Nasdaq TotalView-ITCH 5.0

ITCH is the revolutionary
Nasdaq outbound protocol



Nasdaq

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Overview

Nasdaq TotalViewITCH is a direct data feed product offered by The Nasdaq Stock Market, LLC. This specification covers both the software and hardware (FPGA) versions of the feed.

Nasdaq TotalViewITCH features the following data elements (in binary number format) for all exchange-•-listed equities securities traded via the Nasdaq execution system:

- **Order level data with attribution:** For Nasdaq execution system, Nasdaq will provide its full order depth using the standard ITCH format. TotalViewITCH uses a series of messages to track the life of a customer order. (TOTALVIEW---ITCH is an outbound market data feed only. As an added feature, the TotalView-•-ITCH message formats will support Nasdaq market participant attribution. TotalView-•-ITCH carries order level data for NYSE, NYSE American, NYSE Arca, and BATS listed securities as well as for Nasdaq-•-listed securities.
- **Trade messages:** To ensure that customers have complete information about Nasdaq order flow, TotalView--- ITCH supports a trade message to reflect a match of a non-•-displayable order in the Nasdaq system. TotalView-•- ITCH also supports a separate trade message to reflect Nasdaq cross transactions.
- **Net Order Imbalance Data:** In the minutes leading up to the Nasdaq Opening and Closing Crosses as well as the Nasdaq Crosses for IPO or halted/paused securities, Nasdaq disseminates the indicative clearing price and net order imbalance on Nasdaq. Because the calculation includes non-•-displayable as well as displayable order types, the Net Order Imbalance Indicator(NOII) is the best predictor of the Nasdaq opening and closing prices available to the public.
- **Administrative messages**, such trading actions and symbol directory messages:
  - Trading action messages are used to inform market participants when a security is halted/paused or released for trading.
  - Symbol Directory messages provide basic security data such as the market tier and Financial Status Indicator.
  - Market participant position message carries the Primary Market Maker status, Market Participant status and Market Maker mode fields used by some firms to comply with market regulations.
- **Event controls,** such as start of day, end of day and emergency market halt/resume.

Architecture

The TotalViewITCH feed is made up of a series of sequenced messages. Each message is variable in length based on the message type. The messages that make up the TotalView ITCH protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees.

Nasdaq offers the TotalView ITCH data feed in three protocol options:.

- SoupBinTCP
- Compressed via SoupBinTCP
- MoldUDP64

In the market data messages, instruments are identified by a stock locate code – a low lying integer employed with the intent of serving as an array index for rapidly looking up instrument details. The locate codes are dynamically assigned each day, starting with a value of 1, and communicated via the Stock Directory message. An instrument's locate code will not change intraday; however, there should be no expectation that the assignment will be the same

across multiple days. The Stock Locate code appears all messages, and at the same position in all messages to support efficient filtering. A default value of 0 will be applied to messages which are not stock dependent.

FPGA version:

Nasdaq will broadcast the TotalViewITCH FPGA feed from the U.S. primary data center facility in Carteret, New Jersey in the MoldUDP64 protocol option only. Given the unshaped network traffic, Nasdaq is requiring firms to have 10 Gb or 40 Gb network connection into the Carteret, NJ data center to obtain the TotalViewITCH FPGA feed.

As with the software version of the feed, the TotalViewITCH FPGA feed will be comprised of a series of sequenced order messages. Outside of the fact that the FPGA data delivery is unthrottled or unshaped at the network level, the TotalView-•-ITCH payload will be the same for both versions of the TotalView-•-ITCH 5.0 data formats. TotalViewITCH FPGA product is guaranteed to disseminate payload messages in the same exact order as the software-•-based version of the TotalViewITCH feed.

With this messaging sequencing guarantee, TotalViewITCH FPGA firms will be able to utilize the GLIMPSE service to obtain current state of the book retransmissions. Firms may also use the software version of TotalViewITCH for fault tolerance or disaster recovery purposes.

Data Types

All integer fields are bigendian (network byte order) binary encoded numbers. Unless otherwise noted, they are unsigned.

All alpha fields are ASCII fields which are left justified and padded on the right with spaces.

Prices are integer fields, supplied with an associated precision. When converted to a decimal format, prices are in fixed point format, where the precision defines the number of decimal places. For example, a field flagged as Price (4) has an implied 4 decimal places. The maximum value of price (4) in TotalViewITCH is 200,000.0000 (decimal, 77359400 hex).

Timestamps are represented as nanoseconds since midnight

Message Formats

The TotalViewITCH feed is composed of a series of messages that describe orders added to, removed from, and executed on Nasdaq as well as disseminate Cross and Stock Directory information.

1.1 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**
Message Type	0	1	"S"	System Event Message
Stock Locate	1	2	Integer	Always 0
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Event Code	11	1	Alpha	See System Event Codes below

Nasdaq supports the following event codes on a daily basis on the TotalView-ITCH data feed.

System Event Codes – Daily	
Code	**Explanation**
"O"	Start of Messages. Outside of time stamp messages, the start of day message is 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.
"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 today. It is still possible to receive Broken Trade messages and Order Delete messages after the End of Day
."C"	End of Messages. This is always the last message sent in any trading day.

1.2 Stock Related Messages

1.2.1 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**	**Type**	**Value/Description**
Message Type	0	1	"R"	Stock Directory Message
Stock Locate	1	2	Integer	Locate Code uniquely assigned to the security symbol for the day.
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Time at which the directory message was generated. Refer to Data Types for field processing notes.
Stock	11	8	Alpha	Denotes the security symbol for the issue in the Nasdaq execution system.
Market Category	19	1	Alpha	Indicates Listing market or listing market tier for the issue

Code	Definition
Nasdaq---Listed Instruments	
Q	Nasdaq Global Select Market℠
G	Nasdaq Global Market℠
S	Nasdaq Capital Market®
Non---Nasdaq---Listed Instruments	
N	New York Stock Exchange (NYSE)
A	NYSE American
P	NYSE Arca
M	NYSE Texas
Z	BATS Z Exchange
V	Investors' Exchange, LLC

F	Texas Exchange
<space>	Not available

FinancialStatus Indicator	20	1	Alpha	For Nasdaq listed issues, this field indicates when a firm is not in compliance with Nasdaq continued listing requirements

Code	Definition
Nasdaq---Listed Instruments	
D	Deficient
E	Delinquent
Q	Bankrupt
S	Suspended
G	Deficientand Bankrupt
H	DeficientandDelinquent
J	Delinquent and Bankrupt
K	Deficient, Delinquent and Bankrupt
C	Creations and/or Redemptions Suspendedfor Exchange Traded Product
N	Normal(Default): Issuer Is NOTDeficient, Delinquent, or Bankrupt
Non---Nasdaq---Listed Instruments	
<space>	Not available. Firms should refer to SIAC feeds for code if needed.

