 500 page release that is both inapposite and out of context. In fact, the POP helps to *promote* access to quotations by limiting the chance that a party displaying a quote on an exchange will use a signal from an execution on IEX to cancel its quote on that other market within microseconds. NYSE and Nasdaq’s position would elevate a

⁵ See supra note 3, “Regulation NMS and Protected Quote Status – IEX Quotes Qualify as ‘Automated Quotations’ Under Regulation NMS,” at pp. 5-7.

⁶ See Appendix A.



mindless speed-based philosophy over any other consideration and would in practice serve as an anti-competitive barrier to any new exchange entrant that refused to embrace it.

Comparison to PSX Proposal

Nasdaq in its letter appears to imply that the POP is similar to a proposal filed in 2012 by Nasdaq OMX PSX (“PSX”), which according to Nasdaq was subsequently withdrawn in anticipation of being rejected by the Commission. The proposal would have instituted a 5 millisecond delay for inbound liquidity taking orders while no such delay would be applied to liquidity adding orders. PSX’s proposal was rightfully withdrawn because its “speed bump” was applied only to a subset of orders and actually may have harmed the accessibility of its quotations. The material differences between IEX and what PSX proposed are addressed in the First Response Letter. See “Regulation NMS and Protected Quote Status – The POP is Different from Other ‘Speed Bump’ Proposals.”

Equalizing Latency Among Customers in the Data Center

Nasdaq notes that IEX does not equalize latency among customers located in the same data center where the POP is located and suggests that a third-party data center provider located at or near the POP could sell preferential proximity to the POP “to the highest bidder,” which it suggests could diminish benefits associated with the POP.

While we do not believe this comment is relevant to the approval of the Application, we note that the purpose of the POP is different from the purpose of “delay coils”⁷ used by other exchanges to equalize latency among a subset of their customers (generally, those purchasing co-location services in the same data center as the exchange’s matching systems). The POP is designed to guard against the impact of latency arbitrage strategies, and we do not believe there is material value in purchasing “preferential access” to a box with 38 miles of coiled cable, especially compared to the preferential access that the incumbent exchanges provide. Further, the cost and method of access to IEX’s system is the same across all members, and IEX has deliberately chosen to differentiate itself from NYSE and Nasdaq by *not* selling preferential access to the highest bidder. We also note that in a recent filing seeking approval for the use of wireless communication technology on the roof of the Nasdaq data center, in response to concerns that the proposal would have anticompetitive effects, Nasdaq took precisely the opposite position: namely, that a wireless network could be established on a building across the street from the data center providing “the same or similar data, at the same or similar speed, at the same or similar cost.”⁸ Presumably, using this standard, connectivity within the same building would qualify as “the same or similar speed,” and of course in the case of IEX there will be no difference in terms of cost.

In terms of equitable costs, we note that Nasdaq offers a variety of “connectivity types” to its co-located customers who have already paid for the privilege of co-locating. Nasdaq offers 1G, 1G Ultra, 10G, 10G Ultra, and 40G cross-connects, with prices ranging from \$30,000 to \$240,000 per year.⁹ In order to induce members to pay for even faster access, each incremental step up (from 1G to 40G) results in a

⁷ See <http://files.shareholder.com/downloads/NDAQ/758668008x0x740452/7918EF32-2541-4F6F-9144-EDC02228351B/NDAQ.20140327.pdf>, p. 4.

⁸ See Exchange Act Release No. 68735 (January 25, 2013).

⁹ See <https://www.nasdaqtrader.com/content/Productsservices/trading/CoLo/LowLatencyFS.pdf>.



“latency improvement” between 5 and 24 microseconds.¹⁰ Of particular note, the total latency improvement for a member who purchases the highest tier of Nasdaq latency products is several hundred microseconds when compared with a baseline configuration.¹¹ In other words, the “delay coil” that Nasdaq offers creates an equal playing field only for co-located customers that are also willing to buy the fastest cross-connect and other top-tier latency services that Nasdaq offers. A summary of the array of exchange latency products presently offered can be found in Appendix A.

Finally, no market can practically ensure that all participants have the exact same information at exactly the same point in time. However, IEX believes that we can achieve “equitable” conditions for the greatest number of participants by ensuring that IEX has the most up to date market information when pricing trades between two participants and that no participant can act on market information before IEX receives it.

Claim that POP Will Create an Unfair Advantage for Orders on IEX

NYSE claims that, although the POP allows IEX to always keep its view of the national best bid and offer (“NBBO”) up-to-date, it prevents other exchanges from obtaining an up-to-date view of the NBBO because of the delay in IEX’s quote.

We believe this comment was fully addressed in the First Response Letter. See “Specific Comments About the POP – The POP will not Negatively Impact the Determination of the NBBO or the Ability of Participants to React to Changing Prices.” In summary, as reflected in our prior response:

- Quote dissemination is never instantaneous. Updates to the NBBO must obey the laws of physics and do not propagate instantaneously. Any calculation of the NBBO, whether observed by a market center, broker-dealer, or other market participant, depends on the observer collecting and aggregating quote updates generated by sources in different geographical locations, and thus the updates will inevitably be “delayed” to various degrees when the receipt of each is compared to the event that caused it. The “delay” NYSE asserts will exist is a natural consequence of interconnecting a geographically diverse marketplace. The effect of the POP in this context is precisely comparable to the effect, for example, of the choice of the NYSE to locate in Mahwah or the Chicago Stock Exchange in Chicago.
- IEX will publish quote updates directly to the SIPs without traversing the POP. We note that NYSE updates its own view of the NBBO and the protected best bid or offer through SIP data,¹² and as such, its view of IEX’s quotes will be as current as its view of those of any other exchange.

To supplement our First Response Letter and to provide further data relevant to the relative impact of the POP compared to other geographic latencies that currently exist throughout the national market system, IEX asked a subset of our broker-dealer subscribers to voluntarily provide data on their round trip latency experience when routing to an exchange (or IEX) and back. The average results across brokers are summarized in the chart below and individual broker numbers are provided in Appendix B.¹³

¹⁰ Supra note 8.

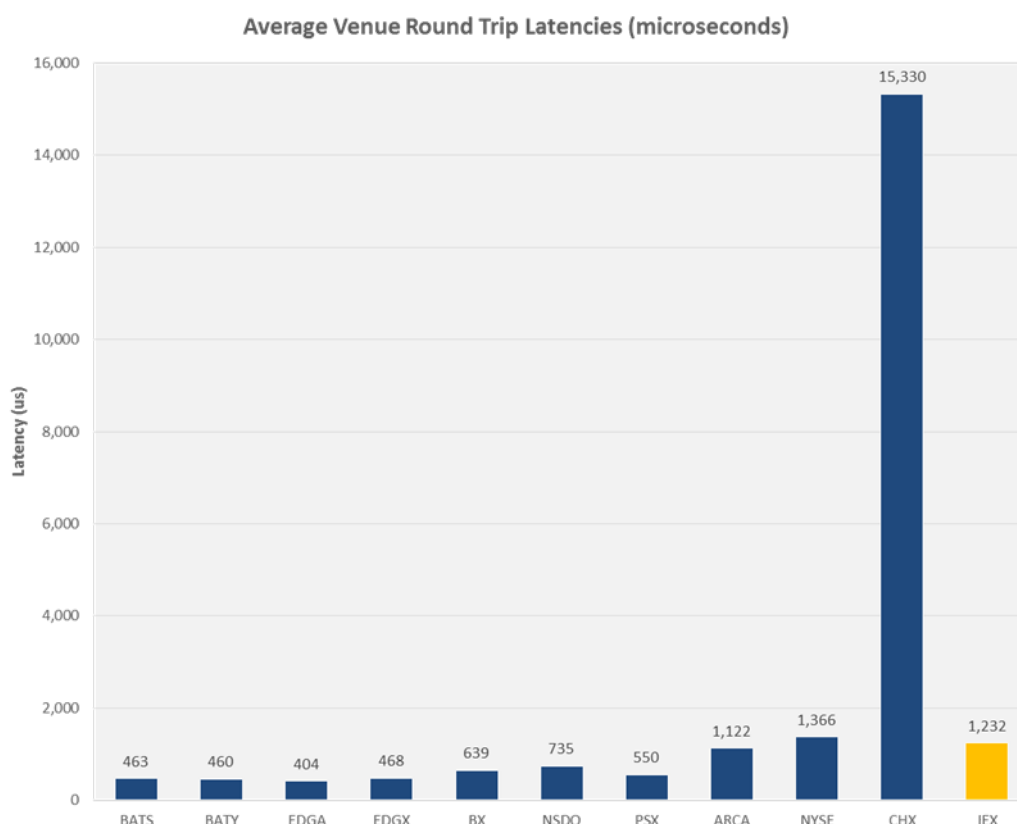
¹¹ See Appendix A.

