

NASDAQ OMX[®] | NASDAQ FUTURES **Clearing Trade Interface (CTI)**

Specification

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NASDAQ FUTURES CTI Interface Specification

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1. Overview

The NASDAQ FUTURES Clearing Trade Interface (CTI) is an interface that provides the user with copies of all trade related messages sent for clearing purposes.

CTI sends the following messages:

- Clearing trades, trade corrections and trade cancels on a low latency, real-time basis.
 - Routed to a given firm's connection based on:
 - Clearing Member Trade Agreement (CMTA) or Options Clearing Corp. (OCC) Number and/or
 - Exchange Account (or badge) Number and/or
 - Exchange Internal Firm Identifier (IFI)
- Optional administrative messages:
 - Directory messages to relay symbol and contract information for those symbol traded on NASDAQ FUTURES.
 - Trading action messages to inform market participants when a specific option or future is halted or released for trading on the exchange.

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2. Architecture

2.1 Network protocol

Messages are transported using [SoupBinTCP](#) v4.00 on top of TCP/IP.

2.2 Failover

Message gaps due to short connection losses are easily recovered by reconnecting to the exchange with the last sequence number processed by the firm before disconnect. SoupBinTCP supports a store on the exchange side where it keeps all messages for a trading session sorted by sequence numbers regardless of the client's connection state. SoupBinTCP will send all sequenced messages starting with the sequence number requested by the firm upon login.

Upon certain failures CTI may be restarted. None of the trades are going to be lost. All messages in the CTI message store will be recreated. Trades, trade corrections and cancels will be marked as "possible duplicates". After recovery if firms reconnect with sequence number 1, they should be ready to process "possible duplicates" accordingly.

In the event of catastrophic issues, the whole exchange system may be restarted in the middle of the trading day (intraday session roll-over). In this case, a new SoupBinTCP session will be started. The CTI message store will be empty and not have trades/etc from the previous session. Firms have to login with sequence number 1. Trade ids are guaranteed to be unique across sessions for the same trading day.

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2.3 Backup

The exchange provides backup connections that have the same subscription and port as the primary but different IP addresses.

If there is a physical problem with the primary, firms can switch to the corresponding backup immediately. For smooth transition, it is recommended to login to the backup with the last sequence number received on the primary before it went down.

If there is a physical problem with the whole datacenter and the problem is not going to be fixed until next day, firms have to be ready to connect to the disaster recovery site on the next day.

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3. Subscription

Firms can configure their connections to route trade related messages based on the following match criteria (entitlements):

- OCC clearing number(s),
- or/and
- Exchange badge(s) (Exchange Account number + suffix, used by market makers),
- and/or
- Exchange Account number(s) (used by specialists and order providers)
- and/or
- IFI (exchange internal firm identifier which describes a group of exchange badges or/and Exchange Accounts).

"Excluding" logic is not supported. For example, "send all trades for OCC number 123 to a given connection" is a valid configuration while "...except trades for badge 789-A" is not. Trade routing by firm names is not supported at this time either.

If an order provider overrides OCC clearing number by supplying a CMTA number in orders, CMTA number will be used for routing decisions instead of the order provider's default OCC clearing number.

By default all non-trade related messages (events, symbols, and trading actions) are routed to the firms unconditionally. It is possible to configure a connection to only send trade related messages without any events, symbols and trading actions.

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4. Messages

CTI will support three basic types of messages:

- System Events
- Administrative Data
- Trade related information

A firm can request configuring its lines to send only trade related information.

All integer fields are unsigned big-endian (network byte order) binary numbers.

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

Prices are integer fields. When converted to a decimal format, prices are in fixed point format with 10 whole number places followed by 8 decimal digits. So price 1.3 will be a integer number with value of 130000000.

Each message has a time located at offset 1 (Seconds, Nanoseconds). This time reflects the time when the message was created by the system not sent out. If firms connecting to CTI request to resend the message on reconnect, the message time will not change. "Seconds" is the number of whole seconds after midnight of the day and "Nanoseconds" is the remaining sub-second portion of the time. The "Seconds" field will have a range of 0 to 86400 (i.e. 12:00:00am to 11:59:60pm (Leap second)) and "Nanoseconds" will have a range of 0 to 999999999. All times in this protocol are U.S. Eastern Time zone.

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4.1. System Event

The system event message is used to signal a ring wide event.

