

# **MOEX Trading and Clearing Systems Load Testing plan for 24 September 2016**

## **Infrastructure**

### **Markets**

During the load testing all MOEX Trading Systems will be tested, with the following maximum number of orders per market are to be reached:

- Equities market (ASTS system) – 75 000 000
- FX market (ASTS system) – 75 000 000
- Derivatives market (Spectra system) – 120 000 000

The aim of this testing is to provide participants with an opportunity to check their infrastructure and software at peak transaction frequency and with increased number of orders.

Total load testing run time – 3 hours. Target numbers of orders for every market 1.5-2 times exceed the maximum numbers achieved in real trading.

It is planned that transaction frequency during the tests will exceed the real market frequencies by 3-4 times in one second intervals, but at the same time the frequency will be below the maximum system performance capacity.

The maximum performance capacity of trading and clearing engines and all the subsystems will be measured during the short interval at the end of the tests to avoid the distortion of measurements caused by transaction queues.

In order to create realistic environment it is recommended to all participants to connect all the external systems that are used during the normal trading to the ASTS system. It is also recommended to connect all the external systems to the Spectra system via all available connectivity protocols (Plaza2/CGate, FIX/FAST, TWIME).

### **Details on testing procedure related to the planned migration to DataSpace data center and remote ASTS Gateways termination**

- Equities, FX and Derivatives market main trading servers will be transferred to the Dataspace data center for the testing period.
- FX and Equities market Participants' remote Gateways will be disconnected. All the external systems and trading terminals must be reconfigured to connect to the Exchange's Gateways or to the customer dedicated Gateways located at the data center. Regional Technical Centers' Gateways will operate normally.
- It is recommended to use Exchange's Gateways to connect to the SPECTRA system.
- FAST marketdata broadcasting services will be transferred to the DataSpace data center.

- "Full order log" service will be available for testing for SPECTRA users via FAST udp multicast marketdata protocol.

## Services

The following services and subsystems will be up and running during the tests:

- Index Servers
- Web services

## Requirements to the infrastructure of participants

### Network

In order to reach the maximum planned intensity of transactions and FAST udp multicast marketdata feed the following bandwidth requirements should be met per every channel:

- Equities market – 1 Mbit/s bandwidth per each ASTS Bridge API information request cycle and each trading terminal
- FX market – 1 Mbit/s bandwidth per each ASTS Bridge API information request cycle and each trading terminal
- Derivatives market – 10 Mbit/s
- FIX udp multicast for Equities market (feed A) – 80 Mbit/s
- FIX udp multicast for FX market (feed A) – 80 Mbit/s
- FIX udp multicast for Derivatives market without Full order log (feed A) – 5 Mbit/s
- FIX udp multicast for Derivatives market with Full order log (feed A) - 50 Mbit/s

In case of simultaneous use of multiple services, the total bandwidth requirement corresponds to the sum of the values for each service given above.

ASTS and SPECTRA clients with smaller bandwidth will witness the delays in receiving order replies and market data and the FAST packets losses once 100% of the channel bandwidth becomes occupied by the traffic.

## Load Testing Scenario

Participants may run their own scenarios but it is strongly recommended to adhere to the following principles in avoidance to create artificial deterioration of test results:

- To comply with the real trading statistics withdraw 99% of orders or more by order number.
- Try not to conclude too many trades. Otherwise tests may stop when the maximum trade number is reached while the maximum order number is not.
- We strongly recommend participants to analyze market parameters for instruments during load testing for minimizing quantity of transactions that would be rejected due to non-market price range.

MOEX team may block accounts in case if improper activity that interferes with load testing is detected.

### Load Testing Schedule (tentative)

Start time (tentative) – 12:00 MSK, end of test – 15:00 MSK

Figures for peak frequencies is approximate.

Event	Duration, minutes	Event start time	FX Market, transaction /sec	Equities Market, transaction /sec	Derivatives Market, transaction /sec	FX Market, orders	Equities Market, orders	Derivatives Market, orders	
<b>Start</b>	30	0	0	0	0	0	0	0	12:00
<b>Opening auction</b>	10	30	0	200	0	0	120000	0	
<b>3000</b>	20	40	3 000	3 000	3 000	2 400 000	2 520 000	2 400 000	
<b>6000</b>	5	60	6 000	6 000	6 000	3 600 000	3 720 000	3 600 000	
<b>12000</b>	5	65	12 000	12 000	12 000	6 000 000	6 120 000	6 000 000	
<b>25000</b>	10	70	25 000	25 000	25 000	16 000 000	16 120 000	16 000 000	
<b>Intermediate Clearing on Derivatives Market</b>	20	80	8 000	8 000		22 400 000	22 520 000		
<b>8000</b>	40	100	8 000	8 000	8 000	35 200 000	35 320 000	28 800 000	
<b>Maximum</b>	30	140	30 000	35 000	80 000	71 200 000	77 320 000	124 800 000	
<b>Stop loading</b>	0	170	0	0	0	71 200 000	77 320 000	124 800 000	
<b>Stop</b>		180							15:00