Round Lot Size	21	4	Integer	Denotes 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

Code	Definition
Y	Nasdaq system only accepts round lots
N	Nasdaq system does not have any order size restrictions for this security. Odd and mixed lot orders are allowed.

Issue Classification	26	1	Alpha	Identifies the security class for the issue as assigned by Nasdaq. See Appendix for allowable values.
Issue Sub-•-Type	27	2	Alpha	Identifies the security sub-•-type for the issue as assigned by Nasdaq. See Appendix for allowable values.
Authenticity	29	1	Alpha	Denotes if an issue or quoting participant record is set-•-up in Nasdaq systems in a live/production, test, or demo state. Please note that firms should only show live issues and quoting participants on public quotation displays.

Code	Definition
P	Live/Production
T	Test

Short Sale Threshold Indicator	30	1	Alpha	Indicates if a security is subject to mandatory close-in-out of short sales under SEC Rule 203(b)(3). **Code** — **Definition** Y — Issue is restricted under SEC Rule 203(b)(3) N — Issue is not restricted <space> — Threshold Indicator not available
IPO Flag	31	1	Alpha	Indicates if the Nasdaq security is set up for IPO release. This field is intended to help Nasdaq market participant firms comply with FINRA Rule 5131(b). **Code** — **Definition** Nasdaq---Listed Instruments Y — Nasdaq-listed instrument is set up as a new IPO security N — Nasdaq-listed instrument is not set up as a new IPO security Z — Nasdaq-listed instrument is a non-IPO new listed security Non---Nasdaq---Listed Instruments <space> — Not available
LULDReference Price Tier	32	1	Alpha	Indicates which Limit Up / Limit Down price band calculation parameter is to be used for the instrument. Refer to LULD Rule for details. **Code** — **Definition** 1 — Tier 1 NMS Stocks and select ETPs 2 — Tier 2 NMS Stocks <space> — Not available
ETP Flag	33	1	Alpha	Indicates whether the security isan exchange traded product (ETP): **Code** — **Definition** Y — Instrument is an ETP N — Instrument is not an ETP <space> — Not available
ETP Leverage Factor	34	4	Integer	Tracks the integral relationship of the ETP to the underlying index. Example: If the underlying Index increases by a value of 1 and the ETP's Leverage factor is 3, indicates the ETF will increase/decrease (see Inverse) by 3. Leverage Factor is rounded to the nearest integer below, e.g. leverage factor 1 would represent leverage factors of 1 to 1.99.

T	his field is used for LULD Tier I price band calculation purposes.

Inverse Indicator	38	1	Alpha	Indicates the directional relationship between the ETP and Underlying index. Code: Y — ETP is an Inverse ETP Code: N — ETP is not an Inverse ETP Example: An ETP Leverage Factor of 3 and an Inverse value of 'Y' indicates the ETP will decrease by a value of 3.

1.2.2 Stock Trading Action

Nasdaq uses this administrative message to indicate the current tradingstatus of a security to the trading community.

Prior to the start of system hours, Nasdaq will send out a Trading Action spin. In the spin, Nasdaq will send out a Stock Trading Action message with the "T" (Trading Resumption) for all Nasdaq--- and other exchange-•-listed securities that are eligible for trading at the start of the system hours. If a security is absent from the pre-•-opening Trading Action spin, firms should assume that the security is being treated as halted in the Nasdaq platform at the start of the system hours. Please note that securities may be halted in the Nasdaq system for regulatory or operational reasons.

After the start ofsystemhours, Nasdaq willuse the Trading Action message to relay changes in tradingstatus for an individualsecurity. Messages will be sent when a stock is:

- Halted
- Paused*
- Released for quotation
- Released for trading

* The paused status will be disseminated for NASDAQ---listed securities only. Trading pauses on non---NASDAQ listed securities will be treated simply as a halt.

Stock Trading Action

Name	Offset	Length	Value	Notes
Message Type	0	1	"H"	Stock Trading Action Message.
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Stock	11	8	Alpha	Stock symbol, right padded with spaces
Trading State	19	1	Alpha	Indicates the current trading state for the stock. Allowable values: "H" = Halted across all U.S. equity markets / SROs "P" = Paused across all U.S. equity markets / SROs (Nasdaq---listed securities only) "Q" = Quotation only period for cross-•-SRO halt or pause "T" = Trading on Nasdaq
Reserved	20	1	Alpha	Reserved.
Reason	21	4	Alpha	Trading Action reason.

1.2.3 Reg SHO Short Sale Price Test Restricted Indicator

In February 2011, the Securities and Exchange Commission (SEC) implemented changes to Rule 201 of the Regulation SHO (Reg SHO). For details, please refer to SEC Release Number 34-61595. In association with the Reg SHO rule change, Nasdaq will introduce the following Reg SHO Short Sale Price Test Restricted Indicator message format.

For Nasdaq-•-listed issues, Nasdaq supports a full pre-•-opening spin of Reg SHO Short Sale Price Test Restricted Indicator messages indicating the Rule 201 status for all active issues. Nasdaq also sends the Reg SHO Short Sale Price Test Restricted Indicator message in the event of an intraday status change.

For other exchange-•-listed issues, Nasdaq relays the Reg SHO Short Sale Price Test Restricted Indicator message when it receives an update from the primary listing exchange.

Nasdaq processes orders based on the most Reg SHO Restriction status value.

Reg SHO Restriction				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"Y"	Reg SHO Short Sale Price Test Restricted Indicator
Locate Code	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Stock	11	8	Alpha	Stock symbol, right padded with spaces
Reg SHO Action	19	1	Alpha	Denotes the Reg SHO Short Sale Price Test Restriction status for the issue at the time of the message dissemination. Allowable values are: "0" = No price test in place "1" = Reg SHO Short Sale Price Test Restriction in effect due to an intra-•-day price drop in security "2" = Reg SHO Short Sale Price Test Restriction remains in effect

1.2.4 Market Participant Position

At the start of each trading day, Nasdaq disseminates a spin of market participant position messages. The message provides the Primary Market Maker status, Market Maker mode and Market Participantstatefor each Nasdaq market participant firm registered in an issue. Market participantfirms may use thesefields to comply withcertain marketplacerules.

