

Colocation

PRODUCTION CONNECTIVITY

valid since 10 October 2022

DOCUMENT SERIES

NETWORK CONNECTIVITY SOLUTIONS - PRODUCTION ENVIRONMENT

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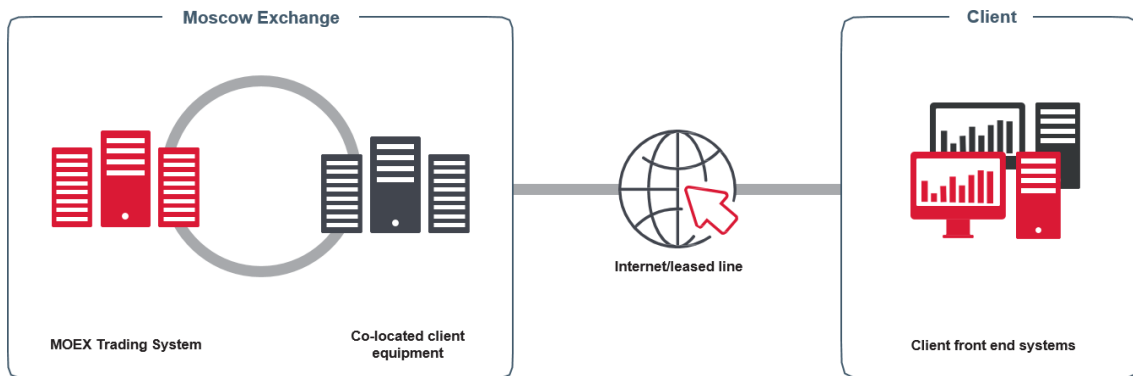
NETWORK CONNECTIVITY SOLUTIONS - TESTING ENVIRONMENT

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OVERVIEW



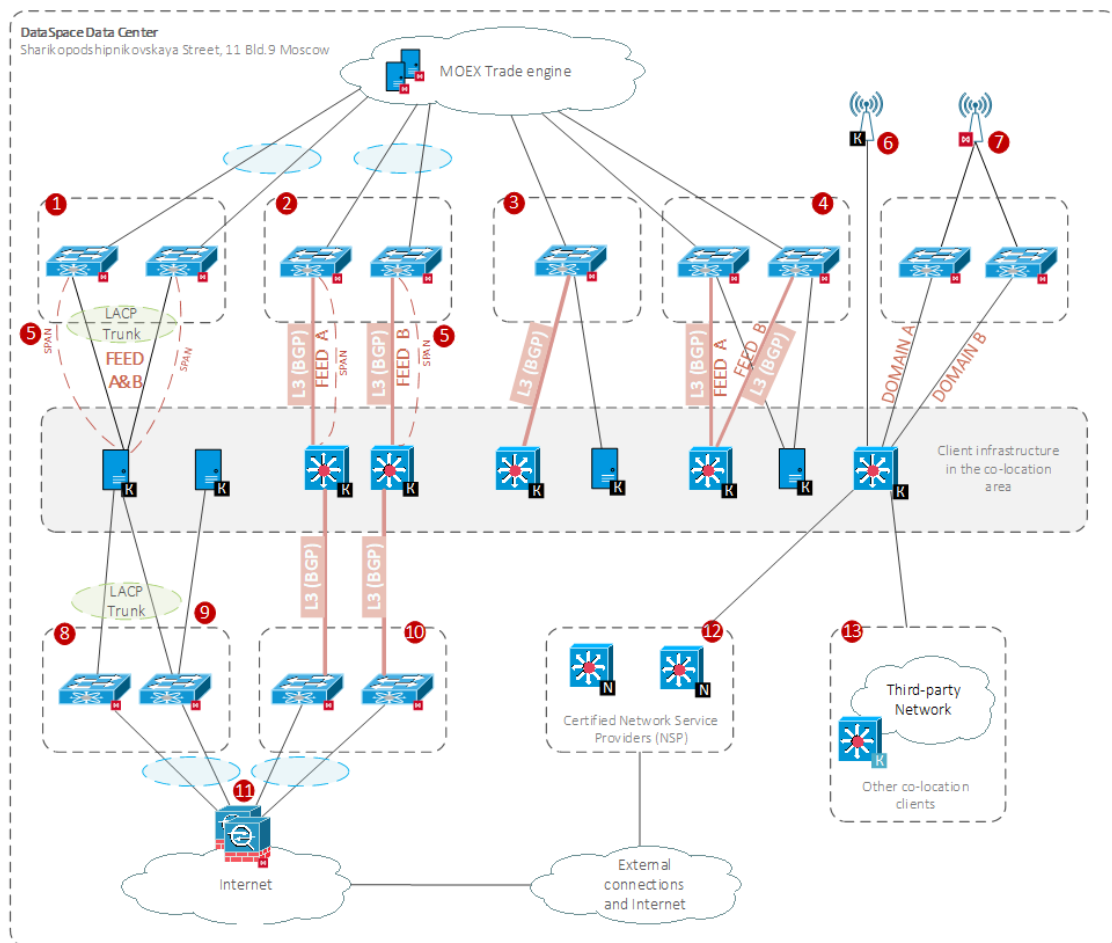
Co-location is a group of services that includes technical access to MOEX from the co-location facility*, installation of a client's equipment in a dedicated data hall in the closest proximity to MOEX's trading platform as well as the related services such as cross-connections to other co-location clients, providing an Internet connection* and providing the storage units.