¹² See NYSE Rule 19, Supplementary Material .01.

¹³ See Appendix B. Data averaged from four IEX ATS subscribers, that have independently verified their identity to the Commission, but have chosen to not be disclosed in this public response letter, to their competitors.



For confidentiality reasons, broker identities were provided only to the Commission staff to enable independent verification of the data. These four brokers are representative of the typical agency broker subscriber of the IEX ATS that has its own electronic trading platform.



The third-party broker data clearly shows that the IEX round-trip latency, including the POP, is an order of magnitude less than that of the Chicago Stock Exchange, and it is on average less than the round-trip latency of NYSE as well. In the case of the latter, these results stem from the combination of NYSE’s inherent system latencies and its decision to locate its data center in Mahwah, New Jersey, which is relatively distant from typically more centrally-located broker routers and exchange matching engines. This data clearly demonstrates the relative nature of latencies (based on each participant’s distance from each exchange) and that the overall IEX latency is well within the range of latencies that presently exist in the national market system.

Comments Related to Order Types and Order Book Features

Complexity

The NYSE letter suggests that the number and complexity of certain order types offered by IEX conflicts with its statement that it is a “simple, fair, and transparent market.”

While we believe the comment is not relevant to the question of whether to approve our Application, a response is warranted because the comment is at best disingenuous, and its insinuation that IEX is proposing a relatively more complicated market as a factual matter is categorically wrong.



IEX provides the same basic order types that are offered by all markets, along with the standard modifiers that are sought by investors and their brokers. What IEX does *not* offer are any of the dizzying array of specialized order types that are designed to cater exclusively to a subset of high-speed trading firms – for example, various “post only” order types – that are designed to work in tandem with “maker-taker” pricing and the payment of rebates. NYSE’s “DAY ISO ALO” (characterized by one HFT expert as giving “the ability for a trader to get ahead of investor orders using fast price feeds and regulatory exemptions while receiving a rebate”),¹⁴ NYSE Arca’s “Post No Preference Blind,”¹⁵ and Nasdaq’s “Midpoint Peg Post-Only”¹⁶ order types are just three examples. IEX did not for a moment consider including order types with those features because we believe that they breed conflicts of interest and detract from the ability of investors to receive favorable executions, particularly, for example, when rules for such order types specify that they “will execute upon entry only in circumstances where economically beneficial to the party entering the Order.”¹⁷

Where IEX has chosen to innovate, it has done so deliberately for the purpose of providing some measure of protection to *investors*. The Discretionary Peg order type, which NYSE maligns as exceedingly complicated, for example, is designed to protect orders pegged to the NBBO from being “picked off” (i.e., executed) at disadvantageous prices in very small time increments just before adverse changes in the NBBO. This phenomenon and the usefulness of this particular order type to address it are well understood by IEX market participants and their investor clients. Presently, over 50 IEX subscribers, many of them agency brokers, understand and utilize this functionality. We believe that NYSE’s professed concern about IEX’s “complex” order types is ironic; the Discretionary Peg order type, like the POP, represents a specific design and response by our market to address the market complexity NYSE and other exchanges have *created* by introducing multiple markets, order types, and technology products that cater to high speed trading strategies.

To that point, in assessing the overall complexity that exchanges add to market structure, it is important to consider not just order types, but also the byzantine menu of proprietary networking and connectivity options of varying latency and capacity (including but not limited to 1GB, 1GB Ultra, 10GB, 10GB Ultra, 10GB LX, 40GB, microwave, fiber optic, unicast, multicast, FPGA, ASCII, binary, dedicated servers),¹⁸ and the mounting variety of market data products offered by the existing exchanges including those operated by NYSE and Nasdaq. These products are marketed, based on their latency reducing performance, as a preferred and even necessary alternative to slower products and they are sold at premiums 5-10 times the cost of slower products. Additionally, this complexity is exacerbated by the multi-tier system of basic trading fees perpetuated by the incumbent exchanges. Among the NYSE

¹⁴ See <http://www.bloomberg.com/news/articles/2014-08-06/nyse-order-revamp-seen-worsening-conflicts-that-sprecher-decried>, Haim Bodek quote.

¹⁵ See NYSE Arca Rule 7.31, http://nysearcarules.nyse.com/pcx/pcxe/pcxe-rules/chp_1_1/chp_1_1_8/chp_1_1_8_3/chp_1_1_8_3_3/default.asp.

¹⁶ See https://www.nasdaqtrader.com/content/productsservices/trading/MPPO_factsheet.pdf.

¹⁷ See Nasdaq Rule 4702(b)(5)(A).

¹⁸ See Appendix A.



group of exchanges, for example, there exist dozens of pricing categories across their three markets.¹⁹ In contrast, IEX will operate a single market and will charge all members a simple flat fee based on the type of execution (e.g., non-displayed, displayed, routed, etc.).

Finally, we note that the incumbent exchanges presently offer a multitude of order types,²⁰ order parameters, fee structures, and access technology. See Appendix A for additional materials on incumbent exchange technology product offerings.

Pegged Orders

NYSE makes three claims with respect to IEX's use and treatment of "pegged" order types, all of which are unfounded and on closer analysis raise serious questions with respect to NYSE's own treatment of pegged orders from an investor protection standpoint.

First, NYSE claims that *"IEX's POP functionality creates an unfair advantage for orders on IEX's book and harms investors with orders on other markets"* on the ground that NYSE will need to wait for 350 microseconds to receive notice of an IEX quote update in cases where the IEX quote change would affect the NBBO.

As described elsewhere in this response, the POP does not make IEX less accessible, and does not cause its quotes to be less "current" than those of other exchanges. As amply demonstrated elsewhere in this response and the appendices, depending on the location of the recipient of the data, IEX quote information may be updated more quickly than that of other exchanges and any difference in this respect is not material.

NYSE provides the following example to highlight IEX's alleged "harm to investors":

The PBBO is .10 x .20 and NYSE has a midpoint peg order to buy with a limit price of .15. If the PBBO changes to .10 x .15 because of a quote change on IEX, the NYSE will not receive the IEX quote change until it passes through the 350 microsecond "communication buffer" of the POP. The midpoint peg order to buy resting on the NYSE's book would remain (mis)priced at .15 because of this intentional delay.

In simple terms, NYSE's example illustrates a very important race between NYSE (to peg its customer's order to the latest price) and a high-speed trader (who can react to new pricing information in less than 350 microseconds to the detriment of NYSE's pegged investor order).

To follow the sequence of events based on the NYSE example:

1. IEX publishes a quote change, reflecting the new .15 offer. This quote change passes through the POP (350 microseconds) for members who receive the IEX proprietary data feed.