Throughout the day, Nasdaq willsend out this message only if Nasdaq Operationschanges the status of a marketparticipant firm in an issue.

Market Participant Position				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"L"	Market Participant Position message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight

MPID	11	4	Alpha	Denotes the marketparticipant identifier for which the position message is being generated
Stock	15	8	Alpha	Stock symbol, right padded with spaces
Primary Market Maker	23	1	Alpha	Indicates if the market participant firm qualifies as a Primary Market Maker in accordance with Nasdaq marketplace rules "Y" = primary market maker "N" = non-primary market maker
Market Maker Mode	24	1	Alpha	Indicates the quoting participant's registration status in relation to SEC Rules 101 and 104 of Regulation M "N" = normal "P" = passive "S" = syndicate "R" = pre-syndicate "L" = penalty
Market Participant State	25	1	Alpha	Indicatesthe marketparticipant'scurrent registration status in the issue "A" = Active "E" = Excused/Withdrawn "W" = Withdrawn "S" = Suspended "D" = Deleted

1.2.5 Market---Wide Circuit Breaker (MWCB) Messaging

1.2.5.1 MWCB Decline Level Message

Informs data recipients what the daily MWCB breach points are set to for the current trading day.

MWCB Decline Level Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"V"	Market wide circuit breaker Decline Level Message.
Stock Locate	1	2	Integer	Always set to 0
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Time at which the MWCB Decline Level message was generated
Level 1	11	8	Price (8)	Denotes the MWCB Level 1 Value.
Level 2	19	8	Price (8)	Denotes the MWCB Level 2 Value.
Level 3	27	8	Price (8)	Denotes the MWCB Level 3 Value.

1.2.5.2 MWCB Status Message

Informs data recipients when a MWCB has breached one of the established levels

MWCB Decline Leve l Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"W"	Market-•-Wide Circuit Breaker Status message
Stock Locate	1	2	Integer	Always set to 0
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Time at which the MWCB Breaker Status message was generated
Breached Level	11	1	Alpha	Denotes the MWCB Level that was breached. "1" = Level 1 "2" = Level 2 "3" = Level3

1.2.6 Quoting Period Update

Indicates the anticipated IPO quotation release time of a security.

IPO Quoting Period Update				
Name	Offset	Length	Value	Notes
Message Type	0	1	"K"	IPO Quoting Period Update Message
Stock Locate	1	2	Integer	Always set to 0
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Time at which the IPO Quoting Period Update message was generated
Stock	11	8	Alpha	Stock symbol, right padded with spaces
IPO Quotation Release Time	19	4	Integer	Denotes the IPO release time, in seconds since midnight, for quotation to the nearest second. NOTE: If the quotation period is being canceled/postponed, we should state that: 1. IPO Quotation Time will be set to 0 2. 2. IPO Price will be set to 0
IPO Quotation Release Qualifier	23	1	Alpha	"A" = Anticipated Quotation Release Time: This value would be used when Nasdaq Market Operations initially enters the IPO instrument for release "C" = IPO Release Canceled/Postponed: This value would be sued when Nasdaq Market Operations cancels or postpones the release of the new IPO instrument
IPO Price	24	4	Price (4)	Denotes the IPO Price to be used for intraday net change calculations 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 zeroes. The decimal point is implied by position, it does not appear inside the price field

1.2.7 Limit Up – Limit Down (LULD) Auction Collar

Indicates the auction collar thresholds within which a paused security can reopen following a LULD Trading Pause.

LULD Auction Collar				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"J"	LULD Auction Collar
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds past midnight
Stock	11	8	Alpha	Stock symbol, right padded with spaces
Auction Collar Reference Price	19	4	Price (4)	Reference price used to set the Auction Collars
Upper Auction Collar Price	23	4	Price (4)	Indicates the price of the Upper Auction Collar Threshold
Lower Auction Collar Price	27	4	Price (4)	Indicates the price of the Lower Auction Collar Threshold
Auction Collar Extension	31	4	Integer	Indicates the number of the extensions to the Reopening Auction

1.2.8 Operational Halt

The Exchange uses this message to indicate the current Operational Status of a security to the trading community. An Operational Halt means that there has been an interruption of service on the identified security impacting only the designated Market Center. These Halts differ from the "Stock Trading Action" message types since an Operational Halt is specific to the exchange for which it is declared, and does not interrupt the ability of the trading community to trade the identified instrument on any other marketplace.

Nasdaq uses this administrative message to indicate the current trading status of the three market centers operated by Nasdaq.

Operational Halt				
Name	**Offset**	**Length**	**Type**	**Value/Description**
Message Type	0	1	"h"	Operational Halt
Stock Locate	1	2	Integer	Locate code uniquely assigned to the security symbol for the day.
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Time at which the Operational Halt message was generated. Refer to Data Types for field processing notes.
Stock	11	8	Alpha	Denotes the security symbol for the issue in Nasdaq execution system
Market Code	19	1	Alpha	"Q": Nasdaq "B": Nasdaq Texas "X": PSX
Operational Halt Action	20	1	Alpha	"H": Operationally Halted on the identified Market "T": Operational Halt has been lifted and Trading resumed

1.3 Add Order Message

An Add Order Message indicates that a new order has been accepted by the Nasdaq system and was added to the displayable book. The message includes a day-•unique Order Reference Number used by Nasdaq to track the order. Nasdaq will support two variations of the Add Order message format.

1.3.1 Add Order – No MPID Attribution

This message will be generated for unattributed orders accepted by the Nasdaq system. (Note: If a firm wants to display a MPID for unattributed orders, Nasdaq recommends that it use the MPID of "NSDQ".)

Add Order Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"A"	Add Order – No MPID Attribution Message.
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.
Order Reference Number	11	8	Integer	The unique reference number assigned to the new order at the time of receipt.
Buy/Sell Indicator	19	1	Alpha	The type of order being added. "B" = Buy Order. "S" = Sell Order.
Shares	20	4	Integer	The total number of shares associated with the order being added to the book.
Stock	24	8	Alpha	Stock symbol, right padded with spaces
Price	32	4	Price (4)	The display price of the new order. Refer to Data Types for field processing notes.

1.3.2 Add Order with MPID Attribution

This message will be generated for attributed orders and quotations accepted by the Nasdaq system.

