

MOEX Trading and Clearing Systems Load Testing plan for 23 November 2013

Infrastructure

Markets

During the load testing the following maximum number of orders per market are to be reached:

- Equities market (ASTS system) – 40 000 000
- FX market (ASTS system) – 40 000 000
- Derivatives market (Spectra system) – 60 000 000

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 and all the intermediate servers and client gates to the Spectra system.

Total load testing run time – 4 hours. Target numbers of orders for every market 1.5-2 times exceed the maximum numbers achieved in real trading.

All the gateways that satisfy minimum system requirements will be switched on before the testing starts. As the load during the tests increases all the gateways not capable to process that load level will be noted.

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.

It is planned that transaction frequency during the tests will exceed the real market frequencies by 3-4 times on 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.

Services

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

- Index Servers
- Web services
- FIX marketdata for all clients who use this service
- FIX UDP multicast marketdata inside the trading network and on colocation
- FIX transactional servers

Requirements to the infrastructure of participants

Gateway

- CPU: Intel Xeon with minimum 4 cores
- RAM – 32 Gb
- Free disk space – 20 Gb

Intermediate server

- CPU: Intel Xeon with minimum 2 cores
- RAM – 24 Gb
- Free disk space for test logs – 20 Gb

Network

In order to reach the maximum planned intensity of transactions every local Gateway should be connected by channels with the following bandwidth per every channel:

- Equities market – 4 Mbit
- FX market– 2.5 Mbit
- Derivatives market – 4 Mbit
- FIX udp multicast for Equities market (feed A) – 20 Mbit
- FIX udp multicast for FX market (feed A) – 10 Mbit
- FIX udp multicast for Derivatives market (feed A) – 5 Mbit

Note: only those clients with local Gateways who use at least 10 Mbit lines should expect their Gateways to run normally at the expected peak frequencies.

Clients with smaller bandwidth will witness the slippage of Gateways once 100% of the channel bandwidth becomes occupied by the replication traffic.

To avoid any reconfigurations during the tests it is recommended that all the owners of local Gateways contact the Exchange telecom team in advance in order to split gateway connections between connection channels.

Clients who do not use local Gateways should expect that the traffic with market data requests during the peak frequency will reach 100 kbit per every market data request.

Channel bandwidth for clients who use FAST UDP multicast marketdata service should be at least the sum of the requirements given above for every service.

Load Testing Scenario (tentative)

Transactions from ASTS Trading and Clearing System

The main volume of transactions will be on the following boards: TQBR, TQNL, TQNE (Equities market) and CETS (FX market). Transaction generators at the Exchange will be running as follows:

- 100 most liquid instruments from real trading
- ratio of transactions per instrument will be similar to the real trading statistics
- number of order submissions and cancellations will be almost the same
- order/trade ratio may change dynamically

Participants may run their own scenarios but it is strongly recommended to adhere to the following principles:

- Do not enter too many orders with the same security at the same price and in the same direction.
- To comply with the real trading statistics withdraw 95% 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.

Schedule for Equities market (tentative)

1. Trading system start – 0 min
2. Pre-trade period – start on 31st minute, end on 41st minute
3. 200 transactions per second – from 41st to 60 minute
4. 4000, 6000, 8000, 12000 transactions per second for 5 minutes each (20 minutes total). Gateway slippage is monitored. Limits for every remote gateway are recorded. Expected number of orders – 5 million.
5. 4000 transactions per second for 20 minutes, plus transactions from clients. 7 million orders at the end of this step.
6. 100 transactions per second for 15 minutes during the intermediate clearing on the Derivatives market.
7. 8000 transactions per second for 10 minutes. Expected number of orders – 10 million. All the hopelessly lagged Gateways will be switched off.
8. 12000 transactions (6000 orders) per second for 20 minutes.
9. 3000 transactions per second for 40 minutes during the evening clearing session on the Derivatives market.
10. Maximum transaction frequency for 15 minutes to measure the system performance capacity.

Total time for tests 170 minutes.

Total trading and clearing system availability time – 200 minutes.

Schedule for FX market

1. Trading system start – 0 min
2. 200 transactions per second – from 31st to 60 minute
3. 4000, 6000, 8000, 10000 transactions per second for 5 minutes each (20 minutes total). Gateway slippage is monitored. Limits for every remote gateway are recorded. Expected number of orders – 5 million.
4. 3000 transactions per second for 20 minutes, plus transactions from clients. 7 million orders at the end of this step.
5. 100 transactions per second for 15 minutes during the intermediate clearing on the Derivatives market.
6. 8000 transactions per second for 10 minutes. Expected number of orders – 10 million. All the hopelessly lagged Gateways will be switched off.
7. 10000 transactions per second for 20 minutes.
8. 3000 transactions per second for 40 minutes during the evening clearing session on the Derivatives market.
9. Maximum transaction frequency for 15 minutes to measure the system performance capacity.

Total time for tests 170 minutes.

Total trading and clearing system availability time – 200 minutes.

Transactions from Spectra Trading and Clearing System

Trading sessions from previous days will be replayed with real orders/trades ratio. Everyone who is planning to participate in testing should submit an application beforehand. Their accounts will be used by the Exchange for automatic order submission otherwise, so the performance measurement for these participants will be impossible.

Schedule for Derivatives market (tentative)

- 1 Trading system start – 0 min
- 2 Client connections - start on 31st minute, end on 41st minute
- 3 200 transactions per second – from 41st to 60 minute
- 4 4000, 6000, 8000, 12000 transactions per second for 5 minutes each (20 minutes total). Intermediate server slippage, system metrics and client channels load are monitored.

- 5 5000 transactions per second for 20 minutes, plus transactions from clients.
- 6 Intermediate clearing – 15 minutes.
- 7 8000 transactions per second for 10 minutes.
- 8 12000 transactions per second for 20 minutes.
- 9 Evening clearing session - 40 minutes.
- 10 25000-30000 transactions per second for 15 minutes to measure the system performance capacity.

Total time for tests 170 minutes.

Total trading and clearing system availability time – 200 minutes.