Market Data Solutions

Equities Feed

Specification

Version 2.2

19 March 2015

Template version 4.3

Document History

VERSION	DATE	SUMMARY OF CHANGES
1.0	2014-05-19	First draft
1.1	2014-08-05	Add Trading Schedule [s] message Add Orderbook Restrictions message [k] Change msg Ids: [E] to [e], [C] to [c], [Q] to [p], [F] to [f], [X] to [O] Consolidate Trade Indicator field on [q] message Remove Quote Level field from [O] message for top of book Change FirmId in [N] message to an Alpha field Rename ITCH® BBO feed to ITCH® Basic with Last Sale, and added Trade [p] message Reduced all individual quantity fields from 8 bytes to 4 Moved ‘Halt’ indication from [S] msg to [H] msg Consolidated fields in [Y] message
1.2	2014-09-04	Reinstate [C], [E], [P] messages for when Broker Anonymity is enforced Add Ownership Rule ID field to [f] message Add detail to [k] message fields Update reference data descriptions [H] msg now sent for all orderbooks at start of day Restore quantity fields to 8 bytes
1.2.1	2014-09-11	Add reference price update to [O] message
1.2.2	2014-10-09	Add iNav News Feed

2.0	2014-11-18	Removed the following messages from the ITCH® Index and News feed: Trading Schedule Price Tick Size Quantity Tick Size Orderbook Restrictions Orderbook Trading Action
2.1	2015-03-02	Added Company Disclosures and Exchange Notices News Feed Added 'B' Short Sell Eligible field value to [k] msg Clarified description of [Y] msg Weight field Clarified session behaviour descriptions (Table 4). ITCH® copyright and registered trademark added throughout document.
2.2	2015-03-19	Updated description of [N] msg NewsId field to indicate 0 if not set.

Contents

Tables

1 Context

1.1 Intended Audience

This document is intended for

- NASDAQ OMX technical staff
- Philippines Stock Exchange technical staff

1.2 Business Context

X-stream provides support for the standard INET protocols. The document will cover market data dissemination. ITCH® is an efficient way of distributing market data in terms of bandwidth required.

1.3 Requirements

The INET ITCH® protocol is widely used and considered an industry standard. This standard is ideal for a low latency messaging. X-stream should adhere, as closely as possible, to the latest published versions of both this fixed width message definitions.

The point-to-point transport layer for ITCH® payloads will be SoupBinTCP. Details on this protocol can be found at the following link:

https://www.nasdaqtrader.com/content/technicalsupport/specifications/dataproducts/soupbintcp.pdf

SoupBinTCPv3.0 is required as it supports binary types in the payload. Binary types are employed in the latest ITCH® and OUCH standards so required for X-stream.

The transport for one-to-many distribution of ITCH® market data is MoldUDP64. The Mold protocol provides a sequenced and recoverable UDP multicast stream.

Note: For added security, X-stream enforces case sensitivity on all usernames and passwords used in the SoupBinTCP Login Request Packet ‘L’.

2 ITCH® Data Types

Table 1 – ITCH® Data Types

DATA TYPE	DESCRIPTION
Alpha	Left justified and right padded.
Null-Terminated Alpha	Left justified null terminated, i.e. variable length. Maximum length includes the null character.
Integer	Unsigned big-endian binary encoded.

2.1 Price Decimals

The number of Price Decimals in use for each orderbook is sent in the Orderbook Directory Message [R] push at the start of the day. When a price value is received as an Integer in messages for that orderbook, the following formula must then be used to determine the Price:

$\mathbf{Price = Integer / 10^{PriceDecimals}}$

3 ITCH® Messages

This section describes the messages used by the ITCH® market data feeds generated by X-stream.

Table 2 – ITCH® Time Stamp – Seconds Message [T]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"T"	Time Stamp -Seconds Message Id.
Second	1	4	Integer	Number of seconds since midnight.

Table 3 – ITCH® System Event Message [S]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"S"	System Event Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Group	5	8	Alpha	Id for symbol grouping (Board level only). "N" = Normal "O" = Oddlot "I" = Index Left blank if the event is at System level or Orderbook level.
Event Code	13	1	Alpha	Event Code. Refer to System Event codes in table below.
Orderbook	14	4	Integer	Used to identify if the event applies to a single orderbook within the Group. Orderbook Code set to 0 if the event applies at a System level or Group level.