Add Order - MPID Attribution Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"F"	Add Order – MPID Attribution Message.
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.
Order Reference Number	11	8	Integer	The unique reference number assigned to the new order at the time of receipt.
Buy/Sell Indicator	19	1	Alpha	The type of order being added. "B" = buy order. "S" = sell order.
Shares	20	4	Integer	The total number of shares associated with the order being added to the book
Stock	24	8	Alpha	Stock symbol, right padded with spaces
Price	32	4	Price (4)	The display price of the new order. Refer to Data Types for field processing notes.
Attribution	36	4	Alpha	Nasdaq Market participant identifier associated with the entered order

1.4 Modify Order Messages

Modify Order messages always include the Order Reference Number of the Add Order to which the update applies. To determine the current display shares for an order, ITCH subscribers must deduct the number of shares stated in the Modify message from the originalnumberof shares stated in the Add Order message with the same reference number. Nasdaq may send multiple Modify Ordermessages for the same order referencenumber and the effects are cumulative. When the number of display shares for an order reaches zero, the order is dead and should be removed from the book.

1.4.1 Order Executed Message

This message is sent whenever an orderon the book is executed in whole or in part. It is possible to receiveseveral Order Executed Messages for the same order reference number if that order is executed in several parts. The multiple Order Executed Messageson the same orderare cumulative.

By combining the executions from both types of Order Executed Messages and the Trade Message, it is possible to build a complete view of all non-•-cross executions that happen on Nasdaq. Cross execution information is available in one bulk print per symbol via the Cross Trade Message.

Order Executed Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"E"	Add Order – Order Executed Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Order Reference Number	11	8	Integer	The unique reference number assigned to the new order at the time of receipt
Executed Shares	19	4	Integer	The number of shares executed
Match Number	23	8	Integer	The Nasdaq generated day unique Match Number of this execution. The Match Number is also referenced in the Trade Break Message

1.4.2 Order Executed With Price Message

This message is sent whenever an order on the book is executed in whole or in part at a price different from the initial display price. Since the execution price is different than the display price of the original Add Order, Nasdaq includes a price field within this execution message.

It is possible to receivemultiple Order Executed and Order Executed With Pricemessages for the same order if that orderis executed in several parts. The multiple Order Executed messages on the same orderare cumulative.

These executions may be marked as non-•-printable. If the execution is marked as non-•-printed, it means that the shares will be included into a later bulk print (e.g., in the case of cross executions). If a firm is looking to use the data in time-•-and-•-sales displays or volume calculations, Nasdaq recommends that firms ignore messages marked as non-printable to prevent double counting.

Order Executed With Price Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"C"	Add Order –Order Executed with Price Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number

Timestamp	5	6	Integer	Nanoseconds since midnight
Order Reference Number	11	8	Integer	The unique reference number assigned to the new order at the time of receipt
Executed Shares	19	4	Integer	The number of shares executed
Match Number	23	8	Integer	The Nasdaq generated day unique Match Number of this execution. The Match Number is also referenced in the Trade Break Message
Printable	31	1	Alpha	Indicates if the execution should be reflected on time and sales displays and volume calculations "N" = Non-Printable "Y" = Printable
Execution Price	32	4	Price(4)	The Price at which the order execution occurred. Refer to Data Types for field processing notes

1.4.3 Order Cancel Message

This message is sent whenever an order on the book is modified as a result of a partial cancellation.

Order Cancel Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"X"	Order Cancel Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Order Reference Number	11	8	Integer	The reference number of the order being canceled
Cancelled Shares	19	4	Integer	The number of shares being removed from the display size of the order as a result of a cancellation

1.4.4 Order Delete Message

Thismessage is sent whenever an order on the book is being cancelled. All remaining shares are no longer accessible so the order must be removed from the book.

Order Delete Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"D"	Order Delete Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Order Reference Number	11	8	Integer	The reference number of the order being canceled

1.4.5. Order Replace Message

This message is sent whenever an order on the book has been cancel-•-replaced. All remaining shares from the original order are no longer accessible, and must be removed. The new order details are provided for the replacement, along with a new order reference number which will be used henceforth. Since the side, stock symbol and attribution(if any) cannot be changed by an Order Replace event, thesefields are not included in the

message. Firms should retain the side, stock symbol and MPID from the original Add Order message.

Order Replace Message

Name	Offset	Length	Value	Notes
Message Type	0	1	"U"	Order Replace Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Original Order Reference Number	11	8	Integer	The original order reference number of the order being replaced
New Order Reference Number	19	8	Integer	The new reference number for this order at time of replacement Please note that the Nasdaq system will use this new order reference number for all subsequent updates
Shares	27	4	Integer	The new total displayed quantity
Price	31	4	Price (4)	The new display price for the order Please refer to Data Types for field processing notes

1.5 Trade Messages

1.5.1 Trade Message (Non---Cross)

The Trade Message is designed to provide execution details for normal match events involving non-•-displayable order types. (Note: There is a separate message for Nasdaq cross events.)

Since no Add Order Message is generated when a non-•-displayed order is initially received, Nasdaq cannot use the Order Executed messages for all matches. Therefore this message indicates when a match occurs between non---displayable order types. A Trade Message is transmitted each time a non-•-displayable order is executed in whole or in part. It is possible to receive multiple Trade Messages for the same order if that order is executed in several parts. Trade Messages for the same order are cumulative.

Trade Messages should be included in Nasdaq time-•-and-•-sales displays as well as volume and other market statistics. Since Trade Messages do not affect the book, however, they may be ignored by firms just looking to build and track the Nasdaq execution system display.

Trade Message (Non-Cross)

Name	Offset	Length	Value	Notes
Message Type	0	1	"P"	Trade Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.
Order Reference Number	11	8	Integer	The unique reference number assigned to the order on the book being executed. Effective December 6, 2010, Nasdaq will populate the Order Reference Number field within the Trade (Non--- Cross) message as zero. For the binary versions of the TotalView---

				ITCH data feeds, the field will be null---filled bytes (which encodes sequence of zero)
Buy/Sell Indicator	19	1	Alpha	The type of non-display order on the book beingmatched "B" = Buy Order "S" = Sell Order Effective 07/14/2014, this field will always be "B" regardless of the resting side
Shares	20	4	Integer	The number of shares being matched in this execution
Stock	24	8	Alpha	Stock Symbol, right padded with spaces
Price	32	4	Price (4)	The match price of the order Please refer to Data Types for field processing notes
Match Number	36	8	Integer	The Nasdaq generated session unique Match Number for this trade The Match Number is referenced in the Trade Break Message

1.5.2 Cross Trade Message

Cross Trademessage indicates that Nasdaq has completed its cross process for a specific security. Nasdaq sends out a Cross Trademessage for all activeissues in the system following the Opening, Closing and EMC cross events. Firms may use the Cross Trade message to determine when the cross for each security has been completed. (Note: For the halted / paused securities, firms should use the Trading Action message to determine when an issue has been releasedfor trading.)

