

DERIVATIVES SOLA 5

SAIL Business Design Guide

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1 Introduction

1.1 Purpose

The purpose of this publication is to provide customers with the knowledge and technical details necessary for accessing and using the SOLA trading system.

This SAIL Business Design Guide provides essential information for participants and independent software vendors in the functional design of their application in order to interface with SOLA using the native SOLA Access Information Language (SAIL) protocol.

1.2 Readership

The target audience for these publications is anyone working at either the business or Information Technology (IT) level of an organisation interested in the functional design of the SOLA trading system.

1.3 Revision History

This document has been through the following iterations:

Issue	Date	Description
1.0	August 2012	updated with SOLA 5 content : <ul style="list-style-type: none"> • 4.1.1.6: new paragraph (committed/cross for strategy) • 5.5 : added new MU and IX message description • 7.7: added MU and IX message

2 Service Description

2.1 Market Model

2.1.1 Options

2.1.1.1 Anonymity

Orders on the SOLA trading system are anonymous: during trading sessions perfect anonymity is provided and market participants cannot see who is in the marketplace: only the five best bids and asks including their respective quantities are broadcast. Any market participants who enter orders remain anonymous. Once a trade is executed, participants will not see the opposite counterparty on the trade.

2.1.1.2 Market Quality

To create a deeper more liquid market with tighter pricing, the Exchange has adopted a market model which increases transparency, facilitates access, lowers the barriers to entry and facilitates competition. A strict price/time priority algorithm for order matching: FIFO (First-in; First-out) is employed to help achieve this.

2.1.2 Futures

2.1.2.1 The Order Book

SOLA broadcasts market information on the five best limit prices on both sides in the order book, the number of orders at each price on the bid and on the ask as well as the cumulative quantity available at each limit price. This information displayed by the order book can be seen on any terminal, and is anonymous.

2.1.2.2 Order Priorities

During the course of the trading day, priority is set first by price, then by time stamp. At the same price, priority is given to the first order that has been sent, in other words, on a first-in, first-out (FIFO) basis. Note that the limit orders produced by triggered stop orders are time-stamped from the moment the stop was triggered, not from the time the stop order was sent to the market.

2.1.2.3 Price Levels

Orders, on some instruments, must be entered within certain price levels in order to avoid costly typing errors on the part of participants and to ensure the market's integrity by limiting excessive price fluctuations. These price levels are determined and updated by the Exchange during the course of the trading day. They are different from the daily price limits set by the Exchange, which halt trading when reached. No buy order can be sent in with a limit price above the upper price level. Similarly, no sell order can be sent in with a limit price below the lower price level.–They are often referred to as minimum and maximum price levels.

2.1.2.4 Request for Quote (RFQ)

In certain scenarios the Exchange may decide to allow participants to utilize the Request for Quote (RFQ) functionality. RFQs allow participants to ask for a market for a given quantity of a specific instrument. This informs other participants of the interest in that instrument, allowing them to respond accordingly. Sending an RFQ does not require that a subsequent order be sent into the market. In any case, participants are not required to respond to an RFQ unless they are market makers who must respond as per their overall obligations to the market.

2.1.3 Strategies

2.1.3.1 Strategy Instrument

A strategy is viewed as a single instrument in SOLA, and strategies are quoted with a bid and an ask. A strategy instrument can be bought or sold like any other instrument. A strategy order can either trade against an opposite strategy order (in same instrument book) or against several leg orders (implied trade). Only strategy instruments which are system configured “implied enabled” can trade in implied mode.

2.1.3.2 Strategy-Strategy Trade and Leg Execution Notifications

A strategy order for which the strategy type is **not** “implied enabled” can only trade against an opposite order/quote on the same strategy instrument. The SOLA Trading System matches the buy and sell orders at the price defined by the market (ask/bid) at the time of order entry. SOLA also calculates the trade price of each leg of the strategy and disseminates them in real-time to the parties involved in the trade and to the rest of the market. The leg prices are the price at which the legs are to be cleared. Since a strategy-strategy trade does not lift any leg orders/quotes, the leg notifications are merely “volume adjustment trades” and do not affect the last trade price and high/low statistics of the leg instruments.

Example of Strategy-Strategy Trade

Market is as follows on the September, June and September-June spread.

September contract:	104.55 – 104.58
June contract:	104.47 – 104.51
September-June Spread:	0.05 – 0.09

A buy order 0.10 on the spread book will trade against the ask at 0.09. The system will generate prices on each leg, say 104.58 for the September contract and the 104.49 for the June contract (giving a price differential of $104.58 - 104.49 = 0.09$)

2.1.3.3 Implied Trades and Leg Execution Notifications

Implied-In (not implemented for IDEM market)

“Implied "in" orders are derived from regular posted orders on individual legs. Implied "in" orders allow to create a synthetic strategy market available for trading to all market participants.

An incoming order on a strategy instrument (which supports implied trading) may negotiate against an implied-in order, generated by outright orders from the leg markets. In case of an implied trade, SOLA also disseminates the leg prices in real-time to the party who submitted the strategy order. Note that these prices are not calculated but are the prices at which the outright (leg) orders traded. Since an implied-in trade lifts orders/quotes from the outright markets, statistics such as last trade price, traded volume and high/low prices for each of the leg instruments are affected.

Example of Implied-In Trade

Market as follows on the September, June and September-June spread.

September contract:	104.55 – 104.58
June contract:	104.47 – 104.51
September-June Spread:	0.05 – 0.12
<i>Implied prices:</i>	[0.04] – [0.11]

The implied ask on the September-June spread book, generated by the outright ask on the September book and the outright bid on the June book, is 0.11 (i.e. 104.58 - 104.47). The implied ask of 0.11 is better than the real ask of 0.12 on the September- June spread book. Therefore an incoming order to buy the September-June spread at 0.12 will trade against the implied ask of 0.11 and therefore generate trades against the September sell order(s) at 104.58 and the June buy order(s) at 104.47.

Leg notifications are sent to the submitting strategy participant at 104.58 for the September leg and 104.47 for the June leg.

Similarly, the implied bid on the September-June spread is generated by the outright bid of the September contract and the outright ask on the June contract at a price of 104.55 – 104.51 = 0.04. In the above example, the real bid (0.05) of the September-June spread is better than the implied bid (0.04). Therefore an order to sell the September-June spread at a price of 0.04 will trade against the bid of 0.05 in the spread book.

Implied-Out

“Implied Out” orders for a given leg instrument are derived from a combination of an existing regular strategy order(s) and existing outright order(s) in the other underlying individual legs. This type of order allows creating a synthetic market on the given underlying leg.

Example of Implied-Out Trade

Market as follows on the September, June and September-June spread.

September-June Spread:	0.05 – 0.11
September contract:	104.55 – 104.58
June contract:	104.43 – 104.51
<i>Implied prices:</i>	[104.44] – [104.53]

The implied bid on the June contract is generated by the bid of the September contract and the ask of the September-June spread at a price of $104.55 - 0.11 = 104.44$. An implied bid of 104.44 is better than the real bid of 104.43 in the June book. A sell order on the June contract at a price of 104.43 will hit the implied bid at 104.44 and generate trades with the buy order(s) on the September book at 104.55 and the sell order(s) on the September-June spread book at a price of 0.11. Real-time leg execution notices will be sent for the strategy order, at a price of 104.55 for the September leg and a price of 104.44 for the June contract.

Similarly, one can synthesise an implied ask of 104.53 in the June contract, generated from the ask of 104.58 of the September book and the bid of 0.05 in the September- June spread book. In this case, the real ask of 104.51 of the September-June spread book is better than the implied ask of 104.53. An incoming order to buy at 104.53 will trade against the real ask of 104.51 instead of the implied ask of 104.51.

2.1.3.4 Order Priority within a given Strategy Book

For a given strategy book, whenever there is an implied price and a real market price present, priority is always given to the best price. However, at equal price, priority is always given to the real order(s) over the implied order(s).

Example of order priority within a strategy book

Suppose the Market as follows on the September, June and September-June spread.

September contract:	104.55 – 104.58
June contract:	104.47 – 104.51
September-June Spread:	[0.04] 0.05 – 0.11 [0.11]
<i>Implied prices are shown in []</i>	

As shown in the above example, the implied ask on the September-June contract is 0.11 (i.e. $104.58 - 104.47$), which is at the same price as a real sell order(s) in the September-June spread book. An incoming order to buy at 0.12 will first trade against the real sell order in the September-June spread book at 0.11 instead of the implied order (from the sell order(s) of the September contract at 104.58 and the buy order(s) at 104.47).

2.1.3.5 Order Priority across several Strategy books sharing the same underlying leg

If there are several strategy orders from different strategy books, whereby each of the strategy instruments share a common underlying leg and generate the **equal implied-out price on**

that leg, the strategy order with oldest timestamp (which was entered first in the system) will have a highest priority. This is shown by the following example:

Market as follows on the December, December-September spread, June, Sept-June spread.

December book: ❶ 104.55 – 104.58 ❷
 December-September Spread: ❸ 0.05 – 0.09 ❹
September Implied limits: [104.46] – [104.53]
 June book: ❺ 104.39 – 104.42 ❻
 September-June Spread: ❼ 0.07 – 0.11 ❽
September Implied limits: [104.46] – [104.53]

Note: ❶ to ❽ represent the orders in the book. The sequence of entry into the trading system is also identified by the order's numbers, ❶ being the first order to enter, and ❽ being the last one.

The implied bids on the September book are generated by:

Implied Bid from (Bid of December ❶ – Ask of December-Sept spread ❹) is 104.46
 Implied Bid from (Bid of Sept-June. spread ❼ + Bid of June. ❺) is 104.46

An incoming order to sell the Sept. contract at 104.45 can be matched against the implied bid of 104.46 generated from either the combination of the buy order on December outright and sell order on December-Sept spread, or the combination of buy order from the Sept-June spread and the buy order on June outright.

In the above example, since the sell order of December-Sept spread ❹ is entered into the system before the bid of Sept-June spread ❼, it has a higher time-priority. Hence the match will first be made with the December and the December-Sept book. Any remaining quantity will then be matched against the June and Sept-June book.

The implied asks on the September book are generated by:

Implied Ask from (Ask of December ❷ – Bid of December-Sept spread ❸) is 104.53
 Implied Ask from (Ask of Sept-June. spread ❽ + Ask of June. ❻) is 104.53

An incoming order to buy the Sept. contract at 104.52 can be matched against the implied ask of 104.53 generated from either a combination of the sell order in December and the buy order in the December-Sept spread or a combination of the sell order in the June. contract and a sell order in the Sept-June spread.

In the above example, since the buy order of December-Sept spread ❸ was entered into the system before the sell order of Sept-June spread ❽, it has a higher time-priority. Hence the match will first be made with the December and the December-Sept book. Any remaining quantity will then be matched against the June and Sept-June book.

2.1.3.6 User Defined Strategy (Flexco)

A participant can request the creation of a user defined strategy (Flexco) by submitting a New Instrument (ON) message.
 A strategy creation request must include the following information for each of the legs:

- Verb
- Ratio
- Group ID
- Instrument ID

Strategy Creation requests can be accepted, accepted with modifications or rejected.

There are two reasons why a strategy creation request can be accepted with modifications:

1. The Strategy Ratio can be reduced to the least common denominator.
For example a participant requests the creation of a 2 leg strategy where the ratio is 2 on the first leg and 2 on the second leg. During the creation of the strategy the ratio is rounded down to 1.
2. The leg verbs are reversed.
For example, a participant sends a creation request with the instruction to Sell leg A and to Buy leg B. During the strategy creation process the strategy created can be Buy leg A and Sell leg B.

If the creation is modified, the New Instrument Acknowledgement (KN) message includes the new instrument structure. The leg ordering sequence may differ from the original request but will not be marked as modified if the ratio and the verb for all legs remain the same.

The number of strategy instrument creation requests is limited to a maximum number per day, by member. If a member exceeds the number of strategy creation requests allowed then any subsequent request is rejected. Following the first trade occurring on a strategy instrument created by a member, the strategy creation counter for this member is decremented by 1.

2.1.4 Circuit Breaker

2.1.4.1 Instrument Limit Price (X Validation)

Limit orders are validated against the instrument minimum and maximum order prices. The instrument minimum and maximum is re-calculated on a daily basis and is subject to change at any time during a trading day.

If an incoming limit orders fails the validation at entry then SOLA returns an error message (message type ER) for IDEM and an ORDER ACKNOWLEDGEMENT (KE) message for TQD and Oslo.

If an order resting on the order book fails the validation following an instrument limit update then SOLA returns an ORDER ELIMINATION (NZ) message.

