CORTEX EQUITIES

CORTEX ALTERNATIVE TRADING SYSTEM ("ATS")

FIX PROTOCOL CONNECTIVITY SPECIFICATION

2021

TABLE OF CONTENTS

BNP PARIBAS

The bank for a changing world

VERSION CONTROL

Version	Change Date	Description
1.0	*2021*	▪ Document created.
1.1	10/26/2002	▪ **Update default peg instruction**
		▪
		▪
		▪
		▪
		▪ ▪ ▪ ▪
		▪

PURPOSE

This document describes the FIX messages supported only for BNP Paribas' US-based Alternative Trading System, Cortex ATS. The document is specific to the trading of US Equities. All counterparties must certify their trading system prior to being promoted or having access to the production environment. This document also assumes that prior knowledge and understanding of the FIX Protocol specification that can be referenced at http://www.fixprotocol.org/specifications.

CONTACTS

Cortex Equities Americas
cortex.equities.amrs@bnpparibas.com
+1-212-841-3600

Matching

Cortex ATS matches orders based on a strict price/time priority. Cortex ATS will match orders at or within the National Best Bid/Offer and in compliance to the Limit Up/Limit Down Rule. The only exception to price/time priority is if Cortex's **Anti-Crossing logic** supersedes a potential crossing opportunity (see the Anti-Crossing Logic section for more details).

Cortex ATS provides price improvement to the taker of liquidity where applicable.

Cortex ATS supports odd lots.

By default, Cortex ATS does not allow matching during a locked market. Cortex ATS will support functionality to allow matching during 1) a locked market where the NBB = NBO or 2) matching when either the NBB = LU OR NBO = LD. The default configuration for each participant for settings 1) and 2) is not to match.

Please review the Cortex ATS FAQ supplemental document for matching examples.

Anti-Crossing Logic

Cortex ATS supports the ability to prevent a participant from crossing opportunities in the pool with their own flow or other participants. This functionality is referred to as the Anti-Crossing logic.

- **Prevent Self-Crossing:** At the firm-level or session-level, a Liquidity Partner can opt-out from crossing with their order flow. Self-Crossing is allowed by default.
- **Counterparty:** At the firm-level, session-level or order-level, a Liquidity Partner can request not to cross with other participant(s) as defined by the counterparty segmentation rules as described in the current ATS-N filing and FAQ. By default, participants interact with all flows types in the pool.

Eligible Stocks

All RegNMS eligible securities.

Hours of Operation

Cortex ATS will start to accept orders at 8:00 A.M. EST.

Cortex ATS will match orders between 9:30 A.M. EST and 4:00 P.M. EST. Cortex will not match orders in a symbol until the primary exchange for that symbol is open.

Trades are reported to the tape via the NASDAQ Trade Reporting Facility.

Cortex ATS may not be accessible after 4:15 P.M. EST due to system maintenance.

Cancel-on-Disconnect (COD)

All open orders will be canceled after 4:00 P.M. EST.

All sessions are configured with Cancel-on-Disconnect by default. When new sessions are on-boarded, this is the default setting.

If you stop heartbeating after exceeding the heartbeat interval (tag108), and there is no response to our 'Test Request' message (tag35=1), then Cortex will enforce Cancel-On-Disconnect by disconnecting your session, canceling your orders, and once you re-connect you'll receive the cancellations. The heartbeat interval is determined based on the value in tag108 specified in the 'LogOn' message (tag35=A). If a socket disconnect occurs, Cortex will enforce Cancel-On-Disconnect immediately.

Capacity and Latency

Cortex ATS is designed to withstand 2,000 orders per second per FIX session before latency degradation becomes obvious.

DropCopy Functionality

Cortex ATS can send 'dropcopies' of all executions from multiple sessions into a single drop copy session. By default, Cortex ATS will only send 'fills' (tag150=F) on a dropcopy session.