Name	Offset	Size	Value	Notes
Message type	0	1	"S"	System event message
Seconds	1	4	Integer	Seconds portion of timestamp
Nanoseconds	5	4	Integer	Nanoseconds portion of timestamp
Event code	9	1	Alpha	Refer to System Event Codes below
Version	10	1	Integer	CTI version (currently set to 4.0)

Event Code	Explanation	When (typically)
"O"	<i>Start of Messages.</i> This is always the first message sent in any trading day.	After ~6:00am
"S"	<i>Start of System Hours.</i> This message indicates that NASDAQ FUTURES is open.	7:00am
"E"	<i>End of System Hours.</i> This message indicates that NASDAQ FUTURES is closed.	~5:30pm
"C"	<i>End of Messages.</i> This is always the last message sent in any trading day.	~5:35pm

4.2. Directory

At the start of each trading day, the exchange disseminates directory messages for all symbols trading on NASDAQ FUTURES.

DIRECTORY				
Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"R" = Directory Message
Seconds	1	4	Integer	Seconds portion of timestamp
NanoSeconds	5	4	Integer	Nanoseconds portion of timestamp
Product Type	9	1	Alpha	"F" = Future "O" = Option
Product ID	10	4	Integer	Product ID assigned daily, valid for trading day. Unique only when combined with Product Type
Symbol	14	6	Alphanumeric	Denotes the future or option symbol.
Expiration Date	20	4	Integer	option expiration in CCYYMMDD format
Explicit Strike Price	24	8	Integer	Explicit strike price. Refer to Data Types for field processing notes. Applicable for ProductType="O"
Option Type	32	1	Alpha	"C" = Call option "P" = Put option Applicable for ProductType="O"
IssueSymbol	33	13	Alphanumeric	Denotes the unique underlying issue symbol for the symbol, E.g., NAU
Tradable	46	1	Alpha	Denotes whether or not this option is tradable at NASDAQ FUTURES. The allowable values are:

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DIRECTORY				
Name	Offset	Length	Value	Notes
				"Y" = symbol tradable "N" = symbol is not tradable
MPV	47	8	Integer	Minimum Price Variation for this product. All prices must be a multiple of this price.
Symbol Start Time	55	4	Integer	Timestamp in seconds when the symbol starts trading
Symbol End Time	59	4	Integer	Timestamp in seconds when the symbol ends trading
IssueType	63	1	Byte	Provides Issue Type D=Commodity C=Currency I=Index F=ETF M=Metal E=Energy
ExecAlgo	64	1	Byte	Execution Algorithm P=Price/Time R=Pro rata

Symbol Directory Notes:

- 1) **IMPORTANT:** The unique key for each product is the combination of the product type and the product ID. Product IDs are NOT unique across different product types.
- 2) The product directory messages are sent once per symbol, typically before the "Start of System Hours" System Event. Should it be necessary, intra-day updates to this message will be sent as they occur.
- 3) If a Trading Symbol is removed from the system intra-day, a new directory message will be sent with "Tradable" field set to "N". Any Orders/Quotes sent for this removed symbol will be rejected. All existing orders/quotes for this symbol will be purged.
- 4) NASDAQ FUTURES validates incoming orders/quotes prices against the MPV.

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4.3. Security Trading Action

This administrative message indicates the current trading status of an option within the exchange.

After the start of system hours, the system will use the Trading Action message to relay changes in trading status for an individual trading symbol. Messages will be sent when a future or option is halted or is released for trading. If a symbol is absent from the initial daily Trading Action spin, firms should assume that the security is being treated as halted at the start of system hours.

Name	Offset	Size	Value	Notes
Message type	0	1	"H"	Trading action message
Seconds	1	4	Integer	Seconds portion of timestamp
Nanoseconds	5	4	Integer	Nanoseconds portion of timestamp
Product Type	9	1	Alpha	"F" = Future "O" = Option
Product ID	10	4	Integer	Product ID assigned daily, valid for trading day. Unique only when combined with Product Type
Current trading state	14	1	Alpha	Current trading state for the option on the exchange: "H" = Halt in effect "T" = Trading resumed

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4.4. Trade

The exchange sends trades and corrections using this message. Trade cancels can be delivered using this message too if configured on the firm's request but by default CTI sends cancels using different message type (see Trade Cancels section below).

