BURSA MALAYSIA
Creating Opportunities, Growing Value

OPTIMUS

Changes / Enhancements to BTS2

Theoretical Opening/Closing Prices (TOP/TCP) And Theoretical Volume (TOV) Dissemination at 5 Second Interval Market Opening and Closing Process

Effective: 20 November 2023

THEORETICAL OPENING / CLOSING PRICE ("TOP/TCP") / THEORETICAL OPENING VOLUME ("TOV") CALCULATION

BTS2 Pre-OPTIMUS	BTS2 OPTIMUS (20/11/2023 onwards)
▪ During BTS2 auction phases (Pre-Open, Pre-Close, Halt, Circuit Breaker Halts), the order book is in a non-matching state. ▪ All actions (e.g., order entry, amendment and withdrawal of orders) will be used to calculate the Theoretical Opening / Closing Price (TOP/TCP) and Theoretical Open Volume (TOV), which disseminated at every point when orders are entered, amended or withdrawn.	• During all auction phases i.e., Pre-Opening1, Pre-Opening2, Pre-Closing and Index Circuit Breaker Halt sessions, the TOP/TCP/TOV will be calculated if there has been a change to the orderbook during the period. Dissemination of the calculated TOP/TCP/TOV for each security is at an interval of 5 seconds. • Consequently, during the opening/closing, orders will be executed at this re-calculated TOP/TCP/TOV which may differ from the one established and disseminated during the auction phase. • This is an expected behaviour and it is to ensure that less data will be disseminated during auction phases via the FIX Market Data interface to reduce congestions. Please refer to the examples of TOP/TCP/TOV calculation.

THEORETICAL OPENING / CLOSING PRICE ("TOP/TCP") / THEORETICAL OPEN VOLUME ("TOV") CALCULATION AT INTERVAL OF 5 SECONDS

Scenario 1 : Security with orders in orderbook

1. Order Entry with TOP/TOV

Timestamp	BUY ORDER BOOK			SELL ORDER BOOK			
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:30:00am	4	5.55	2000	1	5.55	500	6:00:00am
				2	5.55	600	6:00:00am
				3	5.55	600	6:00:00am

Orders # 1, # 2, #3 queuing in orderbook

Transaction entered # 4: Buy 5.55 , quantity 2000 @ **8:30:00am**

Display of TOP/TOV = 5.55/1700 @ **8:30:05am**

2. Order Entry with no change to TOP/TOV

Timestamp	BUY ORDER BOOK			SELL ORDER BOOK			
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:30:00am	4	5.55	2000	1	5.55	500	6:00:00am
				2	5.55	600	6:00:00am
				3	5.55	600	6:00:00am
				5	5.56	2000	8:31:00am

Transaction entered # 5: Sell 5.56 , quantity 2000 @ **8:31:00am**

Display of TOP/TOV = 5.55/1700 @ **8:31:05am**

Scenario 1 : Security with orders in orderbook - continuation

3. **Order Entry with change in TOP/TOV**

Timestamp		BUY ORDER BOOK			SELL ORDER BOOK		Timestamp
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:32:00am	6	5.56	2000	1	5.55	500	6:00:00am
8:30:00am	4	5.55	2000	2	5.55	600	6:00:00am
				3	5.55	600	6:00:00am
				5	5.56	2000	8:31:00am

Transaction entered # 6: Buy 5.56 , quantity 2000 @ **8:32:00am**

Display of TOP/TOV = 5.56/2000 @ **8:32:05am**

4. **Order withdrawal with change to TOV**

Timestamp		BUY ORDER BOOK			SELL ORDER BOOK		Timestamp
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:32:00am	6	5.56	2000	1	5.55	500	6:00:00am
8:30:00am	4	5.55	2000	2	5.55	600	8:35:00am
				3	5.55	600	8:35:00am
				5	5.56	2000	8:35:00am