In the co-location facility MOEX provides the fastest and the most reliable connection to the trading services. Close proximity to the trading engine ensures order execution with a minimum possible latency and the fastest market data delivery. The co-location services are available to companies and individual customers as well.

The co-location facility is located in the hall 202 of the DataSpace Data Center, Sharikopodshipnikovskaya st 11 building 9, Moscow 115088.

** Communication services are provided by MOEX Information Security LLC, part of the Moscow Exchange Group. Rules and regulations for the communication services are available at the company's website at <https://informationsecurity.moex.com/ru/document> (in Russian).*

TECHNICAL DIAGRAM



1 MOEX Production and Game services access segment for the server equipment (L2 segment)*. Any client connection is provided as two physical links to separate network devices of MOEX. Network interfaces used by the Client must be configured as a failover group using the LACP (IEEE 802.3ad) protocol with the traffic tagging function enabled (i.e. the port is switched to the “trunk” mode) according to the IEEE 802.1q standard**. Connectivity options:

- a. 10 Gbit/s using the 10GBase-SR standard (MM fiber);
- b. 1 Gbit/s using the 1000Base-TX standard (UTP).

2 MOEX Production and Game services access segment for the network equipment (L3 segment)*. Any client connection is provided as two physical links to separate network devices of MOEX. Network interfaces used by the Client must be in L3 mode with the BGP protocol enabled. Client’s Connectivity options:

- a. [recommended] Two separate network devices of the Client;
- b. Two interfaces of the same network device of the Client.

Only 10Gbit/s, the 10GBase-SR standard (MM fiber) connection is available

3 The links for access to low latency transactional software (formerly called FIFO). The client is connected with one physical link at a speed of 10 Gbit/s using the 10GBase-SR standard (MM fiber). Traffic tagging is not used for this connection.

4 The links for access to low latency market data software (formerly called SIMBA). The client is connected with two physical links at a speed of 10 Gbit/s using the 10GBase-SR standard (MM fiber). Port aggregation nor traffic tagging are not used for this connection.

- 5 **The links for receiving mirrored traffic.** They deliver a copy of all network traffic for selected connection to Production and Game segment. Main and mirror links might be connected to different equipment.
- 6 **GPS connection.** Co-location clients may order cross-connects to their GPS receivers installed at the antenna platform of the DataSpace datacenter*.
- 7 **The segment for receiving precise time information via PTP protocol.** Any client connection is provided as two physical links to separate network devices of MOEX. Connectivity options:
 - a. 10 Gbit/s using the 10GBase-SR standard (MM fiber);
 - b. 1 Gbit/s using the 10GBase-LX/LH standard (MM fiber);
 - c. 1 Gbit/s using the 1000Base-TX standard (UTP).
- 8 **The Internet access segment for server equipment (L2 segment)*.** Any client connection is provided by two physical links to separate network devices of MOEX. Interfaces used by the Client (except management interfaces iLo, IPMI, iDRAG , etc.) must be configured as a failover group using the LACP (IEEE 802.3ad) protocol without enabling the VLAN tagging function (the port is switched to the “access” mode). Connectivity options:
 - a. 1 Gbit/s using the 1000Base-TX standard (UTP).
- 9 **Management interfaces connection (iLo, IPMI, iDRAG, etc.) to the internet in case of per-unit co-location is mandatory.**
- 10 **The Internet access segment for the network equipment (L3 segment)*.** Any client connection is provided as two physical links to separate network devices of MOEX. Network interfaces used by the Client must be in L3 mode with BGP protocol support. Client’s Connectivity options:
 - a. [recommended] Two separate network devices of the Client;
 - b. Two interfaces of the same network device of the Client.

Only 1 Gbit/s using the 1000Base-TX standard (UTP) connection is available.
- 11 **MOEX Firewall.** Client’s internet access via MOEX’s equipment is secured with network firewalls. According to the default policy all the network access is blocked and should be allowed per client’s request*.
- 12 **NSP connection.** The Client may access the internet via authorized network service providers operating in the co-location facility. These providers are listed at the [Telecom Operators](#) section below. MOEX has no restrictions regarding the technology, SLA with providers, etc. Connectivity options*:
 - a. LC-LC multimode fiber optic cable;
 - b. 8P8C (RJ-45) UTP.
- 13 **Cross-connects to other Co-location clients** may be ordered by the client. Connectivity options*:
 - a. LC-LC multimode fiber optic cable;
 - b. 8P8C (RJ-45) UTP.

MOEX has no restrictions regarding the number of connectivity schemes used by the Client on the same piece of equipment (including connection to the UAT environment not covered in this paper) if there is a sufficient number of ports to connect.

