

Volume

3.2

OneChicago, LLC. Application Program Interface

OCXdelta1® OneChicago Ticker Plant (OCTP)

OneChicago ⌘

PROGRAMMERS DEVELOPMENT SPECIFICATIONS

Programmer's Guide to Messages and Content for Real-time OneChicago Market Data

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Support and Questions Regarding This Document

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Change Notice

Date	Version	Description of Change
October 22, 2014	V1.4	Updated table 2.1 IP addresses added.
November 6, 2014	V1.5	Added EntryLegPrice near and far description for EFP transactions.
November 10, 2014	V1.6	Updated MPSecID breakdown, and removed 7am dissemination of product catalog.
November 20, 2014	V1.7	Removed static data from update messages. Added Trading Status to Instrument group to be disseminated in product catalog message.
January 23, 2015	V1.8	Added heartbeat message for line integrity.
March 13, 2015	V1.9	Added clarity for Notification time and TransactTime.
March 23, 2015	V2.0	Updated heartbeat message type.
April 2, 2015	V2.1	Updated sample messages and format, added clarity on restart protocol. Specified header is little endian encoded.
April 27, 2015	V2.2	Provided ASCII message type values. Moved sample packet captures to section 6.0.
May 6, 2015	V2.3	Updated title and description. Verified price precision on all prices in specification.
May 12, 2015	V2.4	On May, 18th 2015 <u>OCTP</u> will start new broadcasting for the following: Channel configurations: A Feed => Instrument Definition Refresh 51009 233.158.244.19 B Feed => Instrument Definition Refresh 52009 233.158.244.29 DR A Feed => Instrument Definition Refresh 53009 233.158.244.119 DR B Feed => Instrument Definition Refresh 54009 233.158.244.129 Content: OCXMD:: ProductCatalog Bandwidth: Default loop configuration : 120 sec Current Product list ~ packet rate : 580 packets/s Current Product list ~ data rate : 0.5440 Mb/s
June 9, 2015	V2.5	Added clarity for repeating group tags.
June 29, 2015	V2.6	Added Sequence numbers for Level 1 feed update and refresh messages. Added samples feed stream data for order lifecycle. Added sample corporate event Packet Capture.
July 21, 2015	V2.7	Added clarity for GoodMorning message sequence reset.
July 23, 2015	V2.8	Changed Good Morning dissemination time to 5:10 CT.
August 3, 2015	V2.9	Updated channel configurations tables.
August 18, 2015	V3.0	Decommissioned EFP refresh channels. Added Sample level 2 Market Data refresh message.
November 23, 2015	V3.1	Added Position Accountability. Spread orders will now Have EntryLegPriceNear and EntryLegPriceFar for both Market Data Refresh and Market Data Update messages). Added UAT C feed configurations.
January 11, 2015	V3.2	On January 11 th , OCTP will introduce Instrument Group Trading Session Open/Close Time changed from HHmmss to HH:mm:ss

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1.0 Introduction

The OneChicago Ticker Plant (OCTP) publishes trade and quote data using the following message format explained in this document. All data will be transmitted using a multicast network protocol. The OCTP is a redundant dissemination system for parties interested in market data, and exists as two feeds on distinct servers, systematically disseminating real time OCXdelta1 market data. Consumers are required to join groups for both Primary (A) and Secondary (B) feeds to provide reliability.

OneChicago utilizes extranet providers in addition to leased lines from the interested participants. Visit our website for a complete list of extranet providers.

OCTP serializes messages using Google Protocol Buffers (GPB). For information on how to work with Google Protocol Buffers, visit <https://developers.google.com/protocol-buffers/docs/overview>

1.1 Message Cycles

It is advised the users log on before message cycles begin.

Table 1.1

<u>Messages</u>	<u>Time</u>
Good Morning	05:10 CT
Product Catalog	06:00 CT
Exchange Summary -SOD	06:15 CT
Exchange Summary -EOD	16:45 CT
Market State Notification	See Trading Hours.
Market Data Refresh Channels	07:00 CT (refresh intervals begin)
Market Data Updates	Event driven.

2.0 Connectivity

Two connections are required to receive the A and B feeds. It is not permitted to receive both feeds over the same physical connection.

2.1 Network Configuration - Production and DR:

Direct connections require the use of PIM Sparse mode with static Rendezvous Points (RPs). Firms need to setup routes and allow traffic from the matching multicast group and source address. Routing is currently provided statically, BGP is done only by request. Configurations with an extranet service will differ.

Table 2.1

	A Feed Groups		B Feed Groups	
Data Center	Source Network	Rendezvous	Source Network	Rendezvous
NJ2	10.38.66.131/32	10.38.66.254/32	10.38.66.132/32	10.38.66.254/32
CH1	10.38.65.131/32	10.38.65.254/32	10.38.65.132/32	10.38.65.254/32
CH1 (UAT)	10.38.65.90/32	10.38.65.254/32	N/A	N/A

Ticker Plant customers must choose between extranet providers or leased line connection. Our production environment is located at NJ2, and Disaster Recovery at CH1. Consumers are encouraged to establish connectivity to our UAT environment to ensure OCTP upgrades can be adequately tested prior to release.

Firms who choose to use direct connections are responsible for ordering and managing their own WAN circuits and routers to connect to the OneChicago Ticker Plant. In the event of a disaster, data will be disseminated from OneChicago's disaster recovery site in Chicago. Direct connect firms are required to have a circuit and router in the DR site.

3.0 Channels/Feeds

A channel is broken into two groups (primary and secondary) where information is identical across the twin feeds. OCTP feeds are allocated across 9 channels, resulting in the 18 individual feeds.

3.1 Channel Descriptions

OCTP supports three types of channels, main channels, level 1 market data, and level 2 market data. Level 1 feeds distribute top of book quote and trade data aggregating size at best bid and best ask price level. Level 2 feeds distribute updates from respective markets on an individual order basis, in addition to trade data.

3.1.1 Main Channel

Message Type(s): Good Morning, Product Catalog, Exchange Summary, and Market State Notification.

3.1.2 Level 1- SSF Refresh Channel

Disseminates top of book quote and trade data for OCXdelta1 Single Stock Futures (SSF) and Block markets. Channel refresh interval TBD. Products will cycle alphabetically

Message Type(s): Market Data Refresh

3.1.3 Level 2- SSF Refresh Channel

Disseminates full book depth (by order) quote and trade data for OCXdelta1 Single Stock Futures (SSF) and Block markets. Channel refresh interval TBD. Products will cycle alphabetically

Message Type(s): Market Data Refresh

3.1.4 Level 1- Spread Refresh Channel

Disseminates top of book quote and trade data for OCXdelta1 Single Stock Futures (SSF) and Block intra-market/calendar spread markets. Channel refresh interval TBD. Products will cycle alphabetically

Message Type(s): Market Data Refresh

3.1.5 Level 2- Spread Refresh Channel

Disseminates full book depth (by order) quote and trade data for OCXdelta1 Single Stock Futures (SSF) and Block intra-market/calendar spread markets. Channel refresh interval TBD. Products will cycle alphabetically

Message Type(s): Market Data Refresh

3.1.6 Level 1- Incremental Update Channel

Disseminates event driven (real time) top of book quote and trade data for all OCXdelta1 markets.

Message Type(s): Market Data Update

3.1.7 Level 2- Incremental Update Channel

Disseminates event driven (real time) order based quote and trade data for all OCXdelta1 markets.

Message Type(s): Market Data Update

3.1.8 Instrument Definition Refresh Channel

Disseminates product catalog messages on a refresh throughout the trading day.

Message Type(s): Product Catalog.

