THE UNITED STATES SECURITIES AND EXCHANGE COMMISSION

ROUNDTABLE ON MARKET DATA PRODUCTS, MARKET ACCESS SERVICES, AND THEIR ASSOCIATED FEES

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U.S. Securities and Exchange Commission

100 F Street, NE

Washington, D.C.

PARTICIPANTS:

Jay Clayton, Chairman
Kara Stein, Commissioner
Robert Jackson, Jr., Commissioner
Elad Roisman, Commissioner
Hester Peirce, Commissioner
Brett Redfearn
John Roeser
Mark Donohue
David Shillman
Dan Gray
Hans Heidle

Panel One
Doug Cifu
Chris Concannon
Stacey Cunningham
Brad Katsuyama
Mehmet Kinak
Hal Scott
Tom Wittman

PARTICIPANTS(CONT.):
Panel Two
Oliver Albers
Matt Billings
Michael Blaugrund
Jeff Brown
Simon Emrich
Adam Inzirillo
Mark Skalabrin

Panel Three
James Brooks
Michael Friedman
Chris Isaacson
Vlad Khandros
Jamil Nazarali
Ronan Ryan
Joseph Wald

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MR. REDFEARN: Good morning. Welcome to the Securities and Exchange Commission Staff's Roundtable on Market Data and Market Access. I'm Brett Redfearn, Director of the Division of Trading and Markets and I will be moderating the first panel today.

We very much appreciate the willingness of such a thoughtful and diverse representation of market participants to join us here today so that, together, we can address the important and challenging set of issues. I am confident that the discussions we will have over the next two days will allow us all to consider, in a rigorous and comprehensive way, how we might bring greater transparency and clarity to our critical market data and connectivity infrastructure.

I also want to introduce my colleagues and panel moderators here with me. David Shillman and John Roeser, Associate Directors in the Office of Market Supervision; Dan Gray, Senior Special Counsel, also in the Office of Market Supervision; Mark Donohue, Senior Policy Adviser in the Office of Analytics and Research; and Hans Heidle from the Division of Economic and Risk Analysis.

I would also like to thank my staff in the Division of Trading and Markets for putting this all

together, especially Arisa Kettig.

So now I would like to welcome Chairman Clayton and Commissioners Stein, Jackson, Peirce and Roisman, our panelists and our audience members who are here in person or tuning in remotely.

So with that, I would like to begin by asking Chairman Clayton to make his opening remarks. Chairman Clayton.

CHAIRMAN CLAYTON: Thank you, Brett. Good morning, everyone.

I want to thank the Division of Trading and Markets for organizing this Roundtable on Market Data and Market Access. This roundtable is an important step in what will be a broad and open-minded review of a set of issues that people have been raising for some time. I am delighted at the level of participation we have. We have very broad and diverse perspectives, including those of investors, exchanges, brokers and other market participants. And the caliber and experience of our panelists is really all we could ask for, so I thank you all for being here.

I want to actually be quite brief here. It's funny, when people say my remarks are going to be brief, then everyone is thinking, oh, my God, I can't believe how long this is going on. I know there are diverse

views. I know these views are emotionally held.

I encourage you to state your views with vigor -- excuse me -- maybe not that much vigor --

(Laughter.)

CHAIRMAN CLAYTON: -- state with vigor and support. But I also ask all participants to think about what will best serve our Main Street investors who are in the market for the long term.

As I have often said, and I am speaking for myself, not the Commission or any of my colleagues, if you want to appeal to me, explain to me why what you want is in the interests of people who are in the market for the long term.

I look forward to an insightful and constructive discussion. Thank you.

MR. REDFEARN: Thank you, Chairman. Commissioner Stein.

COMMISSIONER STEIN: I also want to welcome everyone to today's roundtable. And I want to thank the Chairman, and join the Chairman in thanking the Staff for organizing it.

I think my remarks are medium length, given Jay's length. But I was just going to briefly frame some of the issues.

The central market system was born 40 years

ago. Technology and communications at the time were not as fast or as data rich as they are today. In the 1970s, mainframes were at the nexus of information processing. And a state-of-the-art mainframe took up an entire room and could store only a small portion of the data stored on my smartphone. And that mainframe was also 1,000 times slower and it cost 10 times more. As technology has developed over the last 40 years, so too has the market's use of data. Today, our major financial institutions are, in effect, tech companies.

The issue before us today is has securities market regulation kept up or do we need to adapt it to better work in a computerized marketplace?

To understand where we are today, I think we need to understand why the current regulatory system was enacted in the first place. At the time the central market system was created, the Commission was concerned that, quote, there is no way that an investor can be certain the investment process is working for him or her all the time, end of quote. The solution was to create a communications and regulatory system that would, quote, give the investor's order constant protection and representation in all markets at the same time, end of quote.

In authorizing the creation of such a system,

Congress had two goals. The first was the centralization of all buying and selling interests. The second was the protection of the priority of public orders, so that each investor would receive the best possible execution of his or her order, regardless of where in the system it originated. In other words, the goals were to update the market system to reflect the realities of increased data.

As then-Chairman Bradford Cook said, the public investor is, quote, looking at a goldfish bowl while really living in the middle of an aquarium, end of quote. While I would say today, the public investor is looking at an aquarium, when we are really living in an ocean.

Have our rules withstood the test of time? Have we achieved Congress's goals? Were there any unintended consequences? I'm interested in hearing everyone's thoughts on these issues. And I am also interested in hearing everyone's thoughts on other issues related to market data.

Does market data need to be nearly instantaneous to be relevant? What system should we develop to ensure today's investors receive the best possible execution of their order? And how much should that system cost and who should pay for it? And what incentives should be in place to ensure that market data is relevant and reliable?

Sometimes we defer these simple but difficult questions. And that often means that new issues or conflicts may arise. For example, the NMS planned governance committees oversee the National Market System. But can they be inherently conflicted because they work for the exchanges?

So I encourage you all to tackle these simple but difficult questions and I look forward to the discussion. Thank you.

MR. REDFEARN: Thank you, Commissioner. Commissioner Jackson.

COMMISSIONER JACKSON: Well, thank you so much, Director Redfearn. I am delighted to be here, and delighted that all of us here at the SEC are having a critical conversation about how to ensure our investors have all the information and access they need to our capital markets.

And to me, folks, that's the start and the end point of today's conversation, how this affects ordinary investors. Data and access pricing is not a zero-sum game between exchanges and brokers. When fair access to our markets is expensive or inefficient, those costs are passed straight along to investors.

So when we're talking about fairness today, it's important to remember who we're talking about. What

we're talking about is what's fair to ordinary investors. And I'm hoping today we are going to hear about the effects data and access prices have on ordinary American families saving for retirement.

That's why it was so troubling to see that, on a conference call with analysts yesterday, the president and CEO of Nasdaq told the markets that, quote, Main Street investors pay nothing for data, and, quote, this debate is really a commercial dispute between exchanges and broker-dealers. That's exactly the wrong way to think about today's conversation.

Today is about ordinary investors and making sure that our stock markets, the symbol of capitalism around the world, are structured in a way that gives access to our economic growth to ordinary mom and pop investors. Regulating these areas is among the Commission's core duties. The Exchange Act tasks us with ensuring that exchange actions do not unduly burden competition and are fair and reasonable.

Our challenge is deepened by the exponentially increasing complexity of our markets, leaving regulators fighting to see the full picture from exchange rule filings. I'm thrilled that we at the SEC are taking those obligations seriously. And one point that I want to emphasize is that, in order for us to do that, costs

of data on the exchanges are a key element of the market data story.

A competitive market won't permit you to charge much more than it costs a product to be produced. But I can tell you it's an area where we have little to no information. So one of the things I hope to learn about today and what I want to see going forward is real transparency and disclosure into how much it costs to produce these data to connect participants and to provide colocation services. I think the time for transparency into those markets is long overdue.

And so I am hoping we can make progress today on some of the issues that afflict our stock markets. I am grateful to all of you that you're here today to help us figure this out. And I look forward to the conversation and all that you'll do to help protect American investors.

MR. REDFEARN: Thank you, Commissioner. Commissioner Peirce.

COMMISSIONER PEIRCE: Thank you, Brett. So when we were preparing for this Market Data Roundtable, Brett told me that I had to dress in market data themed outfit. I thought -- I had to scratch my head. So I settled on this jacket, my ink-spot jacket, as a sign of all the ink that's been spilt on market data issues over

the years.

(Laughter.)

COMMISSIONER PEIRCE: So the wonderful thing about today is -- today and tomorrow is that we have all of these people with such expertise in the room together to talk about these issues. These issues are often very contentious. But I think having everyone in the same place to discuss them is tremendously important.

I do hope -- I know that there are specific issues that you all are going to be addressing. But I do hope that you will take a step back, too, and think more broadly. Commissioner Stein mentioned the mandate that the SEC was given. And we have proceeded with that mandate to facilitate the establishment of a National Market System and then oversee the provision of data related to trades in that system.

And I contend that technology and time would have, on its own, brought together a National Market System. And certainly the core function of markets, one of the core functions of markets, is to produce data. Markets produce information about prices and they do it very well. And typically, inserting the government into that relationship and trying to have a government overlay actually impedes the flow of information. So I hope that we can think about these issues in the context of sort of

some of those broader principles.

So thank you all for being here today. Although I won't be able to be here for all of today's and tomorrow's roundtable, I will be watching at home later. So thanks very much.

MR. REDFEARN: Thank you, Commissioner. Commissioner Roisman.

COMMISSIONER ROISMAN: It's still weird to be last, because all the good points have been made. But I want to thank again Brett and the Division and our panelists for coming today and contributing your time and energy to this discussion.

Looking at the agenda and at those seated around the room, it is clear that we have very knowledgeable participants who will not hesitate to engage in robust discussions over the next two days. From these discussions, I hope to gain a more granular understanding of the forces that motivate various customers' demand for SIP data versus the different types of proprietary data and levels of access that exchanges provide.

In this regard, I have several specific questions on which we need more information as the Commission considers policymaking in this area, and others that are intimately related. As an initial

matter, how are regulatory requirements imposed on market participants influencing this demand?

I have already voiced my concern about the Order Protection Rule and asked the Commission to review its effects in today's marketplace. But I would be very interested to hear about other rules, such as the Vendor Display Rule, or obligations to achieve best execution to maybe pushing market participants towards products or services that they would not otherwise demand for themselves or their customers. I believe a starting point for the Commission should be to review any such rules to see how we can tailor the requirements to achieve their objectives and limit any unintended consequences.

Next, to what extend do participants demand premium data products or access from exchanges in order to provide their own products or services that compete with the same exchanges? In this regard, I am thinking of entities like internalizers and crossing platforms, ATSs, dark pools and ECNs that may utilize exchange data to provide quotes and facilitate off-exchange trading in real time. We need to bear in mind that these types of market participants, while providing their own value in the marketplace, are doing so on top of fundamental services that we currently rely on exchanges to provide,

such as facilitating capital formation and price discovery. And while we heavily regulate exchanges, these market participants operate with much less regulatory scrutiny and lower cost. So as we understand how such market participants capitalize on the functions of exchanges, we should consider the extent to which they are bearing their share of those costs.

As for exchanges, Regulation NMS contemplated that certain market data fees would be used to bolster SRO funding. In Regulation NMS, the Commission explicitly stated that many commenters recommended that the level of market data fees should be reviewed and that, in particular, greater transparency concerning the costs of market data and the fee-setting process is needed. While the Commission agreed, it directed commenters to voice their concerns in a separate concept release relating to SRO structure. Considering the issues we are discussing today, is it time for us to revisit the 2004 SRO concept release?

With respect to market participants who pay premiums to exchanges for data and access to optimize their own trading, what prevents a broker-dealer from unsubscribing to proprietary fees if fees get too high? What alternatives could meet its objectives and what forces of friction prevent switching? Also, how could

the SIP products be improved to fulfill this demand?

Finally, we need to ask how retail investors are affected by the issues we are discussing at this roundtable, a notion that I think all of the commissioners agree with. What level of price improvement is achieved when broker-dealers trading on behalf of institutional investors and ultimately retail investors rely on these higher-cost products or services rather than the SIP? If costs for market data and access were reduced, how much of that savings would be passed on to retail investors and investors in general?

So sum up, I believe it's important for the Commission to discern where market forces versus regulation are driving demand for premium products and services versus SIP products, as well as how retail investors are benefitting from our regulation in this area. Any change in the Commission's approach to market data and access will inevitably affect today's market dynamics. As regulators, it's incumbent on us to understand as fully as possible the incentives our actions generate and, on this basis, decide whether the benefits we aim for are worth the consequences that will ensue.

Before I close, I think it's important to step back and put some context around these discussions. As

we debate the merits of shaving micro- and nanoseconds of latency in our equities trading, we have yet to achieve reliable pretrade transparency in our fixed income markets. And in fixed income, posttrade transparency is debated in terms of minutes and hours. The U.S. fixed income market is much larger than our equities market and yet we have not discussed that market in as fine a detail as we are addressing the equity market at this roundtable.

While I look forward to learning as much as I can over the next two days, I am also eager for the Commission to consider how we can make the U.S. fixed income markets as robust and favorable to investors as our equity markets.

I know the Chairman has created the FIMSAC and I am very thankful for that, and for the work that the Division and the participants on that committee put into it. So thank you very much.

CHAIRMAN CLAYTON: Brett, if I may?

I'm going to take back some of the time I ceded.

(Laughter.)

CHAIRMAN CLAYTON: I want to -- I just want to try and put this in a much broader picture for a moment. I just returned from IOSCO with the international

securities regulators and FSB with the central bankers and securities regulators who are responsible for financial stability. And I want to let everybody here know that it's not just people in America who are watching how we are handling these issues but regulators around the world, they take our lead on many of these things. And that's, you know, an important perspective. We are setting the standards by which the rest of the world will adopt.

Leads to the second point, which is only in America could you have a roundtable like this to discuss issues like this, where people are willing to come forward and put forth their wares and tell you what they think. And I just can't emphasize enough how much I appreciate the willingness of our first panelists and all our panelists to do that. So thank you.

MR. REDFEARN: Thank you, Chairman, and thank you all very much for your remarks. Very quickly, I am going to make a few comments.

First, let me say that the views that the Staff and I express today are our own and do not necessarily reflect the views of the Commission, the Chairman or other Commissioners or other members of the Staff.

Our goals for this roundtable are straightforward. We want to examine our infrastructure

for distributing market data with an eye to ensuring that we are fulfilling our mission to protect investors, maintain fair, orderly and efficient markets and facilitate capital formation. More specifically, to meet our obligations under the Exchange Act, we need to ensure that the fees that are being charged for such important market data services are fair and reasonable, not unreasonably discriminatory and do not impose an undue or inappropriate burden on competition.

These are words that you've read or heard a hundred times with respect to the mandate of the Commission. However, these are words that require significant thought and consideration by both regulators and market participants alike. This is especially true in today's market environment, given the remarkable evolution of market technology, market infrastructure and the corporate structure of today's stock exchanges.

Today and tomorrow, we plan to discuss what our panelists think is working well with our market infrastructure and where there are areas that may be in need of improvement. And if there are areas that warrant a new or improved approach, we are encouraging our panelists to give us their thoughts about how to proceed in the right direction.

Throughout our discussions today and tomorrow,

first and foremost we are here for individual investors, Main Street investors, as Chairman Clayton often calls them. We are not here to benefit any one business model over another. And we continue to be focused on how individual investors may be affected from any potential changes being discussed.

As most of you know, we currently have a two-tiered system of market data and market access in U.S. equity markets. There are the consolidated data feeds distributed pursuant to joint SRO National Market System plans and there are the proprietary data products and access services that are provided directly by the exchanges. One set of products is faster, more content rich and more costly than the other.

It's unclear whether the landscape that we have today was what was envisioned or expected when related policy decisions were made in the past. So how did we get here? To answer that, we need to go back to the 1970s, when Congress directed the establishment of a National Market System, or NMS. The primary objective of the NMS was to promote fair and efficient markets and Congress emphasized its belief that market data systems would, quote, form the heart of the National Market System. The joint SRO market data plans then were created to implement this statutory directive and the

plans began distributing consolidated data stream through a central processor or SIP.

By 1999, the Commission concluded the consolidated data had been an essential element in the success of U.S. securities markets. It stated the consolidated data had been, quote, the principal tool for enhancing the transparency of buying and selling interests in a security and for facilitating the best execution of customer orders by their broker-dealers.

The Commission again addressed market data concerns when it adopted Reg NMS in 2005. Although many commenters at the time recommended that the Commission adopt a competing consolidator model to replace the SIP model, the Commission decided not to adopt such a model but did remove any restrictions that would prevent exchanges from distributing their own information directly. The Commission's rationale for these Regulation NMS decisions has important implications for our discussions today and going forward.

At the time, the Commission was concerned that moving away from the SIP model toward a competing consolidator model might undercut the benefits of core data. The reason for this concern is telling. The Commission noted that, quote, if the benefits of a fully consolidated data stream are to be preserved for

investors, every consolidator would need to purchase the data of each SRO. Under these circumstances, the Commission concluded that, quote, as a practical matter, payment of every SRO's fees would be mandatory, thereby affording little room for competitive forces to influence the level of fees. It noted that some exchanges might well propose higher fees to increase their revenues, particularly those with dominant market shares, whose information is most vital for investors.

Today, a key overarching issue for this roundtable is whether, despite the Commission's belief in 2005 that retaining the existing SIP model would uphold the integrity and affordability of core data, a series of factors including significant technological advances and new proprietary data offerings has led to the result that the Commission hoped to avoid.

Technology has greatly transformed our markets. This transformation raises fundamental questions for our two-tiered system of market data and market access, including does SIP data with its latencies in content differentials compared to proprietary data meet the basic needs of market participants in today's algorithmic markets? Or are the exchanges' proprietary data products and access services necessary to satisfy competitive forces and regulatory duties? And does SIP data alone

still qualify as core data, or have we inadvertently evolved to a model in which the purchase of an additional set of proprietary data and access products is mandatory for core data?

I very much look forward to our panelists today as we discuss these and many other questions of importance to investors and the health of the U.S. equity markets.

So let's move on to our panel discussions. Thank you again, all, for being here today. While other panels are going to be focused on more specific issues, the first panel is going to be addressing sort of the full spectrum of products and services related to the SIP and prop data and connectivity. And so with that, I would like to first thank our panelists for being here and note that, given the opening remarks, it's possible that this goes a little longer than planned. So just keep in mind when we get to the end of this and it's lunchtime that there's going to be a little time required to get out and get back in through security, so just keep that in mind, as we will be starting promptly after that.

So with that, I'd like to ask our panelists to introduce themselves. And before getting into other questions, take five minutes to share their high-level views on the evolution of SIP data products, exchange

proprietary data products and market connectivity services, including what works well and what could be improved. So, Doug, why don't you start us off?

MR. CIFU: Thank you. Thank you, Brett.

Good morning. My name is Doug Cifu and I am the cofounder and chief executive officer of Virtu Financial. Virtu is a global market making and institutional agency firm that provides competitive two-sided bids and offers in over 25,000 unique financial instruments in 235 markets in 36 countries around the world. Given the breadth and scope of our trading activities, we are uniquely positioned to provide a perspective on the topics being discussed at today's roundtable. Simply put, we purchase market data and pay for connectivity to nearly every exchange in the world.

In the United States equity market, our various activities as a market maker and broker means that on many days, we execute nearly 20 percent of the consolidated volume in the market. We also act as an important and valued business partner for nearly every retail broker and wealth manager in the U.S. equity market, handling approximately 30 percent of orders in the U.S. retail market. As a part of this service, we provide real price improvement or prices that are better than the national best bid or best offer to nearly 90

percent of the retail orders we receive. To be a hundred percent clear, these are not rebates or payments to brokers but real dollars, an average of $1.7 million per day this year and a total of more than $300 million last year provided to real Main Street investors who are the customers of our clients. This service is highly competitive, as we compete on price improvement with a half dozen other fabulous firms.

As a result, as our CEO, I need to be maniacally focused on our costs so that we can continue to provide that service to Mr. and Mrs. 401(k) in a sustainable and efficient manner as all costs go into our bid and offer spreads and reduce the price improvement that we are able to provide. Every dollar we pay for overpriced market data or connectivity is one less dollar available for price improvement. Virtu's customers have choices and they choose to trade with us because of the value, transparency and the service we provide.

Today, we will be discussing the very important and timely topic of market data and connectivity costs. Yesterday, I submitted a full comment letter outlining our concerns which, given the time constraints, I will not repeat. But as a major customer of the three exchange conglomerates to which we paid nearly $34 million in 2017 for market data connectivity and colo

costs, let me be direct and clear. We, as an industry, have jumped the shark. Incredibly, on a per venue basis, we pay the three U.S. exchange operators for market data connectivity and colo costs more than five times what we pay the nearly 225 other exchange operators in the other 35 countries in which we operate.

Given the realities of the modern electronic market, no market participant that desires to route an order effectively and consistent with its best execution obligations either as a principal or an agent can do so without paying for full depth of book market data from 11 exchanges and connectivity from them all. While the SIP is useful and necessary for some parts of our business, we and every other modern market participant are compelled to purchase proprietary data feeds and exchange connectivity. Virtu's clients take their fiduciary responsibility seriously and hold all of their brokers to the highest standards available, including using publicly available information when routing orders.

There is a reason for this heightened focus on market data and connectivity fees. The access fee cap has limited the exchanges' ability to charge us more for transactions so, in response, the exchanges created synthetic access fees by ratcheting up market data and connectivity charges over the last decade, circumventing

the mandates of Reg NMS. Many of these charges are simply unconscionable.

Let me explain exchange connectivity very clearly. The exchanges charge my firm a total of $1.188 million per year each and every year for six cross-connects. A cross-connect is simply a cable that plugs into an exchange. This is literally the cable that they use. It is provided by a vendor in Hicksville, Long Island, right near where I grew up. We contacted them and purchased this spool for $189. It's literally the Nasdaq cable. It is 328 feet of wire. Because we are Virtu, we shopped around and found the exact same spool cheaper on Amazon for $88.

(Laughter.)

MR. CIFU: If you need six of these, one primary and one backup, to connect to the Nasdaq, New York and Bats, the exchange costs around $1,300, purchasing from the expensive vendor in Hicksville.

We don't get new cable every year for our money. It's the same cable. We just keep paying for it over and over every year. If we spent one year's worth of cross-connects on Amazon, we'd have enough fiber to string from Carteret, New Jersey, to the CME's data center in Aurora, Illinois. That's 733 miles of cable. This is literally the $600 hammer that the Department of

Defense was criticized for so severely in the 1980s. We have no way to negotiate this price. This is in no way fair and reasonable.

We ask that the Commission examine and require the exchanges to publish their costs of providing these services. With respect to market data, we humbly request that there be real competition so that firms like Virtu could produce our own SIP and market data feeds at a fraction of the cost.

We are not anti-exchange. We believe the exchanges play a valuable and critical role in the financial ecosystem. We just believe in free and fair competition, transparency and efficient markets. We do not have that at all today.

I look forward to today's discussions. Thank you again to Brett Redfearn and his staff and the Commissioners for sponsoring this timely two-day roundtable. Thank you very much.

MR. REDFEARN: Thank you, Doug. Chris.

MR. CONCANNON: Thanks. Here's your cable back.

I'm Chris Concannon, president and COO of Cboe Global Markets. I want to thank Chairman Clayton and the other Commissioners and I want to thank the Staff for organizing this roundtable.

When I first heard about the roundtable several months ago, I was hopeful. I thought, great, this would be an opportunity to make some real changes to the SIP, that we would come here with some productive proposals and offer our help. Brett, as you know, we worked with you in your prior life, we worked with you and SIFMA on several SIP proposals that I think were real compromises.

However, in light of the recent unprecedented and unwarranted public assaults on exchanges, we now have less appetite for compromise. So I come here with no proposal on hand and little willingness to suggest compromise. We are here and willing to listen but we would like to listen to real facts, not unsupported claims.

The evidence is clear. Trading costs for retail investors continues to decline. Commissions are driving towards zero. Execution quality remains exceptionally high and retail investors are executing at or inside the market spread. Retail investors have never had it better.

I can go on my phone today, get realtime market data for free, execute an order for $4.95 or, in some brokerages, free and get executed at or inside the spread. There is no other market in the world that performs that way. Now, my order may get sold for

payment for order flow. That could be another roundtable idea in the future.

But let's turn to the institutional investor. According to a recent Morningstar study, in 2017 mutual fund and ETF investors on average saved around 4 billion in fund expenses, compared to 2016. Investors in mutual funds and exchange-traded funds experienced an 8 percent decline in their fees from 2016 to 2017. The facts are clear. Investors' costs continue to go down while their execution quality goes up.

So I ask you what is this debate about? It's not about Main Street versus Wall Street. It's literally a debate between Wall Street and the regulated exchanges. You have the investment banks, also known as SIFMA, and the HFTs in one corner and the exchanges in the other corner. This is not about mom and pop investors, this is not about hotdogs and apple pie. This is about BMWs and Range Rovers.

Unfortunately, the Commission is being forced to decide whose economic rents are appropriate, investment banks and HFTs or regulated exchanges? So let's talk about those economic rents briefly.

In the second quarter of 2018, the top five investment banks made over 20 billion in trading revenues. That's just the top five. They are on track

to make over 80 billion total trading revenues for 2018. Within their equity trading business, just to be fair, they only made 8.4 billion in the second quarter. Again, that's just the top five investment banks. In the second quarter of 2018, Cboe's proprietary market data for the entire industry was $9 million. So that's 8.4 billion versus 9 million.

The irony in all of this is the only ones left with excessive economic rents will be the lawyers we all have to hire to litigate these issues for years to come, litigation that will likely play out long after we are all here.

A preview of some of the facts that you will hear at the roundtables today. First, the SIP revenue is flat to down over the last decade. You will hear evidence that firms have choice. You will hear that term a lot, choice, when it comes to purchasing market data and exchange access. And clearly, they exercise that choice. You will also hear clear evidence of platform theory, where the fierce competition between exchanges restricts market data pricing power. And again, firms exercise choice. And finally, you will hear from executives from highly profitable businesses that whine and complain about their costs, including me. Thank you.

MR. REDFEARN: Thank you, Chris. Stacey.

MS. CUNNINGHAM: Hi, I'm Stacey Cunningham. I'm president of the New York Stock Exchange Group. We operate five equity exchanges, two options markets, and we are part of Intercontinental Exchange, which is the largest global ecosystem of exchanges and clearinghouses and data providers worldwide.

So I am going to start off with the good news. I mean, the U.S. capital markets, the U.S. equity markets are the deepest, most liquid, most transparent and most efficient markets in the world. We are literally the envy of the world's markets. And we think we shouldn't take that position for granted.

The markets are driven, our markets are driven by the forces of supply and demand, of competition and transparency, and we shouldn't assume that tinkering with those things is not going to undermine what makes us so unique.

Our markets operate well. You know, we share the Commission's view on the importance of protecting the Main Street investor. We share a lot of the points that Chris just made. I mean, the Main Street investor has never had it better. They are able to look up a stock quote for free. They are able to trade and get an executed price that is better than they got before and they are able to do it in less than a second, and all for

less than the price of a cup of coffee. The market data debate is not a Main Street issue; it is a Wall Street issue. It is about Wall Street profits and that's one of the concerns.

The value and importance of market data and connectivity has evolved and it has increased, based on the competition that was introduced with regulations, namely Reg NMS. That competition has benefitted investors and brought costs down, as Chris just detailed, but it's introduced fragmentation, dramatic fragmentation. It is unsurprising that, in a fragmented world, that variable costs come down and fixed costs have gone up. But the overall, all-in cost to trade on the New York Stock Exchange has come down.

When I say the all-in cost to trade, that includes transaction fees, market data fees, colocation fees, port fees and all of the connectivity fees. That all-in cost to trade, while it's a different mix of revenues than it was before, it has come down. It is cheaper to trade on the NYSE today than it is to trade in most dark pools. It is cheaper to trade on the NYSE today than it is to trade on IEX. That mix is different but it's coming down.