* For further details on network connectivity requirements, please see the *Moscow Exchange Co-location Rules and Conditions (DataSpace DC)* available at <https://fs.moex.com/files/8128>.

** Addresses of subnets given to the Client (including transit ones for L3) and relevant VLANs are given in [Addressing Plan](#). Basic settings of interfaces and routing rules are given in [Setup Instruction](#).

SUPPORTED HARDWARE

The following equipment is supported in the co-location facility:

- Rack mounted equipment with a standard mounting kit (slide rails / rails / brackets) for standard 19-inch cabinets;
- Equipment with integrated or rack mounted power supply unit;
- Equipment with at least two power supplies in a stand-by mode.

MOEX has no restrictions regarding the choice of producers of the equipment installed and connected in the co-location facility.

The following equipment is not supported and thus not allowed for use:

- One with non-standard power supply jacks;
- One with signs of unauthorized modification, including modification of power circuit;
- One with integrated wireless modules/devices (of any type);
- One with integrated sound/video recording devices/modules;
- Damaged or defective equipment.

These are general equipment criteria, for the full list of requirements, please read the Moscow Exchange Co-location Rules and Conditions (DataSpace DC) available at <https://fs.moex.com/files/8128>.

NETWORK CONNECTIONS REQUIREMENTS

Access to the Production and Game trading systems is possible on following speeds:

- 10 Gbit/s (10GBASE-SR standard) for network and server equipment;
- 1 Gbit/s (1000BASE-TX standard) for server equipment only.

Connections that provide access to low latency transactional services are carried out at a speed of 10Gb/s (10GBASE-SR Standard) for network and server equipment.

Connections that provide access to low latency market data software, is carried out by two physical links at a speed of 10Gbp/s according to the 10GBase-SR standard (multimode optics). Port grouping and traffic tagging on the connection are not applied.

In this network segment there's no bandwidth limitation (traffic shaping).

Connection for receiving mirrored traffic duplicate the source connection standard.

Connection for receiving precise time information via PTP protocol is possible on following speeds:

- 10 Gbit/s using the 10GBase-SR standard (MM fiber);
- 1 Gbit/s using the 10GBase-LX/LH standard (MM fiber);
- 1 Gbit/s using the 1000Base-TX standard (UTP).

If the Internet access is provided through MOEX, the bandwidth is set according to the Client's request* and applied to all its connections simultaneously. Minimum bandwidth available for order is 1 Mbit/s.

To choose the Internet connection bandwidth clients may use the following basic calculation: the recommended bandwidth is a composite of the following values depending on the number of the services used and FAST UDP Multicast market data feeds:

- 4 Mbit/s multiplied by the number of the gateway/terminal copies
- 10 Mbit/s multiplied by the number of the gateway/terminal copies with full order/trade log feed (FORTS_ORDLOG_REPL/FORTS_DEALS_REPL)
- 15-50 Mbit/s for each of A and B copies of Equity & Bond Market FAST feeds
- 15-50 Mbit/s for each of A and B copies of FX Market FAST feeds
- 6-15 Mbit/s for each of A and B copies of Derivatives Market FAST feeds

For further details, please read the [Load Test Report](#).

* Forms of service requests or services change are available on MOEX Information Security's website at <https://informationsecurity.moex.com/ru/document>

ADDRESSING PLAN

Subnet description	Subnet address
ADDRESSES FOR ACCESS TO MOEX SERVICES	
Transactional connections	10.224.X.0/24
Transactional connections (standby)	10.225.X.0/24
Connections that provide access to high-speed transactional services	10.250.X.0/24
Connections that provide access to high-speed services for providing Exchange information FeedA	10.251.X.0/24*
Connections that provide access to high-speed services for providing Exchange information FeedB	10.252.X.0/24*
Equity & Bond Market FeedA	10.231.X.0/24
Equity & Bond Market FeedB	10.241.X.0/24
FX Market FeedA	10.232.X.0/24
FX Market FeedB	10.242.X.0/24
Derivatives Market FeedA	10.233.X.0/24
Derivatives Market FeedB	10.243.X.0/24
Derivatives Market FeedA (FullOrderLog)	10.234.X.0/24
Derivatives Market FeedB (FullOrderLog)	10.244.X.0/24
TRANSIT NETWORKS FOR NETWORK EQUIPMENT BGP CONNECTIVITY	
Left side	10.215.X.0/26
Right side	10.215.X.64/26
Connections that provide access to high-speed transactional services	10.216.X.0/26
Connections that provide access to high-speed services for providing Exchange information FeedA	10.216.X.128/26
Connections that provide access to high-speed services for providing Exchange information FeedB	10.216.X.192/26
<p>MOEX allocates network subnets during the service configuration. Client independently chooses specific IP addresses for internal systems and requests them from MOEX**. IP addresses are used in the login requests and other connectivity service requests. They can be passed to the trading member with a special form.</p> <p>Separate subnet 10.225.X.0/24 is used for reservation of TSMR protocol connections, specifically for the case when the Trading system(Equity & Bond, FX, but NOT Derivatives) has an active connection from the 10.224.X.Y address, but Client believes it's stuck and wants to reset it. In that scenario connecting from the 10.225.X.0/24 subnet would close the original connection and establish new one.</p> <p>AS Number used on Client network equipment is allocated by the MOEX out of a private range. Client is allowed to use own public AS Number.</p>	

* These subnets are intended for access to all markets (Derivatives, Currency, Stock). Ordering separate addresses to access different markets is not required. For one pair of addresses it is possible to order access to all markets at once.

