NASDAQ Net Order Imbalance SnapShot (NOIS)
Version 2.10

1. Overview

NASDAQ Net Order Imbalance SnapShot (NOIS) 2.10 is a direct data feed product offered by The NASDAQ Stock Market®.

NOIS 2.10 is being released in association of the equity symbology initiative and will support issue symbols up to 8 characters in total length.

NOIS 2.10 is intended for newswire providers only. For Net Order Imbalance (NOI) data for the full range of NASDAQ-listed issues, firms should process the NOIView 2.10, TotalView-ITCH 3.2, TotalView-ITCH 4.1, or TotalView-Aggregated 1.1 data feeds.

NOIS 2.10 provides only a snapshot of the NASDAQ net order imbalance data at selected time intervals for newswire providers. The snapshot times are as follows:

- NASDAQ opening cross: The NOIS 2.10 dissemination time is two minutes prior to the NASDAQ Opening Cross event. For the standard NASDAQ Opening Cross, NOIS disseminates messages only for U.S. exchange-listed equities that show an imbalance shares amount equal to or more than 50,000 shares.

- NASDAQ closing cross: The NOIS 2.10 dissemination times are 5 minutes prior to and 2 minutes prior to the NASDAQ Closing Cross event. For the NASDAQ Closing Cross, NOIS disseminates messages only for U.S. exchange-listed equities that show an imbalance shares amount equal to or more than 50,000 shares.

- NASDAQ IPO cross: NOIS 2.10 messages are disseminated approximately 3 minutes and 13 minutes after the Trading Action – Quote resumption message is disseminated for the issue. NOIS will also be disseminated if the quotation window is extended for the IPO security. There is no share filter for the IPO cross. For the IPO cross, NOIS disseminates messages for NASDAQ-listed issues only.

- NASDAQ halt cross: NASDAQ will use the Halt Cross to release securities subject to a regulatory trading halt or single security trading pause. For the Halt Cross, NOIS 2.10 messages will be disseminated approximately 3 minutes after the Trading Action – Quote resumption message is transmitted for the issue. NOIS will also be disseminated if the quotation window is extended for the halted or paused security. There is no share filter for the halt cross. For the Halt Cross, NOIS disseminates messages for NASDAQ-listed issues only.

In addition to the net order imbalance data, NASDAQ will also support intra-day trading action messages for NASDAQ-listed issues and select system event messages on NOIS 2.10.

2. Architecture

The NOIS 2.10 feed is made up of a series of sequenced messages. Each message is variable in length based on the message type and is composed of non-control ASCII bytes. The messages that make up the NOIS 2.10 protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees.

NASDAQ offers the NOIS 2.10 data feed in the MoldUDP protocol option only.

3. Data Types

All numeric fields are represented in ASCII digits and are right-justified. Padding spaces appear on the left as necessary.

Prices are given in decimal format with 6 whole number places followed by 4 decimal digits. The whole number portion is padded on the left with spaces; the decimal portion is padded on the right with zeros. The decimal point is implied by position; it does not appear inside the price field.

Timestamp reflects the NASDAQ system time at which the outbound message was generated. NASDAQ states time as the number of milliseconds past midnight. The time zone is U.S. Eastern Time.

All alpha fields are left-justified.   Padding spaces appear on the right as necessary.

4. Message Formats

NOIS 2.10 supports three basic types of messages:

- o   System Event messages

- o   NASDAQ Net Order Imbalance SnapShot messages

- o   Trading Action messages

Within the system event type, NASDAQ may support multiple message formats as outlined below.