3.2 Channel Groups

Table 3.2 Primary Channels

Groups	Channel port	Channel IP
A Feed => Main	51000	233.158.244.10
B Feed => Main	52000	233.158.244.20
A Feed => Level 2- SSF Refresh	51001	233.158.244.11
B Feed => Level 2- SSF Refresh	52001	233.158.244.21
A Feed => Level 2 - Spread Refresh	51003	233.158.244.13
B Feed => Level 2 - Spread Refresh	52003	233.158.244.23
A Feed => Level 2 – Incremental Update	51004	233.158.244.14
B Feed => Level 2 – Incremental Update	52004	233.158.244.24
A Feed => Level 1- SSF Refresh	51005	233.158.244.15
B Feed => Level 1- SSF Refresh	52005	233.158.244.25
A Feed => Level 1 - Spread Refresh	51007	233.158.244.17
B Feed => Level 1 - Spread Refresh	52007	233.158.244.27
A Feed => Level 1 – Incremental Update	51008	233.158.244.18
B Feed => Level 1 – Incremental Update	52008	233.158.244.28
A Feed => Instrument Definition Refresh	51009	233.158.244.19
B Feed => Instrument Definition Refresh	52009	233.158.244.29

Table 3.3 DR Channels

Groups	Channel port	Channel IP
DR A Feed => Main	53000	233.158.244.110
DR B Feed => Main	54000	233.158.244.120
DR A Feed => Level 2- SSF Refresh	53001	233.158.244.111
DR B Feed => Level 2- SSF Refresh	54001	233.158.244.121
DR A Feed => Level 2 - Spread Refresh	53003	233.158.244.113
DR B Feed => Level 2 - Spread Refresh	54003	233.158.244.123
DR A Feed => Level 2 – Incremental Update	53004	233.158.244.114
DR B Feed => Level 2 – Incremental Update	54004	233.158.244.124
DR A Feed => Level 1- SSF Refresh	53005	233.158.244.115
DR B Feed => Level 1- SSF Refresh	54005	233.158.244.125
DR A Feed => Level 1 - Spread Refresh	53007	233.158.244.117
DR B Feed => Level 1 - Spread Refresh	54007	233.158.244.127
DR A Feed => Level 1 – Incremental Update	53008	233.158.244.118
DR B Feed => Level 1 – Incremental Update	54008	233.158.244.128
DR A Feed => Instrument Definition Refresh	53009	233.158.244.119
DR B Feed => Instrument Definition Refresh	54009	233.158.244.129

Table 3.4 UAT Channels

Groups	Channel port	Channel IP
C UAT Feed => Main	55000	233.158.244.130
C UAT Feed => Level 2- SSF Refresh	55001	233.158.244.131
C UAT Feed => Level 2 - Spread Refresh	55003	233.158.244.133
C UAT Feed => Level 2 – Incremental Update	55004	233.158.244.134
C UAT Feed => Level 1- SSF Refresh	55005	233.158.244.135
C UAT Feed => Level 1 - Spread Refresh	55007	233.158.244.137
C UAT Feed => Level 1 – Incremental Update	55008	233.158.244.138
C UAT Feed => Instrument Definition Refresh	55009	233.158.244.139

4.0 Message Overview

Message packets contain header and body.

4.1 Repeating Groups

Repeating group tags are denoted with a ‘→’ value preceding the field name. These may appear more than once per message, indicating all components.

4.2 Message Header

Message Header is binary encoded. The header is little endian.

Table 4.2

Field Name	Field Type	Byte Length	Notes
Message Type	char	1	See table 4.3 for valid message types.
Sequence Number	uint32_t	4	Sequenced by channel.
Sending Time	uint64_t	8	Millisecond UTC timestamp
Protobuf Size	uint32_t	2	Byte size of serialized protobuf message

4.3 Message Types

Valid message types are listed below with subsequent char values.

Table 4.3

Message Type	Value	ASCII
Exchange Summary	c	99
Good Morning	b	98
Market Data Refresh	2	50
Market Data Update	1	49
Market State Notification	a	97
Product Catalog	d	100
Heartbeat	Null	00

4.4 Message Body

Message body is a serialized GPB. See GPB Templates 5.0.

4.5 Message Descriptions

4.5.1 Good Morning

OneChicago starts each trading day by pushing out a start of day message. This is an opportunity for each consumer to confirm connectivity. The Good Morning message will be disseminated only on the main channel and will indicate a sequence reset message for all OCTP channels. In the event of a technology issue, OneChicago may reset sequence numbers intra-day. The receipt of a Good Morning serves as notice that the sequence numbers for all channels on the corresponding feed have been reset. See Message Cycles *Table 1.1*.

Table 4.5.1.1 Good Morning Structure

Field	ID	GPB Type	Comments
TradeDate	190	string	YYYY-MM-ddTHH:MM:SS UTC timestamp
Text	186	string	“OCX.TP MAIN CH, READY” or other notification text.

4.5.2 Product Catalog

Product catalog describes an OCXdelta1 market’s instrument configuration by a unique security identifier (MPSecID). In the event of technology issues, OneChicago may distribute the product catalog outside of predetermined message cycle times. See Message Cycle table 1.1. The Product Catalog message is also available over the Instrument Refresh Channel.

Table 4.5.2.1 Product Catalog Structure

Field	ID	GPB Type	Notes
Instrument	1029	InstrumentGroup	
→Symbol	183	string	SSF symbol e.g. AAPL1C
→ MPSecID	112	fixed64	OneChicago assigned SecurityID
→→ Underlying	459	string	Underlying stock ticker
→ ProductType	147	int32	14 =SSF 15 =EFP 16 =Spread
→ MaturityDate	96	string	YYYYMMdd
→ MaturityDateBack	97	string	YYYYMMdd – For calendar spreads will be populated with expiration date of back contract month. e.g. AAPL1C calendar spread Sep v Oct back month will have October expiration YYYYMMdd
→ SecuritySubType	173	int32	S = SSF

			B = Block E = EFP BS = Block Spread SS = SSF Spread
→ ProductSubType	146	int32	0 =SSF 1 = Block 2 = EFP 3 = Block Spread 4 = SSF Spread
→ OpenTime	509	string	UTC timestamp HH:mm:ss – Close time for appropriate product type. Times vary across product types.
→ CloseTime	464	string	UTC timestamp HH:mm:ss – Close time for appropriate product type. Times vary across product types.
→ StrikePrice	454	double	Option strike price
→ ContractMultiplier	61	double	OneChicago assigned contract multiplier – number of stock deliverables per futures contract.
→ PositionLimit	458	int32	OneChicago assigned position limit – represents the maximum number of contracts that anyone can carry in one instrument at any given time. -1 = Position Accountability Position Accountability: Traders who hold net positions greater than 22,500 in a contract subject to Position Accountability must provide information to the exchange and consent to halt increasing their positions when so ordered by the exchange
→ TradingStatus	195	int32	2=Halted 17=Open 18=Closed 21=Pre-open
LastMessage	701	int32	When LastMessage field is populated with 1, it signifies the end of the Product Catalogue stream.

4.5.2.1 Corporate Events

When an underlying experiences a corporate event the underlying repeating group may appear more than once per message, indicating all underlying components. For more information regarding corporate events visit our website at:

See 5.9 for sample Product catalog corporate event packet capture.

<http://www.onechicago.com/wp-content/uploads/content2011/SSF%20Corporate%20Events%20Ver%202%204.pdf>

4.5.3 Exchange Summary

Exchange summary describes the OCXdelta1 trading activity for given trading day. This message will be distributed at two distinct times each day. The first distribution of exchange summary contains the previous trading day's market information, including the official open interest for each respective market as reported by the OCC. The second distribution contains end of day summaries of the current trading day's activity, note open interest is not included in this distribution. See Message Cycle table 1.1.

Summary content is distributed by Single Stock Future (SSF) contracts, rather than tradable instrument. EFP, Block, Spread, and SSF markets are summarized within each message entry.