** The request form for trading IP address is available in the Co-location Rules and Conditions (<https://fs.moex.com/files/8128>)

ADDRESSES TO ACCESS THE INTERNET

Connection to the Internet	10.218.X.0/24
Connection of management interfaces to the Internet	10.219.X.0/24
Public address space	85.118.178.0/23

TRANSIT NETWORKS FOR NETWORK EQUIPMENT BGP CONNECTIVITY

Left side	10.215.X.128/28
Right side	10.215.X.144/28

Telecom provider MOEX Information Security network subnets during the service configuration. Client independently chooses specific IP addresses for internal systems and requests them from MOEX*. The operator allocates a public address and maps it to the address chosen by the Client (Static NAT).

AS Number used by the Client to configure network equipment is allocated by the Operator out of a private range. The Client is allowed to use its own public AS Number.

**The request form for Internet address is available in the Operator's procedures. <https://fs.moex.com/files/19344> (in Russian)*

MOEX's services addresses are available at <https://www.moex.com/s745>, and through a request to the [Technical Support Service](#).

EQUIPMENT SETUP

Clients of MOEX's trading network can use the following server addresses for DNS service: 91.203.252.10, 91.203.254.10 and for NTP service: 91.203.252.12, 91.203.254.12.

NETWORK DEVICE SETUP

Network device connections require IP addressing, dynamic routes exchange via BGP with MOEX hardware and for connections to the Production and Game services access segment PIM in SSM mode (Source-Specific Multicast) to be configured. MOEX has no restrictions regarding the Client's internal infrastructure design behind the L3-connection.

BGP timers: keepalive 3, hold 20

It is recommended to configure Bidirectional Forwarding Detection (BFD) if supported (except connections that provide access to high-speed transactional services).

Bfd timers: interval 250 min_rx 250.

Recommendations for Cisco:

- 0) Make sure *feature bfd* is enabled;
- 1) *bfd echo* must be enabled;
- 2) Enter *no ip redirects* on the interface;
- 3) Traffic on UDP ports 3784 and 3785 is allowed in both directions, if applicable;
- 4) BFD is enabled in both the interface configuration and in the *router bgp* section.

SERVER SETUP

PRODUCTION AND GAME ENVIRONMENTS SEGMENT CONNECTIVITY

We recommend disabling the Reverse Path Filtering feature on the interfaces receiving multicast data.

Two physical interfaces allocated on the server for production and game services connectivity must be configured as LACP group (IEEE 802.3ad). Then virtual group interface will be used to access different services via different VLANs (IEEE 802.1q).

Access to the transaction services (FIX, TWIME, Plaza II, etc.):

Add VLAN 224 to the trunk group on interfaces for connectivity to the production and game transaction services segment and make the following configuration:

ip: allocated address(es) from the 10.224.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Add routes**:

```
route add -p 91.203.252.0 mask 255.255.252.0 10.224.0.1
```

```
route add -p 10.63.0.0 mask 255.255.252.0 10.224.0.1
```

```
route add -p 10.61.0.0 mask 255.255.252.0 10.224.0.1
```

To ensure configuration accuracy, ping to 10.224.0.1 is available on the network.

Equity & Bond Market FAST:

Add two new VLANs, 231 and 241, to the trunk group on the interfaces for connectivity to the production and game transaction services segment and make the following configuration:

Feed A:

VLAN 231

ip: allocated address(es) of the 10.231.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Feed B:

VLAN 241

ip: allocated address(es) of the 10.241.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Add routes**:

```
route add -p 91.203.253.227 mask 255.255.255.255 10.231.0.1
```

```
route add -p 91.203.253.229 mask 255.255.255.255 10.231.0.1
```

```
route add -p 239.195.1.32 mask 255.255.255.224 10.231.0.1
```

```
route add -p 91.203.255.227 mask 255.255.255.255 10.241.0.1
```

```
route add -p 91.203.255.229 mask 255.255.255.255 10.241.0.1
```



```
route add -p 239.195.1.160 mask 255.255.255.224 10.241.0.1
```

FX Market FAST:

Add two new VLANs, 232 and 242, to the trunk group on the interfaces for connectivity to the production and game transaction services segment and make the following configuration:

Feed A:

VLAN 232

ip: allocated address(es) of the 10.232.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Feed B:

VLAN 242

ip: allocated address(es) of the 10.242.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Add routes**:

```
route add -p 91.203.253.225 mask 255.255.255.255 10.232.0.1
```

```
route add -p 91.203.253.228 mask 255.255.255.255 10.232.0.1
```

```
route add -p 239.195.1.0 mask 255.255.255.224 10.232.0.1
```

```
route add -p 91.203.255.225 mask 255.255.255.255 10.242.0.1
```

```
route add -p 91.203.255.228 mask 255.255.255.255 10.242.0.1
```

```
route add -p 239.195.1.128 mask 255.255.255.224 10.242.0.1
```

Derivatives Market FAST:

Add two new VLANs, 233 and 243, to the trunk group on the interfaces for connectivity to the production and game transaction services segment and make the following configuration:

Feed A:

VLAN 233

ip: allocated address(es) of the 10.233.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Feed B:

VLAN 243

ip: allocated address(es) of the 10.243.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Add routes**:

```
route add -p 91.203.253.226 mask 255.255.255.255 10.233.0.1
route add -p 91.203.253.230 mask 255.255.255.255 10.233.0.1
route add -p 91.203.253.232 mask 255.255.255.255 10.233.0.1
route add -p 91.203.253.236 mask 255.255.255.255 10.233.0.1
route add -p 239.195.5.0 mask 255.255.255.0 10.233.0.1
route add -p 239.195.15.0 mask 255.255.255.0 10.233.0.1

route add -p 91.203.255.226 mask 255.255.255.255 10.243.0.1
route add -p 91.203.255.230 mask 255.255.255.255 10.243.0.1
route add -p 91.203.255.232 mask 255.255.255.255 10.243.0.1
route add -p 91.203.255.236 mask 255.255.255.255 10.243.0.1
route add -p 239.195.133.0 mask 255.255.255.0 10.243.0.1
route add -p 239.195.143.0 mask 255.255.255.0 10.243.0.1
```

Derivatives Market FAST FullOrderLog:

Add two new VLANs, 234 and 244, to the trunk group on the interfaces for connectivity to the production and game transaction services segment and make the following configuration:

Feed A:

VLAN 234

ip: allocated address(es) of the 10.234.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Feed B:

VLAN 244

ip: allocated address(es) of the 10.244.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Add routes**:

```
route add -p 91.203.253.233 mask 255.255.255.255 10.234.0.1
route add -p 239.195.10.0 mask 255.255.255.0 10.234.0.1
route add -p 91.203.253.234 mask 255.255.255.255 10.234.0.1
route add -p 239.195.11.0 mask 255.255.255.0 10.234.0.1
route add -p 91.203.253.240 mask 255.255.255.255 10.234.0.1
route add -p 91.203.253.241 mask 255.255.255.255 10.234.0.1

route add -p 91.203.255.233 mask 255.255.255.255 10.244.0.1
```

```

route add -p 239.195.138.0 mask 255.255.255.0 10.244.0.1
route add -p 91.203.255.234 mask 255.255.255.255 10.244.0.1
route add -p 239.195.139.0 mask 255.255.255.0 10.244.0.1
route add -p 91.203.255.240 mask 255.255.255.255 10.244.0.1
route add -p 91.203.255.241 mask 255.255.255.255 10.244.0.1

```

CONNECTIONS PROVIDING ACCESS TO LOW LATENCY TRANSACTIONAL SOFTWARE

On the interface for connecting to the access perimeter to low latency transactional services, traffic tagging is not used, it is only necessary to configure IP addressing:

ip: allocated address(es) from the 10.250.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client*.

netmask: 255.255.0.0

default gateway: none

Add routes**:

```

route add -p 91.203.252.67 mask 255.255.255.255 10.250.0.1
route add -p 91.203.252.68 mask 255.255.255.255 10.250.0.1

```

To ensure configuration accuracy, ping to 10.250.0.1 is available on the network.

CONNECTIONS PROVIDING ACCESS TO LOW LATENCY MARKET DATA SOFTWARE

Important: to assign the addressing of each connection, the client independently chooses a subnet from the reserved address space, depending on the required number of IP addresses. The first available address from the selected subnet is configured on the exchange side.

Mask prefix	Mask	Number of available IPs
/31	255.255.255.254	1
/30	255.255.255.252	1
/29	255.255.255.248	5
/28	255.255.255.240	13
/27	255.255.255.224	29
/26	255.255.255.192	61
/25	255.255.255.128	125

Make the following configuration on the connection ports:

Feed A:

ip: allocated address(es) of the 10.251.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client from the subnet, assigned for the port.

netmask: 255.255.255.z , where "z" corresponds to the subnet assigned to the port

default gateway: none

Feed B:

ip: allocated address(es) of the 10.252.x.y/24 network, where x is the number of the co-location agreement (x/CL) and y is chosen independently by the client from the subnet, assigned for the port.

netmask: 255.255.255.z, where "z" corresponds to the subnet assigned to the port

default gateway: none

Routes for accessing low latency market data service**:

Derivatives market (SPECTRA)

```
route add -p 91.203.253.244 mask 255.255.255.254 10.251.x.g
route add -p 239.195.20.81 mask 255.255.255.255 10.251.x.g
route add -p 239.195.20.82 mask 255.255.255.254 10.251.x.g
route add -p 239.195.20.84 mask 255.255.255.254 10.251.x.g

route add -p 239.195.20.86 mask 255.255.255.255 10.251.x.g
route add -p 239.195.21.81 mask 255.255.255.255 10.251.x.g
route add -p 239.195.21.82 mask 255.255.255.254 10.251.x.g
route add -p 239.195.21.84 mask 255.255.255.254 10.251.x.g
route add -p 239.195.21.86 mask 255.255.255.255 10.251.x.g
route add -p 91.203.255.244 mask 255.255.255.254 10.252.x.g
route add -p 239.195.148.81 mask 255.255.255.255 10.252.x.g
route add -p 239.195.148.82 mask 255.255.255.254 10.252.x.g
route add -p 239.195.148.84 mask 255.255.255.254 10.252.x.g
route add -p 239.195.148.86 mask 255.255.255.255 10.252.x.g
route add -p 239.195.149.81 mask 255.255.255.255 10.252.x.g
route add -p 239.195.149.82 mask 255.255.255.254 10.252.x.g
route add -p 239.195.149.84 mask 255.255.255.254 10.252.x.g
route add -p 239.195.149.86 mask 255.255.255.255 10.252.x.g
```

Foreign Exchange Market (ASTS)

```
route add -p 91.203.253.246 mask 255.255.255.255 10.251.x.g
route add -p 239.195.1.16 mask 255.255.255.254 10.251.x.g
route add -p 239.195.1.18 mask 255.255.255.254 10.251.x.g
route add -p 91.203.255.246 mask 255.255.255.255 10.252.x.g
route add -p 239.195.1.144 mask 255.255.255.254 10.252.x.g
route add -p 239.195.1.146 mask 255.255.255.254 10.252.x.g
```

Stock Market (ASTS)

```
route add -p 91.203.253.247 mask 255.255.255.255 10.251.x.g
route add -p 239.195.1.20 mask 255.255.255.254 10.251.x.g
route add -p 239.195.1.22 mask 255.255.255.254 10.251.x.g
route add -p 91.203.255.247 mask 255.255.255.255 10.252.x.g
route add -p 239.195.1.148 mask 255.255.255.254 10.252.x.g
route add -p 239.195.1.150 mask 255.255.255.254 10.252.x.g
```

, where "x" is the number of the colocation agreement (x/CL), and "g" is the first available address from the selected subnet assigned to the port.

CONNECTIVITY TO THE INTERNET ACCESS SEGMENT

Two physical interfaces allocated on the server for internet access connectivity must be configured as LACP group (IEEE 802.3ad). Then virtual group interface must be configured as follows:

ip: allocated address(es) of the 10.218.x.y/24 network, where x is the number of the co-location agreement (x/CLZ) and y is chosen by the client*

netmask: 255.255.0.0

default gateway: 10.218.0.1 (if no other connections are in use)

default gateway: none (if other connections are used)

VLAN is not indicated in case of internet connection.

To ensure the configuration accuracy, ping to 10.218.0.1 is allowed on the network.

By default all internet access except DNS requests to servers 8.8.8.8 and 8.8.4.4 (via the 10.218.0.1 gateway) are forbidden by MOEX security policy. Access is granted by Client's request.

Connecting a remote management interface:

Make the following configuration on a management port (HP ILO Advanced, IBM RSA, DELL DRAC, IPMI, etc):

ip: allocated address(es) of the 10.219.x.y/24 network, where x is the number of the co-location agreement (x/CLZ) and y is chosen by the client*

netmask: 255.255.0.0

default gateway: 10.219.0.1

All network access to the management interface's address is forbidden by default. It can be granted per client's request.

Outgoing connections from the remote management interfaces to the Internet are always forbidden.

* - the address must be approved before being used; for approval, please submit a request at colo@moex.com

** - this syntax is for Windows platform

CONNECTIVITY TO THE PRECISE TIME INFORMATION SEGMENT

Two physical network interfaces used for the connection work separately without logical aggregation. These interfaces receive PTP protocol multicast traffic on UDP ports 319, 320 from two separate MOEX devices.

Connection does not use traffic tagging, no VLAN configuration is required.

PTP domain numbers are unique for each connection and provided during the initial service configuration.

MOEX doesn't use IP addressing on the network interfaces. If source IPs are required on client equipment following addresses may be used: 1.0.0.3 for domain A and 1.0.0.4 for domain B.