For most issues, the Cross Trade message will indicate the bulkvolume associated with the cross event. If the order interest is insufficient to conduct a cross in a particular issue, however, the Cross Trade message may show the shares as zero.

To avoid double counting of cross volume, firms should not include transactions marked as non-•-printable in time---and-•-sales displays or market statistic calculations.

Trade Message(Non ---Cross)				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"Q"	Cross Trade Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.
Shares	11	8	Integer	The number of shares matched in the Nasdaq Cross.
Stock	19	8	Alpha	Stock symbol, right padded with spaces
Cross Price	27	4	Price (4)	The price at which the cross occurred. Refer to Data Types for field processing notes.
Match Number	31	8	Integer	The Nasdaq generated day-•-unique Match Number of this execution.
Cross Type	39	1	Alpha	The Nasdaq cross session for which the message is being generated. "O" = Nasdaq Opening Cross. "C" = Nasdaq Closing Cross. "H" = Cross for IPO and halted / paused securities.

1.5.3 Broken Trade / Order Execution Message

The Broken Trade Message is sent whenever an execution on Nasdaq is broken. An execution may be broken if it is found to be "clearly erroneous" pursuant to Nasdaq's Clearly Erroneous Policy. A trade break is final; once a trade is broken, it cannot be reinstated.

Firms that use the ITCH feed to create time---and---sales displays or calculate market statistics should be prepared to process the broken trade message. If a firm is only using the ITCH feed to build a book, however, it may ignore these messages as they have no impact on the current book.

Broken Trade Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"B"	Broken Trade Message.
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.
Match Number	11	8	Integer	The Nasdaq Match Number of the execution that was broken. This refers to a Match Number from a previously transmitted Order Executed Message, Order Executed With Price Message, or Trade Message.

1.6 Net Order Imbalance Indicator (NOII) Message

- Nasdaq begins disseminating Net Order Imbalance Indicators (NOII) at 9:25 a.m. for the Opening Cross and 3:50 p.m. for the Closing Cross.
- Between 9:25 and 9:28 a.m. and 3:50 and 3:55 p.m., Nasdaq disseminates the NOII information every 10 seconds.
- Between 9:28 and 9:30 a.m. and 3:55 and 4:00 p.m., Nasdaq disseminates the NOII information every second.
- For Nasdaq Halt, IPO and Pauses, NOII messages will be disseminated at 1 second intervals starting 1 second after quoting period starts/trading action is released.
- For more information, please see the FAQ on Opening and Closing Crosses.
- Nasdaq will also disseminate an Extended Trading Close (ETC) message from 4:00 p.m. to 4:05 p.m. at five second intervals.
- For more information, please see the FAQ on Extended Trading Close.

NOII Message				
Name	**Offset**	**Length**	**Value**	**Notes**
Message Type	0	1	"I"	NOII Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.

Paired Shares	11	8	Integer	The total number of shares that are eligible to be matched at the Current Reference Price.
Imbalance Shares	19	8	Integer	The number of shares not paired at the Current Reference Price.
Imbalance Direction	27	1	Alpha	The market side of the order imbalance. "B" = buy imbalance "S" = sell imbalance "N" = no imbalance "O" = Insufficient orders to calculate "P" = Paused
Stock	28	8	Alpha	Stock symbol, right padded with spaces
Far Price	36	4	Price (4)	A hypothetical auction---clearing price for cross orders only. Refer to Data Types for field processing notes.
Near Price	40	4	Price (4)	A hypothetical auction-•-clearing price for cross orders as well as continuous orders. Refer to Data Types for field
Current Reference Price	44	4	Price (4)	The price at which the NOII shares are being calculated. Refer to Data Types for field processing notes.
Cross Type	48	1	Alpha	The type of Nasdaq cross for which the NOII message is being generated "O" = Nasdaq Opening Cross "C" = Nasdaq Closing Cross "H" = Cross for IPO and halted / paused securities "A" = Extended Trading Close
Price Variation Indicator	49	1	Alpha	This field indicates the absolute value of the percentage of deviation of the Near Indicative Clearing Price to the nearest Current Reference Price. "L" = Less than 1% "1" = 1 to 1.99% "2" = 2 to 2.99% "3" = 3 to 3.99% "4" = 4 to 4.99% "5" = 5 to 5.99% "6" = 6 to 6.99% "7" = 7 to 7.99% "8" = 8 to 8.99% "9" = 9 to 9.99% "A" = 10 to 19.99% "B" = 20 to 29.99% "C" = 30% or greater <Space> = Cannot be calculated

1.7 Retail Price Improvement Indicator (RPII)

Identifies a retail interest indication of the Bid, Ask or both the Bid and Ask for Nasdaq-•-listed securities.

Retail Interest Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"N"	Retail Interest message
Stock Locate	1	2	Integer	Locate code identifying the security

Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight.
Stock	11	8	Alpha	Stock symbol, right padded with spaces
Interest Flag	19	1	Alpha	"B" = RPI orders available on the buy side "S" = RPI orders available on the sell side "A" = RPI orders available on both sides (buy and sell) "N" =No RPI orders available

1.8 Direct Listing with Capital Raise Price Discovery Message

The following message is disseminated only for Direct Listing with Capital Raise (DLCR) securities. Nasdaq begins disseminating messages once per second as soon as the DLCR volatility test has successfully passed.

Direct Listing with Capital Raise Price Discovery Message

Name	Offset	Length	Value	Notes
Message Type	0	1	"O"	Direct Listing with Capital Raise Message
Stock Locate	1	2	Integer	Locate code identifying the security
Tracking Number	3	2	Integer	Nasdaq internal tracking number
Timestamp	5	6	Integer	Nanoseconds since midnight
Stock	11	8	Alpha	Stock symbol, right padded with spaces
Open Eligibility Status	19	1	Alpha	Indicates if the security is eligible to be released for trading "N": Not Eligible "Y": Eligible
Minimum Allowable Price	20	4	Price (4)	20% below Registration Statement Lower Price
Maximum Allowable Price	24	4	Price (4)	80% above Registration Statement Highest Price
Near Execution Price	28	4	Price (4)	The current reference price when the DLCR volatility test has successfully passed
Near Execution Time	32	8	Integer	The time at which the near execution price was set
Lower Price Range Collar	40	4	Price (4)	Indicates the price of the Lower Auction Collar Threshold (10% below the Near Execution Price)
Upper Price Range Collar	44	4	Price (4)	Indicates the price of the Upper Auction Collar Threshold (10% above the Near Execution Price)

5 Support

- For generalproductsupport and technical support for Nasdaq data feeds, pleasecontact Nasdaq Global Information Services at clientsuccess@nasdaq.com

Appendix A - Documentation and Revision Control Log

June 11, 2026: NASDAQ TotalView-ITCH Version 5.0

Added listing market value “F” to represent Texas Exchange in Market Category field.

