Discussion paper on 'Strengthening of the Regulatory framework for Algorithmic Trading & Co-location'

1. Objective

To seek commentsand inputs from all stakeholders, including Investors, Market Infrastructure Institutions (MIIs), andIntermediaries,toexplore and address concerns relating to market quality, market integrity and fairness due to increased usage of Algorithmic Trading & Co-location in Indian securities market.

2. Background

2.1. Algorithmic trading (for brevity, Algo), in simple words, is a step-by-step instruction for trading actions taken by computers (automated systems). Typically, trading algorithms enable the traders to automate the process of taking trading decisions based on the preset rules / strategies.

2.2. Market participants, both clients and propriety trading by brokers, have adopted algorithmic trading as it provides speed, control andanonymity to the end-user. Further, delegation of decision making to the algorithms has enabled traders to generate large number of orders in a small interval of time, and at the same time, react to opportunities that may exist for fractions of a second.

2.3. High Frequency Trading (HFT) is a subset of algorithmic trading that comprises latency-sensitive trading strategies and deploys technology including high speed networks, colocation, etc. to connect and trade on the trading platform. The growth and success of the high frequency trading (latency sensitive version of algorithmic trading) is largely attributed to their ability to react to trading opportunities that may last only for a very small fraction of a second. Co-location (for brevity, Colo) has provided the vehicle to high frequency traders to capture such trading opportunities.

2.4. International Organization of Securities Commissions (IOSCO) in its Consultation Report '*Technological Challenges to Effective Market Surveillance Issues and Regulatory Tools*' published in August 2012 had identified the following characteristics to identify High Frequency Trading:

(1) The use of sophisticated technological tools for pursuing a number of different strategies, ranging from market making to arbitrage;

(2) Employment of algorithms along the whole investment chain: analysis of market data, deployment of appropriate trading strategies, minimization of trading costs and execution of trades;

(3) A high daily portfolio turnover and order to trade ratio (i.e., a large number of orders are cancelled in comparison to trades executed);

(4) Flat or near flat positions at the end of the trading day, meaning that little or no risk is carried overnight, with obvious savings on the cost of capital associated with margined positions. Positions are often held for as little as seconds or even fractions of a second;

(5) Mostly employed by proprietary trading firms or desks; and

(6) Latency sensitive.

2.5. Adoption of such advancements in technology in our market in recent yearshave resulted in vast majority of orders being generated through trading algorithms. Currently, more than 80% of the orders placed on most of the exchange traded products are generated by algorithms and such orders contribute to approximately 40% of the trades on the exchanges.

2.6. The available academic literature indicate that algorithmic trading has contributed in improving market quality by facilitating rapid assimilation of information intomarket prices, tightening of spreads, improvement of liquidity, etc. However, the academic literature also indicate that algorithmic trading may have accentuated the issues of adverse selectioncosts for non-algorithmic traders and increased probability of 'flash crashes' vis-à-vis the situation in the pre-algo / pre-colocation era.

3. Circulars issued by SEBI

3.1. Algorithmic Trading: SEBI vide circulars dated March 30, 2012 and May 21, 2013 has put in place the broad guidelines for algorithmic trading in the securities market. The guidelines, inter alia, include risk management measures / checks for Algorithmic (Algo) trading.

3.2. Colocation: SEBI vide circular dated May 13, 2015 has laid down guidelines to ensure fair and equitable access to the co-location facility and to ensure that the facility of co-location / proximity hosting does not compromise integrity and security of the data and trading systems. The stock exchanges are required to provide co-location / proximity hosting in a fair, transparent and equitable manner.

4. Issue under consideration

4.1. Algorithmic / high frequency trading has continued to attract the attention of investors and regulators across the world during last few years.Some of such issues that have been drawn regulatory attention are contribution to price volatility, market noise(excessive order entry and cancellation), cost that high-frequency trading imposes on other market users, technological arms race, limited opportunities for regulators to intervene during high volatility, strengthening of surveillance mechanism, etc.

4.2. IOSCO in its Final Report on '*Regulatory Issues Raised by the Impact of Technological Changes on Market Integrity and Efficiency*' (published in October 2011) had recommended that "*Regulators should require that trading venue operators provide fair, transparent and non-discriminatory access to their markets and to associated products and services*".

4.3. Fair, Transparent and Non-discriminatory access is one of the key pillarsof a safe and vibrant capital market. As some market participants across the globe have highlighted the concern of unfair access and inequity to the non-colo / non-HFT participants vis-à-vis the participants that use trading algorithms and co-location to trade, securities market regulators are examining various proposals to address such concern.

4.4. It has been gathered that the following mechanism are under consideration of the stock exchanges / regulators globally to provide fair and equitable access to all categories of the investors:- *Minimum Resting Time for Orders, Frequent Batch Auctions, Random Speed Bumps or delays in order processing / matching, Randomization of orders received during a period, Minimum transaction to order ratio rule, etc*.