HOW TO GET STARTED

To get started, client must perform the following steps:

- Consult a manager from the technology service sales team by phone on +7 (495) 363-3232, ext. 5656 or email at itsales@moex.com to make sure that the chosen solution best suits client needs, find out what paperwork is required and which next steps should be taken.
- Read the principal co-location regulations: Colocation Technology Service Rules and Equipment Colocation Regulation.
- Choose connectivity protocols and software (the choice might depend on the current trading software in use).
- Choose infrastructure architecture, hardware list and types of connection to MOEX and the Internet.
- Send two copies of the order form and the client authorization form to the Exchange via the EDI Universal File Gateway or as hardcopies to 125009 Moscow Vozdvizhenka St. 4/7 bldg. 1. MOEX will review the documents and confirm whether or not you may start the installation process.
- Send a request indication the desired date and the installation list (the request form is available in the Equipment Colocation Regulation) to colo@moex.com using one of the emails indicated in the client authorization form.
- **(Optionally)** Connect to the UAT environment to compare the solutions, review the algorithms and check software.
- **(Optionally)** Pass the Software certification procedure in order to connect to MOEX's trading systems (required, if non-standard trading software is used).
- Enter into the access agreement with Moscow Exchange with respect to the software and information products.
- Switch to the production mode.

HOW TO GET TECHNICAL SUPPORT

In case of any issues with the service or if you have a question regarding the connection to MOEX, please contact MOEX's technical support using the following contact details:

- T +7 (495) 733-9507, +7 (495) 287-7691,
- T +7 (495) 363-3232, ext. 2345
- Email: colo@moex.com













For best support we highly recommend you to provide the following details in your original email:

- Company name;
- Connectivity option to MOEX: Colocation;
- IP-addresses used to connect;
- Hardware used to connect*;
- Brief description of the issue;
- **(Optionally)** Results of your tests.

** the code given by MOEX when the equipment was brought in (MOEX-Code)*

Only people named on the client authorization form may submit requests.

AUTHORIZED NETWORK SERVICE PROVIDERS

	*RetnNet Tel +7 (495) 663-16-40		* Vypel Communications Tel 8 (800) 700-80-61
	*Relline Tel +7 (495) 256-8181		*MACOMNET Tel +7 (495) 796-94-00
	*Avelacom Tel +7 (495) 777-03-01, Tel +7 (925) 007-04-33		Equant Tel +7 (495) 777-08-00
	Megafon Tel +7 (495) 502-20-00 Tel +7 (812) 960-00-00		Mobile Telesystems Tel +7 (495) 956-00-00
	Trans Telecom Company Tel +7 (495) 784-66-70		TELECOM-BIRZHA Tel +7 (495) 627-59-44
	COMCOR Tel +7 (495) 411-71-71		MASTERTEL Tel +7 (495) 300-33-33 Tel +7 (968) 894-32-51

* Operators with equipment installed in the co-location facility that are set for providing telecom services

FREQUENTLY ASKED QUESTIONS

What documents are needed for colocation?

All documents are available at <http://www.moex.com/a1819>

Completed documents must be submitted at Moscow 125009 Vozdvizhenka Str 4/7, building 1.

May an individual co-locate a server and trade through DMA?

You may enter into a colocation agreement with MOEX as an individual, but only trading members are allowed to trade on MOEX. So, you will have to deal with a broker.

If you wish to set up connection to MOEX just to receive market data, the agreement may be between MOEX and an individual. For any further information regarding the issue, please contact us at itsales@moex.com.

What services are available for co-located systems?

All MOEX production and game services.

How do we go about getting access to our rack? Will we need to submit a ticket?

The client should send a request to Moscow Exchange at colo@moex.com stating the purpose, estimated date and time of visit to the DC (before 16:00 for weekdays and before 18:00 Thursday for weekends).

The request must include the list of planned works on the Client's equipment, full names of the individuals doing the work on the Client's behalf.

All DC visitors must have their valid IDs with them.

Where is the equipment located?

The client equipment is hosted in a specialized controlled Data Center facility in close proximity to MOEX's trading engine. This allows the lowest latency order confirmation and market data.

Data Center DataSpace1 is located at: 11 building 9 Sharikopodshipnikovskaya Str Moscow 115088

What are co-location options?

We have two options: per unit or per cabinet.

- In case of per unit co-location, the client is billed for each unit occupied by the equipment and communication lines between the equipment in different units.

- In case of per cabinet co-location, the client is billed for the whole rack regardless the number of units occupied by the equipment.

What kind of equipment is eligible for co-location?

Servers, network equipment and storage systems. You choose equipment models and producers completely on your own.

An option of installing equipment with dielectric fluid for cooling is managed by exception for each unit of that equipment.

The space for colocation is limited. To avoid an unexpected refusal of colocation, make sure your hardware composition is agreed with MOEX specialists.

For further information regarding collocated equipment, please refer to the Equipment Colocation Regulation (DataSpace Data Center) available at <https://fs.moex.com/files/8128>.

What is the size of equipment and fixings? How many units can be placed in a standard cabinet?

Equipment must be compatible with typical 19-inch rack installation using one or more standard units.

The rack dimensions: 700 x 1200, 48U of which 42U are available for mounting equipment.

Racks accommodate organizers and PDU which may impede mounting, i.e. the actual capacity of a rack can decrease.

Do you provide fixing elements needed for installation?

Yes, fixing elements (nuts and bolts) compatible with racks are provided by MOEX.

Can two-, three-, or multi-unit equipment be installed?

Yes, if technically possible. In case of per unit pricing, multi-unit equipment is charged at the rate per unit multiplied by number of units.