But fragmentation has introduced some challenges. It is harder for institutional investors to

source large liquidity. And, yes, it's more expensive to stitch the market back together when you're looking at a number of different venues.

But we look at the revenues that the NYSE earns on market data and it is roughly $220 million. Industrywide, including the other exchanges, it's about $600 million. That is half of what it is for the SEC's own Section 31 fees that are described as small. And it is just a fraction, a miniscule fraction of the top five equity trading revenues for five banks. So looking at just five banks for just the first nine months of the year, they just reported $25.8 billion worth of revenues. So this is a Wall Street issue and this is about Wall Street profits.

When IEX earns a profit, those profits accrue to their private owners, their largely institutional ownership. When the New York Stock Exchange, Nasdaq or Cboe earn profits, they accrue to their public shareholders. That's changed. When NYSE, Nasdaq and Cboe used to earn profits, they accrued to their member owners. This is a Wall Street issue. This is how it's changing. And this is about profits among Wall Street and who deserves what.

And so we are perfectly content, and NYSE is very pleased to be part of this conversation over the

next two days. We've come with ideas and recommendations that we do think would support some improvements and enhancements to our public markets, specifically around market data and connectivity. But we do think the time would be better spent talking about how we encourage our public markets to be more competitive globally and versus private market landscape, the private market landscape, because that is a Main Street issue. Like that is a real Main Street issue when we look at the number of public companies that are dropping. And part of the NYSE's core mission is to make sure that public investors, the Main Street investor, has access to opportunities so that they are not left out of the most dynamic and fastest growing companies that are out there in the world. And that's part of what we would like to solve for and we think the Commission shares that view. And think, if we took all of the brain power that's in this room and on this dais and among the Staff and focus on those issues, that we would all win instead of fighting amongst ourselves. But thank you. Thank you for having us here today.

MR. REDFEARN: Thank you, Stacey. Brad.

MR. KATSUYAMA: Thank you. My name is Brad Katsuyama. I am the CEO and cofounder of IEX the Investors Exchange. Just for clarity, I think we're the only regulated exchange on the other side of this debate

from the regulated exchanges. You know, we appreciate the invitation to be here. We are thankful for the Staff's work in putting this together.

You know, to put the issue in context, you know, we should consider how technology has evolved and impacted other industries and contrast that with basically what we're going to talk about today, what's happening in the equity markets in the U.S. You know, technology has been harnessed to bring sustained improvements to all types of consumers by delivering new products and services faster, cheaper and better. Even in industries where there are a relatively small handful of dominant players, if you think of smartphones or computers, even data delivery and storage, competition has yielded incredible performance and functionality improvements with no cost increases or lower costs over successive years.

If you compare that to the U.S. equity market, there are 13 exchanges, all but one of them, us, owned by just three companies. The products created and sold by each exchange are unique to that exchange. And based on comments that I saw posted last night, most members' experiences are similar to that of IEX. There are egregious markups, consistent price hikes by the exchanges over the years.

The reason for this stark difference is because there simply is no substitute. You know, we hear about choice. There is no choice. There is no substitute for a New York Stock Exchange direct connection in a New York Stock Exchange data center. There is no competitor for this product.

If there was any other alternative, and trust me when I say this, IEX would have gladly paid millions of dollars to someone else other than our competitors for connectivity and market data from those exchanges. It would simply be a bad business choice to do otherwise. But there is no choice. Don't be fooled when they say there is.

You know, law and regulation also gives exchanges a special status. Because of the status and the need for brokers to seek best execution to trade actively on all major exchanges in order to meet obligations to their clients, the exchange families also enjoy a regulatory monopoly on the sale of their products. The market data they sell is not generated so much as regenerated from the trading activity of their own members. Further, because the exchanges also control the so-called public consolidated data feeds, by design they have ensured that those feeds are suboptimal for sophisticated traders, perpetuating their product

monopolies in a multitiered system of market data.

Like other exchanges, IEX does receive portions of the revenue created by SIP fees. But unlike the other exchanges, we believe those fees should be reexamined based on full transparency of revenues and costs to operate these systems. The excessive fragmentation benefits exchanges by creating multiple product and data monopolies but it creates an unnecessary burden on investors and brokers who are required to make the necessary investments to navigate an increasingly complex market.

Commissioner Jackson in a recent speech made this point very clearly, and I quote, why do we have so many exchanges, only to have nearly all of them owned by three corporate parents? I understand, of course, why a company would buy and absorb competitors with the same business model. But it's harder to see why a company would acquire and then continue to operate virtually identical businesses. One reason our exchanges do this is so they can charge investors to connect to each exchange, end quote.

You know, from its beginning, IEX set out to become a very different type of market. Our approach to offering market data and connectivity falls in line with this. When we designed our market, long before we

applied to be an exchange, we made a decision not to mimic other exchanges by trying to extract monopoly rents from our members. As an exchange, we remain committed to that decision. We also have consistently spoken out against exchange pricing practices in testimony, comment letters and published opinion pieces. We also joined a petition late last year as the only exchange signing alongside a broad cross section of investors, brokers and traders asking the SEC to create more transparency around exchange costs and revenues for market data.

IEX has continued to rely on simple, flat trading fees rather than the controversial practice of paying rebates for order flow. And we also provide our market data and connectivity for free, both because we think it results in a fairer, less conflicted and more transparent market but also because it aligns our interests more tightly with those of our broker members and their investor clients over the long term.

The Commission's recent market data decision rightly calls into question whether many previous exchange fee hikes can be justified and it will raise the bar for approval of new fee increases. From our perspective, this change is welcome and long overdue.

In trying to answer the important question of whether exchange products are priced fairly and subject

to sufficient market competition, IEX has initiated an internal review of our own costs of offering direct connectivity and market data. When comparing our estimates to the prices charged by the large exchanges, the results are striking. For example, we estimate that the potential markup for providing industry-standard connections in an exchange-run data center approaches 3,000 percent. So Doug's cable on the end, if you add in people, if you add in some other things, you're still looking at a 3,000 percent potential markup. An analysis of our cost to produce and distribute market data suggests a potential markup for standard depth of book feeds of the type that are challenged in the SIFMA litigation may approach 1,500 percent or more.

To be sure, there are differences among exchanges and their individual costs of operations. But there are also important common aspects including basic space, hardware, software and personnel requirements. And many of these cost elements actually decrease on a per user basis, such that larger exchanges should benefit from diminishing incremental costs. But it's impossible to understand this connection between fees and costs without adequate disclosure by exchanges.

IEX does not expect that our efforts to promote transparency of our own costs will stop the debate but it

certainly helps to justify the point of having this debate. And it sheds light on a factor, costs, that to this point have been almost completely cloaked in darkness.

Our suggestion with how to move forward with this debate can be summarized in two words. Transparency and accountability. We need greater transparency of the revenues exchanges earn from selling market data and connectivity products. When they talk about market data, they seem to leave out the fact that you need to actually connect to get it. We need greater transparency on the costs that exchanges incur to offer these products. We need full voting representation by brokers, traders and investors on the governance committees that operate our public data feeds to ensure that these committees are fully transparent and accountable to all segments of the industry and the public. And finally, we should make historical market data more freely available to the public at little to no cost. It is unacceptable that the only studies that academics and other observers can perform are on data that the exchanges decide to offer them. Greater availability of historical data will increase the ability of independent observers to study market structure and recommend improvements.

As the only independent stock exchange, IEX

appreciates the opportunity to participate in these discussions and we look forward to answering any questions.

MR. REDFEARN: Thank you, Brad. Met.

MR. KINAK: Good morning. I guess I should say afternoon. By the time we get this thing started, it will be over.

I was going to keep my comments short and speak but I don't think I'm going to get a chance to speak after my opening comments so I will go ahead and lay everything out there right now.

So my name is Mehmet Kinak. I work for T. Rowe Price. I have been at T. Rowe for 19 years. And what I am doing today is representing the buy side, representing retail and representing long-term, Main Street investors.

I get tired of hearing exchanges say that they represent the institutional community, that they represent retail and that they represent long-term, Main Street investors. They do not; we do. We handle their pensions, their retirement accounts, everything you can imagine. We are here not to incentivize our own book but to incentivize the fairness and the returns of those Main Street investors. We are here for Mr. and Mrs. 401(k). I want to make that very clear to people.

When I am sitting here, I'm not worried about

my own book. Look, we have fees, too, and I will get into how much our fees have increased. But I'm not here trying to get our fees to come down because it's detrimental to our practice at T. Rowe Price. That's not what I am concerned about. What I am concerned about is an ecosystem that slants one direction over another.

Now, when Chris comes in here and says, hey, I'm not looking for compromise, that's basically what kind of a system we have now, right? They get to set the rules for us and we basically have to follow them. That's kind of a tilted system that I think probably needs to be addressed, having this ecosystem of a for-profit company that also can self-regulate itself, that also has policy reform that allows it to get flow. It's just a terrible cocktail that's been created, unfortunately, and it needs to be addressed.

So with that, let me start by saying the buy side hasn't been vocal on market data. I get that. We're usually kind of more involved in regulatory and structural reform. But we don't voice up on market data too often. But it does impact us. So these blanket statements that I just heard to my right that say costs have not gone up are incorrect.

In the last three years, our costs for nondisplay data at T. Rowe Price, that we pay, has gone

up 25 percent. In the last five years, those costs have doubled. For display terminal usage in the last five years, those costs have gone up 50 percent. So for someone to say that costs do not increase is absolutely false.

The other thing I want to point out, the non-displayed agreements that came into effect say seven to 10 years ago have really caused a major problem for how we conduct our business as an institution. There are broad definitions around what's considered non-displayed and, frankly, there's a lot of creative liberties taken into what is a non-displayed product. They don't allow us to store, to reproduce, to report, to use for analysis any type of data without charging us.

I also want to be clear that the exchange actually doesn't derive data, they aggregate data. It's my data. It's retail's data. It's Doug's data. It is not their data. But we are having to pay for it multiple times, over and over and over again for every single instance where I have to look at it.

And this comment that retail doesn't pay for a quote is absolutely false. They don't pay for it directly but it is in their cost of execution, as is with us. We also pay for it indirectly, and I want to be very clear on this point. We pay a commission to brokers for

the services that we find valuable. That's how we pay our broker-dealers for the executions that they have to provide for us. They are being taxed for the commissions that we are giving them, both directly from execution fees, but also indirectly from the synthetic fees that Doug talked about. We are no longer giving them the value from a commission perspective that they probably deserve.

Now, people can cite how much the top five brokers have earned. Those are separate businesses. We're in a market where commission rates have come down. We're in a market where management fees have come down. We're in a market, as Brad pointed out, where all technology costs are declining. And yet market data fees continue to increase.

We are going to get to a point eventually where, if someone says to me, I have to raise commission rates in order to provide that best execution service that broker is obligated to produce for me, that hurts mom and pop. They are the ones paying the commission rates. They are the ones incurring those costs.

So when we say, hey, we're protecting investors, we're not. If commission rates have to increase, those investors get hurt and it's the tax that the exchanges continue to charge.

Now, most people are going to sit here and say, hey, we need better governance. I'm all for that. We need better transparency. I'm all for that.

But the reality is, my ask is, these costs have to come down. Plain and simple. How do we do that? Bring competition into the space. I know for a fact that Doug can do what the SIP does -- in fact, I could say this factually. Doug does what the SIP does every single day for a fraction of the cost of the SIP. Maybe I'm wrong.

But there are competing firms out there that basically aggregate data and can distribute it for a fraction of the cost. Put real competition into that space.

As far as proprietary data, regulate it. It doesn't make any sense for the margins that exist right now. There has to be some fairness and reasonable kind of metric to decide what is fair and reasonable.

I look forward to your questions.

MR. REDFEARN: Thank you, Met. Hal.

MR. SCOTT: I'm Hal Scott, emeritus professor at Harvard Law School and the director of the Committee on Capital Markets Regulation. The Committee on Capital Markets Regulation has found that the U.S. equity markets are performing well for U.S. retail and institutional

investors, as the cost to buy and sell stock is near record lows. However, we believe that marginal reforms to the U.S. equity market structure could further reduce trading costs for U.S. investors. And we identified critical market data services as one potential area for improvement.

By this, I mean that broker-dealers must pay exchanges for access to the securities information processors, SIPs, for proprietary or depth of book data feeds and connectivity services to efficiently execute investor orders and fulfill their best execution obligation. This area, we feel, needs improvement.

While trading venues, exchanges and so-called dark pools clearly compete for order flow from broker-dealers and this competition has been the primary driver of reduced costs for investors, it is fairly clear that this competition has not constrained the cost of exchanges' critical market data services. This is due in part to the fact that broker-dealers do not pay for market data services when they are choosing a trading venue to execute a customer order. Instead, broker-dealers must pay fixed costs to access these market data services in order to make routing decisions. These costs, however, are passed through to customers, so investors have a direct interest in the cost of these

fees.

There are a wide range of options that the SEC could undertake to examine whether the cost of critical market data services are excessively high and, if so, then to take action to reduce them.

First, a measure that the committee recently supported would be to require exchanges to make standardized and thorough -- and I emphasize the word thorough -- disclosures as to their revenues from all critical market data services and the underlying cost of providing those services. Such transparency would provide the SEC and the public with the information necessary to determine if the cost of critical market data services is meaningfully and unnecessarily increasing the cost of trading stocks.

Second, the SEC could require that exchanges provide further evidence that the fees that they charge for critical market data services are appropriate and subject to competitive forces when the exchanges file for fee approvals. As we all know, the Commission recently made it clear that they are doing so, and I applaud those actions.

Third, the SEC could allow for competition among consolidators of SIP data. The committee has also supported this measure, as we believe it would address

concerns that the SIPs represent a single point of failure for the U.S. equity markets, and could improve the speed and quality of consolidated sources of market data while also reducing their cost.

However, these reforms would not subject proprietary data feeds and connectivity services to competitive forces. Without such competition, the SEC will be unable to exit the rate-setting business, whereby they must act as an arbiter of fees for these services, a burdensome, imprecise and potentially impossible task.

The SEC should therefore accept full public comment as to regulatory changes that could better subject these fees to competition. But if the SEC determines that doing so is not possible, then the SEC should consider whether it be more appropriate to only allow exchanges to charge fees for these services that match their direct costs. Thank you.

MR. REDFEARN: Thank you, Hal. Tom.

MR. WITTMAN: Thank you. My name is Tom Wittman, Executive Vice President of Nasdaq, CEO of our regulated exchanges in the U.S. and run marketplaces around the world, Nordics and the U.S.

So first, I would like to thank the SEC for convening this roundtable. This is another chapter in the 20-year commercial debate of the cost and value of

data among large banks, trading firms, commercial data vendors and the exchanges. Nasdaq appreciates this opportunity to discuss this important topic, address common misperceptions and offer ideas to ensure our markets are fair, orderly and protect our investors.

The direction of U.S. public policy for many years has been toward deregulation and reliance on market forces to drive innovation and democratize access for U.S. consumers. Competitive market forces encouraged by the SEC's Reg NMS framework have helped the U.S. markets to be the envy of the world and ushered in a golden age for retail investors. Today's markets are light years ahead of where we were even a decade ago. Technology and competition have been a massively democratizing force for investors. Exchanges are fierce competitors which, more so than we were when closed clubs owned by broker-dealers and operated as near-monopolies in our listed stocks. This is directly linked to an explosion of competition, deployment of technology and a resulting decline in investor cost.

Relentless fee compression on Wall Street has also been the catalyst for an ongoing commercial debate among banks, brokers and the exchanges over market data products and market access services. But let's be careful not to turn the commercial debate over

proprietary data products used by large banks and trading firms to give them a competitive edge into a public policy issue. These are competitive must-haves, not regulatory must-haves. I think Chris and Stacey have outlined, you know, the banks' revenues compared to data.

There are three myths that have become a common refrain in this public debate, three myths that Nasdaq aim to dispel with facts, data and evidence over the next two days.

Myth number one, the stock exchanges are effectively taxing mom and pop investors. Quite the opposite is true. We are in a golden age for retail investors, as pointed out by Doug. Thanks to advances in technology, individual investors can access state-of-the-art analytical tools and market data at little to no cost. Millions of U.S. investors get core market data in real time as part of a low-cost service they get from online brokerage firms and financial applications. Other retail costs are a fraction of what they once were, from low or even zero fees for ETFs and low and commission-free equity trading. The costs of providing SIP data to Americans saving for retirement and their life goals through brokerage and 401(k)s at almost a dollar a month for realtime data for each tape and these fees are typically absorbed by the brokerage firms that provide

the data to those investors. Because the SIP cost is capped, the cost for a large brokerage firm is estimated at 17 cents per retail client per month as outlined by our CEO in the earnings last night.

Myth number two, firms and professional traders are forced to purchase the fastest data feeds and access with lowest latency. The fact is, competition and innovation have created a wide array of proprietary data products that professionals can choose to use or not based on their market model. The professional traders and commercial data vendors profit immensely as they use vastly more data and technology but fewer eyeballs to transact trillions of dollars of securities. Moreover, most of our product business aims to offer online brokerages a lower cost alternative to SIP for many of their uses. This data now powers an extensive and innovative array of services for retail investors. Our Nasdaq basic product has saved investors over $200 million since 2009. The Commission has never issued a rule or regulation requiring firms to purchase anything other than SIP data. Trading firms that purchase proprietary data are driven by demands of competition and their business, not regulation, plain and simple.

Myth number three, exchanges have kept the SIP slow, costly and starved for funds. The SIP operated by

Nasdaq is 400 times faster than it was in 2010. Latency is down to 16 microseconds. The SIP carries 20 times more messages than a decade ago at much lower cost per message. In fact, the SIP revenue is down 24 percent, adjusted for inflation, compared to 2008. And I think it operated very well over the last heavy trading days. The share of SIP revenues for the exchanges are also down significantly because of competition. The big gainers of SIP revenue have been large off-exchange trading dark pools and broker-dealers who account for about 40 percent of equity trading volume. Nasdaq shares up to 98 percent of dollars it receives for eligible prints with FINRA and Nasdaq tier of contributing firms on a quarterly basis. To that point, Nasdaq took in $272 million in SIP revenues from the TRF and 232 million in revenue as rebates. At least one large broker-dealer received more rebates than it paid the Nasdaq fees for its market data, connectivity and equipment use in 2017.

Now, I know, Doug, the cable is cute and you're a competitor as well as a big customer of ours. And you are a firm that does participate in the dark pool. But I think what we fail to quote is the amount of rebates that come back to the firms that actually compete with the exchanges and trade off exchange. I would say that 50 percent of the revenues you received in rebates cover 50

percent of your cost for both data and data center usage access fees for the Nasdaq stock market.

It bears repeating, U.S. markets are the envy of the world. Capital is abundant. Liquidity is deep. Spreads are tight and executions are fast and certain. The question then becomes, what is the basis for government intervention? To Nasdaq, it's clearly not Main Street investors. They pay low or no fees for a broad range of high-quality products and services. Competition and innovation and proprietary data have created an array of products that professionals can chose to use, purchase or avoid. There is simply no basis for government intervention in a well-functioning marketplace to resolve commercial dispute about the profits of sophisticated competitors.

There is, however, a role for the government to guide the transparency and governance of a utility-like function such as the SIP. Given the industry's apparent insufficient trust in the proper operation of the SIP, the government should promote competition, especially price competition. When it comes to the market data, we should not expand the role of government regulation in setting prices and the practices are being addressed effectively by market forces and competition.

Nasdaq believes in the value of the SIP as a

public feed and the value of prop products where experimentation can thrive. Earlier this month, we proposed market structure reforms that the SEC and industry could act on. We have also outlined our views and backed them with some extensive data and evidence to back up the arguments in Nasdaq's written submission to the SEC.

We look forward to engaging in the thoughtful debate that contributes to good public policy and continued innovation on the side of our investors. Thank you.

MR. REDFEARN: Thank you, Tom. And thank you all very much for those comments. Now that we have agreement, we can move on to --

(Laughter.)

MR. REDFEARN: So, look, there's a lot that's thrown out on the table here. And our intention really is to constructively engage and try to figure out how we can come to a, you know, a closer solution. And again, keeping in mind individual investors along the way, critical to how we think about all of this.

We have this product called the SIP, right? Which is, you know, which is out there and it's serving a certain function in the marketplace and it's unclear whether that function is exactly what the function was

when it was initially designed and even during Reg NMS. So we want to talk about a few different things.

We want to start just by asking this question. Because we have the SIP, we have the Security Information Processors out there. And I want to ask, what is it -- what is it for? Does it work for trading? Is it just for eyeballs? Can you use it for trading? Does it work for best execution?

And then the sort of second related question is, what should it be for? Should the SIP be for something else? So what is it for, what is it used for more?

So Doug, why don't we start for you. Can you use the SIP for your trading system?

MR. CIFU: Sure, so let me be direct in how I answer it. Which is, look, I think you framed it correctly, Brett, which is, you know, the SIP is an eyeball product. It hasn't really changed in its functionality, as I understand it, since, you know, I was in college, 1986, 1987. So it's a product that has not evolved. And as Met correctly indicated and as we use at Virtu, if we don't have a full view of the marketplace, if we don't have a full depth of book that we have consolidated into our version of the SIP -- so top of book but also many, many levels below, we cannot fulfill

our obligations, in our view, for best execution on behalf of our many clients, including T. Rowe Price. And that is what the marketplace demands.

So really, you have seen this amalgamation of the SIP and the proprietary products as core products. Let's just call it what they are. Without proprietary data feeds, there's not a firm today, either as a market maker or an institutional agency broker or prop trading firm that can exist. It's just that simple. Without that full depth of book, it's just impossible to exercise your fiduciary obligations and, frankly, we would -- you know, T. Rowe Price would cut us off tomorrow.

So the SIP has a certain functionality. It's used by our retail customers, our retail broker customers with respect to their -- and I'm not going to address, you know, how much they pay for it. That's their business with the exchanges. They put in their own comment letters, they have their own views. That's not my -- not my issue.

I know at Virtu, in order to fulfill our obligations to our retail brokers and to our many, many valuable institutional agency customers from around the world. Without that full depth of book, we just don't exist as a trading firm. And I think for all of the firms that we compete with that that is essentially a

core product.

And I think Met and Brad made very interesting points, which is what the exchanges have done throughout the years is effectively try to slice and dice how they charge for these things and say it really hasn't gone up. But it has because there's many different ways. I mean, SIFMA put a great letter in yesterday that kind of goes through the many ways that we all have been charged a lot more because of the way the various categories in which market data is now charged.

And please don't forget connectivity. Because as Brad said, you know, it's great to get market data but if you're not actually physically connected to the exchange, it's kind of meaningless, right? And so I know the -- you guys find the cable kind of trite but it really does drive home the point that market data and connectivity are one in the same. So what these guys have done is taken costs and sort of divided it into many different buckets, if you will, including connectivity. And it's just unconscionable how much that it's increased over the years.

MR. REDFEARN: Thank you, Doug.

So Chris, I think we're aware that a lot of technology has been invested in the SIPs, that the aggregation speeds have gotten a lot faster, that, you

know -- but despite all of that, it still has this central point of consolidation in one place, it doesn't have depth, doesn't have -- there's a lot of things it doesn't have. So I guess the question is, what is it -- what do you think the SIP is good for today and what do you think the SIP should be good for?

MR. CONCANNON: So angry Chris left the room and happy Chris is here.

(Laughter.)

MR. CIFU: He'll be back.

(Laughter.)

MR. CONCANNON: The SIP is of great value. You have to go back to Congress, and they found value in organizing the SIP. Now, that's many, many years ago. But even the SEC to this day still requires that SIP quote at time of execution. It was just a number of years ago we requested the SEC, could we replace an exchange product, an exchange proprietary product in place of the SIP? And the SEC themselves said, no, the SIP is required at time of execution.

Is it valuable? Well, when I look at our four exchanges and I look at the number of members we have connected to our four exchanges, not everyone buys our proprietary market data. So there are firms in the industry that are reliant on the SIP for execution. And

there is no rule or regulation that we've been able to find where proprietary depth of book market data is required by the regulators.

Now, if you want to fulfill a commercial business, you have a choice of fulfilling that commercial business and buying full depth of book from every exchange in the U.S. No one actually does that. In fact, when I add up our list of clients, it doesn't include all the brokers in the U.S.

So the SIP does have value because people are using the SIP, both broker-dealers as well as folks that are routing orders among the various exchanges in the U.S.

MR. REDFEARN: Stacey, yeah.

MS. CUNNINGHAM: I just wanted to one of the points that Chris made that might be a helpful fact. When you look across our exchanges as well, not only are not all brokers members of all exchanges and not all of our members are subscribing to proprietary data feeds, not all of our members do the same thing on each of our markets. So you look at some of our smaller markets and a member of National Stock Exchange or NYSE National might not subscribe to the proprietary data feed there but they are also a member of NYSE and do subscribe there. And part of that is the competitive nature of the

different markets that exist and whether or not they feel, for their particular business model, they need to take that feed. So I would challenge the point that Doug made that all brokers that look like him, because I know some that -- they don't look just like him but they're in the same business and --

MR. CONCANNON: They're not as good looking as Doug.

MS. CUNNINGHAM: But they're not doing all the -- not acting with the same behavior and feel as if they need to take all of the products across each of our markets equally. So I think there is a competitive landscape there. Some of them choose just to use the SIP. So I think to answer your question about the value of the SIP, some do feel that is.

And just getting back to the connectivity piece of it, that's why I raised the point about all-in cost because that all-in cost does include connectivity. So when I'm talking about the mix of the services together, the all-in cost has come down and is cheaper than trading in many other places.

MR. CIFU: Just one point I should have made before which is with regard to the SIP, and we put this in our proposal letter yesterday, which is if everyone thinks it's so valuable, terrific. Then make it

competitive. Right, Met articulated before, at Virtu, you know, homogenizing 11 or 12 direct feeds into a top-of-book feed and then distributing it is not really like black magic; it's not that difficult to do. Right? So we could do it for a fraction of the cost. If it's a $370 million business, I'm happy to do it for $37 million and still make money on it. I guarantee you we would make money on it. And so would Citadel and so would a bunch of other great firms that are sitting in here.

We all can do this. It's really not, you know, an incredible technological exercise to homogenize the top of book and distribute it. So there is just an immense built-in margin to it. That's the frustration that you hear today. Right? It's not that these folks are ill intended; it's just that with the evolution of technology and the reduction of costs, we should as an industry be able to do this a lot cheaper. And this is just a friction and a tax on the industry that we're all bearing -- and ultimately passed on to the end user.

MR. REDFEARN: Brad, what do you think the SIP is useful for or what do you think it should be useful for?

MR. KATSUYAMA: I mean, I think you can break it down in two areas where it's deficient. One is the lack of information and the other one is just speed. As

you said, there's an aggregation cost from a speed perspective. So if there is no element of speeding up the SIP edge to edge and getting over the geographic issues, so I think that's kind of a moot point. Anyone who cares or is, you know, making machine-level decisions cannot use the SIP just from a speed standpoint. But I do think if you improve the information on the SIP, it can certainly be valuable to a host of people now that just simply either are getting the SIP without that information, so just trading at a disadvantage, or may look -- are not as speed dependent and may look to convert over. But if full information and speed become important, which it is for the majority of large players maintaining their own electronic trading platform, then I would not say the SIP serves much of a purpose to them.

But I do think, again, improving the information is just about willingness. You know, we've been pushing for more information to be on the SIP for quite a while. But again, the less valuable the SIP is, the more subscribers you have to the feeds that have more robust information. So it's just a pure conflict issue.

MR. REDFEARN: So, Met, same question. I mean, what is the value of SIP? And it would be interesting, also, to hear your view of when you're handling your institutional customer orders and you're dealing with

your counterparties, what your feeling is with respect to participants who are potentially using the SIP for routing or for their ATS versus using proprietary data feeds?