Table 4 – System Event Codes

SYSTEM EVENT CODE	EXPLANATION	ORDER ENTRY	ORDER AMEND & CANCEL	TRADING
‘O’	Start of Messages. This is the first message sent.	N	N	N
‘S’	Start of System Hours. The Pre-Open Session commences.	Y*	Y*	N
‘R’	Pre-Open No Cancellation period.	Y*	N	N
‘Q’	Start of Market Hours. The Pre-Open uncross occurs, and continuous trading begins.	Y	Y	Y
‘A’	The scheduled Break in trading begins.	N	N	N
‘B’	The scheduled Break in trading ends.	Y	Y	Y
‘L’	Pre-Close commences.	Y*	Y*	N
‘J’	Pre-Close No Cancellation period.	Y*	N	N
‘P’	Trading At Last. The Closing Auction uncross occurs, and traders can then enter limit orders for execution at the determined closing price. Trades can only occur at this price.	Y*	N	Y*
‘M’	End Of Market Hours.	N	N	N
‘E’	End Of Trading. It indicates that the Exchange is closed.	N	N	N
‘C’	End of System Messages. Last message sent.	N	N	N

* Normal board only

Table 5 – ITCH® Trading Schedule Message [s]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“s”	Trading Schedule Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Group	5	8	Alpha	Id for symbol grouping (Board level only). “N” = Normal “O” = Oddlot “I” = Index Left blank if the event is at System level or Orderbook level.
Event Code	13	1	Alpha	Event Code. Refer to System Event codes in Table 4.
Orderbook	14	4	Integer	Used to identify if the event applies to a single orderbook within the Group. Orderbook Code set to 0 if the event

NAME	OFFSET	LEN	VALUE	NOTES
				applies at a System level or Group level.
Scheduled Time	18	4	Integer	Number of seconds past midnight that the event is scheduled.

Table 6 – ITCH® Price Tick Size Message [L]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"L"	Tick Size Table.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Tick Size Table Id	5	4	Integer	Indicates the Tick Size Table id.
Tick Size	9	4	Integer	Price Tick Size.
Price Start	13	4	Integer	Start of Price for this Tick Size.

Table 7 – ITCH® Quantity Tick Size Message [M]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"M"	Tick Size Table.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Tick Size Table Id	5	4	Integer	Indicates the Tick Size Table id.
Tick Size	9	8	Integer	Quantity Tick Size. If 0 then Quantity Start indicates the maximum allowed order quantity for the orderbook.
Quantity Start	17	8	Integer	Start of Quantity for this Tick Size.

Table 8 – ITCH® Orderbook Directory Message [R]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"R"	Orderbook Directory Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Unique orderbook identifier.
Price Type	9	1	Alpha	Indicates "U" ('per unit' price type) or "P" (price as percentage).
ISIN	10	12	Alpha	ISIN code
Sec Code	22	12	Alpha	Security code
Currency	34	3	Alpha	Trading currency

NAME	OFFSET	LEN	VALUE	NOTES
Group	37	8	Alpha	Id for symbol grouping (board only). “N” = Normal “O” = Oddlot “I” = Index
Lot Size	45	8	Integer	Lot size for the orderbook
Quantity Tick Size Table Id	53	4	Integer	Quantity Tick Size Table. Cross reference to Quantity Tick Size table.
Price Tick Size Table Id	57	4	Integer	Price Tick Size Table Id. Cross reference to Price Tick Size table.
Price Decimals	61	4	Integer	Decimals for price fields across all messages for this orderbook.
Delisting Date	65	4	Integer	YYYYMMDD 0 represents no delisting date.
Delisting Time	69	4	Integer	HHMMSS Ignore if delisting date is 0.
Instrument Type	73	1	Alpha	“C” = Common stock “P” = Preferred stock “W” = Warrant “E” = ETF “D” = PDR “I” = Index
Shares	74	8	Integer	The number of shares outstanding
Product Code	82	8	Alpha	The product code for the orderbook

Table 9 – ITCH® Orderbook Restrictions Message [k]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“k”	Orderbook Restrictions Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Unique orderbook identifier.
Short Sell Eligible	9	1	Alpha	“Y”es “N”o “B”uy back only
High Collar	10	4	Integer	Maximum allowed price via static limit. The price is 0x7FFFFFFF (hex) 2147483647 (dec) to indicate no limit.
Low Collar	14	4	Integer	Minimum allowed price via static limit.

