TITLE: **DISTRIBUTION OF MARKET DATA BASED ON PRICE LEVEL TRANSITIONS**

## BACKGROUND

[0001] An electronic trading system generally includes a trading device in communication with an electronic exchange. The electronic exchange sends information about a market for a tradeable object (market information), such as prices and quantities, to the trading device. The trading device sends messages, such as messages related to orders, to the electronic exchange. The electronic exchange attempts to match quantity of an order with quantity of one or more contra-side orders.

[0002] Electronic exchanges have continued increasing the amount of market information provided to the trading device. This increase provides various benefits and problems. For example, increasing the amount of market information may increase transparency about the market. In another example, some trading devices – such as mobile devices – are connected to the exchange via a connection that has bandwidth, download, or data limitations. Increasing the amount of market information may cause trading devices to reach their bandwidth, download, or data allowance/limitations sooner. In another example, trading devices have limited processing capacity. Increasing the amount of market information transmitted to the trading device may result in processing problems for the trading device. In yet another example, traders may not be able to comprehend (mentally process) all the information displayed on the trading device. As a result, increasing the amount of market information may be distracting to the trader and cause them to lose focus.

[0003] There is a need to effectively control the amount of market information transmitted through an electronic trading system.

## SUMMARY OF INVENTION

[0003a] According to a first aspect of the present invention, there is provided a method including: receiving, by a computing device, market data for a tradeable object, wherein the market data includes a quantity available at each price level of a plurality of price levels for the tradeable object, wherein the quantity available for each price level is for a same side, wherein the same side is either to buy or sell the tradeable object; coalescing, by the

computing device, the market data; determining, by the computing device, an aggregate quantity for the plurality of price levels, wherein the aggregate quantity is based on the quantity available at each price level of the plurality of price levels; identifying, by the computing device, whether a price level transition has occurred based on the determined aggregate quantity and a threshold, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased or decreased past the threshold from a previous aggregate quantity; and distributing, by the computing device, the coalesced market data in response to identifying the price level transition has occurred.

[0003b] According to a second aspect of the present invention, there is provided a computer readable storage medium storing instructions that, when executed, cause a computing device at least to perform operations including: receiving market data for a tradeable object, wherein the market data includes a quantity available at each price level of a plurality of price levels for the tradeable object, wherein the quantity available for each price level is for a same side, wherein the same side is either to buy or sell the tradeable object; coalescing the market data; determining an aggregate quantity for the plurality of price levels, wherein the aggregate quantity is based on the quantity available at each price level of the plurality of price levels; identifying whether a price level transition has occurred based on the determined aggregate quantity and a threshold, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased or decreased past the threshold from a previous aggregate quantity; and distributing the coalesced market data in response to identifying the price level transition has occurred.

[0003c] According to a third aspect of the present invention, there is provided a system including: a processor; and a memory storing instructions that, when executed, cause the system to perform at least operations including: receiving, by a computing device, market data for a tradeable object, wherein the market data includes a quantity available at each price level of a plurality of price levels for the tradeable object, wherein the quantity available for each price level is for a same side, wherein the same side is either to buy or sell the tradeable object; coalescing, by the computing device, the market data; determining, by the computing device, an aggregate quantity for the plurality of price levels, wherein the aggregate quantity is based on the quantity available at each price level of the plurality of price levels; identifying, by the computing device, whether a price level transition has occurred based on the determined aggregate quantity and a threshold, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased or decreased past the threshold from a previous aggregate quantity; and distributing, by the computing device, the coalesced market data in response to identifying the price level transition has occurred.

