ITCH for AIX

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CONTENTS

1 Revision History

Date	Revision	Change Description
26-09-2025	1.0	Initial version.

2 About the Manual

The purpose of this document is to describe the ITCH protocol.

3 ITCH Overview

AIX ITCH is a direct data feed product. The ITCH feed displays all public orders and trades that occur on the auto-matched market(s).

ITCH is an outbound market data feed only, the protocol does not support order

entry. ITCH features, among others, the following data elements:

- Order level data (MBO) with attribution

  The system will provide its full order depth using the standard ITCH format. ITCH uses a series of order messages to track the life of a customer order, including order executions. The ITCH message formats support market participant attribution, if used by the marketplace.

- Trade messages

  ITCH supports a trade message to reflect a match of a non-displayable order in the system.

- Reference Data

  - Order book Directory messages provide basic security data such as the ISIN code and Financial Product.
  - Tick Size Table Entry messages to convey Tick Sizes for order books.
  - Short Sell Status messages indicates the short sell rules of an order book.

- Event controls

  - Order book State message to inform receivers of state changes.

3.1 Architecture

The ITCH feed is made up of a series of sequenced messages. Each message is variable in length based on the message type. The messages will be binary encoded using SoupBinTCP. The messages that make up the ITCH protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees.

3.2 Data Types

Type	Size	Notes
Numeric	1, 2, 4, or 8 bytes	Unsigned big-endian binary encoded numbers. **Note:** The transport layer, SoupBinTCP, uses big-endian for its numeric values.
Alpha	variable	Left justified and padded on the right with spaces. Composed of non-control ISO 8859-1 (Latin-1) encoded bytes.
Price	4 bytes	Prices are signed integer fields. Number of decimals is specified in the Order book Directory message. **Note:** A Price field with bit 31 set (the highest bit, MIN_INT) while all other bits are zero (decimal -2147483648) means that no price was available. This value also represents a market order in the Add Order messages. The Tick Size Table Entry message contains an 8 Byte Price field.

4 Message Formats

The ITCH feed is composed of a series of messages that describe orders added to, removed from, and executed on the AIX Trading system. It also contains messages for basic reference data of the order books as well as state changes and halts.

4.1 Time Messages

For bandwidth efficiency reasons, timestamps are separated into two pieces:

Timestamp portion	Message Type	Notes
Seconds	Standalone message	Unix time (number of seconds since 1970-01-01 00:00:00 UTC) A Timestamp – Second message will be disseminated for every second for which there is at least one payload message.
Nanoseconds	Field within individual messages	Reflects the number of nanoseconds since the most recent Timestamp-Seconds message that the payload message was generated.

4.1.1 Seconds Message

This message is sent every second for which at least one ITCH message is being generated. The message contains the number of seconds since the start of 1970-01-01 00:00:00 UTC, also called Unix Time.

Name	Offset	Length	Value	Notes
Message Type	0	1	"T"	T - Seconds Message
Second	1	4	Numeric	Unix time (number of seconds since 1970-01-01 00:00:00 UTC)

4.2 Reference Data Messages

4.2.1 Order Book Directory

At the start of each trading day, Order book directory messages are disseminated for all active securities, including halted securities, in the AIX Trading system.

Name	Offset	Length	Value	Notes
Message Type	0	1	"R"	Order book Directory Message
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order book ID	5	4	Numeric	Denotes the primary identifier of an order book. **Note:** Expired Order book IDs may be reused for new instruments.
Symbol	9	32	Alpha	Security short name.
Long Name	41	32	Alpha	Human-readable long name of security.
ISIN	73	12	Alpha	ISIN code identifying security.
Financial Product	85	1	Numeric	Values: 1 = Option 2 = Forward 3 = Future 4 = FRA 5 = Cash 6 = Payment 7 = Exchange Rate 8 = Interest Rate Swap 9 = REPO 10 = Synthetic Box Leg/Reference 11 = Standard Combination 12 = Guarantee 13 = OTC General 14 = Equity Warrant 15 = Security Lending 18 = Certificate
Trading Currency	86	3	Alpha	Trading currency.
Number of decimals in Price	89	2	Numeric	Number of decimals used in price for this order book. **Note:** A value of 256 means that the instrument is traded in fractions (each fraction is 1/256).
Number of decimals in Nominal Value	91	2	Numeric	Number of decimals in Nominal Value.
Odd Lot Size	93	4	Numeric	Indicates the number of securities that represents an odd lot for the order book.