NAME	OFFSET	LEN	VALUE	NOTES
				The price is 0x7FFFFFFF (hex) 2147483647 (dec) to indicate no limit.
CB Limit Up %	18	4	Integer	Circuit breaker maximum movement allowed up as a percentage from the Last Traded Price (dynamic limit). A value of 0 indicates no limit.
CB Limit Down %	22	4	Integer	Circuit breaker maximum movement allowed down as a percentage from the Last Traded Price (dynamic limit). A value of 0 indicates no limit.
CB Limit Decimals	26	4	Integer	Decimals to apply to the CB Limit Up % and CB Limit Down % values

Table 10 – ITCH® Index Member Directory Message [Y]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“Y”	Index Member Directory Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Index Orderbook	5	4	Integer	Unique orderbook identifier for the Index.
Member Orderbook	9	4	Integer	The unique orderbook identifier for a component of the Index orderbook.
Index Member Weight	13	8	Integer	Weighting for the member component at the start of the day (as a percentage, using price decimals specified for the Index Orderbook).

Table 11 – ITCH® Index Value [Z]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“Z”	Index Value Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Index Orderbook	5	4	Integer	Unique orderbook identifier for the Index.
Value	9	8	Integer	Index Value.

Table 12 – ITCH® Orderbook Trading Action Message [H]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"H"	Stock Trading Action Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Unique orderbook identifier.
Trading State	9	1	Alpha	Current trading state for orderbook. "T" = Trading "V" = Suspended This message is sent at the start of the day to indicate the initial state of each orderbook. Suspended intra-day with "V" + Reason "S", then unsuspended with "T" + Reason "N". Frozen intra-day with "V" + Reason "F", then thawed with "T" + Reason "N". Halted intra-day with "T" + Reason "H", then lifted with "T" + Reason "N".
Reason	10	1	Alpha	Refer to reason in table below.

Table 13 – Trading Action Reasons

TRADING ACTION REASON	EXPLANATION
'N'	Normal trading
'S'	Suspended by market control
'F'	Frozen due to circuit breaker (dynamic limit)
'H'	Halted (intraday auction)

Table 14 – ITCH® Add Order Message [A]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"A"	Add Order Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Order Number	5	8	Integer	The day unique reference number assigned to the new order. A value of zero indicates that this is a reference price update.
Order Verb	13	1	Alpha	"B"uy "S"ell Blank if reference price update.
Quantity	14	8	Integer	The total quantity of the order being

NAME	OFFSET	LEN	VALUE	NOTES
				added to the book. A value of zero indicates that this is a reference price update.
Orderbook	22	4	Integer	Unique orderbook identifier.
Price	26	4	Integer	The price of the new order, or reference price update. The price is 0x7FFFFFFF (hex) 2147483647 (dec) to indicate a ‘market’ order or that a reference price is unavailable.

Table 15 – ITCH® Order Executed Message [E]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“E”	Order Executed Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Order Number	5	8	Integer	The day unique order reference number of the passive order being executed.
Executed Quantity	13	8	Integer	The number of shares executed.
Match Number	21	8	Integer	The day unique match identifier.

Table 16 – ITCH® Order Executed (with Broker ID) Message [e]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“e”	Order Executed (with Broker ID) Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Order Number	5	8	Integer	The day unique order reference number of the passive order being executed.
Executed Quantity	13	8	Integer	The number of shares executed.
Match Number	21	8	Integer	The day unique match identifier.
Passive Broker ID	29	4	Alpha	Broker identifier of the passive order. Blank if unset.
Active Broker ID	33	4	Alpha	Broker identifier of the active order. Blank if unset.

Table 17 – ITCH® Order Executed With Price Message [C]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“C”	Order Executed with Price Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Order Number	5	8	Integer	The day unique executed order reference number.
Executed Quantity	13	8	Integer	The number of shares executed.
Match Number	21	8	Integer	The day unique match identifier.
Printable	29	1	Alpha	Indicates if the execution should be reflected in volume calculations. ‘N’ = Non Printable ‘Y’ = Printable
Execution Price	30	4	Integer	The price at which the execution occurred.

Table 18 – ITCH® Order Executed With Price (and Broker ID) Message [c]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“c”	Order Executed with Price (and Broker ID) Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Order Number	5	8	Integer	The day unique executed order reference number.
Executed Quantity	13	8	Integer	The number of shares executed.
Match Number	21	8	Integer	The day unique match identifier.
Printable	29	1	Alpha	Indicates if the execution should be reflected in volume calculations. ‘N’ = Non Printable ‘Y’ = Printable
Execution Price	30	4	Integer	The price at which the execution occurred.
Passive Broker ID	34	4	Alpha	Broker identifier of the passive order. Blank if unset.
Active Broker ID	38	4	Alpha	Broker identifier of the active order. Blank if unset.