Name	Offset	Size	Value	Notes
Message type	0	1	"T"	Trade message
Seconds	1	4	Integer	Seconds portion of trade time
Nanoseconds	5	4	Integer	Nanoseconds portion of trade time
Send type	9	1	Alpha	"S" = Send (original transmission) "P" = Possible duplicate (unsolicited retransmission)
Symbol Information				
ProductType	10	1	Alpha	"F" = Future "O" = Option
ProductID	11	4	Integer	Product ID assigned daily, valid for trading day. Unique only when combined with Product Type
Issue Symbol	15	13	Alpha	Denotes the unique underlying issue symbol for the symbol, E.g., NAU
Symbol	28	6	Alpha numeric	Denotes the future or option symbol.
Expiration Date	34	4	Integer	Expiration date in CCYYMMDD
Strike price	38	8	Integer	Strike price of the option (see Messages section for field processing). Applicable to Product Type = "O" only
Option kind	46	1	Alpha	"C" = Call "P" = Put Applicable to Product Type = "O" only
Open State	47	1	Alpha	Reflects whether the symbol is currently open for trading. The allowable values are: Y = Open for auto execution N = Closed for auto execution
Trade Information				
Transaction Type	48	1	Alpha	"X" = new trade "Y" = trade correction "Z" = trade cancels (if trade cancel messages are to be sent using this message. See Trade Cancels description below)
Liquidity	49	1	Alpha	"A" = Add "R" = Remove "B" = Block Trade reported to NASDAQ Futures "E" = EFRP Trade reported to NASDAQ Futures
Correction number	50	2	Integer	Trade correction number. 0 for new trades. Used to identify version of the

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				trade being corrected. Increments by 1 for each subsequent correction (see examples).
Cross ID	52	4	Integer	Trade Group Id. Ties together all clearing trades of a given atomic transaction in the matching engine. 0 if cross id is not available.
Pair ID	56	4	Integer	Pair Id. Unique per side. The buy and sell side of a given trade will have the same Pair ID.
Match ID	60	4	Integer	Execution Id (0 for manual trades). Uniquely identifies an execution for a given day. Can be used to match executions sent on SQF or other feeds. The buy and sell side of a given trade will have different Match IDs
Auction ID	64	4	Integer	Auction id for trades resulting from an auction. 0 if none.
Auction Type	68	1	Alpha	` ` = No Auction
Ref Pair ID	69	4	Integer	For corrected trades, pair ID of prior trade. 0 if never corrected. See examples for details.
Ref correction number	73	2	Integer	For corrected trades, correction number of prior trade. 0 if never corrected. See examples for details.
Execution Type	75	1	Alpha	Please refer to Appendix B for values of Execution Type.
Trade side	76	1	Alpha	"B" = Buy "S" = Sell
Trade price	77	8	Integer	Trade price (see Messages section for field processing)
Trade contracts	85	4	Integer	Number of contracts traded.
Side changed	89	1	Alpha	"Y" = for new trades and corrections that affected this side of the trade "N" = for corrections that affected only contra side (see examples for details)
Reserved ¹	90	8	N/A	Reserved for future extension
Clearing Information				
OCC clearing number	98	4	Integer	OCC clearing number or CMTA provided by firm
Give-up OCC clearing number	102	4	Integer	OCC clearing number of the giving-up firm if OCC clearing number above is CMTA. Otherwise 0.
Exchange clearing number	106	4	Integer	Exchange assigned clearing number for the firm
Exchange Account	110	4	Integer	Exchange assigned Account number
Exchange suffix	114	1	Alpha	Exchange assigned Account suffix for market makers (badge suffix)

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Participant Type	115	1	Alpha	Participant Type See Appendix A for values.
CTI Code	116	1	Alpha	CTI Code See Appendix A for values.
Origin Code	117	1	Alpha	Origin Code See Appendix A for values.
OCC Code	118	1	Alpha	OCC Code See Appendix A for values.
Multi Account	119	5	Alpha numeric	Sub account if provided in the order (FIX tag 440 "Clearing Account")
Account	124	32	Alpha numeric	Account as specified in the order (FIX tag 1 "Account")
Reserved ¹	156	50	N/A	Reserved for future extension
Origin Information				
Firm	206	4	Alpha numeric	Firm ID
Trader ID	210	8	Alpha numeric	Trader Id
Order date	218	4	Integer	Date when the order/quote was received in CCYYMMDD
Order ID	222	30	Alpha numeric	Right padded FIX order id or spaces
Quote ID	252	8	Binary	Quote ID for quotes with IDs (from SQF feed v6 and higher). Right padded "1" for quotes without ids. Spaces if this side of the trade is a not a quote.
SQF Order ID	260	8	Binary	SQF Order ID for SQF orders with IDs (from SQF feed v6 and higher). Right padded "1" for SQF Orders without IDs. Spaces if this side of the trade is a not an SQF order.
Supplementary ID	268	13	Alpha numeric	Supplementary ID from FIX orders (FIX tag 58 "Text")
Order Indicators	281	2	Integer	Bit 1 = Directed (0-no, 1-yes) Bit 2 = Post Only (0-no, 1-yes) (Bit 3 = MKT Order (0-no, 1-yes) Bits 4-15 = not used Bit 15 is least significant bit. Note: Directed, Post Only and MKT Order indicators will not be available for Manual Trades, Trade Correction and Cancels
Order Type	283	1	Alpha	"O" = FIX Order "Q" = SQF Quote "W" = SQF Order " " (space) = Others
Order Size	284	4	Integer	Size of the order/quote or 0 for manual trades, trade correction and cancels.
Order Price	288	8	Integer	Price of the order/quote. 0 for MKT Orders (Indicated by MKT bit in OrderIndicators above). 0 for manual trades, trade correction and cancels.
TIF	296	1	Alpha	Time In Force for the order/quote