2.1.4.2 Trade Price Vs Control Price (Y Validation)

Prior to creating a trade, SOLA validates that the potential execution price is between the instrument low and high trade limit. If the potential execution price is outside these limits then there are two possible outcomes: the incoming order is rejected and the instrument state

changes to Suspended or the instrument state changes to Reserved. In both cases the instrument state returns to normal state after a period of time defined by the Exchange.

2.1.4.3 Trade Price Vs Last (Z Validation)

Prior to creating a trade, SOLA validates that the potential execution price has a variation to the previous execution price that is not exceeding the low variation limit and against the high variation limit. If the potential execution price is outside these limits then there are two possible outcomes: the incoming order is rejected and the instrument state changes to Suspended or the instrument state changes to Reserved. In both cases the instrument state returns to normal state after a period of time defined by the Exchange.

2.2 Description of Trading Phases

The trading phases are described in the following sections.

2.2.1 Consultation Start

This phase is reserved for the Exchange to perform actions on instruments for the forthcoming trading day (e.g. reserve instruments). No order entries coming from participants or the Exchange can be accepted during this phase. However, the Exchange can perform order deletions for a specific instrument or global deletions of a specific participant's orders.

2.2.2 Order Cancellation

This phase allows Participants to cancel orders.

2.2.3 Pre-opening

This phase allows Participants to enter, modify, and cancel orders. Orders introduced during this period contribute to the calculation of the Calculated Theoretical Opening ("CTO") but are not traded during this phase.

2.2.4 Opening

At the scheduled Opening time, the random opening period begins and the instrument opening process can occur at any time between the beginning and the end of the random period. The random period duration is configured by the Exchange. During the opening process orders are matched and trades are generated at the last CTO. An optimization algorithm maximizes the number of trades and reduces the remaining imbalance. FIFO (time priority at each price) is used to allocate the trades at the CTO.

2.2.5 Trading Session (Continuous Trading)

This is the main trading period, whereby orders and quotes may be entered, deleted and modified with execution enabled. The switch to the Trading Session phase marks the end of the opening processes and is triggered as soon as the opening phase ends.

2.2.6 Closing (Not Implemented for IDEM Market)

During the Closing state order entry and order cancellation are not accepted unless the instrument state allows these actions. This phase normally comes following a closing auction.

2.2.7 Exchange Intervention

This is a period during which the Exchange can perform all the modifications necessary to regulate the market and correct errors (deletion of orders for a specific instrument, cancellation of trades, etc.). During this period, neither Participants nor the Exchange can place orders. Participants may receive messages during this phase, e.g., Group or Instrument State change notices.

2.2.8 Consultation End

This phase is reserved for the Exchange for the purposes of consulting with the market. During this period, neither Participants nor the Exchange can place orders. Participants will not receive any messages during this phase.

2.2.9 Mini Batch

This is a phase during which a group switches to next trading day. Orders whose validity date has expired are deleted and statistics for the instruments are reset (high, low, volume). Participants cannot enter orders on any instrument during this phase. Notifications of expired orders are sent to Participants, though Participants are not typically connected during this phase. Such messages would be available upon next connection.

2.2.10 Post-session

This is a weekly session during which various off-line processing takes place - including all Maintenance processing. Participants cannot enter any orders on any instrument during this phase. As in the Mini Batch phase, messages to Participants may be created during this phase. However, they would typically be available upon next connection.

2.2.11 Forbidden

This phase is not scheduled and is activated manually by the Exchange. A state change to Forbidden can occur at any time during the trading day and is normally used when group being permanently de-listed. During these periods, neither Participants nor the Exchange can place, modify or cancel orders.

2.2.12 Interrupted

This phase is not scheduled and is activated manually by the Exchange. A state change to Interrupted can occur at any time during the trading day and is normally used when a group is deliberately shutdown for a technical or business emergency. During these periods, neither Participants nor the Exchange can place, modify or cancel orders.

2.3 Instrument Groups

An instrument group is a set of investment instruments or financial instruments governed by the same trading rules.

An instrument is identified by its Group ID plus its Instrument ID. An Instrument ID is unique within its instrument group.

2.3.1 Group State Change Notifications

SOLA notifies all clients when a group of instruments switches to a different trading state by sending an INSTRUMENTS GROUP STATUS CHANGE NOTICE (NG) message, indicating the group's new status. This can be done during:

- Order Cancellation
- Pre-Opening
- Opening
- Trading Session
- Closing
- Exchange Intervention
- Consultation End
- Mini Batch
- Post-trading
- Interrupted
- Halted

In the rare event that trading is interrupted for all instrument groups, clients will receive one INSTRUMENTS GROUP STATUS CHANGE NOTICE (NG) for each group available on the Exchange. Each message will indicate that the trading session has been interrupted.

2.3.2 Instruments State Change Notifications

The status of an instrument can be modified by the Exchange independently of the group to which it belongs. In such cases, SOLA sends all clients an INSTRUMENT STATE CHANGE NOTICE (NI) message specifying, amongst other parameters, the new status of the instrument, as well as the type of action which triggered this change.

Note: In some cases, when an action affects an instrument without modifying its status, the INSTRUMENT STATE CHANGE NOTICE (NI) message is sent to indicate this action.

There are three valid states for an instrument on SOLA, as given below:

- Forbidden: Order entry is forbidden and no trading activities are available
- Suspended: Order cancellation is authorized and order entry is forbidden.
- Reserved: Order entry is authorised but the trading mode is limited to Order Cancellation (if Group trading mode is Trading or Order Cancellation)
- Normal: Follows group trading rules

The forbidding of an instrument is carried over from one session to the next unless there is a change in instrument status. However, an INSTRUMENT STATE CHANGE NOTICE (NI) message is sent at the start of each session as a reminder of any reservation or forbidden conditions. If changed, an INSTRUMENT STATE CHANGE NOTICE (NI) message is sent to clients.

2.4 Behaviour of an Instrument Independently of its Group

The normal behaviour of an instrument is to follow the rules of its group according to the group status. This section describes certain cases where the instrument behaves independently of its group.

2.4.1 Reservation, Opening of an Instrument

The reservation of an instrument is instigated by the Exchange when the instrument undergoes a financial operation. Reservation, triggered manually or automatically at the opening, is aimed at controlling the market by limiting the gap between prices.

The impact which the reservation of an instrument has on the processing of orders related to that instrument varies according to the phase in which the group is situated.

2.4.2 Order Cancellation

If necessary, the Exchange can prevent an instrument from trading when the market opens. The Exchange can then reauthorize the instrument and the rules governing the instrument's group are reapplied.

2.4.3 Trading Session

If necessary, the Exchange can reserve an instrument. The instrument is then set apart from the group and its trading rules. Orders entered are processed as during the Order Cancellation phase.

The Exchange can lift the reservation on an instrument by opening the instrument which will then follow the trading rules governing its group.

2.5 Behaviour of a Strategy Instrument Dependent on its Legs

A strategy instrument always follows its leg trading state. If any of its legs are placed in a forbidden or reserved mode, the trading engine automatically places the strategy instrument in an Order Cancellation mode.

The strategy instrument can only open if all its leg components have been opened and are in continuous trading. The strategy instrument will then follow the standard opening sequence of trading phases.

3 Connection Management

3.1 Connection Types

All Member Firms are assigned a unique Participant ID. Each participant has a User ID and password coded in an MD5 format using the time present in the message.

Two types of entities are found under each Participant ID:

- **Connections:** Connections are entry points to the SOLA Front-end. There are several connection types, each of which allows different message types. A Participant can have several connections depending on requirements.
- **Traders:** Traders represent logical persons or groups of persons owning orders entered on the order book. Traders do not need to log on (they may do so optionally) and may use any Connection of the Participant to which they belong. Trading privileges (such as market making) are assigned at the Trader ID level.

3.2 Connection Implementation

Connection types are implemented by the use of specific User IDs related to each type. Specifically, the format of the individual User ID is:

XXYY####

Where:

- XX - is a two letter acronym identifying the connection type (OR, BQ, PQ, DC, FX)
- YY - is an incremental number identifier starting at 01
- ### - represents the Participant ID assigned to a Participant (CED code)

In accordance with the structure above, the new IDEM users will be generated with the following naming conventions:

- OR + XX + CED Code (OR = Order Routing)
- BQ + XX + CED Code (BQ = Bulk Quote)
- PQ + XX + CED Code (PQ = Panic Quote)
- DC + XX + CED Code (DC = Drop Copy)
- FX + XX + CED Code (FX = FIX)

Any client placing a message not supported by a given connection will receive an ERROR (ER) message with the appropriate error code. The table overleaf shows the functionality available in each Connection Type.

SAIL Message	OR	BQ	PQ
Order Entry (OE)	✓		
Order Modification (OM)	✓		
Order Cancellation (XE)	✓		
Request For Quote (RQ)	✓	✓	
Bulk Quotes (Qi, BD)		✓	
Global Cancellation (GC)		✓	✓

Each participant will be issued with at least one connection of the OR type. In addition to this each market making participant will also be issued with at least one connection of the BQ type.

Market Makers may also request a PQ connection designed specifically for sending Global Cancellation (GC) messages. This connection provides Market Makers with a way to pull their quotes out of the market instantly. However, to avoid synchronisation issues, it is highly recommended to manage Disconnection Instructions (see section on Disconnection Instruction Management).

3.3 Message Sequencing

3.3.1 User Sequence ID

Clients must include a User Sequence ID in all business messages. This is a numeric sequential field that is used to check if there is a gap in the incoming message to the Exchange within a connection session. The first business message for the session must be set to 1.

All technical messages sent to the client (Heart Beat, Connection Acknowledgement, etc.) show the next expected User Sequence ID.

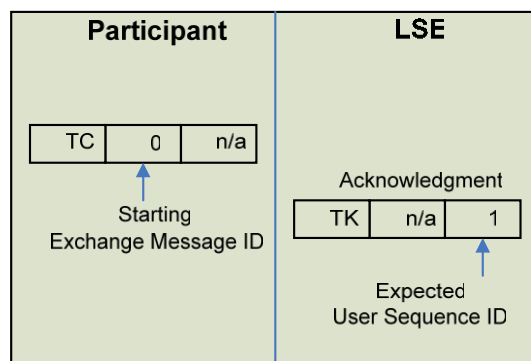
The acknowledgements to a business message (KE, KM, KO, KG, LA) or an Error Notice (TE, ER) are populated with the same User Sequence ID present in the incoming message.

3.3.2 Exchange Sequence ID

This field is a message ID managed by the Exchange. It is present in most of the messages sent by the Exchange to the Client. A User may request retransmission from a specific Exchange Message ID when connecting to the Exchange during the day.

3.4 User Connection and Disconnection

3.4.1 First Time User Connection (TC)



Exchange Message ID (Participant inbound)

For the first connection, the only valid value for the User's Exchange Message ID is zeroes.

Expected User Sequence ID (Exchange outbound)

The Exchange response indicates that the (next) expected User Sequence ID is 1.

Session ID

When the Client connects for the **first time each day**, he must set the Session ID to blank spaces. The acknowledgment contains the current Session ID.

Protocol ID

In the User Connection Message, the user specifies the protocol ID for the connection. When the SAIL protocol version changes, the Client is able to communicate using the previous protocol version for a period. The expiration of the previous protocol time period will be communicated by the Exchange. If the specified protocol ID is not supported, an error message (TE) is sent.

3.4.2 Message Retransmission

3.4.2.1 Retransmission of all messages for a session

Participant			LSE		
Trader Connection			Acknowledgment		
TC	0	n/a	TK	n/a	5
			Messages retransmission		
			KE	aa1	1
			KE	aa2	2
			NT	aa3	0

Exchange Message ID (Participant inbound)

Setting the Exchange Message ID to 0, the User indicates that he wants retransmission of his messages from the beginning of the session. For this example, messages aa1, aa2 and aa3 are retransmitted to the Client (since these are the only 3 messages that have been sent during this session).

Expected User Sequence ID (Exchange outbound)

When the Client connects, and it is not for the first time, the acknowledgement message indicates the next expected User Sequence ID (5 in this example).

3.4.2.2 Retransmission from a specific message for a session

Participant			LSE		
Trader Connection			Acknowledgment		
TC	aa3	n/a	TK	n/a	5
				aa3	0

Exchange Message ID (Participant inbound)

Setting the Exchange Message ID to aa3, the User asks for retransmission of his messages from aa3.

Expected User Sequence ID (Exchange outbound)

When the Client connects, and it is not for the first time, the acknowledgement message indicates the expected User Sequence ID (5 in this example).