¹⁹ See, e.g., https://www.nyse.com/publicdocs/nyse/markets/nyse/NYSE_Price_List.pdf; https://www.nyse.com/publicdocs/nyse/markets/nyse-arca/NYSE_Arca_Marketplace_Fees.pdf; https://www.nyse.com/publicdocs/nyse/markets/nyse-mkt/NYSE_MKT_Equities_Price_List.pdf.

²⁰ See, e.g., NYSE Rule 13; NYSE Arca Equities Rule 7.31 and 7.31P; BATS Rule 11.9; and Nasdaq Rules 4702 and 4703.



2. NYSE and the high-speed trader **both have to wait 350-microseconds** to receive the quote update from IEX, since all participants are treated equally.
3. Once the quote update is received, NYSE and the high-speed trader are in a race back to NYSE. NYSE is attempting to protect its customer's buy order by pegging to the correct price (.125). The high-speed trader is looking to sell to the investor at the stale price of .15.
4. Depending on who reaches NYSE's matching engine first, NYSE's investor buy order is pegged to the correct price or it will trade at the stale price.

Most important to the hypothetical scenario that NYSE poses is that actual "mispricing" of pegged hidden orders already occurs on NYSE as a result of the fact that, in contrast to many other exchanges and IEX, **NYSE relies on SIP data to update its own view of current market prices and re-price its pegged orders.** In the current market structure, because of significant differences between the speeds with which SIP and proprietary data are aggregated and sent to market participants,²¹ a market that relies on SIP data to update its view of current prices exposes any orders entrusted to it to inferior execution. By operating in this way, NYSE enables market participants that purchase its high priced high-speed proprietary data and access products to systematically disadvantage pegged and other orders resting on its order book.

This point is corroborated by a 2014 academic paper titled "How Slow is the NBBO? A Comparison with Direct Exchange Feeds":

The amount of time it takes for information to be routed between market centers and the SIP determines latency in an absolute sense, but latency perceived by market participants depends on their perspective; that is, from which data center latency is measured. Measuring latency is challenging because it depends on location. Thus, our exact latency numbers depend on our precise measurement approach and the location of our server. Averaged across all exchanges latency is about 1.5 milliseconds (1500 microseconds).²²

As NYSE of course well knows (because it profits from these practices), some market participants pay large premiums to gain access to proprietary data as quickly as possible from all of the exchanges and locate as closely as possible to exchange systems in order to profit by trading against anyone relying on slower data. These participants will always be able to trade to the disadvantage of orders resting on an exchange that allows its own view of market prices to be less current than those of its fastest participants. That is *precisely* why IEX employs the POP and updates its own understanding of market prices with the use of proprietary data feeds.

Further, even if NYSE discontinued relying on the SIP and instead subscribed to the fastest proprietary feeds, it would still most likely lose the race to update its view of current prices to participants with the ability to do so more quickly. NYSE reaps significant revenue by empowering its fastest participants in ways that further widen the information gap. Just earlier this month, on November 5, 2015, NYSE filed with the Commission a rule change to offer "a wireless connection to allow users to receive market data

²¹ See Exchange Act Release No. 34-67857 (September 14, 2012) ("NYSE Proceeding").

²² See <http://faculty.haas.berkeley.edu/hender/nbbo.pdf>, pp. 319-320.



feeds from third party markets.”²³ In simple terms, NYSE is proposing to place a millimeter wave dish on the roof of its data center to maximize the advantage that its fastest participants already have when trading against investor orders that are placed either on the NYSE itself or on other markets. Ironically, the NYSE rule filing states that, “The Exchange believes that this removes impediments to, and perfects the mechanisms of, a free and open market and a national market system and, ***in general, protects investors and the public interest*** because it would provide Users with choices with respect to the form and optimal latency of the connectivity they use to receive Third Party Data.”²⁴ **(emphasis added)**

The negative impact to investors from this “race to zero” between exchanges and their members is precisely why IEX created a means of equal access, namely the POP, for all its members. It seems to us that the primary reason not to do so is economic, as NYSE’s co-located members would not be willing to pay nearly as much for access if their orders were required to traverse 38 miles of coiled cable.

Finally, as a tangible extension of NYSE’s hypothetical pegged order scenario taking into account the existing market structure, we consider the scenario where a quote change on Nasdaq results in an NBBO change in a NYSE-listed security. By our analysis, this scenario represents about 17% of all NBBO changes in NYSE-listed securities.²⁵ Were NYSE to consume Nasdaq quote updates using a competitive fiber optics network provider’s “ultra low-latency” connectivity, it would take 343 microseconds²⁶ for the Nasdaq quote update to travel the 42.8 miles between Carteret and Mahwah before it could be processed by NYSE’s system. However, as discussed above, NYSE in fact consumes Nasdaq quote updates (and those of all other exchanges) through the SIPs so it takes NYSE much longer to update its view of the NBBO raising the significant risk that pegged orders on NYSE will be mispriced.²⁷ NYSE’s claim that “IEX is proposing a structure premised on impairing the quality of investors’ executions on competing venues” is irresponsible. In reality, by selling co-location, direct market data feeds, wireless networks, and other technology and data to high-speed traders, NYSE has built an architecture that enables latency arbitrage, and thus “impairs the quality of investors’ executions” on both competing venues and its own .

In sum, NYSE’s claim that IEX is creating an unfair advantage to orders on its own market is truly a “through the looking glass” distortion of reality. IEX believes that all markets, and *particularly* national securities exchanges, should be in the business of actively trying to protect orders that are entrusted to them. Actions taken by IEX to protect its participants’ orders do not give orders on IEX an unfair advantage. They serve instead to *protect against* what we believe is an unfair advantage created by the incumbent exchanges for the benefit of their fastest participants (and the exchanges’ revenue stream). As we said in our previous letter, market integrity is not a zero-sum game.

NYSE also claims that IEX provides an advantage to its non-displayed pegged orders over displayed orders because pegged orders are repriced based on direct feeds, which would not be required to go through the POP. Again, the fact that IEX seeks to provide options for a group of investors using one

²³ See Exchange Act Release No. 34-76374 (November 5, 2015).

²⁴ See *id.*

²⁵ IEX Data, July 2015 to October 2015.

²⁶ See http://hudsonfiber.com/wp-content/uploads/HFN_CaseStudies_Driving_New_Standards-06232015.pdf.

²⁷ See Supplementary Material in NYSE Rule 19. Locking or Crossing Protected Quotations in NMS Stocks



type of order does not mean that it is disadvantaging another. NYSE similarly incorrectly assumes that IEX's "Order Execution Recheck" functionality would unfairly favor pegged orders relative to others, when in reality all resting non-displayed orders on IEX, pegged or not, participate in this functionality.

Finally, NYSE's complaint that all pegged orders are "undisplayed" (i.e., non-displayed) does not seem relevant to any material issue. Midpoint Peg orders are typically non-displayed because they are ranked at the midpoint, and the prohibition against subpenny pricing precludes displaying orders at those prices.²⁸ While we do not object to the pegging of displayed orders as a general matter, we consider our position a reasonable judgement call given our market design. NYSE's argument that this feature somehow degrades the price discovery process makes no sense; pegged orders, whether displayed or not, do not participate in price discovery, but follow it.

Comparison to Displayed Orders

NYSE claims that "[m]arket participants are unlikely to be willing to send orders for display on IEX when such orders would have none of the advantages of the dark, pegged orders on IEX. Accordingly, NYSE believes that it is likely that IEX's order book would be composed primarily, or entirely, of these dark, pegged orders and would not be performing one of the central functions of a registered exchange, which is to foster the price discovery process through display of orders."

This comment, again, does not appear relevant to approval of the Application, but we are responding nonetheless to address inaccuracies.