~~[0003a] According to a first aspect of the present invention, t~~There is provided ~~disclosed~~ a ~~system comprising: an electronic exchange adapted to receive order messages for a tradeable object and transmit a price feed including market data related to one or more unmatched orders for the tradeable object; a gateway adapted to receive the price feed, coalesce the market data, and transmit the market data; and a trading device that is adapted to receive the market data from the gateway and display the market data on a display device, wherein a price level transition is a change at a price level that triggers distribution of market data, and wherein the gateway is configured to identify one or more price level transitions and transmits the market data in response to identifying the one or more price level transitions.~~

~~[0003b] According to a second aspect of the present invention, t~~There is provided ~~disclosed~~ a ~~method for distributing market data, comprising: receiving, using a computing device, market data including information about prices and quantities for a tradeable object; identifying, using the computing device, one or more price level transitions, where the one or more price level transitions is a change at a price level that triggers distribution of the market data; and distributing, using the computing device, the market data in response to identifying the one or more price level transitions.~~

~~[0003c] According to a third aspect of the present invention, t~~There ~~is provided~~ disclosed ~~a tangible computer readable storage medium including a set of instructions for execution by a processor, the set of instructions, when executed, implement a method including: receiving, using a computing device, market data including information about prices and quantities for a tradeable object; identifying, using the computing device, one or more price level transitions, where the one or more price level transitions is a change at a price level that triggers distribution of the market data; and distributing, using the computing device, the market data in response to identifying the one or more price level transitions.~~

## BRIEF DESCRIPTION OF THE FIGURES

[0004] Certain embodiments are disclosed with reference to the following drawings.

[0005] FIG. 1 illustrates a block diagram representative of an example electronic trading system in which certain embodiments may be employed.

## CLAIMS

What is claimed is:

1. A system comprising:

an electronic exchange adapted to receive order messages for a tradeable object and transmit a price feed including market data related to one or more unmatched orders for the tradeable object;

a gateway adapted to receive the price feed, coalesce the market data, and transmit the market data; and

a trading device that is adapted to receive the market data from the gateway and display the market data on a display device,

wherein a price level transition is a change at a price level that triggers distribution of market data, and

wherein the gateway is configured to identify one or more price level transitions and transmits the market data in response to identifying the one or more price level transitions.

2. The system of claim 1, wherein the electronic exchange is configured to identify the one or more price level transitions and transmit the price feed in response to identifying the one or more price level transitions.

3. The system of claim 1, wherein the trading device is configured to identify the one or more price level transitions and display the market data in response to identifying the one or more price level transitions.

4. The system of claim 1, wherein the one or more price level transitions includes a change from quantity available at the price level to no quantity available at the price level.

5. The system of claim 1, wherein the price level transition includes a change from no quantity available at the price level to quantity available at the price level.

6. The system of claim 1, wherein the gateway transmits the market data at an end of a coalescing period.

7. The system of claim 6, wherein the end of the coalescing period occurs at an expiration of a defined period of time.

8. The system of claim 6, wherein the end of the coalescing period occurs when a message requesting market data is received from the trading device.

9. A method for distributing market data, comprising:

receiving, using a computing device, market data including information about prices and quantities for a tradeable object;

identifying, using the computing device, one or more price level transitions, where the one or more price level transitions is a change at a price level that triggers distribution of the market data; and

distributing, using the computing device, the market data in response to identifying the one or more price level transitions.

10. The method of claim 9, wherein the one or more price level transitions includes a change from quantity available at the price level to no quantity available at the price level.

11. The method of claim 9, wherein the one or more price level transitions includes a change from no quantity available at the price level to quantity available at the price level.

12. The method of claim 9, wherein the one or more price level transitions includes a price change at a best bid price or a best ask price for the tradeable object.

13. The method of claim 9, wherein the one or more price level transitions includes a change in a last traded price for the tradeable object.

14. The method of claim 9, wherein the one or more price level transitions includes a change in the overall quantity available at multiple price levels such that the overall quantity available is less than or more than a defined quantity threshold.

15. The method of claim 9, wherein the one or more price level transitions includes a change in the low or high price level for a trading session.

16. The method of claim 9, wherein a price level transition does not include a change from a first quantity available at a price level to a second quantity available at the price level, where both the first and second quantity available are positive integers.

17. The method of claim 9, further comprising: coalescing market data until the one or more price level transitions is identified.

18. A tangible computer readable storage medium including a set of instructions for execution by a processor, the set of instructions, when executed, implement a method including:

receiving, using a computing device, market data including information about prices and quantities for a tradeable object;

identifying, using the computing device, one or more price level transitions, where the one or more price level transitions is a change at a price level that triggers distribution of the market data; and

distributing, using the computing device, the market data in response to identifying the one or more price level transitions.