Table 19 – ITCH® Broken Trade Message [B]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"B"	Broken Trade Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Match Number	5	8	Integer	The X-stream match number of the execution that was broken. This refers to a match number from a previously transmitted Order Executed Message, Order Executed with Price Message, or Trade Message.
Reason	13	1	Alpha	The reason the trade was broken. See currently supported Broken Trade Reasons table below.

Table 20 – ITCH® Broken Trade Reasons

REASON	EXPLANATION
'S'	Supervisory – The trade was manually broken by the Exchange.

Table 21 – ITCH® Order Delete Message [D]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"D"	Order Delete Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Order Number	5	8	Integer	The reference number of the order being cancelled.

Table 22 – ITCH® Order Replace Message [U]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"U"	Order Replace Message Id
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Original Order Number	5	8	Integer	The original order number of the order being replaced.
New Order Number	13	8	Integer	The new reference number for the order at the time of replacement.
Quantity	21	8	Integer	The new total open quantity, i.e. the balance of the new order.
Price	29	4	Integer	The new price for the order. The price is 0x7FFFFFFF (hex) or 2147483647 (dec) for a 'market'

NAME	OFFSET	LEN	VALUE	NOTES
				order.

Table 23 – ITCH® Indicative Price/Quantity Message [I]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"I"	Indicative Price/Quantity Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Theoretical Auction Quantity	5	8	Integer	The total quantity eligible to be matched at the current Theoretical Auction Price.
Orderbook	13	4	Integer	Unique orderbook identifier.
Best Bid	17	4	Integer	The current best buy price.
Best Offer	21	4	Integer	The current best sell price.
Theoretical Auction Price	25	4	Integer	The indicative auction price for this orderbook.
Auction Type	29	1	Alpha	Auction Type code. Refer to Auction Type codes in table below.

Table 24 – Auction Type Codes

AUCTION TYPE CODE	EXPLANATION
'O'	Opening Auction (Pre-open)
'I'	Intra-day Auction (Halt)
'C'	Closing Auction (Pre-close)

Table 25 – ITCH® Trade Message [P]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"P"	Trade Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Executed Quantity	5	8	Integer	The number of shares executed. 0 if the message is sent for Close Price.
Orderbook	13	4	Integer	Unique orderbook identifier.
Printable	17	1	Alpha	Indicates if the execution should be reflected in statistics calculations. 'N' = Non Printable 'Y' = Printable
Execution Price	18	4	Integer	The price at which the execution

NAME	OFFSET	LEN	VALUE	NOTES
				occurred.
Match Number	22	8	Integer	The day unique match identifier. 0 if the message is sent for the Close Price.
Trade Indicator	30	1	Alpha	Indicates the type of trade. ‘ ’ = regular trade ‘C’ = intentional cross trade (the same user simultaneously entered both sides of the trade) ‘B’ = block sale ‘M’ = manual trade (market control)

Table 26 – ITCH® Trade (with Broker ID) Message [p]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“p”	Trade (with Broker ID) Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Executed Quantity	5	8	Integer	The number of shares executed. 0 if the message is sent for Close Price.
Orderbook	13	4	Integer	Unique orderbook identifier.
Printable	17	1	Alpha	Indicates if the execution should be reflected in statistics calculations. ‘N’ = Non Printable ‘Y’ = Printable
Execution Price	18	4	Integer	The price at which the execution occurred.
Match Number	22	8	Integer	The day unique match identifier. 0 if the message is sent for the Close Price.
Trade Indicator	30	1	Alpha	Indicates the type of trade. ‘ ’ = regular trade ‘C’ = intentional cross trade (the same user simultaneously entered both sides of the trade) ‘B’ = block sale ‘M’ = manual trade (market control)
Buy Broker ID	31	4	Alpha	Broker identifier of the buy side of the trade. Blank if unset.
Sell Broker ID	35	4	Alpha	Broker identifier of the sell side of the trade. Blank if unset.

Table 27 – ITCH® Foreign Shares Available Message [f]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“f”	Foreign Shares Available Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Product Code	5	8	Alpha	The Product Code for which the foreign shares are available.
Ownership Rule ID	13	2	Alpha	Identifier of the foreign ownership rule for which this message applies.
Sign	15	1	Alpha	Whether the foreign shares available value is positive or negative. ‘+’ = positive ‘–’ = negative
Foreign Shares Available	16	8	Integer	The number of shares currently available for foreign ownership.