3.4.3 Disconnection Instruction Management

Participant	LSE						
Disconnection Instruction <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">TA</td> <td style="text-align: center;">n/a</td> <td style="text-align: center;">n/a</td> </tr> </table>	TA	n/a	n/a	TA Acknowledgment <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">TM</td> <td style="text-align: center;">n/a</td> <td style="text-align: center;">5</td> </tr> </table>	TM	n/a	5
TA	n/a	n/a					
TM	n/a	5					

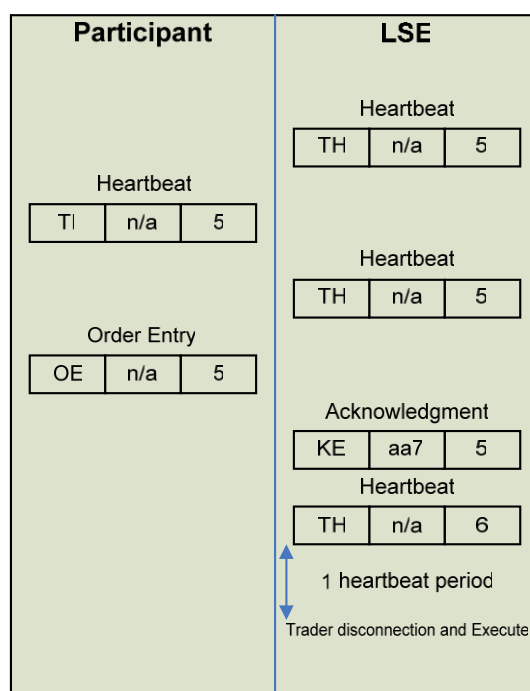
This message is used by the Participant to indicate order/quote handling preferences when the connection ends (terminated by the Exchange or by the Participant).

When a disconnection occurs, all the disconnection instructions sent by the traders are executed. For example, if a Market Maker wants to cancel his quotes upon disconnection, all the existing quotes he has on the Exchange are cancelled.

Disconnection Instructions are managed at the trader level. Once a connection is established, one Disconnection Instruction Message must be sent per trader that will use the connection.

Note: These instructions are valid only for the current session. This message is optional; if it is not sent by a specific trader, the system does not cancel anything when that trader disconnects, or when the connection is lost.

3.4.4 User Disconnection by Exchange: Heartbeat Missing



When the Client connects, he specifies the inactivity interval corresponding to the number of non-responded heartbeat messages (TH) the Exchange must count before disconnecting. A Heartbeat message can be responded to by a Heartbeat Response (TI) or by any other message.

If the user is disconnected, his Disconnection Instructions (TA) are processed.

In the example above, the Client has requested to be disconnected after a period of one heartbeat. After a period of two heartbeats without any Heartbeat Response from the Client, the Client is disconnected and his trader's disconnection instructions (if specified) are processed.

3.4.5 User Disconnection by Client

Participant	LSE						
Heartbeat	Heartbeat						
<table border="1"> <tr> <td>TI</td> <td>n/a</td> <td>3</td> </tr> </table>	TI	n/a	3	<table border="1"> <tr> <td>TH</td> <td>n/a</td> <td>3</td> </tr> </table>	TH	n/a	3
TI	n/a	3					
TH	n/a	3					
Trader Disconnection							
<table border="1"> <tr> <td>TD</td> <td>n/a</td> <td>n/a</td> </tr> </table>	TD	n/a	n/a				
TD	n/a	n/a					
	Acknowledgment						
	<table border="1"> <tr> <td>TL</td> <td>n/a</td> <td>3</td> </tr> </table>	TL	n/a	3			
TL	n/a	3					
	Trader Disconnection and Execute Disconnection Instructions						

The client requests a disconnection by sending a User Disconnection (TD). The User is disconnected and his Disconnection Instructions, if any, are processed.

3.5 Error Management

3.5.1 Incorrect Incoming Message

Participant	LSE						
Heartbeat	Heartbeat						
<table border="1"> <tr> <td>TI</td> <td>n/a</td> <td>3</td> </tr> </table>	TI	n/a	3	<table border="1"> <tr> <td>TH</td> <td>n/a</td> <td>3</td> </tr> </table>	TH	n/a	3
TI	n/a	3					
TH	n/a	3					
Erroneous message							
<table border="1"> <tr> <td>XX</td> <td>n/a</td> <td>3</td> </tr> </table>	XX	n/a	3	Error Notice			
XX	n/a	3					
	<table border="1"> <tr> <td>TE</td> <td>n/a</td> <td>3</td> </tr> </table>	TE	n/a	3			
TE	n/a	3					

In this example, the client has sent an erroneous message. The Technical Error message (TE) sent back to the client will explain the error.

The client will remain connected.

3.5.2 Out of Sequence

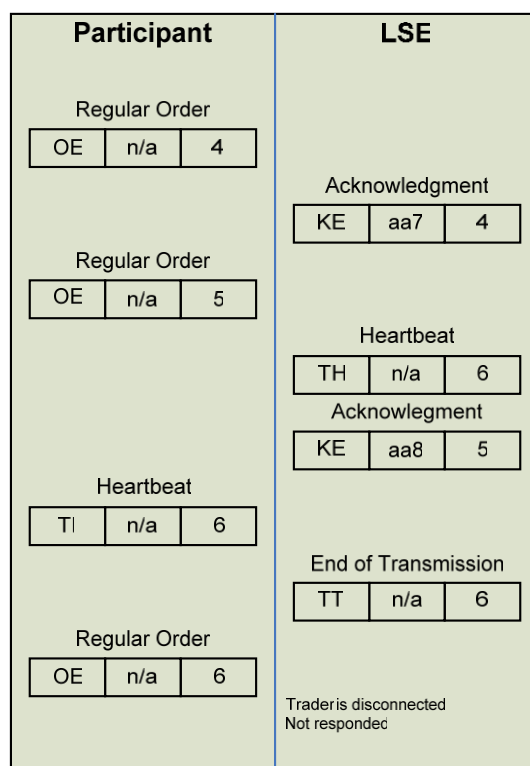
Participant	LSE						
Connection <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>TC</td> <td>0</td> <td>n/a</td> </tr> </table>	TC	0	n/a				
TC	0	n/a					
Disconnection Instruction <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>TA</td> <td>n/a</td> <td>n/a</td> </tr> </table>	TA	n/a	n/a	Acknowledgment <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>TK</td> <td>n/a</td> <td>1</td> </tr> </table>	TK	n/a	1
TA	n/a	n/a					
TK	n/a	1					
Regular Order <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>OE</td> <td>n/a</td> <td>5</td> </tr> </table>	OE	n/a	5	Acknowledgment <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>TM</td> <td>n/a</td> <td>1</td> </tr> </table>	TM	n/a	1
OE	n/a	5					
TM	n/a	1					
	Out of sequence <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>TO</td> <td>n/a</td> <td>1(*)</td> </tr> </table>	TO	n/a	1(*)			
TO	n/a	1(*)					
	Client is disconnected Must send a Connection message						
	(*): Expected User Sequence ID						

In the example above, the client sends an incorrect User Message ID, the Exchange then responds with an Out of Sequence message (TO). The incoming message is not processed and the user is disconnected. The 'Out of Sequence' message indicates the expected User Sequence Number.

The user must reconnect and restart with its User Sequence ID equal to the value indicated in the User Connection Acknowledgement message (TK). Another example is illustrated below:

Participant	LSE						
Regular Order							
<table border="1"> <tr> <td>OE</td> <td>n/a</td> <td>4</td> </tr> </table>	OE	n/a	4				
OE	n/a	4					
Regular Order	Acknowledgment						
<table border="1"> <tr> <td>OE</td> <td>n/a</td> <td>5</td> </tr> </table>	OE	n/a	5	<table border="1"> <tr> <td>KE</td> <td>aa7</td> <td>4</td> </tr> </table>	KE	aa7	4
OE	n/a	5					
KE	aa7	4					
Regular Order	Acknowledgment						
<table border="1"> <tr> <td>OE</td> <td>n/a</td> <td>7</td> </tr> </table>	OE	n/a	7	<table border="1"> <tr> <td>KE</td> <td>aa8</td> <td>5</td> </tr> </table>	KE	aa8	5
OE	n/a	7					
KE	aa8	5					
	Out of sequence						
	<table border="1"> <tr> <td>TO</td> <td>n/a</td> <td>6*</td> </tr> </table>	TO	n/a	6*			
TO	n/a	6*					
	Client is disconnected Must send a Connection message						
	*: Expected User Sequence ID						

3.5.3 End of Transmission



SOLA sends an 'End of Transmission' message (TT), indicating the end of the session.

The next trading day, clients must start the connection cycle and reset their User Sequence ID counter.

In this example, the last inbound message (order with User Sequence number of 6) will not receive a response.

4 Order Management

4.1 Order Entry

4.1.1 Order Types

4.1.1.1 Limit Orders

Limit Orders entered into the order book are executed at the price stated or better. Any residual volume, left after part of a Limit Order has traded, is retained on the order book until it is withdrawn or traded (unless designated Immediate). A limit order is submitted by setting the Price Type field of ORDER ENTRY (OE) message to "L".

4.1.1.2 Top Order

Top Orders entered into the book are executed at the best price available in the market for the total quantity available from any contra bid or offer. Any residual volume after partial execution is automatically converted to a limit order at the price at which it was just executed. A Top Order is submitted by setting the Price Type field of ORDER ENTRY (OE) message to "M".

Top Orders on a strategy instrument entered into the book are also executed at the best available price in the market for the total quantity available from contra orders. However, if there are implied limits which offer a better price than the opposite real limits in the strategy book, the incoming Top Strategy order will trade at each of the implied limits until there is no more remaining quantity. If the Top Strategy order is partially filled after being matched with the implied orders, the remaining quantity will then trade against contra orders at the best executable price in its own (strategy) book. Any residual volume left after all trades (implied and own-book trades) will be booked as a limit order at the last executed price.

4.1.1.3 Market Order

Market Orders entered into the order book are executed at the best price available in the market until all available volume on the opposite side of the market has been traded. Any residual volume left is automatically converted to a limit order at the latest price at which the original order was executed. A Market Order is submitted by setting the Price Type field of the ORDER ENTRY (OE) message to "W".

4.1.1.4 Committed Order

If a pre-arranged trade occurs between different members (inter-bank), then both parties involved must submit a committed order to complete the transaction at the Exchange. Committed Orders do not interact with the instrument order book. A Committed Order is submitted by setting the Price Type field of ORDER ENTRY (OE) message to "C". A Committed Order must include the opposite member firm in the order message.

A Committed Order can only match with an opposite Committed Order sharing the following criteria:

- Orders have opposite side (Buy / Sell)
- Same Price
- Same Quantity
- In both Committed Orders, Opposite Firm equal the Opposite Firm

Committed order book is not disseminated to the external market and a Committed Order will remain in the committed order book until the order:

- Trades
- Is deleted
- Is automatically cancelled at the end of the current trading day

4.1.1.5 Two Sided Order (Message Type OX) or Cross Order

If a pre-arranged trade occurs where both parties are from the same member then the member submits a Two Sided Order to complete the transaction at the Exchange. A Two Sided Order does not interact with the instrument order book. The same member must be on both sides of the order. A Two Sided Order can be rejected or traded at reception.

4.1.1.6 Cross/Committed orders (including Block) on strategies

As for internal/committed cross orders on individual series, the price of each leg of the strategy could be validated against the existing bid-ask spread available on the market.

Since strategies are inserted with a "Net price" an algorithm has been implemented to:

- attribute a price to each leg of the strategy, consistently with the total net price of the strategy;
- verify that such prices – individually - are consistent with the maximum allowed price deviations from the best bid ask spread available on the order book.

The cross trade will be accepted only if all the legs of the strategy pass the validation

Hereafter an example of the leg price calculation is provided

Ex:

Buy MIBO put and call at strike of 17,000 pts., at a price of 2,850 pts (theoretical: $975+1,680=2,655$); quantity of 500 standard contracts (block trade – min. size for blocks = 100 standard contracts)

For blocks of FTSE MIB option series, the tolerance band is currently set at best bid-ask spread plus/minus 10%.

Current Market:

Instrument	Side	Qty	Tolerance	Cont. Size	Tick	Bid	Ask	Last	Ref.
MIBO2I17000	Buy	500	10% (850.5–1,072.5)	2.5	5	945	975	975	980
MIBO2U17000	Buy	500	10% (1,480.5–1,848)	2.5	5	1,645	1,680	n/a	1.615

First step:

- The first leg MIBO2I17000 is assigned 960 (mid-point)
- The second leg MIBO2U17000 is assigned with the difference = 1,890 (2,850-960)
- The second leg price is outside the current market (max. is 1,680) and the tolerance band (max. is 1,848). The system stores the distance from the limit of the best bid-ask = 210 (1,890-1,680) and tolerance band = 42 (1,890-1,848).