MR. KINAK: So the SIP for us is kind of what we look at. Obviously, investment decisions are probably made by eyeballs and looking at the SIP itself from either our Bloomberg or FactSet terminals. But as far as brokers having a choice of whether or not they can use the SIP or direct feeds, that doesn't exist. There is no choice there.

If a broker is routing using SIP data, they are not routing my flow. They can route someone else's but they're not eligible to get my flow, period. That's not negotiable. And it's kind of funny that people say, well, we offer different services for different people. Trading is a zero-sum game. Everyone has to understand that. This isn't like Southwest where I get to pay $15 extra dollars and I can board the plane faster than anyone else. We're all going to get a seat, we're all going to end up at the same destination. I might have to sit in the middle and two people next to me I don't like but, ultimately, I'm still getting where I need to go. That's not trading.

If I'm slower than the other person, I lose.

That's it. That's the fraction of time we're talking about.

So when someone says, hey, from a commercial enterprise, it makes sense for you to use a faster system over a slower system -- no. This is a best execution obligation. We are obligated to try and produce best execution on every single order that we have. If our brokers are not aligned in that manner to use the most direct, the fastest, the most robust feeds they can get their hands on, then we will trade with someone else.

And that's the choice we actually have, is the choice of which brokers are aligned with us, not which exchanges give us different products that we may or may not find useful.

MR. REDFEARN: Hal, do you have a view on the SIP and, you know, what do you think of how it's doing today and where do you think it could potentially go?

MR. SCOTT: Well, when one looks at the SIP, I think historically Congress and the SEC as well has regarded it as a public good. And why is that? It's not just for traders, it's for the country. I mean, we follow the market. You know, lots of people make decisions about all sorts of things based on the prices at the market, not just trading decisions. So I think it's important that that information be provided to the

public.

Now the question is, what information is provided to the public through SIPs? I think when the SIPs were created, people could correct me if I'm wrong, we didn't have prop data right beside them. We thought we were giving the public the correct prices, okay, of what was trading on exchanges. Now technology changes, okay, and the prop feeds are really the better source of information as to what these prices are. So why isn't the public entitled to have that, you know, as part of SIP?

So I guess one possible way to go here would be to include basically the prop data in the SIP as far as possible and then make sure that the competitive consolidator is providing that information to the public. At least at some option. I'm not recommending that, but I think that's an option that should seriously be looked at by the SEC.

I would not be in favor of getting rid of SIPs. That, I would not be in favor of.

MR. REDFEARN: Yeah, so, Tom, I know there has been investment in the SIP. But in terms of where we think this goes from here, what are your thoughts in terms of what can be done to, I don't know, improve the SIP? Or should something be done to improve the SIP?

MR. WITTMAN: So I think we've made, with the SIP powered by Nasdaq's technology, a lot of improvements to that SIP. And it's, I think, an interesting stat is from the time it takes to ingest a message within a SIP and spit it out the other side is around 15 mics. And the Nasdaq system itself is a proper system, bringing in an order and sending out a prop feed is around 24, 25 mics. So the SIP is fast.

I think there's different uses between what the SIP can be used for. We think there is better governance that could be put around the SIP, advisory, advisory vote, and some clarification around the vendor display rule.

As Doug talked about, the feeds that come out of the exchanges, there's different market models for different exchanges. So we can't run -- back to a comment that was made, we don't run three different equity exchanges with the same market model. An SRO has to have a ruleset for the market model it wants to run.

A market model like a pro rata market model or a price time model needs to give market makers the ability to ingest that data and look at this very fragmented marketplace and figure out how they're going to manage the capital that they have at risk. So that requires a different type of feed and a feed that's

probably not of interest to me entering an order through an online brokerage firm to buy and sell stock at limit price. That's not of interest. But it is of great interest to those liquidity providers who are providing the liquidity to the marketplace so you can pick up your iPhone and see what the current price is of a stock. So there's different uses for these different data feeds based on fragmentation, market models in the way the exchanges are set up.

MR. REDFEARN: I guess maybe a quick follow-up question. If -- we all appreciate the fact that speed is very relevant and important in today's market. And in the current SIP construct the aggregation times are pretty impressive, in particular at the Nasdaq UTP SIP, which has gotten down quite a bit. But they're still in one place, so it's still 350 microseconds from Mahwah to Carteret or whatever it is, 200-plus from Secaucus to Carteret, right? And so we're talking about potentially a world where there are brokers who actually might not be able to afford the other product, who might want to use the SIP for a trading system to use that. Is that the right structure to ensure that you have a competitive product for people to trade with?

MR. WITTMAN: I think you could put the SIP anywhere you want it. Right now, they're on the East

Coast. You could recommend put all order data and have a clog for the exchanges in the same place. I mean, you can get crazy with these ideas.

I think that the advancements made actually work and I think we've got to watch that we don't overload the SIP with a bunch of data that's not going to be relevant to a certain set of consumers. You can't create a lowest common denominator that's going to be expensive.

We talk about in a data center what do you use to consume data. There's different size pipes for different consumers. Doug needs a bigger pipe. Those market-making firms need a bigger pipe because of the amount of equities and options that they're quoting. So they need a different infrastructure for that.

So the SIP works. There are some incremental adjustments that we could make to that. But geography -- I think we're -- you know, you're moving to the longest leg of the horse. What do you want to solve?

MR. REDFEARN: So, Doug, moving on, we have a situation here then where I guess there are some brokers on the list that don't use the product. And I don't know if you have some idea of like who are the brokers? I'm interested in, you know, what is that sort of universe that's not using proprietary data for trading? And what

are your thoughts about, you know, what is needed for brokers to be trading? What do people need to have?

CHAIRMAN CLAYTON: Hey, Brett, let me jump in for a second and give Doug a chance to think about his answer.

I have to leave in a minute for something but I wanted to make a comment or two before I left.

First, just the value of this debate and the willingness of you to come here. Now, I said it at the beginning and now I can say it after having heard, it's extremely valuable. Thank you.

We're talking about, and I think Mehmet used the word, an ecosystem. Just to try and capture this for somebody who hasn't lived in this world for 25 years. The data -- it's clear, data is central to the ecosystem, absolutely. It's clear that data provides an advantage. Some of you believe, you know, striving for more data is an advantage that you're compelled by the law to undertake. Data production and distribution costs money, it's not free. We know that.

The question we're trying to answer is, you know, how do we do this in the most effective way? And I want to take a step back and talk about that ecosystem. What we're looking for in that ecosystem is liquidity, resiliency, all-in cost of execution, quality of

execution and, to a point that has been made, the overall attractiveness of our public capital markets.

So I know we're talking about data, I know we're talking about fees. But let's not forget that, you know, that's the end objective here.

And with that, I want to say thank you. I also want to say, Hal, if we can do it with competition, I'm all for it because that means less work for us.

And lastly, to your point, Hal, the value of prices, not just the value of prices for trading but the value of prices to our economy is difficult to overstate. So much -- so much of our economy depends on the participants believing that the prices they see, and particularly the prices they see in our equity markets and debt markets, are fairly derived and derived based on good information.

So again, thank you all very much.

MR. REDFEARN: Thank you, Chairman.

So go ahead, Doug.

MR. CIFU: Yeah, thank you. Look, I mean, I think Met put it best, which is -- and he's the consumer, right? So other brokers don't tell me how they run their businesses, not surprisingly. I can tell you what we do at Virtu and I can tell you my view as a former reformed lawyer and having had discussions with FINRA about this

over the years. Which is, I think in the absence of really understanding the marketplace and having full depth of book, I find it difficult to imagine that you can be competitive and I find it difficult to imagine that you could satisfy your best execution obligations. I just don't understand how you could have a properly functioning algorithm in today's marketplace that is routing a customer order in the absence of full depth of book.

Now, that's not to say -- and again, pardon me for actually saying something complimentary about the exchanges -- I think they have done a nice job in terms of getting the SIP down to a speed that is as low latency and as fast as possible. I mean, they can't, despite their efforts, make the speed of light any faster. Right? And Carteret is in South Jersey, Secaucus is here and Mahwah is in North Jersey. I'm a Jersey guy, so I know this very well.

And so you have to have a consolidation point. But that's sort of besides the point, right? It has a different purpose, the SIP, I understand what it's for, and leave it there.

My biggest complaint about the SIP is that we just charge way too much to do it. All right? So at the end of the day, the market has said and will continue to

say that if you are a firm that is not capable of harmonizing direct feeds and producing your own consolidated view of the market to handle my order, you're not going to continue to be in business in the next five, 10 years. It's just impossible to do that, you just can't compete.

MR. CONCANNON: So it's interesting to me to hear from folks that say the SIP is fairly useless to their business model is too expensive. Because I would assume they're not paying the fees for the SIP. I understand retail and large investment banks are some of the biggest users of SIP, mostly because the eyeballs that they employ, because the professional user fee -- not the nonprofessional but the professional user fee is high relative to retail investor costs.

But when I think about -- you asked the question, Brett, about brokers and how they use the different services in an exchange, I happen to have a few fun facts I'd like to share with you.

So this is just our top 10 firms across our four exchanges by market share. So presumably, they're making a lot of money, given the size of their market share.

There are four investment banks and six HFTs. Five out of the top 10 get a check from us after the

costs of their connectivity and market data. So we are cutting them a check monthly after their costs.

The largest client we have by market share pays the lowest market data bill among the top 10. So there are some firms who have figured out how to profit and how to trade without exorbitant market data costs, relative to the other top 10.

The largest client we have by market share does not buy the most capacity to trade on our four exchanges. In fact, they are ranked fifth in terms of how much capacity they buy. One of the top 10 clients pays no connectivity fee to us. So they don't have a cable, they're not required to have a cable and they pay nothing, yet they're in the top 10. And how do they do that? They go through a third party.

So a third-party aggregator pays for one cable and is granted full access to not our one exchange, that terribly cheap cable that Doug was pointing at. That gives you access to seven exchanges. It also -- I did a little math while I was waiting for my question. So you get access to seven exchanges, not one. And it buys you capacity. So that's really what we're talking about, capacity to our exchanges.

Because, as you recall, we have no capacity fees. We don't charge for orders or message traffic or

cancellations. So that one line that Doug can buy on Amazon gives you 2.5 billion messages in a month and it can be expanded up to one trillion messages per month. So that's the capacity that that little cable can give us because of the technology advances that we have.

So how do we charge for capacity? We charge through ports. There was a time when we didn't charge for ports. And guess what people did, they bought hundreds of them. They just installed hundreds of ports into our market and they can explode our capacity at any moment. So the ports or access fees that we charge are all related to the capacity that this SEC requires us to deliver. When we open up our capacity, we are not allowed to fall over. So we invest millions of dollars in operating our exchange at a Reg SCI level that doesn't allow us to tip over absent a fine. So it's that capacity that people are buying when they are complaining about their costs of market data.

In fact, Hal's study, it was a great study, but it includes the hundreds of ports that firms choose to buy in terms of capacity. So the growth of market data in his study is false. It's not market data that's growing, it's the capacity that the industry is demanding from these exchanges.

I'll give you another stat. Sorry, this is

angry Chris again.

MR. REDFEARN: I knew he'd be back.

MR. CONCANNON: So just -- and let's go back to last week, October 11, 2018. We got blasted with 8.2 billion messages across our equity exchanges. We didn't slow down, we didn't fall over. Because we invested for years in technology to handle 8.2 billion messages. Our options exchanges handled 30 billion messages. And we never charge for those 30 billion messages; we only charge for that cable that Doug's talking about.

MR. REDFEARN: Chris, just given some of the other feedback that we've gotten, including some of the comment letters that come in that talk about markups or things like that, you know, if somebody is connecting into Cboe or one of the other markets, I think they don't have a choice as to where they -- do they have a choice as to how they get in there? So therefore, if they need to connect and they need to buy certain things, including for capacity, what are your views about, you know, sort of this question about transparency vis-a-vis the markups and the costs associated with that, given in some cases the lack of choice?

And also on market data, remember a lot of it is market data and connectivity together. Market data alone oftentimes doesn't capture some of the -- Hal?

MR. SCOTT: You know, I think we should have a system that's not dribs and drabs disclosure. Okay, so Chris is giving us data here. I haven't heard this data before. Why isn't this data available to everybody in a standardized form, so we all can have rational discussion with the full data in front of us. We don't have that. Okay? And until we have that, we are not going to make a lot of progress on this. So --

MR. CONCANNON: Yeah but, Hal, if we're going to have full transparency, we need full transparency from the industry, not just the exchanges sitting at the center. We have to have full transparency. How much does it cost for microwave technology across the U.S. from Chicago to --

MR. CIFU: A lot.

MR. CONCANNON: Exactly. So when we're talking about economic rents, Hal, you know well, everybody has to show their economic rent so we compare them.

You're asking for what -- Brett, to go back to answer your question, what are the costs associated with a fixed connection? What I'm saying is it's not the cost of the hardware that you connect through. It's not the cost of the cable that you're connecting to. It's the cost of the technology that sits behind it that has to receive billions of messages. That's what we're charging

for.

We're selling capacity to our exchanges. And, lo and behold, the top 10 firms on our exchange eat up 50 percent of the capacity on our exchanges. So there are people in the industry, firms in the industry, that see it as a profit -- a profit tool. They have choice. They don't have to buy. In fact, the top firm doesn't buy as much capacity as one of the middle firms. So they have choice on how much capacity they can buy, they have choice on which feed they want. They can get the top of book, they can use the SIP or they can use full depth of book. And, lo and behold, as we look at the data, every one of our top 10 firms makes a different choice around how much they spend on market data and how much they spend on capacity.

MR. REDFEARN: Brad.

MR. KATSUYAMA: I mean, I think it's clear what the coordinated effort here is from the exchanges' standpoint, is just to kind of distract from, you know, the most obvious issues. I think when you talk about the quality of the markets, and the markets are fine, what are we talking about? I mean, the quality of the markets are due to the investors who provide those orders, the brokers who send them to the market, the market makers that supply liquidity.

Exchanges can't trade. So to take credit for the quality of this market from an exchange standpoint, I think, is ridiculous. It's kind of a distraction.

I think the whole Wall Street versus Wall Street thing, again, it's another -- it's another distraction, right? This is about fairness, this is about competition. How many new, emerging brokers have you heard about? Right? Because the cost, the table stakes to be competitive is so high, it keeps other people from coming around the table.

So you can quote stats about your top brokers. In a way, the brokers that are arguing are almost arguing against their own entrenched position, because they can actually afford to pay it. I think they're arguing from a perspective of fairness.

The last piece, you know, again choice, and to flip it to say the industry needs to prove back to the exchanges what the industry's margins are, again, it's another ridiculous distraction. Because, at the end of the day, exchanges enjoy a regulatory position. This market has been set up so that exchanges are at the center. There is a mandate to connect for best execution purposes. So the industry doesn't have to prove anything to the exchanges; the exchanges need to prove back to the industry that the things that they charge for are fair

and competitive. Because in today's market, there really is no competition.

So for a lack of competition, you know, barring some massive regulatory reform, the only other option you have is to prove that you're pricing things fairly under the current regulatory regime.

So even -- you know, the discussion on the SIP, there's a governance committee, it's going to hem and haw, going to drag out, it's going to look something like another thing that's dragging on in these committees. Let's just get, brass tacks, transparency. What does it cost? Okay. Because when you start talking about message rate, guess what, 600 bucks for a four-gig phone, $150 a gig. You probably can pay 600 bucks, 700 bucks for a 256-gig phone. That's three -- you can't talk about message rate because obviously technology has kept up.

So all the evolution that we've seen has just not translated because of a regulatory monopoly. So everything that you hear that's just trying to twist it back or put it back on the industry, or let's talk about that or let's talk about how great everything is, it's all a point to get away from transparency.

Let's make this real simple. What are the costs? And then we can talk about fairness. But you

can't talk, all-in costs, this, that, taking jabs here and there. What are the costs? Let's figure out what the costs are, then we can have a discussion on fairness.

And I think all of this, what you're seeing right here, is a distraction to not have to hand over what the costs are. And I think it's the exchanges' responsibility to do that, given the positions that we've been anointed with as regulatory -- as regulated entities.

So, you know, from our perspective, again, we could charge these charges. We could. And they say, you're not going this because of this, that and the other thing. At the end of the day, what's in the best interests, long term, of the investment ecosystem? Everyone is here to make money, but what's fair, given the regulatory situation that we find ourselves in? Everything else that I've heard is really just a distraction from the core point.

MR. CONCANNON: For the record, that's angry Brad that just showed up.

(Laughter.)

MR. REDFEARN: So we do have an obligation to figure out what's fair, reasonable and not unreasonably discriminatory. And the markets have evolved and the technology has become more sophisticated and the

investments have, you know, ultimately helped the efficiency of our markets.

But we have had people come in and tell us they can't afford to buy the fast stuff anymore and so they have to settle for this. So maybe -- this is what I was getting at -- maybe there are people who are at a certain point where they feel like they maybe can't compete with Doug or maybe they can't do Met's business because of the cost infrastructure here. And we have to create a fair, reasonable and not unreasonably discriminatory market environment for all of the participants in the market.

So we're trying to figure out how we get to that point. So, you know, given some of this evolution, how do we think about the broker-dealers on the bottom part of the list? Is it that they don't want it or they can't afford it or they have a different model? They don't want to trade with Met, how do we understand that?

MR. CIFU: Well, Brad and Met actually made the right point. Which is, you know, for Virtu, it's actually a competitive mode. One of the reasons we've scaled and grown and made an acquisition of Knight Capital was to bring scale and efficiency to our business model so that we could afford to continue to pay these costs.

So from a purely selfish point of view, right,

it's a barrier to entry for competition. As we get larger, you know, we're going to be able to use our buying power, if you will, and our scale in a way that other brokers can't. So from a purely selfish point of view, Brad actually makes the right point.

It's really remarkable, and I'm sitting here reflecting, and I'm thinking is there another industry in the world where, you know, we're a large customer, probably the entire equity market is represented here. We submitted a letter with 23 other firms, every -- you know, retail firms, institutional firms, other market makers, IEX, and we're all basically saying the same thing. Like, you know, guys, it's just not right, it's not fair, you're not being transparent. This is not reasonable. This is not the way to treat your customers.

I mean, at Virtu, if I acted this way towards the retail brokers that I do all the work for, towards Met, they would just turn me off, right? Because it's a competitive marketplace where I'm competing with Citadel and Susquehanna and Two Sigma and all these other great firms out there. Why do we have a system where every customer is basically saying to you guys, enough? Be fair to us, be transparent. This doesn't make any sense.

Okay, I get that there's more costs than the $88 cable. I did that for effect, right? But I run a

major technology firm that connects to 235 marketplaces. I know how much it costs to do this. Brad has been a hundred percent transparent. He runs an exchange and he told you what it costs to do this. Go read his blog, it was very well done.

So we -- the emperor has no clothes. We're here telling you that the emperor has no clothes. And so the fix is, make it competitive, allow us to compete and/or make these guys be transparent. Because you're going to give them a regulated oligopoly, just be fair about it. You know, this is the cable company, this is the telephone company before it was broken up, right? That's the industry that we're faced with.

MR. CONCANNON: I just -- Brett, I have to respond, because both Brad and Doug are making a statement that -- when you look at the fierce competition that the exchanges engage in, the pricing competition that we go back and forth, you see all the pricing maneuvers that we are trying -- scratching at each other's market share, all to solve the economic benefits of the members, the same members that are complaining.

IEX is a new exchange. We even have a new competitor walking into our space --

MR. KATSUYAMA: It wasn't very easy, but we're here.

MR. CONCANNON: There's no -- well, you were a pretty successful dark pool and now you're an exchange dressed up as a dark pool.

(Laughter.)

MR. CIFU: Angry Chris is back.

MR. CONCANNON: But the point is -- and this SEC has actually made the claim -- they understand there's fierce competition among the exchange business.

Now, to suggest that we're not competing aggressively and we're in some oligopoly is absurd when you look at the facts of how order flow moves regularly across our various exchanges. Our market share is down because we didn't respond to pricing maneuvers by the other exchanges sitting up here. So there is fierce competition in the space.

We've tried to compete with market data. We offer the lowest market data fees out there. And some firms buy it and some firms choose not to buy it. And I get that Met is demanding from his brokers that they all buy the fastest feeds and have microwave towers. But that's his choice to demand that. The SEC, by regulation --

MR. KINAK: No, no, no.

MR. CONCANNON: It is, Met. It is, Met.

MR. KINAK: No, we have a best execution

obligation. That is paramount to everything we do.

MR. CONCANNON: Okay, where is that best execution obligation written that you have to buy microwave towers?

MR. KINAK: I have the best execution --

MR. CONCANNON: Did the SEC issue that order? Or FINRA? Because I haven't seen microwave towers in any of their --

MR. KINAK: For me to say to someone that I have the slowest systems, that I don't see the market in its accurate form but I'm still executing orders on your behalf is absolutely not even allowed -- I can't even say that to a client. Now, it doesn't have to be written in any regulatory rule. It is understood --

MR. CONCANNON: It does, because it's commercial decision then.

MR. KINAK: No, it is not a commercial decision. It's also -- let's get to the point here. You guys have built this system. This arms race was built by the exchanges to offer competing products from a speed perspective so that you can charge people differing rates for different market data. Now, when everyone has to come to the table to get it -- look, frankly, you got greedy. All right? You want to ask why you have to be obligated to show your fees? It's because you come with

privilege. You're an exchange. You have privilege. Take your protection away? Maybe I don't want to connect to you anymore. Right? Maybe I don't want to relate with you.

But the reality is I have to take in, I have to see 100 percent of the market and I have to see the realtime market at all times. That is not a commercial decision. I do not make money based on what the spread or a tick change happens in microseconds. We hold investments for three and a half years. But I still have a best ex obligation to go and get the best price for my customer every single time that I trade. And it doesn't have to be written in a regulatory rule.

That's ridiculous to say that comment. It's ridiculous to build the arms race and then turn around and say, you don't have to subscribe to it.

MR. CONCANNON: Well, Met, in fact people don't subscribe to it. We have four exchanges and -- and you're not a subscriber and many brokers aren't subscribers of our fast data feed.

MR. KINAK: So we are not a direct subscriber. We obviously subscribe through our broker-dealers and we require them to describe.

MR. CONCANNON: That's a commercial decision and the SEC has never demanded in any rule or regulation

that anyone has to buy these --

MR. REDFEARN: So, Chris, one of the questions, and we'll tone this down a little bit for a second and hope to get nice Chris back, is one of the questions that we're asking is about -- and I understand this and these are important issues and so it's understandable that there would be passion here. But one of the questions that we're asking is about the core data, is about what do people feel they need. Do people feel that they need to have depth of book to trade? Do they feel like they need to have this data?

And to the extent that we hear yes to that question, then that has implications to it. The SIP hasn't really been revisited for a long time.

We have other panels where we'll be having conversations about the fact that there's no odd lots in the SIP and for high-priced stocks, there's a lot of inside markets in odd lots and maybe odd lots should be in the SIP. There will be questions about if people do want to use it for trading, maybe there's another architecture we can use for that. So there may be ways that we can improve it.

But we certainly have heard from plenty of people on trading that they need to buy certain products to be able to trade in the market. We've contemplated

the discussion about best execution and do you need to have prop data. And so far, it's been limited solely if you use the prop data for your customer execution engine or your own trading systems, you have to use it for that, so it's got to be one or the other. But it's kind of a question that we struggle with on that front, so it's not necessarily set one way or the other.

But I do feel like Tom has been down there trying

MR. WITTMAN: I've been trying but I can't get in.

MR. REDFEARN: I want to give you an opening here, Tom.

MR. WITTMAN: He's checking the stock prices on his pre-application on his iPhone there as we're talking.

I mean, the transparency conversation is hard for me to follow because I think everything we do as exchanges, we communicate to our customers, we file with the SEC on what it is.

When it comes to cost of product, there is choice. And, you know, you can't burden a certain class of citizen with a behemoth data intake. If you look at some of the -- like Nasdaq Basic, in 10 years, the price was increased from $20 to $26 a month per user, 14 years for total view, $70 to $76. I honestly think that the

cost to some of these firms has nothing to do with the incremental increase of some of these products, it's the cost of automation and changing from eyeballs, reducing the number of people who trade and increasing the amount of automation used to trade. So it's more about that and buying services.

And Met, I know you want to push a button, but you've got -- when it comes to your business, you have broker-dealers that you use and those broker-dealers compete with each other. Those broker-dealers compete with us. And they have the opportunity to take a look at any data product that we produce and any means for acquiring that market data to run their businesses and make money trading your order flow, right? So that's competition. And I think that's what I want to see, I want to see more competition. I don't want to see a democratized solution like move everything into one central place and have three different SIPs, you know, producing the same data.

And I'm not asking to see what you or any of my competitors or customers' margin is. I don't care how Doug's algorithm or anybody else's algorithm and the costs that they have to do that. You know, they've got margins, they're making money. And I think what we do is fair and transparent.

MR. REDFEARN: Guys, I want to close with one last question --

COMMISSIONER ROISMAN: Actually, Brett, do you mind if I have one quick question?

MR. REDFEARN: Yeah, sure.

COMMISSIONER ROISMAN: Thanks. So I appreciate this low-key conversation.

(Laughter.)

COMMISSIONER ROISMAN: But I guess, what I've heard, I mean, it's clear you guys are all passionate and have been in this fight for a long period of time. So I'm relatively new.

It sounds to me like a lot of this is, as I tried to point out and I think many people have said before, it does tie back to certain rules, NMS, like OPR and then ultimately best execution and other things.

Doug, you mentioned opening up SIP for competition. If you created your own SIP, would you use it?

MR. CIFU: Sure. I mean, we use the SIP and we pay -- despite what Chris said, we pay a decent amount of money for the SIP. We pay more for the proprietary feed. So, of course, we would absolutely use SIP.

COMMISSIONER ROISMAN: So the same product that you would create for everyone would be what you would

use?

MR. CIFU: Yes.

COMMISSIONER ROISMAN: And, Met, would that satisfy you?

MR. KINAK: I mean, if I had the opportunity to measure his SIP versus the actual SIP and he was providing the same robust data at a probably faster speed and much lower cost, absolutely, yes.

COMMISSIONER ROISMAN: And do you think that would negate the need for proprietary feeds? Because it seems like Doug would still be taking the proprietary feeds in order to create --

MR. CIFU: Sure, I mean, yeah. As I said, they're really different products for different purposes.

COMMISSIONER ROISMAN: Right. So I guess my point is, we can continue to create a SIP which will always be slower, because it's aggregating properties, than proprietary feeds. And there's still going to be always a race because some clients are going to want the best and perhaps there's going to be a better aggregator than you guys. I don't know if there is one right now but there could be.

MR. CIFU: Sure.

COMMISSIONER ROISMAN: So are we going to just be here in five more years talking about the same thing?

MR. CIFU: Well, I guess it depends what the solution is. I mean, if you made it all competitive, I think as an industry we'd be very happy to have competitors for the proprietary products as well. Right? Or at least some measure of understanding what the cost is of providing that proprietary product.

I think the SIP and the proprietary products are very different and for very different purposes, right? And so the point I was making before was that we think that we could produce a SIP that was highly competitive to what they were producing at a fraction of the cost, because it's not such an engineering feat, if you will, to aggregate a bunch of feeds and create a top of book.

COMMISSIONER ROISMAN: I appreciate that. Again, I think I just come back to it may be that this body needs to provide more clarity on many of these issues.

MR. REDFEARN: Thank you, Commissioner.

Listen, I know we're pretty much out of time here. But the one question I did want to ask is, we have to evaluate all of the fees that are for connectivity and for market data on the proprietary side and otherwise, but in particular on the proprietary side, with the standard of fair, reasonable and not unreasonably

discriminatory. And we struggle with how to -- how to identify what is fair, what is reasonable and what is not unreasonably discriminatory.

So in as short a number of words as possible, can you guide us in terms of how we should think about doing that?