5. Proposal

SEBI is examining various options to allay the fear and concern of unfair and inequitable access to the trading systems of the exchanges. In this regard, it has been decided to consult market participants and seek their views on the efficacy and need to introduce the following mechanisms in our markets.

5.1. Minimum Resting Time for Orders

(a) Resting time is defined as the time between an order is received by the exchange and the said order is allowed to be amended or cancelled thereafter.

(b) The proponents of algorithmic trading have always argued that it has improved liquidity and depth of orders. The opponents of algorithmic trading have contended that the liquidity and depth provided by trading algorithms is 'Apparent' and 'Fleeting' as it vanishes as the traders intend to execute trade.

(c) This issue of 'fleeting' or 'vanishing' liquidity arises from the ability of the trading algorithms to react to new developments (such as receipt of new order or market news) by usually modifying / cancelling their orders or placing new orders. It is also gathered that such ability to modify their orders has raised concerns with a section of market participants who consider that this ability is prone to market abuse.

(d) In view of the above, securities market regulators / stock exchanges are considering / have considered the idea to eliminate “fleeting orders” or orders that appear and then disappear within a short period of time. As per the Minimum Resting Time mechanism, the orders received by the stock exchange would not be allowed to be amended or cancelled before a specified amount of time viz. 500 milliseconds is elapsed.

(e) Currently, there are no instances of the‘resting time’mechanism being mandated by any regulator. It has been observed that Australian Securities and Investment Commission (ASIC) had sought feedback on the matter few years ago, but decided not to go ahead with the proposal.

5.2. Frequent Batch Auctions

(a) Under the ‘continuous matching’ system deployed by the stock exchanges, the buy and sell orders received by an exchange are continuously matched and resultant trades take place.

(b) The mechanism of Frequent Batch Auctionswould accumulate buy and sell orders on the order book for a particular length of time (say 100 milliseconds). At the end of every such period, the exchange would match orders received during the time interval.

(c) This proposal tries to address the problem of ‘latency advantage’ by undertaking batch auctions at a particular interval. The idea is to set a time interval for matching of orders which is short enough to allow for opportunities for intraday price discovery,but long enough to minimize the latency advantage of HFT to a large extent.

For example: if one-way observed latency for a co-located participant at an exchange and an investor located at New Delhi is 1ms and 15ms respectively, Batch Auctions at every 20ms -30ms may offer a fair chance to non-colocated participants to capture a trading opportunity.

(d) Expected impact: The proposal may nullify the latency advantage of the co-located players to a large extent. However, due to batch auction sessions happening every few milliseconds, the market infrastructure may require corresponding changes.

(e) It may be noted that Taiwan Stock Exchange (TWSE) used to have continuous auction mechanism as the order matching method wherein orders were batched over various time intervals. TWSE has now moved to continuous limit order book mechanism for regular trading. Auction methodology is used only for opening and closing price sessions. Further, effective from April 2013, trading in illiquid stocks in the equity

markets of NSE, BSE, MSEI are conducted only through a periodic call auction mechanism.

5.3. Random Speed Bumps or delays in order processing / matching

(a) The Speed Bump mechanism involves introduction of randomized order processing delay of few milliseconds to orders.The expected impact of the mechanism is to discourage latency sensitive strategies as such delays would affect HFT but would not deter non-algo order flow for which delay in milliseconds is insignificant.

(b) It is understood that the intent behind such mechanism is to nullify the latency advantage of the co-located players to a large extent. Globally, the following developments have taken in this space:

(i) As per Thomson Reuters, it willbe introducing a mechanism for its FX Spot Matching services that introduces a short delay of several milliseconds before processing orders.

(ii) ParFX, a wholesale electronic trading platform designed by Tradition (an interdealer broker in over-the-counter financial and commodity-related products), applies randomized pause to all order submissions, amendments and cancellationsby between 20-80 milliseconds. This limits the advantage of 'first in, first out' trading and nullifies advantages gained by low-latency trading strategies. It is understood that the objective is to provide a level playing field for participants wherever they are located and whatever their technological or financial strength.

(iii) TSX Alpha Exchange (TSXA) imposes a randomized order processing delay of between 1 and 3 milliseconds on all orders that have the potential to take liquidity. This is intended to discourage opportunistic liquidity taking strategies. The intention is to encourage orders to contribute to greater volume at the best bid/offer, translating to larger trade sizes and better fill rates for active orders.

(iv) SEC (USA) has approved a proposal of IEX that non-routable Immediate-or-Cancel ("IOC") orders shall be subjected to a certain sub-millisecond delaybefore arriving at the IEX system.

5.4. Randomization of orders received during a period (say 1-2 seconds)

(a) As per the mechanism, time-priority of the new / modified orders that would be received during predefined time period (say 1-2 seconds

period)is randomized and the revised queue with a new time priorityis then forwarded to the order matching engine.

(b) Similar to the mechanism`s mentioned above, the said mechanism is expected to nullify the latency advantage of the co-located players to a large extent that they get on the basis of physical proximity to the trading platform and thereby, discourage latency sensitive active strategies.

