Multi Legged Order functionality

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1 Introduction

Currently, in a single order request, the user is allowed to put order on a single contract. In order to create a strategy which requires orders to be put on multiple contracts, which was not possible through a single order request. Also, if the strategy is created using multiple order requests, the simultaneous execution of all orders at desired price is not guaranteed.
In order to facilitate the strategy based trading in derivatives segment; BSE is introducing the multileg order functionality in equity derivatives and currency derivatives segment. The multileg order facility can be used to put combination of orders in different contracts of an asset or different contracts of different assets belonging to same capacity group[1]. The exchange guarantees the simultaneous execution of all legs specified in the order at specified rate if the counter side is available. In case even if one of the legs does not get executed, the exchange cancels the entire multileg order.

The characteristics of the multileg orders are as follows.

Segment

- The multileg orders will be supported in equity derivatives and currency derivatives segment only.

Session

- The multileg orders will be supported in continuous session only.

Order characteristics

- A multi-legged order can have up to maximum of 4 individual orders (4 legged order). All individual orders in the multileg order request should belong to contracts of the same asset or different assets belonging to same capacity group[1].
- The individual orders in a multileg order should be such that no two orders belong to the same contract and also a multileg order cannot have 2 futures contract of the same asset The scope of futures contracts extends to the calendar spread contracts also.
- Only limit and market orders with IOC retention will be allowed in a multi-legged order request.
- Disclosed quantity orders will not be allowed in multileg orders.
- The order attributes like Price, Quantity should satisfy the criteria applicable to that attribute.

[1] Capacity Group – It is a group of Assets defined by Exchange. This information will be available in the master file. Please note that multileg facility is currently offered only for the option product for all assets.

- The user can specify if full quantity execution is required by setting the All or None (AON) flag. i.e. the multileg orders will not be executed for partial quantities

Matching logic

- The individual leg orders in a multileg order will be matched against the passive orders present in the order book of the respective contract. Thus it is possible that a multileg order will be either matched completely or partially. The matching behavior in both cases is described below

    - During matching process, if the multileg order is fully matchable then trades for full order contracts will be generated. i.e. if the no. of contracts (lots) which is specified for each individual order is completely matchable then the trades will be generated for each order for the full quantity as specified in the order.

    - In case the quantities specified in any individual order of the multi-legged order is not possible to be matched completely, then matching will happen in proportionate basis.
    - The proportionate basis logic is explained in Annexure 1 with an example

- **In case the AON flag is set for the multileg order then that order will be considered for full quantity matching only.** In case full quantity is not available then the multileg order will be cancelled.

Trade notifications

- Post matching, single execution comprising of all individual leg execution report will be sent to the user. The execution report will contain the executed quantity in each contract as well as the cancelled quantity if any for each contract.
- The execution will be followed by separate trade in each leg instrument with each trade having unique trade ID for that contract.
- The member application would require performing real time reconciliation between executions and individual trades explained in annexure 2
- All post-trade rules and functions such as trade rectification, trade confirmation etc will continue to remain same as existing. The execution needs to be reconciled with the individual trades.

Market Data

- The trades generated out of multileg orders will reflect in the individual contract market data information in following fields
    - LTP
    - LTQ
    - Open , High, Low and Close
    - Weighted average rate
    - No of Trades
    - Volume
    - Turnover
    - OI

RRM mode

- Multileg order will not be allowed if a member is in RRM mode due to capital violation. Similarly if the member is in MWPL RRM for a particular product then the multileg order will be rejected if any individual order of the multileg order belongs to that product.

Personal Download

- The member application can download individual leg trades. The execution report will not be available in the personal trade download

2 IML Impact

- The order request for multileg order should be submitted using a new order request message (Message type: 2025). The structure for request is mentioned in section 2.1
- No update or delete action is allowed for multileg orders.
- All individual orders in multileg order request will have all fields common except
    - Order type
    - Market Protection
    - Rate
    - Quantity
    - Contract (Scrip code)
    - Buy Sell Flag

- All individual orders in the multileg order request will have different order ID.