Name	Offset	Length	Value	Notes
				Note: A value of 0 indicates that this lot type is undefined for the order book.
Round Lot Size	97	4	Numeric	Indicates the quantity that represents a round lot for the issue
Block Lot Size	101	4	Numeric	Indicates the number of securities that represents an odd lot for the order book. **Note:** A value of 0 indicates that this lot type is undefined for the order book.
Nominal Value	105	8	Numeric	Nominal value.
Reserved	113	1	Numeric	Reserved
Underlying Order book ID	114	4	Numeric	Order book ID of underlying instrument.
Strike Price	118	4	Price	Strike Price
Expiration Date	122	4	Numeric	Date of order expiration. Valid format will be “YYYYMMDD”.
Number of decimals in Strike Price	126	2	Numeric	Number of decimals used in Strike Price for this order book.
Put or Call	128	1	Numeric	Option type. Values: 1 = Call 2 = Put A value of 0 indicates that Put or Call is undefined for the order book.
Ranking Type	129	1	Numeric	Specify what ranking type should be used. 1 = Price Time

4.2.2 Tick Size Table Entry

This message contains information on a tick size for a price range. Together, all Tick Size messages with the same order book ID form a complete Tick Size Table. Each order book has a set of Tick Size Table Entries to define its tick size table.

Name	Offset	Length	Value	Notes
Message Type	0	1	"L"	Tick Size Message.
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order book ID	5	4	Numeric	The order book to which this entry belongs.
Tick Size	9	8	Numeric	Tick Size for the given price range.
Price From	17	4	Price	Start of price range for this entry.
Price To	21	4	Price	End of price range for this entry. Zero (0) means infinity.

4.2.3 Short Sell Status

A Short Sell Status Message “V” indicates the short sell rules of an order book. This “V” message is a part of ITCH Reference Data Messages.

Prior to the start of system, “V” message is sent for the orderbooks which might have short sell allowing. If an orderbook is absent from “V” message, clients should assume that the orderbook has no short selling rules at the start-of-day reference data messages.

If there is a change in the short sell rules during the day for an order book, “V” message will be re-sent for that order book.

Name	Offset	Length	Value	Notes
Message Type	0	1	“V”	Short Sell Status Message
Timestamp - Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order book ID	5	4	Numeric	Order book identifier. (Only applicable for Equity Market instruments)
Short Sale Restriction	9	1	Numeric	Specify Short Sell status and what Short Sell validation rule that should be used. Valid values; 0 = No restrictions (Short selling is allowed with no price validation) 1 = Short selling is not allowed 2 = Short selling is allowed with up-tick rule

4.3 Event and State Change Messages

4.3.1 System Event Message

The system event message type is used to signal a market or data feed handler event.

Name	Offset	Length	Value	Notes
Message Type	0	1	"S"	S – System Event Message.
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Event Code	5	1	Alpha	The system supports the following event codes on a daily basis: “O” = Start of Messages. Outside of time stamp messages, the start of day message is the first message sent in any trading day. “C” = End of Messages. This is always the last message sent in any trading day.

4.3.2 Order Book State Message

The Order book state message relays information on state changes.

Name	Offset	Length	Value	Notes
Message Type	0	1	"O"	Order Book State Message.
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order Book ID	5	4	Numeric	Order book identifier.
State Name	9	20	Alpha	Name of Order Book State

4.4 Market by Order Messages

4.4.1 Add Order Messages

An Add Order Message indicates that a new order has been accepted by the AIX Trading system and was added to the displayable book. The message includes an Order ID that is *unique per order book and side* used by the AIX Trading to track the order.

Add Order message format are supported:

- **Add Order—No MPID Attribution**

  Generated for unattributed orders in the AIX Trading system.

Name	Offset	Length	Value	Notes
Message Type	0	1	"A"	Add Order Message.
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order ID	5	8	Numeric	The identifier assigned to the new order. **Note:** The number is only unique per Order book and side.
Order Book ID	13	4	Numeric	Order book identifier.
Side	17	1	Alpha	“B” = buy order. “S” = sell order.
Ranking Sequence Number	18	4	Numeric	Transaction-based and sequential number starting from 1. Used only in ranking logic with ranking time. It does not show order book position.
Quantity	22	8	Numeric	The visible quantity of the order. **Note:** Orders with an undisclosed quantity will have this field set to 0.
Price	30	4	Price	The display price of the new order. For details about field processing notes, see subchapter “Data Types”.
Order Attributes	34	2	Numeric	0 = Not applicable
Lot Type	36	1	Numeric	2 = Round Lot
Ranking Time	37	8	Numeric	Ranking timestamp - Nanosecond For ranking logic see “Appendix, How to Build an Order Book View”.