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				'I' = IOC 'D' = DAY 'G' = GTC `` = Not Applicable (For quotes, manual trades, trade cancel and corrections).
Reserved ¹	297	8	N/A	Reserved for future extension

Notes:

- 1) Assumptions about the contents of reserved fields are not recommended. They can be zero, spaces, or any other values.

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4.5. Cancel Trade

By default CTI sends trade cancels using this message. The alternative is to request configuring CTI for a given firm and connection block to send "extended" cancels with all the trade information using Trade message (described above) with transactionType set to Z.

Name	Offset	Length	Value	Notes
Message Type	0	1	"V"	Cancel trade message
Seconds	1	4	Integer	Seconds portion of cancel time
Nanoseconds	5	4	Integer	Nanoseconds portion of cancel time
Send type	9	1	Alpha	"S" = Send (original transmission) "P" = Possible duplicate (unsolicited retransmission)
Product Type	10	1	Alpha	"F" = Future "O" = Option
Product ID	11	4	Integer	Product ID assigned daily, valid for trading day. Unique only when combined with ProductType
Issue Symbol	15	13	Alpha	Denotes the unique underlying issue symbol for the symbol, E.g., NAU
Symbol	28	6	Alphanumeric	Denotes the future or option symbol.
Expiration date	34	4	Integer	Expiration date in CCYYMMDD
Strike price	38	8	Integer	Strike price of the option (see Data Types for field processing). Applicable for ProductType = "O"
Option kind	46	1	Alpha	"C" = Call "P" = Put " "(space) = Future Applicable for ProductType = "O"
Correction number	47	2	Integer	Trade correction number. 0 for new trade.
Cross ID	49	4	Integer	Trade Group Id. Ties together all clearing trades of a given atomic transaction in the matching engine.
Pair ID	53	4	Integer	Pair Id. Unique per side. The buy and sell side of a given trade will have the same Pair ID.
Match ID	57	4	Integer	Execution Id (0 for manual trades). Uniquely identifies an execution for a given day. Can be used to match executions sent on SQF or other feeds. The buy and sell side of a given trade will have different Match IDs
Trade side	61	1	Alpha	"B" = Buy "S" = Sell

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4.6. Pre Trade Risk Management

The Pre Trade Risk Notification message is used to inform firms that one of their pre trade risk monitors has changed state. The state change could be a warning, a cutoff or a reset.

Pre Trade Risk Notification Message

Name	Offset	Length	Value	Notes
Type	0	1	Alpha	"W" = Pre Trade Risk Notification Message
Seconds	1	4	Integer	Seconds portion of the timestamp
Nanoseconds	5	4	Integer	Nanoseconds portion of the timestamp
RiskIDType	9	1	Alpha	F= Firm T= Trader G = Group
RiskID	10	8	Alphanumeric	ID of Pre Trade Risk Monitor whose status is being updated. Left justified, padded with spaces to the right. Value depends on Monitor Type: Type "F" – 4 byte firm mnemonic Type "T" – 8 byte Trader ID Type "G" – 8 byte Group ID
RiskStatus	18	1	Alpha	Status " " – Reset (not alerted) "7" – 70% limit warning "8" – 80% limit warning "9" – 90% limit warning "X" – Cutoff limit reached.
Pre Trade Risk Parameter	19	1	Alpha	Pre Trade Risk Parameter warning/cutoff that was triggered " " – N/A (if status is Reset) "A" – Open Exposure Value "B" – Open Total Value "C" – Exec Exposure Value "D" – Exec Total Value
Trigger Value	20	8	Binary	The value that caused the status change. Note this will be 0 on a Reset.