Risk Controls

Cortex ATS supports the following pre-trade risk checks:

Risk Control	Description
Maximum Daily Notional	Can be configured per FIX session or across multiple sessions for a given client. Total daily notional amounts exceeding this limit will be rejected.
Maximum Order Notional	Order notional amounts exceeding this limit will be rejected.
Maximum Order Quantity	Order quantities exceeding this limit will be rejected.
Clearly Erroneous/Limit Price Checks	Limit price check for orders to prevent clearly erroneous executions. If the order limit price is a certain percentage of a threshold away from the last bid/offer of the security, the order will be rejected. Price thresholds are defined as: x < $1 - 75% $1.00 <= x < $10.00 - 50% x >= $10 - 20%

Order Types

The order types supported by Cortex ATS are Day/IOC Market, Limit, Market/Far-touch Peg, Primary/Near-touch Peg, and Midpoint Peg orders as depicted below.

FIX 4.2	Market Order	Limit Order	Market/ Far-touch Peg	Primary/ Near-touch Peg	Midpoint Peg
MsgType (tag35)	D	D	D	D	D
OrderType (tag40)	1	2	P	P	P
ExecInst* (tag18)	1	1	1<space>P or P<space>1	1<space>R or R<space>1	1<space>M or M<space>1
TimeInForce (tag59)	0 (Day) or 3 (IOC)	0 (Day) or 3 (IOC)	0 (Day) or 3 (IOC)	0 (Day) or 3 (IOC)	0 (Day) or 3 (IOC)

**All orders must be marked 'NOT HELD' with tag18 containing '1'*

**Peg orders received without a peg type instruction will default to Market Peg*

Minimum Quantity Functionality

Cortex ATS supports 'MinQty' in tag110 on New (tag35=D) and Cxl/Replace (tag35=G). Cortex ATS will not aggregate/bundle orders to meet the quantity specified in tag110.

1. If the 'New' order does not contain 'MinQty', and subsequently the order is 'Cxl/Replace' with the 'MinQty' tag included, then Cortex ATS will accept the 'Cxl/Replace' request, and process the 'MinQty'.
2. If the 'New' order contains 'MinQty', and subsequently the order is 'Cxl/Replace' with 'MinQty' omitted, then the 'Cxl/Replace' request will be accepted and 'MinQty' will be excluded.
3. If Cortex ATS receives a request to 'Cxl/Replace' an order that is partially filled, where 'MinQty' greater than 'OrderQty', then the 'Cxl/Replace' request is rejected.
4. If Cortex ATS receives a request to 'Cxl/Replace' an order that is partially filled order, where 'MinQty' equal to 'Order Qty', then the 'Cxl/Replace' request is rejected.
5. On a partially filled order, when the 'LeavesQty' < 'MinQty', by default, the Cortex ATS will reset the 'MinQty' to equal 'LeavesQty' and will cross with any opposite side order equal or greater than 'LeavesQty'. Clients may choose to have such orders automatically cancelled back instead. To enable this feature, please request it during FIX certification.
6. A MinQty can be automatically applied to any of the counterparty groups described in Q21 through the use of a MinQty/Counterparty rule. To enable this feature, please request it during FIX certification. Please note that the MinQty values specified in the MinQty/Counterparty rule take precedence over the value in tag 110 on an order. The MinQty/Counterparty rule may be specified on an order in FIX tag 9110. Please see the FAQ for more information.

Erroneous Trades

Cortex ATS will follow the clearly erroneous rulings communicated by SROs and bust/break trades as needed.

The Trade Desk will ensure that the trades are removed from NASDAQ Trade Reporting Facility and that clearly erroneous trades are not booked.

Compliance

For Regulatory reporting, use the following:

- MIC Code or ISO Code or Last Market (tag30) = BNPC
- Clearing Firm = 2154
- Trade Reporting Facility and Market Participant ID = BNPX
- Executing Broker = BNPX
- Sent to Firm MPID = BNPX
- Destination Code = M
- Recipient Type = M
- Bloomberg Advertised Volume is BNPS and combined with all of BNPP's flow

If a FIX tag within this range: 1-5000 is not explicitly supported by Cortex ATS then your message will be rejected. Tags within this range: 5000 – 9999 will be ignored.

If a FIX tag is repeated in a message, Cortex ATS will process the first occurrence of the tag in the message.