Second step:

- The system pushes the price of the second leg at the first tick value inside the tolerance limit (1,845), since the max. (1,848) does not respect the tick table
- It is not possible to increase the price of the first leg while remaining inside the current market (960+45=1,005 > 975), but
- It is possible to increase the price of the first leg while remaining inside the tolerance band (960+45=1,005 < 1,072.5). So, MIBO2I17000 is adjusted to 1,005 (960+45).

So generated trades are:

- 1 contract MIBO2I17000, quantity 500 lots, @1,005
- 1 contract MIBO2U17000, quantity 500 lots, @1,845

4.1.2 Price Terms

4.1.2.1 Stop and If Touched

STOP orders and IF TOUCHED orders are triggered when their trigger price is reached (i.e., Last traded price is equal to Trigger price). When triggered, they enter the book as new incoming orders. If the Special Price Term field of an Order Entry (OE) message is set to STOP or IF TOUCHED then the trader must specify a price under additional price (trigger price).

The following table illustrates all possible triggering surfaces:

Triggering Surface	Verb	Price Term
Trigger Price ≥ LAST	Buy	T: If Touched
	Sell	S: Stop
Trigger Price ≤ LAST	Buy	S: Stop
	Sell	T: If Touched
Trigger Price ≥ BID	Buy	F: If BID Touched
	Sell	E: Stop on BID
Trigger Price ≤ BID	Buy	E: Stop on BID
	Sell	F: If BID Touched
Trigger Price ≥ ASK	Buy	H: If ASK Touched
	Sell	I: Stop on ASK
Trigger Price ≤ ASK	Buy	I: Stop on ASK
	Sell	H: If ASK Touched

The trigger validation is performed only once the order creating new trigger conditions is completely processed. All orders triggered following a change in the trigger conditions (BID/ASK/LAST) are sorted by time priority and sequentially submitted in the instrument order book. If the state instrument order book does not allow order entry then the triggered order is cancelled.

4.1.3 Quantity Terms

4.1.3.1 Minimum Quantity

If the Quantity Term is set to MINIMUM (Quantity Term set to 'M'), the order has to be traded for at least the Additional Quantity when the order is processed by the trading engine. If not, the order is rejected.

For a strategy order with a Minimum Quantity, the Trading Engine evaluates if the order can be executed against opposite orders in the same strategy book, otherwise the order is rejected, even though the incoming strategy order may trade against implied orders for the minimum quantity specified at a better price than the market in its own-book.

4.1.3.2 Disclosed Quantity (Iceberg order)

If the Quantity Term is set to DISCLOSED (Quantity Term set to 'D'), the order is booked for its total quantity; however, the system broadcasts only the Additional Quantity. When the Disclosed quantity is totally traded, the order loses its time priority and the system shows to the market the lesser of either the Additional Quantity or Remaining Quantity.

In the case of several strategy orders from different strategy instruments, each with a Disclosed quantity, trading against an implied-out (outright) leg order, the Trading Engine will maintain a time-priority across the different strategy books if the Disclosed quantity for a given strategy order is totally traded.

If a Quantity Term is selected, the Additional Quantity field must be filled. Additional Quantity must be less than Order Quantity.

4.1.4 Order Duration Types

When submitting an order to the Exchange, clients must provide one of the duration types given below.

4.1.4.1 Day

Orders designated as 'Day' will remain on the book until the order:

- trades
- is deleted
- is automatically cancelled at the end of the current trading day

A 'Day' order is submitted by setting the Duration Type field of the ORDER ENTRY (OE) message to 'J'.

4.1.4.2 Good Till Day (GTD)

Orders designated as “Good Till Day” will remain on the book until the order:

- trades
- is deleted
- is automatically cancelled at the end of the day specified in the “GTD Date” field

A ‘GTD’ order is submitted by setting the Duration Type field of ORDER ENTRY (OE) message to “D” plus the GTD Date field is set to the date upon which the order must expire.

4.1.4.3 Good Till Cancelled (GTC)

Orders designated as ‘Good Till Cancelled’ will remain on the book until the order:

- trades
- is deleted
- is automatically cancelled on expiration of the contract month to which the order is related

4.1.4.4 Immediate Orders (FAK)

Immediate Orders (also known as Immediate or Cancel - IOC) are immediately executed against any existing orders at the specified price or better up to the volume of the Immediate order. Any residual volume, left after part of the Immediate order was traded, will be automatically deleted.

An Immediate order is submitted by setting the Duration Type field of ORDER ENTRY (OE) message to ‘E’.

4.1.4.5 While Connected Orders

Orders designated as “While Connected” will remain in the book until the order:

- Trades
- Is deleted
- Is automatically cancelled following a Participant disconnection
- Is automatically cancelled in the event of a SAIL Front End failure
- Is automatically cancelled at the end of the current trading day

A “While Connected” order is submitted by setting the Duration Type field of ORDER ENTRY (OE) message to ‘W’.

4.1.5 General Processing (Buy or Sell Order)

To enter an order, the client sends an ORDER ENTRY (OE) message. For the specifications of these messages, refer to the SAIL Specifications guide and the IDEM to SOLA Message Modifications document. This message will contain the Client’s User Sequence ID.

SOLA performs validation on the parameters of the ORDER ENTRY (OE) message received.

If validation fails, SOLA sends an ERROR MESSAGE (ER/TE) rejecting the message received and indicating the code for the first error detected and the message type for the message generating the error along with its User Sequence ID.

If validation is successful, SOLA accepts the message received and populates an Order ID to the order entered. This ID is unique by instrument and by day. SOLA sends the client an acknowledgement for the order entered via an ORDER ACKNOWLEDGEMENT (KE) message. The ORDER ACKNOWLEDGEMENT message will contain the unique Order ID. It also contains the User Sequence ID which enables the client to reconcile the acknowledgment to the original message entered.

An ORDER ACKNOWLEDGEMENT indicates that the order has been:

- Entered on the order book (Status = “ ”, a part of the order having possibly been executed)
- Eliminated (Status = E)
- Executed in full, or Partially for IOC orders (Status = X)

If an order is either partially or fully executed, the client receives, immediately after the ORDER ACKNOWLEDGEMENT (KE) message, one or several EXECUTION NOTICE (NT) messages providing additional information related to the transaction that took place.

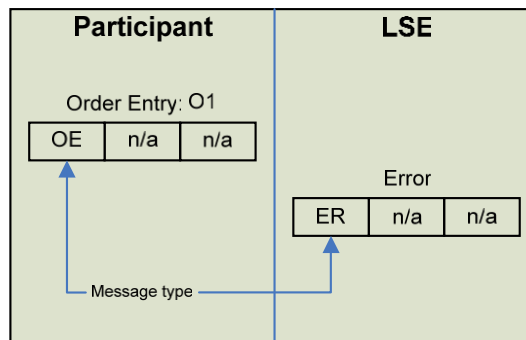
If the order was on a strategy instrument, the client also receives LEG EXECUTION NOTICE (NL) messages providing additional information related to the price and quantity at which each of the individual legs of the strategy instrument traded.

If the order has been booked, the client will automatically receive at a later time one of the following messages:

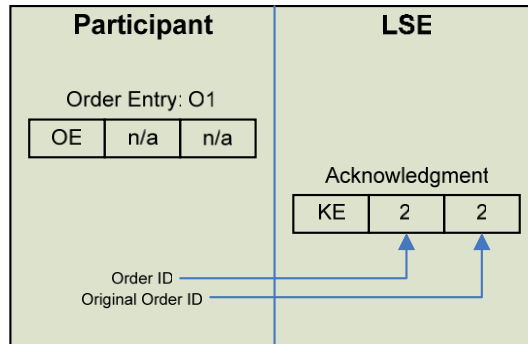
- One or more EXECUTION NOTICE (NT) messages
- In the case of a strategy: several LEG EXECUTION NOTICE messages (NL) in addition to the EXECUTION NOTICE. Each NL message can be linked to its parent strategy trade (EXECUTION NOTICE (NT) on the strategy instrument) message by the ‘Strategy Instrument ID’, ‘Strategy Group’ and ‘Strategy Trade Number’ fields
- An ORDER ELIMINATION (NZ) message

All messages related to an order (execution notice, cancellation notice, order acknowledgement) contain the current Order ID and the Original Order ID. The User Sequence ID is set to zeroes.

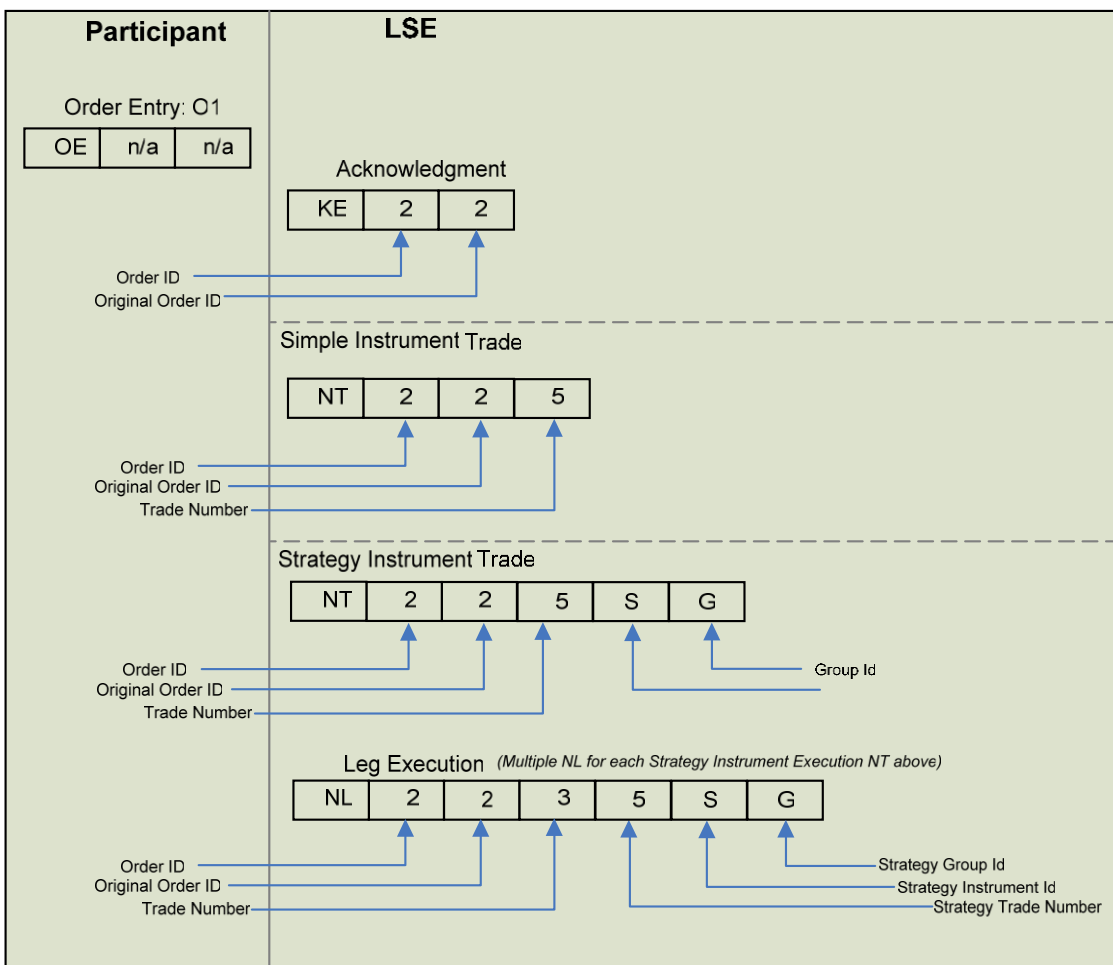
Order entry with rejection:



Order entry without execution:



Acceptance and Execution of an Order/Strategy Order:



4.2 Order Modification

A participant may amend all orders self-entered or entered by the Exchange on their behalf. A participant cannot modify an order if it has been fully executed, deleted or cancelled.

