Market Data Solutions

EQUITIES FEED

Specification

Version 1.0

30 June 2014

Document History

VERSION	DATE	SUMMARY OF CHANGES
1.0	2014-06-30	Release version

Contents

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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:

$\textbf{Price = Integer / } 10^{\text{PriceDecimals}}$

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.
Scheduled Time	18	4	Integer	HHMMSS Set to indicate the scheduled time for a system event. Set to 0x7FFFFFFF (hex) 2147483647 (dec) to indicate that this system event has just been triggered.

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
‘H’	HALT Auction (unscheduled) begins.	Y	Y	N
‘U’	End of the HALT Auction (unscheduled). An intraday uncross occurs, and continuous trading is then resumed.	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.	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

Table 5 – 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 6 – 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 7 – 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
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.

NAME	OFFSET	LEN	VALUE	NOTES
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
Short Sell Eligible	90	1	Alpha	“Y”es “N”o
High Collar	91	4	Integer	Maximum allowed price via static limit
Low Collar	95	4	Integer	Minimum allowed price via static limit
CB Limit Up %	99	4	Integer	Circuit breaker maximum movement allowed up as a percentage from the Last Traded Price (dynamic limit)
CB Limit Down %	103	4	Integer	Circuit breaker maximum movement allowed down as a percentage from the Last Traded Price (dynamic limit)
CB Limit Decimals	107	4	Integer	Decimals to apply to the CB Limit Up % and CB Limit Down %

Table 8 – 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	4	Integer	Percentage weighting for the member component.
Index Member Factor	17	4	Integer	Capping factor for the member component.
Index Member Weight/Factor Decimals	21	4	Integer	Decimals to apply to the Index Weight and Factor.

Table 9 – 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 10 – 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” = Normal “V” = Suspended/Frozen At the start of day “V” is sent for each symbol that is suspended. No message implies state is “T”. Suspended/frozen intra-day with “V”, then unsuspended/thawed with “T”.
Reason	10	1	Alpha	Refer to reason in table below.

Table 11 – Trading Action Reasons

TRADING ACTION REASON	EXPLANATION
BLANK	Reason not available
‘S’	Suspended by market control
‘F’	Frozen due to circuit breaker (dynamic limit)

Table 12 – 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.

NAME	OFFSET	LEN	VALUE	NOTES
				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 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, reference price update. The price is 0x7FFFFFFF (hex) 2147483647 (dec) to indicate a 'market' order or that a reference price is unavailable.

Table 13 – 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.
Passive Broker ID	29	4	Alpha	Broker identifier of the passive order.
Active Broker ID	33	4	Alpha	Broker identifier of the active order.

Table 14 – 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.

NAME	OFFSET	LEN	VALUE	NOTES
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.
Broker ID	34	4	Alpha	Broker identifier of the executed order.

Table 15 – 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 16 – ITCH Broken Trade Reasons

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

Table 17 – 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 18 – 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’ order.

Table 19 – 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 Opening/Closing Quantity	5	8	Integer	The total quantity eligible to be matched at the current Theoretical Opening/Closing 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 Opening/Closing Price	25	4	Integer	The current opening/closing price for this orderbook.
Auction Type	29	1	Alpha	Auction Type code. Refer to Auction Type codes in table below.

Table 20 – Auction Type Codes

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

Table 21 – ITCH Trade Message [Q]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"Q"	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 occurred.
Match Number	22	8	Integer	The day unique match identifier. 0 if the message is sent for the Close Price.
Buy Broker ID	30	4	Alpha	Broker identifier of the buy side of the trade.
Sell Broker ID	34	4	Alpha	Broker identifier of the sell side of the trade.
Cross Trade Indicator	38	1	Alpha	Indicates whether the same member simultaneously entered both sides of the trade (cross). 'C' = cross trade Blank if not a cross trade.
Block Trade Indicator	39	1	Alpha	Indicates whether the execution was a block trade. 'B' = block trade Blank if not a block trade.

Table 22 – 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.
Sign	13	1	Alpha	Whether the foreign shares available value is positive, negative, or if foreign

NAME	OFFSET	LEN	VALUE	NOTES
				ownership is not permitted. '+' = positive '–' = negative 'X' = foreign ownership not permitted
Foreign Shares Available	14	8	Integer	The number of shares currently available for foreign ownership.

Table 23 – ITCH BBO Quotation Message [X]

NAME	OFFSET	LEN	VALUE	NOTES
Type	0	1	"X"	BBO Quotation Message Id.
Timestamp	1	4	Integer	Nanoseconds since last Time Stamp seconds message.
Orderbook	5	4	Integer	Unique orderbook identifier.
Bid Price	9	4	Integer	Bid price for the orderbook. A value of 0x7FFFFFFF (hex) 2147483647 (dec) indicates no bid depth at this level.
Bid Size	13	8	Integer	Aggregated number of visible shares at the bid price. A value of 0 indicates no bid depth at this level.
Offer Price	21	4	Integer	Offer price for the orderbook. A value of 0x7FFFFFFF (hex) 2147483647 (dec) indicates no offer depth at this level.
Offer Size	25	8	Integer	Aggregated number of visible shares at the offer price. A value of 0 indicates no offer depth at this level.
Quote Level	33	1	Integer	Level of the bid and offer quote, with 1 representing the top price level of the orderbook, 2 the next price level, and so on. A value of 0 represents the current Theoretical Opening/Closing Price and Theoretical Opening/Closing Quantity for an orderbook in pre-open or pre-close.