Standard Message Header

Tag	Field Name	Req'd	Comments
8	BeginString	Y	Must be first field in message
9	BodyLength	Y	Must be second field in message
35	MsgType	Y	Must be third field in message
34	MsgSeqNum	Y	Integer message sequence number.
49	SenderCompID	Y	SenderCompID. Assigned by Cortex ATS
56	TargetCompID	Y	BNPC
52	SendingTime	Y	Time of message transmission (always expressed in UTC (Universal Time Coordinated, also known as 'GMT')
50	SenderSubID	N	Ignored.
57	TargetSubID	N	Ignored.
43	PossDupFlag	N	Always required for retransmitted messages, whether prompted by the sending system or as the result of resend request
97	PossResend	N	Required when message may be duplicate of another messages sent under a different sequence number

Standard Message Trailer

Tag	Field Name	Req'd	Comments
93	SignatureLength	N	Required when trailer contains signature. Note: Not to be included within SecureData (91) field
89	Signature	N	Note: Not to be included within SecureData (91) field
10	CheckSum	Y	(Always unencrypted, always last field in message)

Logon

Tag	Field Name	Req'd	Comments
	Standard Header	**Y**	**MsgType = A**
98	EncryptMethod	Y	Not supported.
108	HeartBtInt	Y	Heartbeat Interval
141	ResetSeqNumFlag	N	Supported.
95	RawDataLength	N	Not supported.
93	RawData	N	Not supported.
	Standard Trailer	**Y**	

Sequence Numbers

Sequence numbers, both inbound and outbound, will be reset to 1 every day. The recommended heartbeat interval is 30 seconds.

Resend Request and Sequence Reset

The Heartbeat Interval that is specified in the Logon message will be used to make sure that your connection is alive and functioning. If inactivity is detected for a period longer than the Heartbeat, Cortex ATS will send a Test Request to determine if you are still active. If there is no response to the Test Request within a period of 2.4*Heartbeat Interval from the last message received from you, then Cortex ATS will immediately close the connection.

Heartbeat

A Heartbeat message should be sent if the agreed upon 'HeartBtInt' has elapsed since the last message was sent.

Test Request

The Heartbeat Interval that is specified in the Logon message will be used to make sure that your connection is alive and functioning. If inactivity is detected for a period longer than the Heartbeat, Cortex ATS will send a Test Request to determine if you are still active. If there is no response to the Test Request with a period of 2.4*Heartbeat Interval, then Cortex ATS will immediately send a logout message and the connection will be closed.

Reject

Session level rejects are used to indicate violations of the session protocol, or missing fields.

Business Reject

All application level messages that fulfill session level rules but violate business logic (e.g., invalid order type or invalid order quantity) will be rejected by sending Execution Report (MsgType = 8) with appropriate values for OrdStatus and ExecType.

Logout

A Logout message should be sent by the counterparty by 4:15 PM EST to close the FIX session.

FIX MESSAGES TYPES

Administrative Messages

- Standard FIX administrative messages are supported

Incoming Messages

- New Order – Single
- Order Cancel Request
- Order Cancel/Replace Request (Order Modification Request)

Outgoing Messages

- Execution Report
- Order Cancel Reject

New Order Single

Tag	Field Name	Req'd	Comments
35	**MsgType**	**Y**	**MsgType = D**
1	Account	N	May be used in Anti-Internalization Logic. Reflected back on execution reports associated with this order (optional).
11	ClOrdID	Y	Unique ID for the day. Should be 22 characters or less. Duplicate ClOrdId's will be rejected.
21	HandlInst	Y	1 = Automated execution order, private, no Broker intervention
18	ExecInst	Y	Not Held = '1' (required for ATS) Instructions for order handling for pegging (optional). Midpoint Peg = 'M' Market Peg = 'P' Primary Peg = 'R' Example for Midpoint Peg with Not Held instruction = '1 M' or 'M 1'. Note there is a <space> between '1' and 'M'.
60	TransactTime	Y	Time the order was initiated by the counterparty. Must be in GMT timestamp
55	Symbol	Y	Symbol (upper case).
65	SymbolSfx	N	Required if applicable
54	Side	Y	Buy = '1' Sell = '2' Sell Short = '5' Sell Short Exempt = '6'
38	OrderQty	Y	Number of shares for this order.
40	OrdType	Y	Market = '1' Limit = '2' Pegged='P'
44	Price	N	Limit Price for the Limit orders. Required on Limit Orders.
110	MinQty	N	Minimum fill quantity (optional).
47	Rule80A	Y	Agency = 'A' Principle = 'P'
59	TimeInForce	N	Day = '0' (default) IOC = '3'
114	LocateReqd	N	'N' = Indicated the broker is not required to locate. Required for Sell Short orders.
5700	LocateBroker	N	String. Required locate code for Sell Short orders.
1688	ShortSaleExemptionReason	N	0 = Exemption Reason Unknown 1 = Incoming Short Sale Exempt 2 = Above National Best Bid (Broker Dealer Provision) 3 = Delayed Delivery 4 = Odd-Lot 5 = Domestic Arbitrage 6 = International Arbitrage 7 = Underwriter or Syndicate Distribution 8 = Riskless Principal 9 = VWAP
109	ClientID	N	May be used in Anti-Internalization Logic
115	OnBehalfOfCompID	N	May be used in Anti-Internalization Logic
9110	MinQtyCounterpartyRule	N	ID of the rule that will be applied to the order.