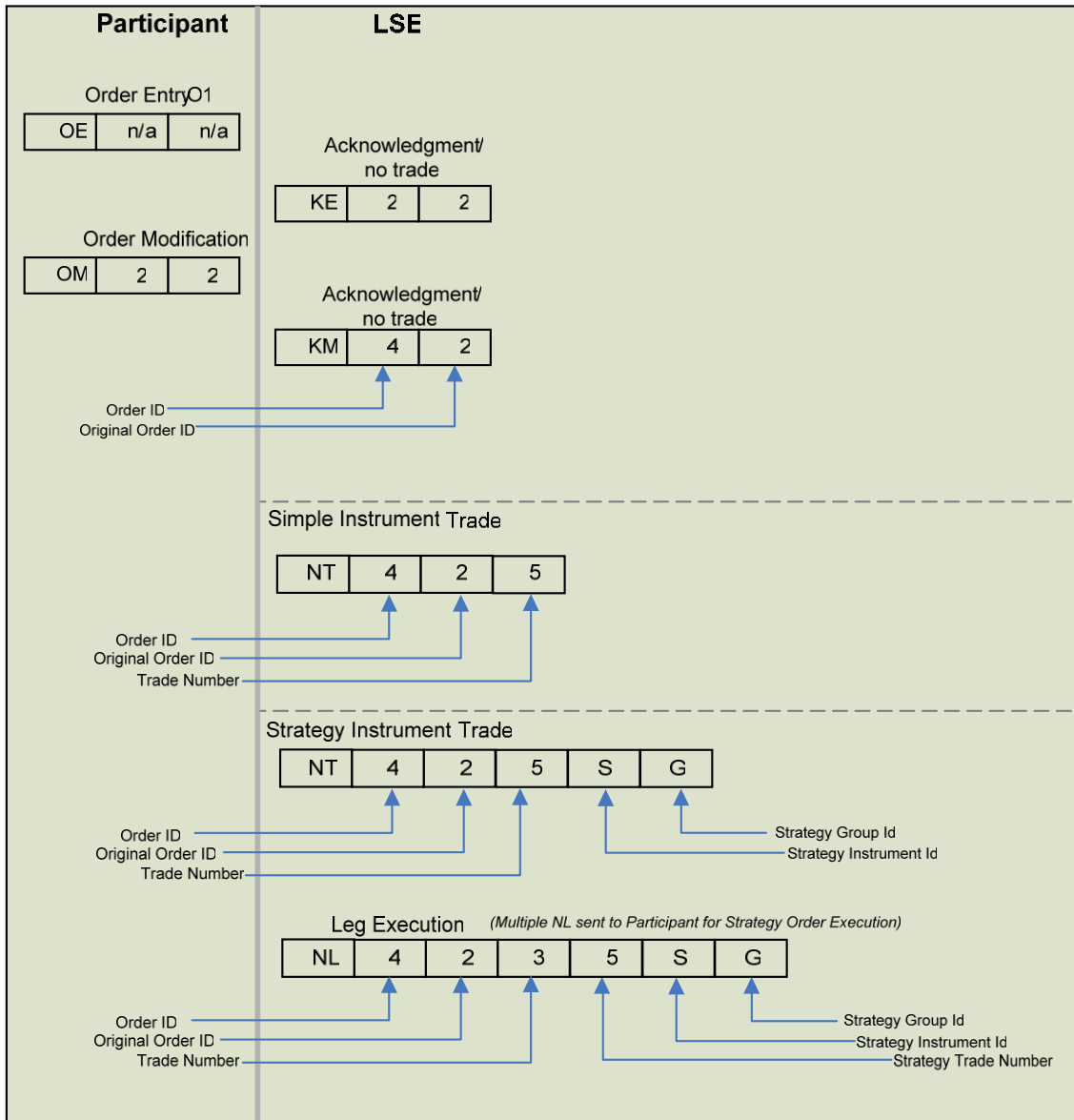
A participant cannot modify the instrument ID or the side of the order. With the exception of a quantity reduction, in which case the order retains price/time priority, a modified order is eliminated from the order book and replaced by a new one.

To modify an order, the CLIENT sends an ORDER MODIFICATION (OM) message.

SOLA performs validation on the order details received. When an error is detected in the incoming message, SOLA returns an ERROR MESSAGE (ER/TE) specifying the error.

If the message is valid, SOLA replaces the original order from the order book with the new one, to which it attributes a new order ID. It sends the acknowledgement of the modification in the form of an ORDER MODIFICATION ACKNOWLEDGEMENT (KM) message. This message contains the new order ID attributed to the modified order, the Original Order ID (Order ID of the modified order) and the revised characteristics of the order.

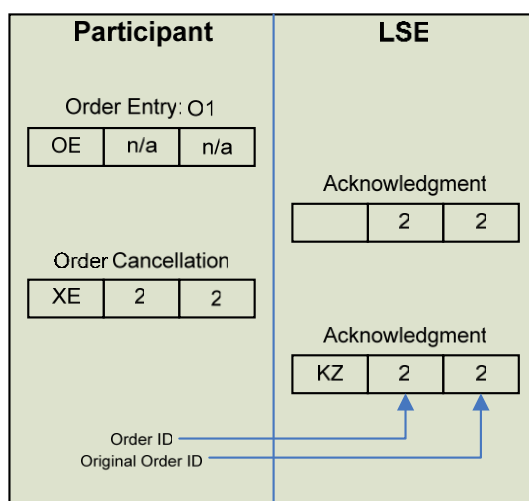
The modified order's status takes the same values as for Order Entry acknowledgements.



4.3 Order Cancellation

Participants may cancel all orders entered either by themselves or on their behalf by the Exchange. Cancellations will only be valid for orders, or part of an order, which are currently booked.

To cancel an order, the client sends an ORDER CANCELLATION (XE) message. If the cancellation is valid, SOLA sends the acknowledgement of the cancellation in the form of an ORDER CANCELLATION ACKNOWLEDGEMENT (KE) message (Status = A: 'Order cancelled by the trader')



If the ORDER CANCELLATION is not valid, SOLA sends an ERROR (ER/TE) message indicating the error code for the first error detected.

A client can also cancel an order entered by another client belonging to the same Participant. The client that sent the cancellation request will, however, take ownership of the order and receive the ORDER CANCELLATION ACKNOWLEDGEMENT (KZ) message confirming the cancellation.

4.4 Unsolicited Services

4.4.1 Entry or Cancellation of an Order by the Exchange

The Exchange may enter or cancel orders on behalf of a Participant.

The cancellation can be done for orders entered by the Exchange in the Participant's account.

This action can take place during:

- Order Cancellation
- Trading Session

If the Exchange enters an order on behalf of a participant, the client receives an ORDER ACKNOWLEDGEMENT (KE) message. Clients will also receive all messages related to this

order: EXECUTION NOTICE (NT), LEG EXECUTION NOTICE (NL) for a strategy order, ORDER ELIMINATION (NZ). All messages related to orders entered by the Exchange are sent to all Participants' connections with a User Sequence ID set to zeroes.

Clients will receive a NOTICE OF CANCELLATION (NZ) for any orders cancelled on their behalf.

4.4.2 Elimination of an Order

The table below describes all the scenarios where order elimination may occur **without** the participant sending a cancellation message.

Reason for Elimination	
The order price is outside the instrument limit price	ORDER ELIMINATION (NZ) messages are sent to the Clients concerned.
During the instrument opening Market Order without opposite order are eliminated.	ORDER ELIMINATION (NZ) messages are sent to the Clients concerned.
Participant disconnection eliminates While Connected Order.	ORDER ELIMINATION (NZ) messages are sent to the Clients concerned.
Instrument state does not allow order with disclosed quantity.	ORDER ELIMINATION (NZ) messages are sent to the Clients concerned.
Cancellation of an order by the Exchange	Possible during: Order Cancellation, Trading Session, Exchange Intervention, Consultation End of Day, and Group Interruption. ORDER ELIMINATION (NZ) messages are sent to the clients concerned.
Instrument has expired, updated or is deleted	Carried out during Mini Batch or Post-session. ORDER ELIMINATION (NZ) messages are sent
IOC orders partially filled or not filled	ORDER ELIMINATION (NZ) messages are sent
Validity of the order is reached	Carried out at the end of each trading day just before or during Mini Batch. Also carried out at the end of the week (last trading day of the weekly session) just before Post-session

4.4.3 Cancellation of a Trade by the Exchange

If required, the Exchange can cancel a trade that took place during the day. This cancellation can be initiated in accordance with Exchange rules.

This can take place during:

- Order Cancellation
- Trading Session
- Exchange Intervention
- Consultation End
- On an Interrupted group

SOLA sends the two clients concerned a TRADE CANCELLATION NOTICE (NX) message. This message specifies all the parameters related to the cancelled trade.

5 Quote Management

5.1 Bulk Quote Data

Before entering a Bulk Quote, participants must specify the clearing data for all trades that may occur as a result of their quotes.

The Market Maker must send this data using the BULK QUOTE DATA (BD) message for each group for which he is a registered Market Maker.

A Bulk Quote Data message is acknowledged by the BULK QUOTE DATA ACKNOWLEDGMENT (KD) message containing a Quote ID. This Quote ID references the current Order ID and the Original Order ID for all trades resulting from a Quote on any instrument of the group for the trader.

5.2 Entry of a Bulk Quote

Bulk Quote entry allows traders to enter multiple quotes within the same message for instruments in the same group. They provide a more efficient way for a Market Maker to send quotes to the trading system.

Clients may enter a BULK QUOTE (Qi) message containing 1 to 280 separate quote(s). SOLA validates the message and each quote within the message.

If the BULK QUOTE (Qi) message is not valid, SOLA responds with an ERROR (ER/TE) message indicating the error code for the first error detected.

If the message is valid, SOLA sends a BULK QUOTE CONFIRMATION (LA) message. If a particular quote cannot be processed, the BULK QUOTE CONFIRMATION indicates the Quote number and the error code for this particular quote.

Quotes are valid only for the current Trading Day.

5.3 Entry of a Global Cancellation

The GLOBAL CANCELLATION (GC) message allows the participant to cancel all quotes related to a specific trader on all instruments in the same class with one message. The Trader ID and the instrument Group ID are used to specify which quotes to cancel.

The GLOBAL CANCELLATION (GC) message is available to all participants to cancel quotes placed with the BULK QUOTE (Qi). The GLOBAL CANCELLATION message is acknowledged by the GLOBAL CANCELLATION CONFIRMATION (KG) message.

5.4 Entry of a Request for Quote

Request for Quote entry allows participants to broadcast a REQUEST FOR QUOTE to other participants.

The client enters a REQUEST FOR QUOTE message containing the Group ID, Instrument ID Code and possibly a quantity. If the message is valid, the client receives a STANDARD ACKNOWLEDGEMENT (KO) message.

If the REQUEST FOR QUOTE (RQ) message is not valid, SOLA sends an ERROR (ER/TE) message indicating the error code for the first error detected.

Please refer to the HSVF Specifications for market dissemination messages.

5.5 Market Maker Monitoring

There are two types of Market Maker Monitoring:

- Market Maker Obligation to continuously provide a number of valid quotes
- Market Maker Obligation to respond to a REQUEST FOR QUOTE

Market Maker obligations are evaluated following:

- Grace Period expired following instrument state change
- Quote update
- Obligation Surface update
- Request For Quote

The Monitoring Status (MM) message provides the Market Maker with real-time information on their quoting obligation. Every time a Market Maker is in infraction and the grace period expired, a status update is sent to the Market Maker.

The grace period is defined by the exchange in order to allow Market Makers a predefined period of time to replace a missing or invalid quote following:

- Trade
- Market Maker Protection
- Deliberate Quote Removal

In order to enhance the information available for Market Makers (MM), two different messages are disseminated.

They will be disseminated for each update of the MM obligation surface, but at least twice per day showing the ATM (At-the-Money) value and the ATM series respectively:

The Sail "IX" ATM value message includes: -

- The identifier of Instrument Group (for each underlying of option contracts)
- The underlying price .

The Sail "MU" ATM series message includes: -

- The Identifier of the group

- The identifier of at-the-money series (for each underlying of option contracts and for each expiry).

5.6 Market Maker Protection

The SOLA Market Maker Protection feature is designed to protect market making participants from "excessive" trades due to the following:

- Technical problems at Participant's end preventing normal market updates
- Quoting errors at Participant's end due to erroneous underlying price information
- Unintentionally being "swept" by another Market Maker

SOLA provides several protection counters and each counter can trigger the Market Maker Protection if its value is equal to or greater than the parameter provided by the Trader. SOLA provides two types of Market Maker Protection; Standard and Advanced. The first is enabled by default for all Market Makers and the second is optional and requires special message handling.

5.6.1 Protection Counters

The following lists all the protection counters available. These counters can be set by the Trader using the Bulk Quote Data (BD) message. Functionally, protection counters are provided for each class where the Trader is assigned as Market Maker.