First, as NYSE should know, even as an alternative trading system ("ATS"), IEX has voluntarily chosen to accept and display lit orders.²⁹ Even though most ATSS have very limited ability to attract displayed orders, because of their "unprotected" status under Regulation NMS, in October of this year: (i) approximately 24% of IEX displayed quotes were at the NBBO; (ii) IEX had displayed quotes in 4,721 unique symbols; and (iii) 8.76% of IEX matched volume resulted from displayed quotes.³⁰ As an exchange with protected quotes, the amount and proportion of displayed volume can be expected to increase substantially, and given that we use the same order types that are proposed in our rule book, the suggestion that all of IEX's volume would derive from non-displayed orders is nonsensical.

Second, as noted in the First Response Letter, participants will have a powerful incentive to post displayed quotes because they will have priority over all non-displayed orders at the same price, and IEX plans to discount pricing to both parties who provide and access displayed orders relative to non-displayed orders.³¹

Of course, NYSE and other exchanges accept and aggressively seek to attract non-displayed orders as well³²; they simply have not been very successful at doing so. Non-displayed orders are often important

²⁸ See *supra* note 23, at 209

²⁹ See IEX Trading Alert #2015 – 005, <http://www.iextrading.com/trading/alerts/2015/005>; IEX Stats, <http://www.iextrading.com/stats>.

³⁰ IEX Data for October 2015.

³¹ Subject to Commission filing.

³² See <http://online.wsj.com/public/resources/documents/CSReponsetoNYSE04172015.pdf>, page 3; see <https://www.nyse.com/publicdocs/nyse/markets/nyse/NYSE-Order-Type-Usage.pdf>, "Non-Displayed Limit"



to institutional investors to achieve their objectives, and IEX's model is designed to combine the best of both displayed and non-displayed venues, and in so doing, bring the benefits of exchange oversight and regulation to more of the trading that currently happens off-exchange.

Discretionary Peg Order Type

NYSE alleges that the Discretionary Peg order type offered by IEX performs a function that would typically be performed by brokers. NYSE states that it does not oppose IEX's proposal in this regard, but seeks clarification from the Commission to define the boundaries of when an exchange "may or may not offer services that are otherwise performed by broker-dealers." NYSE cites to a Nasdaq rule filing,³³ proposing to offer a range of benchmark order routing strategies to members, that was disapproved by the Commission, and for which commenters raised concerns that the proposed functionality was a broker-dealer function. We do not believe that this issue is relevant to our application, but note for the record that the basis for the Commission's disapproval clearly differentiates the proposed Nasdaq functionality from IEX's Discretionary Peg order type. The disapproval was based on two factors. First, the Commission noted that Nasdaq did not adequately explain in the proposal how it would apply the controls required by Rule 15c3-5 under the Exchange Act to benchmark child orders. Second, the Commission noted that the benchmark orders would not initially be directed to the Nasdaq matching engine, raising potential competitive concerns in relation to Nasdaq members. The Discretionary Peg order type is entirely different than the Nasdaq proposal to offer benchmark order routing strategies.

Odd Lot Orders

Nasdaq notes that under IEX's proposed Rules, odd lot orders, as well as larger orders partially filled such that an odd lot remains, are automatically considered non-displayed. Nasdaq states that the Commission should consider whether this result would systematically disadvantage smaller orders that might be submitted by retail investors.

Current exchanges handle odd-lots in a variety of ways. Our approach is designed to ensure that the IEX proprietary market data feed does not include information that cannot be reported to the SIPs. IEX will always work to find the optimal solution for the greatest number of IEX participants, including retail investors, and odd-lot handling will be no exception.

Although Nasdaq conflates the treatment of odd-lots with that of "retail investors," it is important to note that these do not necessarily go hand-in-hand. We note that one study found that "20-25% of trades initiated by HFTs are odd lots, and that trades initiated by HFTs are more likely to be odd lots than trades initiated by non-HFTs."³⁴ Accordingly, we would encourage a broader study of the use of odd-lot orders in general by the Commission.

Comments Concerning the Routing Function

section; see <https://www.nasdaqtrader.com/content/ProductsServices/Trading/OrderTypesG.pdf>, "Non-Display" section.

³³ See Exchange Act Release No. 34-58629 (January 11, 2013).

³⁴ See O'Hara, Maureen and Yao, Chen and Ye, Mao, What's Not There: The Odd-Lot Bias in TAQ Data (July 22, 2011). Johnson School Research Paper Series No. 31-2011; Midwest Finance Association 2012 Annual Meetings Paper, available at <http://ssrn.com/abstract=1892972>, at 13-14.



Both letters raise various questions or points concerning the operation of IEX's proposed routing function, operated by IEX Services LLC ("IEXS"). Additional information with respect to the routing function was provided in the First Response Letter under "The Exchange Routing Function and Pegged Orders – The Exchange Does Not Provide an Unfair or Discriminatory Advantage to IEXS." In this section, when referring to the overall routing function, including both the routing logic located within the Exchange and the outbound routing broker acting as a courier to away trading centers, we use the term "Routing System."

Nasdaq questions whether "IEX members would be able to access liquidity at other trading venues more easily than any member could access liquidity at IEX." As discussed above, the POP creates no more of a deterrent to members accessing liquidity at IEX than the decision of NYSE or Nasdaq to locate their data centers in Mahwah or Carteret, New Jersey, respectively. In each case the precise latency depends on the location of the member's router in relation to the exchange's data center.

NYSE claims that "IEX's Affiliated Routing Broker Has Access to Trade Execution Information that IEX is Withholding from Investors." As explained in our First Response Letter, IEXS does not make any execution decisions or receive any market data from IEX for use in making routing decisions, which are made exclusively by the Exchange in accordance with its rules. IEXS never receives a view of the NBBO nor does it receive any market data from the Exchange. Therefore, it does not and cannot receive information that others don't receive. Additionally, we consider NYSE's use of the term "investor" preposterous in the context of a "withholding" period measured in microseconds.

NYSE also claims that IEX is "granting an advantage" to IEXS relative to other broker-dealers that provide the same service, because those same brokers have to wait 350 microseconds to receive an execution report, whereas IEXS is able to route to away markets without having to incur the same 350 microseconds of latency. Nasdaq expresses similar concerns.

In answering these claims, several points are important to consider, in sequence:

First, given that IEXS does not make any execution decisions or receive any market data from IEX, it has no informational advantage over any of IEX's members.

Second, the purpose of requiring outbound execution messages to go through the POP (350 microseconds) is to prevent "information leakage" or "liquidity fade" when IEXS routes to other markets. As cited in our First Response Letter, the Commission approved a Nasdaq rule change to its router functionality in 2012 in response to Nasdaq's discovery that executions on Nasdaq were leading to "information leakage" and "market impact" and causing its router to miss shares available at away markets. Nasdaq noted that the information leakage resulted "in a lower likelihood of successfully accessing liquidity on away markets and an increased likelihood of ultimately receiving an execution at an inferior price."³⁵ As Nasdaq did, IEX has taken measures to prevent "information leakage" and "market impact," in order to better protect the interests of members and investors that send routable orders to IEX.

³⁵ See Exchange Act Release No. 34-67990 (October 5, 2012), p. 3.



Third, the POP does not disadvantage any IEX member using its own router from accessing liquidity on away markets if the router accounts for inherent latencies, including the latency of the member's own network, the geographical dispersion of exchanges relative to the location of the member's router, and exchanges' internal system latencies. All of these factors are relevant in preventing information leakage and "liquidity fade." One example of a commercial router that considers all of these factors, branded "THOR," was created by the Royal Bank of Canada.³⁶

Many brokers, for example, locate their routers in Secaucus or Weehawken, New Jersey, as they are centralized locations that help account for the geographic dispersion of exchange data centers.³⁷ Some brokers have provided their round-trip latency statistics to IEX for purposes of this response, as summarized in Appendix B. As the appendix clearly illustrates, some broker routers actually have to "wait" longer to receive a fill from NYSE, given its decision to locate its data center in Mahwah, than they do to receive a fill from IEX.