MR. CIFU: I think I would go back again to Brad is probably the best person on this panel to discuss it. He has been fully transparent at IEX in terms of they run an exchange, they've got the same obligations as the other 12 exchanges. Their exchange is situated -- their matching engine is in New Jersey like everybody else's. So they are in the exact same footing as the other three exchange groups. And Brad has fully disclosed what it costs.

I think I would just look at that and say, why do you guys charge so much more?

MR. CONCANNON: So it's a great question. And, as I think about it, obviously the cost of access depends on your choice of access. Clearly, if you want to be a large player, you're going to buy more access.

But technically, you simply need, because of OPRs, as the Commissioner pointed out, you simply need top of book. You can get that -- you have, again, choice -- from the SIP or you can get that directly, a top-of-

book data feed. Which, if you aggregate all the top-of-book data feeds across all the various exchanges, you would have, ironically, depth of book. Because if you look at the statistics, 97 percent of executions are at or inside the NBBO. The top of book from every exchange gives you what is technically full depth of book.

But the cost of access to our exchange, as I pointed out, it would be one cable per month. And then you would have access to our seven exchanges and you would need a port from the various exchanges. So it's fairly cheap access to get to our market, which is call it 16 to 18 percent market share of the U.S. equity markets. Still doesn't give you the over-the-counter market and all access to the dark pools that Met may require his brokers to have.

MR. REDFEARN: Stacey.

MS. CUNNINGHAM: Thanks, Brett. It's hard to get into this group.

So one thing I just wanted to say is I think what I'm hearing a number of times happen is we're pulling out one aspect of fees and focusing on just that and stripping market data out of the overall ecosystem. And, you know, I don't believe that I heard any of the exchanges up here say that market quality that is good in the market is a result purely of the exchanges. It is an

ecosystem and we recognize that.

And it is our all-in costs that matter because there is a relationship between transaction fees and market data fees and connectivity. And so I think that's why it's important to look at that relationship and not try to just isolate one component and say fees are rising over here and we're going to ignore the fact that fees have come down in other places, because that definitely seems to be what's happening.

And we heard an impassioned response from Brad. But it is cheaper to trade on NYSE than it is to trade on IEX. And so I think if you're looking at just one aspect of fees, yeah, you can talk about, you know, some of the things in isolation. That's very different from what the overall landscape is. And so I think it's important to look at that holistically and there is competition. The facts are, despite what we hear from Doug and from Met, the facts are not all brokers take all products, not all brokers exhibit the same behavior on all markets. So there is a competitive landscape and they are choosing what's right for them.

It doesn't mean that we can't make improvements. And just to address some of the cost concerns that have come up, I don't believe that investors or anyone, that any market participant, is

expecting to pay the cost of the product, the cable, the seat on the New York Stock Exchange. When people spend a million bucks to buy a seat on the New York Stock Exchange, they weren't thinking, well, how much wood went into creating this seat. Or, Doug, when a Florida Panthers fan buys a ticket, I don't think they're thinking about the paper the ticket was printed on and what that costs, or even the chair that they're sitting in in the stadium. They're thinking about the ecosystem that they're walking into and what they're about to experience.

For exchanges, that's capacity, that's access, that's the exchanges processing information that's coming in, sequencing orders, putting them together. And it's not just aggregation. It's how do the orders arrive and how do they interact with each other. And that's what gets published out.

There are enhancements we can make. We're here with recommendations. I agree, Brett, that on the SIP, I agree with Brad, you know, I think we can add more core data to the SIP. I think odd lots does make sense to include. We can include auction and balance information. I know there's another panel that's going to go through that. I think it would be helpful to add new products.

We can't solve the geographic latencies. Or

there is debate the NYSE brought to the SIP committee a long time ago to talk about the nature of a distributed SIP and is that something we should explore. Those conversations have been ongoing. But in the short term, we could use wireless technology to deliver SIP and overcome some of the geographic latencies.

So there are steps that we can take. But I don't think we should get lost in some of the nuances of, you know, what isolated costs are. This is an all-in cost discussion and we shouldn't lose track of it. It's a competitive landscape.

MR. REDFEARN: Brad, fair, reasonable and not unreasonably discriminatory.

MR. KATSUYAMA: So I think, first off, what Stacey said about cost to trade on New York versus IEX is totally false. I mean, cost for who? If you're a demander of liquidity, if you have an urgency to trade like a lot of investors do, they're paying 30 cents a hundred across the spread on New York. That's three mils. Three cents a hundred on IEX, 10 times cheaper.

If you're a collector of rebates, yes, it might be cheaper. Again, it's a whole other discussion. But again, everything I've heard, it's just misdirection, here, that and the other thing.

I think if you want to get to the heart of is

it fair, is it reasonable, is there competition, just look at the margins. Right? Because if the margins are extreme, and we can't calculate those because we have no transparency, then that's telling you that, one, it's not fair, two, it's not reasonable and, three, it's not competitive. So they can say it, trust us. And I think it's been trust us for a very long time. And part of the reason we're sitting up here and there's so much anger is that we've trusted for a long time and we've started to figure out that we can't trust the exchanges anymore.

The only way to evaluate fair, reasonable and competitive is to actually look at the data and look at the numbers and assess the margins. And if they are extreme and too high then what we have is a regulated monopoly abusing its position in the market. It's plain and simple.

MR. REDFEARN: Met.

MR. KINAK: First of all, for the record, I'm always angry. I'll just put that out there.

(Laughter.)

MR. KINAK: A couple of things that Chris said, one, we do not require brokers to connect to dark pools or require that they run a dark pool. In fact, if they choose not to trade at a specific dark pool, I could care less. Depth of book is not a function of where things

trade, it is the actual depth of the book, where in the price of a stock people are residing. It doesn't matter if 97 percent of the time it happens in the NBBO, it still doesn't give me clarity on what depth of book is.

But when you talk about fair and unreasonable, the barrier to entry for a broker-dealer right now is significant. It's extremely significant. Whenever a small broker-dealer comes into our offices and says, hey, look, I'd love to route. You know, MiFID has come in -- and I hate to bring European regulation into the conversation -- but MiFID has come in and given us an opportunity from a nonresearch perspective to compete for best execution. Our first question to them is, are you taking in the full, you know, data services that all these exchanges offer? I'm talking, you know, direct feeds, depth of book information, all of that stuff? And if the answer is, no, then the conversation ends.

I don't see how smaller brokers can afford all the things that Doug pays for and compete in this environment. So do I think it's fair and reasonable? Absolutely not.

And finally, you know, Brad made the point that we're angry. The reason we're angry is I'm sitting here as an investor and the exchanges keep saying that they're here for my protection and for my innovation. I haven't

seen it. Okay? You may have innovated for other market participants. As an institutional investor, I don't feel protected at the exchange and I don't feel like they're innovating on my behalf. And that's why you see the passion that comes out. Thank you.

MR. REDFEARN: Fair, reasonable and not unreasonably discriminatory.

MR. SCOTT: So I think, again, I'll come back to the disclosure. I think we need full and comprehensive disclosure of the cost of these exchanges in providing the data. It's not an answer to say, well, if you want us to provide our costs, we should have every company in America tell us their cost. It's not an adequate response to say, you want to know the margins of the exchanges, we should know the margins of every company in America's margins. That's not the answer. They're SROs, okay?

And you, the SEC, have a statutory obligation to judge whether they're charging fair and reasonable prices. You don't have that obligation with every company in America but you have it with them. And therefore, they need to provide this disclosure.

MR. REDFEARN: Tom, final word. We're trying to understand how we do that, how we meet that statutory obligation of fair, reasonable and not unreasonably

discriminatory.

MR. WITTMAN: So I think Nasdaq does that every day. I think what's going to be difficult is -- the points were made by Chris a bit -- you've got to take a look at this in the entire ecosystem. Because there are banks and brokers that have a net check given to them by exchanges for liquidity provision because they're net adders. I talked about the profit sharing we do with the SIP data. So these things are all interrelated, along with market structure, Reg NMS, order protection.

So it's not going to be -- it's not going to be an easy task to dissect those intersections and make those determinations. But like I said, we -- I think we do that every day.

MR. REDFEARN: So I want to just thank the panelists for coming here today, for bringing your passion and your thoughts. We really appreciate it. We will struggle with these issues and try to land at the right place. And so an open discussion is extremely helpful. We appreciate your participation, also allowing other members of your organizations to come in to other panels and help us figure this out.

We do want to get to the right place. We do want to do the right thing by investors and keep them at the top of the mind throughout this process.

Let me just make a quick administrative announcement. So we are behind schedule with this but I am glad we were able to have the conversation we did. I will just remind the audience that we will be starting promptly at 1:15. I know that there will be challenges getting in and out of security here, so just keep that in mind.

And lastly, I would just ask if the panelists from Panel Two in the afternoon can come by here just for one second, that would be super helpful.

But with that, let me thank you again, thank you all very much. We appreciate it.

(Applause.)

(Whereupon, at 12:33 p.m., a luncheon recess was taken.)

A F T E R N O O N S E S S I O N

MR. REDFEARN: We are going to ask everybody to grab their seats. Please come in and get seated as soon as you can. We are actually going to have to probably get started before everybody makes it through the security line but we will do our best to fill them in later.

So that being said, I am going to turn it over to John Roeser.

MR. ROESER: Okay. Our second panel will focus

on, to the extent the SIP data is meeting the needs of market participants.

I'd like to start off by thanking our panelists and give them a few minutes to introduce themselves and give their thoughts on how the SIP is working well and what could be improved.

MR. ALBERS: Perfect. Thank you, John.

My name is Oliver Albers and I am the global head of sales and strategic partnerships within our global information services business at Nasdaq, and that covers our data business, which includes our exchange data, but also a lot of other data assets that we have, our index business and our investment data and analytics business.

So with that said, I want to thank the SEC for convening this roundtable. To Nasdaq, this is not a one-dimensional conversation about market data, access fees, colocation or even best execution. Our competitive and multifaceted markets exist as a single fabric whose strength relies on many threads. We all need to be very mindful to pull those threads carefully and focus on the impact to Main Street investors. We should rely on market forces and shy away from government rate setting which, frankly, does not work. Nasdaq welcomes the opportunity to contribute to a better understanding of

the SIPs and a proprietary data product servicing investors of all shapes and sizes around the globe.

The SIPs consolidate the best bid, best offer and last sale from all U.S. equity exchanges and also calculate and disseminate the national best bid, best offer, or NBBO, for any publicly traded equity in the U.S. The NBBO is a really important reference price and benchmark for investors. So much so that nearly 97 percent of trades occur at or within the NBBO. The SIPs are the basis for this important information. But firms can also create their own BBO, which we heard earlier, but it's not easy for all participants. The SIPs make it easy. The SIPs also do this quite well.

There have been vast improvements in SIP data in recent years, even as SIP revenue to exchanges has fallen. The Nasdaq SIP has an average latency of just 16 millionths of a second, which is 15,000 times faster than the blink of an eye. The Nasdaq SIP can also handle 10 billion messages per day, 20 times more than a decade ago, and significant cybersecurity and fraud prevention investments by Nasdaq and other operators have increased the overall market efficiency and resiliency.

Most importantly, SIP data comes at low or no cost to Main Street investors. The nominal price for SIP data has dropped by 96.3 percent over 30 years. When

adjusted for inflation, the SIP revenues allocated to the exchanges has fallen 23.7 percent from 2007 to 2017. Meanwhile, SIP revenues to off-exchange trading venues have gone up. In fact, 30 percent of all SIP revenue earned by Nasdaq over the past five years has been given back to broker-dealers.

Turning to proprietary products, let's start with the question of why they even exist. Well, there are many different types of market data consumers, from major Wall Street banks and market makers to retail online brokerages and media companies across the world and all have differing data needs. In a competitive market with many different types of participants, there is no one size fits all. Some trading firms have business and trading models for which they need and are willing to pay for the latest technologies, both from exchanges and other third parties, and online brokerage firms on the other hand may choose top-of-book proprietary data and connectivity that meets their needs at a lower cost than the SIPs. And, of course, many, many others rely just on SIP data and do not purchase direct feeds from an exchange.

Generally, Nasdaq offers BBO, last sale, full depth-of-book feeds for each of our equities exchanges via a multitude of connectivity options, via market data

vendors, global points of presence and even directly on our website. We provide choice to make it as easy as possible for firms and investors of all shapes and sizes to consume our data. For all of these products, we are far from the only game in town and the intense competition we face has only benefitted mainstream investors.

So I hope the key takeaway from this conversation is that a simplistic view of core versus noncore, slow versus fast, public versus private is inaccurate and misleading. First, the SIP isn't slow; it's state of the art and lightning fast. Second, prop isn't necessarily deeper or more expensive than the SIP. And finally, competition between the SIPs and prop products isn't problematic, it's good; it encourages innovation and experimentation that ultimately drives down cost and benefits Main Street investors who get all of this data at little or no cost.

So while our analysis suggests that the regulatory scheme for U.S. stock market data is accomplishing its goals, we do think there is room for improvement. One example is we have asked the SEC to clarify the vendor display rule to eliminate confusion among broker-dealers about when they must use consolidated SIP data and when they may rely on data from

a stock exchange like Nasdaq. Such clarity could reduce the already low market data cost for the investing public without negating brokers' obligation to provide best execution when an investor trades, which remains sacrosanct.

So I want to thank the Commission again for convening this conversation and really look forward to a lively discussion -- hopefully not as lively as the last one.

(Laughter.)

MR. ROESER: Thanks, Oliver. Matt.

MR. BILLINGS: Thanks, John. Good afternoon, virtual Chairman Clayton, Commissioners and Commission Staff --

(Laughter.)

MR. BILLINGS: -- thank you for the opportunity to participate in today's roundtable. I am Matt Billings, managing director, market data strategy, TD Ameritrade.

TD Ameritrade, based in Omaha, Nebraska, was founded over 43 years ago. TD Ameritrade on behalf of our 11 million accounts has long advocated for market data structure that provides retail investors with equitable, low-cost access to quality market data. It should not be a surprise that TD Ameritrade strongly

agrees with Chairman Clayton's goal of ensuring that the current market data structure is in the best interests of retail investors, Main Street investors.

One of the strengths -- I'm going to go a little bit off script there -- so one of the things we heard about in the first panel was about the golden age of retail investing, about how it's never been better for retail investing. And I am respectful of that because we're all in the same ecosystem and all these people up here, we're all in the same ecosystem, we're all driving towards the same thing and that's the client experience.

But I do want to state that that process for the retail investor starts with firms such as retail brokers such as TD Ameritrade and our peers in that group. That's where it starts. That's where the innovation and the drive about the client experience, that focus on client experience is always paramount to what we do and how we think.

Back to script, I apologize.

One of the strengths TD Ameritrade sees in our offering is our ability to provide such a diverse community of retail investors quality trading tools and technology, research and execution, all at a low cost to investors. As market data is the lifeblood of the markets, access to quality market data, whether through

browsers, downloadable software, mobile platforms, IBR, it's critical to our offering.

TD Ameritrade, with our largely self-directed retail clients, is one of the largest redistributors of SIP data. As such, TD Ameritrade believes the SIP does offer retail investors an adequate core, top of book, consolidated representation of the market.

With that said, there are several areas of the CTA UTP plans that warrant review. We have provided a more thorough review in our written comments that we previously submitted. We will briefly touch upon a couple of these areas in this statement. Particularly, challenges presented in the onboarding of clients for realtime consolidated data, and the administrative burdens of the CTA UTP plans.

First off, I would like to touch upon the challenges for our clients. For retail investors to receive realtime SIP data, they are put through multiple steps. The account must be that of a natural person versus a legal entity. That matters. If you are a legal entity, you are immediately disqualified and you are now considered a professional, okay, and that changes the scope of it. A legal entity being a qualified plan, 401(k), sole proprietorship, partnership, corporation. It doesn't disqualify you from realtime data, it changes

the scope of where you stand in that area.

You may need to provide current employment information, employer, address, title, function, answer a series of questions on top of that, and ultimately attest to exchange agreements. This is primarily done to determine whether the client qualifies as a nonprofessional versus a professional user of market data. This is a key point of differentiation.

The retail client, by default, according to the plans, is considered professional and must prove themselves otherwise. For Main Street investors who open a small business account, a mom or pop shop, they probably would be shocked to find out that they are considered professionals and must pay $92 across all three tapes per month to access realtime consolidated data or, instead, receive delayed data if you so choose.

Retail brokers have the administrative burdens of establishing and maintaining policies, procedures and systems to determine whether retail investors are classified correctly as professional or nonprofessional, and to maintain those classifications going forward. The plans regularly audit brokers for compliance with their overly complex rules, which are not harmonized across the CTA and UTP plans, and are cause for misinterpretation.

Obviously, TD Ameritrade takes this contractual

obligation seriously. But in the area of market data, the goal posts always seem to be moving. An expectation of review is evolving as we speak from a securities registration, a Broker Check, a FINRA Broker Check registration, to having to check LinkedIn and other nonverifiable websites to determine professional and nonprofessional classification. Noncompliance, in which a client may be determined to be misclassified as a nonprofessional by those reviewing on behalf of the plans comes as a high cost, as they will seek back payments for up to 36 months.

Now, let's compare this review of CIP data to an exchange top-of-book offering. It is important that an exchange top-of-book solution, a standalone exchange, indicative of such as Nasdaq Basic, Cboe One or NYSE BQT, only accounts for the orders under that exchange complex so it is not a consolidated quote and cannot be represented as such. The exchange indicative offerings come at a fraction of the cost of the SIP. You may pay for one year of an exchange top-of-book solution for what you would pay for one month of the SIP.

An exchange top-of-book data enterprise license largely incorporates professionals and nonprofessionals under their licenses, removing the cumbersome burdens on qualifying clients during onboarding, simplifying

management of those accounts and reducing audit risk. The question ultimately becomes, at what point does a retail broker move away from the NMS plans in favor of these alternative exchange top-of-book data products that provide for that fixed license that costs significantly less than that of the SIPs and also allows retail brokers to avoid negative onboarding investor experience, administrative overhead and the audit risk liability that currently exists under the plans.

TD Ameritrade and many others have observed the market system has challenges. As a result, we welcome the Commission's focus on ensuring a system that makes sense for retail investors, for all investors.

Again, I thank you for the opportunity today and look forward to answering your questions.

MR. ROESER: Thank you, Matt. Michael.

MR. BLAUGRUND: Thank you, John.

First, I would like to thank the SEC Staff, and Director Redfearn in particular, for the invitation to participate on today's panel. Stacey earlier spoke about the equity market landscape and how fragmentation has changed both the ways exchanges operate and how financial firms run their businesses. These changes set the stage for exchange market data to play a critical role in improving outcomes for end investors. Market data has

democratized access to realtime information, which historically was only available to those at the physical point of sale. It has facilitated competition for order execution services. It has allowed for significant industry automation. It has enabled transaction cost analysis, resulting in improved accountability of agents to asset owners, and it has enabled improved regulatory surveillances.

We can likely all agree that market data is exceptionally valuable for investors. But what we can't seem to agree on is what different constituencies should pay for it and why different types of users should pay more or less. There are broadly three classes of users with distinct fee schedules. Retail investors that view market data on their phone or a website; industry professionals that view data on screens, often on a professional market data terminal; and nondisplay use, in which computers consume market data programmatically to support algorithmic trading or the operation of an execution menu.

Segmenting usage in this way allows for an equitable allocation of fees and there are several key policy points that merit mention. First, retail investors do not directly pay for the market data they see and we aren't asking them or their brokers to pay the

same level of fees we'd expect from market professionals. The most a retail subscriber pays to view SIP market data is $3 a month and many pay less. We think it's an appropriate public policy for Wall Street to subsidize market transparency for Main Street investors.

Second, until the last five years, the cost of market data was overwhelmingly paid by those who were viewing data on screens, while those who consume data into algorithms paid very little. The exchanges and SIPs introduced nondisplay usage fees to acknowledge the industry's automation and to ensure purely electronic trading firms were paying their fair share.

Third, all market data products offered by the exchanges and SIPs are universally available to everyone. We don't offer unique or preferential pricing to anyone and there's no such thing as a private feed. All exchange market data is public.

Like any of us in our early forties, the SIP could use a makeover.

(Laughter.)

MR. BLAUGRUND: NYSE has recommended four potential changes to the core data regime, some of which Stacey mentioned earlier. The first would be to expand the definition of core data to include odd lots priced better than the BBO and auction imbalance information.

Secondly, we recommend the SEC undertake rulemaking to establish a simplified SIP revenue allocation methodology. Third, we recommend publicly webcasting all SIP operating committee general sessions to provide comfort to the industry that the participants and advisers are acting appropriately and are accountable. And fourth, we recommend the SEC undertake an analysis of the cost and benefits to the industry to shift the SIP from a single location design to a geographically distributed system. Taken together, we think these enhancements to the SIP would meaningfully increase its value to the industry and address many outstanding concerns.

Again, I appreciate the opportunity to participate today and look forward to the discussion.

MR. ROESER: Thanks, Michael. Jeff.

MR. BROWN: Thank you, John. And thank you, Director Redfearn, for holding this important two-day event. Certainly, we need to discuss market data every 20 years or so, whether we need to or not.

But let me just begin -- first of all, I'm Jeff Brown, I run Schwab's government affairs office. And you might wonder why you'd have a lobbyist up here. But I have actually had a long career in the markets. At one time, I was chair of the Nasdaq UTP committee, so I have

some insight into how that organization works or doesn't work.

Let me begin by giving you just a short statement. And that is that the public's market data, quotes and trade prices, are still a monopoly and the public is charged a monopoly toll for its own information. Now, you might think -- and people who know would say, well, that's Jeff's words, he's been saying that for years. But it's actually Chuck Schwab's testimony before the Senate Banking Committee from February of 2000. And, you know, sadly nothing has changed. Literally, that's why we're here, because nothing has changed.

Now, we've had 19 years since then of a revolution in telecommunication and digital processing, you know, that has changed the way products can be delivered and offered, and certainly the volumes that are sent through the system. And I don't really want to talk today about fees and costs, I want to talk about the quality of the SIP product.

You know, the SIP data feed has less data today, less information today, than it did 20 years ago. Absolutely, the exchanges said, well, we've spent so much to be able to run billions of bits of information through it, that's true. But it's still a top-of-the-

book product. And the exchanges will say, well, that's sufficient for retail investors; they don't need any more than that. And indeed, you know, Chris Concannon said this morning and I agree with him, and so it just shows I'll agree with exchange people every now and then, it shows that the SEC has always accepted that point of view. The SEC has said, oh, top of book is all you need. So a product that was developed in the 1980s is still used today.

Now, think about that. If you were trying to sell something and you were selling a product that had been designed, all the features designed in the 1980s, you'd be able to sell that? I know the exchange financed a paper where the market data structure was compared to the market for automobiles. And so think about it. If I just tried to sell an automobile that was designed in the 1980s, do you think anyone would buy it? And even worse, do you think the government would say to people, you know, that's all you need?

Well, we don't think that's all you need as a retail investor. The SIP, which is valuable, and I agree with Hal Scott's comment this morning that it's something we need, but it can be upgraded and it can be made relevant again by adding depth of book.

Now, why don't the exchanges want to add depth

of book? Because they're afraid it will cannibalize their sale of proprietary data. But frankly, retail investors, if you want to deal with the latency issue, you can't solve it, you can't outlaw the laws of nature that say electrons only move so fast. What you can show them is information on below and above the bid/ask, so that they don't rely on the simple top of book but they can make judgments about where a stock may be going and where they may need -- what type of order they need, what type of -- whether they need to move now or wait.

So our recommendation for this panel and for this day is that the SEC move to impose, you know, depth of book on the SIP. Because we think that change alone can offer retail investors a tremendous benefit.

MR. ROESER: Thanks, Jeff. Simon.

MR. EMRICH: Thank you. Thank you to you and the commissioners for organizing this roundtable on such an important topic. I'm very happy to be here and participate in discussion.

My name is Simon Emrich. I am the head of market structure strategies at Norges Bank Investment Management. We are the investment management division of the Norwegian Central Bank and we are responsible for investing the Norwegian government pension fund global. We are large, long-term investors in global financial

instruments. As of the end of last year, we were invested in assets in excess of $1 trillion across 72 countries. Our investment in the U.S., less equities, amounted to approximately $250 billion, making it our largest holding by country.

We are active market participants in all of the markets that we are invested in through a variety of fundamental and systematic strategies. These are managed both in house and through external managers. Our active participation in that many countries means that we have to be very well aware of the differences in market structure across those countries and regions. This includes the macro structure of our peer investors, the intermediaries and trading venues, as well as the regulatory environment.

From this perspective, there's a number of features of the U.S. equity markets that, in our mind, are exemplary. This includes the effect of competition across trading venues for order flow, the regulatory framework that's been set up, especially around best execution obligations, and certainly not least -- thinking about Europe in particular -- the existence of a consolidated tape, which provides an aggregate, transparent lens to pre- and post-trade transparency. We think that this adds great value to the marketplace here

in the U.S.

Our investment horizon and the nature of our liability stream often allows us to consider longer term issues in market structure on both a macro and a micro level. We make those views available publicly and also sponsor some academic research in that area on the evolution of asset markets.

We believe that the current macro structure of the U.S., in sense of our peer investors that we have, what we've seen over the last 10 years is an increase in institutionalization of asset management, such that for the 1,000 largest stocks in the U.S., on average, 80 percent of the shares outstanding is now held by institutional investors, and the rise of passive investment strategies, those factors are at least partially driven by the micro structure of markets and their regulatory framework.

The concentration inherent in institutional asset management depends crucially on the quality of the price discovery process in public markets. Similarly, many passive investment strategies, especially if they're in an ETF wrapper, depend on efficient trade execution in short, tight, no-arbitrage bounds.

Secondly, if we look at the -- at the market data structure in particular and the cost for brokers,

from a longer-term perspective, we are seeing a decrease in the competitive landscape for broker-dealers. We are going to talk about that a bit later. But we see that the set of brokers that are just feasible for us keeps on shrinking, at least possibly due to market data and technology cost.

Any changes to the market microstructure will over time impact the macrostructure as well. As an investor with long investment -- long-term horizon, we have to be very aware of this connection and evaluate innovation on a microstructure accordingly. In this context, we believe that the evolving revenue mix for exchanges, with its greater emphasis on subscription-like fixed fees, as opposed to variable per-trade fees, has the potential to have a substantial impact on the macrostructure of markets. Exchanges play a crucial role in price discovery and trade matching processes and they need to be fairly compensated for these services.

I very much look forward to the discussion and your questions. Thank you.

MR. ROESER: Thank you, Simon. Adam.

MR. INZIRILLO: Thank you very much. I'd like to thank the SEC, Brett and his staff for organizing the market data panels today and tomorrow. My name is Adam Inzirillo. I am managing director, cohead of electronic

product at Bank of America Merrill Lynch within the equities division.

Market data has been widely debated over the last several years, primarily due to the changes in fees and the increased appetite for more sophisticated products. I like to think it is important to understand how the proprietary and CTA UTP products are used in the marketplace so the investor community is more informed.

Proprietary market data products like Nasdaq Total View, NYSE Integrated Feed, along with the depbooks products from CBOE provide valuable information to the investor community to make informed decisions about accessing publicly available quotations. The direct feeds provide users the ability to provide a depth of book across the U.S. equity exchanges. The key features of the direct feeds are order-by-order information, adds, modifications, cancels and trade messages, imbalance feeds for auctions and security status. Some markets may provide an aggregated book information as an option to an order-by-order book feed, which I just mentioned.

The standard information processor, or the SIP, is divided into two parts, the CTA for tape A and tape B securities and UTP for tape C securities. Generally, the SIP provides the following information: Top of book, best bid and offer, limit up/limit down bands, normalized

quote conditions, security status for the listing exchange, Rule 201 status and trades. SIP is valuable for trades, as it provides the entire universe, including but not limited to hidden and ATS transactions.