Trade Counter (disabled for IDEM): This counter is incremented by one every time the Trader executes a trade of at least N lots on any instrument of the given class. Once the counter has reached a defined threshold the Market Maker Protection is triggered.

Formula:

$$\text{Maximum Trade} = \sum \text{Trade Occurrence (Trade Volume} > \text{Minimum Volume)}$$

Volume Counter: This counter is incremented by the trade volume every time a Trader executes a trade on any instrument of a given class. Once the counter has reached a defined threshold the Market Maker Protection is triggered.

Formula:

$$\text{Maximum Volume} = \sum \text{Volume}$$

Value Counter (disabled for IDEM): This counter is incremented by the trade value every time the Trader executes a trade on any instrument of a given class.

Formula:

$$\text{Maximum Value} = \sum (\text{Trade Volume} \times \text{Price} \times \text{Contract Size} \times \text{Tick Value})$$

Delta Volume Counter: This counter is incremented or decremented by the trade volume every time the Trader executes a trade on any instrument of a given class. This counter determines the net underlying position using the type of option transacted and the action to buy or sell as conditions.

Formula:

Option Delta Volume = Absolute \sum ((Buy Call Volume + Sell Put Volume) – (Sell Call Volume + Buy Put Volume))

Future Delta Volume = Absolute \sum (Buy Volume – Sell Volume)

Delta Value Counter (Disabled for IDEM): This counter is incremented or decremented by the trade value every time the Trader executes a trade on any instrument of a given class. This counter determines the net underlying position using the type of option transacted and the action to buy or sell as conditions. This counter used in combination with the delta volume enables protection against out of the money.

Formula:

Option Delta Value = Absolute \sum (Buy Call or Sell Put Volume x Price x Contract Size x Tick Value) – (Sell Call or Buy Put Volume x Price x Contract Size x Tick Value)

Future Delta Value = Absolute \sum (Buy Volume x Price x Contract Size x Tick Value) – (Sell Volume x Price x Contract Size x Tick Value)

5.6.2 Counter Reset

If no time interval is provided by the trader, then the counter is reset every time the Trader sends a quote message to refresh the market previously posted on at least one of the class instruments.

If a time interval is provided by the Trader then the counter is reset if the interval of time between two trades is greater than the time interval provided by the trader.

5.6.3 Triggered Market Maker Protection

Once triggered, the Exchange automatically cancels all quotes posted by the Trader on the class. This feature “protects” both quotes currently booked and incoming quotes that the Market Maker may generate as part of an update. As soon as the Market Maker protection is triggered, the participant receives a NOTICE OF CANCELLATION OF ALL QUOTES (NP) message to confirm that the quotes currently live have been removed.

5.6.3.1 Standard Market Maker Protection

If the Market Maker Protection is triggered on an instrument class the counter is reset when the Trader sends a quote message on any instrument of this instrument class.

5.6.3.2 Advanced Market Maker Protection

Combined with the Standard Market Maker protection, the Advanced Market Maker Protection provides participants with an additional layer of defence. This feature may be enabled or disabled, on demand, by Market Makers using the MARKET MAKER PROTECTION SUBSCRIPTION (RP) message.

Quoting for the Trader is disabled once the Advanced Market Maker Protection is triggered. Any subsequent quote update is rejected. The Trader restores its quoting capacity by sending a new MARKET MAKER PROTECTION SUBSCRIPTION (RP) message.

APPENDIX - SAIL Message Flow

This section details the message sequencing for the SAIL Protocol. Please refer to the SAIL Specifications Guide and the IDEM to SOLA Message Modifications document for details about message types and definitions.

6.1 General Messages

A Group of Instruments is Opening:

PARTICIPANT		EXCHANGE
	Group Status = Trading Session ←	NG

Authorize / Forbid / Reserve Order Entry:

PARTICIPANT		EXCHANGE
	←	NI

Interrupt / Forbid an Instrument Group:

PARTICIPANT		EXCHANGE
	←	NG

6.2 Order Processing

Order is rejected:

PARTICIPANT		EXCHANGE
OE	→	
	←	ER/TE

Order is accepted but not executed:

PARTICIPANT		EXCHANGE
OE	→	
	Order Status = Booked ←	KE

Order is accepted and partially executed:

PARTICIPANT		EXCHANGE
OE	→	
	← Order Status = Booked	KE ¹
	←	NT
	←	NL ²
1. The order acknowledgement indicates the quantity traded at order entry. 2. Several Leg Execution Notices also sent to Participant if OE is on a Strategy Instrument		

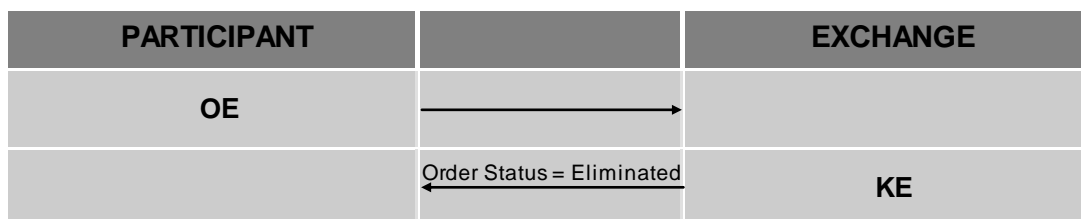
Order is accepted and fully executed:

PARTICIPANT		EXCHANGE
OE	→	
	← Order Status = Traded	KE
	←	NT ¹
	←	NL ²
1. In all Execution scenarios, SOLA will automatically set the 'ID Code for Counterpart Participant' field to the receiving firm's Participant ID if the participant traded against one of its own orders. 2. Several Leg Execution Notices also sent to Participant if OE is on a Strategy Instrument		

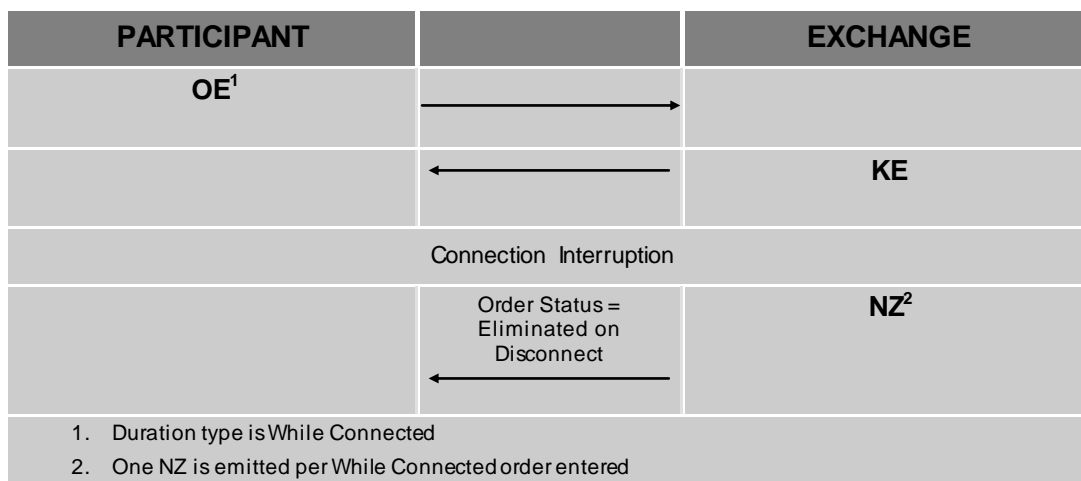
Immediate Order is partially executed in Trading Session:

PARTICIPANT		EXCHANGE
OE	→	
	← Order Status = Executed	KE
	←	NT
	←	NL ¹
	←	NZ
1. Several Leg Execution Notices also sent to Participant if OE is on a Strategy Instrument		

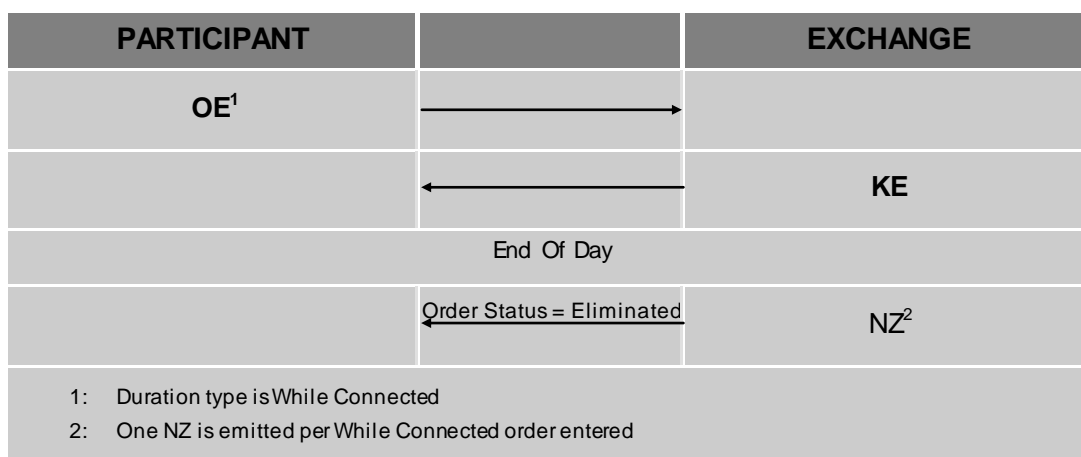
Immediate Order is not executed in Trading Session:



While Connected orders cancelled on disconnection with the Exchange:

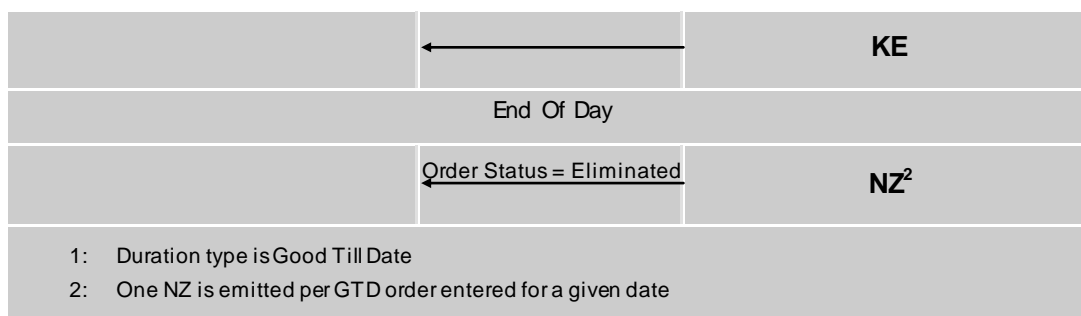


While Connected orders cancelled on EOD Mini batch:

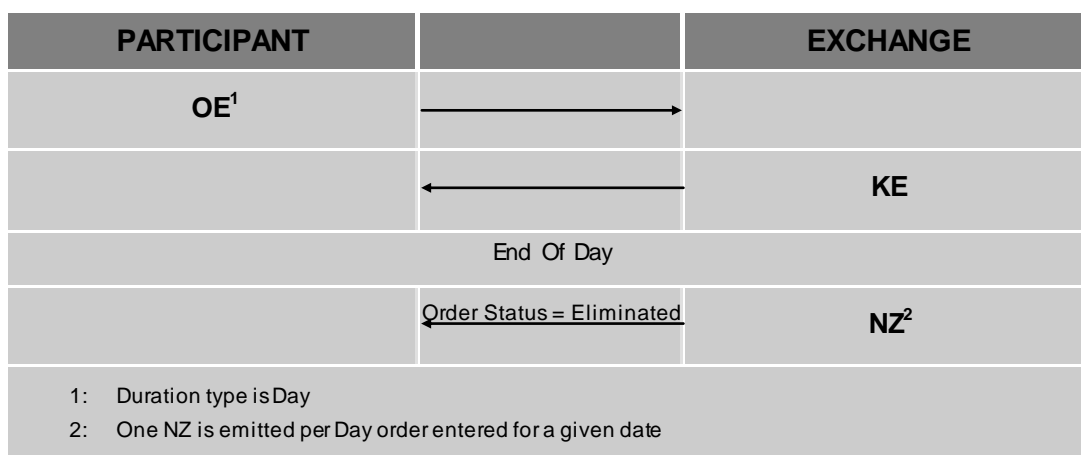


Good Till Date orders cancelled on date reached:

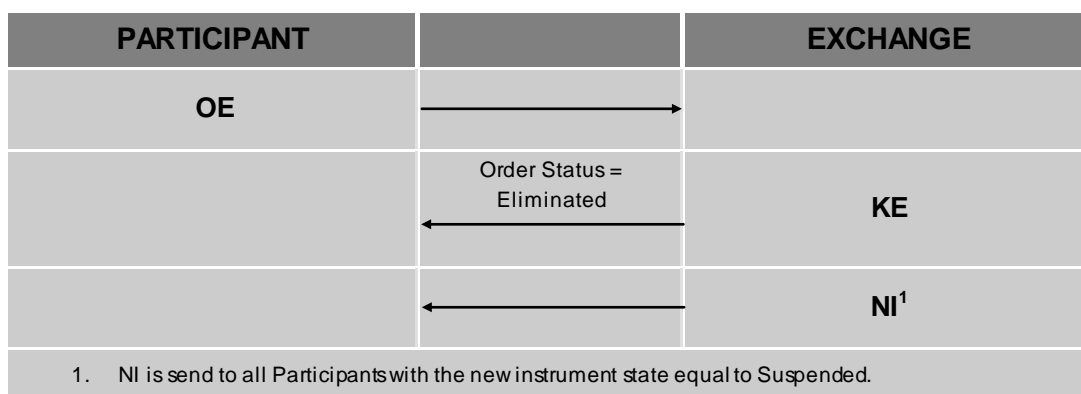




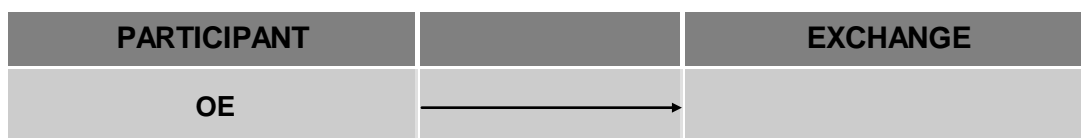
Day orders cancelled during the end of day process:



Limit Order Trigger Circuit Breaker when the Circuit Breaker State is Suspended:



Limit Order Trigger Circuit Breaker and when the Circuit Breaker state is Reserved:



	← Order Status = Booked	KE
	←	NI ¹
1. NI is send to all Participants with the new instrument state equal to Reserved.		

