MOSCOW EXCHANGE

ASTSBridge (v. 4.2.2)

Universal bidirectional interface for connecting external systems to the Moscow Exchange ASTS Trading & Clearing System

User Guide

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INTRODUCTION

This guide describes universal bidirectional interface for connecting external systems to the Moscow Exchange ASTS Trading & Clearing System in real time for trading and informational purposes.

ASTSBridge is the software part of a hardware-software system consisting of two interconnected servers – one located in the Moscow Exchange trading network, another – in client's local network. Data between these two networks is transferred in real time with appropriate (in the Moscow Exchange expert opinion) level of protection and security.

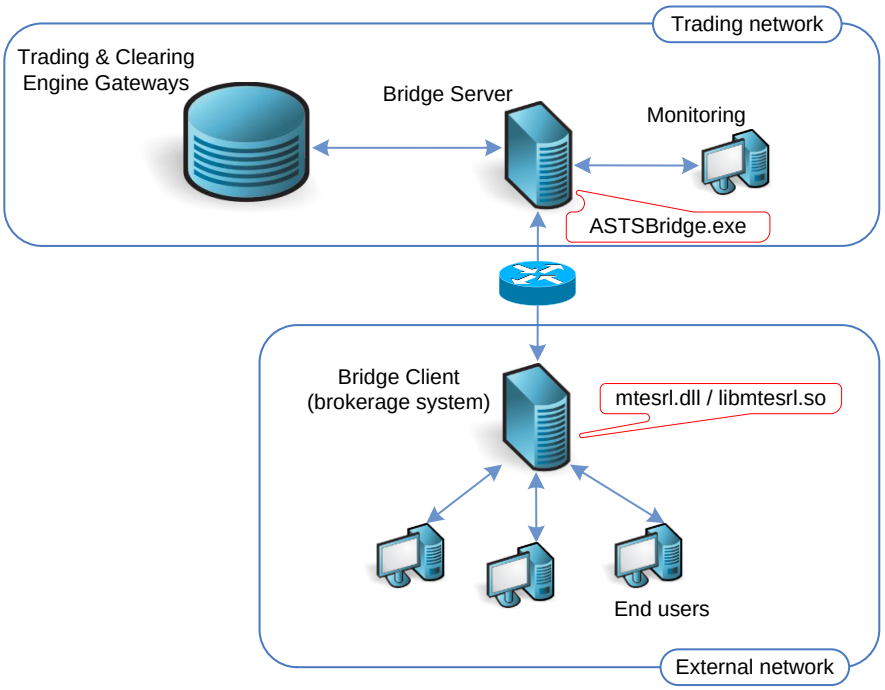
ASTSBridge provides bidirectional connection to the Trading & Clearing System and includes an application programming interface (API), which provides functions for obtaining data from the Trading System (orders, orderbook, securities, etc.) as well as for executing transactions (submit and withdraw orders, etc.). The API is described in a separate document: "Application Programming Interface for connecting external systems to the Moscow Exchange ASTS Trading & Clearing System". Programming interface provides connection of analytical and brokerage systems, risk-management systems, order collection and market data distribution systems, back offices, etc.

ASTSBridge is used for high-speed connection through Cisco PIX/ASA IP-filter on TCP/IP protocol.

Sample client application TEClient is supplied with the product. It uses a dynamic library (Windows DLL) mtesrl.dll, which provides application programming interface (API) to application-receiver of the external system, to connect to the ASTS Trading & Clearing System.

SYSTEM ARCHITECTURE

The system architecture is shown on the following diagram:



Pic.1 ASTSBridge system architecture

FUNCTIONAL FEATURES OF ASTSBridge

ASTSBridge supports following main operations:

- connect to the ASTS Trading & Clearing System (TS) using ID & password of a TS user, who is administrator of the Bridge;
- receive requests for trading information and information updates from an external system, and pass them to the TS;
- receive replies (data, information updates) from TS and pass the information to the external system;
- receive requests for active transactions (enter and withdraw orders, etc.) from the external system and transmit them to the TS;
- receive reply to the active transaction from TS and pass it to the external system;
- receive error messages (resulting from processing requests for information or active transactions) from TS and pass them to the external system;
- pass the description of "bridge interface" to the external system on request;
- state recovery after connection loss or any failures in the trading system, external system or bridge;
- disconnect from TS on bridge administrator's request.

ASTSBridge provides logging for the following events:

- connection to Trading System;
- transaction requests from an external system;
- requests for information (updates) from an external system;
- disconnection from the TS.

ASTSBridge provides connection to Moscow Exchange Equities & Bonds market (Main Market sector), FX market and Government Securities markets.

IMPLEMENTATION DETAILS

The application is implemented as two software components, that can be executed on two separate machines. Server component (ASTSBridge), implemented as separate application for 32 or 64 bit versions of Microsoft Windows 2000/XP/Vista/7 or Microsoft Windows Server 2003/2008, connects to ASTS Trading & Clearing System via TSMR protocol. Client component ASTSConnectivity API (mtesrl.dll for 32 or 64 bit Windows; libmtesrl.so for 32 and 64 bit Linux) provides an application programming interface (API) to external system. API is described in a separate document: "Application Programming Interface for connecting external systems to the Moscow Exchange ASTS Trading & Clearing System". Data is transferred between components via TCP/IP protocol.

In order to provide connection flexibility and "security barrier" for external systems connecting to ASTS TS (via mtesrl.dll), ASTSBridge provides receiving requests for providing, updating information and executing transactions, only within the "bridge interface" allowed to the current user. Description of the allowed "bridge interface" can be requested by external system dynamically. This description has a specific structure and includes:

- description of tables (table names, types and additional information), available to the client;
- description of table fields (field names, types, formats and additional information), available to the client;
- description of transaction (transaction names, types, formats and additional information), available to the client;
- description of transaction fields (transaction field names, types, formats and additional information), available to the client;
- description of specific constants (e.g., enumerated types), used to encode the values of fields in tables and transactions.

"Bridge interfaces" descriptions are stored and maintained centrally, and the needed description is transferred from Trading System to the Bridge on request at the beginning of working session.

Usually, most of external systems establish two or more connections. Any connection may be used either for market data transmission or for transaction execution or for both.

Possibility of running multiple instances of Bridge on a single machine with different configuration files and working directories is also provided. While working in parallel, different instances of ASTSBridge can be connected to the same or to different instances of ASTS Trading System. ASTSBridge server component can serve multiple instances of ASTSConnectivity API (mtesrl.dll), connected via different communication ports.

HARDWARE AND SOFTWARE REQUIREMENTS

For a proper functionality of ASTSBridge server and external systems which use mtesrl.dll, the following minimal software and hardware requirements are established:

- The operating system of one of the following versions (32 or 64 bit):
  - Microsoft Windows 2000 with Service Pack 2 installed;
  - Microsoft Windows XP with Service Pack 3 installed;
  - Microsoft Windows Vista;
  - Microsoft Windows 7;
  - Microsoft Windows Server 2003;
  - Microsoft Windows Server 2008.
- Hardware:
  - CPU – Intel Core 1,4GHz or higher;
  - RAM –1GB or more;
  - HDD with 10 GB free space for logging;
  - Ethernet network card;

These requirements do not consider specific characteristics of the external system and may be adjusted upwards depending of the resources required for external system proper operation.

INSTALLATION, UNINSTALLATION, UPDATES

The product is supplied as a ZIP-archive.

To install ASTSBridge just unzip the archive to any directory on your hard drive.

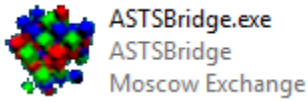
If using Windows XP or later, right-click on archive icon and select "Extract all" in a context menu, then follow the instructions.

In previous versions of Microsoft Windows, use third-party archivers: 7-Zip, WinRar, WinZip, etc.

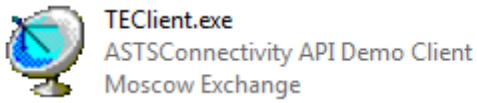
The distribution package has the following directory structure:

`server`	ASTSBridge server side;
`mtesrl`	client library for connection external systems to ASTSBridge;
`demo`	examples of using client library, C++ and Delphi code samples;
`doc`	product documentation;
`embedded`	client library for direct connection to ASTS Trading System. Can be used only on the system, situated in Moscow Exchange data center, under colocation terms (called "embedded" Bridge).
`legacy`	outdated RS-232 version - ASTSBridge Serial (TEServer), provided for compatibility reasons;

To run ASTSBridge server double-click its icon in *server* directory:



After configuring ASTSBridge server (see ***ASTSBridge -> Settings***) you can run sample client application. To do so, double-click TEClient icon in the *demo* directory:



For information on connecting your own external system to the MICEX trading system, see the manual for developers, "Application Programming Interface for connecting external systems to the Moscow Exchange ASTS Trading & Clearing System".

When updating the product, it's necessary to save configuration files of previous version. **NOTE**: Do not unzip the distribution archive to the working folder of previous version. It can cause a loss of important data and break ASTSBridge and external systems operability.

Current version, by default, uses XML-formatted configuration files, however, to ensure compatibility INI-formatted configuration files are also supported. But it's still recommended to convert old INI-files to XML format.

To uninstall the product, it's enough to delete its folder. If ASTSBridge was registered as a Windows Service, it's necessary to uninstall the service first. If products working folder differs from its installation folder, it's necessary to delete working folder first (see New configuration parameters).

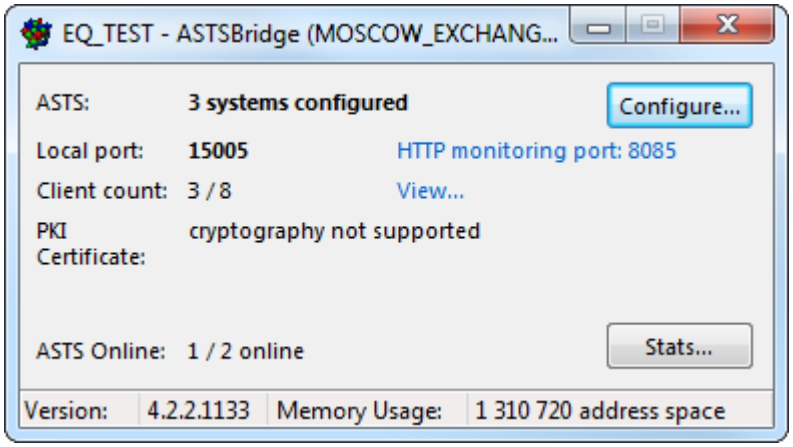
WORKING WITH ASTSBridge

ASTSBridge is a modern technology for connecting to ASTS Trading & Clearing System. It provides a multi-user access and an ability to choose bridge interfaces. Connection is performed through TCP/IP protocol. Main features are:

- possibility to choose the needed version of the bridge interface (i.e. the set of tables, fields and transactions), the USERID and the set of trading boards. These options are defined at the connection time individually for each single connection, so, very flexible configuration is available at the client side;
- possibility to specify several Bridge addresses at connection time, so connection will dynamically switch between them, in case of network problems;
- opportunity to use the electronic digital signature and streaming encryption from Validata (to decrease server load and ping time);
- possibility to run ASTSBridge as Windows Service;
- MTESRL client library for 32 and 64 bit Windows and Linux.

ASTSBridge server accepts incoming client connections and establishes a TSMR connection to the ASTS Trading & Clearing System individually for each client.

ASTSBridge server user interface



Pic. 2 ASTSBridge server main window

Main ASTSBridge server user interface elements:

Element	Description
Title	The window title displays server ID and full name, clients will connect to (see ***Settings***).
Connection info	"Connection info" panel displays the parameters of the active connection: • **ASTS**: name of the ASTS server and the name or number of the Trading System service; • **Local port**: name or number of a local port, clients should connect to; • **HTTP monitoring port**: the number of port to access the monitoring application using a web-browser. Click this link to open the monitoring interface; • **Client count**: a number of currently connected clients / maximum allowed number of connections; • **View** – click this link to open clients' connections information with a web-browser; • **PKI Certificate**: title of the digital signature certificate when cryptography is enabled; • **ASTS Online** –active connection to trading system is established.
«Configure» button	Push the "Configure" button to run ASTSBridge Configuration Utility (BridgeConfig) - tool for editing configuration file. Changes, made with BridgeConfig, take effect immediately and do not require a restart of the system.
«Stats» button	Push the "Stats" button to show some additional statistical data: • **Running time**: running time of current server instance; • **Max clients**: maximum number of simultaneous client connections today and since the server startup (total); • **Today**: number of requests (reqs), read bytes and sent bytes for today; • **Total**: number of requests (reqs), read bytes and sent bytes since the server startup; Click "**Hide"** button to hide additional statistical data.
Status bar	Status bar shows the ASTSBridge version and memory usage.