4.1 System Event Message

The system event message type is used to signal a market or data feed handler event. The format is as follows:

SYSTEM EVENT MESSAGE				
Name	**Offset**	**Length**	**Value**	**Notes**
Timestamp	0	8	Numeric	Time at which the system event was generated. Time is represented as number of seconds and milliseconds past midnight, Eastern Time (ET).
Message Type	8	1	"S"	System Event Message
Event Code	9	1	Alpha	Refer to System Event Codes below

SYSTEM EVENT CODES	
Code	**Explanation**
"O"	*Start of Messages.* This is always the first message sent in any trading day.
"S"	*Start of System Hours.* This message indicates that NASDAQ is open and ready to start accepting orders.
"Q"	*Start of Market Hours.* This message is intended to indicate that Market Hours orders are available for execution.
"X"	*Clear NOII - Opening Cross Data.* This message signals that firms may clear NOII cache for the regular Opening Cross.
"M"	*End of Market Hours.* This message is intended to indicate that Market Hours orders are no longer available for execution.
"E"	*End of System Hours.* It indicates that NASDAQ is now closed and will not accept any new orders.
"C"	*End of Messages*. This is always the last message sent in any trading day. For initial implementation of the NASDAQ execution system, this message will be disseminated between 8:00 and 9:00 p.m., ET.

4.4.1 Stock Directory

At the start of each trading day, NASDAQ disseminates stock directory messages for all active symbols in the NASDAQ execution system.

Market data redistributors should process this message to populate the Financial Status Indicator (required display field) and the Market Category (recommended display field) for NASDAQ-listed issues.

STOCK DIRECTORY				
Name	**Offset**	**Length**	**Value**	**Notes**
Timestamp	0	8	Numeric	Time at which the directory message was generated. Refer to Data Types for field processing notes.
Message Type	8	1	"R"	Stock Directory Message
Stock	9	8	Alpha	Denotes the security symbol for the issue in the NASDAQ execution system.

Market Category	17	1	Alpha	Indicates Listing market or listing market tier for the issue "N" = New York Stock Exchange (NYSE) "A" = NYSE Amex "P" = NYSE Arca "Q" = NASDAQ Global Select Market^{SM} "G" = NASDAQ Global Market^{SM} "S" = NASDAQ Capital Market$^{®}$ "Z" = BATS BZX Exchange
Financial Status Indicator	18	1	Alpha	For NASDAQ-listed issues, this field indicates when a firm is not in compliance with NASDAQ continued listing requirements. "D" = Deficient "E" = Delinquent "Q" = Bankrupt "S" = Suspended "G" = Deficient and Bankrupt "H" = Deficient and Delinquent "J" = Delinquent and Bankrupt "K" = Deficient, Delinquent and Bankrupt Space = Company is in compliance, if NASDAQ-listed issue
Round Lot Size	19	6	Numeric	Indicates the number of shares that represent a round lot for the issue
Round Lots Only	25	1	Alpha	Indicates if NASDAQ system limits order entry for issue "Y" = only round lots are accepted in this stock "N" = odd/mixed lots are allowed

4.2.2 Stock Trading Action Message On NOIS 2.10, NASDAQ will send out the stock trading action message only when the trading state for an issue changes intra-day.

NOIS 2.10 will <u>not</u> support a full pre-opening trading action spin.   If a firm wants to know which NASDAQ securities are subject to a regulatory trading halt at the start of the operational day, it should refer to the Trading Halts page of the NASDAQ OMX Trader$^{®}$ website.

STOCK TRADING ACTION				
Name	*Offset*	*Length*	*Value*	*Notes*
Timestamp	0	8	Numeric	Time at which the stock trading action message was generated
Message Type	8	1	"H"	Stock Trading Action Message
Stock	9	8	Alpha	Denotes the security symbol for the issue in the NASDAQ Single Book.

Current Trading State	17	1	Alpha	Reflects the current trading state for the issue "H" = Halt / pause in effect "P" = Paused across all U.S. equity markets / SROs (NASDAQ-listed securities only) "Q" = Quotation-only period in effect "T" = Trading resumed on NASDAQ
Reason	18	4	Alpha	Reflects the Market Ops or MarketWatch code for the trading state change. Refer to Appendix A for values.

4.3 Net Order Imbalance SnapShot (NOIS) Message

NASDAQ disseminates NOIS 2.10 messages at the pre-defined intervals in the minutes leading up to the NASDAQ Opening and Closing Crosses as well as the IPO/Halt Crosses. For timing information, please refer to section 1 of this document. Please note that NASDAQ generates this message only for NASDAQ-listed issues only.