Order eliminated by an instrument limit update (X Validation):

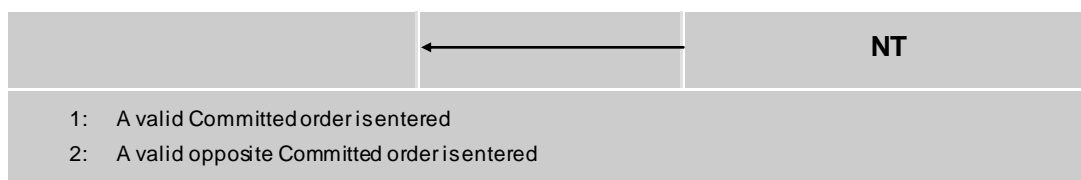
PARTICIPANT		EXCHANGE
OE	→	
	← Order Status = Booked	KE
Instrument Limit Update (X Validation)		
	← Order Status = Eliminated	NZ ¹

Incoming limit order with outside the instrument minimum or maximum price. (X Validation):

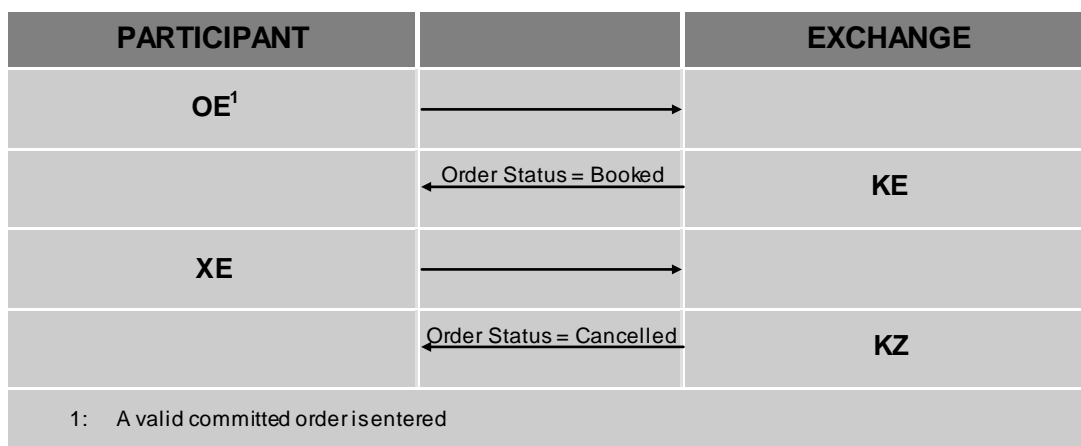
PARTICIPANT		EXCHANGE
OE	→	
	← Order Status = Eliminated	KE

Committed orders traded:

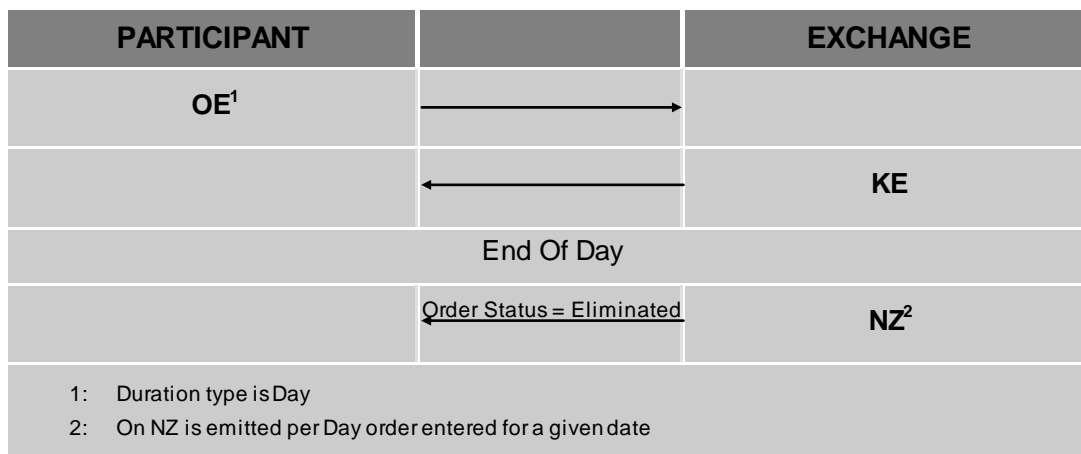
PARTICIPANT		EXCHANGE
OE ¹	→	
	← Order Status = Booked	KE
OE ²	→	
	← Order Status = Executed	KE
	←	NT



Committed order cancelled by participant before it trades:



Pending Committed order cancelled during the End Of Day Process:



Entering an Accepted Cross Order



	←	KO
	←	NT (2 times)

Cross Order Rejected

PARTICIPANT		EXCHANGE
OX	→	
	←	ER/TE

6.3 Modification Processing

Modification is rejected:

PARTICIPANT		EXCHANGE
OM	→	
	←	ER/TE

Modification is accepted:

PARTICIPANT		EXCHANGE
OM	→	
	←	KM

Modification is Accepted, Order Trades against 3 Counterparts

PARTICIPANT		EXCHANGE
OM	→	
	←	KM
	←	NT

	←	NT
	←	NT

6.4 Quote Processing

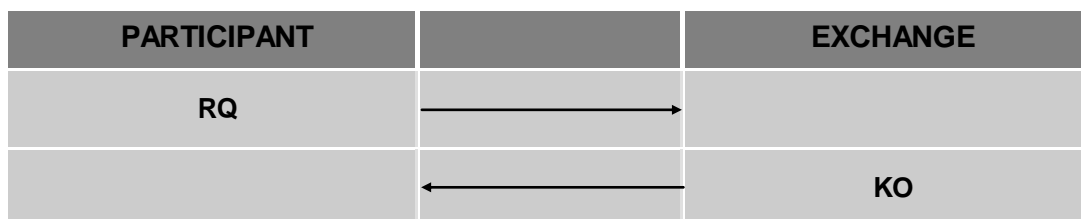
Entering or Modifying Quotes:

PARTICIPANT		EXCHANGE
BD ¹	→	
	←	KD
Qi ²	→	
	←	LA ²
<p>1. The clearing data present in the BD message are valid for all the Bulk quotes sent by this trade until either another BD message is sent or the end of the session.</p> <p>2. The Message Type for bulk quote messages varies depending on the volume of quantity and price. Please refer to the SAIL Specifications Guide for more information.</p>		

Entering or Modifying Quotes that Trade:

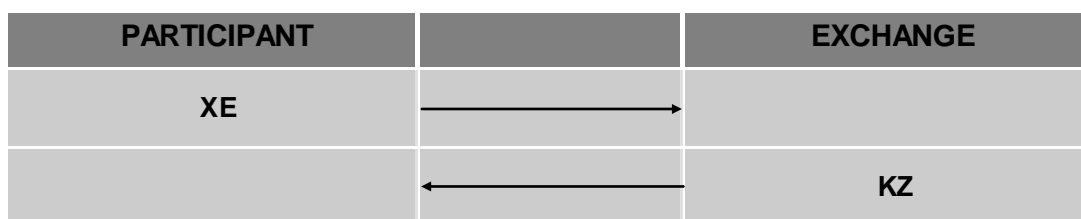
PARTICIPANT		EXCHANGE
Qi	→	
	←	LA
	←	NT
	←	NL ¹
	←	NT
<p>NOTE: One execution notice (Message Type NT) per trade.</p> <p>1. Several Leg Execution Notices also sent to Participant if Qi is on a Strategy Instrument</p>		

Request for Quote:

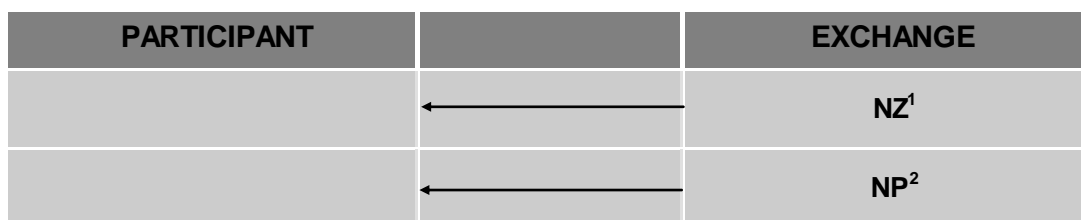


6.5 Cancellation Processing

Cancellation is accepted:



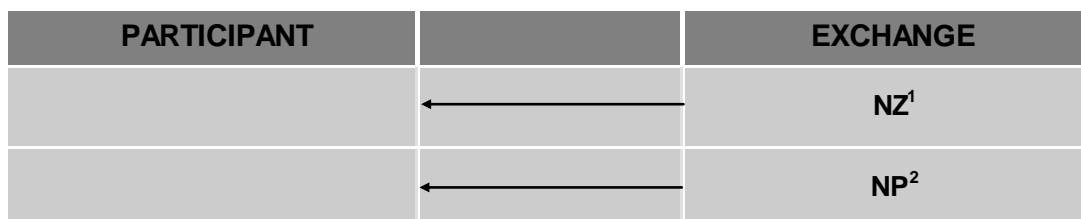
Cancellation of all Quotes and Orders for a Member for a Particular Group of Instruments (Initiated by the Exchange):



NOTE: This command cancels all orders and quotes belonging to a given member for a particular group of instruments.

1. One NZ message for each cancelled order.
2. A single NP message for all the cancelled quotes for the instruments belonging to the group.

Eliminate all Orders for an Instrument (Initiated by the Exchange)



1. One NZ message for each cancelled order.
2. One NP message to all membersto indicate that all quotes for all instruments on that group have been cancelled.

Cancel all Quotes of a Market Maker or a Group (Initiated by the Exchange):

PARTICIPANT		EXCHANGE
	←	NP ¹
1. A single NP message for all the cancelled quotes.		