Table 4.5.3.1 Exchange Summary Structure

Field	ID	GPB Type	Notes
InstrumentSummary	1026	InstrumentSummaryGroup	
→Symbol	183	string	SSF symbol e.g. AAPL1C
→MaturityDate	96	string	YYYYMMdd
→SecurityType	173	string	FUT
→HighPx	442	double	High price. Across all OCX markets.
→HighPxIndicator	519	int32	Indicator for value associated with high price. Possible indicators: 9 = No Value 0 = Trade 49 = Bid Initially 'no value'; Trade Events: EFP Trade, Price of transacted SSF leg SPREAD Trade, Price of either transacted SSF legs SSF/BLOCK Trade, price of transacted

			Bid: SSF/BLOCK, price of entered bid
→ LowPx	444	double	Low price. Across all OCX markets.
→ LowPxIndicator	520	int32	Indicator for value associated with low price. Possible indicators: 9 = No Value 0 = Trade 50 = Offer Initially 'no value'; Trade Events: EFP Trade, Price of transacted SSF leg SPREAD Trade, Price of either transacted SSF legs SSF/BLOCK Trade, price of transacted Offer: SSF/BLOCK, price of entered offer
→ ClosePx	445	double	Closing price. Across all OCX markets. Last trade, that was within 60 seconds of the market close. If no trade within 60 seconds of close we use reference price.
→ ClosePxindicator	521	int32	0 = Trade 1 = Reference Price Initially 'no value'; Trade Events: EFP Trade, Price of transacted SSF leg SPREAD Trade, Price of either transacted SSF legs SSF/BLOCK Trade, price of transacted Reference Price: Theoretical price calculation at the time of close
→ OpenPx	443	double	Opening price. Across all OCX markets. First trade, that was within 60 seconds of the market open. If no trade within 60 seconds of open we use reference price.
→ OpenPxIndicator	522	int32	0 = Trade 1 = Reference Price Initially 'no value'; Trade Events:

			EFP Trade, Price of transacted SSF leg SPREAD Trade, Price of either transacted SSF legs SSF/BLOCK Trade, price of transacted Reference Price: Theoretical price calculation at the time of the open
→ SettlePx	446	double	Official exchange assigned settlement price.
→ NetChangePx	448	double	Day to day difference in settle Price
→ BlockVolume	451	int32	Total block volume - sum of all volume for block transactions on the corresponding SSF.
→ EFPVolume	450	int32	Total EFP volume - sum of all volume for EFP transactions on the corresponding SSF.
→ SSFVolume	523	int32	Total SSF volume - sum of all volume for SSF transactions on the corresponding SSF.
→ TotalVolume	449	int32	Total volume- sum of all volume that settle to the corresponding SSF.
→ OpenInterest	452	int32	Open interest for the previous trading day will come in the morning exchange summary, as it is a summation of yesterday's trading day. Summation of today's trading day shows no open interest.
TradeDate	190	string	YYYYMMdd – always today's trade date.
LastMessage	701	int32	When LastMessage field is populated with 1, it signifies the end of the Exchange Summary Message stream.

4.5.4 Market Data Refresh

Market data refresh describes quote and trade data for a given OCXdelta1 market. See Message Cycle table 1.1.

Table 4.5.4.1 Market Data Refresh Structure

Field	ID	GPB Type	Notes
Instrument	1029	InstrumentGroup	
→ MPSecID	112	fixed64	OneChicago assigned SecurityID
MDEntry	1027	MDEntryGroup	

→ EntryPrice	511	double	Level 1: With entry side bid, entry price will represent the current best bid. Additionally entry price with entry side of offer will represent the current best offer. Level 2: Price of corresponding order or trade event.
→ EntrySize	512	double	Level 1: With entry side bid, entry size will represent the current best bid. Additionally entry size with entry side of offer will represent the current best offer. Level 2: size of corresponding order or trade event.
→ EntrySide	513	int32	49 = Bid 50 = Offer
→ EntryLegPriceNear	514	double	For Calendar spreads, entry leg price near is the fair market price of the SFF associated with front leg for the spread. For EFP transactions Entry Leg price will represent the stock price.
→ EntryLegPriceFar	515	double	For Calendar spreads, entry leg price far is the fair market price of the SFF associated with back leg for the spread. For EFP transactions Entry Leg price will represent the future price.
→ SequenceNo	516	int32	For LEVEL 1 order events: Incremented on each market event affecting TOB aggregated at price level by Side Example: Refresh (Bid TOB, NO Ask TOB) SequenceNo = 1 -> Bid entered at best price SequenceNo = 2 -> Bid updated (px/qty) or another bid entered at the same price (+/- to qty) SequenceNo = 3 -> Bid canceled/filled resulting in 0 best bid qty (indicating no bid) For LEVEL 2 order events: Incremented on each market event for the corresponding order. Example: SequenceNo = 1 -> order enters market SequenceNo = 2 -> order is updated (px/qty) SequenceNo = 3 -> order is filled

			Order is cancel replaced SequenceNo = 2, Order is filled SequenceNo = 3. <i>See example 5.8 Market Data Order Life Cycle Sample</i>
→ ReferenceID	517	fixed64	The persistent ID of an individual order for the lifetime of the order. Level 2 only. For trade events, indicates the exchange assigned Trade Match ID, and will be referenced for trade bust events.
→ EntryRate	518	double	Implied rate for calendar spread orders and trades, and will be disseminated both for level 1 and level 2 order entry and trade events.
→ TransactTime	196	string	HH:mm:ss.SSS – For level 1 and level 2 order and trade events will indicate the time in which the trade or order event occurs on the OCXdelta1 match platform out to millisecond resolution. – milliseconds UTC timestamp
→ NetChangePx	448	double	Change in price on day, off of yesterday's settlement price. Only disseminated on trade events and block and SSF product subtypes.
LastPx	84	double	Last traded price.
LastQty	85	double	Last traded quantity.
LastMessage	701	int32	When LastMessage field is populated with 1, it signifies the end of the Exchange Summary Message stream.

4.5.5 Market Data Update

Market data update describes event driven (real-time) quote and trade data for a given OCXdelta1 market. See Message Cycle table 1.1.

Table 4.5.5.1 Market Data Update Structure

Field	ID	GPB Type	Notes
Instrument	1029	InstrumentGroup	
→ MPSecID	112	fixed64	OneChicago assigned SecurityID
MDEntry	1027	MDEntryGroup	
→ EntryType	510	int32	Relevant for level 2 refresh and only trade events on level 1 refresh 1 = New 2 = Update 3 = Delete

			4 = Trade 5 = Trade bust For level 2 order events you can receive new, update, delete. For trade events you will receive trade and trade bust, both on level 1 and level 2 refresh channels. Dissemination of top of book order events will not include an entry type, and should be identified via entry side.
→ EntryPrice	511	double	Level 1: With entry side bid, entry price will represent the current best bid. Additionally entry price with entry side of offer will represent the current best offer. Level 2: Price of corresponding order or trade event.
→ EntrySize	512	double	Level 1: With entry side bid, entry size will represent the current best bid. Additionally entry size with entry side of offer will represent the current best offer. Level 2: size of corresponding order or trade event.
→ EntrySide	513	int32	49 = Bid 50 = Offer
→ EntryLegPriceNear	514	double	For Calendar spreads, entry leg price near is the fair market price of the SFF associated with front leg for the spread. For EFP transactions Entry Leg price will represent the stock price.
→ EntryLegPriceFar	515	double	For Calendar spreads, entry leg price far is the fair market price of the SFF associated with back leg for the spread. For EFP transactions Entry Leg price will represent the future price.
→ SequenceNo	516	int32	For LEVEL 1 order events: Incremented on each market event affecting TOB aggregated at price level by Side Example: Refresh (Bid TOB, NO Ask TOB) SequenceNo = 1 - > Bid entered at best price SequenceNo = 2 -> Bid updated (px/qty) or another bid entered at the same price (+/- to qty) SequenceNo = 3 -> Bid canceled/filled resulting in 0 best bid qty (indicating no bid)

			For LEVEL 2 order events: Incremented on each market event for the corresponding order. Example: SequenceNo = 1 -> order enters market SequenceNo = 2 -> order is updated (px/qty) SequenceNo = 3 -> order is filled Order is cancel replaced SequenceNo = 2, Order is filled SequenceNo = 3. <i>See example 5.8 Market Data Order Life Cycle Sample</i>
→ ReferenceID	517	fixed64	The persistent ID of an individual order for the lifetime of the order, level 2 only. For trade events, indicates the exchange assigned Trade Match ID, and will be referenced for trade bust events.
→ EntryRate	518	double	Implied rate for calendar spreads orders and trades, and will be disseminated both for level 1 and level 2 order entry and trade events.
→ TransactTime	196	string	HH:mm:ss.SSS – For level 1 and level 2 order and trade events will indicate the time in which the trade or order event occurs on the OCXdelta1 match platform out to millisecond resolution.
→ NetChangePx	448	double	Change in price on day, off of yesterday's settlement price. Only disseminated on trade events and block and SSF product subtypes.