NOIS MESSAGE				
Name	**Offset**	**Length**	**Value**	**Notes**
Timestamp	0	8	Numeric	Time at which the NOII message was generated
Message Type	8	1	"I"	NOII Message
Imbalance Shares	9	9	Numeric	Number of shares not paired at the Current Reference Price.
Imbalance Direction	18	1	Alpha	Indicates the market side of the imbalance "B" = buy imbalance "S" = sell imbalance "N" = no imbalance "O" = insufficient orders to calculate
Stock	19	8	Alpha	Denotes the security symbol for which the NOII message is being generated
Near Price	27	10	Price	A hypothetical auction-clearing price for cross orders as well as continuous orders.
Current Reference Price	37	10	Price	Indicates price at which the NOII shares are being calculated.
Cross Type	47	1	Alpha	Denotes the type of NASDAQ cross for which the NOII message is being generated "O" = Open Cross "C" = Close Cross "H" = Intra-day Opening Cross for IPO and Halted/Paused securities

5. Support

o   For general product support for NASDAQ data feeds, please contact NASDAQ OMX
    Global Data Products at +1 301 978 5307 or dataproducts@nasdaqomx.com.

o   For technical support for NASDAQ data feeds, please contact NASDAQ OMX Global
    Software Development at devsupport@nasdaqomx.com.

Appendix A

Trading Action – Reason Codes

For NASDAQ-listed issues, NASDAQ acts as the primary market and has the authority to institute a trading halt or trading pause in an issue due to news dissemination or regulatory reasons.

For CQS issues, NASDAQ abides by any regulatory trading halts and trading pauses instituted by the primary or listing market as appropriate.

For both issue types, NASDAQ may also halt trading for operational reasons.

NASDAQ will send out a trading action message to inform its market participants when the trading status of an issue changes. For informational purposes, NASDAQ also attempts to provide the reason for each trading action update. For bandwidth efficiency reasons, NASDAQ uses a 4-byte code for the reason on its outbound data feeds.

REASON CODES FOR TRADING HALT ACTIONS	
Code	Value
T1	Halt News Pending
T2	Halt News Disseminated
T5	Single Stock Trading Pause In Effect
T6	Regulatory Halt — Extraordinary Market Activity
T8	Halt ETF
T12	Trading Halted; For Information Requested by Listing Market
H4	Halt Non-Compliance
H9	Halt Filings Not Current
H10	Halt SEC Trading Suspension
H11	Halt Regulatory Concern
O1	Operations Halt; Contact Market Operations
LUDP	Volatility Trading Pause
LUDS	Volatility Trading Pause – Straddle Condition
MWC1	Market Wide Circuit Breaker Halt – Level 1
MWC2	Market Wide Circuit Breaker Halt – Level 2
MWC3	Market Wide Circuit Breaker Halt – Level 3
MWC0	Market Wide Circuit Breaker Halt – Carry over from previous day
IPO1	IPO Issue Not Yet Trading
M1	Corporate Action
M2	Quotation Not Available
Space	Reason Not Available

REASON CODES FOR QUOTATION/TRADING RESUMPTION ACTIONS	
Code	Value
T3	News and Resumption Times
T7	Single Stock Trading Pause / Quotation Only Window
R4	Qualifications Issues Reviewed/Resolved; Quotations/Trading to Resume
R9	Filing Requirements Satisfied/Resolved; Quotations/Trading To Resume
C3	Issuer News Not Forthcoming; Quotations/Trading To Resume
C4	Qualifications Halt ended; Maintenance Requirements Met; Resume
C9	Qualifications Halt Concluded; Filings Met; Quotes/Trades To Resume
C11	Trade Halt Concluded By Other Regulatory Auth.; Quotes/Trades Resume
MWCQ	Market Wide Circuit Breaker Resumption
R1	New Issue Available
R2	Issue Available
IPOQ	IPO Security Released for Quotation (NASDAQ Securities Only)

| IPOE | IPO Security — Positioning Window Extension (NASDAQ Securities Only) |
| *Space* | Reason Not Available |

Appendix B

Documentation Revision Control Log

December 22, 2015: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10
- Corrected the stock directory message to align with what is being disseminated from the data feed

March 9, 2015: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10

- Added Stock Directory, along with associated Issue Classification, and Sub-type values to support future launch of Exchange Traded Managed Funds (ETMFs).