Table 24 – 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.
FirmId	13	max(30+1)	Null-Terminated Alpha	Reference Firm
Title	varies	max(80+1)	Null-Terminated Alpha	News Title
Reference	varies	max(200+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

4.1 ITCH Total View

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

Table 25 – ITCH Total View messages

TYPE	NAME
T	Time Stamp
S	System Event
L	Price Tick Size
M	Quantity Tick Size
R	Orderbook Directory
H	Orderbook Trading Action
A	Add Order
E	Order Executed
C	Order Executed With Price
B	Broken Trade
D	Order Delete
U	Order Replace
I	Indicative Price/Quantity
Q	Trade
F	Foreign Shares Available

4.2 ITCH Best Bid and Offer (BBO)

The ITCH BBO feed consists of the ITCH messages in the table below.

Table 26 – ITCH BBO messages

TYPE	NAME
T	Time Stamp
S	System Event
L	Price Tick Size
M	Quantity Tick Size
R	Orderbook Directory
H	Orderbook Trading Action
X	BBO Quotation

4.3 ITCH News

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

Table 27 – ITCH News messages

TYPE	NAME
T	Time Stamp
S	System Event
L	Price Tick Size
M	Quantity Tick Size
R	Orderbook Directory
H	Orderbook Trading Action
N	News Item

4.4 ITCH Index

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

Table 28 – ITCH Index messages

TYPE	NAME
T	Time Stamp
S	System Event
L	Price Tick Size
M	Quantity Tick Size
R	Orderbook Directory
H	Orderbook Trading Action
Y	Index Member Directory
Z	Index Value

5 ITCH Message Kinematics

5.1 Static Reference Data

At the beginning of the day, static 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. This message can also be sent intra-day to notify about any updates (such as Collars, CB Limits).

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 System Event Message [S] will be sent with the currently Scheduled Time for all events.

5.2 Orderbook Trading Action [H]

The Orderbook Trading Action will send the initial Trading State of “V” for all suspended orderbooks. Orderbooks not included in this first spin are to be assumed “T” (Normal).

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.

5.3 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 29 – ITCH Event Message flow

X-STREAM TRANSITION	SYSTEM EVENT MESSAGE [S] SYSTEM EVENT CODE (System, Group or OrderBook Level)	ORDERBOOK TRADING ACTION MESSAGE [H] 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		'T' – "Normal" 'V' – "Suspended"	'O' – "Open Auction"
PREOPEN_NC triggers (no cancellation)	'R' – "Pre Open (No Cancellation)"		
OPEN triggers	'Q' – "Start Of Market Hours"		
During Trading		'T' – "Normal" 'V' – "Suspended"	
HALT triggers (unscheduled)	'H' – "HALT Auction"		
During HALT Auction		'T' – "Normal" 'V' – "Suspended"	'I' – "Intra-day Auction"
OPEN triggers	'U' – "End HALT Auction"		
BREAK triggers	'A' – "Start Break"		
End BREAK triggers	'B' – "End Break"		
PRECLOSE triggers	'L' – "Pre Close"		
During Pre-Close Auction		'T' – "Normal" 'V' – "Suspended"	'C' – "Close Auction"
PRECLOSE_NC triggers (no cancellation)	'J' – "Pre Close (No Cancellation)"		
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			

5.4 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] being sent if trades are generated. The Trade [Q] 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.

5.5 Update of Reference Price

An Add Order [A] message with Order Number and Quantity both set to zero is used to indicate the reference price of an order book.

Add Order [A] messages are sent after the initial OrderBook Directory [R] messages to indicate the initial reference price.

A manual reference price update intra-day will generate an Add Order [A] message.

Reference price changes due to auctions will not generate an Add Order message.

5.6 Close Price

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

Trade [Q] messages are sent immediately after the 'Trading At Last' System Event Message [S] to indicate the close price.

5.7 Add Order [A] and Order Executed With Price [C]

During normal trading, when an incoming order gets in and matches, an Order Executed [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] message is sent for each executed order.

5.8 Trade [Q]

The Trade [Q] message is used to publish cross, block and manually entered (market control) trades only. For auction executions or regular executions during continuous trading, the Order Executed With Price [C] and Order Executed [E] messages are sent, respectively.

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 30 – 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	Foreigner Shares Available
Indicative Matching Price	Indicative Price/Quantity
Collars	Orderbook Directory
Session Timetable	System Event
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*