**Claims**

1. A method including:

receiving, by a computing device, market data for a tradeable object, wherein the market data includes a quantity available at each price level of a plurality of price levels for the tradeable object, wherein the quantity available for each price level is for a same side, wherein the same side is either to buy or sell the tradeable object;

coalescing, by the computing device, the market data;

determining, by the computing device, an aggregate quantity for the plurality of price levels, wherein the aggregate quantity is based on the quantity available at each price level of the plurality of price levels;

identifying, by the computing device, whether a price level transition has occurred based on the determined aggregate quantity and a threshold, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased or decreased past the threshold from a previous aggregate quantity; and

distributing, by the computing device, the coalesced market data in response to identifying the price level transition has occurred.

2. The method of claim 1, further including:

identifying, by the computing device, whether a second price level transition has occurred based on the market data, wherein the coalesced market data is distributed in response to identifying the second price level transition has occurred.

3. The method of claim 2, wherein the second price level transition is a change from the quantity available at the price level to no quantity available at a price level for the tradeable object.

4. The method of claim 2, wherein the second price level transition is a change from no quantity available at the price level to the quantity available at a price level for the tradeable object.

5. The method of claim 2, wherein the second price level transition represents a change in a best bid price or a best ask price for the tradeable object.

6. The method of claim 2, wherein the second price level transition represents a change in the low or high price level for a trading session.

7. The method of any one of the preceding claims, wherein the market data is received from an exchange.

8. The method of any one of the preceding claims, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased from the previous aggregate quantity above the threshold.

9. The method of any one of claims 1 to 7, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has decreased from the previous aggregate quantity below the threshold.

10. The method of any one of the preceding claims, wherein the threshold is an absolute threshold.

11. The method of any one of claims 1 to 9, wherein the threshold is a relative threshold.

12. The method of any one of the preceding claims, wherein distributing the coalesced market data includes displaying the coalesced market data.

13. The method of any one of claims 1 to 11, wherein distributing the coalesced market data includes sending the coalesced market data to a trading device.

14. The method of any one of the preceding claims, further including:

distributing, by the computing device, the coalesced market data at an end of a coalescing period.

15. The method of claim 14, wherein the end of the coalescing period occurs at an expiration of a defined period of time.

16. The method of claim 14, wherein the end of the coalescing period occurs when a message requesting market data is received from a trading device.

17. The method of any one of the preceding claims, wherein the computing device is a gateway.

18. The method of any one of claims 1 to 16, wherein the computing device is an exchange.

19. The method of any one of claims 1 to 16, wherein the computing device is a trading device.

20. A computer readable storage medium storing instructions that, when executed, cause a computing device at least to perform operations including:

receiving market data for a tradeable object, wherein the market data includes a quantity available at each price level of a plurality of price levels for the tradeable object, wherein the quantity available for each price level is for a same side, wherein the same side is either to buy or sell the tradeable object;

coalescing the market data;

determining an aggregate quantity for the plurality of price levels, wherein the aggregate quantity is based on the quantity available at each price level of the plurality of price levels;

identifying whether a price level transition has occurred based on the determined aggregate quantity and a threshold, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased or decreased past the threshold from a previous aggregate quantity; and

distributing the coalesced market data in response to identifying the price level transition has occurred.

21. The computer readable storage medium of claim 20 , wherein the instructions further cause the computing device to identify whether a second price level transition has occurred based on the market data, wherein the coalesced market data is distributed in response to identifying the second price level transition has occurred.

22. The computer readable storage medium of claim 21, wherein the second price level transition is a change from the quantity available at the price level to no quantity available at a price level for the tradeable object.

23. The computer readable storage medium of claim 21, wherein the second price level transition is a change from no quantity available at the price level to the quantity available at a price level for the tradeable object.

24. The computer readable storage medium of claim 21, wherein the second price level transition represents a change in a best bid price or a best ask price for the tradeable object.

25. The computer readable storage medium of claim 21, wherein the second price level transition represents a change in the low or high price level for a trading session.

26. The computer readable storage medium of any one of claims 20 to 25, wherein the market data is received from an exchange.