4.5.6 Market State Notifications

Market state notifications are event driven and distributed in two fashions, by OCXdelta1 product type and security identifier (MPSecID). Typical start of day and end of day market cycles notify market states by product type. Halt and resumption market states are typically notified by security identifier.

Table 4.5.6.1 Market State Notification Structure

Field	ID	GPB Type	Notes
UpdateType	524	int32	0 = Product Type 1 = Product Sub Type 2 = MPSecID
NotificationTime	801	Fixed64	Microsecond UTC timestamp from epoch

TradingStatus	195	int32	2=Halted 17=Open 18=Closed 21=Pre-open
Text	186	string	Optional Relevant message.
HaltReason	700	int32	Reason for security halt. HaltReason_REGULATORY = 1
Instrument	1029	InstrumentGroup	
→ MPSecID	112	fixed64	OneChicago assigned SecurityID

Table 4.5.5.1 Trading Sessions

Trading Status	Description
Pre-Open	For all supported OCXdelta1 tradable instruments this trading session allows bilateral trade reporting only.
Open	This trading session allows day limit order entry, order replace, order cancel, bilateral trade reporting, and price time priority order matching.
Close	This trading session prohibits any trading activity including order cancel, and bilateral trade reporting.
Halt	This trading session allows order cancel only.

4.5.7 Heartbeats

Heartbeat messages will be transmitted every 5 seconds of inactivity to every channel including main channels as a line integrity test. They will be a simple message header with Message Type 00.

4.5.8 Restarts

In the unlikely event OneChicago must restart a Ticker Plant intraday, all connected users will be notified. Working order and trade messages will be replayed in the order in which they were previously disseminated. The data transmitted in these messages will be identical to the message sent prior to the restart event.

5.0 Sample Packet Captures

5.1 Good Morning Packet Capture

```
-----  
10:45:00.863576 : PCAP: 233.158.244.10:51000  
-----
```

```
GOOD_MORNING
```

```
Packet Length : 61  
62010000 003ed748 6a4c0100 002e00d2  
0b154f43 582e5450 204d4149 4e204348  
2c205245 414459f2 0b133230 31352d30  
332d3330 5431303a 34353a30 30
```

```
Header Length : 15  
SndTm 1427712300862  
MsgType 98  
SequenceNo 1  
Size 46
```

```
Payload Length : 46  
Text: "OCX.TP MAIN CH, READY"  
TradeDate: "2015-03-30T10:45:00"  
-----
```

5.2 Product Catalog Packet Capture

15:22:17.599415 : PCAP: 233.158.244.200:58200

PRODUCT_CATALOG

Packet Length : 117

64417504	007f0af1	cd500100	006600e8
2b00aa40	60e90300	00000000	00594082
06083230	31353132	31388a06	01308107
8080ba88	037b078b	90090098	090eea0a
0153ba0b	05504550	3143980c	11d01cff
ffffffff	ffffffff	01dalc03	50455082
1d083230	3a30303a	3030ealf	0831323a
30303a30	30		

Header Length : 15

SndTm	1446564137599
MsgType	100
SequenceNo	292161
Size	102

Payload Length : 102

LastMessage: 0

Instrument {

ContractMultiplier: 100
MaturityDate: "20151218"
MaturityDateBack: "0"
MPSecID: 10018111151218000000
ProductSubType: 0
ProductType: 14
SecuritySubType: "S"
Symbol: "PEP1C"
TradingStatus: 17
PositionLimit: -1
Underlying: "PEP"
CloseTime: "20:00:00"
OpenTime: "12:00:00"

}

15:58:16.468826 : PCAP: 233.158.244.200:58200

PRODUCT_CATALOG

Packet Length : 109

64f40600	0094fb11	ce500100	005e00e8
2b00aa40	58e90300	00000000	00594082
06083230	31353132	31388a06	01308107
8060d230	4480128b	90090298	090fea0a
0145ba0b	05535449	3143980c	11d01cbc
69dalc03	53544982	1d083230	3a30303a
3030ealf	0831323a	30303a30	30

Header Length : 15

SndTm	1446566296468
MsgType	100
SequenceNo	1780
Size	94

```
Payload Length : 94
LastMessage: 0
Instrument {
  ContractMultiplier: 100
  MaturityDate: "20151218"
  MaturityDateBack: "0"
  MPSecID: 10021213151218000000
  ProductSubType: 2
  ProductType: 15
  SecuritySubType: "E"
  Symbol: "STI1C"
  TradingStatus: 17
  PositionLimit: 13500
  Underlying: "STI"
  CloseTime: "20:00:00"
  OpenTime: "12:00:00"
}
```

```
-----
13:02:59.598279 : PCAP: 233.158.244.200:58200
-----
```

PRODUCT_CATALOG

```
Packet Length : 125
64e10402 000e8271 cd500100 006e00e8
2b00aa40 68e90300 00000000 00594082
06083230 31353038 32318a06 08323031
35303931 388107c6 7053be8a 87128b90
09049809 10ea0a02 5353ba0b 05535449
3143980c 15d01cff ffffffff ffffffff
01da1c03 53544982 1d083230 3a30303a
3030ea1f 0831323a 30303a30 30
```

```
Header Length : 15
SndTm 1446555779598
MsgType 100
SequenceNo 132321
Size 110
```

```
Payload Length : 110
LastMessage: 0
Instrument {
  ContractMultiplier: 100
  MaturityDate: "20150821"
  MaturityDateBack: "20150918"
  MPSecID: 10021221150821150918
  ProductSubType: 4
  ProductType: 16
  SecuritySubType: "SS"
  Symbol: "STI1C"
  TradingStatus: 21
  PositionLimit: -1
  Underlying: "STI"
  CloseTime: "20:00:00"
  OpenTime: "12:00:00"
}
```


5.3 Exchange Summary Packet Capturs

```
-----  
11:15:08.750209 : PCAP: 233.158.244.10:51000  
-----
```

EXCHANGE_SUMMARY

```
Packet Length : 147  
63310901 004e3d2a e04f0100 008400f2  
0b083230 31353039 3138e82b 00924073  
82060832 30313531 303136ea 0a034655  
54ba0b05 4a4f4531 44d11b7b 14ae47e1  
fa3140d9 1bec51b8 1e85ab31 40e11ba4  
703d0ad7 a33140e9 1b5c8fc2 f528dc31  
40f11b5c 8fc2f528 dc314081 1c9a9999  
999999a9 3f881ce8 07901c00 981c00a0
```

```
--
```

```
TradeDate: "20150918"
```

```
LastMessage: 0
```

```
InstrumentSummary {
```

```
  MaturityDate: "20151016"
```

```
  SecurityType: "FUT"
```

```
  Symbol: "JOE1D"
```

```
  HighPx: 17.98
```

```
  OpenPx: 17.67
```

```
  LowPx: 17.64
```

```
  ClosePx: 17.86
```

```
  SettlePx: 17.86
```

```
  NetChangePx: 0.05
```

```
  TotalVolume: 1000
```

```
  EFPVolume: 0
```

```
  BlockVolume: 0
```

```
  OpenInterest: 3000
```

```
  HighPxIndicator: 49
```

```
  LowPxIndicator: 50
```

```
  ClosePxindicator: 1
```

```
  OpenPxIndicator: 0
```

```
  SSFVVolume: 1000
```

```
}
```

```
-----
```

5.4 Market Data Refresh Level 1 Packet Capture

19:27:59.056887 : PCAP: 233.158.244.117:53007

MARKET_DATA_REFRESH

Packet Length : 171

32f3a800	00ae4274	764c0100	009c00a1
05000000	00000000	00a90500	00000000
000000e8	2b009a40	39a20c15	32303135
30343031	2d31393a	32353a35	312e3030
32f91f00	00000000	00000081	20000000
00000000	00882031	b1200000	00000000
00009a40	39a20c15	32303135	30343031
2d31393a	32353a35	312e3030	32f91f00
00000000	00000081	20000000	00000000
00882032	b1200000	00000000	0000aa40
0a81079b	72749b82	7f8392	