February 19, 2026: NASDAQ TotalView---ITCH Version 5.0

Non-IPO New Issue value “Z” added to IPO flag of Stock Directory message.

February 13, 2026: NASDAQ TotalView---ITCH Version 5.0

Nasdaq BX name change to Nasdaq Texas

June 16, 2025: NASDAQ TotalView---ITCH Version 5.0

Added additional listing market value “M”.

April 28, 2023: Nasdaq TotalView-ITCH Version 5.0
Introduction of Direct Listing with Capital Raise Message and new Imbalance Direction of Paused to NOII Message

July 14, 2022: Nasdaq TotalView-ITCH Version 5.0
Due to the launch of non-integer leverage factors, updated the Value/Description field of ETP Leverage Factor from section 1.2.1 page 7.

June 13, 2022: Nasdaq TotalView-ITCH Version 5.0
Corrected subheading number ordering from section 1.2 - 1.5, pages 9 - 18.

Jan 7, 2022: Nasdaq TotalView-ITCH Version 5.0
Nasdaq added “Extended Trading Close” to the “Cross Type” field under NOII message. For more information, refer http://www.nasdaqtrader.com/TraderNews.aspx?id=dtn2022-1

May 3, 2018: Nasdaq TotalView-ITCH Version 5.0
Nasdaq made the decision to fall back to the previous version number to avoid customer confusion related to different sequencing between the version number of the product specifications and the version number of the actual product code.

March 3, 2018: Nasdaq TotalView-ITCH Version 5.0
Released a new version of Nasdaq TotalView-ITCH documentation to add a new Operational Halt message (Section 4.2.8) to indicate the current Operational Status of a security to the trading community.

September 12, 2017: Nasdaq TotalView-ITCH Version 5.0
Nasdaq added a new Market Category code in the Symbol Directory messages for the Investors’ Exchange, LLC to distinguish IEX listed issues. New market category code is “V”.

September 6, 2017: Nasdaq TotalView-ITCH Version 5.0
Nasdaq updated the specification to include a new LULD Auction collars message (4.2.7) to support the release of LULD enhancements.
Other revisions to spelling and format were made.

March 6, 2015: NASDAQ TotalView---ITCH Version 5.0
Released a new version of TotalView-•-ITCH documentation to include new Issue Sub-•-Type Code “EM” for NextShares Exchange Traded Managed Funds.

January 2, 2015: NASDAQ TotalView---ITCH Version 5.0
Nasdaq RPI program ceased on 12/31/14. Please refer to Equity Trader Alert #2014-•-94.

December 5, 2014: NASDAQ TotalView---ITCH Version 5.0
Released a new version of TotalView-•-ITCH documentation to include missing Issue Sub-•-Type Codes (Appendix E):

- AI – Alpha Indexes ETNs
- CO – Collateralized Mortgage Obligation

- EU – Equity Units
- F – HOLDRS
- IR – Interest Rate
- IW – Index Warrant
- J – Corporate Backed Trust Security
- PP – PoisonPill
- Q – Closed -•-End Funds

- RT – REIT
- SC – Spot Rate Closing
- SI – Spot Rate Intraday
- WC – World Currency Option
- X – Trust
- Y – Other
- Z – NA

June 12, 2014: NASDAQ TotalView-ITCH Version 5.0

Released a new version of TotalView-ITCH documentation to support the following change:

- Per Data Technical News #2014-17, Revised the Buy/Sell Indicator value in the Trade Message (Non-Cross) to "Always 'B' regardless of resting side"

September 26, 2013: NASDAQ TotalView-ITCH Version 5.0

Released a new version of TotalView-ITCH documentation to support the following change:

- Added stock symbol to several market data messages
- Clarified interpretation of the levels in the MWCB Decline Levels Message

August 2, 2013: NASDAQ TotalView-ITCH Version 5.0

Released a new version of the TotalView-ITCH documentation to support the following change:

- Inclusion of the Appendices for Issue Classification and Issue Sub-Type
- Revised IPO Quotation Period Update Message to havestock symbol instead of stock locate
- Changed the length of the IPO Price in the IPO Quotation Period Update Message
- Changed length and values of the Levels in the MWCB Decline Level Message
- Changed the IPO Quotation Release Message Type to "K"
- Revised Timestamp format
- Moved positioningof the Symbol Locateand Tracking Number fields, and updated field offsets accordingly

July 10, 2013: NASDAQ TotalView-ITCH Version 5.0

Released a new version of the TotalView-ITCH documentation to support the following change:

- Incorporation of Symbol Locator Codes
- Added Enhanced Symbol Directory
- Added IPO Quotation Release Message
- Added Market-Wide Circuit Breaker (MWCB) Messaging
  - MWCBDecline Level Message
  - MWCB Status Message
- Additionof an internal tracking number to multiple messages
- Addition of 'C' to the Financial Status Indicator field in the Symbol Directory Message

March 9, 2013: NASDAQ TotalView-ITCH Version 4.10

Released a new version of the TotalView-ITCH documentation to support the following change:

- Added the following Trading Action Reason Code for LULD to reflect when the National Best Bid is below the lowerpriceband and/or the National Best Offeris above than the upperpriceband and the NMS Stock is not in a Limit State.
- LUDS --- Volatility Trading Pause – StraddleCondition

January 9, 2013: NASDAQ TotalView-ITCH Version 4.10

Released a new version of the TotalView-ITCH 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.

January 8, 2013: NASDAQ TotalView---ITCH Version 4.10

Released a new version of the TotalView-•-ITCH documentation to support the following changes:

- Modified the Retail Price Interest Indicator Message. Changed the message type from“G” to “N”.

November 2, 2012: NASDAQ TotalView---ITCH Version 4.10

Released a new version of the TotalView-•-ITCH 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 followingcodes:
  - 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.
- Added the Retail Price Interest Indicator Message

November 1, 2011: NASDAQ TotalView---ITCH Version 4.10

NASDAQ OMX added a new Market Category code in Symbol Directorymessages for the BATS BZX Exchange to distinguish BATS-•-listed issues. New market category code is “Z”.

