Load testing schedule on 20 September 2014

Infrastructure testing

Trading systems

During load testing our trading platforms serving Equities (main sector), FX and Derivatives markets will be supporting the following max order limits per session:

- Equities – 30 000 000

- FX – 30 000 000

- Derivatives– 60 000 000

In order to receive realistic results all participants are advised to connect all their front end systems used for ASTS production system. For Spectra platform it is recommended to connect all dedicated access servers and all API/FIX IDs used for production.

Total testing duration – 4 hours. Target max order limits for each market are 1.5-2 times higher than current daily max numbers.

Before the testing begins we will turn on all dedicated access servers that meet minimum hardware requirements. Upon the load rise the Exchange will monitor and log all access servers not able to process the load.

This test is aimed to provide the Clients the ability to check its network infrastructure and software in high transaction rate conditions.

It is planned to create load by 3 to 4 times exceeding peak values for normal market conditions, which do not exceed Trade system performance limits.

Performance limits measurement for the Trade system and its subsystems is planned to be done at the end of testing to ensure performance testing results are not distorted by order processing queues.

Services

During load testing the following services and subsystems will be available:

- Index servers

- Web site and related information services

- FIX market data servers for all clients who use the service

- FIX UDP multicast market data server – for local Exchange network/colocation

- FIX transactional servers

Client infrastructure requirements

Dedicated access Gateway (ASTS platform)
- CPU – at least 4-core Intel Xeon

- RAM – 32 GB

- Available disk space for logging – 20 GB

Dedicated access servers (Spectra platform)
- CPU – at least 2-core Intel Xeon

- RAM – 24 GB

- Available disk space for logging – 20 GB

Connectivity

In order to reach planned transaction rates each network circuit should provide the following bandwidth for each dedicated access server:

- Equities – 4 Mbit/s

- FX – 2.5 Mbit/s

- Derivatives – 4 Mbit/s

- FIX UDP multicast for Equities (feed A) – 20 Mbit/s

- FIX UDP multicast for FX (feed A) – 10 Mbit/s

- FIX UDP multicast for Derivatives (feed A) – 5 Mbit/s

Note: we expect that at peak transaction rates only clients having circuits with bandwidth of 10 Mbit/s or higher will experience normal operation of their dedicated access servers.

Clients having circuit bandwidth less than 10 Mbit/s should expect lags at 100% network load caused by replication traffic.

In order to avoid any additional configuration during testing, all clients using dedicated access servers are advised to discuss their access servers' distribution between network circuits with Moscow Exchange network specialists beforehand.

For clients using shared access servers we expect that data requests traffic at peak transaction rate will reach 100 Kbits per each market data request.

Clients receiving FAST UDP multicast market data should ensure their network bandwidth exceeds the total of all bandwidth requirements for each service specified above.

Load testing scenario (approximate)

Transaction flow for ASTS Trade system

Majority of transactions is planned to be produced in TQBR trading mode for Equities and in CETS trading mode for FX. Exchange –side transactions will be generated as follows:

- 50 Equity instruments allowing unsecured trades and for 8 FX spot instruments will be used.

- Transaction rate ratio for instruments will closely match production market statistics.

- Numbers of placed and canceled orders will coincide.

- There will be no specific limits for orders and transactions volume.

Participants can use their own trading scenarios. In order to avoid any artificial reasons for performance system degradation it is necessary to abide by the following transaction flow limits:

- It is prohibited to place and cancel over 10,000 orders for each instrument on each side at the same price.

- In order to follow the market statistics, at least 99% of orders should be canceled by its numbers.

- It is not recommended to make too many trades or the testing will be paused once the trade limit is reached even though the max order limit is not.

If the Exchange registers any activity interfering with testing, the Exchange reserves the right to ban this user IDs from testing.

Testing schedule for Equities (approximate)

1. Trade system start –0 minute.

2. Preopen period – start at minute 31, finished at minute 41.

3. Transaction rate - 200 tran/s, start of testing, from minute 41 to minute 60.

4. Transaction rate is increased to 4,000 tran/s, 6,000 tran/s, 8,000 tran/s, 12,000 tran/s every 5 minutes respectively, total time - 20 minutes. Any lags along with max transaction limits are monitored and logged for each dedicated Gateway server. Expected order number in order book – 5 mln.

5. Transaction rate at 4,000 tran/s along with participants activity is kept for 20 minutes. Expected order number in order book at this step – 7 mln.

6. Transaction rate at 100 tran/s is kept for 25 minutes during intermediate clearing simulation on Derivatives market.

7. Transaction rate is increased to 8,000 tran/s for 10 minutes. Expected order number in order book at this step – 10 mln. **Dedicated access servers not able to process the load are switched off**.

8. Transaction rate is increased to 12,000 tran/s (6,000 orders/s) for 20 minutes.

9. Transaction rate is decreased to 3,000 tran/s for 40 minutes during evening clearing simulation on Derivatives market.

10. Maximum transaction rate is generated for 15 minutes.

Expected duration of normal trading is 170 minutes.

Total trade system availability is 210 minutes.

Testing schedule for FX market (approximate)

1. Trade system start –0 minute.

2. Transaction rate - 200 tran/s, start of testing, from minute 31 to minute 60.

3. Transaction rate is increased to 4,000 tran/s, 6,000 tran/s, 8,000 tran/s, 10,000 tran/s every 5 minutes respectively, total time - 20 minutes. Any lags along with max transaction limits are monitored and logged for each dedicated Gateway server. Expected order number in order book – 5 mln.

4. Transaction rate at 5000 tran/s along with participants activity is kept for 20 minutes. Expected order number in order book at this step – 7 mln.

5. Transaction rate at 100 tran/s is kept for 25 minutes during intermediate clearing simulation on Derivatives market.

6. Transaction rate is increased to 8,000 tran/s for 10 minutes. Expected order number in order book at this step – 10 mln. **Dedicated access servers not able to process the load are switched off**.

7. Transaction rate is increased to 10,000 tran/s for 20 minutes.

8. Transaction rate is decreased to 5,000 tran/s for 40 minutes during evening clearing simulation on Derivatives market.

9. Maximum transaction rate is generated for 15 minutes to measure max Trade system performance limits.

Expected duration of normal trading is 170 minutes.

Total trade system availability is 210 minutes.

Transaction flow for Spectra trade system

The system will replay previous trading days' activity with real order/trade ratio. Clients who wish to participate in load testing should submit their request beforehand; otherwise Exchange robots will produce unplanned activity under their firm IDs which will affect test results for these clients.

Testing schedule for Derivatives market (approximate)

1. Trade system start –0 minute.

2. Client connections session – started at minute 31, finished at minute 41.

3. Transaction rate - 200 tran/s, start of testing, from minute 41 to minute 60.

4. Transaction rate is increased to 4,000 tran/s, 6,000 tran/s, 8,000 tran/s, 12,000 tran/s every 5 minutes respectively, total time - 20 minutes. Any server lags along with network performance limits are monitored and logged for each dedicated Spectra access server.

5. Transaction rate at 5,000 tran/s along with participants' activity is kept for 20 minutes.

6. 25 minutes of intermediate clearing simulation.

7. Transaction rate is increased to 8,000 tran/s for 10 minutes.

8. Transaction rate is increased to 12,000 tran/s and along with participants' activity is kept for 20 minutes.

9. 40 minutes of evening clearing session simulation.

10. Maximum transaction rate is increased to 25,000-30,000 tran/s for 15 minutes to measure max Trade system performance limits.

Expected duration of normal trading is 180 minutes.

Total trade system availability is 210 minutes.