

TotalView-ITCH

Version 2.00

1 Overview

TotalView-ITCH 2.0 is the direct data feed product offered by The NASDAQ Stock Market. ITCH 2.0 provides real-time information about orders and executions on the NASDAQ system for securities listed on NASDAQ, New York Stock Exchange (NYSE), American Stock Exchange (Amex), and the US regional exchanges.

It should be noted that the ITCH 2.0 formats do not support market participant attribution at the order level, trading halt status information, or NASDAQ cross-related data. If you are interested in such data elements, please refer to the data feed specifications for TotalView-ITCH versions 3.0 and higher.

TotalView-ITCH does not support order entry; it is an outbound data-dissemination feed only. For information on NASDAQ inbound protocols, please visit the [NASDAQ Transactions Services](#) section of the NASDAQ Trader website.

2 Architecture

The ITCH 2.0 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 ITCH 2.0 protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees.

NASDAQ offers the TotalView-ITCH 2.0 data feed in three protocol options:

Protocol Option	Number of Outbound Channels
SoupTCP	Single outbound channel for all securities
Compressed via SoupTCP	Single outbound channel for all securities
MoldUDP	Single outbound channel for all securities

3 Data Types

All numeric fields are composed of a string of ASCII coded digits, right justified and space filled on the left.

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

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 fields are given in milliseconds seconds past midnight Eastern Time.

4 Message Formats

The ITCH 2.0 feed is composed of a series of messages that describe orders added to, removed from, and executed on NASDAQ systems.

4.1 System Event Message

System Event Messages signal events that affect the entire NASDAQ system.

System Event Message				
Name	Offset	Len	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp.
Message Type	8	1	"S"	System Event Message.
Event Code	9	1	Alpha	See System Event Codes below.

System Event Codes	
Code	Event Explanation
"S"	Start of Day. This is always the first message sent in any trading day. It indicates that NASDAQ is open and ready to start accepting orders.
"E"	End of Day. It indicates that NASDAQ is now closed and will not accept any new orders today. All orders that remain open in this session are now dead and can be purged from the book. It is still possible to receive Broken Trade Messages and Order Cancel Messages after the End of Day.

4.2 Add Order Message

An Add Order Message indicates that a new order has been accepted by the NASDAQ system and added onto the displayable book. It includes a day-unique Order Reference Number assigned by NASDAQ to the order.

Add Order Message				
Name	Offset	Len	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp.
Message Type	8	1	"A"	Add Order Message.
Order Reference Number	9	9	Numeric	The unique reference number assigned to this new order. Increasing, but not necessarily sequential.
Buy/Sell Indicator	18	1	Alpha	"B" = buy order "S" = sell order.
Shares	19	6	Numeric	Total number of shares being added to the book (may be less than the number of shares entered).
Stock	25	6	Alpha	Stock symbol right padded with spaces.
Price	31	10	Price	The limit price of the order.
Display	41	1	Alpha	"Y" = displayed in the quote Note: "S" value is no longer supported as of the NASDAQ/INET merger.

4.3 Modify Order Messages

A Modify Order Message always references an order previously transmitted with an Add Order Message via the Order Reference Number. Multiple Modify Order Messages can modify a single order and the effects are cumulative. A Modify Order Message always reduces the number of shares currently pending in the referenced open order by the number of shares indicated. When the number of currently pending shares for an order reaches zero, the order is dead and should be removed from the book.

4.3.1 Order Executed Message

This message is sent whenever an order on the book is executed in whole or in part. The execution price is always equal to the limit price of the order as indicated in the Add Order Message.

Order Execution Message				
Name	Offset	Len	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp.
Message Type	8	1	"E"	Order Executed Message.
Order Reference Number	9	9	Numeric	The reference number of the order that was executed. References a previously sent Add Order Message.
Executed Shares	18	6	Numeric	The number of shares executed.
Match Number	24	9	Numeric	The NASDAQ generated day-unique Match Number of this execution. The match number is also referenced in the Trade Break Message.

4.3.2 Order Cancel Message

This message is sent whenever an order on the book is modified as a result of being canceled in whole or in part.

Order Cancel Message				
Name	Offset	Len	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp.
Message Type	8	1	"X"	Order Cancel Message.
Order Reference Number	9	9	Numeric	The reference number of the order being canceled or reduced. References a previously sent Add Order Message.
Canceled Shares	18	6	Numeric	The number of shares canceled.

4.4 Trade Message

The Trade Message provides information about execution events that involve orders not visible on the NASDAQ book. Trade Messages do not affect the book, and can be ignored if you are just building a book.

Trade Messages are required to provide NASDAQ time-and-sales and other execution based data; they fill in the gaps left when an order that is not otherwise visible on ITCH is executed.

Since no Add Order Message is ever sent for non-displayed orders, it is not possible to send a Modify Order Message when a hidden order is executed. Instead, a Trade Message is transmitted each time a hidden order is executed in whole or in part. It is possible to receive several Trade Messages for the same order if that order is executed in several parts. The multiple Trade Messages on the same order are cumulative.