27. The computer readable storage medium of any one of claims 20 to 26, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased from the previous aggregate quantity above the threshold.

28. The computer readable storage medium of any one of claims 20 to 26, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has decreased from the previous aggregate quantity below the threshold.

29. The computer readable storage medium of any one of claims 20 to 28, wherein the threshold is an absolute threshold.

30. The computer readable storage medium of any one of claims 20 to 28, wherein the threshold is a relative threshold.

31. The computer readable storage medium of any one of claims 20 to 30, wherein distributing the coalesced market data includes displaying the coalesced market data.

32. The computer readable storage medium of any one of claims 20 to 30, wherein distributing the coalesced market data includes sending the coalesced market data to a trading device.

33. The computer readable storage medium of any one of claims 20 to 32, wherein the instructions further cause the computing device to distribute the coalesced market data at an end of a coalescing period.

34. The computer readable storage medium of claim 33, wherein the end of the coalescing period occurs at an expiration of a defined period of time.

35. The computer readable storage medium of claim 33, wherein the end of the coalescing period occurs when a message requesting market data is received from a trading device.

36. The computer readable storage medium of any one of claims 20 to 35, wherein the computing device is a gateway.

37. The computer readable storage medium of any one of claims 20 to 35, wherein the computing device is an exchange.

38. The computer readable storage medium of any one of claims 20 to 35, wherein the computing device is a trading device.

39. A system including:

a processor; and

a memory storing instructions that, when executed, cause the system to perform at least operations including:

receiving, by a computing device, market data for a tradeable object, wherein the market data includes a quantity available at each price level of a plurality of price levels for the tradeable object, wherein the quantity available for each price level is for a same side, wherein the same side is either to buy or sell the tradeable object;

coalescing, by the computing device, the market data;

determining, by the computing device, an aggregate quantity for the plurality of price levels, wherein the aggregate quantity is based on the quantity available at each price level of the plurality of price levels;

identifying, by the computing device, whether a price level transition has occurred based on the determined aggregate quantity and a threshold, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased or decreased past the threshold from a previous aggregate quantity; and

distributing, by the computing device, the coalesced market data in response to identifying the price level transition has occurred.

40. The system of claim 39, wherein the instructions further cause the system to identify, by the computing device, whether a second price level transition has occurred based on the market data, wherein the coalesced market data is distributed in response to identifying the second price level transition has occurred.

41. The system of claim 40, wherein the second price level transition is a change from the quantity available at the price level to no quantity available at a price level for the tradeable object.

42. The system of claim 40, wherein the second price level transition is a change from no quantity available at the price level to the quantity available at a price level for the tradeable object.

43. The system of claim 40, wherein the second price level transition represents a change in a best bid price or a best ask price for the tradeable object.

44. The system of claim 40, wherein the second price level transition represents a change in the low or high price level for a trading session.

45. The system of any one of claims 39 to 44, wherein the market data is received from an exchange.

46. The system of any one of claims 39 to 45, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has increased from the previous aggregate quantity above the threshold.

47. The system of any one of claims 39 to 45, wherein the occurrence of the price level transition is identified when the determined aggregate quantity has decreased from the previous aggregate quantity below the threshold.

48. The system of any one of claims 39 to 47, wherein the threshold is an absolute threshold.

49. The system of any one of claims 39 to 47, wherein the threshold is a relative threshold.

50. The system of any one of claims 39 to 49, wherein distributing the coalesced market data includes displaying the coalesced market data.

51. The system of any one of claims 39 to 49, wherein distributing the coalesced market data includes sending the coalesced market data to a trading device.

52. The system of any one of claims 39 to 51, wherein the instructions further cause the system to distribute, by the computing device, the coalesced market data at an end of a coalescing period.

53. The system of claim 52, wherein the end of the coalescing period occurs at an expiration of a defined period of time.

54. The system of claim 52, wherein the end of the coalescing period occurs when a message requesting market data is received from a trading device.

55. The system of any one of claims 39 to 54, wherein the computing device is a gateway.

56. The system of any one of claims 39 to 54, wherein the computing device is an exchange.

57. The system of any one of claims 39 to 54, wherein the computing device is a trading device.