April 6, 2011: NASDAQ TotalView---ITCH Version 4.10

NASDAQ OMX added two new Trading Action– Reason codes to Appendix C for the NASDAQ Volatility Guardpilot program. New Reason codes were V1 and V2.

November 4, 2010: NASDAQ TotalView---ITCH Version 4.10

NASDAQ OMX updated the Reg SHO message description to reflect the new SEC implementation date.

October 6, 2010: NASDAQ TotalView---ITCH Version 4.10

NASDAQ OMX added a note to Trade (Non-•-Cross) message format stating that the Order Reference Number would be zero for all transactions as of December 6, 2010.

July 14, 2010: NASDAQ TotalView---ITCH Version 4.10

NASDAQ OMX added a new Regulation SHO Short Sale Price Test Restricted Indicatormessage format to be introduced in the fourthquarter of 2010.

July 2, 2010: NASDAQ TotalView---ITCH Version 4.10

NASDAQ OMX added new Action Tradingcode(s) to the Stock Trading Actionmessagefor the NASDAQ Volatility Guard trading pause.

May 25, 2010: NASDAQ TotalView-ITCH Version 4.10

NASDAQ added two new Trading Action Reason code values (T5 and T7) for single security trading pause situations.

January 26, 2010: NASDAQ TotalView-ITCH Version 4.10

Released a new version of the TotalView-ITCH documentation to support the following changes:

- Increased length of the symbol field from 6 characters to 8 characters in multiplemessage formats in support of the equitysymbology initiative.
- Modified the values for the Market Category field in Symbol Directory messages to delineate among NYSE, NYSE MKT and NYSE Arca-listed issues.
- Added note to Appendix B to reflectthat NASDAQ OMX is reviewing its stocksymbolconventions to determine if changes are needed.

February 3, 2009: NASDAQ TotalView-ITCH Version 4.00

NASDAQ revised Order Reference Number field definitionfor the Add Ordermessages to remove the following statement: "The order reference numberis increasing, but not necessarily sequential."

October 21, 2008: NASDAQ TotalView-ITCH Version 4.00

NASDAQ releases TotalView-ITCH 4.0 specifications to public. This document includes the following format modifications from earlier versions of the ITCH feed.

- Numeric fields modified to support binaryintegers
- Timestamp granularitychanged to nanoseconds pastmidnight
- Added Order Replace message
- Updatedprotocol references to reflect new SoupBinTCP protocol associated with ITCH 4.0 feed.

October 20, 2008: NASDAQ TotalView-ITCH Version 3.10

NASDAQ releases TotalView-ITCH 3.1 specifications to the public. This document included the following format modifications from earlier versions of the ITCH feed.

- Expanded Order Reference Number and Match ID field size in all Order and Traderelatedmessages to 12 bytes (from 9 bytes)
- Added Order Replace message
- Updated protocolreferences to reflect new network support documentation associated with ITCH 3.1

September 16, 2008: NASDAQ TotalView-ITCH Version 3.00

NASDAQ corrected a few corporate references in the TotalView-ITCH 3.0 specifications document. No material changes were made.

June 10, 2008: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specifications document to add new codes for emergency market condition (EMC) situations:

- Section 4.2 – System Event Message. Added the following three codes for EMC situations.

A = Emergency market condition – halt

R = Emergency market condition – quote only period

B = Emergency market condition – resumption

- Section 4.6.2 – Cross Trade message: Added cross typeof "E" for EMC situations. Also added processingnote to indicate that NASDAQ will begin to generate a cross trade message for all active issues in the system beginning in the third quarter of 2008.

March 5, 2008: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specifications document to reflect a change in the Message Type value for the new Market Participant Positionmessage format to be added to data streamon or about April 21, 2008:

- Section 4.3.3 – Market Participant Position. The message type valuefor this message should be "L".

January 16, 2008: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specifications document to reflect the following new message format to be added to data stream on or about April 21, 2008:

- Section 4.3.3 – Market Participant Position. This message is designed to provide Primary Market Maker status, Market Participant status and Market Maker mode fields used by some firms to comply with market regulations.

April 30, 2007: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specifications document to reflect the following changes:

- Section 4 – For clarity reasons, the Data Type field was updated for all formats to delineate between alphabetic and alphanumeric fields.
- Section 4.3.1 – Within the Issue Directory message format, NASDAQ updated the code list for the Market Category field to denote that space is an allowable value. The Market Category field may be space filled if the security symbol is associated with a test issue OR if NASDAQ Operations adds a production issue to its online systems intra-day.

February 15, 2007: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specifications document to reflect the following changes:

- 4.3.2 – Stock Trading Action. Updated document to reflect actual system processing rules for pre-opening trading action spin.
- Appendix B – Stock Symbol Convention. Updated document to reflect the most current URL links to NASDAQ symbology matrices.

October 2, 2006: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specifications document to reflect the following changes:

- Section 4.1 – Timestamp. Addedsentence to address sequencingof second and millisecond timestamps.
- Corrected the numbering in remainderof section 4.

August 22, 2006: NASDAQ TotalView-ITCH Version 3.00

NASDAQ modified the TotalView-ITCH 3.0 specification document to reflect the following changes:

- Section 4.2 – System Events: Updated the explanationsfor the "O", "Q", "M" and "M" events to more accurately reflect the feed processing.
- Appendix B – Stock Symbol Conversion: Please contact NASDAQ Systems Engineering for up-to-date

symbol suffix matrix.

July 11, 2006: NASDAQ TotalView-ITCH Version 3.00

NASDAQ releases TotalView-ITCH 3.0 specifications to the public. This document included the following format modifications from earlier versions of the ITCH feed.

- Moved the timestampfromthe individualmessages to separate seconds andmillisecondsmessages for bandwidth and processing efficiency reasons.
- Added the following new messages to be consistent with TotalView-Aggregated feed:
  - Stock Directory
  - Net Order Imbalance Indicator
- Replaced Halt/Resume message with Stock Trading Actionmessage to be more consistent with other NASDAQ data feeds.
- Updated Add Ordermessages in the following ways:
  - Updated Add Order (A) message to remove the display field. Firms should process all orders for NASDAQ quotation displays.
  - Added new Add Order – MPID Attribution (F) message as NASDAQ execution system will support market participant attribution at the order level.
- Updated Modify Order messages in the following ways:
  - Updated Order Executed message to support Printable field. Printable field will be used to denote cross transactions.
  - Added new Order Executed With Price Message (C) for situations where the execution price is different from the display price of an order. This message is intended to reflect situations where there was price improvement with the NASDAQ system.
  - Added new Order Delete (D) message format to reflect when an order is cancelled in full. This change was done for bandwidth efficiency reasons.
- Added Cross Trade(Q) message to reflect bulk transactions such as the NASDAQ Crosses.