Fourth, broker routers have the means to effectively route to multiple markets, and to multiple price levels, without "waiting" for execution reports. In particular, the use of intermarket sweep orders ("ISOs") under Regulation NMS was specifically designed to help participants access multiple price levels at multiple markets simultaneously. From the Regulation NMS Adopting Release:

The Commission also included in the reproposal paragraphs (b)(5) and (b)(6) of Rule 611 that provided exceptions for intermarket sweep orders that respond to the need of market participants to access multiple price levels simultaneously at different trading centers. Commenters that addressed this exception overwhelmingly supported it. Citadel, for instance, stated that the intermarket sweep exception is crucial, addresses most of its concerns about the Commission's initial trade-through proposal, and would have many benefits.

By facilitating intermarket sweep orders of all kinds, Rule 611 as adopted will allow a much wider range of beneficial trading strategies than as originally proposed. In addition, the intermarket sweep exception will help prevent an "indefinite loop" scenario in which waves of orders otherwise might be required to chase the same quotations from trading center to trading center, one price level at a time.³⁸

Many broker routers "sweep" through multiple price levels using ISOs.³⁹ When they do so, the router would need to send only a single wave of orders. Again, in that circumstance, the POP would not affect the outcome, relative to the ability to reach other markets. Further, because all order messages, including cancellation and amendment requests, must traverse the POP before arriving at IEX's trading system, an order sent to execute against the IEX quote will be successful in doing so, as long as it arrives before an order to cancel a contra-side order arrives, just as with any other exchange.

Fifth, NYSE's example attempting to show that IEX is placing its members at an "unfair competitive disadvantage" is both baseless and misleading. The example states:

³⁶ See <https://www.rbccm.com/thor/cid-260178.html>.

³⁷ See <http://marketsmedia.com/closer-whats-co-location/>

³⁸ See Exchange Act Release No. 34-51808, pp. 104-105.

³⁹ See, e.g., <https://www.credit-suisse.com/media/sites/aes/doc/aes-us-order-handling-guidelines.pdf>, pp. 5-6.



*To illustrate, if an IEX member were to send a 1,000 share routable order to IEX, the IEX POP would hold that order for 350 microseconds before matching the order against orders in the IEX order book. If 200 shares of this incoming order traded against orders resting in the IEX order book, leaving 800 unexecuted shares, the member would have to wait an additional 350 microseconds more than the normal latency attendant with message transmission to receive notice that 800 shares remained unexecuted. **Only then would the member be able to send these 800 shares to another venue to attempt an execution.** If, however, the member were to direct the IEX affiliated routing broker to route any unfilled portion of its original 1000 share order, the member's remaining 800 shares would be routed 350 microseconds faster. (emphasis added)*

NYSE's carefully crafted example illustrates a "sequential" smart order router. A sequential router, sends an order to one market, waits for a response, and then sends an order to another market, waits for a response there, and so on sequentially. NYSE expresses concern that a third party router will suffer from the latency associated with the POP, which could occur because information leakage or "fading liquidity" impacts the ability of the router to access liquidity on other markets. But *any* sequential router would suffer from this disadvantage, which is not materially affected by the POP. For example, this type of router sending an order to Mahwah (which is the most remote of the major data center locations) would need to travel that distance and back before routing to the next market. NYSE's example could just as easily be applied to its own markets to describe a "built-in time advantage."⁴⁰

Sixth, NYSE's comment seems to be based on the fact that once a routable order enters the IEX System, all subsequent actions with respect to the handling of that order occur within the System and do not re-traverse the POP. This argument rests on the fact that the Routing System has the ability to access liquidity on the Exchange and send out orders to away markets without re-traversing the POP, whereas a router operating from outside the Exchange would need to wait for an execution report from IEX before determining whether and how to route to other markets. To our knowledge, all exchange routers operate in the same way in all material respects. In particular, once a routable order enters an exchange's system, that order can execute and route away without needing to pass again through the member's network and/or entry port. For example, we assume that a routable order sent to NYSE's data center in Mahwah, New Jersey via its point-of-presence in White Plains, New York, if using NYSE's router, would not be required to travel the distance to and from White Plains before unexecuted shares are routed by NYSE's router to other venues.

Finally, because of the POP, orders routed by IEXS or *any other router* will be protected from information leakage resulting from fills on IEX. In other words, when a broker routes to multiple markets, including IEX, it is far more difficult, if not impossible, for a fast trader to observe a fill on IEX and subsequently cancel or modify orders on other markets while the router's orders are in flight. In contrast to the change to the Nasdaq router described previously, which benefited its own router to the exclusion of others, the POP works to provide comparable protection to all third party routers.

Comments Concerning Need for Greater Clarity

⁴⁰ See *supra* note 1, at 4.



NYSE's claim that IEX did not "impart transparency" in our Application or "egregiously" failed to describe certain functionality is also entirely without factual basis. As noted elsewhere in this response, IEX is providing substantially more information than NYSE has provided on means of access and preferential access, router functionality, and other matters, and we have attempted in this response to shed additional light on how these matters affect market structure. We believe that additional disclosure on these matters from all exchanges would be helpful, and we would encourage the Commission to seriously consider requiring that all exchanges provide it.

Definitions

The NYSE and Nasdaq letters state that the Application omits needed information on certain aspects of the Exchange's operation. NYSE claims that IEX does not define the term "System." In fact, the term is defined in the Form 1 template itself, under the Exhibit C heading, as "an electronic trading system to be used to effect transactions on the exchange ("System")." The term "System" is also defined in Rule 1.170(nn) of the IEX proposed rulebook, which is a part of our Application. NYSE also notes that Exhibit E of the Application does not define the term "access." As used in Exhibit E, the term "access" is simply used to refer to the means by which a member communicates trading information directly with the Exchange (e.g., when sending new orders, cancel requests, and replace requests, and when receiving execution reports and market data). IEX believes this meaning should be well understood in the context in which it is used in Exhibit E.

Description of the POP

NYSE alleges that IEX's point-of-presence is not adequately described. NYSE poses eight specific questions with regard to the POP. Nasdaq asks for additional clarity on how market data is disseminated with respect to the POP, as well as whether routable orders traverse the POP.

We believe that all of these questions are addressed in the First Response Letter.⁴¹ A further description of the IEX Router and IEXS is also contained in the First Response Letter and additional detail is provided in this response. We will shortly amend the Application to provide such additional detail that was provided in that letter and in this response.

More generally, we note that the so-called "speed bump" is described in IEX's Form ATS, which was voluntarily published on our website at the time IEX commenced its operations in October of 2013. This disclosure describes the architecture of the POP, its location in relation to IEX's trading system, its purpose, and discloses that the POP applies to both the submission of orders and the receipt of market data, when offered.⁴² We also note that the POP has been widely chronicled and reported in numerous publications of both general and industry circulation.⁴³ Accordingly, we do not believe that commenters have lacked a reasonable opportunity to understand or comment on this aspect of the IEX model. As described in the First Response Letter, IEX has adopted the POP instead of co-location and other multi-tier access arrangements that have been offered by other exchanges, including NYSE and Nasdaq. In

⁴¹ See *supra* note 1, at "Introduction -- What is IEX's POP and why does it create a fairer market for participants."

⁴² See IEX Form ATS, *available at* <http://iextrading.com/docs/IEX%20Form%20ATS%20July%2029%202015.pdf>, p. 7.