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5. Examples

5.1 Ref Pair Id and Correction Number in Trade message

As part of a transaction in the trading system, participant B buys 100 contracts from participant S:

CTI sends a clearing trade to both participants with a new pairId (let's say 5) and correctionNumber 0. Since this completely new trade (#5/0) doesn't refer to any prior trades, refPairId and refCorrectionNumber in trade messages for buyer and seller are both set to 0.

Later back office changes the trade #5/0 taking 70 contracts from seller S and assigning them to another seller (let's say participant S2). The buyer stays the same:

CTI sends a corrected trade (transactionType field is set to Y "Trade Correction") to buyer B and seller S for 30 contracts with unchanged pairId (5) and correctionNumber incremented by 1 ($0+1=1$). refPairId and refCorrectionNumber in messages for this trade #5/1 are set to refer to prior trade #5/0.

Also as part of the change to the trade #5/0, CTI sends a new trade (transactionType X "new trade") to buyer B and seller S2 for 70 contracts with new pairId (let's say 6) and correctionNumber 0. refPairId and refCorrectionNumber in messages for this trade #6/0 are set to refer to prior trade #5/0.

If back office changes the trade #5/1 further taking 10 more contracts from seller S and assigning them to another seller (let's say participant S3 this time) with the same buyer:

CTI will send a corrected trade (transactionType field is set to Y "Trade Correction") to buyer B and seller S for 20 contracts with unchanged pairId (5) and correctionNumber incremented by 1 ($1+1=2$). refPairId and refCorrectionNumber in messages for this trade #5/2 are set to refer to prior trade #5/1.

Also as part of the change to the trade #5/1, CTI will send a new trade (transactionType X "new trade") to buyer B and seller S3 for 10 contracts with new pairId (let's say 7) and correctionNumber 0. refPairId and refCorrectionNumber in messages for this trade #7/0 are set to refer to trade #5/1.

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5.2 sideChanged in Trade message

After participant B buys 100 contracts from participant S:

CTI sends a clearing trade to both participants with sideChanged set to Y(es).

If later back office changes price of the trade:

CTI will send a corrected trade (transactionType field set to Y "Trade Correction") to both participants with sideChanged set to Y(es)

Later back office changes the trade re-assigning all contracts on the sell side from participant S to participant S2 and keeping the same buyer:

CTI sends a corrected trade (transactionType = "Trade Correction") to buyer B with sideChanged set to N(o) because all that changed for the buyer is a contra side. Participant S gets a trade cancel, and participant S2 gets a new trade with sideChanged set to Y(es).

If later back office splits the sell side between existing seller S2 and 5 more sellers keeping the same buyer:

CTI will send 6 corrected trades to buyer B with sideChanged set to N(o) because total contracts didn't change (only contra side). Participant S2 gets a trade correction too but his sideChanged will be Y(es) because the seller's contracts got reduced. All other new sellers will get new trades with sideChanged set to Y(es).

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6. Support

Department	Phone	Email
Operation Center (NOC)	+1 212 231 5049	nocgroup@nasdaqomx.com
Subscriber Services	+1 212 231 5180	subscriber@nasdaqomx.com

Appendix A – Participant Types

Firms sending messages requiring Participant Type (orders, quotes) will submit one of the Participant Types below. Each Participant Type value corresponds to a specific combination of Customer Type Identifier (CTI) code, Origin Code, and OCC Account Type Code.

Participant type	Corresponding combination		
Value	CTI Code	Origin Code	OCC C/F/M
A	1	1	M
B	1	2	M
C	2	1	M
D	2	2	M
E	2	1	F
F	2	2	F
G	3	1	M
H	3	2	M
I	4	1	C

Appendix B – Execution Type Code

Code	Description	
"A"	REGULAR	Indicates that the transaction was a regular automated system match.
"L"	Regular Late	Regular automated system match that was reported late.
"B"	Block	Block Trade – trade meeting minimum size for block status as defined in the contract specifications in the NASDAQ FUTURES rule book.
"P"	EFP	Exchange for Physical (EFP)
"R"	EFR	Exchange for Risk (EFR)
"O"	EOO	Exchange of Options for Options (EOO)
"U"	Block As Of	As Of Block Trade
"V"	EFP As Of	As Of Exchange for Physical (EFP) Trade

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"W"	EFR As Of	As Of Exchange for Risk (EFR) Trade
"X"	EOO As Of	As Of Exchange of Options for Options (EOO) Trade

Appendix C – Revision Control Log

Revision #	Date	Change
2	6/26/2013	Initial Document
2.1	7/19/2013	Revision

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