March 9, 2013: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10
Released a new version of the NOIS documentation to support the following changes:
- Added the following Trading Action Reason Code for LULD to reflect when the National Best Bid is below the lower price band and/or the National Best Offer is above than the upper price band and the NMS Stock is not in a Limit State.
    - LUDS - Volatility Trading Pause – Straddle Condition

January 9, 2013: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10
Released a new version of the NOIS documentation to support the following changes:
- Added the following Trading Action Reason Code:
    - MWC0 - Market Wide Circuit Breaker Halt – Carry over from previous day
- Removed the Trading State, "R", from the Stock Trading Action message.

November 6, 2012: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10
Released a new version of the NOIS documentation to support the following changes:

- Added the "P" value to the Trading State in the Stock Trading Message.
- Modified the values for the Trading Action Reason Codes. Added the following codes:
    - LUDP - Volatility Trading Pause
    - MWC1 - Market Wide Circuit Breaker Halt – Level 1
    - MWC2 - Market Wide Circuit Breaker Halt – Level 2
    - MWC3 - Market Wide Circuit Breaker Halt – Level 3
    - MWCQ - Market Wide Circuit Breaker Resumption
- Removed the Trading Action values related to the Volatility Guard Program. Removed Trading State, "V". Eliminated Trading Action Reason Codes, V1 and V2.

April 6, 2011: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10
For NASDAQ Volatility Guard pilot program, NASDAQ OMX added new Action and Reason codes for the Stock Trading Action message.   New Action codes were V and R.   New Reason codes were V1 and V2.

Please note that, due to the short duration of the Volatility Guard trading pause, no NOIS messages will be generated.   Firms must use the NASDAQ TotalView-ITCH, NASDAQ TotalView-Aggregated or NASDAQ NOIView products for the Net Order Imbalance Indicator data related to NASDAQ Volatility Guard situations.

May 25, 2010: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10
NASDAQ added two new Trading Action Reason code values (T5 and T7) for single security trading pause situations.

NASDAQ also added note to indicate that it would follow the same NOIS dissemination rules for a single stock trading pause as it uses for a regulatory halt.

January 26, 2010: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.10

NASDAQ releases the NOIS 2.10 specification in support of the equity symbology initiative. In NOIS 2.10, the symbol field was increased from 6 characters to 8 characters.

NASDAQ also updated the NOIS documentation to reflect that the NASDAQ Opening and Closing Crosses now include NYSE-, NYSE Amex-, and NYSE Arca-listed issues as well as NASDAQ-listed issues.

February 20, 2007: NASDAQ Net Order Imbalance SnapShot (NOIS) Version 2.00

NASDAQ releases the NOIS 2.00 specification document to the public.

For efficiency reasons, NASDAQ plans to move the NOIS product to a new system platform in the second quarter of 2007.   In association with the platform change, NASDAQ will also modify the data formats to support 6-byte issue symbols as required under the new NASDAQ symbol plan.   Please see NASDAQ Vendor Alert #2007-012 for the detailed customer migration plans.

Appendix C

Stock Symbol Convention

For NASDAQ-listed issues, NASDAQ OMX currently restricts its symbol length to a maximum of 8 characters. For common stock issuances, NASDAQ, PSX and BX will only assign root symbols of 1 to 4 characters in length with possible fifth and or sixth character denoting a suffix. In certain instances, a dot "." delimiter may be applied to symbols after the root and between the suffix eg., XXXX.A. For subordinate securities, NASDAQ and BX will assign a 5 character symbol for which the last character relays information about the issue class or issue type. For the current list of fifth and or six character symbol suffixes, please refer to Ticker Symbol Convention page on the NASDAQ OMX Trader website.

For NYSE-, NYSE MKT- and NYSE Arca-listed securities with subordinate issue types, please refer to Ticker Symbol Convention page on the NASDAQ OMX Trader website.