4.4.2 Modify Order Messages

Modify Order messages always include the Order ID, Order book ID and Side of the Add Order to which the update applies.

To determine the currently displayed quantity for an order, ITCH subscribers must deduct the quantity stated in the Modify message from the original quantity stated in the Add Order message with the same Order ID. AIX Trading may send multiple Modify Order messages for the same order and the effects are cumulative. When the displayed quantity for an order reaches zero, the order is dead and should be removed from the book.

4.4.2.1 Order Executed Message

This message is sent whenever an order on the book is executed in whole or in part.

If the incoming order causing the match cannot be fully filled, the remainder will be placed in the book after the match has occurred.

It is possible to receive several Order Executed Messages for the same order if that order is executed in several parts. Multiple Order Executed Messages on the same order are cumulative.

Name	Offset	Length	Value	Notes
Message Type	0	1	"E"	Order Executed Message.
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order ID	5	8	Numeric	The order ID associated with the executed order.
Order book ID	13	4	Numeric	Order book identifier.
Side	17	1	Alpha	“B” = buy order. “S” = sell order.
Executed Quantity	18	8	Numeric	The quantity being executed.
Match ID	26	8	Numeric	Assigned by the system to each match executed.
Reserved	34	4	Numeric	
Reserved	38	14		

4.4.2.2 *Order Delete Message*

This message is sent whenever an order on the book is being deleted. There will be no remaining quantity, so the order should be removed from the book.

Normally, no Order Delete message is sent when an order is completely filled. The receiver needs to keep track of the remaining quantity on all orders by recalculating the remaining quantity on each Order Executed message received. Orders must be removed from the book when the remaining quantity reaches 0.

Table 12: Order Delete Message

Name	Offset	Length	Value	Notes
Message Type	0	1	"D"	Order Delete Message
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order ID	5	8	Numeric	The original order identifier of the order being deleted. **Note:** The Order ID is only unique per order book and side.
Order book ID	13	4	Numeric	Order book identifier.
Side	17	1	Alpha	"B" = buy order. "S" = sell order.

4.4.2.3 *Order Book Flush Message*

This message is sent whenever an order book is flushed.
All remaining orders are no longer accessible and should be removed from the book.

Name	Offset	Length	Value	Notes
Message Type	0	1	"Y"	Order Book Flush Message
Timestamp - Nanoseconds	1	4	Timestamp	Nanoseconds portion of the timestamp.
Order Book ID	5	4	Integer	Order book identifier.

4.5 Trade Messages

4.5.1 Trade Message

The Trade Message is designed to provide execution details for normal match events involving non-displayable order types. This message is also used to publish individual cross trades.

Since no Add Order Message is generated when a non-displayed order is initially received, the Order Executed message cannot be used for all matches. The Trade Message is used to report a match for a non-displayable order in the book.

It is possible to receive multiple Trade Messages for the same order if that order is executed in several parts. Trade Messages for the same order are cumulative.

Trade Messages should be included in trade tickers as well as volume and other market statistics. Since Trade Messages do not affect the displayed book, however, they may be ignored by participants just looking to build and track the order book view.

Name	Offset	Length	Value	Notes
Message Type	0	1	"P"	Trade Message
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Match ID	5	8	Numeric	Assigned by the system to each match executed.
Combo Group ID	13	4	Numeric	Used to group combination order book executions and the trades in the constituent order books together. See Appendix C for details.
Side	17	1	Alpha	Type of non-display order on the book being matched. "B" =buy order "S" =sell order Will be set to blank (space) for anonymous markets.
Quantity	18	8	Numeric	Quantity being matched in this execution.
Order book ID	26	4	Numeric	Order book identifier.
Trade Price	30	4	Price	
Reserved	34	7		
Reserved	41	7		
Printable	48	1	Alpha	Indicates if the trade should be included in trade tickers and volume calculations. Values: "N" = non-printable "Y" = printable
Occurred at Cross	49	1	Alpha	Values: "Y" = Yes, trade occurred at the cross "N" = No, trade occurred at continuous market

4.5.2 Auction Messages

Markets by order dissemination may be disabled during auctions by configuration. In such cases, every existing order of specific Order Book must be removed from the book by an “Order Book Flush Message” immediately prior to the auction.

