

OTTO DROP

Version 1.1e

Overview

NASDAQ accepts limit orders from subscribers and executes matching orders when possible. Non-matching orders may be added to the NASDAQ Book, a database of available limit orders, where they wait to be matched in price-time priority.

DROP is a protocol that delivers real-time information about activity that takes place on the NASDAQ.

Each DROP account is configured to transmit information concerning orders entered by one or more NASDAQ subscriber firms. DROP is typically used by clearing firms to track the activity of their correspondents, or by larger firms to monitor the activity of multiple NASDAQ access points for risk management purposes.

Each DROP host can be configured to send a message anytime an order is entered, canceled, executed, or broken – or any combination of these events.

DROP does not provide the ability to enter orders into NASDAQ.

Architecture

DROP is a very simple protocol that is based on CR/LF terminated lines.

To begin a session, the client connects to the specified host and port using a standard TCP/IP socket.

Once the socket connection has been established, the client sends the assigned password followed by a CR/LF or just a CR.

The host authenticates the password begins sending the activity messages to the client as a series of fixed length lines. Each line represents a single event and is terminated with an ASCII CR/LF pair.

Upon receiving a valid login, the DROP host will send any previously generated messages as quickly as possible. Once it has sent all pending events the connection will remain open but idle until the next matching event occurs. As soon as a new event occurs, the corresponding message is sent as quickly as possible. If the client is not able to read messages as quickly as they occur, they are automatically queued and delivered in sequence as quickly as possible.

The end of the trading day is marked by the transmission of an empty line consisting of just a CR/LF pair.

If the client wishes to log out at any time, it sends an empty line consisting of a CR/LF pair or just an LF. The host will then close the TCP/IP socket and begin waiting for a new connection.

The protocol was designed to be simple enough that it could easily be used manually with a standard Telnet client. Using a Telnet client, a user can log into a DROP port, download messages, log out, and then directly import the downloaded messages into a spreadsheet or database application.

Recovering From Broken Connections

In the case where a client loses the connection to the DROP host and wishes to reconnect without having to re-read though all the messages it has already received, there is an optional line number parameter that can be added to the end of the password line when logging in. The format of this login line is...

password[,line number]

where "password" is the assigned client password and line number is the optional line number the client would like the host to begin transmission with. The login line is always terminated with a CR/LF pair or just an LF. If the optional line number is not specified, the DROP host always begins transmission with the first message for the current day (line #1).

By counting incoming lines, the client can re-connect and request the precise next expected line number and prevent any redundant messages.

Data Types

Numeric fields, with exception of Order Reference Number, are a string of ASCII coded digits, right justified and space filled on the left. Order Reference Number is a string of ASCII coded HEX digits right justified and zero filled on the left.

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

Prices, except for the explicit strike price, 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.

Timestamps are numeric given in seconds past midnight Eastern Time.

The explicit strike price field (part of the OSI-compliant symbol identification) will be given as a 6 digit field with the decimal point placement determined by the Strike Price Denominator field (values are A through E).

| Denominator Code | Whole Digits | Decimal Digits |
|------------------|--------------|----------------|
| A | 5 | 1 |
| B | 4 | 2 |
| C | 3 | 3 |
| D | 2 | 4 |
| E | 1 | 5 |

The strike price denominator field will be determined by the value of the strike price: if the strike price is <\$10 use E;

if the strike price is $\geq \$10$ and $< \$100$ use D;

if the strike price is $\geq \$100$ and $< \$1000$ use C;

if the strike price is $\geq \$1000$ and $< \$10000$ use B;

if the strike price is $\geq \$10000$ and $< \$100000$ use A;

For example, if the strike price is \$5.50, then the explicit strike price will be "550000" and the strike price denominator will be "E", representing one whole digit ("5") and 5 decimal digits ("50000").

If the strike price is \$205.75, then the explicit strike price will be "205750" and the strike price denominator will be "C", representing 3 whole digits ("205") and 3 decimal digits ("750").

Fault Redundancy

Multiple DROP hosts can be configured to send information on an identical set of events and matching firms and ports, making it possible to create mirrored DROP hosts for purposes of fault redundancy.

For maximum redundancy, the mirrored machines should be located at geographically diverse data centers with communications carrier access diversity. The two lines could also terminate at different subscriber locations on distinct computing platforms.

Service Bureau Configuration

A single DROP host can deliver information for one or more firms, allowing a service bureau configuration. In this case, the DROP account must be authorized by each desired firm using a DROP Port Authorization Form.

Trade Event Message Line Format

Once logged in, the client will receive a series of message lines from the host in real time. Each message line is fixed format and CR/LF terminated ASCII text.