- The multileg order request will be acknowledged with either of the following 2 messages as response
    - Reject Response
    - Execution Response

- The Reject Response will be sent as response to the request if the multileg order is rejected by exchange. The multileg order could be rejected either due to incorrect value provided in order structure or if no matchable quantity was found for the order while matching.
- The Reject reason text will convey the reason for the rejection of the order.
- The Execution Response is sent if there is matchable quantity available for on the opposite side for a multileg order.
- The matching will happen as per the matching logic explained in Annexure 1 and post matching single execution report comprising of all individual leg execution will be delivered using the Execution response explained in section 2.3.
- In case of partial matching, the execution report will also consist of any cancelled quantity for individual leg order.
- Additionally trades will be generated for individual orders separately and delivered to the user using trade notification message (Message type: 1521 and 3521).
- Each trade notification will have unique trade ID for that contract. Each trade notification will have the respective individual leg reference tag and the reference tag which was sent in the request.
- Member application is required to reconcile the executions with trades on real time basis. This reconciliation is required for handling failure in persistency. This is explained in Annexure 2
- The Individual leg trades generated out of multileg order will be available as part of trade download request (Message type: 1095 and 1085)

2.1 Multi Leg Order Request

Type of Message : REQUEST
Direction : TPS to CTE
Description : This request message is sent by the TPS to the CTE to add a multi leg order.

Field Name	Type	Description	Values, meanings, Validations
Message Type	Long	Type of the Request	2025
Location Id	Long Long	Registered Location ID of the end-user who is placing the orders	

Order Reference tag	Long Long	Reference tag to be used by TPS. This will be echoed back in the response and in trades.	
Client Type	Short	Predefined Client Type	
Number of Legs	Short	Number of Legs needs to be defined	Minimum 2 and Maximum 4
All None Flag	Char	If full quantity execution is required	Y- Full Execution only N- Full or Partial Execution
Client ID	Char (11+1)	The client code of the client	Client Id must be "OWN" for Client type OWN.
Leg Substructure			
Instrument Code	Long	The instrument code for which the order is being added	
Order Qty	Long	The required order quantity	Should be Multiple of Mkt. Lot
Price	Long	The rate at which the scrip is to be bought or sold. For market order the rate field should be sent 0.	For equity derivatives the rate should be in paisa. For Currency Derivatives the rate should be in bps
Leg Reference tag	Long	Reference tag to be used by TPS. This will be echoed back in the response and in trades	
Market Protection	Short	Applicable for market order	Valid percentage range 0 to 20%.
Buy/Sell flag	Unsigned Char	Order Mode	Valid Values B – BUY S- SELL
Order Type	Unsigned Char	Type of order	L – Limit Order G – Market Order

2.2 Multi Leg Order Reject

Type of Message : REPLY
Direction : CTE to TPS
Description : This is the reject message sent in response to multieg order request.

Field Name	Type	Description	Values, meanings, Validations
Message Type	Long	Type of the Request	2026

Order Reference tag	Long Long	Reference tag sent in the request.	
Gateway in Timestamp	Long Long	The time when the request was accepted by the Gateway. The Timestamp is in UTC format	
Gateway out Timestamp	Long Long	The time when the response was sent by the Gateway. The Timestamp is in UTC format	
Instrument Code	Long	The instrument code for which the order is being added	
Reason Code	Long	The reason code for rejection of the multi leg order	
ReasonText Length	Short	Number of chars for field "Reason Text"	Max 2000
Reason Text	Char	Reject Reason	Max 2000 bytes

2.3 Multi Leg Order Execution Report

Type of Message : Reply
Direction : CTE to TPS
Description : This is the reply message sent in response to multi leg order request if the Order is executed.

Field Name	Type	Description	Values, meanings, Validations
Message Type	Long	Type of the Request	2027
Gateway in Timestamp	Long Long	The time when the request was accepted by the Gateway. The Timestamp is in UTC format	
Matching Engine In Timestamp	Long Long	The time when the request was accepted by the Matching Engine from gateway . The Timestamp is in UTC format	
Matching Engine Out Timestamp	Long Long	The time when the response was sent by the Matching Engine to gateway . The Timestamp is in UTC format	
Gateway out Timestamp	Long Long	The time when the response was sent by the Gateway. The Timestamp is in UTC format	
Location Id	Long Long	Registered Location ID of the end-user who is placing the orders	Location Id