Table 28 – ITCH® BBO Quotation Message [O]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	“O”	BBO Quotation Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Unique orderbook identifier.
Best Bid Price	9	4	Integer	Best Bid price for the orderbook, or reference price update. A value of 0x7FFFFFFF (hex) 2147483647 (dec) indicates no bid depth or that a reference price is unavailable.
Best Bid Size	13	8	Integer	Aggregated number of visible shares at the best bid price. A value of 0 indicates no bid depth. A value of 0x7FFFFFFFFFFFFFFF (hex) 9223372036854775807 (dec) indicates that this is a reference price update.
Best Offer Price	21	4	Integer	Best Offer price for the orderbook. A value of 0x7FFFFFFF (hex) 2147483647 (dec) indicates no offer depth, or that this is a reference price update.
Best Offer Size	25	8	Integer	Aggregated number of visible shares at the best offer price. A value of 0 indicates no offer depth. A value of 0x7FFFFFFFFFFFFFFF (hex)

NAME	OFFSET	LEN	VALUE	NOTES
				9223372036854775807 (dec) indicates that this is a reference price update.

Table 29 – ITCH® News Item Message [N]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"N"	News Item message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Unique orderbook identifier.
NewsId	9	4	Integer	Unique news item identifier if set, otherwise 0.
FirmId	13	30	Alpha	Reference Firm
Title	43	max(80+1)	Null-Terminated Alpha	News Title
Reference	varies	max(255+1)	Null-Terminated Alpha	Reference for news item associated object (e.g. a URL, file pathname)
NewsText	varies	Max(511+1)	Null-Terminated Alpha	News data.

4 ITCH® Feeds

This section specifies the messages that are sent on each of the ITCH® feeds. It indicates whether they are sent as a reference message either at the start of the day (SOD) or end of the day (EOD), and/or whether they are a dynamic message sent during the trading day.

4.1 ITCH® Total View

The ITCH® Total View market data feed consists of the ITCH® messages in the table below.

Table 30 – ITCH® Total View messages

TYPE	NAME	REFERENCE	DYNAMIC
T	Time Stamp		Yes
S	System Event		Yes
s	Trading Schedule	SOD	
L	Price Tick Size	SOD	
M	Quantity Tick Size	SOD	
R	Orderbook Directory	SOD	
k	Orderbook Restrictions	SOD	Yes
f	Foreign Shares Available	SOD	Yes
H	Orderbook Trading Action	SOD	Yes
A	Add Order	SOD†	Yes
E	Order Executed*		Yes
e	Order Executed (with Broker ID)**		Yes
C	Order Executed With Price*		Yes
c	Order Executed With Price (and Broker ID)**		Yes
B	Broken Trade		Yes
D	Order Delete		Yes
U	Order Replace		Yes
I	Indicative Price/Quantity		Yes
P	Trade*	EOD‡	Yes
p	Trade (with Broker ID)**	EOD‡	Yes

* Sent when the market has Broker Anonymity

** Sent when the market does not have Broker Anonymity

† Sent to indicate the reference price for an orderbook

‡ Sent to indicate the closing price for an orderbook

4.2 ITCH® Basic with Last Sale

The ITCH® Basic with Last Sale feed consists of the ITCH® messages in the table below.

Table 31 – ITCH® Basic with Last Sale messages

TYPE	NAME	REFERENCE	DYNAMIC
T	Time Stamp		Yes
S	System Event		Yes
s	Trading Schedule	SOD	
L	Price Tick Size	SOD	
M	Quantity Tick Size	SOD	
R	Orderbook Directory	SOD	
k	Orderbook Restrictions	SOD	Yes
H	Orderbook Trading Action	SOD	Yes
O	BBO Quotation	SOD†	Yes
P	Trade*	EOD‡	Yes
p	Trade (with Broker ID)**	EOD‡	Yes

* Sent when the market has Broker Anonymity

** Sent when the market does not have Broker Anonymity

† Sent to indicate the reference price for an orderbook

‡ Sent to indicate the closing price for an orderbook

4.3 ITCH® News

The ITCH® News market data feed consists of the ITCH® messages in the table below.

Table 32 – ITCH® News messages

TYPE	NAME	REFERENCE	DYNAMIC
T	Time Stamp		Yes
S	System Event		Yes
R	Orderbook Directory	SOD	
N	News Item		Yes

4.4 ITCH® Index

The ITCH® Index market data feed consists of the ITCH® messages in the table below.