Header Length : 15

SndTm 1427916473006

MsgType 50

SequenceNo 43251

Size 156

Payload Length : 156

LastPx: 10.23

LastQty: 180

LastMessage: 0

MDEntry {

TransactTime: "20150401-19:25:51.002"

EntryPrice: 10

EntrySize: 5

EntrySide: 49

EntryRate: 0

}

MDEntry {

TransactTime: "20150401-19:25:51.002"

EntryPrice: 10.5

EntrySize: 10

EntrySide: 50

EntryRate: 0

}

Instrument {

MPSecID: 10557422150417150619

}

19:27:59.056887 : PCAP: 233.158.244.117:53007

MARKET_DATA_REFRESH

Packet Length : 202

324a710f	006d6099	cd500100	00ca00a1
05000000	00000000	00a90500	00000000
000000e8	2b009a40	50a20c15	32303135
31313033	2d31333a	34303a31	302e3430
32f91f9a	99999999	99c93f81	20000000
00000024	40882031	91208a8e	e4f21f4a

```

5e409920 575bb1bf ec565e40 a02008b1
20daab8f 87bebb95 3f9a4050 a20c1532
30313531 3130332d 31333a34 313a3331
2e383635 f91f4725 75029a08 d33f8120
00000000 00002440 88203291 208a8ee4
f21f4a5e 409920b0 03e78c28 5d5e40a0
2001b120 9b38b9df a128a03f aa400a81
07c6f00a 3a27ecc7 8a

Header Length   : 15
SndTm           : 1446558392429
MsgType         : 50
Seq             : 1012042
Sz              : 202

LastPx: 0
LastQty: 0
LastMessage: 0
MDEntry {
  TransactTime: "20151103-13:40:10.402"
  EntryPrice: 0.2
  EntrySize: 10
  EntrySide: 49
  EntryLegPriceNear: 121.1582
  EntryLegPriceFar: 121.3582
  SequenceNo: 8
  EntryRate: 0.021224
}
MDEntry {
  TransactTime: "20151103-13:41:31.865"
  EntryPrice: 0.29740000000000005
  EntrySize: 10
  EntrySide: 50
  EntryLegPriceNear: 121.1582
  EntryLegPriceFar: 121.4556
  SequenceNo: 1
  EntryRate: 0.03156
}
Instrument {
  MPSecID: 10000221150821150918
}

```

5.4 Market Data Refresh Level 2 Packet Capture

```
-----  
19:27:59.056887 : PCAP: 233.158.244.113:53003  
-----
```

```
MARKET_DATA_REFRESH
```

```
Packet Length : 474  
3242985c 008a637a 474f0100 00da01a1  
05000000 00000000 00a90500 00000000  
000000e8 2b009a40 46a20c15 32303135  
30383139 2d31393a 33363a35 392e3337  
33f91f29 5c8fc2f5 28cc3f81 20000000  
00000014 40882032 a02001a9 20067af9  
e5c038be 8eb12001 8750a566 0f943f9a  
4046a20c 15323031 35303831 392d3139  
3a33363a 34332e34 3039f91f 295c8fc2  
f528cc3f 81200000 00000000 14408820  
32a02001 a920057a f9e5c038 be8eb120  
018750a5 660f943f 9a4046a2 0c153230  
31353038 31392d31 393a3336 3a33332e  
353033f9 1f295c8f c2f528cc 3f812000  
00000000 00144088 2032a020 01a92004  
7af9e5c0 38be8eb1 20018750 a5660f94  
3f9a4046 a20c1532 30313530 3831392d  
31393a33 363a3235 2e333939 f91fe27a  
14ae47e1 ca3f8120 00000000 00002440  
882032a0 2001a920 037af9e5 c038be8e  
b12012a5 bdc11726 933f9a40 46a20c15  
32303135 30383139 2d31393a 33363a31  
352e3734 35f91fb1 726891ed 7cbf3f81  
20000000 00000014 40882031 a02001a9  
20027af9 e5c038be 8eb12085 3e58c686  
6e863f9a 4046a20c 15323031 35303831  
392d3139 3a33363a 31322e36 3030f91f  
b1726891 ed7cbf3f 81200000 00000000  
14408820 31a02001 a920017a f9e5c038  
be8eb120 853e58c6 866e863f aa400a81  
0765c637 f7e338be 8e
```

```
Header Length : 15  
SndTm 1427916473006  
MsgType 50  
SequenceNo 43251  
Size 156
```

```
Payload Length : 459  
LastPx: 0  
LastQty: 0  
LastMessage: 0  
MDEntry {  
    TransactTime: "20150819-19:36:59.373"  
    EntryPrice: 0.22  
    EntrySize: 5  
    EntrySide: 50  
    SequenceNo: 1  
    ReferenceID: 10285721000104000006  
    EntryRate: 0.01959  
}  
MDEntry {  
    TransactTime: "20150819-19:36:43.409"
```

```

    EntryPrice: 0.22
    EntrySize: 5
    EntrySide: 50
    SequenceNo: 1
    ReferenceID: 10285721000104000005
    EntryRate: 0.01959
  }
  MDEntry {
    TransactTime: "20150819-19:36:33.503"
    EntryPrice: 0.22
    EntrySize: 5
    EntrySide: 50
    SequenceNo: 1
    ReferenceID: 10285721000104000004
    EntryRate: 0.01959
  }
  MDEntry {
    TransactTime: "20150819-19:36:25.399"
    EntryPrice: 0.210000000000000002
    EntrySize: 10
    EntrySide: 50
    SequenceNo: 1
    ReferenceID: 10285721000104000003
    EntryRate: 0.0187
  }
  MDEntry {
    TransactTime: "20150819-19:36:15.745"
    EntryPrice: 0.123000000000000001
    EntrySize: 5
    EntrySide: 49
    SequenceNo: 1
    ReferenceID: 10285721000104000002
    EntryRate: 0.010953
  }
  MDEntry {
    TransactTime: "20150819-19:36:12.600"
    EntryPrice: 0.123000000000000001
    EntrySize: 5
    EntrySide: 49
    SequenceNo: 1
    ReferenceID: 10285721000104000001
    EntryRate: 0.010953
  }
  Instrument {
    MPSecID: 10285721150717150821
  }

```

```

-----
19:27:59.056887 : PCAP: 233.158.244.113:53003
-----

```

MARKET_DATA_REFRESH

```

Packet Length : 315
32b6db0e 00b1ae95 cd500100 003b01a1
05000000 00000000 00a90500 00000000
000000e8 2b009a40 5aa20c15 32303135
31313033 2d31333a 34313a33 312e3836
35f91f47 2575029a 08d33f81 20000000
00000024 40882032 91208a8e e4f21f4a
5e409920 af03e78c 285d5e40 a02001a9
2047ea2e 2204ecc7 8ab1209b 38b9dfa1
28a03f9a 405aa20c 15323031 35313130

```

```

332d3133 3a34313a 32322e32 3431f91f
b1726891 ed7cbf3f 81200000 00000000
14408820 3191208a 8ee4f21f 4a5e4099
20a7e848 2eff515e 40a02001 a92046ea
2e2204ec c78ab120 8be1ea00 88bb8a3f
9a405aa2 0c153230 31353131 30332d31
333a3430 3a31302e 343032f9 1f9a9999
999999c9 3f812000 00000000 00244088
20319120 8a8ee4f2 1f4a5e40 9920575b
b1bfec56 5e40a020 01a92045 ea2e2204
ecc78ab1 20daab8f 87bebb95 3faa400a
8107c6f0 0a3a27ec c78a

Header Length : 15
SndTm         : 1446558089817
MsgType       : 50
MsgType       : 50
Seq           : 973750
Sz            : 315

LastPx: 0
LastQty: 0
LastMessage: 0
MDEntry {
  TransactTime: "20151103-13:41:31.865"
  EntryPrice: 0.297400000000000005
  EntrySize: 10
  EntrySide: 50
  EntryLegPriceNear: 121.1582
  EntryLegPriceFar: 121.45559999999999
  SequenceNo: 1
  ReferenceID: 10000221000097000007
  EntryRate: 0.03156
}
MDEntry {
  TransactTime: "20151103-13:41:22.241"
  EntryPrice: 0.123000000000000001
  EntrySize: 5
  EntrySide: 49
  EntryLegPriceNear: 121.1582
  EntryLegPriceFar: 121.2812
  SequenceNo: 1
  ReferenceID: 10000221000097000006
  EntryRate: 0.013053
}
MDEntry {
  TransactTime: "20151103-13:40:10.402"
  EntryPrice: 0.2
  EntrySize: 10
  EntrySide: 49
  EntryLegPriceNear: 121.1582
  EntryLegPriceFar: 121.3582
  SequenceNo: 1
  ReferenceID: 10000221000097000005
  EntryRate: 0.021224
}
Instrument {
  MPSecID: 10000221150821150918
}

```

5.5 Market Data Update Packet Capture

```
-----  
13:07:26.031569 : PCAP: 233.158.244.204:58204  
-----
```

MARKET_DATA_UPDATE

```
Packet Length : 104  
31ad0600 00cf9275 cd500100 0059009a  
4049a20c 15323031 35313130 332d3133  
3a30373a 32362e30 3331f01f 01f91f00  
00000000 405e4081 20000000 00000014  
40882031 a02001a9 2041d7e7 73e7e3c7  
8ab12000 00000000 000000aa 400a8107  
40133bc0 f7e3c78a
```

```
Header Length : 15  
SndTm 1446556046031  
MsgType 49  
SequenceNo 1709  
Size 89
```

```
Payload Length : 89  
MDEntry {  
  TransactTime: "20151103-13:07:26.031"  
  EntryType: 1  
  EntryPrice: 121  
  EntrySize: 5  
  EntrySide: 49  
  SequenceNo: 1  
  ReferenceID: 10000212080821000001  
  EntryRate: 0  
}  
Instrument {  
  MPSecID: 10000212150821000000  
}
```

```
-----  
13:06:32.841574 : PCAP: 233.158.244.204:58204  
-----
```

MARKET_DATA_UPDATE

```
Packet Length : 124  
31a20600 0009c374 cd500100 006d009a  
405da20c 15323031 35313130 332d3133  
3a30363a 33322e38 3430f01f 01f91faa  
f1d24d62 10d03f81 20000000 00000024  
40882031 91208a8e e4f21f4a 5e409920  
7c613255 305a5e40 a02001a9 2041ea2e  
2204ecc7 8ab12022 c495b377 469b3faa  
400a8107 c6f00a3a 27ecc78a
```

```
Header Length : 15  
SndTm 1446555992841  
MsgType 49  
SequenceNo 1698  
Size 109
```

```
Payload Length : 109
MDEntry {
  TransactTime: "20151103-13:06:32.840"
  EntryType: 1
  EntryPrice: 0.251
  EntrySize: 10
  EntrySide: 49
  EntryLegPriceNear: 121.1582
  EntryLegPriceFar: 121.4092
  SequenceNo: 1
  ReferenceID: 10000221000097000001
  EntryRate: 0.026636
}
Instrument {
  MPSecID: 10000221150821150918
}
-----
```


5.6 Market State Notification Packet Capture

```
-----  
13:30:04.960517 : PCAP: 233.158.244.10:51000  
-----
```

MARKET_STATE_NOTIFICATION

```
Packet Length : 41  
61fa4103 00bfe9df 6a4c0100 001a0098  
0c118932 94d9a67a 81120500 aa400a81  
07408652 dda215e3 90
```

```
Header Length : 15  
SndTm 1427722201535  
MsgType 97  
SequenceNo 213498  
Size 26
```

```
Payload Length : 26  
TradingStatus: 17  
NotificationTime: 1427722201389460  
Instrument {  
    MPSecID: 10440212150417000000  
}
```

5.7 Heartbeat Packet Capture

```
-----  
19:27:25.884133 : PCAP: 233.158.244.110:53000  
-----
```

HEARTBEAT

```
Packet Length : 15  
00140000 00bcd873 764c0100 000000
```

```
Header Length : 15  
SndTm 1427916445884  
MsgType 0  
SequenceNo 20  
Size 0
```

```
Payload Length : 0  
-----
```

5.8 Market Data Order Life Cycle Sample

```
#####
(1)    1 Bid event (enter 10 @ $128.50) ( incr not shown )
(2)    1 Bid event (enter 10 @ $128.50) ( incr not shown )
(3)    1 Bid event (enter 10 @ $128.50)
#####
```

LEVEL 1 Incremental

```
-----
SndTm      =1435072298112
MsgType    =49
Seq        =32
Sz         =76
MDEntry {
  TransactTime: "20150623-15:11:38.113"
  EntryPrice: 128.5
  EntrySize: 30
  EntrySide: 49
  SequenceNo: 3
  EntryRate: 0.021931
}
Instrument {
  MPSecID: 10000211151218000000
}

31 20 00 00 00 80 7c f9 20 4e 01 00 00 4c 00 9a
40 3c a2 0c 15 32 30 31 35 30 36 32 33 2d 31 35
3a 31 31 3a 33 38 2e 31 31 33 f9 1f 00 00 00 00
00 10 60 40 81 20 00 00 00 00 00 00 3e 40 88 20
31 a0 20 03 b1 20 96 05 13 7f 14 75 96 3f aa 40
0a 81 07 80 c0 3f 03 0f e3 c7 8a
-----
```

LEVEL 1 SSF Refresh

```
-----
SndTm      =1435072331017
MsgType    =50
Seq        =1697361
Sz         =162
LastPx: 0
LastQty: 0
LastMessage: 0
MDEntry {
  TransactTime: "20150623-15:11:38.113"
  EntryPrice: 128.5
  EntrySize: 30
  EntrySide: 49
  SequenceNo: 3
  EntryRate: 0.021931
}
MDEntry {
  TransactTime: "20150623-12:00:00.000"
  EntryPrice: 0
  EntrySize: 0
  EntrySide: 50
  SequenceNo: 0
  EntryRate: 0
}
Instrument {
  MPSecID: 10000211151218000000
}
}
```

```
32 51 e6 19 00 09 fd f9 20 4e 01 00 00 a2 00 a1
05 00 00 00 00 00 00 00 00 00 a9 05 00 00 00 00 00
00 00 00 e8 2b 00 9a 40 3c a2 0c 15 32 30 31 35
30 36 32 33 2d 31 35 3a 31 31 3a 33 38 2e 31 31
33 f9 1f 00 00 00 00 00 00 10 60 40 81 20 00 00 00
00 00 00 3e 40 88 20 31 a0 20 03 b1 20 96 05 13
7f 14 75 96 3f 9a 40 3c a2 0c 15 32 30 31 35 30
36 32 33 2d 31 32 3a 30 30 3a 30 30 2e 30 30 30
f9 1f 00 00 00 00 00 00 00 00 81 20 00 00 00 00
00 00 00 00 88 20 32 a0 20 00 b1 20 00 00 00 00
00 00 00 00 aa 40 0a 81 07 80 c0 3f 03 0f e3 c7
8a
```

```
#####
(1)      1 Ask event (enter 10 @ $128.51)
#####
```

LEVEL 1 Incremental

```
-----
SndTm      =1435072584896
MsgType     =49
Seq         =89
Sz          =76
MDEntry {
  TransactTime: "20150623-15:16:24.896"
  EntryPrice: 128.51
  EntrySize: 10
  EntrySide: 50
  SequenceNo: 1
  EntryRate: 0.02209
}
Instrument {
  MPSecID: 10000211151218000000
}
```

```
31 59 00 00 00 c0 dc fd 20 4e 01 00 00 4c 00 9a
40 3c a2 0c 15 32 30 31 35 30 36 32 33 2d 31 35
3a 31 36 3a 32 34 2e 38 39 36 f9 1f b8 1e 85 eb
51 10 60 40 81 20 00 00 00 00 00 00 24 40 88 20
32 a0 20 01 b1 20 90 49 46 ce c2 9e 96 3f aa 40
0a 81 07 80 c0 3f 03 0f e3 c7 8a
```

LEVEL 1 SSF Refresh

```
-----
SndTm      =1435072693183
MsgType     =50
Seq         =5334345
Sz          =162
LastPx: 0
LastQty: 0
LastMessage: 0
MDEntry {
  TransactTime: "20150623-15:11:38.113"
  EntryPrice: 128.5
  EntrySize: 30
  EntrySide: 49
  SequenceNo: 3
  EntryRate: 0.021931
}
MDEntry {
```

```

    TransactTime: "20150623-15:16:24.896"
    EntryPrice: 128.51
    EntrySize: 10
    EntrySide: 50
    SequenceNo: 1
    EntryRate: 0.02209
}
Instrument {
    MPSecID: 10000211151218000000
}

32 49 65 51 00 bf 83 ff 20 4e 01 00 00 a2 00 a1
05 00 00 00 00 00 00 00 00 00 a9 05 00 00 00 00 00
00 00 00 e8 2b 00 9a 40 3c a2 0c 15 32 30 31 35
30 36 32 33 2d 31 35 3a 31 31 3a 33 38 2e 31 31
33 f9 1f 00 00 00 00 00 10 60 40 81 20 00 00 00
00 00 00 3e 40 88 20 31 a0 20 03 b1 20 96 05 13
7f 14 75 96 3f 9a 40 3c a2 0c 15 32 30 31 35 30
36 32 33 2d 31 35 3a 31 36 3a 32 34 2e 38 39 36
f9 1f b8 1e 85 eb 51 10 60 40 81 20 00 00 00 00
00 00 24 40 88 20 32 a0 20 01 b1 20 90 49 46 ce
c2 9e 96 3f aa 40 0a 81 07 80 c0 3f 03 0f e3 c7
8a
-----

#####
(4)      1 Bid event (cancel 10 @ $128.50)
#####

LEVEL 1 Incremental
-----
SndTm      =1435072786765
MsgType     =49
Seq         =129
Sz          =76
MDEntry {
    TransactTime: "20150623-15:11:38.113"
    EntryPrice: 128.5
    EntrySize: 20
    EntrySide: 49
    SequenceNo: 4
    EntryRate: 0.021931
}
Instrument {
    MPSecID: 10000211151218000000
}

31 81 00 00 00 00 4d f1 00 21 4e 01 00 00 4c 00 9a
40 3c a2 0c 15 32 30 31 35 30 36 32 33 2d 31 35
3a 31 31 3a 33 38 2e 31 31 33 f9 1f 00 00 00 00
00 10 60 40 81 20 00 00 00 00 00 00 34 40 88 20
31 a0 20 04 b1 20 96 05 13 7f 14 75 96 3f aa 40
0a 81 07 80 c0 3f 03 0f e3 c7 8a
-----

LEVEL 1 SSF Refresh
-----
SndTm      =1435072981078
MsgType     =50
Seq         =8225281
Sz          =162
LastPx: 0
LastQty: 0

```

```

LastMessage: 0
MDEntry {
  TransactTime: "20150623-15:11:38.113"
  EntryPrice: 128.5
  EntrySize: 20
  EntrySide: 49
  SequenceNo: 4
  EntryRate: 0.021931
}
MDEntry {
  TransactTime: "20150623-15:16:24.896"
  EntryPrice: 128.51
  EntrySize: 10
  EntrySide: 50
  SequenceNo: 1
  EntryRate: 0.02209
}
Instrument {
  MPSecID: 10000211151218000000
}

32 01 82 7d 00 56 e8 03 21 4e 01 00 00 a2 00 a1
05 00 00 00 00 00 00 00 00 00 a9 05 00 00 00 00 00
00 00 00 e8 2b 00 9a 40 3c a2 0c 15 32 30 31 35
30 36 32 33 2d 31 35 3a 31 31 3a 33 38 2e 31 31
33 f9 1f 00 00 00 00 00 10 60 40 81 20 00 00 00
00 00 00 34 40 88 20 31 a0 20 04 b1 20 96 05 13
7f 14 75 96 3f 9a 40 3c a2 0c 15 32 30 31 35 30
36 32 33 2d 31 35 3a 31 36 3a 32 34 2e 38 39 36
f9 1f b8 1e 85 eb 51 10 60 40 81 20 00 00 00 00
00 00 24 40 88 20 32 a0 20 01 b1 20 90 49 46 ce
c2 9e 96 3f aa 40 0a 81 07 80 c0 3f 03 0f e3 c7
8a
-----

#####
(5)    1 Bid event (cancel 10 @ $128.50) ( incr not shown )
(6)    1 Bid event (cancel 10 @ $128.50)
#####

LEVEL 1 Incremental
-----
SndTm      =1435073053319
MsgType     =49
Seq         =183
Sz          =76
MDEntry {
  TransactTime: "20150623-15:24:13.320"
  EntryPrice: 0
  EntrySize: 0
  EntrySide: 49
  SequenceNo: 6
  EntryRate: 0
}
Instrument {
  MPSecID: 10000211151218000000
}

31 b7 00 00 00 87 02 05 21 4e 01 00 00 4c 00 9a
40 3c a2 0c 15 32 30 31 35 30 36 32 33 2d 31 35
3a 32 34 3a 31 33 2e 33 32 30 f9 1f 00 00 00 00
00 00 00 00 81 20 00 00 00 00 00 00 00 88 20
31 a0 20 06 b1 20 00 00 00 00 00 00 00 00 aa 40

```

0a 81 07 80 c0 3f 03 0f e3 c7 8a

LEVEL 1 SSF Refresh

SndTm =1435073106465
MsgType =50
Seq =9484237
Sz =162
LastPx: 0
LastQty: 0
LastMessage: 0
MDEntry {
 TransactTime: "20150623-15:24:13.320"
 EntryPrice: 0
 EntrySize: 0
 EntrySide: 49
 SequenceNo: 6
 EntryRate: 0
}
MDEntry {
 TransactTime: "20150623-15:16:24.896"
 EntryPrice: 128.51
 EntrySize: 10
 EntrySide: 50
 SequenceNo: 1
 EntryRate: 0.02209
}
Instrument {
 MPSecID: 10000211151218000000
}

32 cd b7 90 00 21 d2 05 21 4e 01 00 00 a2 00 a1
05 00 00 00 00 00 00 00 00 00 a9 05 00 00 00 00 00
00 00 00 e8 2b 00 9a 40 3c a2 0c 15 32 30 31 35
30 36 32 33 2d 31 35 3a 32 34 3a 31 33 2e 33 32
30 f9 1f 00 00 00 00 00 00 00 00 81 20 00 00 00
00 00 00 00 00 88 20 31 a0 20 06 b1 20 00 00 00
00 00 00 00 00 9a 40 3c a2 0c 15 32 30 31 35 30
36 32 33 2d 31 35 3a 31 36 3a 32 34 2e 38 39 36
f9 1f b8 1e 85 eb 51 10 60 40 81 20 00 00 00 00
00 00 24 40 88 20 32 a0 20 01 b1 20 90 49 46 ce
c2 9e 96 3f aa 40 0a 81 07 80 c0 3f 03 0f e3 c7
8a