Execution Report

Tag	Field Name	Req'd	Comments
35	MsgType	Y	MsgType = 8
52	SendingTime	Y	GMT date-time that message was sent.
20	ExecTransType	Y	New = '0' Cancel = '1' Correct = '2'
17	ExecID	Y	Day-unique ID of execution.
19	ExecRefID	N	Only present when ExecTranstype = Cancel (1) or Correct (2)
11	ClOrdId	Y	ClOrdID of the order being accepted, executed, or rejected, of ClOrdID of the cancel.
41	OrigClOrdID	N	ClOrdID of the order being cancelled/replaced.
37	OrderID	N	OrderID supplied by BNP Paribas.
39	OrdStatus	Y	State of the order. New = '0' Partially Filled = '1' Filled = '2' Cancelled = '4' Replaced = '5' Rejected = '8'
103	OrdRejReason	N	Only when ExecType is Rejected (8).
1	Account	N	Reflected back on execution reports associated with this order (optional).
55	Symbol	Y	Symbol (upper case)
65	SymbolSfx	N	Required if applicable.
54	Side	Y	Buy = '1' Sell = '2' Sell Short = '5' Sell Short Exempt = '6'
38	OrderQty	Y	Number of shares for this order.
40	OrdType	Y	Market = '1' Limit = '2' Pegged= 'P'
44	Price	N	Limit Price for the Limit orders.
110	MinQty	N	Minimum fill quantity (optional).
47	Rule80A	Y	Agency = 'A' Principle = 'P'
59	TimeInForce	Y	Day = '0' IOC = '3'
76	ExecBroker	Y	Identifies executing broker. 'BNPC'= BNPP Cortex ATS

Execution Report (continued)

Tag	Field Name	Req'd	Comments
32	LastShares	Y	Quantity of shares traded on this message.
31	LastPx	Y	Price on this message for only this number of shares.
14	CumQty	Y	Cumulative quantity of shares executed for this order.
6	AvgPx	Y	Average Price of executions for this order weighted by trade size. Zero if CumQty is zero.
60	TransactTime	Y	Time of acknowledgement generation. GMT timestamp
58	Text	N	If present, indicates reason for reject or cancel.
150	ExecType	Y	New = '0' Partial Fill = '1' Fill = '2' Cancelled = '4' Replaced = '5' Rejected = '8'
151	LeavesQty	Y	Quantity of shares open for the order.
851	LastLiquidityInd	Y	For fills only Added Liquidity = '1' Removed Liquidity = '2'
376	CrossID	N	A CrossID is a unique identifier of a match between a buy and a sell. Both the buyer and seller on a single transaction receive the same CrossID but separate ExecIDs.
1688	ShortSaleExemptionReason	N	0 = Exemption Reason Unknown 1 = Incoming Short Sale Exempt 2 = Above National Best Bid (Broker Dealer Provision) 3 = Delayed Delivery 4 = Odd-Lot 5 = Domestic Arbitrage 6 = International Arbitrage 7 = Underwriter or Syndicate Distribution 8 = Riskless Principal 9 = VWAP