CTA and UTP have been moved to binary which has reduced latency. But please note, the SIP latency stats are published via the websites, which generally only measure the inbound message out to the marketplace for publishing. So the key difference between proprietary and the SIP feeds is the ability to build a depth of book across all markets.

The nature of the SIPs, the nature of the locations of the SIPs introduce unavoidable latency effects. The UTP SIP, which are Nasdaq-listed names, is in Carteret. CTA SIP, which is NYSE Arca, AMEX, Bats, IEX-listed names, is located in Mahwah. For example, the general time of travel between Carteret and Mahwah is approximately 350 microseconds.

Ideally, the market data revenue which, for example, in 2017, which is also publicly available on the CTA and UTP websites is tape A is 164 million, tape B was 96.5 million and tape C was 125 million. The market data revenue pools should be used to consolidate the CTA and UTP. There is no longer a need to have them isolated or separated.

In addition, the quote revenue pool can be used to create a centralized data center for equal and fair distribution of data. Lastly, the quote revenue could be used to standardize protocols across the exchanges for direct access to proprietary products and allow for easier access to direct or similar connectivity, it would be worthwhile to have a single point across all exchanges. So, for example, today for a connectivity cost to a particular market center, you may pay 20,000 or 15,000. However, if you build a direct feed for each market center, you then have to pay an incremental fee per market center. So having a single cost would allow for an easier barrier to entry -- reduce the barrier to entry, excuse me.

Although he industry has made great strides over the last eight to 10 years, there is more that can be done to ensure fair and equitable data distribution across all market participants. Thank you.

MR. ROESER: Thanks, Adam. Mark.

MR. SKALABRIN: Hi, I'm Mark Skalabrin, founder and CEO of Redline Trading Solutions.

So Redline builds high-performance trading technology that's used by our customers, who are banks, hedge funds, proprietary trading firms, to integrate market data into their applications. So we're in more

than half the top 12 investment banks in applications like smart order routing, matching, we're in eight different dark pools, in order to provide the NBBO price reference. And so we get an in-depth look of how these customers need to use market data in order to be successful in the market.

It's been talked about already from other participants, I think Adam included, that, you know, you cannot -- these customers cannot be competitive with the SIP. And there's two main reasons that have been talked about. One is latency, the geographic latency. So, just as an example, if you're sitting at Secaucus and you get a direct feed tick from Bats, it shows up in a few microseconds from when they publish it. That same tick for the SIP for Nasdaq-listed symbols goes to Carteret, for NYSE-listed symbols they go to Mahwah and they come back again. The real numbers are, for one, about 350 microseconds and the other about close to a millisecond in latency for those to show up for someone using the SIP to get the Bats tick. So this is just an architectural - - an obsolete architecture, really, for an automated trading system in today's world. It just -- you can't be competitive with those kind of latencies compared to just getting it directly from the exchange.

And then as also has been mentioned, there's a

series of content that exists in the direct fees, some depth in orders and imbalances and odd lots and other things, that provide valuable information in how to make decisions in trading applications. So a smart order router who wants to get a hit rate for their clients to take their orders and effectively fill them need the direct feed information.

Now, we sell to various customers, leading firms that have lots of money and really imbed this technology, but also to startup brokers and small firms trying to integrate in the market. And not all of them use direct feeds. And it was mentioned before that some people just don't buy the direct feeds. Some people can do without it. And we deal with them in that decision process. It's not a mystery why they don't use the direct feeds; it's solely cost. Okay? They can't afford the cost of the infrastructure.

And what we do for our customers who are using the direct feed is we build a synthetic NBBO that looks exactly like the SIP. And you might say, well, geez, if you can build that, why doesn't that obsolete the SIP? And it's solely a pricing issue that, someone who gets the SIP, their starting price is, nondisplay, about $150,000 a year. If we create something that looks identical to the SIP in form with our technology and they

use that to trade, top of book, no odd lots, just identical but doesn't have the latency constraints, then it costs about $750,000 a year because they have to pay the direct feed fees to do that. So that's the dynamic of the market for people trying to start up and compete with people with more resources. It really is a barrier to entry.

All right, thank you.

MR. ROESER: Okay. Thanks, Mark.

So pretty happy so far. Let's focus on the costs of SIP data. How has the cost of SIP data evolved over time? Has it increased, decreased, stayed the same? Who bears the cost, nonprofessionals, professionals, brokers that use the data for nondisplay?

I'll start with Oliver.

MR. ALBERS: Let me turn on my mic here. So I'll take that.

So I think if you look at the cost of retail, it's stayed flat or even decreased over the years. I think, you know, if you look at who absorbs the vast majority of the cost of the SIP, it is the professional trader. I think about 20 percent of the SIP revenues come from retail and about 80 come from professional traders.

But, you know, the professional sort of user

fees or subscriber fees have stayed relatively flat over the past, you know, 10 years. I think, you know, where you have seen changes and, you know, this was kind of in line with, you know, we're moving into a data economy, you know, technology is overtaking humans in certain capacity and, you know, there is a tremendous growth in nondisplay usage. And so while you see a tremendous decrease in the number of eyeballs that are accessing data, you see a decrease in the eyeballs, you see a tremendous increase in terms of the numbers of servers that are accessing the data.

And so, you know, we've seen some offset of the professional fees from a usage standpoint, the revenue that comes from the eyeballs, to revenue that comes via nondisplay fees.

MR. BLAUGRUND: Can I just add?

MR. ROESER: Sure. Go ahead, Michael.

MR. BLAUGRUND: The data that Oliver was referencing there is now publicly available on the SIP websites. One of the recommendations from the SIP Advisory Committee was to add that transparency, both CTA and UTP. In addition to the overall levels and distribution of revenues by SRO, include the breakdown by revenue type.

MR. REDFEARN: Just to take a quick follow-up,

Oliver, are you talking about the revenue generated from pros and non-pros? Or are you talking about the actual cost for an individual pro versus a non-pro?

MR. ALBERS: I'm talking about the revenues generated from pros/non-pros.

MR. REDFEARN: And that is in the scenario where the total number of pros in particular has gone down over that period of time?

MR. ALBERS: Yes.

MR. REDFEARN: Okay, just wanted to clarify that. Thanks.

MR. BILLINGS: I think to clarify one point, we actually don't know the costs to produce the SIP, as was discussed in the previous panel. We just know who bears the cost of paying for it. And that is, you know, in large part, retail investors. The retail investors, we are -- TDA being a large redistributor, we do meet the enterprise license caps. Those cap out for nonprofessionals -- let me say that's for nonprofessionals -- at just over $1.8 million per month. That does not -- external professionals are outside the caps and that's another leg that you have to pay beyond nonprofessionals.

And as Oliver was mentioning, there's a significant amount of nonprofessionals out there. And

the thing that we were kind of referencing in our opening statement, our challenge here is that we want to kind of recast this whole professional/nonprofessional discussion, in which we sense there's way too many folks out there designated as professionals that should be nonprofessionals, that should be under that cheaper rate. Regardless of who you are at, regardless of not at TD Ameritrade, but whoever you work with, it's meaningful to think that if you are simply a sole proprietorship and you open an account at one of these retail broker-dealers, you get tagged as a professional. And therefore, if you wish to receive that realtime data, you have to choose to absorb that cost or receive delayed data.

We think it makes sense to kind of rethink that approach and kind of, you know, balance it out in some way.

MR. BLAUGRUND: If I can make two quick points? You know, I think Matt makes a really important point that if the process and the procedure of onboarding clients is creating friction for retail participation, we should absolutely address that. And I'd be shocked if anyone, you know, takes the other side of that argument.

I think, you know, historically the SIP Operating Committee, you know, wanted to establish

policies and ensure they were fairly applied. And so I think that's probably why you now have a longer checklist like you were describing. But I think, as a policy matter, we would all be on board with trying to find a reasonable definition of retail, such that someone who isn't a market professional isn't unfairly categorized.

The second point I would make, you know, with respect to the cost of running the SIP, I know it was made in the earlier panel but I think it's important to reiterate, the cost of producing market data is not just the cost of the circuitry of the aggregating processor, it's the cost of operating exchanges, it's the cost of operating FINRA, you know, operating the full market.

We haven't disclosed the direct costs of the SIP in part because I think we're worried about the misperception that the direct costs of the SIP would represent the overall cost of producing data. And I think a large part of that reluctance comes from a view that it would be misunderstood.

MR. ROESER: Jeff.

MR. BROWN: You know what? We've heard this several times today about how SIP data for retail investors has gone down every year. And that's just not true. And we -- you know, I think SIFMA just submitted a study by Expand, which is, I guess, an affiliate of

Boston Consulting. And that study shows that SIP data has gone up since 2010 by about 200 percent.

And one of the areas where we are directly impacted is there is a cap of a dollar per month for nonprofessionals. But there's also a per-query fee. And that per-query fee has gone up. And we have millions of clients who are charged based on that per-query fee. They don't hit the cap, they get charged. And as that fee goes up -- and it went up 50 percent in 2015, I believe.

So that impacts the cost structure that causes us to pay more. And, you know, we'll cover that for our customers. But, you know, at the end of the day things aren't free. And when you hear the exchanges talk about there's a free lunch for retail, that just doesn't exist. People pay for it. Our firm has to cover that.

And Matt makes a great point that the contracting with the SIP providers is so arcane and full of these distinctions. You know, if you use your iPhone and you use your iPad to look at trading information and you just happen to have them both open, you're a professional. And, I mean, that distinction -- there may have been some legitimate basis years ago. It makes no sense now for our clients to be labeled that, simply because they open two devices. So there needs to be a

real hard look at that whole structure.

MR. ALBERS: Jeff, I think what you just said is inaccurate. It doesn't classify you as a professional if you have two devices open. Just for the record.

And one other thing I'd just like to -- I mean, when we talk about the cost of retail, Professor Jim Angel from Georgetown University did do a study recently. And for large firms, the average price for a nonprofessional is 14 cents a month.

MR. BILLINGS: We do not agree with that math, respectfully, to Professor Angel. I don't know if it accounts for everything that goes into the absorption of the SIP and then our redistribution of it. I mean, we're paying for -- everything such as that. And, you know, I would contend that there is a lot more that goes into that than a simple, you know, one number divided by this number. There's a lot -- as you know, it's as complex as anything is in our business. And this is as complex as that.

MR. ALBERS: And there's a lot of things in there that have nothing to do with exchanges, network providers, software providers, et cetera. Like, you know, I've seen stats where, you know, in terms of the cost of consumption, the actual content fees are like 5 percent.

MR. ROESER: Okay, Simon. Costs of SIP data to market participants, how has it evolved?

MR. EMRICH: So from our perspective, you know, we use both SIP and direct feeds, we use top-of-book direct feeds, we have depth of book as well. What we find is the use cases for SIP data over the years has just decreased, has decreased substantially. We use the data directly for our trade planning and then for posttrade TCA as well. And obviously, the brokers that we employ as agents also have to use the data. So for the brokers, as has been mentioned before, the brokers can't really be competitive for our sort of trading just using the SIP. They need to have the full depth of book. We depend on them to slice up our orders and trade them over time. We need them to have a full view of the market, not just the top of the book.

From our own perspective, from our trade planning perspective, similarly, we are looking for larger trade sizes. We are very interested in block trades and conditional orders and things like that. We find that the information that we receive from the SIP is just not sufficient for that; we need to have the full depth of book.

Even from a posttrade perspective, for a TCA perspective, the geographical latency of the SIP has been

mentioned before. The brokers that we employ, we find that the tech stack that they need to have is fairly well defined. You need to be in Secaucus, you need to be colocated at the exchanges, you need to have a certain port quality, you need to use millimeter waves to connect to the various trading venues. The SIP does not represent that physical reality that the brokers observe in terms of the sequencing of the orders, the sequencing of the quotes coming in. So even from a posttrade perspective, from a TCA perspective, using the SIP for that is for us no longer sufficient to evaluate the best execution obligation that we place on the brokers.

MR. REDFEARN: Simon, just a quick follow-up. On the last panel, there was some discussion with Met from T. Rowe regarding sort of the dialogue with the brokers that they use to handle their orders about whether they may or may not use the SIP. You kind of alluded to this, but is this a question that you ask brokers that are handling your orders? Do you use the SIP for your router or for your ATS versus the direct data feeds? Is this a metric that you use to --

MR. EMRICH: So it used to be from a transaction cost analysis. Over the years, we observed that there were significant differences in the performance of some of the brokers that we employed. So

we started, you know, trying to explain why that was the case. And we really found out that it's the tech stack. You either have it or you don't. And part of that tech stack is really do you use direct feeds.

So similar to what Met was saying in the earlier panel, the discussion is over the second you say that you don't use direct feeds. Now, that's for the algorithmic portion of our executions. For other larger, larger trades that we do, you can make a different argument. But for the algorithmic portion, it's certainly the case that direct feeds and direct depth of book feeds are a nonnegotiable requirement.

MR. ROESER: Adam.

MR. INZIRILLO: Yeah, I think it's important to note too, when you take in the proprietary market data feeds, you have to be able to process it efficiently, right? So there's a thing called a feed handler. So the information comes in, you have to process it in a timely manner to ensure that it's accurate and consistent, right? So a depth of book is important for calculating or understanding the marketplace across all the U.S. equity exchanges.

The SIP is also necessary. We have to have that for redundancy, to be able to look at the best bid offer should one of the direct feeds fail. In addition,

there's some additional information that we also -- that only comes through the SIP. For example, the limit up/limit down bands. Imbalance feed information also comes through the proprietary market data feeds. However, if you so choose to, you may utilize, you know, an imbalance feed product from one of the exchanges like NYSE or Nasdaq.

So I think it's also important to realize that there is value to data. Right? So if you value depth of book, you may have to pay a little bit more for it. However, over the last couple of years, I think it's important to note, between the SIP fees as well as the proprietary fees, there's been an increase in nondisplay fees. For example, on the prop feeds, you usually have category one, category two and category three. Category one means that you're filling principally. Category two generally means that you're filling principal and agent. Category three means that you operate an ATS and there's generally a fee across the board for each one of those. Generally speaking, they don't double dip. You pay the one fee if you have to.

And similarly, in 2015, CTA also built out a nondisplay fee. So I think one of the bigger fee increases across the board over the last four to five years have been the nondisplay fees across the prop

products as well as the SIP products.

MR. ROESER: Mark.

MR. SKALABRIN: Yeah, so we -- I mean, we live in a world of automated trading. So we don't have much perspective on the display fees for the SIP. And as Adam said, the nondisplay use of the SIP since 2013 has probably gone up by a factor of three in terms of doing it. And the access fees have sort of modestly increased. But the big increase, like on the direct feeds, has been the injection of this nondisplay fee. And that's really what drove that increase.

I think if I was an exchange, I would say that the price of the SIP is not too bad. And I could see that argument, if it was useful for the purpose that it used to be useful for. But, as Adam said, it's -- in the kinds of applications that we see, it's been relegated to a backup feed, really. It's a fail-over to the real feed you need to do the job. And at that, it's expensive for a backup feed.

And I think, you know, you take the price and the other sort of structure of the SIP and you apply it to, you know, a feed that really solves the problem well, I think that's probably okay.

MR. ROESER: Okay, let's move to latency differentials between the SIP feed and the prop feed and

talk about what are the challenges that result from those differentials and thinking in terms of geographic latency, the consolidation times and the different connectivity options that may impact latency. And I think I'll go -- start with Mark and go in reverse order.

MR. SKALABRIN: Okay, we talked about this a little bit already. But, you know, there's a couple different sources of latency in the SIP. One is geographic latency. Stop there. It's architected in a way that data has to go to one place, get merged and come back again. I will note that there's two parts to the SIP really. There's a BBO, the top of every exchange, and there's an NBBO. And it's only the formation of that NBBO that requires data to go to one place and come back. And I would argue that that NBBO isn't that useful anymore at all and that, you know, if exchanges put out a feed directly at every -- you know, published like they do and it was transported by the industry, that it would be totally usable. And effectively today, people have to form the NBBO at their location. Even a dark pool does that that's just trying to match at the best bid and offer. If they use the SIP NBBO, their customers would be subject to latency harm, because it's too old to use at their location after it's merged to really get effective performance.

So, I mean, the solution is, you know, get data streaming out of exchanges, bring it to where you need it and then process it the way it needs to be processed and that solves this core latency problem.

MR. INZIRILLO: Yeah, I'd like to just put out a couple facts that I grabbed from the website for the CTA and UTP. So there has been a lot of work in just latency. And again, what I mentioned before, it's just the inbound message versus publishing. Right?

So if you look at Q2 in 2013 for the tape A and tape B feeds, it was roughly 59 microseconds for the average. Today, it's roughly 13 microseconds.

If you go back in the ninetieth percentile, which is probably more indicative of how long it really takes to travel or publish the information, in Q2 2013, it was roughly a millisecond. Today, it's roughly 18 microseconds when you get down to the ninetieth percentile.

I think there's another element of this that really doesn't emphasize the issue also with the SIP, is during high times, during market volatility, it's the queuing or the publishing of information, right? So, for example, if I take in the direct feeds, I can be able to extrapolate that information. In that packet, it doesn't update the quote. Meaning like there's not a refresh.

What can happen is the SIP will actually have that because the administrator or the tape C provider or tape B provider will then publish just a size update, right? So it would still be showing 10, the direct book might see the feed would be down from 10 to 9, right? So there is a lot of information that gets published. So during times of high market volatility, you do see a lot of queuing and, as a result of that, causes additional delays, particularly when you add on the geographical items that I mentioned before.

MR. DONOHUE: Just to follow up, on the queuing issue, can you see it in the latency stats published by the SIP or is this only -- can you only see this by comparing the SIP to the direct feed?

MR. INZIRILLO: Yeah, I think -- correct me if I'm wrong, Michael or Oliver, but I think generally the CTA and the UTP publishes only the inbound versus the publishing latency stats. So for you to actually do the detailed analysis, you would actually have to look of calculating the depth of book, meaning all the market centers across all the U.S. exchanges, and then comparing that versus the SIP. And during high volatility, you do see times where there's a queuing that does occur. So if you have a report the next day, that would help you find that.

MR. SKALABRIN: Just one quick thing on that. Sorry. We measure that. So we at Nasdaq will correlate the direct feed and the SIP and just build statistics. And, you know, the P50 tracks very close to what Nasdaq said, you know, that's just a handful of microseconds at that location, because it doesn't have to go somewhere and come back for a Nasdaq-listed symbol. But the maxes and the P99.9, you're into the milliseconds. You know, on a given day, it could be tens of milliseconds maximum difference between the direct feed and the SIP.

MR. BLAUGRUND: Mark, I think to your question, you can now actually divine that from the SIP data itself. The exchange puts a time stamp of when they sent it and then there's also a time stamp added by the SIP when it was processed. Some of the more enterprising SIP Advisory Committee members have spent some energy on that.

MR. REDFEARN: Mark, can I -- I just want to see if I understood you correctly. Did you say that during the busiest times of day, that you see in the data tens of milliseconds of difference between what you're seeing in SIP versus the direct feeds?

MR. SKALABRIN: Yeah. If you look at the maximum of a day, it would be there. The P99.9 is usually over a millisecond. And that's sort of real

experience, sort of just measuring it as it's received.

MR. ROESER: Simon.

MR. EMRICH: So I think the point was made earlier, I think in the first panel and also in the beginning of this panel, you know, 97 percent of the time, trades happen within the NBBO. You know, in our experience, when we look at our transaction costs, it's the other three percent that matter. So there is a -- there is a delay.

And part of that, the most interesting part of the delay for me is really the location of the consolidator, the geographical delay that's introduced, and the data connection element to the consolidator. Right? So from our perspective, the latency of the consolidator itself, the consolidation engine, the improvements that we've made are remarkable over the years. But it just doesn't measure the physical reality of the brokers that we're using. So even from a posttrade perspective, it doesn't tell a story that we need to hear, that we need to find out.

It was quite interesting to sort of hear about the, you know, competing SIPs and different locations. If I look at the broker landscape right now, they've all converged on one physical location. So most of the brokers we are using, they are in Secaucus, right?

Geographically, it makes sense in terms of the distance to the various -- to the various exchanges. So it would seem to me that, to mitigate the geographic latency element, it's really not so much about having competing ones but it's really about moving to Secaucus as well.

MR. BROWN: From a retail firm perspective, you know, we look at it entirely differently. You know, as Met said this morning, it's an eyeball issue for our firm, you know, whether our clients are seeing what it is that's actually out there. And, of course, the latency issue has come way down within the SIP, as we've heard. But that doesn't mean that the time and place advantage for firms that are in Secaucus, it doesn't -- I mean, it really just replaces the old -- if you were on the floor of the New York Stock Exchange in the '70s, you had a time and place advantage. Now it's just automated by being in Secaucus.

So for the way we look at it is then, you know, and this is really why our reform, we think, is important. Clients ought to see more so that they don't have to rely on the NBBO and whether it's there when they want to make a trade. And indeed, when we look at our -- our numbers, you know, we've heard that three percent of trades occur outside the BBO, well, we see in our order float as much as 20 percent of our orders, you know,

exceed the BBO at the time that they arrive at Schwab. And so, you know, that's a big difference.

But even if it were 3 percent of orders exceeding the BBO, I recall when in NMS we adopted a trade-through rule because there were trade-throughs of less than 2 percent in the market. We adopted a trade-through rule to prevent that. But we allow 3 percent or up to 20 percent of orders to kind of be executed in the blind if you don't know the depth of market. That's not fair to a retail client. Retail clients shouldn't be at that disadvantage. And so that's why we're pretty adamant about changing the SIP.

MR. BILLINGS: Hey, Jeff, can I ask for a point of clarification? What do you mean by 20 percent? What are you getting at with that number?

MR. BROWN: When an order arrives, it exceeds the BBO at that given -- at that given time.

MR. BILLINGS: So you're talking like enhanced liquidity, larger than the bid or ask, your client order?

MR. BROWN: Yes.

MR. BILLINGS: Okay. Got it, thank you.

MR. BLAUGRUND: I think the question was the relative speed profile between SIP and the proprietary --

MR. ROESER: Yeah, geographic latency and the consolidation time. But also maybe it would be helpful

to get into what are the connectivity options that are different for the SIPs and the proprietary feeds and what method of transmission is used on the proprietary feed versus sending data to the SIP, fiber, microwave?

MR. BLAUGRUND: Sure, I will try to tackle as much of that as I can. So as a baseline, I think everybody knows this but, just to restate it, exchanges publish their information to the SIP and over any proprietary feeds at the same time. Right? That's an important policy to comply with Rule 603.

That being said, the method of transmission of that information and the timing of the aggregation of that information into a consolidated feed plays a role. As I think we all acknowledge, the aggregation time has improved dramatically. As we've seen that decline, it highlights the fact that the geographic latency becomes a more meaningful portion of the overall time line.

Exchanges publish their proprietary data over a multicast, sort of a broadcast mechanism. But today, when they publish to the SIP, they have to use a unique hash protocol, right? So it's a bespoke protocol, sort of in SIP-readable language that's the same across all the different exchanges, so the SIP just reads one type of incoming message and has to spend less time normalizing that to produce the BBO. It helps keep the

aggregation time down but it necessitates a secondary publication.

We would recommend that the operating committee direct the processors to change that consumption mechanism so that the processors could take the proprietary feeds directly, so exchanges would just be producing one outbound output, which could be carried because of its technical protocol over wireless. Whereas the existing unicast protocol does not lend itself to that mechanism.

So we think that that would be a very meaningful improvement in terms of the data-center-to-data-center timings we currently see, potentially pairing that, as we discussed, with a geographic distribution of the platforms.

MR. SHILLMAN: Michael, are there any reliability tradeoffs with that approach?

MR. BLAUGRUND: Thank you, that's a great question. Yes. You know, wireless is -- is innately less reliable than fiber. If it's cloudy or if it's storming, you know, you can lose packets. It's an engineering problem to be solved, to have a fiber backup and to arbitrate appropriately between, you know, you'd expect to get something over wireless first but, if not, if you receive it over the fiber, to baffle with that.

It is a policy decision, though, because you're going to have things arrive in an unexpected sequence. And so we would just need to be comfortable that that would become the new norm.

MR. REDFEARN: Just to chime in, I think it's an interesting point because we've talked about aggregation, latency and now getting into the -- you know, and that problem, probably more so at the UTP SIP but has been largely solved. And then there's this sort of connectivity thing.

It's interesting, there are provided services directly from the sort of exchange source data center over microwave which, by I think the websites will indicate 40 to 50 percent faster in terms of transmitting that way. So as far as another source of latency, it's interesting.

So you're suggesting, Michael, that if the protocol was changed, that it might be just as feasible to utilize microwave. If there's bad weather, maybe they flip back to fiber. But in a situation like that, it might be another part of the equation to the extent that there was an interest in seeing the SIP get more aligned with where the proprietary networks are.

MR. BLAUGRUND: Yeah, I think there would be tradeoffs. The fidelity of the sequence would be

somewhat degraded but it might be an appropriate tradeoff.

MR. BILLINGS: I would say it's very thought provoking. You know, I think as we're managing our client base and the human consumption of it, doesn't mean that we settle for anything and that if we have a want to keep on improving upon where we are today with the speed and resiliency of the SIP, we are all for that. You know, we rely an incredible amount on it. So as much as people can get creative and not jeopardize that operational resiliency that we have today, that just makes for that much more competitive a solution that we have and that we utilize for our client base.

MR. ALBERS: Yeah, so one recommendation that we would like to make is actually standardizing the connectivity kind of at the SIP operating committee level, where the SIP manages the connectivity from all the different exchanges to the consolidator so we can ensure, you know, we have good, solid connectivity from each individual exchange, from their egress all the way into the SIP. Where today, it's left up to each individual exchange to determine how they distribute their data through the actual consolidation mechanism at the SIP. So that's one thing we'd recommend.

I will say, as well, you know, we feel like the

NBBO is really important. And when you look at, you know, consolidated -- I'm sorry, competing consolidators or distributed SIP, it gets really, really complicated and you start to think about, like, all right, how do you determine what data centers they go into? Is it just Secaucus, is it Weehawken? You know, do we actually need another one in Chicago for the options market makers?

And, you know, when you're talking about competing SIPs, you know, I think there's real value, especially to Matt's business and Met's business, in terms of understanding what that NBBO is. And, you know, do you get into -- you know, if you have competing consolidators, do you get into the idea where there is, you know, benchmark reference price arbitrage.

I mean, I like Doug, I think he's probably a really nice guy. But do I want to trust him executing my trades and managing the price that they're benchmarked against? I don't know. You know, it creates some different conflicts there.

MR. REDFEARN: So, I mean, it's an interesting question that's come up. And, you know, in the -- I believe what I've heard is that in sort of the -- for the industry, for market makers, for a lot of the banks, a lot of the market participants, they're using services like Mark's or others where they're aggregating NBBO.

Aren't we also in a world where all market participants are basically aggregating their own NBBO and there's a slightly, you know, slightly different NBBO, not only dependent on how well you aggregate it but also where you are? So presumably in Carteret, you're getting the -- you know, you're getting the Nasdaq quote faster than you're getting it in Mahwah or in Secaucus. Whereas, if you're in Secaucus, you're probably getting Bats a little bit faster.

So the NBBO is going to vary, inevitably, based upon where you are, presumably, right? And, I don't know. Mark, is there one NBBO or does that no longer exist?

MR. SKALABRIN: No, there's not NBBO. It no longer -- it never existed. It was useful at some point to, you know, at some location, bring everything together and say that this was the NBBO. But at that same moment in time at every other place in the world, the data was coming together, saying that the NBBO was something different.

And so it's really a fake thing. And it's not a

-- it's an inaccurate thing to say that there was an NBBO. And this problem has come up before where people say, hey, how can I do this when it might disagree with

the NBBO. And it's already there today. All these players who take direct feeds and synthesize an NBBO if they need an NBBO already are using something different. And they already have to justify that in a regulatory way that they're doing the right thing. And the good news for them is that what they're doing is more accurate and more effective than using the SIP NBBO, which was constructed at some other location a long time ago with data that had a lot of latency feeding it.