Cancel all Quotes of a Group for a Market Maker (Global Cancellation):

PARTICIPANT		EXCHANGE
GC	→	
	←	KG

6.6 Trade Messages

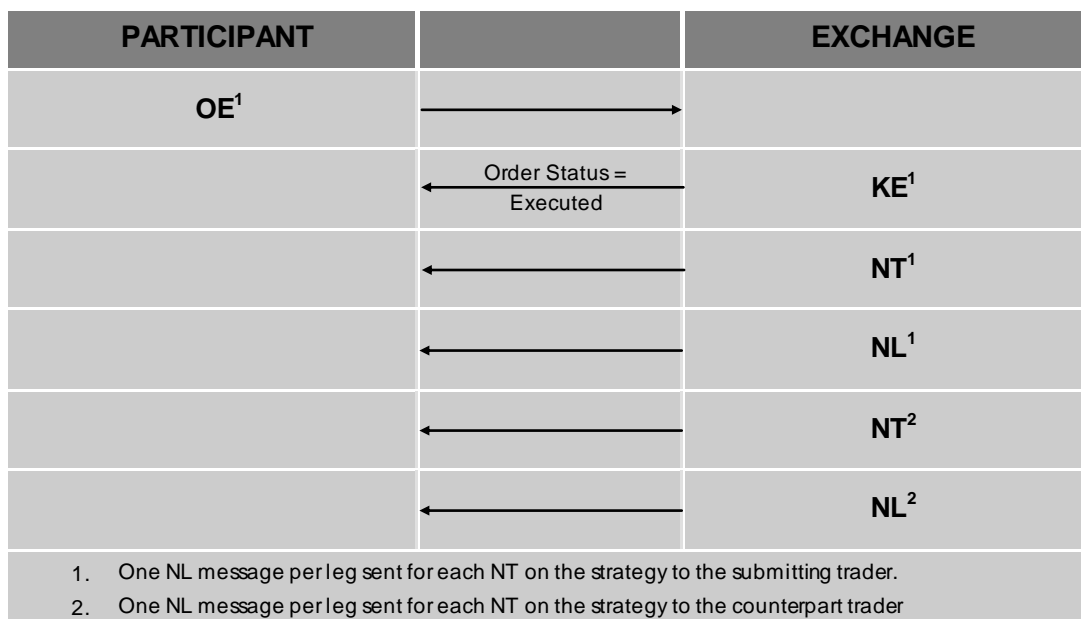
Create Manual Trade with or without Impact on the Last Price (Performed by the Exchange):

PARTICIPANT		EXCHANGE
	←	NT
	←	NL ¹
1. Several Leg Execution Notices NL sent for each NT if instrument is a strategy.		

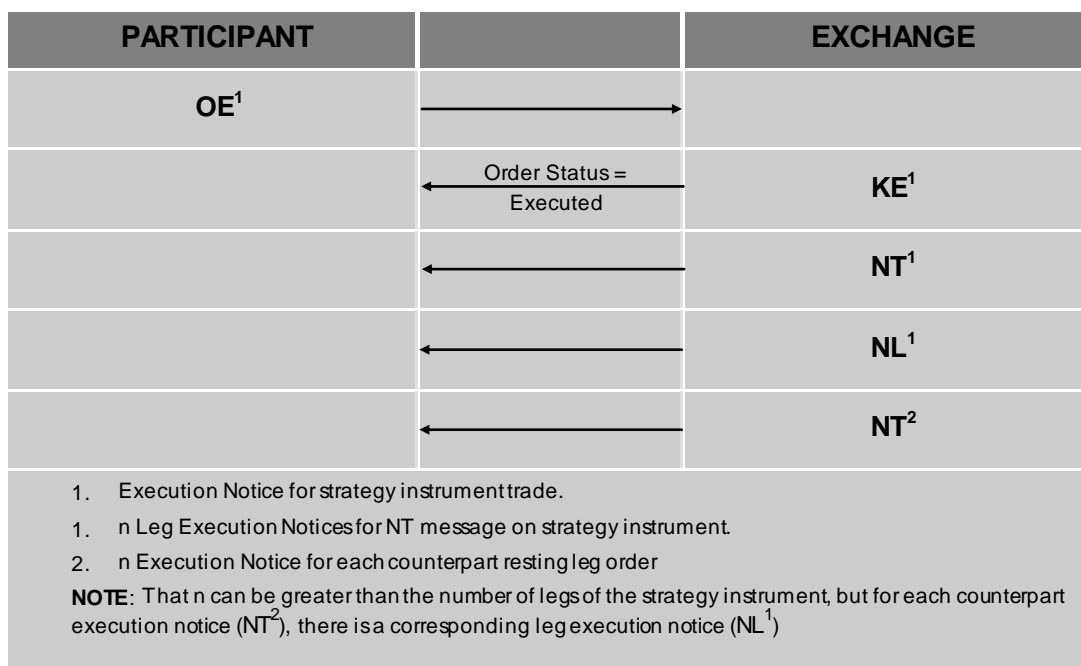
Cancel Trade on the Last Price (Performed by the Exchange):

PARTICIPANT		EXCHANGE
	←	NX

Strategy Order trades against contra strategy order (same book):

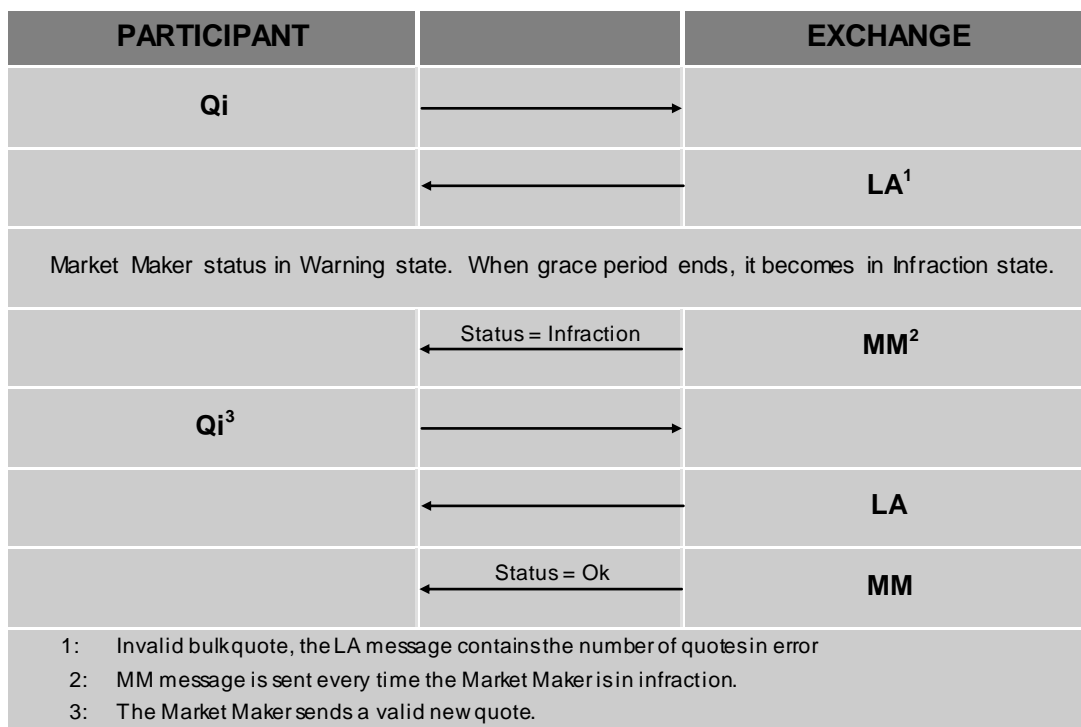


Strategy Order trades against contra leg order (implied trade):

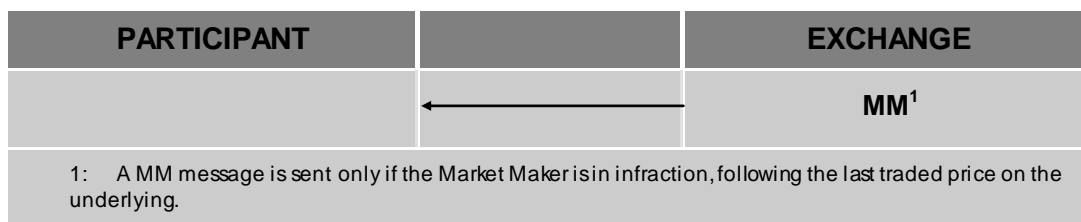


6.7 Market Maker Messages

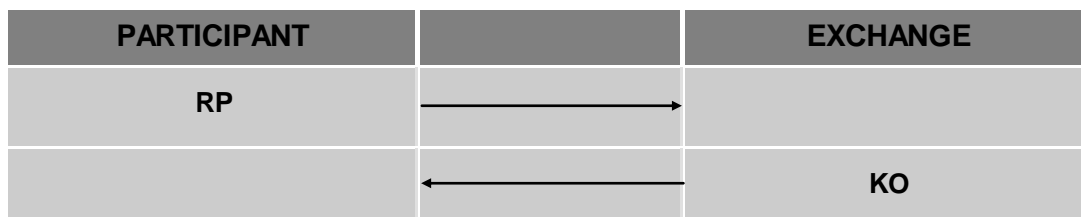
6.7.1 Market Maker Monitoring - Invalid Bulk Quote Grace Period Elapsed:



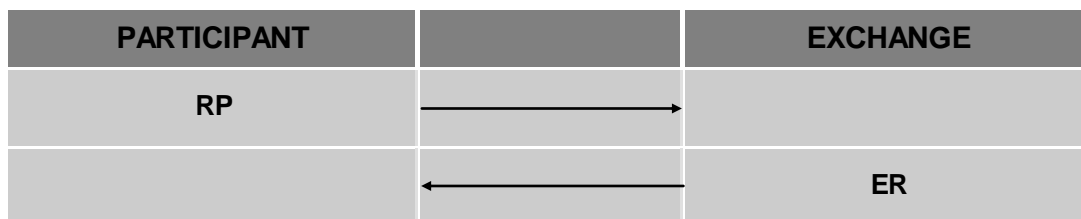
Underlying last traded price raised an MM Infraction message:



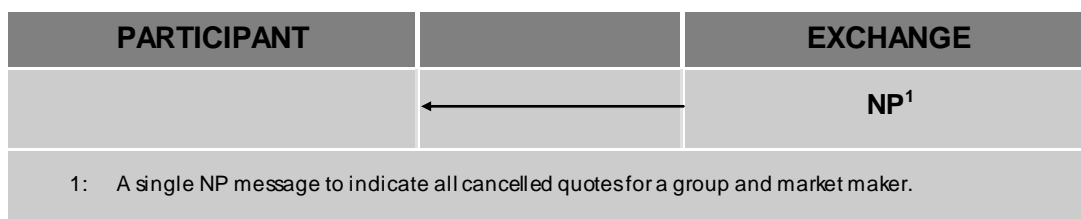
Market Maker Protection Subscription Accepted:



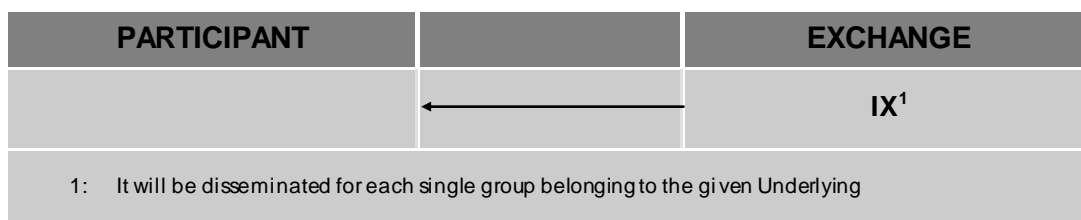
Market Maker Protection Subscription Rejected:



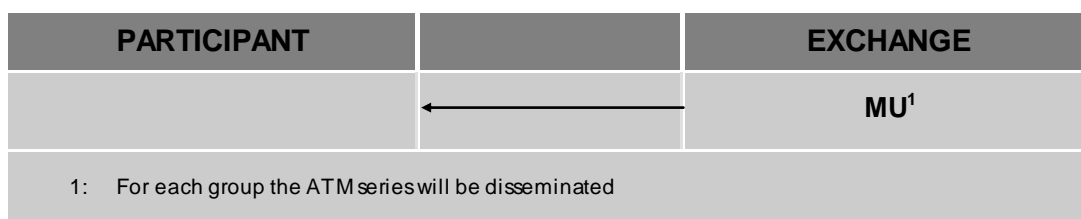
Market Maker Protection Triggered:



Underlying Price used to Determine MM obligation Surface

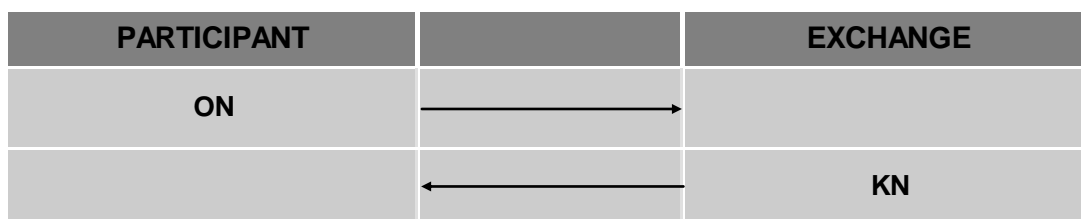


ATM series for MM obligation



6.8 User Defined Strategy (Flexco)

Strategy Instrument Creation Request Accepted:



Strategy Creation Request Rejected:

