

# Universal scheme

## PRODUCTION CONNECTIVITY

valid since 01 December 2022

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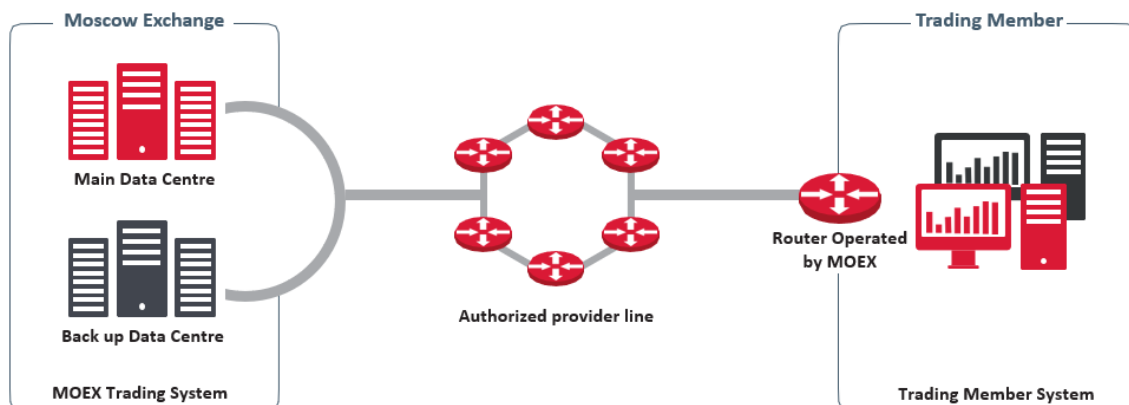
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## OVERVIEW



Universal Scheme is one of the methods to set up network access to MOEX services via aggregated channels of [authorized telecom providers](#). It comprises the provider's "last mile" network reaching the Client's equipment, Client's equipment managed by MOEX and network segments for trading systems connected by the Client according to MOEX standards. For further details, please go to [Technical Scheme](#) below.

The Client's connection points can be located in any area accessible for telecom operators.

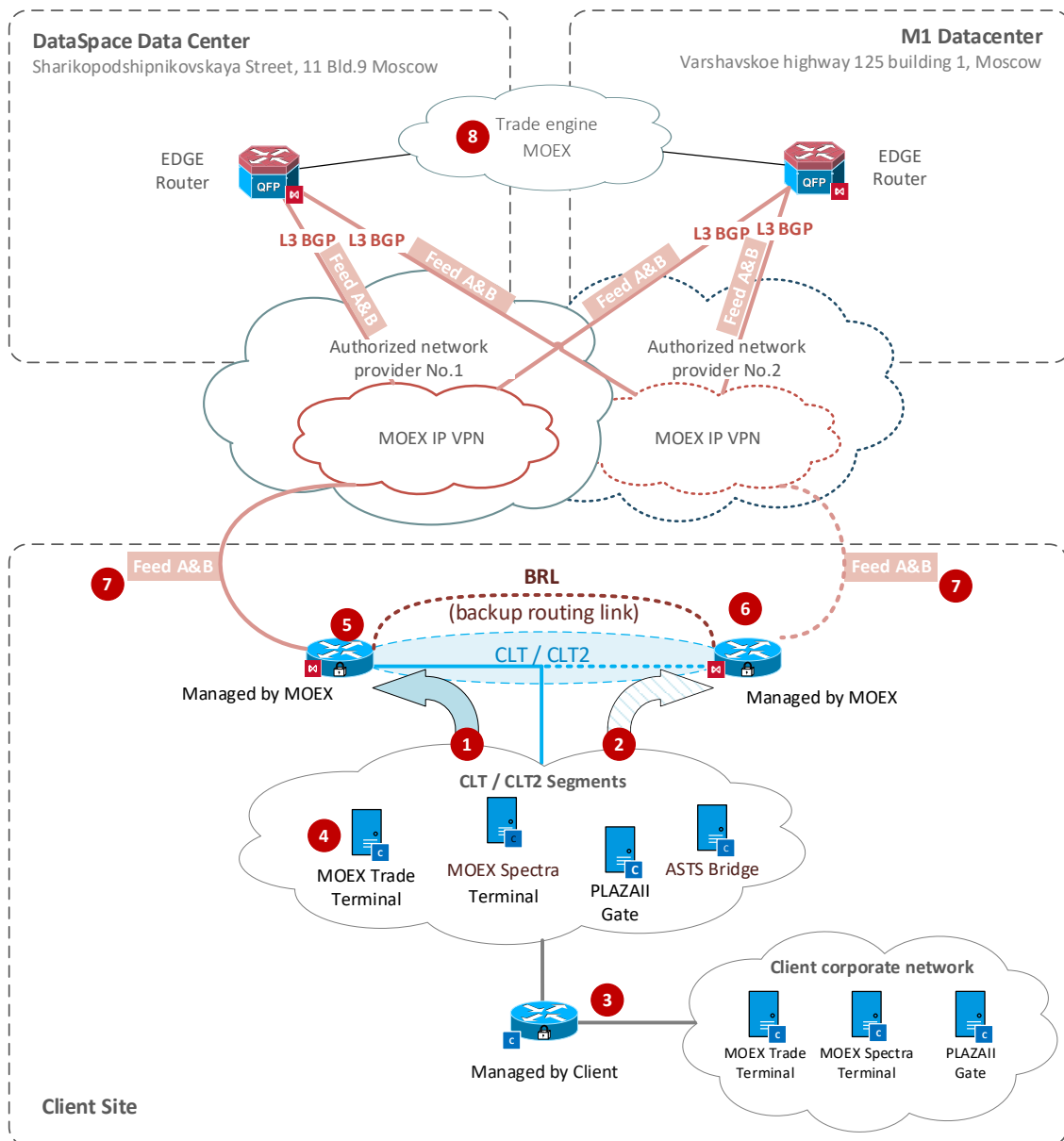
Two connection schemes are available:

- Basic scheme (no redundancy). One connection between the provider and MOEX may fail without the Client losing connection to MOEX's services.
- Failover scheme (automatic redundancy). One network provider may fail completely without the Client losing connection to MOEX services.

Moscow Exchange does not limit the number of connection schemes ordered by one Client.

The service is provided under the Information Technology Services Agreement.

# TECHNICAL DIAGRAM



- 1** **CLT segment** is a dedicated segment of the Client's network designed to install specialized software and exchange systems (item 4) as well as establish a L3 link to the Client's internal network (item 3). VLAN (IEEE 802.1Q standard) is supported; VLAN ID must be transferred to MOEX's specialists at the setup stage.
- 2** **CLT2 segment** is a dedicated network segment used in a failover scheme and identical to CLT segment in its functions. CLT and CLT2 segments use single port on the router managed by MOEX and single broadcast domain (L2 domain). The difference between them is that network connections from CLT segment are sent via the first network provider link by default and CLT2 via the second network provider. This feature can be used for the network traffic load-balancing between two network providers. It is recommended to use CLT segment for Derivatives Market connections and CLT2 segment for Equity, Bond and FX Markets connections. Any configuration of load-balancing also supports failover. Fail of any provider connection does not block connections to MOEX services, however particular application sessions might require re-establishing.

- 3 Client corporate network.** The Client is allowed to connect to systems installed within CLT/CLT2 segments or MOEX's services. Such connection is configured by Client's specialists. In this case, source IPs must be from the CLT or CLT2 IP address ranges (see [addressing plan](#)).
- 4 Client servers and workstation.** Information on MOEX products and services is available at <https://www.moex.com/s397>.
- 5 Router managed by MOEX.** Network router from the [supported hardware](#) list installed on client site.
- 6 Additional Client router managed by the Exchange.** A failover scheme with the circuit of the second operator is the recommended connection method, however, the choice of this method is optional. If you use a failover scheme, you must connect the CLT / CLT2 interfaces of the two routers to the same network segment. Each of the two routers can handle client network requests in these segments according to the HSRP protocol. It is also required to connect separate router interfaces to each other for Peer-link communication and fault tolerance.
- 7 MarketData delivery.** If the Client uses FAST UDP multicast marketdata, then feed subscription must be done using PIM SSM or IGMP v3 protocols, depending on the client network design.
- 8 MOEX services** are in 91.203.252.0/22, 10.63.0.0/22 and 10.61.0.0/22 IP ranges.

## SUPPORTED HARDWARE

Recommended router models manufactured by Cisco Systems: ISR4200, ISR4300, ISR4400 with IPBase license.

Recommended router models manufactured by QTECH: QSR-1920-12-AC, QSR-2920-14-AC-AC with system software version 7.8.0.100:

	Cisco ISR4221 IPBase	Cisco ISR4321 IPBase or Cisco ISR4221 FL- 4220-PERF- K9	Cisco ISR4331 IPBase or Cisco ISR4321 FL- 4320-PERF- K9	Cisco ISR4351 IPBase or Cisco ISR4331 FL- 4330-PERF- K9	Cisco ISR4431 IPBase or Cisco ISR4351 FL- 4350-PERF- K9	Cisco ISR4451 IPBase or Cisco ISR4431 FL- 44-PERF-K9	Qtech QSR- 1920-12-AC or Qtech QSR-2920- 14-AC-AC	Cisco ISR4451 FL- 44-PERF-K9
<b>Features</b>								
<b>Form factor</b>	1 RU Desktop	1 RU Desktop	1 RU	2 RU	1 RU	2 RU	1 RU	2 RU
<b>Integrated WAN Ports</b>	GE / SFP	GE / SFP	GE / SFP	2 PoE GE / SFP	2 PoE GE / SFP	2 PoE GE / SFP	GE / SFP	2 PoE GE / SFP
	GE	GE	GE	GE / SFP	2 GE / SFP	2 GE / SFP	GE / SFP	2 GE / SFP
			SFP					
<b>Performance</b>	20 Mbps	35 Mbps	75 Mbps	175 Mbps	450 Mbps	900 Mbps	900 Mbps	1900 Mbps

If Client needs to use other models of Cisco or Qtech equipment, the configuration of the equipment must first be agreed with the Moscow Exchange by contacting the [technical support](#).

At least two physical Ethernet ports are required on the router.

## NETWORK CONNECTION REQUIREMENTS

The bandwidth Client needs is the sum of the following values depending on the number of the services in use and the amount of FAST UDP Multicast feeds:

- 4 Mbit/s multiplied by the number of the gateways/terminals in use
- 10 Mbit/s multiplied by the number of the gateway/terminals 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](#).

## ADDRESSING PLAN

An authorized Network Service Provider, selected by the client to organize the service, independently provides the client with an IP address (WAN) for connecting the router to his network (Peer2Peer network).

Network addresses for CLT and CLT2 segments are allocated by the Exchange during the service configuration from the ranges indicated in the table below:

Segment	Network address	Prefix	Subnet mask
CLT	10.160.X.0 or 10.161.X.0	/24	255.255.255.0
CLT2	10.164.X.0 or 10.165.X.0	/24	255.255.255.0

The Client determines on its own end IP addresses for its systems\*; no further notice is needed. The IP addresses shall be specified in the login requests and other connectivity service requests; they can be passed to the trading member in a special application (except for addresses for receiving marketdata via FAST protocol).

*\* The last five addresses in each subnet are reserved by the Exchange.*

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

## EQUIPMENT SETUP

To transfer the router management to MOEX specialists, client needs to do the initial configuration on the device:

```
enable secret 123
interface {towards MOEX}
    ip address {allocated by the provider} 255.255.255.252
    no shut
    speed auto
    duplex full
    exit
ip route 0.0.0.0 0.0.0.0 {configured on MOEX's side}
line vty 0 4
    transport input telnet
    password 123
```

```
login
end
```

After the initial configuration is done, MOEX specialist will be able to access the router remotely, perform full configuration and make sure that it works properly.

Configuration of routing on the Client's side designed to access MOEX's services requires that an IP address set on the router interfaces (X.X.X.252) is determined as a next hop.

The following is a basic routing in the syntax of the Windows command line:

Transaction services:

```
route add -p 10.63.0.0 mask 255.255.252.0 GW_CLT*
route add -p 10.61.0.0 mask 255.255.252.0 GW_CLT*
route add -p 91.203.252.0 mask 255.255.252.0 GW_CLT*
```

FX Market FAST:

```
route add -p 91.203.253.225 mask 255.255.255.255 GW_CLT*
route add -p 91.203.253.228 mask 255.255.255.255 GW_CLT*
route add -p 239.195.1.0 mask 255.255.255.224 GW_CLT*
route add -p 91.203.255.225 mask 255.255.255.255 GW_CLT*
route add -p 91.203.255.228 mask 255.255.255.255 GW_CLT*
route add -p 239.195.1.128 mask 255.255.255.224 GW_CLT*
```

Equity & Bond Market FAST:

```
route add -p 91.203.253.227 mask 255.255.255.255 GW_CLT*
route add -p 91.203.253.229 mask 255.255.255.255 GW_CLT*
route add -p 239.195.1.32 mask 255.255.255.224 GW_CLT*
route add -p 91.203.255.227 mask 255.255.255.255 GW_CLT*
route add -p 91.203.255.229 mask 255.255.255.255 GW_CLT*
route add -p 239.195.1.160 mask 255.255.255.224 GW_CLT*
```

Derivatives Market FAST:

```
route add -p 91.203.253.232 mask 255.255.255.255 GW_CLT*
route add -p 239.195.5.0 mask 255.255.255.0 GW_CLT*
route add -p 91.203.253.236 mask 255.255.255.255 GW_CLT*
route add -p 239.195.15.0 mask 255.255.255.0 GW_CLT*
route add -p 91.203.255.232 mask 255.255.255.255 GW_CLT*
route add -p 239.195.133.0 mask 255.255.255.0 GW_CLT*
route add -p 91.203.255.236 mask 255.255.255.255 GW_CLT*
route add -p 239.195.143.0 mask 255.255.255.0 GW_CLT*
```

\* - In the case of a failover scheme servers and workstations for working with the Equity, Bond and FX Markets it is recommended to place them in the CLT2 segment, so the address GW\_CLT in this case should be from the CLT2 segment.

For customers on the exchange network, a domain name service (DNS) is available at the addresses: 91.203.252.10, 91.203.254.10 and the network time protocol (NTP): 91.203.252.12, 91.203.254.12.

## 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](mailto: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.
- Choose telecom operators from MOEX's authorized list. Order connection to MOEX and agree on commercial terms and SLA.
- Sign an ITO agreement with the Moscow Exchange (perhaps it already exists!) and order the Universal Scheme service by submitting the order form (CLT and DMZ addresses are specified by the Exchange). Exchange managers will tell how to fill out the necessary forms correctly.
- Choose connectivity protocols and software (the choice might depend on the current trading software in use).
- **(Optional)** Connect to the UAT environment to compare the solutions, review the algorithms and check software.
- **(Optional)** 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

If client experiences a malfunction of the Service or have a question regarding the connection to MOEX, the technical support service should be contacted with the following information:

- Company name;
- Connectivity option to MOEX: Universal Scheme;
- IP-addresses used to connect;
- Issue overview;
- Telecom provider serving the channel;
- **(Optional)** Results of your tests.
- Technical support service:

Technical support service:

T +7 (495) 733-9507, +7 (495) 287-7691,

T +7 (495) 363-3232, ext. 2345

E-mail: [help@moex.com](mailto:help@moex.com)

## AUTHORIZED NETWORK SERVICE PROVIDERS



Equant  
Tel.: +7 (495) 777-08-00



Vympel Communications  
Tel.: 8 (800) 700-80-61



MegaFon  
Tel.: +7 (495) 502-20-00  
Tel.: +7 (812) 960-00-00



Mobile Telesystems  
Tel.: +7 (495) 956-00-00



Relline  
Tel.: +7(495) 256-8181



MACOMNET  
Tel.: +7 (495) 796-94-00



Trans Telecom Company  
Tel.: +7 (495) 784-66-70



RetnNet  
Tel.: + 7 (495) 663-16-40



TELECOM-BIRZHA  
Tel: +7 (495) 627-59-44



Avelacom  
Tel.: +7 (495) 777-03-01,  
Tel.: +7 (925) 007-04-33



COMCOR  
Tel: +7(495) 411-71-71



MASTERTEL  
Tel.: +7 (495) 300-33-33  
Tel.: +7 (968) 894-32-51

## FAQ

### What is the difference between ConnectME and Universal Scheme?

With ConnectME enabled, the Client's traffic is isolated and transmitted via a communication channel with a fixed configuration. Universal Scheme provides an aggregated communication channel for the transmission of data of all clients of one telecom operator to MOEX's data center. This restricts the choice of telecom operators available, i.e. Universal Scheme offers only a limited number of operators accredited by MOEX.

ConnectME provides a fixed network delay which remains stable over time; traffic in Universal Scheme is routed within the operator's internal network whose architecture can be modified over time.

Flexible solutions for redundant connection are available in ConnectME; Universal Scheme offers two predetermined options: connection via a telecom operator (to the main and disaster recovery DCs) and failover connection via two telecom operators.

### What is the bandwidth of aggregated joints in networks of authorised telecom operators and MOEX's network?

All joints have 1 Gbit/s bandwidth.

### Can I use network equipment other than Cisco or Qtech, i.e. Juniper or Arista?

Only Cisco and Qtech equipment is allowed.

### Does Universal Scheme connectivity imply restrictions on the use of DMA interfaces?

With Universal Scheme enabled, the Client may use any protocols and interfaces to access all MOEX markets, except those that need wide bandwidth (FAST FullOrderLog and others).