So I don't -- I don't see that this problem -- that that problem really exists because we've sort of moved past it.

MR. REDFEARN: Mark, we're going to be moving on in a second to talking just a little bit more on the content differentials to get a little bit of a deeper understanding of that. But in that vein, when we think about the NBBO, if you're constructing an NBBO from all the different markets, one of the issues that will come up in content and already has come up is this issue of odd lots, right? So the odd lots, really you don't see odd lot quotes in the SIP. And if it's less than 100 shares, then it won't constitute the BBO. And, in particular, at times for expensive stocks, that might be meaningful.

When you're constructing an NBBO from direct

feeds and you're looking at odd lots, at individual markets, can you just tell us how -- is the NBBO the same? Or how do you think about the odd lots sort of at the inside when you're looking at the prop data feeds versus the SIP?

MR. SKALABRIN: For odd lots in particular, we just provide, you know, customers can choose whether they want to see them or not. It's frequent in like a dark pool or someone who is under regulatory scrutiny from someone who might be using the SIP to compare their data that we exclude odd lots specifically so that -- we actually do lots of things to make our NBBO look like the SIP. And -- but we can include them or not include them. It's just a customer-specific thing.

One thing I want to just point out though is that when you construct an NBBO at a different location, it's just not a faster version of the NBBO that was constructed someplace else. Because data comes together in different ways, the price of the NBBO can be different. And the way that's analyzed though is you run trade-throughs for instance, as you look at every individual source exchange and see whether you traded through that exchange. And that's really all you need to do to verify that the price that was used was correct. And the NBBO doesn't really play -- the SIP NBBO doesn't

play a role in that analysis.

MR. SHILLMAN: Just quickly following up to Oliver, with Nasdaq's suggestion to standardize connectivity, you know, to the SIPs, was that suggestion with a particular goal in mind to minimize latency, you know, along the lines that Michael is suggesting, or reliability?

MR. ALBERS: Yes.

MR. SHILLMAN: Or just standardization?

MR. ALBERS: Well, the standardization but with the goal of increasing efficiency and, you know, the resiliency and, you know, the determinism of the SIP.

MR. SHILLMAN: So consistent with Michael.

MR. ALBERS: Absolutely.

MR. REDFEARN: Do you contemplate microwave technology in that as well, Oliver?

MR. ALBERS: So what's interesting with microwave, we actually had a microwave offering for SIP out of our Carteret data center and nobody took it. So, I mean, we would look at it. We would always look at it. But, you know, it comes down to our customer needs and what they're looking for.

MR. REDFEARN: But didn't you say that it was the markets that were deciding how the data got from the exchange to the SIP?

MR. ALBERS: I'm sorry?

MR. REDFEARN: I'm talking about getting from the exchange to the SIP.

MR. ALBERS: Oh, you're talking about inbound, from the exchanges to the SIP, rather than SIP distributing --

MR. REDFEARN: Correct.

MR. ALBERS: Oh, we could absolutely look at microwave as well. I mean, it's -- what are the costs?

MR. BLAUGRUND: I don't think we need a second day --

MR. REDFEARN: What's that?

MR. BLAUGRUND: No second day required. We're done.

MR. ALBERS: Yeah. But, no, we do need to look at it and say, okay, you know, who's going to benefit, you know, who pays for it. But, you know, if it's good for the Main Street investor, I mean, we would absolutely look at it.

Going back to the odd lot thing, I have an interesting stat that I wanted to share. You know, the markets have changed dramatically over the past 10 years. So today, 50 percent of the notional value in Nasdaq-listed names is in high-priced names, over $100. So, you know, a 50-share order of Amazon is actually a big order.

Brett is probably one of the few that can trade Amazon in blocks.

(Laughter.)

MR. REDFEARN: I wish.

MR. ALBERS: But given that, I mean, we're all for expanding the SIPs to include odd lots. I mean, it seems like a no brainer, the way the markets have evolved over the years.

MR. SHILLMAN: What about auction, auction imbalance information, like New York suggested?

MR. ALBERS: Auction imbalance information, I'm not going to go there. And I'll tell you why. I'm a firm believer in incentives. And in about 2003, I spent a year working with a whole assortment -- hundreds of people at Nasdaq refining our crossing process. And we patented it and, you know, it's state of the art. It's leveraged across multiple different data centers -- I'm sorry, multiple different exchanges. And it was a competitive differentiator for us. We view that as our IP and we view that as something that is already broadly available to retail investors everywhere via, you know, Bloomberg, Thomson Reuters, on our website. It's available to retail online brokers. And, you know, we just don't see a need for including it on the SIP. And, frankly, a lot of retail users don't use the imbalance

information either. And so including it on the SIP is a tax. It's like, you know, why are we trying to tax everyone? You know, and that's where it comes down to, you know, we're about choice and competition.

And so, going forward, when we're looking at innovation, you know, I also want to make sure we have incentives as exchanges to, you know, compete and make sure, you know, that our IP is value.

MR. REDFEARN: Does that mean, however, then if somebody wants to trade the close and actually see the imbalance to help them trade the close, they would have to buy that feed separately?

MR. ALBERS: No. So I can give you a website Brett, you can look it up. You can watch it every day.

MR. INZIRILLO: Brett, can I just add one thing to that? Just on the odd lot piece, as well, and then I'll get into the imbalance. I think the odd lot piece, where it becomes a little bit of an issue is also odd lots are not protected, right? So if you do publish them to the SIP, they're going to show a 50 lot. And then what is the obligation of the broker-dealer to access that potential bid or offer at an odd lot?

In addition, if you have odd lots and you have a round lot, right? For example, if I look at, you know, Bats Y and they're showing 50 at 10 and 100 at 10, in the

direct feed, I can see that there's 50 and 10. But what am I going to -- should the exchange publish 150 shares out loud? Today, currently, they just do everything in round lots, right? So there would be a little bit of an element or a change there.

And then just on the imbalance feed, I do think it is important, also even for retail. So if you are trading high net worth, it is important to understand what the imbalance is at a particular exchange, because you might have a different time horizon or an idea about where you want to be able to trade, whether it's NYSE or Nasdaq. So maybe not for the general retail but also for high net worth, imbalance feed is -- imbalance feeds are informative.

MR. BILLINGS: John, so there's a lot going on there with odd lots. I want to be a little bit cautious because when we say we'll accept all odd lots, that gives us a little bit of, you know, smack of that could be overly -- overrun people with information. I think maybe there's a thoughtful way of doing it. Maybe there is a price level metric that does it. Above, like -- essentially, we're redefining what an order is, what a round lot is. If you're going to change it to say above $2,000 is X, this or this or this. So we would be cautious.

I mean, more transparency is always -- you know, we're always for more transparency. But I think it deserves thinking it through a little bit, thinking about the implications. And couldn't agree more with Adam in the fact that if we're going to fight to have more transparency, you want to have an answer to whether you have to actually honor those -- that liquidity out there. So I think it's a thoughtful way of going but I think it's one that says -- you know, I'm trying to think of like the education burden for our -- for our clients that says, you know, if we have this security, this is now considered what your increment you're trading, this priced security versus this priced security. I think it could be managed, I just think it's something we need to talk through.

MR. REDFEARN: I think, Matt, one of the things, not for this panel but on an ongoing topic is, given that there are a lot of these high-priced stocks that are out there and you have this, you know, sort of sometimes an inside odd lot market quote that, you know, might be worth contemplating whether or not the round lot, right, as is perceived, whether it's for OPR or how people think about execution quality. For stocks over $100, you know, maybe it's only 10 shares or for stocks over $1,000, maybe it's only one share. Right? Because

if you look at the notional value.

So I think that we have to think about those concepts and together. But, you know, to have an inside odd lot market that is meaningful, meaningful value and a lot of trading is happening there and people who are using the SIP are not seeing that. And in some cases, they don't want to see it because it might even change the way people think of the BBO. There's enough trading happening in that zone that it probably warrants, you know, some consideration about how we think about that.

MR. BLAUGRUND: And just to be clear, I don't think we have a prescriptive recommendation. I think we really should look at the cost/benefit of any change. With respect to the high-priced securities, we would strongly recommend everyone split their stock.

(Laughter.)

MR. ROESER: Okay, so I think we've covered odd lots. Are there other -- does anyone else have any views on the differences in the content and information, SIP versus prop, that are worth noting, challenges or issues? Matt?

MR. BILLINGS: I would say that we were a little bit nuanced in our approach with what Jeff mentioned earlier about depth of book. We -- obviously not in the SIP and whether we might want to incorporate

it into the SIP. You know, once again, we're thinking about what's the implications of that? You know, to be clear, you know, buy side does not have the corner of the market of long-term investors. We have a supermajority of clients who trade less than a handful of times a year, they're thinking for the long term, they're balancing -- they're rebalancing their portfolios. And then we have our active traders, no doubt.

There's a place for depth of book. We have platforms for depth of book. We purchase it for those platforms, explicitly for those active traders to get them a picture that we think makes the most sense to them. But there's other platforms which it's not necessary. It's a little bit -- you know, if it's somebody who is, you know, just checking in, checking their balances, seeing where they're at, you know -- and then it's a supermajority of the clients are like that. So although we think it's another good thought, we just want to be cautious to say, is there implications if you embed the depth into the SIP, does it -- any implications regarding latency and, once again, the cost/benefit analysis around that.

MR. ROESER: Okay. So let's shift to how is the SIP data being used and is it sufficient for those purposes, thinking in terms of trading and routing,

meeting obligations to clients and operating markets? And I'll start with Oliver.

MR. ALBERS: Yeah, so others on the panel probably know this better than I do. But, you know, firms subscribe to SIP data and utilize SIP data for a multitude of purposes. You know, I think it's -- I don't know of any firms that take -- you know, that are actively engaged in adding liquidity to the markets or trading on the markets that are, you know, only consuming products. I think SIP is a big part of it and, you know, will continue to be.

MR. BILLINGS: John kind of led off with our position there. You know, from function, the SIP does work for the retail investor. You know, as we look to improve it and, you know, tackle some latency and go down that route. But suffice it to say if anyone has and deals with any of these self-directed platforms and you have traded with any one of those platforms, you understand the speed at which these platforms operate from the quotes that you receive and the order executions that you receive. So we believe that the SIP, you know, serves that function in regards to that.

MR. REDFEARN: I think the -- I think the question though, Oliver, was, is it sufficient? Right? So this comes back to the question of, for people who are

trading and they're trying to provide best execution for their clients, right, and who knows the regulatory things that come with that. But is the SIP actually sufficient for that or do they absolutely need to get something else to be able to do so?

MR. ALBERS: Absolutely, I think it's sufficient. And I think, you know, looking at customers, it merits that. Because there are clients that just use the SIP.

MR. BILLINGS: Well, I mean, we outsource execution services to people like Doug, who was on the original panel. And he obviously made his point, and others out there who made their points clear, that they use, you know, as much information as they can get to process the orders that we provide them.

MR. REDFEARN: I think Simon already spoke to this point a little earlier, that when you look at trading with your clients, you pretty much -- I'm sorry, with the brokers who are handling your business, you think that maybe it's a different answer?

MR. EMRICH: So the SIP data is, for our purposes, cannot be sufficient, right? And it cannot be sufficient from a pretrade perspective. So for us, from a trade planning perspective, we do need depth of book. It cannot be sufficient for the brokers that we employ as

agents. We find they are not competitive if they are simply using the SIP. And it also is not sufficient for our posttrade analysis. So from a TCA analysis, we do have to recreate the physical reality that our brokers observed, to be fair to the brokers. And that requires us to use the direct feeds.

Now, the introduction of the additional time stamps in 2015 has made a huge difference, when there was the time stamp of the exchange trade match also reported on SIP has made a huge difference in our posttrade usability of the SIP data. It's not perfect, we have to make some assumptions on the delays that the brokers observe, wherever they're located. But the use case has improved.

I want to make one additional point, which again sort of brings in a bit of an international element. There's a number of issues with the SIP that can be improved. There are also some more fundamental issues with the SIP that some of the delays you will never be able to bring them down to zero. So there will always be a role for direct feeds. But having a SIP from a price discovery, price dissemination perspective for, you know, in the first panel I think it was one of the commissioners referred to it as it's good for the economy. If you look at it internationally, I think in

many regions it would be a huge benefit to have anything approaching a consolidated tape. And we don't have that. So the U.S. is one of the very few markets where we have that sort of consolidation.

MR. DONOHUE: Simon, do your use cases change at all if the SIP latency decreases significantly? Or are your use cases the same because of the content and other reasons?

MR. EMRICH: So there's two parts. There's -- we mentioned the different sorts of latency. And the main restriction from a posttrade perspective for us is the geographic latency that's introduced by the location of the SIPs, right, which just doesn't match the geographic location of the brokers that we deem to be competitive in the algorithmic space, who do tend to congregate in Secaucus. So moving the SIP or having a version of the SIP which is defined based on Secaucus would remove that portion.

From an order book aggregation perspective, the technology that brokers generally use is that the command and the control, the smart order router is located in one physical location and then they are colocated at the exchanges to actually pass on the orders. But all the decisions are made at a central place, right? I can -- I can envision a different -- a different algorithmic setup

where some of the decisionmaking powers are actually forward located at the exchanges and the smart order router doesn't have to be as centralized as it is right now. We're not there yet.

But so right now, the main -- in which case, the latency of the SIP aggregation engine also starts to matter. Right now, it's primarily the geographic latency from the difference in location.

MR. ROESER: So just thinking of latency, the SIP data used for operating markets, Michael or Adam, do you want to give your views on the utility of the SIP?

MR. BLAUGRUND: Well, with respect to NYSE in particular, you know, historically NYSE only traded tape A names and relied on the CTA SIP to provide top-of-book information for our market. We continue to do that for tap A, though that will change when we move to our Pillar technology platform next year.

We're in a bit of a unique position, I think, with respect to this question because we are located in the same data center as SIAC. So what we find, and I think it was mentioned on the earlier panel, is not every broker that's running a dark pool consumes the proprietary feeds from every exchange. Notably, two of the five that we operate charge no fees for proprietary market data. But even so, we don't see universal

consumption. So I think that members are likely making their own optimization decisions about how to operate their businesses.

For us, you know, because we historically have not required depth of book for NYSE, the SIP was sufficient.

MR. ROESER: Okay.

MR. INZIRILLO: Yeah, I think it's -- I think you have to have a use case where you use both, right? So depth of book is important to understand where you are potentially in the queue when you aggregate yourself across the overall market center. SIP becomes important because it allows you to understand, again, limit-up, limit-down bands are the only thing that are published via the SIP. Also, you can learn about security status, opening indicator, you could also use the trade information out of there. So if you want to optimize how you calculate the depth of book across the market, you would then potentially isolate the depth of book is purely to understand, order by order, what the current available quotations are by size. And then, for the SIP, it allows you to calculate the other information so you understand is the stock open, what are limit-up, limit-down bands and what's the last sale information. So you'd want to be able to optimize it by bifurcating the

two of them.

MR. BROWN: We, like Matt's firm, route our orders to execution partners. But one of the questions we've looked at is, you know, if they use a SIP for pricing or do they use the direct feeds for pricing, does that impact our clients' execution? And so we've studied that. And the result is that it's an insignificant difference between the use of them, which is odd because we've heard so much about how, you know, the direct feeds are necessary for execution. But we haven't seen -- in fact, the study shows about a one thousandth of a cent difference and it varies between the two feeds. So we're not certain that -- I think the point is that a firm that executes has to -- we can't cherry pick the feed that they want to use. It has to be consistent. Because otherwise, you know, it shouldn't be -- they shouldn't be able to choose one that creates the opportunities for themselves.

MR. ROESER: Okay. So I think we're getting close to our time. But I did want to raise one more issue and that's with regard to the competitive dynamic between the SIP products and the proprietary feeds. Should we be thinking of these as one market? How do they compete? Do they compete with one another?

And I'll go to Oliver. You had some ideas --

Nasdaq has some ideas on the vendor display rule and can you share your views?

MR. ALBERS: Yeah, so it really depends on the customer use case in terms of the proprietary feeds versus the SIP feeds and what they're doing. In many ways, the proprietary feeds are complements to the SIP feeds for many, many use cases. For other use cases, especially use cases outside of the U.S., you know, the Nasdaq Basic, our best bid, best offer, you know, serves as a lower-cost substitute. And with that, those competitive -- because we're in such a competitive environment and we're competing for business against Michael and, you know, Chris Concannon and his Cboe One product, you know, we're also actively engaged with those brokers and those media companies that are using these proprietary products to help engage and educate their investors about trading in the U.S. capital markets. So this competition is actually really good, in that it drives capital flows internationally to us.

And so in that regard, I guess do you want me to go to our market data recommendations next? So we did make two -- actually three recommendations. One, we recommend --

MR. ROESER: Well, focus on the vendor display rule.

MR. ALBERS: You want me to focus there? Okay. So on the vendor display rule, I think -- and Chris Concanon kind of alluded to this that, you know, Bats submitted a no-action letter a few years ago and, you know, I thought his reason for doing so was a little bit more competitive than that, in that, you know, we were doing quite a job taking business from him. And so he submitted that and basically got a response from the SEC that kind of changed the vendor display rule or at least the industry's kind of perception of the scope of the vendor display rule.

So the original vendor display rule said that brokers must offer consolidated data in the context of when a trading and order routing decision can be implemented. So basically at the point of order entry. And the guidance that was given as part of the Bats no-action letter changed that to, when a trading and order routing decision can be made. And that's an expansion of kind of the vendor display rule, in that, you know, I can make a trading decision when I'm looking at my Yahoo account or walking down the street. And so we would really like to see some clarification come out to put it back to its original intent, when it can be implemented.

MR. REDFEARN: So just a question in terms of understanding these products and their relationship to

one another, so for example on Nasdaq Basic, which you characterized as a lower-cost substitute, that's a lower-cost substitute, for example, from the Nasdaq UTP SIP?

MR. ALBERS: Yes, correct, correct. When the SIP data is not required for regulatory purposes.

MR. REDFEARN: So basically, it's just a cheaper thing to buy from the SIP so it's in competition with the actual SIP data?

MR. ALBERS: Yes, correct.

MR. GRAY: Maybe to follow up on that, I think in the Nasdaq earnings conversation yesterday, there was some reference to the Nasdaq Basic product had saved broker-dealers something like 200 million over nine years. So was that calculation sort of what they would have paid to the SIP versus what they actually paid to Nasdaq?

MR. ALBERS: Yeah, that's exactly it. So looking at the fees they would have paid to the SIP and then looking at the -- what they were paying for Basic. And it's actually $240 million since the launch of the product. So it's been a success.

MR. REDFEARN: So before, when you were talking about the total pool of SIP revenues, where the revenue had basically gone down a little bit or the revenue was more or less flat but the users had gone down, the total

top-of-book revenue pool would basically include not only the SIP revenue pool but also some of these competing products?

MR. ALBERS: Well, Basic is a factor in that. But, you know, there are other factors, as well. Automation and lower employment rates in financial services, et cetera.

But the other thing I want to point out is Basic is also -- we have had a lot of people that were on delayed data before move up to realtime data, start to trade more. You know, facilitates a better ecosystem.

MR. INZIRILLO: Brett, can I just add one thing to that? One of the offsetting factors for potentially declining of the tape and the quote revenue is you've seen an increase again, just not to belabor the point, but an increase in nondisplay fees. So prior to 2015, you did not have the nondisplay fee in the SIP and now you have it. And it represents somewhere between 8 and 10 percent of the overall revenue, plus other, which is also an increase there. So that's selling to, you know, TV rights and other applications like Google and Yahoo Finance is also now making up a bigger chunk of that, somewhere between 6 and 8 percent, as well. So it's a bit more diversified of the tape and the quote revenue.

MR. REDFEARN: Okay. We're just trying to

understand -- we're just trying to understand those -- so it looks like that may be in part an offsetting way of capturing revenue in circumstances where users may have been lost to the --

MR. INZIRILLO: Yeah, correct. So if you look at the stats, a couple things that you saw, professional was 55 percent. So if you go back years before that, that number was higher. I think it was roughly 60-some-odd percent. And so you've seen a little bit more of a diversified -- that was on the UTP. Also, on the tape A and tape B, 50 percent was professional. Where if you go back five to 10 years ago, that number is closer in the 60s, 70 percent.

MR. ROESER: Okay, thank you. Do any others want to chime in on the competitive dynamic? Okay.

MR. BILLINGS: Yeah, I would, real quick.

MR. ROESER: Okay.

MR. BILLINGS: Yeah. So to Oliver's point, you know, not only is the Nasdaq basic or NYSE BQT or the Cboe One less expensive than the SIP, keeping in mind it's not as comprehensive as the SIP, that's a business decision you need to make from a client experience, from our perspective. But, as we talked about earlier, it does away with the CTA UTP plan considerations that, you know, their CTA and UTP plans are not harmonized and it

costs us a lot of headache from an administration perspective. And the enterprise licenses for these indicative top-of-book solutions don't come with that barrier. Those professionals that we need to worry about classifying and working through and going through the process and working through the audits in regards to that, that largely goes away with the utilization of these indicative, top-of-book solutions.

MR. ROESER: Okay. So I think to get our next panel started on time at 3:00 and get a little break in, we should wrap up on that note.

So thank you very much to the panelists.

(Applause.)

MR. REDFEARN: So we will take a 10-minute break and we will start again at 3:00. And if the panelists from Panel Three could come up here, that would be helpful.

(Recess.)

MR. REDFEARN: Okay, thank you. Welcome back. Welcome back all of the folks here, as well, and thank you for joining us, who are our new group of panelists here.

We are here for our last panel of the day. Panel Three is going to focus on the proprietary side, so exchange proprietary data products and access services

that offer the most content and the lowest latency. Some of these have been referenced, obviously, in contrast to the SIP discussion that we had earlier.

On this panel, we're going to start similarly, where we ask each of the panelists to introduce themselves and generally discuss the evolution of the proprietary data products and market connectivity services going back five years or so, specifically trying to better understand the content, the connectivity and the costs of both data and connectivity.

So we'd try to get people to stay in the three-minute range if at all possible. But we'd like to go ahead and get started with the introductions and the introductory statements. And James, we'll start with you.

MR. BROOKS: James Brooks. I thank the Staff for inviting me to this roundtable. I manage proprietary data at ICE Data Services, which includes oversight of the NYSE Group's proprietary data feeds. I do not have any responsibility for the market data disseminated under the national market system plans.

Exchanges offer a variety of data products to meet the diverse needs of market participants. For example, the New York Stock Exchange offers a top-of-book feed, a trade feed, an imbalance feed, a depth-of-book

feed and an order-by-order feed. All proprietary data feeds are regulated and are made available to market participants under equal terms. NYSE is not required to offer any of these products and customers subscribe only to those products which serve their particular business models. The annual revenue that the NYSE Group earns across all five of its equity exchanges for all realtime proprietary data is less than $100 million.

Firms pick and choose firms from which they consume data and decide which data products to take from any individual exchange. The more liquidity is fragmented, the more firms tend to spend on market data, particularly, any firm electing to subscribe to the most comprehensive data from all venues.

Customer usage shows that firms make very different choices when deciding what works best to maximize their for-profit business models. For example, roughly half of the global investment banks take the most comprehensive New York Stock Exchange order-by-order feed, the other half do not. More than 30 alternative trading systems reported volume to FINRA this September. More than half of them do not use any proprietary data from the New York Stock Exchange. Of the ATSs that do use the New York Stock Exchange data, the use is mixed, with ATSs choosing either the order-by-order feed, the

depth-of-book feed or the top-of-book feed.

Another topic of this roundtable is market access. The NYSE Group has operated a data center in New Jersey since 2010. The facility and its network are highly resilient and highly redundant, with equal numbers of hops and cable length between customers' equipment in colocation and the matching engines.

As part of its colocation service offerings the NYSE Group's exchanges charge for cabinets and connectivity. Prices for cabinets have not changed at all since the data center opened in 2010 and the rates for connectivity to the local area networks have changed once. Bandwidth needed to consume the largest data feeds for U.S. equity and equity-based options trading has increased significantly in the past several years. In response, our data centers offer higher bandwidth options up to 40 gigabytes a second, with the price per gigabyte decreasing the larger the connection.

The NYSE Group's exchanges took steps to increase customers' choice by introducing a meet-me room in 2012, allowing firms to select any private carrier to transmit data in and out of the data center. In 2013, the NYSE Group's exchanges began offering partial cabinets for colocated firms looking for lower price points and less space.

Colocation customers are allowed to host their own customers in their colocation space at any price point they choose, which is not set by the exchange. Such hosting has increased significantly in the past several years. In short, there is competition in choice made available to customers of NYSE Group's colocation services and its potential customers.

MR. FRIEDMAN: I am Michael Friedman. I work at a firm in New York called Trillium. Trillium operates two business lines. One is a midsize prop trading firm called Trillium Trading. The other is a trading technology vendor called Trillium Labs, which owns and operates a posttrade surveillance system. And in both of those business lines, we consume depth-of-book data. So I wanted to briefly talk about our use cases in both of those.

At Trillium Trading, I'll talk about our role in the ecosystem. Trillium Trading is fairly specialized in the market structure ecosystem, in that all of its parent orders are initiated by a human trader. It's manual trading. We are particularly relevant to the ecosystem in times of rate volatility when more traditional liquidity providers have kind of exceeded their risk parameters and pull their quotes and we step in and provide manual quotes during those times. So we

often act as kind of an emergency brake in restoring equilibrium to the market during great market stress.

We at Trillium Trading need depth-of-book data to do that type of trading. We need to see where resistance levels are, we need to see how likely it is for us to get out of a position once we get into it, and all of those -- there are other reasons as well. But we -- in order to make those judgments, we need to consume depth-of-book data.

And just bringing this back to the SIFMA litigation decision from last week, we haven't heard a lot of talk about firms of our size and our use case and our role in the record in that case. There was a lot of talk about the big fish who are the major consumers of depth-of-book data. I think there was some evidence in that record that there were only 50 to 100 firms, period, who buy all of the depth-of-book feeds. And we're one of them but we're not at the top of that list. We're kind of in the middle of that list. And our experience, as far as our ability to barter our order flow for discounted rates on market data is not the same as what some of the evidence in that case suggested it was for the people at the front of that list who really have a huge amount of volume.

On the subject of the comments from

Commissioners Peirce and Roisman about the decision last week, I just had a couple of comments there. I think they are overstating a little bit the role of the order protection rule in forcing firms to consume depth. I think, yes, we do kind of follow the order protection rule, as everyone does, of course, and use depth of book to achieve that. But we would probably be making similar decisions if not the exact same decisions on where to route orders even without the order protection rule, in the interests of achieving best execution and in the interest of really just getting the best quotes out there that satisfy our trading strategy. So I don't think the world, as far as demand for depth feeds, would be a whole lot different without the order protection rule.

On the other point that Commissioners Peirce and Roisman raised that, where are we now, is the Commission going to be a rate-setter like a utility? I just share the view of probably most people in this room that nobody wants the Commission to be a utility rate setter. It would be great if we could kind of unleash the gates of competition to have the invisible hand of the market take care of that for us. And I actually on the train this morning circled the exact same provision line in the 2005 Reg NMS final adopting release that Brett read to everyone this morning about competing

consolidators. And one way to have competition is to have a competing consolidator. The problem that was identified back in that release was a competing consolidator based on buying data from the exchanges is still buying data from the exchanges. It's packaging it up differently. Maybe you have depth of book in the competing SIP feed now. But it's still involving the exchanges in that process.

And a few pages later in that same adopting release, there's a discussion about independent dissemination of data by other market participants, by broker-dealers. And I think there was a reference in one of these earlier releases to the Boat model in Europe, where when MiFID I first came in in 2007, the big banks got together and created a trade reporting facility from scratch, voluntarily, privately, without any government or regulatory intervention.