Are there any power limitations?

Yes, the power for co-located equipment is limited.

- In case of unit rent, power is limited to 500 Watt according to rating plates on power units. When a 501-1000 W server is co-located on one power unit, the price will be for two single unit servers; a 1001-1500 W server co-located on one power unit will cost as three single unit servers and so on.
- In case of per cabinet colocation, the total maximum power is 6 kW per cabinet (7 kW if a further service is ordered).

Must the equipment be certified?

Only certification that is mandatory in Russia such as Russian National Standard (GOST R) and SES is required.

What power supply type is supported?

The client's equipment must have two power supplies in reserve mode (1+1).

Voltage: 220V, 50Hz.

Outlets: PDU IEC C14.

Do you supply power cables? If not are there any specific requirements that we must adhere to?

The client equipment must contain power cable kit. We can provide standard power cables per client request (if you need non-standard cables, please contact us beforehand so we could check availability).

Can we take pictures inside the data center of our rack?

You can take pictures of your cabinet only.

Who is in charge of installing our hardware in the rack and connecting it to the power and data networks?

If you order a per-unit co-location, MOEX engineer does all the equipment installation and the cabling. In case of entire cabinet co-location, you may either perform equipment installation and cabling yourself or use MOEX engineer's help for that. The equipment connectivity and installation scheme must be preliminary approved by the Moscow Exchange.

**How cabling should be laid? Can cables be laid on the top of the rack? Or under the floor between racks?
Are there pass-through windows between the racks?**

Cross-connect cabling outside a rack is performed by the MOEX specialists using cable systems laid beforehand. Running a cable over the top of a rack is allowed for switching of two nearby racks of the Client and performed also by the MOEX specialists. No other cabling options are available.

Does MOEX supply cables?

We provide cables for connection to the network. Cables interconnecting client equipment within the rack are supplied by the client or MOEX, if just a small amount is needed.

How is the Production and Game services connection redundancy ensured?

Every connection to MOEX network is established over the pair of links in redundant mode. On MOEX side, connection ports are on different network devices. LACP (IEEE 802.3ad) is used for back-up connectivity for servers; BGP is used for back-up connectivity for network devices.

In order to ensure fault tolerant connectivity on the client's side, we recommend the client to connect with two different network devices.

How is the fault tolerance of the connection to low latency transactional connections service ensured?

Since a single path to the gateway is required to comply with the principle of low latency transactional connections service, the classic trade connections redundancy scheme does not apply here. In case of damage to the client link, it will be replaced at the time allowed for the onsite work. In case of failure of the access switch, all connections will be physically transferred to a similar cold standby switch.

Customers are advised to be able to back up trade processes through a Production and Game services connection.

What are the technical requirements for 1 Gbit/s connections?

Cable type: UTP Cat, RJ45 connectors.

Standard: 1000Base-TX.

Only servers may be connected, connection of the clients' network devices is not allowed.

What are the technical requirements for 10 Gbit/s connections?

Supported cable types: LC-LC multimode fiber optic cable.

Standard: SFP+/10GBASE-SR (10 Gbit/s).

Clients' BGP network devices are allowed.

Does MOEX provide an Internet external address if we order the Internet access service?

Yes, we provide an external address within the 85.118.178.0/23 address space.

How to receive extra IP addresses?

You need to order the relevant service.

Does MOEX provide backup internet connection?

Yes, we provide automatic Internet redundancy using BGP between points of connection to upper telecom operators.

Is there any protection against DDOS attacks or port scans?

We restrict by default any network access to your equipment, however, we can whitelist specific addresses/ports upon your request. We don't have any other specific protection against DDOS attacks or port scans.

Can I organize external connection over the Internet through specific NSP?

Yes. To do so, please select NSP from the list of Moscow Exchange certified providers and order "NSP connectivity" service.

Why do I need to order connectivity service through NSP?

Connectivity through an NSP is necessary if you need further communication services along with the Internet access.

How is equipment linked to an NSP? Do I need to pay extra for NSP equipment co-location service when I order NSP connectivity?

Network service providers certified by the Moscow Exchange install their network equipment at the co-location zone by themselves in certain racks. Once the client orders connectivity service from the NSP, the provider allocates a port on their equipment that is connected to a port on the client equipment. No additional payment for NSP co-location is required.

Note: The client should sign on its own a dedicated channel service agreement with the chosen NSP.

Who connects client equipment to the segments to access production and trade services, the Internet, external accredited providers and other clients' co-located equipment?

Any connection is made only by the MOEX engineers. Please note that any connection must be agreed with MOEX representatives in advance.

Does MOEX offer remote hands service? What is Time to Repair?

Remote hands service is possible. You will need to provide your hardware configuration and connectivity scheme so we could check on the manufacturer requirements and provide SLA for you.

When is the remote hands service available?

Our engineer on duty is available from 9:00 am-11:00 pm MSK on business days. He performs basic tasks in emergency cases, i.e. reboot server, replace hot-swap HDD, etc.