February 24, 2006: NASDAQ TotalView-ITCH Version 2.0a

- Replacedallreferences to INET to NASDAQ.
- Added attribution to "Add Order'. This will is the first variable length message in ITCH. It was done to save bandwidth by not sending MMIDs for non-attributed orders.
- AddedHalt/Resume message.

March 17, 2004: ITCH Version 2.00

- Replaced all references to Island (ISLD) with Inet ATS (INET).

December 21, 2000: ITCH Version 2.00

- Corrected the definition for price fields in the spec to match the actualbehavior. Pricefields are paddedon the leftwith spaces, not zeros.

November 5, 2001 – ITCH Version 2.0

- Changed price field format to 6 whole number digits followed immediately by 4 decimal digits. The decimal point was no longer included in the field but implied by position. This reduced the bandwidth of the stream significantlyand makes for much easierparsing and processing of pricevalues.
- Changedtimestamps to be statedas milliseconds pastmidnightrather than hundredths ofsecondspast midnight.
- Replaced the End of Session System event with the End of Day System Event. Although the messages looked identical, the semanticswere different. The old End of Session System Event told subscribers that therewould be no more messages duringthatsession. The new End of Day System Event indicated that thereare no more orders today, but there may still be more messages like Cancels on open orders and Breaks on previously executed orders.
- Removed language about any orders remaining on the book at the end of the session being dead. INET automatically cancels all open orders at the end of the day, so firms should not have any left-•-over orders on the book at the end of the session.
- Reduced the size of all shares fields from 9 digits to 6 digits.
- Removed Contra Broker Code from the Order Executed and Trademessages.

January 19, 2000 – ITCH Version 1.00

- Removed implementation ideas fromdocument.
- Moved all session management to a higher-•-level protocol. ITCH now only specifies the actual messages concerning orders added and executed on the INET book.
- Added the Broken Trade Message to let you know when an execution is broken.
- Added the Print Message to enable people to build INET time-•-and-•-sales, INET last trade, and INET volume services.
- Removed the Timeout “why” for canceled orders.
- Removed the Text Message type.
- Increased the precision of timestamps to hundredthsofseconds.
- Added Match Number to all executions.

May 12, 1998 – ITCH Version 0.22

- Added the Display field to the Add Order Message. This field denotes if the order is displayable in INETquote to the NASDAQ SIP under the SEC order handlingrules.

November 20, 1997 – ITCH Version 0.21

- Changed documentation to show that the Fixed Rewind Request Message type is "W" . Earlierdocument should the type as "R" in error.
- Changed documentationfor Login Request Message to note that a firm’s connection would expire if it failed to log in within 30 seconds of initial login.
- Fixed the descriptionof the Sequence Number field in the Heartbeat Message. The Sequence numbershould be the next expectedsequence number, even during a rewind.

October 1, 1997 – ITCH Version 0.20

- Released initial product specification, in draft format, to a few developers for comment.

Appendix B – Stock Symbol Convention

For Nasdaq-•-listed issues, Nasdaq currently restricts its symbol length to a maximum of 8 characters. For common stock issuances, Nasdaq, PSX and Nasdaq Texas 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 e.g., XXXX.A. For subordinate securities, Nasdaq and Nasdaq Texas 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 NasdaqTrader website.

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

Appendix C – 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 Security 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 Security Trading Pause / Quotation Only Period
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
T3	News and Resumption Times
T7	Single Security Trading Pause / Quotation Only Period

Appendix D – Issue Classification Values

Identifies the security class for the issue as assigned by Nasdaq

Codes for Issue Classification Values	
Code	**Value**
A	American Depositary Share
B	Bond
C	Common Stock
F	Depository Receipt
I	144A
L	Limited Partnership
N	Notes
O	Ordinary Share
P	Preferred Stock
Q	Other Securities
R	Right
S	Shares of Beneficial Interest
T	Convertible Debenture
U	Unit
V	Units/Benif Int
W	Warrant

Appendix E – Issue Sub Type Values

Codes for Issue Classification Values	
Code	**Value**
A	Preferred Trust Securities
AI	Alpha Index ETNs
B	Index Based Derivative
C	Common Shares
CB	Commodity Based Trust Shares
CF	Commodity Futures Trust Shares
CL	Commodity-•-Linked Securities
CM	Commodity Index Trust Shares
CO	Collateralized Mortgage Obligation
CT	Currency Trust Shares
CU	Commodity-•-Currency-•-Linked Securities
CW	Currency Warrants
D	Global Depositary Shares
E	ETF-•-Portfolio Depositary Receipt
EG	Equity Gold Shares
EI	ETN-•-Equity Index-•-Linked Securities
EM	NextShares Exchange Traded Managed Fund*
EN	Exchange Traded Notes
EU	Equity Units
F	HOLDRS
FI	ETN-•-Fixed Income-•-Linked Securities
FL	ETN-•-Futures-•-Linked Securities
G	Global Shares
I	ETF-•-Index Fund Shares
IR	Interest Rate
IW	Index Warrant
IX	Index-•-Linked Exchangeable Notes
J	Corporate Backed Trust Security
L	Contingent Litigation Right

LL	Identifies securities of companies that are set up as a Limited Liability Company (LLC)
M	Equity-•-Based Derivative
MF	Managed Fund Shares
ML	ETN-•-Multi-•-Factor Index-•-Linked Securities
MT	Managed Trust Securities
N	NY Registry Shares
O	Open Ended Mutual Fund
P	Privately Held Security
PP	Poison Pill
PU	Partnership Units
Q	Closed-•-End Funds
R	Reg-•-S
RC	Commodity-•-Redeemable Commodity-•-Linked Securities
RF	ETN-•-Redeemable Futures-•-Linked Securities
RT	REIT
RU	Commodity-•-Redeemable Currency-•-Linked Securities
S	SEED
SC	Spot Rate Closing
SI	Spot Rate Intraday
T	Tracking Stock
TC	Trust Certificates
TU	Trust Units
U	Portal
V	Contingent Value Right
W	Trust Issued Receipts
WC	World Currency Option
X	Trust
Y	Other
Z	Not Applicable

* NextShares Exchange Traded Managed Funds (ETMFs) launched in February 2016. NextShares prices are stated in proxy price on this feed. For more information, please refer to the NextShares Homepage.