Order Cancel Request

Tag	Field Name	Req'd	Comments
35	MsgType	Y	MsgType = 'F'
11	ClOrdId	Y	Unique ID for the day. Should be 22 characters or less. Duplicate ClOrdId's will be rejected.
41	OrigClOrdID	Y	ClOrdID of the order to cancel.
37	OrderID	N	OrderID supplied by BNP Paribas on the order acknowledgement.
60	TransactTime	Y	Time cancel initiated/released. Must be in GMT timestamp
55	Symbol	Y	Symbol (upper case).
65	SymbolSfx	Y	Required if applicable
54	Side	Y	Buy = '1' Sell = '2' Sell Short = '5' Sell Short Exempt = '6'

Order Cancel Reject

Tag	Field Name	Req'd	Comments
35	MsgType	Y	MsgType = '9'
11	ClOrdId	Y	Unique ID for the day. Should be 22 characters or less. Duplicate ClOrdId's will be rejected.
41	OrigClOrdID	Y	ClOrdID of the order to cancel.
37	OrderID	Y	OrderID supplied by BNP Paribas on the order acknowledgement.
39	OrdStatus	Y	OrdStatus of order that failed to be cancelled.
102	CxlRejReason	Y	All valid FIX values
58	Text	Y	Free form text message
434	CxlRejResponseTo	Y	Identifies the type of request that a Cancel Reject is in response to.

Order Cancel/Replace Request

Tag	Field Name	Req'd	Comments
35	MsgType	Y	MsgType = 'G'
1	Account	Y	Reflected back on execution reports associated with this order (optional).
11	ClOrdId	Y	Unique ID for the day. Should be 22 characters or less. Duplicate ClOrdId's will be rejected.
41	OrigClOrdID	Y	ClOrdID of the order to cancel/replace.
21	HandlInst	Y	Required on replace requests.
18	ExecInst	Y	Not Held = '1' (required for ATS) Instructions for order handling for pegging (optional). Midpoint Peg = 'M' Market Peg = 'P' Primary Peg = 'R' Example for Midpoint Peg with Not Held instruction = '1 M' or 'M 1'
60	TransactTime	Y	Time the order cancel order replace request was initiated by the counterparty. Must be in GMT timestamp
55	Symbol	Y	Symbol (upper case).
65	SymbolSfx	N	Required if applicable.
54	Side	Y	Buy = '1' Sell = '2' Sell Short = '5' Sell Short Exempt = '6'
38	OrderQty	Y	Number of shares for this order.
40	OrdType	Y	Market = '1' Limit = '2'
44	Price	N	Limit Price for the Limit orders.
110	MinQty	N	Minimum fill quantity (optional).
47	Rule80A	Y	Valid values as per the FIX protocol.
59	TimeInForce	N	Day = '0' (default) IOC = '3'
114	LocateReqd	N	'N' = Indicated the broker is not required to locate. Required for Sell Short orders.

Order Cancel/Replace Request (continued)

Tag	Field Name	Req'd	Comments
5700	LocateBroker	N	String. Required locate code for Sell Short orders.
1688	ShortSaleExemptionReason		0 = Exemption Reason Unknown 1 = Incoming Short Sale Exempt 2 = Above National Best Bid (Broker Dealer Provision) 3 = Delayed Delivery 4 = Odd-Lot 5 = Domestic Arbitrage 6 = International Arbitrage 7 = Underwriter or Syndicate Distribution 8 = Riskless Principal 9 = VWAP
9110	MinQtyCounterpartyRule	N	ID of the rule that will be applied to the order.

Symbology

Type	Suffix (Tag 65)	Examples
Series (or Class) A-T and V-Z	<v>	ZZZ/A
Series (or Class) A-T and V-Z When Issued	<v> WI	ZZZ/AWI
Preferred	PR	ZZZ/PR
Preferred Series A-T & V-Z	PR<v>	ZZZ/PRA
Preferred Series A-T & V-Z Called	PR<v>CL	ZZZ/PRACL
Preferred Series A-T & V-Z Called When Issued	PR<v>WI	ZZZ/PRAWI
Preferred When Issued	PRWI	ZZZ/PRWI
Preferred Called	PRCL	ZZZ/PRCL
Rights	RT	ZZZ/PT
Units (a combination of securities composed of two or more of warrants, common stocks, preferred stocks and/or bonds)	U	ZZZ/U
When Issued	WI	ZZZ/WI

CONTACTS

Cortex Equities Americas cortex.equities.amrs@bnpparibas.com +1-212-841-3600

DISCLAIMER