By combining the executions received separately via both Order Executed Messages and Trade Messages, it is possible to build a complete view of all executions that happen in NASDAQ systems.

Trade Message				
Name	Offset	Len	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp.
Message Type	8	1	"P"	Trade Message Identifier
Order Reference Number	9	9	Numeric	The NASDAQ reference number of the executed order.
Buy/Sell Indicator	18	1	Alpha	"B" = buy order executed. "S" = sell order executed.
Shares	19	6	Numeric	Incremental number of shares executed.
Stock	25	6	Alpha	Stock symbol, right padded with spaces.
Price	31	10	Price	The match price of the order.
Match Number	41	9	Numeric	The NASDAQ generated session-unique Match Number for this trade. The Match Number is referenced in the Trade Break Message.

4.5 Broken Trade 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 Procedure. A trade break is final; once a trade is broken it cannot be reinstated.

Trade breaks happen only rarely on NASDAQ and will only affect applications that build a time-and-sales database or maintain cumulative NASDAQ volumes or high/low calculations. If you are only building a book, you can ignore these messages; they have no effect on the book.

Broken Trade Message				
Name	Offset	Len	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp.
Message Type	8	1	"B"	Broken Trade Message.
Match Number	9	9	Numeric	The NASDAQ Match Number of the execution that was broken. This refers to a Match Number from a previously transmitted Order Modified - Execution Message or Trade Message.

5 Support

- For general product support for NASDAQ data feeds, please contact NASDAQ OMX Global Data Products at Clientsuccess@nasdaq.com.

6 Revision History

Version 0.20 - 10/1/97

6.1.1 Draft spec released to a few developers

6.2 Version 0.21 - 11/20/97

6.2.1 Fixed Rewind Request Message type to be type "W" from "R". This was just a mistake. A rewind message has always been "W".

6.2.2 Added to the Login Request Message to denote the fact that if you don't log in within 30 seconds of connecting, your connection will be expired.

6.2.3 Fixed the description of the Sequence Number field in the Heartbeat Message. The Sequence number is the next expected sequence number, even during a rewind.

6.3 Version 0.22 - 5/12/98

6.3.1 Added the Display field to the Add Order Message.

6.4 Version 1.00 1/19/2000

6.4.1 Removed the implementation ideas from the document.

6.4.2 Moved all session management to a higher-level protocol. With the ITCH protocol versions 1.00 and higher, ITCH only specifies the actual messages concerning orders added and executed on the INET book.

6.4.3 Added the Broken Trade Message to let you know when an execution is broken in case you are keeping a time-and-sales database or cumulative volumes.

6.4.4 Added the Print Message to enable people to build INET time-and-sales, INET last trade, and INET volume services. Without this message, there was no way to see the trade data when hidden orders are executed.

6.4.5 Removed the Timeout "why" for canceled orders.

6.4.6 Removed the Text Message type. These messages will now be handled out of band using the various email lists.

6.4.7 Increased the precision of timestamps to hundredths of seconds.

6.4.8 Added Match Number to all executions.

6.5 Version 2.0 11/5/2001

6.5.1 All price fields are now 6 whole number digits followed immediately by 4 decimal digits. The decimal point is no longer included in the field and instead is now implied by position. This reduces the bandwidth of the stream significantly and makes for much easier parsing and processing of price values.

6.5.2 All timestamps are now given in milliseconds past midnight rather than hundredths of seconds past midnight.

6.5.3 Replaced the End of Session System event with the End of Day System Event. Although the messages look identical, the semantics are very different. The old End of Session System Event told you that there would be no more messages during that session. This was redundant, since you get that same piece of End of Session information from the higher-lever protocol's (SoupTCP or SoupFILE) End of Session marker. The new End of Day System Event tells you that there will be no more orders today, but there may still be more messages like Cancels on open orders and Breaks on previously executed orders.

6.5.4 Removed language about any orders remaining on the book at the end of the session being dead. INET will automatically cancel all open orders at the end of the day, so subscribers will never have any left-over orders on the book at the end of the session.

6.5.5 Reduced the size of all shares fields from 9 digits to 6 digits. Again, this makes the messages smaller and the values easier to process. This is possible because INET restricted the maximum order size to 6 digits. This has no effect on market quality since anyone wanting to enter an order larger than 6 digits can simple enter more than one order.

6.5.6 Took out the Contra Broker Code from the Order Executed and Trade messages. So few of INET's executions involved SelectNet that it was really not worth sending this data anymore -- it was almost always blank.

6.6 Version 2.00 12/31/2001

6.6.1 Corrected the definition for price fields in the spec to match the actual behavior. Price fields are padded on the left with spaces, not zeros.

6.7 Version 2.00 3/17/04

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

6.7 Version 2.00 8/9/06

6.6.1 Replaced all references to INET with NASDAQ.

6.6.2 Added marketing language to Overview section.

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6.6.3 Added note about protocol options to Architecture section.

6.6.4 Updated contact information to add business line support contact number and update the development team's e-mail address.