⁴³ See, e.g., http://www.tradersmagazine.com/news/ecns_and_exchanges/inside-iexs-magic-shoe-box-113345-1.html



Appendix A to this letter, we provide a summary of various exchange latency product offerings marketed by exchanges as a means to provide enhanced or preferential member access. In general, these arrangements are not fully described in regulatory filings, and there is little information, for example, as to the precise latency advantage that is conferred by each, or the type of parties that might benefit from them.

Time Priority of Orders

The Nasdaq letter cites to language in Rule 11.190 that “[w]hile repricing, orders’ relative time priority is generally preserved,” and Nasdaq asks “When is it not preserved?” This question appears to reflect that Nasdaq did not fully review the text of Rule 11.190. IEX’s repricing logic is clearly described in Rule 11.190, and in particular, the precise manner in which orders are “re-timestamped” is laid out in full. In addition, multiple examples demonstrating repricing of orders and the updating of timestamps are contained in the supplemental materials for Rule 11.190(h) and Rule 11.220.

Discretionary Peg Order Type

Nasdaq suggests that IEX has not provided adequate description of the way that the Discretionary Peg order type functions. Again, we assume the question reflects that Nasdaq did not fully review the text of Rule 11.190. IEX Rule 11.190(b)(10) contains a detailed description of the operation of this order type, including the precise mathematical formula in IEX Rule 11.190(g) that is used to identify a “crumbling quote” situation, which automatically limits the ability of orders to match against contra-side orders up to the midpoint price.

Conclusion

We have appreciated the chance to respond to these additional comments, and we hope that the Commission appreciates our need to respond to comments by NYSE and Nasdaq that were both related and unrelated to our Form 1 Application.

IEX’s request to register as an exchange comes before the Commission at an important inflection point in the evolution of the U.S. equity markets – important for the industry, for corporate issuers, and above all for the investing public. We do not propose to operate as a “cookie cutter” replica of the dominant exchange business model. We believe that model poses conflicts of interest with what we view as an exchange’s public responsibility. Within the existing legal and regulatory structure created by Congress and the Commission, we offer a different view of how to approach member access to the exchange, the sale and dissemination of market data, the construction of order types to further investor objectives, transaction fees, and, above all, the relative benefits and limitations of speed-based trading. We believe that our proposal in its various aspects, in the words of Section 6 of the Exchange Act, better helps “to prevent fraudulent and manipulative acts and practices, to promote just and equitable principles of trade..., 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.”⁴⁴

⁴⁴ See <https://www.sec.gov/rules/proposed/s71004/testimony/s71004-29.pdf>, p. 3.



As a new entrant in any industry that challenges established practices, it is by no means surprising that those with deeply rooted interests in maintaining these practices would seek to mischaracterize, malign, or denigrate the very differences that distinguish the challenger, and to block, limit, or delay its ability to compete. That story, of course, is much older than the market structure debates of recent years. We respect and appreciate the importance of the comment process in helping to inform the Commission as it considers our application, but we hope that it is not permitted to be used as a tactical means to obfuscate the issues presented, or to create excessive delay in taking action. We believe that, with this second response, we have fully addressed all the issues that have been raised by a few commenters, and we deeply appreciate the firms and individuals, within and outside the industry, who have written in support.

Ultimately, the question is not whether our view, or the view of incumbent exchanges, about certain market practices is correct or not, but instead whether IEX will be given a chance to prove itself on an equal footing with the existing exchanges. We believe that there is room in the national market system for an exchange to chart a different course, to favor investor protection over speed, and to allow the markets, the investing public, and corporate issuers themselves to render a verdict.

Sincerely,

Sophia Lee

General Counsel

cc: The Honorable Mary Jo White, Chair
The Honorable Luis A. Aguilar, Commissioner
The Honorable Michael S. Piwowar, Commissioner
The Honorable Kara M. Stein, Commissioner
Stephen Luparello, Director, Division of Trading and Markets
Gary Goldsholle, Deputy Director, Division of Trading and Markets
David S. Shillman, Associate Director, Division of Trading and Markets
Richard Holley III, Associate Director, Division of Trading and Markets



Appendix A: Exchange Latency Technology Products

In this appendix we attempt to demonstrate, using public sources, the latency variations (& price differences) that exist among exchange products & connectivity solutions.

Market Data

<http://www.utpplan.com/>

System resiliency for the SIP consists of:

Secondary back-up server running in parallel (hot/hot) to the primary server, which allows exchanges to immediately reconnect if there is a primary service disruption.

Fully redundant back-up site running hot/warm with a 10 minute recovery time requirement or less if there is a full system failure at the primary site.

System availability requirement of 99.98%.

100% System availability in 17 of the last 23 quarters for Trade Metrics and 18 of the last 23 quarters for Quote Metrics.

Current capacity messages per 100 milliseconds of 215,000 for quote feed and 132,880 for trade feed.

Capacity above peak with capacity-to-peak ratio of 5.8:1 for the quote feed and 8.2:1 for the trade feed.

Current average latency of about 500 microseconds.

<https://www.ctaplan.com/index>

System resiliency for the SIP consists of:

- Secondary back-up server running in parallel (hot/hot) to primary server, which allows exchanges to immediately reconnect if there is a primary service disruption
- Fully redundant back-up site running hot/warm with 10 minute recovery time requirement or less if full system failure at the primary site
- System availability requirement of 99.98%
- 100% system availability in 12 of the last 14 quarters

Additional info

- Current capacity messages per 100 milliseconds of 350,000 for the quote feed and 70,000 for the trade feed.
Capacity above peak with capacity-to-peak ratio of 2:3:1 for the quote feed and 2:9:1 for the trade feed
- Current average latency of about 500 microseconds



CTA

Consolidated Tape Association

NETWORK A

ALL FEES ARE MONTHLY		FEE EFFECTIVE JANUARY 2015
Access Fees ¹		
Direct Access Fees - LS		\$1,250.00
Direct Access Fees - BA		\$1,750.00
Indirect Access Fees - LS		\$750.00
Indirect Access Fees - BA		\$1,250.00

CTA

Consolidated Tape Association

NETWORK B

ALL FEES ARE MONTHLY		FEE EFFECTIVE JANUARY 2015
Access Fees ¹		
Direct Access Fees - LS		\$750.00
Direct Access Fees - BA		\$1,250.00
Indirect Access Fees - LS		\$400.00
Indirect Access Fees - BA		\$600.00

UTP LEVEL 1 FEE SCHEDULE AND FEE POLICY

Published October 26, 2015.

All fees are monthly unless noted. All fees are subject to change. Please note that these prices do not include vendor access charges or telecommunications charges.

DATAFEED ACCESS FEES

TIMING	ENTITLEMENT	FEE	DETAILS
Real-time Data feed	UTP Level 1 – Access Fees	Indirect Access \$500/month per firm	Monthly Access Fees have replaced the Real-Time Annual Administration fee. Please refer to UTP Vendor Alert #2011-9 – UTP Plan Announces Replacement of Level 1 Real-Time Annual Administration Fee for more information.
		Direct Access \$2,500/month per firm	

NYSE Direct Market Data Feed Fee Schedule: <http://www.nyxdata.com/doc/241907>

1.1.1. Access Fees

Description	Product Name	Rate	Product Code
NYSE OpenBook Access Fees	NYSE OPENBOOK: ACCESS FEE	\$5,000.00	32001

1.1.3 Non-Display Fees (see appendix)

Description	Product Name	Rate	Product Code
Non-Display Fees – Category 1	NYSE OPENBOOK: NON-DISPLAY CATEGORY 1	\$6,000.00	38100
Non-Display Fees – Category 2	NYSE OPENBOOK: NON-DISPLAY CATEGORY 2	\$6,000.00	38101
Non-Display Fees – Category 3 (Per platform)	NYSE OPENBOOK: NON-DISPLAY CATEGORY 3	\$6,000.00 Cap:\$18,000	38102
Non-Display Fees – No Non-Display	NYSE OPENBOOK: NO NON-DISPLAY	\$0.00	38170