Withdrawal of sell orders #2,#3 # 5 @ **8:35:00am**

Display of TOP/TOV = 5.56 / 500 @ **8:35:05am**

THEORETICAL OPENING / CLOSING PRICE ("TOP/TCP") / THEORETICAL OPEN VOLUME ("TOV") CALCULATION AT INTERVAL OF 5 SECONDS

Scenario 1 : Security with orders in orderbook - continuation

5. **Order withdrawal with change in TOP**

Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
		BUY ORDER BOOK			SELL ORDER BOOK		
8:32:00am	6	5.56	2000	1	5.55	500	6:00:00am
8:30:00am	4	5.55	2000				

Withdrawal of buy order # 6: Buy 5.56 , quantity 2000 @ **8:40:00am**

Display of TOP/TOV = 5.55/500 @ **8:40:05am**

6. **Amend order price with no change TOV**

Timestamp	#	Price	Qty	#	Price	Qty	
		BUY ORDER BOOK			SELL ORDER BOOK		
8:42:00am	7	5.57	2000	1	5.55	500	6:00:00am

Amend buy order # 4 order price 5.55 to 5.57 (#7) @ **8:42:00am**

TOP/TOV = 5.57 / 500 @ **8:42:05am**

Scenario 1 : Security with orders in orderbook - continuation

7.   **Amend order quantity with change to TOP/TOV**

	BUY ORDER BOOK			SELL ORDER BOOK			
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:45:00am	7	5.57	300	1	5.55	500	6:00:00am

Amend buy order quantity # 7: Buy 5.57, quantity from 2000 to 300 @ **8:45:00am**

TOP/TOV = 5.55/300 @ **8:45:05am**

Scenario 2 : Security with Empty orderbook

1. 1st order entry is a Buy order

	BUY ORDER BOOK			SELL ORDER BOOK			
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:30:57	1	9.00	100	2	9.00	100	8:31:00

Set interval of 5 seconds is started at the buy order entry @ 8:30:57am

Sell order is entered at 8:31:00am (this is within the interval calculation of 5 seconds from buy order entry)

=> TOP /TOV displayed at 8:31:02 (5 seconds from the buy **order #1**)

2. <u>Buy order in order book, sell order is entered</u>

	BUY ORDER BOOK			SELL ORDER BOOK			
Timestamp	#	Price	Qty	#	Price	Qty	Timestamp
8:49:57	1	0.84	100	2	0.835	100	8:50:16

Set interval of 5 second is started at buy order entry 8:49:57am

At 8:50:02am=TOP/TOV= NA

Sell order is entered at 8:50:16am => interval of 5 seconds starts at this point

=>TOP /TOV displayed at 8:50:21 (5 seconds from the sell **order #2**)

Scenario 3 : Security match from Auction phases to matching phase (Transition from Pre-Opening1, Pre-Opening2 , Pre-Closing, HALT to CNT1, CNT2 and TAL)

1. Order entry buy order

Timestamp	BUY ORDER BOOK			SELL ORDER BOOK			Timestamp
	#	Price	Qty	#	Price	Qty	
4:49:53	3	0.805	100	1	0.805	100	4:49:51
				2	0.805	100	4:49:52

TCP/TOV @ 4:49:56 from sell order entry #1 => 0.805 @ 100

2. Enter buy order 4:49:59 (close to TAL)

Timestamp	BUY ORDER BOOK			SELL ORDER BOOK			Timestamp
	#	Price	Qty	#	Price	Qty	
4:49:59	4	0.810	200	1	0.805	100	4:49:51
4:49:53	3	0.805	100	2	0.805	100	4:49:52

Display of TCP/TOV @ 4:49:59 = 0.805 @ 100

At 4:50:00 => buy order #4 matches with sell orders #1 & #2 @ 0.810 ,quantity 200

In this scenario, as the dissemination is at an interval of 5 seconds, the end of TCP/TOV calculation crosses into the matching phase of Trading At Last (TAL) with the newly calculated TCP/TOV. As such, at the commencement of TAL, the match is at 0.810 @ 200 instead of the display TCP/TOV of 0.805 @ 100.

This above scenario is the expected behaviour in BTS2 OPTIMUS and is applicable at all auction phases.

Note: The TOP/TCV/TOV scenarios is applicable to both Normal and OD lot boards