Order Reference tag	Long Long	Reference tag sent in the request.	
Execution Timestamp	Long Long	The time of Execution of multileg order. The timestamp is in UTC format	
Last Fragment	Short		Indicates whether this message is the last fragment (part) of a sequence of messages belonging to one dedicated transaction. 0- Not Last Fragment 1- Last Fragment
No. Execution Summary Details	Short	This field specifies the number of instrument details present in the Execution summary substructure	Max 4
No. of Fills	Short	This field specifies the number of instrument details present in the Fill Group substructure	Max =100
No of Leg Exection	Short	This field specifies the number of instrument details present in the leg execution group substructure. Applicabel only if the multileg contain a spread instrument, Not applicable for simple contracts. The value will be 0 for simple contracts	Max = 600
Execution Summary Substructure			
Exchange Order ID	Long Long	The exchange order ID for the instrument	
Instrument Code	Long	The instrument code for which the order is being added	
Cumulative traded quantity	Long	Total quantity traded for the order	
Cancelled Quantity	Long	The quantity cancelled for this order	
Leg Reference tag	Long	Leg reference tag sent in the request.	
Reason	Short		101 –Order Added 105 –IOC Cancelled 246 –Self Trade Order Deleted
Order Status	Short	Conveys the current status of the order	2 - Filled 4- Cancelled

Execution Type	Short	Reason why this message is generated	4- Cancelled F - Trade
Fill group substructure			
Instrument Code	Long	The instrument code for which the order is being added	
Rate	Long	The rate in paise at which this trade was executed	
Execution ID	Long	The identifier of this trade. This field will be present in the leg trades. This can be used for reconciliation of execution with trades on real time basis	
Leg Reference tag	Long	Leg reference tag sent in the request.	
Traded Qty	Long	The quantity traded in this fill	
Leg execution group substructure (Applicable for Spread contract only)			
Leg Instrument Code	Long	The Leg instrument code for which the order is being added	
Leg Rate	Long	The rate in paise/ bps at which this trade was executed	
Leg Traded Qty	Long	The quantity traded in this fill	
Leg Execution ID	Long	The identifier of this trade. This field will be present in the leg trades. This can be used for reconciliation of execution with trades on real time basis	
Leg Order Mode	Unsigned Char		B- BUY S - SELL
No Fills Index	Short	Reference to the corresponding Fill Group substructure	

Annexure 1

A 4 leg order is put in the system. The logic for matching the order in proportionate contracts is described in steps with an example below

A 4 legged order is entered with each leg having following contracts (lots)

Instrument	Leg 1	Leg 2	Leg 3	Leg 4
Order Quantity	30	50	100	200

Step 1: Determine the Greatest Common Divisor (GCD) of the multi-legged order

Step 1 a: Find the possible Divisor of each leg order contracts

Divisors of 30	2	3	5	6	10	15	30
Divisors of 50	2	5	10	25	50		
Divisors of 100	2	4	5	10	50	100	
Divisors of 200	2	4	5	10	50	100	200

Step 1 b: Find the maximum common divisor for all 4 order lots

GCD: 10

Step 2: Determine the min required contract ratio. Divide each order contract by the GCD

leg 1	leg 2	leg 3	leg 4
30/10=3	50/10=5	100/10=10	200/10=20

Thus Min required lot ratio 3:5:10:20

Thus each leg can have match-able contracts in the multiple of min contract ratio.

The match-able contracts for each leg can be in any of the following possible combination

Combination	**Leg 1**	**Leg 2**	**Leg 3**	**Leg 4**
Combination 1	3	5	10	20
Combination 2	6	10	20	40

Combination 3	9	15	30	60
Combination 4	12	20	40	80
Combination 5	15	25	50	100
Combination 6	18	30	60	120
Combination 7	21	35	70	140
Combination 8	24	40	80	160
Combination 9	27	45	90	180
Combination 10	30	50	100	200

Annexure 2

In present Scenario, an order is matched by matching engine and execution report is generated. The execution report is further sent to be persisted in form of trades and then delivered to the member application.

Since, in Execution Report 2527 is generated from Execution and not from Persistent trade, member application will additionally require performing reconciliation of trades using Message type 3521 to confirm execution report as received from Message type 2527. This is required, since the execution report (Message Type 2527) is provided before persistency, there exists a remote possibility that the execution fails to be persisted.

This is possible in case of an eventuality where there is some technical issue in the matching engine. In such a case, although the execution report (Message type 2527) has been sent, but the trade for corresponding execution report is not present in the exchange trade book. The member application may have received the execution report but the corresponding trade is missing at exchange. Thus, the trade book at member application is different.

This risk of failure in persistency of executions can be mitigated by the member application by utilising both, execution report (Message type 2527) & trades (Message type 3521). The member application can use the execution report (Message type 2527) for all order processing purpose and additionally use the trade messages (Message type 3521) to confirm it with execution report. In case a discrepancy is encountered between executions and trade than the member application can take corrective actions as desired.