Table 33 – ITCH® Index messages

TYPE	NAME	REFERENCE	DYNAMIC
T	Time Stamp		Yes
S	System Event		Yes
R	Orderbook Directory	SOD	
Y	Index Member Directory	SOD	
Z	Index Value		Yes

5 ITCH® Message Kinematics

5.1 Reference Data

At the beginning of the day, reference data messages will be sent on the ITCH® feeds to provide information about the market. The Orderbook Directory Message [R] contains the unique integer orderbook identifier for use in fast security lookup. The Orderbook Restrictions Message [k] contains additional information about the orderbook, such as Collars and CB Limits, and this message can also be sent intra-day to notify about any changes.

Index instruments will be included in the Orderbook Directory on all data feeds. Index composition will be defined by subsequent Index Member Directory Messages [Y] on the ITCH® Index feed only.

The Trading Schedule Message [s] will be sent with the Scheduled Time for all events.

The Foreign Shares Available Message [f] will be sent with the initial number of shares available to foreigners for a Product Code. Product Codes that do not allow foreign ownership will not send out an [f] message.

5.2 Orderbook Trading Action [H]

The Orderbook Trading Action will send the initial Trading State for all orderbooks. This indicates the end of the reference data at the start of the day.

When a group of orderbooks is suspended/unsuspended in X-stream INET then the Orderbook Trading Action [H] message will be sent for all orderbooks in the group to indicate a change in Trading State.

When an orderbook is halted, an Orderbook Trading Action [H] message will be sent with Trading State "T" (Trading) and Reason "H" (Halted). When the halt is lifted, an Orderbook Trading Action [H] message will be sent with Trading State "T" (Trading) and Reason "N" (Normal).

5.3 Broker Anonymity

Some ITCH® messages will be sent based on whether the market is implementing Broker Anonymity or not, as announced by the exchange.

If Broker Anonymity is in force, ITCH® will use:

- Order Executed [E]
- Order Executed with Price [C]
- Trade [P]

If Broker Anonymity is <u>not</u> in force, ITCH® will use:

- Order Executed (with Broker ID) [e]
- Order Executed with Price (and Broker ID) [c]
- Trade (with Broker ID) [p]

5.4 Event Message Flow

The ITCH® System Event Message [S] will be sent as a result of X-stream trade events being triggered at the system, group and orderbook level (e.g. Pre-Open, Open).

Auction Type codes for the ITCH® Indicative Price/Quantity Message [I] will map the auction session in place (“O”pen auction, “I”ntraday Auction, “C”losing Auction).

The following table shows the possible values of System Event Codes and Auction Type values when a transition is triggered or during a particular trading session.

Table 34 – ITCH® Event Message flow

X-STREAM TRANSITION	SYSTEM EVENT MESSAGE [S] SYSTEM EVENT CODE (System, Group or OrderBook Level)	ORDERBOOK TRADING ACTION MESSAGE [H] TRADING STATE / REASON (OrderBook Level)	INDICATIVE PRICE/ QUANTITY [I] AUCTION TYPE (OrderBook Level)
	‘O’ – “Start of Messages” First message sent.		
PREOPEN triggers	‘S’ – “Pre Open”		
During Pre-Open Auction		‘V’ – “Suspended” / ‘S’ – “Suspended” ‘T’ – “Trading” / ‘N’ – “Normal”	‘O’ – “Open Auction”
PREOPEN_NC triggers (no cancellation)	‘R’ – “Pre Open (No Cancellation)”		
OPEN triggers	‘Q’ – “Start Of Market Hours”		
During Trading		‘V’ – “Suspended” / ‘S’ – “Suspended” ‘V’ – “Suspended” / ‘F’ – “Frozen” ‘T’ – “Trading” / ‘N’ – “Normal”	
HALT triggers (unscheduled)		‘T’ – “Trading” / ‘H’ – “Halted”	
During HALT Auction			‘I’ – “Intra-day Auction”
LIFT triggers		‘T’ – “Trading” / ‘N’ – “Normal”	
BREAK triggers	‘A’ – “Start Break”		
End BREAK triggers	‘B’ – “End Break”		
PRECLOSE triggers	‘L’ – “Pre Close”		
During Pre-Close Auction		‘V’ – “Suspended” / ‘S’ – “Suspended” ‘T’ – “Trading” / ‘N’ – “Normal”	‘C’ – “Close Auction”
PRECLOSE_NC triggers (no cancellation)	‘J’ – “Pre Close (No Cancellation)”		

X-STREAM TRANSITION	SYSTEM EVENT MESSAGE [S] SYSTEM EVENT CODE (System, Group or OrderBook Level)	ORDERBOOK TRADING ACTION MESSAGE [H] TRADING STATE / REASON (OrderBook Level)	INDICATIVE PRICE/ QUANTITY [I] AUCTION TYPE (OrderBook Level)
POSTCLOSE triggers	‘P’ – “Trading At last”		
CLOSE triggers	‘M’ – “End Of Market Hours”		
END_OF_DAY	‘E’ – “End of System Hours”		
IPXS-EOM	‘C’ – “End of Messages” Last message sent.		
IPXS-ENDSESS			

5.5 Example Message Flow Pre-Open to Open

The ITCH® System Event Message [S] will first be sent to indicate that the Exchange is open and ready to receive orders. The Event Code will be set to ‘S’ to indicate the start of the daily Pre-Open session.

Throughout the Pre-Open, ITCH® messages will be sent as order actions change the state of the system – such as ITCH® TV Add Order Message [A], ITCH® TV Indicative Price/Quantity Message [I], ITCH® Orderbook Trading Action Message [H] and ITCH® TV Order Delete Message etc.

The auction opening will result in ITCH® Order Executed With Price Messages [C] (or [c]) being sent if trades are generated. The Trade [P] (or [p]) message is not used here, so the client must keep track of these messages to maintain the order book.

The ITCH® System Event Message [S] will then be sent to indicate the particular orderbook group (board) has transitioned to continuous trading. The Event Code will be set to ‘Q’ to indicate the transition to Open is complete.

5.6 Update of Reference Price

For the ITCH® Total View feed an Add Order message [A] with Order Number and Quantity both set to zero is used to indicate the sending of the reference price of an order book (in the Price field).

For the ITCH® Basic feed a BBO Quotation message [O] with Best Bid Size and Best Offer Size both set to 0x7FFFFFFFFFFFFFFF (hex) is used to indicate the sending of the reference price of an order book (in the Best Bid Price field).

The above messages are sent after the initial reference data messages to indicate the initial reference price.

A manual reference price update intra-day will generate the above messages.

5.7 Close Price

A Trade [P] (or [p]) message with Match Number and Executed Quantity both set to zero is used to indicate the close price of an order book.

Trade [P] (or [p]) messages are sent immediately after the ‘Trading At Last’ System Event Message [S] to indicate the close price.

5.8 Add Order [A] and Order Executed With Price [C] (or [c])

During normal trading, when an incoming order gets in and matches, an Order Executed [E] (or [e]) message is sent for the passive orders that match the incoming order (aggressor). An Order Add [A] message will then be sent for any outstanding balance of the incoming order that is booked; no Add Order [A] message will be sent if the incoming order is fully matched or expired.

At the opening of an auction, an Order Executed With Price [C] (or [c]) message is sent for each executed order. An Order Executed With Price message may also be sent for an order executed when thawing after a freeze.

5.9 Trade [P] (or [p])

For the ITCH® Total View feed, the Trade [P] (or [p]) message is used to publish intentional cross, block and manually entered (market control) trades only. For auction executions or regular executions during continuous trading, the Order Executed With Price [C] (or [c]) and Order Executed [E] (or [e]) messages are sent, respectively.

For the ITCH® Basic feed, the Trade [P] (or [p]) message is used to publish all trades. The Order Executed and Order Executed With Price messages are not used.

6 iNav ITCH® News Feed

The iNav is a calculated value sent by a 3rd party calculator to the exchange and is currently distributed through the PSE Website and the Electronic board. The iNav ITCH® News will be sent as an ITCH® Message with an ITCH® News Item [N] Message Type. This message will be sent every 1 minute. This message will also be received in the X-stream Workstation.

Table 35 – iNav ITCH® News Item

NAME	OFFSET	LEN	VALUE	CONTENT
Type	0	1	“N”	News Item message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	ETF orderbook identifier.
NewsId	9	4	Integer	Unique news item identifier per security (odd lot and normal) per day.
FirmId	13	30	Alpha	EXCH
Title	43	max(80+1)	Null-Terminated Alpha	symbol:FMETF, timestamp:09/11/2014 14:19:00
Reference	varies	max(255+1)	Null-Terminated Alpha	
NewsText	varies	Max(511+1)	Null-Terminated Alpha	iNAV:116.7204, PDiNAV:116.8579

7 Company Disclosures and Exchange Notices News Feed

The Company Disclosures and Exchange Notices are submitted through PSE EDGE. This will be sent as an ITCH Message with an ITCH News Item [N] Message Type.

The disclosures news feed includes the following:
1. Company announcements and financial reports submitted by Listed Companies; and
2. Exchange notices which includes listings and disclosure notices.

The disclosures will be released every trading day. Disclosures released when the trading engine is not available will be sent the next trading day.

Table 36 – iNav ITCH News Item

NAME	OFFSET	LEN	VALUE	CONTENT
Type	0	1	"N"	News Item message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Security symbol orderbook identifier. *Orderbook value is 0 if news item is a Listing Notice or Disclosure Notice*
NewsId	9	4	Integer	Unique news item identifier per security (odd lot and normal) per day.
FirmId	13	30	Alpha	Sender of the news. *FirmId value is "EXCH".*
Title	43	max(80+1)	Null-Terminated Alpha	Headline which is the template name of the disclosure: **Company Announcement Sample Data:** "(4-34) Voluntary Trading Suspension" **Financial Report Sample Data:** "(17-2) Quarterly Report" **Other Report Sample Data:** "(17-7) Statement of Changes in Beneficial Ownership of Securities" **Listing Notice Sample Data:** "Jollibee Foods Corporation – Additional Listing" **Disclosure Notice Sample Data:** "MJIC – Trading Halt"
Reference	varies	max(255+1)	Null-Terminated Alpha	URL of the disclosure: http://edge.pse.com.ph/openDiscViewer.do?edge_no=4f1e84932fbc8108b15effbf9088d1ab#sthash.0qW7HeZS.dpbs
NewsText	varies	Max(511+1)	Null-Terminated Alpha	**Company Announcement Sample Data:** "Company Announcement: San Miguel Pure Foods Company, Inc. (4-34) Voluntary Trading Suspension C00501-2015 Feb 04, 2015 12:04 PM" **Financial Report Sample Data:** "Financial Report:

NAME	OFFSET	LEN	VALUE	CONTENT
				Bogo Medellin Milling Company, Inc. (17-2) Quarterly Report CR01181-2015 Feb 16, 2015 01:26 PM” **Other Report Sample Data:** “Other Report: SSI Group, Inc. (17-7) Statement of Changes in Beneficial Ownership of Securities CR01184-2015 Feb 16, 2015 04:00 PM “ **Listing Notice Sample Data:** “Listing Notice: Jollibee Foods Corporation – Additional Listing LN00030-2015 Feb 02, 2015 02:55 PM“ **Disclosure Notice Sample Data:** “Disclosure Notice: MJIC – Trading Halt DN00010-2015 Feb 10, 2015 12:35 PM”

Appendix A - PSE WEP Differences

The following is a summary of the notable differences between the PSE WEP and ITCH® market data messages. It is not an exhaustive list.

- WEP sends a 'Price Update' message to indicate a change to the reference price, while ITCH® sends an 'Add Order' message with an order number of 0 and quantity of 0
- WEP sends a 'Price Update' message to indicate a change to the close price, while ITCH® sends a 'Trade' message with match quantity of 0 and executed quantity of 0
- ITCH® does not publish running market statistics (high, low, last). Subscribers to ITCH® must track order executions and trades throughout the day in order to calculate these values.

Table 36 – WEP vs ITCH® messages

WEP MESSAGE	ITCH® EQUIVALENT
Real Time Index	Index Value
Index Summary	*No equivalent*
Index Composition	Index Member Directory
Stock State Change	System Event
Market Information	Orderbook Trading Action
Mail	News
Foreigner Shares Available	Foreign Shares Available
Indicative Matching Price	Indicative Price/Quantity
Collars	Orderbook Directory
Session Timetable	Trading Schedule
Display Bid or Ask	*Not used by PSE*
Start Referential	*No equivalent*
End Referential	*No equivalent*
Referential	Orderbook Directory, Price Tick Size, Quantity Tick Size
Order Update	Add Order, Order Replace, Delete Order, Order Executed, Order Executed with Price
Quote	BBO Quotation
Trade Creation	Order Executed with Price, Trade
Trade Cancel	Broken Trade
(Trade) Full Information	*No equivalent*
Price Update	Add Order, Trade
TCS Trade	Trade
Auction Summary	*No equivalent*