2.2.1 Access Fees

Description	Product Name	Rate	Product Code
NYSE ArcaBook Access Fees	NYSE ARCABOOK: ACCESS FEE	\$2,000.00	39001

2.1.3 Non-Display Fees (see appendix)

Description	Product Name	Rate	Product Code
Non-Display Fees – Category 1	NYSE ARCA INTEGRATED FEED: NON-DISPLAY CATEGORY 1	\$7,000.00	38112
Non-Display Fees – Category 2	NYSE ARCA INTEGRATED FEED: NON-DISPLAY CATEGORY 2	\$7,000.00	38113
Non-Display Fees – Category 3 (Per Platform)	NYSE ARCA INTEGRATED FEED: NON-DISPLAY CATEGORY 3	\$7,000.00 Cap:\$21,000	38114
Non-Display Fees – No Non-Display	NYSE ARCA INTEGRATED FEED: NO NON-DISPLAY	\$0.00	38174

4.1.1 Access Fees

Description	Product Name	Rate	Product Code
NYSE MKT OpenBook Access Fees	NYSE MKT OPENBOOK: ACCESS FEE	\$1,000.00	32592

4.1.3 Non-Display Fees (see appendix)

Description	Product Name	Rate	Product Code
Non-Display Fees – Category 1	NYSE MKT OPENBOOK: NON-DISPLAY CATEGORY 1	\$2,000.00	38124
Non-Display Fees – Category 2	NYSE MKT ORDER IMBALANCE: NON-DISPLAY CATEGORY 2	\$2,000.00	38125
Non-Display Fees – Category 3 (Per platform)	NYSE MKT ORDER IMBALANCE: NON-DISPLAY CATEGORY 3	\$2,000.00 Cap:\$6,000	38126
Non-Display Fees – No Non-Display	NYSE MKT OPENBOOK: NO NON-DISPLAY	\$0.00	38178

Nasdaq Direct Market Data Feed Fee Schedule:

<http://www.nasdaqtrader.com/Trader.aspx?id=DPUSdata#tv>

<i>Distributor Fees</i>		
Nasdaq Depth Data	Nasdaq Issues	Internal Distribution: \$1,000 per firm External Distribution: \$2,500 per firm Direct Access : \$2,000 per firm
	NYSE and NYSE MKT Issues	Internal Distribution: \$500 per firm External Distribution: \$1,250 per firm Direct Access : \$1,000 per firm

Nasdaq BX Direct Market Data Feed Fee Schedule:

<http://www.nasdaqtrader.com/Trader.aspx?id=DPUSdata#bx>

<i>Distributor Fees</i>		
BX TotalView	Nasdaq, NYSE and Regional Issues	Internal Distribution: \$500 per firm External Distribution: \$1,250 per firm Direct Access : \$1,000 per firm



Nasdaq PSX Direct Market Data Feed Fee Schedule:

<http://www.nasdaqtrader.com/Trader.aspx?id=DPUSdata#psx>

Distributor Fees

PSX TotalView	Nasdaq, NYSE, NYSE Amex and NYSE Arca	Internal Distribution: \$500 per firm External Distribution: \$1,250 per firm Direct Access : \$1,000 per firm
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BATS-Z Direct Market Data Feed Fee Schedule:

https://www.batstrading.com/support/fee_schedule/bzx/

BZX Depth:

Delivery	Fee
Internal Distributor	\$1,000/month
External Distributor	\$5,000/month

BZX Book Viewer:*

Internal Distribution

Distribution Fee	\$1,000/month
Professional User Fee	\$0/month
Non-Professional User Fee	\$0/month

BATS-Y Direct Market Data Feed Fee Schedule:

https://www.batstrading.com/support/fee_schedule/byx/

BYX Depth:

Delivery	Fee
Internal Distributor	\$500/month
External Distributor	\$2,500/month

BYX Book Viewer:*

Internal Distribution

Distribution Fee	\$500/month
Professional User Fee	\$0/month
Non-Professional User Fee	\$0/month



EDGX Direct Market Data Feed Fee Schedule:

https://www.batstrading.com/support/fee_schedule/edgx/

EDGX Depth:

Delivery	Fee
Internal Distributor	\$500/month
External Distributor	\$2,500/month

EDGX Book Viewer:*

Internal Distribution

Distribution Fee	\$500/month
Professional User Fee	\$0/month
Non-Professional User Fee	\$0/month

EDGA Direct Market Data Feed Fee Schedule:

https://www.batstrading.com/support/fee_schedule/edga/

EDGA Depth:

Delivery	Fee
Internal Distributor	\$500/month
External Distributor	\$2,500/month

EDGA Book Viewer:*

Internal Distribution

Distribution Fee	\$500/month
Professional User Fee	\$0/month
Non-Professional User Fee	\$0/month



NYSE: <https://www.sec.gov/rules/sro/nyse/2015/34-76374.pdf>

Description	Amount of Charge
Wireless connection of BATS Pitch BZX Gig shaped data	\$5,000 per connection initial charge plus monthly charge per connection of \$6,000 Fees are subject to a 30-day testing period, during which the monthly charge per connection is waived.
Wireless connection of DirectEdge EDGX Gig shaped data	\$5,000 per connection initial charge plus monthly charge per connection of \$6,000 Fees are subject to a 30-day testing period, during which the monthly charge per connection is waived.
Wireless connection of NASDAQ Totalview-ITCH data	\$5,000 per connection initial charge plus monthly charge per connection of \$8,500 Fees are subject to a 30-day testing period, during which the monthly charge per connection is waived.
Wireless connection of NASDAQ BX Totalview-ITCH data	\$5,000 per connection initial charge plus monthly charge per connection of \$6,000 Fees are subject to a 30-day testing period, during which the monthly charge per connection is waived.

⁸ For example, a User with two wireless connections for Third Party Data may opt to purchase an additional port in order to route the options and equity data it receives to different cabinets.

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Wireless connection of NASDAQ Totalview-ITCH and BX Totalview-ITCH data	\$5,000 per connection initial charge plus monthly charge per connection of \$12,000 Fees are subject to a 30-day testing period, during which the monthly charge per connection is waived.
Port for wireless connection	\$3,000 monthly charge per port, excluding first port



Connectivity

Nasdaq: <http://www.nasdaqtrader.com/content/Productsservices/trading/CoLo/LowLatencyFS.pdf>

CONNECTIVITY TYPE	NRC	MRC	LATENCY IMPROVEMENT*
1G ULTRA	\$1,500	\$2,500	5-12 μ s vs. 1G
10G	\$1,000	\$10,000	8-15 μ s vs. 1G
10G ULTRA	\$1,500	\$15,000	5-9 μ s vs. 10G
40G	\$1,500	\$20,000	3-8 μ s vs. 10G

*Median roundtrip latency measured from order to acknowledgement for the NASDAQ Stock Market™ using Corvil Net

NYSE: <http://www.nyxdata.com/doc/243265>

1.2 Network Connectivity Options (MAHWAH)			
1.2.1 SFTI LCN Services		MRC	NRC
SFTI LCN	1 Gbps port	\$5,000	\$6,000
SFTI LCN	10 Gbps port	\$12,000	\$10,000
SFTI LCN	10 Gbps LX port	\$20,000	\$15,000
SFTI LCN	40 Gbps port	\$20,000	\$15,000

Inter Data Center Transport Connectivity

2. Where is a NASDAQ OMX POP available?

A NASDAQ OMX POP will be available at both the Equinix NY4 facility (755 Secaucus Road, Secaucus NJ) in September 2014, and well as the Equinix CH4 facility (350 East Cermak, 8th Fl, Chicago, IL) in November 2014.

Additional locations will be added based on client requests, so please let us know of additional needs.

Nasdaq Wired Connectivity Types:

<http://nasdaqtrader.com/content/ProductServices/Trading/colo/POPFAQs.pdf>

BANDWIDTH	SERVICE	HANDOFF FEE		POP TRANSPORT FEE		TOTAL*	
		INSTALL	MONTHLY	INSTALL	MONTHLY	INSTALL	MONTHLY
1GBPS	NASDAQ Primary or DR Only**	\$1,000	\$1,500	\$500	\$1,000	\$1,500	\$2,500
10GBPS	NASDAQ Primary or DR Only**	\$1,000	\$5,000	\$500	\$1,000	\$1,500	\$6,000
1GBPS	eSpeed Primary Only	\$1,000	\$500	\$500	\$1,000	\$1,500	\$1,500
1GBPS	eSpeed DR Only (NY4)	\$1,000	\$500	\$500	\$500	\$1,500	\$1,000
1GBPS	eSpeed DR Only (CH4)	\$500	\$500	\$0	\$0	\$500	\$500

*Additional fees will apply for the requested market data (applicable license, distribution and access fees) and order entry (applicable market ports/sessions and access fees).

**NASDAQ DR Only will be available in 2015.



10. What is the latency between the NASDAQ OMX POPs and Carteret?

The one-way circuit latency between Carteret and the Secaucus POP is 150 microseconds.

The one-way circuit latency between Carteret and the Chicago POP is targeted at 7.25 milliseconds.

Nasdaq Wireless Connectivity Types:

<http://www.nasdaqtrader.com/content/ProductsServices/Trading/colo/WirelessExpressConnectFAQs.pdf>

WHAT METRO DATA CENTERS DOES THIS WIRELESS NETWORK CONNECT TO AND AT WHAT LATENCIES?

The table below contains the Wireless Express Connect latencies from our data center in Carteret, NJ:

Remote Site	Wireless Carrier	Expected Latency
Aurora, IL: 2905 Diehl Road (CME data center-DC3)	Strike Networks	8.3 ms*
Mahwah, NJ: 1700 MacArthur Blvd. (NYSE)	Anova Technologies Apsara Networks	385 µsec**
Secaucus, NJ: 755 Secaucus Road (NY4 – Equinix)	Apsara Networks	184 µsec*
Secaucus, NJ: 275 Hartz Way (NY2 – Equinix)	Anova Technologies	195 µsec (current)/ 187 µsec (planned)*
Weehawken, NJ: 300 Boulevard East (NJ2 – Savvis)	Apsara Networks	196 µsec*

*This is round trip expected latency of the wireless network.



WHAT ARE THE FEES FOR THESE SERVICES?

Route	Wireless Carrier	Installation Fee	Monthly Recurring Fee (MRC) – before any discounts
50 mb – Carteret to 755 Secaucus Rd Secaucus, NJ – NY4	Apsara Networks	\$5,000	\$10,000*
50 mb – Carteret to 275 Hartz Rd Secaucus, NJ – NY2	Anova Technologies	\$5,000	\$10,000**
50 mb – Carteret to 300 Boulevard East Weehawken, NJ – NJ2	Apsara Networks	\$5,000	\$10,000*
50 mb – Carteret to 1700 MacArthur Blvd. Mahwah, NJ – NYSE	Apsara Networks	\$5,000	\$20,000*
10 mb – Carteret to 1700 MacArthur Blvd. Mahwah, NJ – NYSE	Anova Technologies	\$5,000	\$15,000*
1 mb – Carteret to 2905 Diehl Rd Aurora, IL – CME data center- DC3	Strike Networks	\$5,000	\$8,000***

* The MRC will be waived for the first 30 days from the order completion date (the Trial Period) for the metro routes.

** The MRC will be waived for the first 30 days from the order completion date (the Trial Period) but will be increased to \$15,000 after implementation of latency reduction of 8 microseconds expected in the coming weeks.

*** The MRC will be charged for the trial period for the Chicago offering. Discounts are available for multiple orders (e.g., \$15,000 for 2mb) for the Chicago route– contact Doug Aragon for more details.

NYSE SFTI: <http://www.nyxdata.com/doc/243265>

1.2.3 SFTI Optic (includes Cross Connect)		MRC	NRC
SFTI Optic (Secaucus - NY 2, 4 or 5)	1 Gbps port	\$2,800	\$2,750
SFTI Optic (Secaucus - NY 2, 4 or 5)	10 Gbps port	\$6,750	\$8,250

1.2.7 SFTI Wireless (Circuit)		MRC	NRC
10 Mbps		\$15,500	\$10,500
20 Mbps		\$20,500	\$10,500



Order Entry

Nasdaq: <http://www.nasdaqtrader.com/Trader.aspx?id=PriceListTrading2>

FIX/OUCH/RASHPort/DROP Connectivity

- Connectivity via FIX for non-trading activity is **\$500 per port/month**
- Connectivity to NY-Metro and Mid-Atlantic Datacenters is **\$550 per port pair/month**.
- For Order Entry internet ports, an additional charge of **\$200 per month for each internet port** will be applied to support bandwidth costs.
- For Market Data internet ports, an additional charge of **\$600 per month for each internet port** will be applied to support bandwidth costs.

- Please note that firms will be charged for their ports in full month increments. Any port cancellation requests that occur after the first day of the month will be effective on the date requested by the firm. However, the firm will be required to pay for the cancelled port through the rest of the month.

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Dedicated OUCH

Each Dedicated OUCH server is offered at a fee of **\$5,000 per month***, with an installation fee of \$5,000.

*Please note that standard monthly OUCH port fees still apply.

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BATS: http://cdn.batstrading.com/resources/features/bats_exchange_Latency.pdf

Order Acknowledgement Latency

- the time it takes to accept, process, and acknowledge **or fill** a Member order
- the complete round trip from edge network device to BOE/FIX handler to matching engine and back
- measured from *outside* the BATS edge network device
- sustained under heavy load
- measured during the entire day, including open and close

Order Latency	10 Gig Connection		1 Gig Connection	
	Binary	FIX	Binary	FIX
Average	82 microseconds	95 microseconds	104 microseconds	126 microseconds
80% of orders within	107 microseconds	107 microseconds	135 microseconds	135 microseconds
99% of orders within	137 microseconds	127 microseconds	135 microseconds	155 microseconds
99.9% of orders within	307 microseconds	257 microseconds	235 microseconds	255 microseconds

Market Data Delivery

Nasdaq: <http://www.nasdaqtrader.com/Trader.aspx?id=PriceListTrading2>

NASDAQ ITCH

Connectivity to NY-Metro and Mid-Atlantic Data Centers

ITCH data feed	\$750 per port pair/month
Multicast ITCH data feed	\$1,000 per port pair/month
Multicast ITCH FPGA data feed	\$2,500 per port pair/month

- For Order Entry internet ports, an additional charge of **\$200 per month for each internet port** will be applied to support bandwidth costs.
- For Market Data internet ports, an additional charge of **\$600 per month for each internet port** will be applied to support bandwidth costs.
- Please note that firms will be charged for their ports in full month increments. Any port cancellation requests that occur after the first day of the month will be effective on the date requested by the firm. However, the firm will be required to pay for the cancelled port through the rest of the month.



Appendix B: Broker Latencies to IEX & Other Venues

For practical context on the impact of the IEX POP, four brokers voluntarily provided us with their round trip latency data by exchange (plus IEX). Even with the POP, brokers experience much lower latencies on IEX relative to CHX and comparable or lower latencies than other exchanges. Please note: not all brokers provided data for all venues. All data provided to IEX is represented in the below charts. For confidentiality reasons, broker identities were provided only to the Commission to allow for their independent verification of this data. These four brokers are representative of the typical agency broker subscriber of the IEX ATS that has its own electronic trading platform.