4.5.2.1 Equilibrium Price Update

This message is used when auctions occur. The message provides the changes in equilibrium price.

If any Price field has bit 31 set (the highest bit, MIN_INT) while all other bits are zero (decimal -2147483648), this means that no price is available.

Name	Offset	Length	Value	Notes
Message Type	0	1	“Z”	Equilibrium Price Update Message
Timestamp – Nanoseconds	1	4	Numeric	Nanoseconds portion of the timestamp.
Order book ID	5	4	Numeric	Order book ID.
Available Bid Quantity at Equilibrium Price	9	8	Numeric	Quantity at equilibrium price on the bid side.
Available Ask Quantity at Equilibrium Price	17	8	Numeric	Quantity at equilibrium price on the ask side.
Equilibrium Price	25	4	Price	Equilibrium Price.
Best Bid Price	29	4	Price	Best Bid Price.
Best Ask Price	33	4	Price	Best Ask Price.
Best Bid Quantity	37	8	Numeric	Best Bid Quantity.
Best Ask Quantity	45	8	Numeric	Best Ask Quantity.

A Appendix A, How to Build an Order Book View

The information needed to build an order book view from the ITCH message flow is contained in the Add Order Messages and the Modify Order Messages. The messages are:

- “A” Add Order – No MPID Attribution
- “E” Order Executed
- “D” Order Delete
- “Y” Order Book Flush

The purpose of the two flavors of the Add Order messages is to add an order to the book.

Orders shall be ranked with using following 3 parameters when ranking type is “Price Time” in “Order Book Directory (R)” message. (Currently all AIX Market instruments’ ranking type is Price Time)

1. Price
2. Ranking Time
3. Ranking Sequence Number

Ranking logic for buy/sell side orders includes the following steps;

1. For buy side orders; as a first step, “price” should be checked. If the price is higher, order position has priority. For sell side orders; as a first step, “price” should be checked. If the price is lower, order position has priority.
2. If the price of two orders is equal to each other’s, “ranking time” should be checked. If the ranking time is earlier, order position has priority.
3. If the price and ranking time of two orders are equal to each other’s, “ranking sequence number” should be checked. If the ranking sequence number is smaller, order position has priority.

For an Order Replace, the order must be removed from its previous position and inserted at New Order Book Position. An order inserted at an existing position shifts the order on that position down (and all orders below as well. A deleted or fully filled order causes existing orders below it to shift their position up one step to fill the “void.”

- The Order Executed message signals a partial or full fill. The order quantity must be reduced by the quantity of the Order Executed message.
- The Order Delete message tells the recipient to remove the order referenced.
- The Order Book Flush message tells the recipient to remove all orders from the referenced order book.

B Appendix B, How to Build a Trade Ticker

The Trade Ticker is based on the following messages:

- Order Executed
- Trade.

C Appendix C, Reserve Order Matching

When a reserve order is matched, one or several times, the messages for the following scenarios are:

Scenario	Message
Reserve order fully filled - matching against the visible and the hidden quantity	E - with the quantity matched against the reserve orders visible quantity
	P - with the quantity matched against the reserve orders hidden quantity
Reserve order not fully filled - matching against the hidden quantity only	D - removing the visible quantity of the reserve order from the order book
	P - with the total matched quantity **Note:** Seen as the matching has only occurred against the hidden quantity
	A - re-adding the visible quantity to the order book.

D Appendix D, Protocol Flow

The daily ITCH data flow is summarized below;

After successfully connection to the ITCH IP/port(s) (on primary & secondary data flows), clients can start listening the ITCH data stream like order level data, trade messages, reference data and event messages. ITCH feed is made up of a series of sequenced messages.

GLIMPSE (binary encoded using SoupBinTCP) service is a part of ITCH data feed to perform a late join or recovering from a data gap.

For more information about SoupBinTCP, please refer to the additional specifications.

Before GLIMPSE service is used, clients must be running and continuously listening ITCH real-time data feed as the first step of recovery and/or late join issues in ITCH.

GLIMPSE provides a snapshot of the current state of the order books. GLIMPSE can be used to quickly sync up with the real-time ITCH feed. At the end of the GLIMPSE snapshot, clients must continue listening real-time ITCH feed from the sequence number specified in GLIMPSE snapshot.

GLIMPSE service uses the same message formats as ITCH protocol.