Settings

Current version, by default, uses XML-formatted configuration files. In this case, configuring an access to multiple ASTS markets and some additional parameters become available. However, to ensure compatibility outdated INI-formatted configuration files are also supported. But it's still recommended to convert old INI-files to XML format with a BridgeConfig utility, included into distribution package.

By default, ASTSBridge server loads its parameters from configuration file whose name matches the name of the main executable. XML files have a higher priority than INI, so ASTSBridge.exe will first try to load ASTSBridge.xml, and if such file does not exist - ASTSBridge.ini will be used. For ASTSBridgeEQ.exe it will be ASTSBridgeEQ.xml (or ASTSBridgeEQ.ini) and so on.

Configuration file name (and full path) can be specified when starting ASTSBridge server from the command line:

```
ASTSBridge.exe /config ConfigFileName.xml
```

Configuration file that ASTSBridge server currently uses is displayed on the top of BridgeConfig utility main window (see pic.3).

BridgeConfig configuration utility

ASTSBridge distribution package contains BridgeConfig.exe - a GUI configuration utility that provides an opportunity to set up ASTSBridge parameters visually, without editing a configuration file with a text editor, and to convert old INI files to XML format.

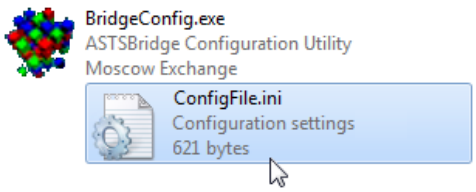
The needed configuration file name should be specified explicitly when starting BridgeConfig:

- from the command line:

  ```
  BridgeConfig.exe ConfigFileName.ini
  ```

- Windows graphical environment:

  drag the desired configuration file to the BridgeConfig.exe icon;



- from ASTSBridge.exe main widow:

  start the Bridge server with a desired configuration file (described above), and click "Configure…" button at the top right of the window form.