Appendix A – Trade Event Message Line Format

| Name | Offset | Length | Type | Sample | Notes |
|------------------|--------|--------|-----------|-------------|---|
| Time Stamp | 0 | 8 | Timestamp | 34293104 | The time the event occurred on Single Book to the nearest millisecond. Format is total milliseconds from Midnight. |
| Type | 8 | 1 | ALPHA | E | A=New order accepted, E=Existing order executed, X=Existing order canceled, C=Previous execution broken, U=Order Replaced, R=Order Re-priced |
| Firm | 9 | 4 | ANUM | 175C | Participant. |
| Capacity | 13 | 1 | ALPHA | F | The Capacity of the participant. C=Customer, F=Firm, M=Market maker, P=Professional Customer, B=Broker Dealer, O=Other Exch. Market maker, J=Joint BackOffice, N=N/A |
| Open / Close | 14 | 1 | ALPHA | O | Option position type O=Open, C=Close |
| Liquidity | 15 | 1 | ALPHA | A | A=Add, R=Remove, O=Market Opening Auction, a=Add Priority Market Maker, r=Remove Priority Market maker, J=Order exposure alerted (flash) order |
| Clearing Account | 16 | 4 | ANUM | BSI | Clearing Account |
| Clearing Member | 20 | 5 | NUM | 00009 | OCC Clearing Member number |
| Clearing Firm | 25 | 5 | NUM | 00003 | OCC Clearing Member number of the firm that will clear the trade according to CMTA (Clearing Member Trade Assignment) |
| Source | 30 | 6 | ANUM | ABCD01 | The source of the order. Typically the account of the OTTO port used to enter the order. |
| Token | 36 | 20 | ANUM | (arbitrary) | The free form Token field as specified by the participant when the order or order replace was entered into NASDAQ. In case of SQF quote or sweep executions token field contains 8-byte SQF message Id of the executed quote or sweep encoded as a 16-byte ASCII string (padded with spaces on the right) |
| Replaced Token | 56 | 20 | ANUM | (arbitrary) | The Token of the order that is being replaced. |
| Reference Number | 76 | 9 | HEX-NUM | 836AFF | The order unique reference number assigned by NASDAQ to the submitted order. |
| Buy / Sell | 85 | 1 | ALPHA | B | The side of the trade executed. B=Bought, S=Sold |

| | | | | | |
|-------------------------------|-----|----|-------|----------|--|
| Contracts | 86 | 6 | NUM | 10000000 | For a new order accept, the total number of contracts entered. For an existing order execute, the incremental number of contracts executed in this trade. Note that a single order can result in multiple executions. For a broken execution, the number of contracts in the previously transmitted execution. |
| Option Symbol | 92 | 6 | ANUM | MSFT | Denotes the options symbol used for a particular instrument. In most cases, this is also the symbol of the underlying security |
| Expiration Month and Put/Call | 98 | 1 | ALPHA | G | Expiration Month and Put / Call indicator A-L are calls: Jan through Dec M-X are puts: Jan through Dec |
| Expiration Date | 99 | 2 | NUM | 27 | Day of the Month of expiration (01-31) |
| Expiration Year | 101 | 2 | NUM | 09 | Last two digits of the year of the option expiration |
| Strike price denominator | 103 | 1 | ALPHA | B | Code to determine decimal location within the strike price (A - E) A= 5.1, B=4.2, C=3.3, D=2.4, E=1.5 |
| Explicit strike price | 104 | 6 | NUM | 002532 | Explicit strike price |
| Price | 110 | 10 | NUM | 12875000 | The execution price. A decimal point after the 6th character is implied, making this field 6x4. |
| Match Id | 120 | 9 | NUM | 122853 | The match number assigned by NASDAQ to this trade. Each match consists of an execution between a buy order and a sell order. This field will only be present on executions and breaks. It will be blank filled on all other messages. |
| Cross Id | 129 | 9 | NUM | 122001 | Cross number identifies a single atomic trade transaction performed by NOM matching engine. Multiple execution Match Ids may have the same Cross Id. |

SQF Quote / Sweep Execution Specification

SQF Quote / Sweep message Ids are specified as binary strings and must be encoded to be transmitted via ASCII OTTO drop. 8-byte binary SQF Ids are encoded as 16-byte ASCII strings where each byte of the SQF Id is represented by two 0-F ASCII characters, e.g. "5E" for 0x5e.

Support:

If you have any questions or comment about this specification, just E-mail to support@nasdaq.com. We also welcome any suggestions for new features or improvements.

Revision History:

- **Version 1.1e – 1/02/2016**
Removed liquidity codes for Away Exchanges.
- **Version 1.1d – 10/02/2015**
Added liquidity codes for BX Options, MIAX, GEMINI and EDGX.
- **Version 1.1c – 05/27/2015**
Added 'a','r' Liquidities for PRISM auctions.
Added Liquidity 'J' for order exposure
- **Version 1.1 – 07/29/2014**
Added Joint Back Office Order capacity ('J')
- **Version 1.1 – 09/09/2011**
Updated the Order Reference Number to be HEX-Numeric

- **Version 1.1 – 06/29/2011**
Updated Capacity in Appendix A to include additional values B=Broker Dealer,
O=Other Exch. Market maker

- **Version 1.1 – 01/20/2011**
Addition of SQF Quote/Sweep executions
Addition of Cross Id field for executions
Removed NOMAD references

- **Version 1.05-OSI – 10/26/2010**
Addition of "2" liquidity Code for C2 exchange
Addition of "O" liquidity Code for Market Opening Auction

- **Version 1.04-OSI – 4/21/2010**
Addition of "P" capacity value for professional customers.

- **Version 1.03-OSI – 02/01/2010**
Draft Update to clarify how the strike price denominator is determined.

- **Version 1.02-OSI – 03/31/2009**
Draft Update to provide new message formats to support OSI compliant messaging

- **Version 1.02 – 06/02/2008**
Addition of new liquidity codes to identify each options exchange

- **Version 1.01 – 12/03/2007**
Adding Order Replace type. Introducing new field Replaced Token.

- **Version 1.00 – 12/02/2007**
Initial dissemination.