And it strikes me that you could have that as a solution here as well. You could have -- a depth-of-book quote is an order message. And every order message has a sender and a recipient. And we've only been focusing on the recipients, the exchanges, to consolidate all those quotes. But what if you consolidated the quotes from the senders, from the exchange members, and put together a competing consolidator based on the senders of those

messages? You'd probably have latency issues. The senders of those messages, by the way, are already hard at work building a new way of reporting all those messages for the consolidated audit trail, so maybe there's some tailwind you could leverage from that process to enable you to have a competing consolidated feed from a different source that didn't involve the exchanges and provided some real competition to the exchanges.

Sorry, I'm running long here. But one last point on the other use case at Trillium is for posttrade surveillance. The types of data we've been talking about, in addition to being useful for trading, are useful for compliance purposes. To take a couple of examples, the market access rule, Rule 15c3-5, requires among other things pretrade risk checks. And you have to, before sending an order, make sure that the account sending it hasn't exceeded their buying power and isn't overextending themselves, isn't going to be a risk of default at clearance.

In order to run that pretrade check, you kind of need some reference of current SIP data to know what the value of their position is at that moment. In the UTP plan and in the CTA plan, that's a nondisplay use and suddenly you're forcing anyone who has to do this rule-

mandated risk check to buy this nondisplay license from the SIP feeds.

In our case, we also -- you do posttrade surveillance, which is also part of Rule 15c3-5, to look for things like spoofing and layering. You need depth-of-book data to really accurately look for spoofing and layering. If you look at some of the enforcement actions that have come through FINRA and even some of the criminal cases, they talk about patterns where the culprit was entering fictitious orders at tiers four through eight of the order book. How are you going to find tiers four through eight of the order book without actually having the depth-of-book data as part of your detection feed? And so it's important to use that data for trade surveillance as well.

Sorry about that.

MR. REDFEARN: Thanks. Chris.

MR. ISAACSON: Yeah. Good afternoon, I am Chris Isaacson, EVP, Chief Information Officer, Cboe Global Markets. Also happen to be one of the founding employees, was one of the founding employees of Bats Global Markets before Cboe purchased Bats. So thanks to Brett and the Staff and the Commission for having me here today. It's a joy to be here.

You can also refer to me as the other Chris or

the joyful Chris, as the angry Chris has left the building.

(Laughter.)

MR. ISAACSON: So I look forward to discussing these topics that we have for this panel in relation to Main Street investors, as we at Cboe strive to cultivate and maintain a transparent, dynamic and efficient market ecosystem that benefits all market participants, especially these investors.

Today, the trading experience for retail investors has never been better. Executions are faster, spreads have narrowed and broker commissions have dramatically decreased, in many cases to zero.

Importantly, in light of this roundtable, it is aforementioned parts of execution and not the market data costs that determine what retail investors actually pay to trade. In fact, retail investors have little or no market data costs as a direct result of the current SIP model which offers fast, reliable and inexpensive market data that serves millions of nonprofessional customers and that count has gone up. So we must not lose sight of these facts when discussing potential modifications to the SIPs, as it was done on previous panels.

Now, as for depth of book and market access services, the truth is exchanges aren't required to offer

these services and firms aren't required to take them. In fact, I just ran some stats and Chris shared some of these, but less than half of our customers, half of our members take depth feeds or the pitch or order-by-order feed as we refer to it. And, in fact, we don't take direct feeds from all the exchanges; we just take it from a subset that we deem good for our business purposes. And that's disclosed as part of our exchange rules. You can go find it.

So, moreover, firms are not obligated to become members of all exchanges, let alone every exchange. So firms make commercial decisions based on their own individual business needs. And recognizing that not all customers and their individual needs are alike, we offer a wide range of product offerings across our exchanges in order to give customers choice. And these choices allow customers to decide which exchanges to connect to and by what means, which features to utilize, which data feeds to purchase and ultimately which fees they're willing to pay.

So Cboe invests tremendous time and money to continuously and reliably offer this wide range of offerings across all our exchanges to compete for market share with other exchange operators and the 30 or so dark pools or off-exchange venues that are out there today.

So while this roundtable is primarily comprised of exchanges as well as highly profitable firms voicing their displeasure about the prices they're paying exchanges for their services but they aren't mandated to take in many cases, we must not lose focus on the experience of the retail investor, as Chairman Clayton mentioned this morning.

So thanks again for having me and I look forward to continuing this important dialogue. And I commend you all for staying awake for an entire day of market data roundtable.

MR. REDFEARN: It's very exciting, Chris.

MR. ISAACSON: Thank you.

MR. REDFEARN: Vlad.

MR. KHANDROS: Thank you for putting this together, thank you for having us. You know, market data is the oxygen of our ecosystem, so this is an important panel or set of two days and we really appreciate the opportunity to be here. I just want to put out two quick comments and then get on to some others.

If I say nothing else, market data pricing is inelastic in many areas. And we'll get into that much greater, but I just want to make sure I explicitly say that up front. And a lot of folks noted that the U.S. capital markets are already very strong. We strongly

agree. We just think they could be a lot better, and so we're here to talk about how we make them better.

And sorry, I'm Vlad. I'm with UBS, managing director at UBS. We are -- we operate a wealth management division, asset management division, a retail market maker, an ATS. In all the -- in most of those areas I just mentioned, we're probably number one or one of the biggest globally in all those areas. So I think we have a very diverse business across retail, brokers, pension funds and other types of clients. Hopefully, we will give you a more -- a very balanced, holistic view on our views on market data.

And when it comes to market data itself, we looked internally and we actually -- this is pretty fascinating. I actually didn't know this until last week, admittedly. I should have. But within UBS, our third largest expense as an entire firm after human capital and real estate is market data. Third, third largest expense. Which surprised -- at least surprised me. Which is fascinating as a firm that's a major financial firm, that market data is our third largest expense.

The equity market itself is extremely competitive, it's extremely efficient. The cost of trading, broadly speaking, continues to come down.

However, from a market data perspective, our costs continue to escalate significantly.

There was a great piece that hopefully folks had seen or will be able to take a look from SIFMA that was submitted, I believe, last night. And one of the charts that SIFMA submitted showed the pricing of NYSE nondisplay market data, which is one of the main topics for this panel. And from memory, I believe it went up 1,100 percent. So I know I heard earlier comments that maybe market data had not gone up or it's flat. But just one core area that we're talking about for this panel, it's up 1,100 percent. And that's a public document from SIFMA.

There's a lot of different areas that we want to talk about and there's a lot of components of market data. I just want to also emphasize that, from our perspective, when we talk about market data, we're thinking about the broader ecosystem. That includes things like connectivity and how we receive the market data. That's all very core. And when you look at it all in aggregate, the prices become even more egregious in aggregate.

I also wanted to emphasize, you know, there was a comment earlier -- there was a lot of great comments earlier today. There was one from Simon from Norges and

his quote, he was talking about the difference of performance among brokers. And I'm sorry if I misquote you. I think said the performance difference amongst brokers is significant and it's really the tech stack, you either have it or you don't.

And that's where we see -- you know, our market share, fortunately, has increased. And we think one of the reasons is because we have the ability to invest heavily in a lot of these areas that we think are vital for best execution. We have clients now that the difference between being their top executing broker and being cut off is one basis point in a rival, one basis point.

Some clients don't necessarily prescribe the exact form of market data we use. That said, if we don't invest heavily in market data, it's hard to imagine that we wouldn't be one of the brokers cut off for those set of clients that measure cost that carefully.

And it worth noting, and then I'll turn it over to Jamil, but it's worth noting, you know, we just put out a piece that came out, I think, today or yesterday that we called Data Science and the Trading Desk that was authored by our head of Americas Cash. And I think what you'll see in the piece from Todd Lopez, it shows how trading desks are increasingly more forensic in their

cost of trading. And more and more, the buy side is taking in complex market data, paying more for it and measuring the brokers even more strictly. So all of these things we're talking about, they all add up to performance overall.

So we appreciate the opportunity. The last comment we had, I just had the opportunity to spend the last few days in Europe and I was in Asia a few weeks ago. And across our business, these issues are not unique to U.S. equities. So fortunately or unfortunately, I believe the Chair started this session by talking about how he was with IOSCO. There's a lot of regulators globally looking at what the U.S. does. And hopefully, we can collectively come up with solutions to further improve the U.S. capital markets.

Thank you again.

MR. REDFEARN: Thank you, Vlad. Jamil.

MR. NAZARALI: Thanks, Brett. And thanks to you, the Commission and Staff for setting up this really important discussion.

My name is Jamil Nazarali and I am global head of business development at Citadel Securities. Citadel Securities is a leading global market maker across equities, options, fixed income, ETFs and FX. On an average day in the U.S., Citadel Securities handles more

than 20 percent of U.S.-listed equity volume, more than 25 percent of listed options volume and about 40 percent of all retail broker-dealer orders. Our clients include retail brokers, institutional investors and banks, and they benefit from our ability to provide consistent and reliable liquidity across a variety of market conditions.

Accurate and up-to-date market data is critical to the functioning of our markets and it helps market makers like us provide the best prices to our customers. And as Vlad said, when we are thinking about market data, we need to think much more broadly than the SIP. We heard a lot of numbers about SIP costs staying flat over the last decade or so. But when we think about market data, we need to think about the cost of direct feeds, ports, cross-connects, usage fees which are charged by the number of servers that consume the market data, and colocation. Having all of these is absolutely critical to us and other market makers in providing the best prices to our customers. And so when we think about market data, we need to look at it holistically.

Second, there's been a lot of discussion about whether using the direct feeds is a commercial decision or something that's important for your best ex requirements. And I will say that our customers demand the best prices and it's not a commercial decision for

us. If we didn't use direct feeds, if we didn't give our customers the best available price in the market -- which, by the way, you need all of those things that I just talked about -- we wouldn't be in business.

MR. REDFEARN: Ronan.

MR. RYAN: Hello, everyone. I echo the sentiment of the rest of the panelists and thank the Staff for putting this together. I think it's absolutely a critical discussion to be had. I also appreciate the fact that you made me wear a tie and I feel like a choked dog up here. So, thanks.

My name is Ronan Ryan. I am the president --

MR. REDFEARN: We never said you had to wear a tie, Ronan.

MR. RYAN: Yes, you did, back in the green room.

(Laughter.)

MR. RYAN: My name is Ronan Ryan. I am the president and cofounder of IEX, the Investors Exchange. As everyone here is probably aware, we are the only U.S. stock exchange that does not charge for market data or for market access.

Before founding IEX, I built smart order routers at RBC and prior to that, I was a technology vendor for a little over 10 years. So I have been

involved in market data and the connectivity evolution over the past 15 years from different perspectives, as a vendor to latency-sensitive proprietary firms, as a broker trying to circumnavigate a fragmented market and now as an exchange offering a commercial alternative to the predominant business model of our incumbents.

When I think about proprietary market data products and access, there are two main decisions an exchange must make, what to offer and what to charge for it. How IEX answers those questions is pretty well known. Like I said, we offer enough functionality so that our members can compete on a level playing field and we give it all away for free.

We do this to align our business models with our customers. Just as brokers earn trading commissions when their customers choose to trade with them, IEX earns transaction revenue when brokers choose to trade on our exchange. It's pretty simple. IEX offers free depth-of-book feed as well as free top-of-book feed. And importantly, we don't offer faster versions of our own market data feeds for a premium price. It's truly one feed at one speed.

We intentionally decided not to provide order-by-order granularity on our depth-of-book feed. This type of granularity enables the recipient to identify

every individual order at every price level. We made this choice for commercial reasons. Our target customer is the broker-dealer acting in an agency capacity, who is less likely to be mining the order-by-order data for a signal. Rather, their customers' orders are usually the content that gives the proprietary feeds value and become the signal that others trade against, increasing execution costs for them. This is one of the many examples where exchanges treat buy side more as a product than a client.

Accessing IEX is fair, simple. Unlike our peers, IEX does not monetize tiered connectivity into the exchange. In fact, we don't offer connectivity of any kind directly into our matching engine.

I'll go a little ad lib here because I would be remiss not to say it and I'm sure we'll talk about it within this panel. But this is the third panel of the day and I've heard constituents from the buy side, from market makers, from brokers, virtually line up and say they have to use the direct fees and exchanges are kind of telling them, well, no, you don't, it's your choice. So I think it's a really important discussion to have and I appreciate the opportunity to discuss it.

MR. REDFEARN: Thank you, Ronan. Joe.

MR. WALD: Good afternoon, Director Redfearn,

all of the SEC Staff, thank you very much for the opportunity to be here today. My name is Joe Wald and I am the CEO and cofounder of Clearpool, a financial technology and independent agency broker. Clearpool has a unique voice in the debate surrounding market data and market access.

First, we are a relatively new entrant to the market, launching in 2014. And therefore, we have recent first-hand experience with the challenges and potential barriers to entry of the current market data and market access regime. Second, we primarily serve regional broker-dealers. They are the lifeblood of research and banking for small and midcap companies. Their clients, in turn, are asset managers who invest on behalf of many pension, 401(k) and individual investors, the Main Street investor. Our broker-dealer clients rely on us to provide their institutional clients with competitive and transparent algorithmic execution services.

We look forward to the discussion during the roundtable of the critical issues related to market data and market access and, as discussed in detail in our written submission for the roundtable on the SEC's website, we believe that there are several important questions that we would like to see examined that should ignite deeper inquiry, conversation and subsequent action

on these issues.

First, is there a disproportionate impact of the current market data and market access regime on smaller broker-dealers and does this act as a barrier of entry to innovation? From what we have experienced, through the high costs for market data and the complex and opaque tiering structure established by the exchanges for transactional fees, smaller broker-dealers end up subsidizing many of the costs for larger firms. And for new entrants, securing market data is a significant upstart cost. Our take on this is, yes.

Is there a lack of transparency and an innate conflict around market data fees and market access fees managed by for-profit entities? It is very difficult for consumers of market data disseminated by exchanges to understand the reasonableness of pricing due to the lack of information provided by the exchanges around market data and other fees. Compounding the problem, market participants do not have adequate opportunity to provide input into any changes of those fees. This question, our take is, yes, as well.

And, as you've heard a number of times today, are there viable alternatives to exchanges' proprietary data feeds? Clearpool and other broker-dealers are compelled to purchase exchanges' proprietary data feeds,

both to provide competitive execution services to our clients and to meet our best execution obligations due to the content of the information contained in the proprietary data fees as well as the latency differences between them, which are major and important considerations for brokers. With respect to this question, our take is, absolutely not.

The spirit of this market data conversation should be about creating a level playing field. Ideally, the same data at the same speed at the same cost. No one should be able to buy that advantage; it must be earned. And for us to have the most competitive and efficient equity markets in the world, we should demand nothing different.

Look forward to answering your questions and thank you very much.

MR. REDFEARN: Thank you very much. So we -- I'm going to just take a little bit of a different approach to start with just a few follow-up questions for some of the comments that were made initially, just so we can get, you know, a little bit more background on that.

The first one is, James, you used a number that was less than 100 million in revenue for market data. Did that include connectivity or was that just data?

MR. BROOKS: That's proprietary data across our

five exchanges, not connectivity.

MR. REDFEARN: Okay. And do you have or would you -- in terms of breaking out the connectivity, because a lot of what we've heard from different folks is it's also sort of, to get the data, to use the data, you need to have the connectivity. Do you have any sense of what that would be?

MR. BROOKS: This isn't an earnings call and I'm not going to start putting out new numbers in this forum.

MR. REDFEARN: Okay.

Secondly, Chris, you mentioned the -- you know, the sort of choices in terms of the differential products or provisions that are put out there. And we've had some interesting commentary on whether or not there's a choice or there's not a choice. I guess the question, vis-a-vis what maybe what Joe said is, part of our job is to ensure this concept of fair, reasonable and not discriminatory. And given all the choices of different things at different speeds, how -- you know, how does that line up with, you know, managing sort of the not discriminatory responsibilities that we have at the Commission? Especially if -- especially if Joe -- I mean, it sounded like Joe was suggesting that it's sort of out of reach for some of the market participants like to really

compete at those levels.

MR. ISAACSON: I think defining what is out of reach is very difficult because somebody with -- depending on the resources of the firm that wants to come in, you could define out of reach as a very, very low number or a very, very high number.

I think, as I mentioned in my opening remarks, the choices we offer our members, they -- nobody has to take the data. That's their own volition. And less than half of them do, right at less than half take the pitch market data.

We offer different ways in which they want to connect. For instance, the connection speeds they want to connect at, they can connect at one gig, one gigabit or 10-gigabit connections. And also the speed at which or the shape of how much bandwidth they need, we offer shaping of that feed to either 100 megabits on our equities markets or a gigabit. So they can tune their connectivity needs and costs to what they want to pay and what they think fits their business model, if they decide they need to take direct feeds for -- if they think that's what they need to be competitive.

However, as I have said, we don't take all the direct feeds from all the exchanges. And many of our customers don't take the direct feeds from us. So,

clearly, somebody -- half of our members are figuring out how to run business models without it.

I don't know if that answers your question.

MR. REDFEARN: Is the "we don't take direct fees from all the exchanges," is that usually meaning that there's a few markets that have like less than 1 percent significance or they're not meaningful and most of the -- because I know that a lot of times, even from when you look at the exchanges, you see the ones that they will take and they won't take.

MR. ISAACSON: I think that market share is a factor. Market share, price can be a factor, location can be a factor. And we look at all of that.

In fact, it's interesting that we ran some statistics within the team and it showed that when we did have a price increase on one of our data feeds, there was attrition of subscribers. There was a high single-digit attrition of subscribers. So there was some elasticity on the price. It's like, some people decided I don't want to take it anymore. So that countervails what some people have said, where I absolutely have to take it, there's no choice.

MR. REDFEARN: So Vlad, you used an 1,100 percent static.

MR. KHANDROS: Yes.

MR. REDFEARN: Can you just --

MR. KHANDROS: Good memory.

MR. REDFEARN: -- go a little bit farther on that? What was the period of time that you were talking about the nondisplay?

MR. KHANDROS: That was looking at the NYSE nondisplay data from when it was created in, I believe, '12, 2012, through present. I'm sorry, 2010 through 2017. I just saw it right now. Thanks to T.R. at SIFMA for sending that to me. So it was 1,100 percent and that's what SIFMA submitted yesterday.

And that's where, you know, earlier comments around SIP revenue coming down, confidently they've been much more than offset by the increase of nondisplay fees and then the selling of competing products from the exchanges that compete with the SIP itself.

MR. REDFEARN: So, Jamil, you used the term "not a commercial decision." If it's not a commercial decision, what is it? I mean, is it a regulatory decision? Is it a best ex decision? Is it a competitive decision? Is it commercial? I'm just trying to understand.

MR. NAZARALI: We feel it's necessary to get our customers the best prices in the market. And there's only one way to do that, and that's to know what the best

price is in the market in as quick a way as possible. So you need to have the most up-to-date prices. And to do that, you need to have all of the different components that I described earlier. Right? You need to have the fastest cross-connects, you need to have the direct feeds, you need to be colocated.

And the good news for retail investors is that, because we're spending the money on all those things, we do get them the best prices. But it costs a lot to do that. And it's not a commercial decision.

It's a little -- you know, we hear this argument. And, with all due respect, saying that some people take it and some people don't. It doesn't really shed light on whether or not people need it. You know, there's utilities, right, there's natural gas companies and they sell natural gas and not everyone buys it, right? That doesn't mean that it's not a utility. For those people that have it, they have to have it. Right? And so there's no substitutes for it. And I think that's kind of -- that's really important to understand. When you need it, there's not a substitute.

MR. KHANDROS: I think earlier, Met talked about trading being a zero-sum game. And one of his points that he was making, which I would certainly agree with is, you know, ultimately, it's whoever is first in

line will get that liquidity. It's not like getting on the airplane and irrespective of when you get on, you're getting on the same plane. So it was a great analogy that really struck home.

There's a lot of firms that, for one reason or another, have over time decided to outsource the routing, outsource their algo usage, outsource a lot of their trading infrastructure. And those might be a lot of the firms that we're hearing from that maybe choose or are able to not consume some market data services and they're instead outsourcing it to other firms that are able to invest in those market data services.

MR. REDFEARN: Yeah, Ronan.

MR. RYAN: Yeah. So along the lines of what Vlad is saying, we're obviously a stock exchange. We have approximately 160 -- I didn't run these stats -- but 160 brokers connected to IEX. We probably roughly have 30 of them taking our market data tops, our market data depth of book, and that's free. So that's, back of the napkin, less than, you know, 25 percent.

But what's important to note is if you look at the equity landscape, there's probably only 20 or so brokers that have their own platform anyway. And those other brokers, the smaller brokers, are white labeling or using the access of the other top 20 brokers, call them,

to access the markets. And again, the top 20 brokers, you know, from the bulge bracket to the market makers to the buy side, again, you know, we had two buy siders, Met and Simon, basically say they'd laugh a broker out of the room if the broker told them they didn't have direct feeds. Jamil is saying it. You have to have direct feeds to compete correctly.

So, you know, yeah, we have less than 25 percent taking our feeds that are free. But that's not the important detail. It's who takes the feeds, why do they need it and who are they serving?

MR. REDFEARN: So we're trying to move our understanding of this ecosystem past data into sort of also the connectivity layer, right? So we've talked a little bit about ports and whether they're, you know, logical ports or physical ports or what have you. Can you, and maybe back to you, James, can you -- for whatever is published numbers -- can you tell us a little bit about like what you get for -- you know, what are some of the options that you have and what is some of the variability between sort of what that means in terms of price and costs -- I'm sorry, in terms of speed and cost?

MR. BROOKS: So Mahwah opened in the data center in 2010 and there was a network. That network has since had to be upgraded and there's been significant

investment in the network. And when designing networks, it's not just about latency, it's about capacity. And at some point, if you don't do things such as go to 40 gigs, people are going to drop packets when they're taking huge data feeds and those data feeds could be equity option feeds such as the OPRA feed. So there has been a lot of investment across the whole industry and certainly exchanges, too, in their data centers to upgrade capacity.

And if firms just want to send orders in, that's a much lower level capacity. And there's a menu of options from a gigabyte up to 40 gigabytes that firms can chose from to take -- to take directly from the exchange.

Not everybody in the data center is a customer of the exchange. There's third party hosting in the data center, where some firms choose to buy space from other firms and leverage their connectivity into the matching engine. And those prices are negotiated between the third parties and the firms who are their customers and the exchanges are not part of that at all.

So to stress, resiliency, redundancy are very important. What really drives costs in terms of the connectivity is increases in bandwidth. As I said, there hasn't been very many price increases. But if you need

to take more bandwidth, you're consuming more connectivity and that connectivity is what's really been driving costs.

MR. REDFEARN: I think that there's certainly an appreciation for all the investment and the, you know, a lot of the technology evolution that's happened in the marketplace and that's provided a lot of benefits to investors. I guess the question is the connection between the level of investment and the level of cost to the participants in the marketplace.

So, Chris, would you characterize the -- sort of how you see the pricing landscape as driven primarily by the investments that are there? Is there some other driver?

MR. ISAACSON: I think we've made market-based pricing and it's also factoring in what our costs are. Any commercial business does -- does this. And I think it's, you know, disingenuous to think that anyone up here is not a profit-seeking -- part of a profit-seeking enterprise, as the exchanges are.

As James has said, there are tremendous investments required that exchanges must make. And not to say that esteemed colleagues at nonexchanges aren't making investments. But there are some certain investments that exchanges have to make because of Reg

SCI, for instance, and the incredible scrutiny we're under from the SEC and other regulators to make sure that we meet certain standards. So we have had to invest millions and millions of dollars to meet the demand.

Even two weeks ago was a great example, when you increase your capacity you have to -- you have to scale for the peaks. You have to scale for multiples of what the average day looks like.

So I think Chris mentioned earlier on the panel, a couple weeks ago, October 11, 8.3 billion orders in equities, well over 30 billion in options, more than 50 billion across our 15 exchanges or markets across the world. That was about 50 percent greater than any day previous to that.

And so now we're planning -- I've just come out capacity planning meetings. We're planning for we have to be at at least 2X that from an order count perspective and multiples of whatever the messages per second, because we can't slow down. Because if we do slow down, there's likely an enforcement case coming against us because we didn't submit our data to the SIP fast enough or we weren't being resilient enough.

So that sort of standard -- which we don't object to the high standards, we like high bars, because we think it's very important to the national market

system. But that high standard has costs associated with it.

And we also think we're providing a great service and people, if they don't like the service, they can vote with their feet. In fact, we've seen that with -- we've had some pricing increases, we think respectful but pricing increases on, for instance, physical or logical ports. And again, we've seen some attrition there, high single digit attrition when we've had pricing changes.

So they can optimize their capacity to us, as Chris said. Through a single physical connection and a single logical port, you can get 2.5 billion orders into one of our exchanges in a month. If you buy enough logical ports, you can get a trillion orders in. So we have to pay for that capacity. It's not the cable that Doug had here. It's -- we have to handle all of that and have a DR system that can handle all that as well. So there's tremendous investment.

And I would also mention, regarding transparency of costs, you know, we file audited financials of every SRO, because we run six of those at Cboe. Audited financials of every SRO, which includes margins, of course, that the SEC gets every year. So we'll stand behind those numbers. Of course, they're

audited. So we're being as transparent as need be on what our costs are.

MR. KHANDROS: I just very quickly want to say, just as a firm that operates an SCI entity which, I agree, is extremely complex and costly and is something that we obviously take very seriously, we still have to earn that business. Firms can choose whether or not they want to trade with us. I just think that's a fundamental difference to keep in mind. Our clients choose to use us. They choose it every day. They can't choose to simply disconnect from an exchange, a protected exchange.

So, you know, there were comments from several commissioners over the last week around the order protection rule, which we would very much endorse revisiting.

MR. WALD: I just want to jump in for a second, as well, just to shed light on the order of magnitude that this kind of -- someone referred to it as a moat earlier -- is for smaller firms. In our first year of operation, market data and market access related costs represented 25 percent of our nonhuman capital operating budget. That's like another rent.

You know, the exchanges are there to provide fair and orderly, you know, access to the markets, not to be an absentee landlord. So we're talking about orders

of magnitude that really just represent a tremendous difficulty for small firms to in, start up and compete in this structure that we've created.

MR. RYAN: Brett, can I jump in here? So I'll start off by saying, obviously, IEX is a for-profit entity, I agree.

When it comes down to connectivity and the physical connectivity and specifically the cross-connects within the data center, the fees that are charged and levied for those products to me are offensive. So when you look at the data center business as a whole, and I agree with Chris, there's obviously much more cost than just the physical cable that Doug -- it was pretty funny -- but there is much more cost to that.

An average cross-connect in a data center that you go to is like $400 per month, and like $250 installed. And if you talk to a company like an Equinix, they'll tell you they have something like 98 percent margin on that.

However, obviously, there is a piece of equipment that the cross-connect needs to, you know, plug into on the exchange side. And the exchange does bear the cost for that.

But what I would say is when you look at NYSE in particular, not to pick on James by any means, but if

you look at their infrastructure, a 10-gig cross-connect and a 40-gig cross-connect plug into the same type of switch. It's an Arista, I can't remember the name of the model. I believe there is a different line card for the 40 gig, it makes it faster and, you know, it's nowhere near market pricing in relation to what it costs, not just to purchase the switch, to power the switch, to rack the switch, to service the switch. It is absolutely, unequivocally nowhere near the cost. It's actually -- cross-connects are bananas, what their charge is.

And then when you talk about its latency, it's not latency it's capacity, I will tell you at the time that exchanges -- specifically when NYSE was going from 10 gig to 40 gig, I had a conversation with -- I'll call it a top five proprietary trading firm on the globe. And they had told us, we don't need to go to 40 gig, 10 gig would be fine. But unfortunately, at the time, 40 gig was two microseconds faster. And if someone breaks the union line and buys the 40 gigs, guess what? Everyone is forced -- it's a strong word -- but forced to buy the 40 gig, if they want to compete in that nature.