(c) It is observed that ICAP's EBS Market Matching Platform has introduced 'Latency Floor' that consists of a random batching window of 1, 2 or 3 milliseconds, whereby all messages submitted within this period are collected and then randomly released to the matching engine. The process is aimed at ensuring that speed as a stand-alone strategy is not a pre-requisite for success on EBS Market.

5.5. Maximumorder message-to-trade ratio requirement

(a) A maximum order-to-trade ratio requires a market participant to execute at least one trade for a set number of order messages sent to a trading venue. The mechanism is expected to increase the likelihood of a viewed quote being available to trade and reduce hyper-active order book participation.

(b) The mechanism was covered as part of the review commissioned by the *UK Government's Foresight Project - The Future of Computer Trading in Financial Markets*.

(c) The review however also highlighted that such mechanism may reduce depth, increase bid-ask spreads, and exacerbate liquidity withdrawal in volatile times.

(d) The mechanism is slightly different from 'Order-to-Trade Penalty Rule' implemented by the stock exchanges in Indian securities market as the trader in the proposed case would not be able to place such orders that further increase the ratio, after the limit is breached. As per the Order-to-Trade penalty mechanism implemented by the stock exchanges in Indian securities marketpenalty as per the prescribed slabs are imposed on the traders. There does not exist restrictions on the placement of orders.

5.6. Separate queues for colo orders and non-colo orders (2 queues)

(a) The mechanism has been extensively deliberated with SEBI's Technical Advisory Committee (TAC) and market participants including stock

exchanges. It was also included as part of the proposal in the consultation paper floated by SEBI in May 03, 2013[1].

(b) Para 6.3 of the said discussion paper describes the mechanism as:

6.3. With the view to ensure that stock brokers (and thereby the investors) who are not co-located have fair and equitable access to the stock exchange's trading systems, stock exchanges facilitating co-location / proximity hosting shall implement an order handling architecture comprising of two separate queues for co-located and non-colocated orders such that orders are picked up from each queue alternatively. It is expected that such architecture will provide orders generated from a non-colocated space a fair chance of execution and address concerns related to being crowded-out by orders placed from colocation. The proposed architecture is as described below:

6.3.1. Stock exchange shall identify and categorize orders as (a) orders emanating from servers of the stock broker placed at the co-location / proximity hosting facility, and, (b) orders emanating from other terminals / servers of the stock brokers.

6.3.2. Separate order-validation mechanism and a separate queue shall be maintained for each of the aforementioned categories of orders.

6.3.3. A round-robin methodology shall be used to time-stamp and forward validated orders from the two order-queues to the order-book, i.e., if an order is taken from the queue of orders emanating from co-location / proximity hosting facility, then the next order shall be from the other queue. In the event any of the order-queues are empty, orders can be sequentially taken from the other queue till a valid order arrives in the empty queue.

6.3.4. The time-stamp given as per para 6.3.3 above shall be used to determine the time priority during matching of orders.

(c) As per the mechanism, separate queues and order-validation mechanism would be maintained for co-lo orders and non-colo orders. Orders from queues will be taken up in the order-book in round-robin fashion.

(d) It may however be noted that the colocated participants would still be among the first to receive the market data feeds due to their proximity to the trading platforms of the exchange and this coupled with the capability to make trading decisions in fraction of seconds (by use of

[1] Discussion Paper dated May 03, 2013 on 'Co-location/Proximity hosting facility offered by the stock exchanges' (http://www.sebi.gov.in/cms/sebi_data/attachdocs/1367581007462.pdf)

trading algorithms) would still provide the colocated participants the ability to quickly react to such market data.

5.7. Review of Tick-by-Tick data feed

(a) Tick-by-Tick (TBT) data feed provide details relating to orders (addition + modification + cancellation) and trades on a real-time basis. TBT data feed facilitates a detailed view of the order-book (such as depth at each price point, etc.).

(b) At present, the exchanges provide TBT data feeds to any desirous market participant upon payment of requisite fee.

(c) Tick-by-Tick data feed is mainly subscribed by HFTs who coupled with their access to colocation use such feeds to recreate the order-book and analyze the impact of execution.

(d) TBT data feed is usually not availed by small players due to the feed being data-heavy (as it includes details of all the order submissions, cancellations and modifications) and because of the additional fee-component.

(e) This has been viewed by a section of market participants to create disparity and inequality in terms of access to data.

(f) The proposal under examination is to provide 'Structured Data'containing Top 20 / Top 30 / Top 50bids/asks, market depth, etc.to all the market participants at a prescribed time interval (or as real-time feed).

(g) The objective of the proposal is to adhere to the principle of market fairness by providing a level playing field to the market participants irrespective of their technological or financial strength.

6. Request for Public Comments

Considering the implications of the said matter on the market participants, we request public comments on the above proposals. It is requested to support comments / views on the aforementioned proposals with data and reasoning. If felt desirable, SEBI may schedule an open discussion session with market participants after receipt of public comments.

The comments may be sent latest by August 31, 2016 to mrddop@sebi.gov.inor by post to:-

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