(2) 1 Ask event (cancel 10 @ \$128.51)
#####

LEVEL 1 Incremental

[2015-06-23 15:25:44.144067] :
channel =233.158.244.188:58008
SndTm =1435073144142
MsgType =49
Seq =201
Sz =76
MDEntry {
 TransactTime: "20150623-15:25:44.143"
 EntryPrice: 0
 EntrySize: 0
 EntrySide: 50

```

SequenceNo: 2
EntryRate: 0
}
Instrument {
  MPSecID: 10000211151218000000
}

31 c9 00 00 00 4e 65 06 21 4e 01 00 00 4c 00 9a
40 3c a2 0c 15 32 30 31 35 30 36 32 33 2d 31 35
3a 32 35 3a 34 34 2e 31 34 33 f9 1f 00 00 00 00
00 00 00 00 81 20 00 00 00 00 00 00 00 00 88 20
32 a0 20 02 b1 20 00 00 00 00 00 00 00 00 00 aa 40
0a 81 07 80 c0 3f 03 0f e3 c7 8a
-----

LEVEL 1 SSF Refresh
-----
SndTm      =1435073201658
MsgType    =50
Seq        =10440111
Sz         =162
LastPx: 0
LastQty: 0
LastMessage: 0
MDEntry {
  TransactTime: "20150623-15:24:13.320"
  EntryPrice: 0
  EntrySize: 0
  EntrySide: 49
  SequenceNo: 6
  EntryRate: 0
}
MDEntry {
  TransactTime: "20150623-15:25:44.143"
  EntryPrice: 0
  EntrySize: 0
  EntrySide: 50
  SequenceNo: 2
  EntryRate: 0
}
Instrument {
  MPSecID: 10000211151218000000
}

32 af 4d 9f 00 fa 45 07 21 4e 01 00 00 a2 00 a1
05 00 00 00 00 00 00 00 00 a9 05 00 00 00 00 00
00 00 00 e8 2b 00 9a 40 3c a2 0c 15 32 30 31 35
30 36 32 33 2d 31 35 3a 32 34 3a 31 33 2e 33 32
30 f9 1f 00 00 00 00 00 00 00 00 81 20 00 00 00
00 00 00 00 00 88 20 31 a0 20 06 b1 20 00 00 00
00 00 00 00 00 9a 40 3c a2 0c 15 32 30 31 35 30
36 32 33 2d 31 35 3a 32 35 3a 34 34 2e 31 34 33
f9 1f 00 00 00 00 00 00 00 00 81 20 00 00 00 00
00 00 00 00 88 20 32 a0 20 02 b1 20 00 00 00 00
00 00 00 00 aa 40 0a 81 07 80 c0 3f 03 0f e3 c7
8a
-----

```

5.9 Corporate Event Packet Capture

```
-----  
11:01:00.648984 : PCAP: 233.158.244.10:51000  
-----
```

PRODUCT_CATALOG

```
Packet Length : 116  
640ef000 006830fa 3e4e0100 006500e8  
2b00aa40 5fe90300 00000000 00594082  
06083230 31353132 31388a06 01308107  
80905f32 45db809d 90090198 090eea0a  
0142ba0b 06474f4f 47324398 0c12d01c  
bc69da1c 06555343 415348da 1c04474f  
4f47821d 06323130 303030ea 1f063132  
30303030
```

```
Header Length : 15  
SndTm          1435575660648  
MsgType        100  
SequenceNo     61454  
Size           101
```

```
Payload Length : 101  
LastMessage: 0  
Instrument {  
  ContractMultiplier: 100  
  MaturityDate: "20151218"  
  MaturityDateBack: "0"  
  MPSecID: 11349312151218000000  
  ProductSubType: 1  
  ProductType: 14  
  SecuritySubType: "B"  
  Symbol: "GOOG2C"  
  TradingStatus: 18  
  PositionLimit: 13500  
  Underlying: "USCASH"  
  Underlying: "GOOG"  
  CloseTime: "210000"  
  OpenTime: "120000"  
}
```


6.0 GPB Templates

Visit <ftp://www.onechicago.com> for relevant proto file template

6.1 Good Morning

```
message GoodMorning
{
  optional string TradeDate = 190;
  optional string Text = 186;
}
```

6.2 Product Catalog

```
message ProductCatalog
{
  optional InstrumentGroup Instrument = 1029;
    optional string Symbol = 183;
    optional fixed64 MPID = 112;
    repeated string Underlying = 459;
    optional int32 ProductType = 147;
    optional string MaturityDate = 96;
    optional string MaturityDateBack = 97;
    optional string SecuritySubType = 173;
    optional int32 ProductSubType = 146;
    optional string OpenTime = 509;
    optional string CloseTime = 464;
    optional double StrikePrice = 454;
    optional double ContractMultiplier = 61;
    optional int32 PositionLimit = 458;
    optional int32 TradingStatus = 195;
  optional int32 LastMessage = 701;
}
```

6.3 Exchange Summary

```
message ExchangeSummary
{
  optional InstrumentSummaryGroup InstrumentSummary = 1026;
    optional string Symbol = 183;
    optional string MaturityDate = 96;
    optional string SecurityType = 173;
    optional double HighPx = 442;
    optional int32 HighPxIndicator = 519;
    optional double LowPx = 444;
    optional int32 LowPxIndicator = 520;
    optional double ClosePx = 445;
    optional int32 ClosePxIndicator = 521;
    optional double OpenPx = 443;
    optional int32 OpenPxIndicator = 522;
    optional double SettlePx = 446;
    optional double NetChangePx = 448;
    optional int32 BlockVolume = 451;
    optional int32 EFPVolume = 450;
    optional int32 SSFVolume = 523;
    optional int32 TotalVolume = 449;
  optional int32 OpenInterest = 452; optional string TradeDate = 190;
  optional int32 LastMessage = 701;
}
```

6.4 Market Data Refresh

```
message MarketDataRefresh
{
optional InstrumentGroup Instrument = 1029;
    optional fixed64 MPSecID = 112;
repeated MDEntryGroup MDEntry = 1026;
    optional int32 EntryType = 510;
    optional double EntryPrice = 511;
    optional double EntrySize = 512;
    optional int32 EntrySide = 513;;
    optional double EntryLegPriceNear = 514;
    optional double EntryLegPriceFar = 515;
    optional int32 SequenceNo = 516;
    optional fixed64 ReferenceID = 517;
    optional double EntryRate = 518;
    optional string TransactTime = 196;
    optional double NetChangePx = 448;
optional double LastPx = 84;
optional double LastQty = 85;
optional int32 LastMessage = 701;
}
```

6.5 Market Data Update

```
message MarketDataUpdate
{
optional InstrumentGroup Instrument = 1029;6
    optional fixed64 MPSecID = 112;
repeated MDEntryGroup MDEntry = 1026;
    optional int32 EntryType = 510;
    optional double EntryPrice = 511;
    optional double EntrySize = 512;
    optional int32 EntrySide = 513;;
    optional double EntryLegPriceNear = 514;
    optional double EntryLegPriceFar = 515;
    optional int32 SequenceNo = 516;
    optional fixed64 ReferenceID = 517;
    optional double EntryRate = 518;
    optional string TransactTime = 196;
    optional double NetChangePx = 448;
}
```

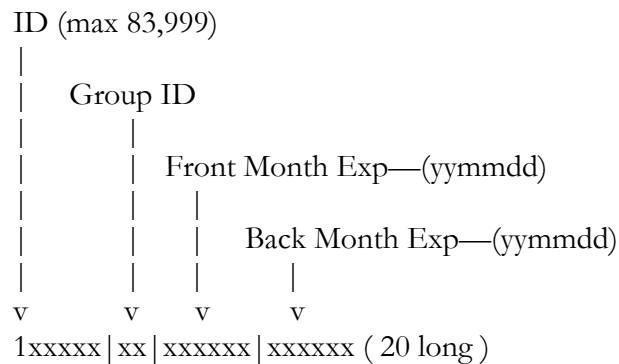
6.6 Market State Notification

```
message MarketStateNotification
{
optional int32 UpdateType = 524;
optional fixed64 NotificationTime = 801;
optional int32 TradingStatus = 195;
optional string Text = 186;
optional int32 HaltReason = 700;
optional InstrumentGroup Instrument = 1029;
    optional fixed64 MPSecID = 112;
optional double ContractMultiplier }
```

7.0 Dissecting the OCXdelta1 MPSecID

OCXdelta1 utilizes proprietary Market Place Security ID's (MPSecID) to identify tradable instruments. MPSecID's are used in all trading, and market data on OCXdelta1. The construction of a MPSecID can be seen below.

7.1 Breakdown



Id values would correspond to product type (i.e. AAPL1C/AAPL1D/ AAPL3H). Group id will distinguish the product subtype. Valid values:

- 11 = SSF
- 12 = Block
- 13 = EFP
- 21 = SSF spread
- 22 = block spread

7.2 Sample MPSecID breakdown

MPSecID – 10000211140815000000

Id = 100002 – **AAPL1C**

Group ID = 11 – **SSF**

Front Month Exp = 140815 – **August 15th, 2014**

Back Month Exp = 000000 – **No back month, not spread**