So, yes, it's a competitive business. I think exchanges is a competitive business. But maybe more so on pricing of, you know, make or take or et cetera. But when it comes down to things like cross-connects and the

need to connect to the exchange, it's not a competitive business.

I mean, again, I've said it a few times, you're hearing many people say they have to buy these cross-connects, they have to have the fastest market data. And no one can provide faster cross-connects within an exchange than the exchange itself. No one can go into Mahwah and provide a faster service to connect to the exchange.

And I think like if anybody that is on the stream is still awake, God bless you. But maybe go and Google the word monopoly. And the word monopoly says it's exclusive possession or control of the supply or trade in a commodity or service. Cross-connects are a commodity. This is a monopoly.

MR. DONOHUE: Chris, can I ask a follow-up with that? So we talked before about half your customers take the direct feeds. Do they all take the 40-gigabit line or what? How does that work out?

MR. ISAACSON: So obviously, there's differences between exchanges. So we don't offer 40 gig. Let me talk a little bit more about the investment we're making into technology. So a little bit of history here. So when Bats purchased Direct Edge, we decided we were going to aggregate data centers at Secaucus, which Simon

mentioned is a center for many brokers and exchanges in the Jersey area, kind of right between Mahwah and Carteret. We decided we were going to consolidate there to try to keep -- keep costs reasonable for customers.

Well, instead of allowing a latency game within data centers, we said we're going to latency equalize to NY4 and NY5. So the person that's closest to our cage in NY5 and the person that has the furthest cage in NY4 has exactly the same latency, down to a variance of about 6 nanoseconds. So we spent a lot of money, more than a shoebox worth of cable. Like there's a lot of cable. And we terminate every connection and we shoot light through it to verify that everyone is being fair. So that takes time, effort, money, resources to make sure we're doing it correctly. We don't offer 40 gig. We didn't see a commercial or a technical need for it. At which point we think there's a technical need for it, we would consider it. But we have not seen a need for it. So one 10-gig connection today, as Chris mentioned this morning, gets you access to seven exchanges. And with all due respect to Ronan, one connection that may be free at IEX gets a connection to market that's less than 5 percent market share, one exchange. This gives you connectivity to seven exchanges, four equities and three options. And that's all over one 10-gig connection.

Now, just we have tried to be, honestly, Cboe and previously Bats, as kind of down the middle as possible as what we think is reasonable fees for the service we're offering. And market -- market rates and tremendous technology. But we have not gone the 40-gig path.

MR. BROOKS: While we're on 40 gigs, I want to jump in here, because there was a comment made about this. When NYSE went to 40 gigs, we also introduced a 10 gig at the same speed and at the same price. So if somebody is saying that there is a latency differential of two mils or mics or whatever it was, that's just not true. And they're at the same price. Why we did both is they require different infrastructure for the firms so you can take your choice of 10 or 40 but you don't have to be on a 40. And if you want to move from a 10 to a 40, it is the same price. But that number is -- I don't know what that latency number was thrown about. And also, just as far as throwing around numbers, this 1,100 price increase for depth, I'll have to take a look at that but I know the history of my pricing and that's a pretty creative number.

MR. REDFEARN: I guess one of the --

MR. KHANDROS: I have a chart if you want to look at it here. It's based on your own filing.

MR. BROOKS: I'll be glad to go through it.

MR. KHANDROS: It's on the SEC website.

MR. BROOKS: I'll be glad to go through that with you. You're citing it and you didn't cite exactly what you used for that. But I've seen a lot of different creative interpretation of public filings and I wouldn't deem what SIFMA says as the arbiter of truth, either.

MR. REDFEARN: I think you all know, we have opened up a comment file. We're encouraging people to submit their comments and their data and their potential responses to whatever data might be submitted as well so that we can really get a finer understanding of some of these nuances.

I guess one of the -- you know, sort of there's this underlying question here which is, you know, to what extent do you need to pay more to get the good stuff, the fastest thing, right, the stuff that is where the competitive space is? And if you don't pay for it, does that mean that you're inherently at a disadvantage in the market? Because we're thinking about fair and discriminatory, right? And we're trying to make sure that the marketplace hasn't evolved to a point where there is some question about, you know, has it evolved to a point where maybe the precepts of fairness and, you know, is it nondiscriminatory are in question, right?

So, to what extent -- James, if somebody is buying, I don't know, Ronan, what is it? The multicast cross-connect at, you know, 20 gigabytes versus 2 gigabytes and you've got to pay this much more. And if you want to buy -- I don't know how many logical ports does a firm need to buy and how many do they have to buy at this? And what is it out to? We've heard a lot of numbers coming out here that start to make it sound like there's a significant cost and that that is difficult or more difficult for smaller firms.

And so I guess we're looking for sort of the response to how do we -- how can we be sure that there's not a scenario that's evolved in some respect that has started to bring into question whether or not, you know, at a reasonable price, that it's not -- it's not starting to challenge the concept of fairness or being nondiscriminatory?

MR. BROOKS: So what we've heard today is that market structure has evolved and, in some sense, it's evolved very rationally in response to regulations and market forces. Participants in the market consume different services. And there are some venues that say, well, we want a different marketing, different models. We want to wrap everything in a per share price. And of the NYSE Group's five exchanges, we have two exchanges

that don't charge anything for market data and IEX doesn't charge anything for market data. Most of the ECNs and a number of the other exchanges, Bats Direct Edge never used to charge for market data.

And things evolve. And it has been acknowledged that the competition is fierce for order flow and it certainly all goes together and you need to look at the all-in cost, not just the cost of one piece. And it's easy for a participant, and it's great marketing and people are allowed to use this, of course, to say, oh, we don't charge this one piece, don't look over here at our price per share or something else. You really need to look at it all in.

And one way to look at it is some firms may send a very high volume of orders, a very low percentage of them may execute. They may have huge bandwidth needs, so they are charging market-based pricing for the ability to send in everything they want to do. Another firm may have a much lower capacity need and doesn't need to pay for it.

If you use just a per share model, you're squeezing people that use totally different levels of service into a single cost paradigm and that's not necessarily rational. It's one way to go. But look at the evolution of services. Some firms consume more

market data than others so they pay for it. They consume more bandwidth, they want more access to the exchange in microsecond bursts, they pay for it. And in a very competitive environment, you can see different pricing models, the venues marketing themselves very differently.

But I would think to some extent it is rational, it's not necessarily simple. But when you have fragmentation and liquidity spread across dozens of venues and multiple exchanges, it gets complex. You know, people have noted that there are three large exchange groups and IEX, so there are four different exchange groups. And some people have been looking at it like, gee, that's not many. Well, it actually used to be one. Things are really traded where they were listed. And what was traded away from a listed venue is largely internalization.

So there are more exchange models now than there have really been before. And there has certainly been healthy entry into the space. We've seen that with Archipelago, Direct Edge, Bats, IEX. Brad was joking about how hard it was for IEX to get in. Well, that's because it was a very different model. If this fixed cost gig is so good and you just want to do a me-too exchange, there's nothing stopping anybody else from entering the space.

So look at it from that evolution, that there's a very different consumption of services. And what is market-based pricing look for that? In a competitive environment, you would expect there to be multiple exchanges and you'd expect them to have different pricing models.

MR. FRIEDMAN: As a smaller firm, we would very much welcome kind of tiered pricing based on latency and order message volume so that we would be at a lower end of that. That's one of our frustrations with license fees for nondisplay, for example. You kind of jump from zero to 12 grand a month if you do the simplest computation, mathematical computation with the data. And there's no kind of tiered gradients of are you a Citadel or are you just checking your risk parameters.

MR. WALD: Just to add on to that, I mean, clearly you can't forget about the transaction fees and the way that they have been kind of used to subsidize those market data fees. I mean, we heard it earlier on the first panel. Some large firms get most if not all of their market data fee and access costs subsidized by the amount of volume that they do and the amount of tier rebates they get. In many cases, those tier rebates are not fair and equitable, either. They're negotiated firm by firm. If you took a look at -- and I don't think this

is something that's published at all. There's zero transparency on who's receiving this plethora of different fees and tiers across the board. And in many cases, what you'd probably come to find out is that one or two firms are the only beneficiaries of a particular tier.

All of that is really a barrier to entry for small firms. It's basically the cost is moved to the many and subsidized by the few. I mean, it just doesn't make any sense.

MR. KHANDROS: I just wanted to quickly the -- it was NYSE prop, nondisplay was a big contributor to the prop. So I should have clarified that earlier.

And I also want to say, just in fairness to James, there are multiple other exchange groups that are not necessarily that different in increase in fees. It's just that, from a public fee disclosure standpoint, the third-party group that SFMA hired focused on several. They're the one that was finished in time for the panel was NYSE. So there are several others as well that will be highlighted down the road. So just in fairness to James.

MR. BROOKS: Okay. I'll be glad to look at that. I'll respond later.

MR. KHANDROS: And then also, I think there is

just this question of what, in terms of fairness and what is right for Mr. and Mrs. 401(k). I think on the one hand, we want to be sure from a trading standpoint that their brokers are directly using or are using other brokers that are investing heavily in infrastructure and best execution. I mean, that's really important. And whether it's retail brokers or asset managers or other types of clients, they are increasingly measuring our performance extremely scientifically, more so than ever before. And that will no doubt continue. I think a lot of the question that we're probably struggling up here is what is that right balance. And clearly, we've established most firms cannot afford to provide best ex on their own. And so that's why so many choose to outsource it.

And so, you know, I think -- perhaps that's okay for the market. But I think that's one of the core questions, I think, that a lot of the panelists up here are maybe struggling a little bit with in answering.

MR. ROESER: So just thinking back to our last panel on SIP data and the use of SIP data, different latencies versus prop and the content differences, Jamil, you noted that you're relying on the depth-of-book products, you have to have the fastest, the best. Are there issues -- is the SIP just for eyeballs? Is there

information on the SIP that you need as well that factors in?

MR. NAZARALI: Well, I wouldn't say the SIP is just for eyeballs. But I would say that having the SIP is not enough. Right? For a number of reasons. You know, we talked about odd lots, we talked about depth of book. And we also talk about speed.

Now, the SIP has gotten a lot faster. And we have to just keep in mind that's processing speed. The biggest reason why you have to have the direct feeds is because, if you have a centralized process and you're requiring all of the exchanges which are at different locations to send you their transactions and then you have to process it and, you know, most of the ATSs and many of the broker-dealers are in Secaucus, you then have, you know, data moving -- you know, could be from Mahwah to Carteret to Secaucus. If you get that data direct, you're only going to have one of those legs.

And so, no matter how fast you make this SIP processing time, the fact that it's centralized is going to make it slower in all cases than getting the data directly. And so, and that length of time can be, you know, several hundred microseconds.

So to answer your question, SIP is not enough for a number of reasons, speed being a big part of that.

But also, it doesn't have all of the data that you need.

MR. RYAN: Also on the SIP, so I agree with Jamil in that it tells only part of the story. But like Adam said on the previous panel, there is a lot of information you need from the SIP like limit up, limit down. So it absolutely has a use more than eyeballs.

But not having depth of book, not having imbalance info and, to Jamil's point again, just the way in which you can have a GE trade in Carteret and that trade has to be sent from Carteret to Mahwah and then you take it from Mahwah back to wherever your trading environment is. If -- I believe it was Blaugrund who said it earlier, the distributed SIP, whereby GE could actually come just directly out of Carteret and you do put your own circuits from wherever your location is directly into Carteret, much the same way as you would a direct feed, if the SIP had that information, the imbalance and depth, it could be much more useful in that type of model.

But the way the SIP exists today, again, you've heard so many people say it today, it's just usable in its current construct for trading.

MR. REDFEARN: So this leads us to, I think, another important question. One of the things that we're contemplating during the course of these two days is what

should be the core data infrastructure? How should we be thinking about what is core?

We've heard a lot of things already discussed. We've heard odd lots should be added to the SIP potentially but we have to figure out what the obligations are related to that. We've heard the auction information has been suggested. We've heard depth of book potentially being suggested. We've heard microwave connectivity might sort of level it out.

And again, back to the question about how do we make it fair for all participants in the market so that if you're not buying the, you know, all the bells and whistles, you're still sort of coming in at a core -- with sort of a core, basic level without being sort of potentially priced out to the point where you're not able to necessarily -- so what are your thoughts? I'd like to kind of get the views of different panelists here, what are your thoughts on how should we think about what is the core infrastructure?

Presumably, it's not the same thing as it was in 19 -- you know, '74 or whatever it was when it was initially conceived?

MR. ISAACSON: So if you don't mind, I'll take that. So I think, from a core data perspective, what we have on the SIPs today is quite good. I will make -- odd

lots have been talked about. So we would be open to adding odd lots to quotes. It should be noted that odd lots were added to the trade feeds on both SIPs two or three years ago. So all odd lot trades show up already.

We would have to think about it from an order protection rule, as was mentioned on the previous panel. Are you going to protect those odd lots? Of course, we should figure that out. But, you know, we would likely be very in favor of that.

And then option information, you know, we too are a listing exchange, primarily ETFs and then our own stock. And we would likely be very much in favor of considering putting that information on the SIP as well.

But I think providing depth on SIPs, we would not go that far. I think there's potential for a lot of confusion there, potentially, for the intended purpose. You've heard multiple panels here where there's different purposes for the SIP versus non-SIP feeds.

So I'd also step back, you know, as a person who sat on the committee for many years in my role at Bats and still have some visibility there. It's -- the SIPs have come in a tremendous -- they've made a lot of progress. When I first sat on those SIPs, we were talking in milliseconds and we've talked about -- other panels have talked about how much it has improved. But

the SIPs were in need of improvement and so many of those improvements have happened.

Now, if we're talking about submission of data or transmission of data between data centers in a more -- in a better protocol, and we're open to discussion about distributed SIPs as well. It just has to -- we have to understand that the exchanges are also responsible, have obligations that are related to us as the people that are in trouble, frankly, if the SIPs don't work.

So that's our views on core data. Odd lots and auction information and continue the discussion on improving the technology of the SIPs.

MR. REDFEARN: Joe, going down to your end, what do you think should be the core?

MR. WALD: Yeah, core data, I think, you know, it's nice that the SIPs have improved but they are just not useful in terms of being able to be core data products. They do have a number of things that continue to be used in conjunction with the proprietary feeds. But not having depth of book, not having the richness of data that you need to be able to have effective order placement and to be able to really go out and execute in the marketplace the right way is a critical component that's lacking.

The auction data is another one that I think is

just -- the way the market has evolved, with how much passive investing goes on, with how important the opening and the closes have become, I think that's another, you know, area that has to be addressed, not only on the market data side but clearly on the cost side. You know, you spoke about monopoly a little bit. Well, you know, the auctions are one area where there is a monopoly and there isn't the type of competition that you have on regular trading costs. And that's reflected pretty clearly. The cost of an auction execution is probably about 10X the cost of a normal execution in the regular trading day.

So there are a number of conflicts here that have to be managed. And one great solution would be to bring the SIP up to speed and redefine what is core data and how that data gets disseminated, who gets it, how fast do they get it, what does it cost across the board. I think that those are critical challenges that are important for us to continue to discuss.

MR. REDFEARN: Ronan, do you have a view on how we should think about core data going forward?

MR. RYAN: I agree with what Joe said. And similar to what I said before, there is an opportunity to potentially build a distributed SIP. I don't even think you need to connect to it via microwave. I mean, fiber

can be fast enough from a distributed standpoint. If it's not ping-ponging back between the data centers in order for you to get a quote, the SIP -- and again, Mark from Redline beforehand was giving percentage numbers on performance of the SIP versus direct feeds. I can't speak to it being that wide. But if it is, in fact, that wide, then we need to do better on the SIP before we would consider it being any form of replacement for direct feeds.

Along with depth. And Chris is right, depth can be fairly confusing. Maybe it can be a simpler version of depth, just an aggregated amount at each level rather than an order by order. But it's worth investigation. But I do think we're a long way off. And for now, direct feeds is the need. And transparency in those costs, from soup to nuts, not the shell game of this is this and this hasn't changed but this did, I think it's really, really important.

MR. REDFEARN: Jamil.

MR. NAZARALI: Yeah, I think it's really important, as we think about what data to include in the SIP that we recognize there's really two reasons why firms use the direct feeds. Number one is it contains a lot of information that the SIP doesn't. All right? And we can solve for that by including some of the

information that we discussed earlier.

But the second reason is because of the speed reason. And that speed reason is going to exist always if you have the SIP processed centrally, right? And so we should be very careful in attempting to solve the problem by just including more data. Because you will still have a large number of firms needing to use the direct feeds to ensure they're getting the most up-to-date prices because, you know, as Ronan described, you're not going to have that -- you're going to continue to have that pinging across the different locations versus taking it direct. And you really, if you want to make the SIP a replacement or largely a replacement, you need to solve both of those problems.

MR. REDFEARN: So your starting point, the first thing you would say is solve for the geographic latency issue with the central point of consolidation and then take it from there?

MR. NAZARALI: Yes, because I think that that's actually -- yes, that's right.

MR. REDFEARN: Vlad.

MR. KHANDROS: Yeah, for sure having distributed SIP has a lot of merit to solve for the latency differences that are inherent in the current structure. And for sure, adding datasets such as odd

lots and revisiting order protection when doing that has a great deal of merit as well.

That said, while I agree strongly with a lot of the comments made, it's -- I do worry about kind of a game of whac-a-mole here, which is if we start fixing parts of the SIP or if we start fixing parts of nondisplay fees, we still have a lot of other issues that are being created over that process. And so, you know, there were conversations over years past around having a truly competitive process for the SIP and there's likely a good argument to take a step back and have a truly competitive process that gets revisited, so that different industry players have the opportunity to compete and innovate rather than having the same established players constantly being the primary providers.

MR. REDFEARN: Michael, your view on this one?

MR. FRIEDMAN: Just that CME, I think, has a 10-level depth product which is pretty standard. So maybe you wouldn't need to add full depth if you were doing depth in the SIP, just some abbreviated version of it.

MR. REDFEARN: James.

MR. BROOKS: Yeah, since Michael spent so much time on this, I'll say that I'd agree with the geographic

points. No matter how much the processor is sped up, that's dwarfed by the geographical differences. In one of our written comments, we've mapped that out on paper and diagramed it out. It's been talked about so extensively, I think, here, I'm not going to add on yet another one.

MR. REDFEARN: I welcome back Commissioners Jackson and Roisman. Just so you guys -- if you have any questions before we get close to the end here, please --

COMMISSIONER ROISMAN: Is it safe down here?

MR. REDFEARN: What's that?

COMMISSIONER ROISMAN: Is it safe now?

MR. REDFEARN: It's safer.

(Laughter.)

MR. BROOKS: Yeah, we're happy --

MR. REDFEARN: We've got a happy Michael, happy James, Chris is joyful, joyful Chris.

All right, let us know.

Listen, I only have one more question that I wanted to ask, which gets back to, you know, just to dig a little bit deeper on the question of fair and reasonable. I asked this on the last panel and it is one that we struggle with, right? Which is that when filings are going in, we have a statutory obligation to examine fair, reasonable and not unreasonably discriminatory when

we're looking at these things. And in the course of that process, we have to look at, you know, all of the market participants and we're trying to understand this.

And I'd just -- I'm looking for any other insight you can provide in terms of how we -- how we manage that challenge.

MR. KHANDROS: So in many ways, just to take a quick step back, the cost of trading, the performance of trading still seems quite key, and hopefully still one of the big themes we have, as in what is the cost of trading for retail, what is the cost of trading for institutions? And those broadly are going in the right direction. So I do want to make sure, towards the end, we have a positive note. Which is, you know, I think we are all here saying that things are working generally well. But there are pockets of the capital markets that we need to significantly improve, like market data.

In terms of fairness, I think it goes to this question of we want to be sure that mom and pop, that Mr. and Mrs. 401(k) are getting access, are getting best execution. We want to be sure that's happening. I think the question is, does it need to happen with them accessing it directly or not? You know, we heard comments from a number of folks. You know, Matt from TD earlier said, you know, his comment was he doesn't

necessarily need to take in all of the top end market data feeds because he's closely measuring performance of brokers he's leveraging to do it and he expects they're investing heavily to do it. And so to me, his customers, in his comments, sound like they're still getting extremely competitive execution quality.

And so in many ways, that sounds like the -- like it's generally going well. That said, we need to make sure that we don't have fees going up at such significant levels where there is no ability to switch out, there is no ability to truly compete or move flow around based on those market data fee increases.

MR. RYAN: Yeah, what I'd add to that is, you know, I guess it was echoed on this morning's panel as well that there just needs to be more transparency on cost. It's not a case of I'll show you mine if you show me yours. That's a little nonsensical. The role that we play as exchanges and as SROs, to an extent, are regulated oligopolies. It's our responsibility to share what our costs are.

And when I look at our bills from other exchanges and, yes, we are all in on a per share basis, I can't even understand necessarily what we are paying other exchanges. The bills are like phonebooks with like spin ports and flux capacitors and rustproofing and all

this other kind of stuff.

I think it is just fair to ask -- and of course, all the exchanges, obviously there's costs and I agree with Chris on the equidistant cables and everything like that. And you can make profit off them. But at least, I guess, to the regulatory bodies, it doesn't necessarily have to be public exactly what your costs are, but some expression of where costs are.

And, you know, all-in costs, I know you have to run an exchange, I know you have to run a matching engine. I haven't seen really any exchanges who have a business model on paying more rebates than they charge for take fees on the whole. So there's money made there, too.

So I just think it's a matter of full transparency. It's, you know, it's beating a dead horse, but it is pretty critical. And like, that's why we're here talking about this nonsense for two days. But very good idea to put it together.

(Laughter.)

MR. REDFEARN: Thank you for that, Ronan.

MR. WALD: I'll keep beating that dead horse. Because transparency really is the best place to start first. Ultimately, things like having fee changes, filings that go in that are effective immediately are

counterintuitive to a process around justifying whether these costs are fair and equitable. That's probably a good place to start. But ultimately understanding the nature of these fees, why they've changed, who they benefit, what are they actually there for, who is subscribing to them, an overall kind of new structure around transparency overall, I think, is going to help really get us to the place we need to go.

MR. ISAACSON: I just want to make a point on transparency though. If you look at the entire order flow life cycle, what part of it has the most transparency around fees that have to be filed with the SEC? It's really at the exchange. And there's a whole lot of steps from Matt at TD Ameritrade and that order or Met, where the fees aren't nearly as transparent as they are at the exchange.

So I just want to make it clear, we're held to obviously very different regulatory standards than a large part of the rest of the order life cycle here. And if we're going to change that standard -- sorry about that, didn't mean to hit you, Michael -- so if we're going to change that standard materially, do you want a competitive landscape for exchanges or not? Or do you want to freeze the landscape with your standard?

MR. FRIEDMAN: I think you could go a long way

towards fair and reasonable by segmenting the world of exchange members into, I mean, the Virtus and the Citadels have one set of needs, the big banks have a different set of needs, the Clearpools and the Trilliums have a different set of needs. And we don't all need to get the same menu of options and the same prices, as long as we're on a level playing field with our peers. I think that might help things.

MR. DONOHUE: Can I ask this question? And I think Stacey may have brought this up earlier, the all-in costs idea. And, James, you walked through a number of issues that seemed could be relevant to evaluating the fairness and reasonableness of fees. Can we do that effectively on a one-off basis? Or do we need to look at the reasonableness and fairness of fees as all-in fees?

MR. BROOKS: Looking at one individual fee by itself doesn't make sense because they are all related. And it makes sense that there's different competing models, different marketing around the models. So I think it's something that needs to be approached very carefully. And it's going to evolve over time and it needs to be allowed to evolve over time.

I definitely believe in pricing for the value of products and the market-based approach. And as Chris said, we don't want to freeze what's happening.

I'd say that we're all servicing the end investor here. And that's something we've heard a lot. Everybody is representing the investor. And that's true. Exchanges do, wholesalers do, retailers do, institutions do. So I don't think there's anybody up here that isn't servicing or focused on the investor. And everybody is saying the investor has it very well now.

But one thing to note, there is no end investor up here on any of these panels. None. None of us are end investors. And this really is Wall Street and exchanges. It is not Main Street.

And when I hear some participants talking about cost going up, it's their costs going up. If it's been better for the investor than ever before, you know, is it really about the end investor? And I do want to point that out, because everybody here is doing their best to serve the end investor. And everybody up here is for profit. And in a very competitive environment, that works. And I don't think that should be lost.

So that's a long way of saying, getting back to your question which I think is very pertinent, you do need to look at the whole ecosystem and the services provided. And if you look at just one, other things are going to evolve around that. You knock one fee out, that's going to pick winners and losers and charges will

be done in a different way. And maybe that's good for some models and bad for other models.

And people talk about the complexity of pricing. To some extent, complexity is rational. If it was very simple, that's not rational. And, look, you can even go into an ice cream store and it's one scoop, it's two scoop, there's half-priced Tuesday and you get a banana split and if you get the deluxe sundae you get two free toppings, otherwise you pay per topping. There's lots of businesses with complex pricing. I don't think this is actually unique to our industry at all. And it does need to be considered very carefully if we just have this myopic, one-off approach, let's just look at one thing and not the all-in model and ecosystem, that would be a mistake.

MR. REDFEARN: Does anybody have any final comments before we wrap up?

(No response.)

MR. REDFEARN: Okay, let me just say this. Before we wrap up, I just wanted to make a brief announcement.

So the purpose, a lot of the purpose of today's discussion was to really dive into getting a lot of -- a different array of views about the whole market data and market connectivity infrastructure. We got a very high-

level view in the first panel. It was a deeper dive specifically on the SIPs in the second one, and this one on proprietary data products and access. I think we have turned up a lot of interesting and very useful, insightful points from an array of perspectives and a variety of participants.

I think tomorrow, the intention is to be focused on areas where we can sort of pick up from here and talk about are there any policy areas that we as a Commission should be contemplating? So the panels tomorrow are going to be focused on, really, again, what should the core infrastructure be, how should it be built, sort of picking up on those issues. The second one is going to be looking at the governance issues associated with the SIPs, where we will be addressing possible conflicts and confidentiality policies and executive sessions. And there have been a lot of remarks related to that. There will be a discussion about -- deeper on funding of the core data infrastructure and how we look at the cost model and how we deal with some of these challenges around figuring this stuff out.

And last but not least, talking about transparency, what are the areas where public transparency will be helpful for us to be able to make better policy, better policy decisions and be able to

sort of evaluate a lot of what's coming across our desks a little bit better.

So I just wanted to put that out. We will be starting tomorrow at 9:00 a.m. And with that, I am going to wrap up and thank you.

Unless, do you guys have any final comments you want to make before we wrap up, Commissioners?

COMMISSIONER JACKSON: No, just very briefly want to thank all the participants for the insights. We know you're all busy and you all have demanding roles. And I have to tell you, to a person, for all my colleagues, we are delighted that you took the time to come and share these insights. And we're looking forward to tomorrow's conversations. So thank you very much.

MR. REDFEARN: All right, thank you all very much.

(Applause.)

(Whereupon, at 4:26 p.m., the meeting was adjourned, to reconvene at 9:00 a.m. the following day.)

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PROOFREADER'S CERTIFICATE

In the Matter of: ROUNDTABLE ON MARKET DATA AND MARKET ACCESS

File Number: OS-1025

Date: Thursday, October 25, 2018

Location: Washington, D.C.

This is to certify that I, Christine Boyce (the undersigned), do hereby certify that the foregoing transcript is a complete, true and accurate transcription of all matters contained on the recorded proceedings of the investigative testimony.

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I, Jemima Euell, reporter, hereby certify that the foregoing transcript is a complete, true and accurate transcript of the matter indicated, held on __10/25/2018_____, at Washington, D.C., in the matter of:

ROUNDTABLE ON MARKET DATA AND MARKET ACCESS.

I further certify that this proceeding was recorded by me, and that the foregoing transcript has been prepared under my direction.

Date: 10/25/2018

Official Reporter: Jemima Euell

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