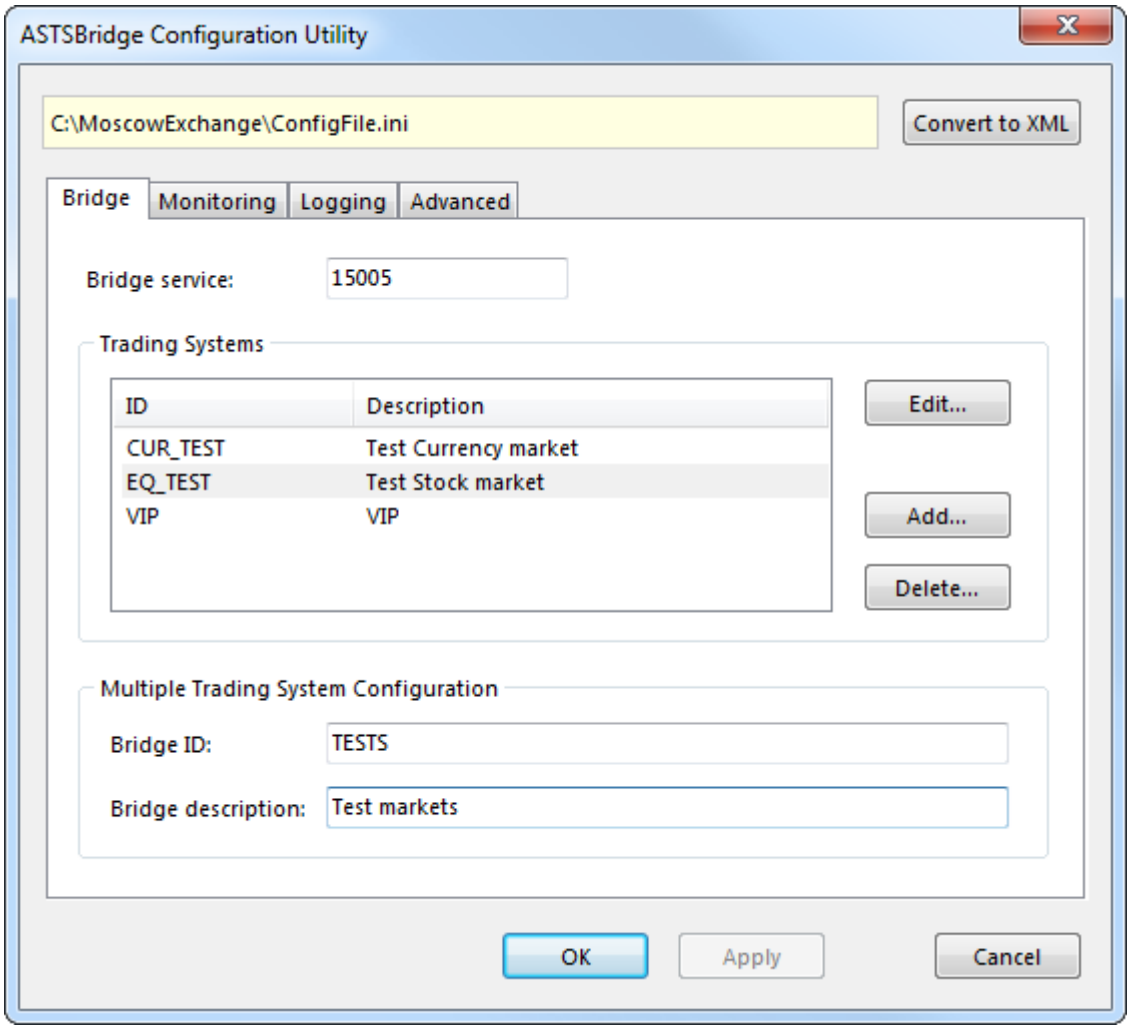
To convert old configuration file to XML format, start BridgeConfig with each needed configuration file, and press "Convert to XML" button at the top right of the window form. Save changes, by pressing "OK" or "Apply". A new configuration file will be named `filename.xml`, and initial INI-file will be renamed to `filename.ini.bak`.

After conversion the configuration file to XML, some additional features will become available: setting up an access to multiple trading systems, control of allowed clients' IP-addresses and others.

ASTSBridge monitors changes of its configuration file during operation, so settings made with the configuration utility will automatically take effect after pressing «*OK*» or «*Apply*» buttons, restart of Bridge server is not required.

Configuration file also can be edited manually with any text editor. (see XML configuration file structure)

BridgeConfig main window



Pic. 3 BridgeConfig main window

Interface elements of BridgeConfig main window are divided into four tabs: "Bridge", "Monitoring", "Logging" and "Advanced". At startup, Bridge tab is active.

Main BridgeConfig interface elements:

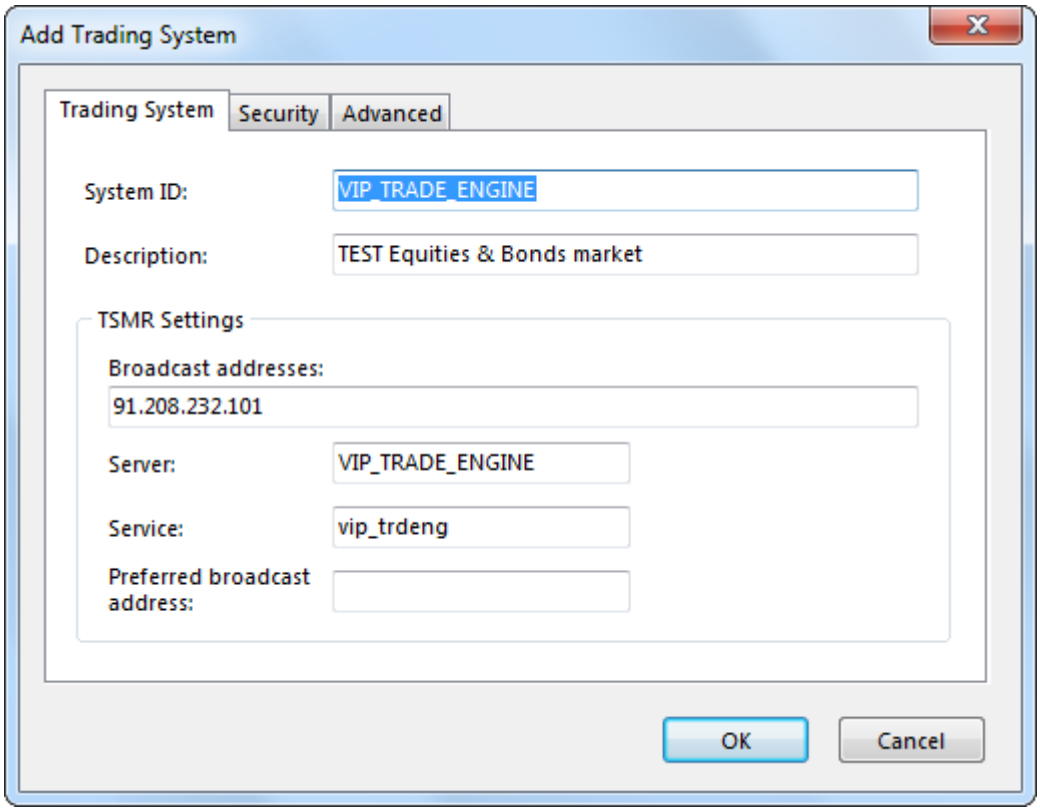
Element	Description
Configuration file	Full path to ASTSBridge configuration file.
Bridge	
Bridge service:	Name or number of the TCP service of the server. For example, "15005".
Trading Systems	List of configured connection profiles, containing server identifiers and their random descriptions.
"Edit…" button	Edit connection profile parameters.
"Add…" button	Add a new connection profile.
"Delete…" button	Delete selected connection profile.
Multiple Trading System Configuration	Unique Bridge identifier and description. This panel becomes available after configuring multiple connection profiles to different Trading systems.

Monitoring	
Allow HTTP-monitoring on port:	The name or number of the service, on which http-agent for server monitoring is running. Monitoring is available using a web-browser at: *http://{server_address}:{service}* .
Gather per-user statistics every:	Interval to collect statistics on the client connections. For each client the following data is collected: bytes received and sent, number of requests, average time of request processing by the Trading System, packet delays.
Notify about problems by e-mail. Server:	Mail server IP or name (SMTP) to send diagnostic e-mail notifications to the administrators.
E-mail account to send from:	E-mail address to put in the FROM field of diagnostic notifications.
Bridge administrator e-mail addresses:	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the server startup & shutdown and other system messages. Empty value means not to send any such messages.
Notify if free disk space less than:	The lowest free drive space (in MB) when the notification on the low disk space is sent to the system administrator.
Or key expires in … days	A number of days before Validata key expiration, when system administrator will be informed about it. This parameter is valid only when cryptography is enabled.
E-mails to notify of logon problems:	List of e-mail addresses (comma separated) of recipients who would like to get notifications on client connection problems. Empty value means not to send any such messages.
E-mails to notify of bridge slowdowns: Notify in case of … slowdowns within … min.	List of e-mail addresses (comma separated) of recipients who would like to get notifications on Bridge server performance, new client connections establishing, as well as at slow connection to the ASTS Trading System or its absence. Empty value means not to send any such messages. Condition for sending a slow connection notification – number of times the value of MaxProcessingTime was exceeded during the specified time interval (minutes).
E-mails to notify of network failures: Notify in case of … slowdowns within … min.	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the client's network problems. Empty value means not to send any such messages. Condition for sending a network problem notification – number of failures during the specified time interval (minutes).
Logging	
Working folder:	Full path to ASTSBridge working directory, which will be used for storing log-files and TS interface caching. If value is not specified, or is an empty string, installation directory will be used.
Automatically delete log-files older than:	Number of days to keep log files on the server hard drive. If set to 0, the log will never be removed.
Save user logs to file	Allow collecting and storing statistics of users working in files. In case of high client applications activity, statistic data may require a large amount of memory and it is recommended to disable this function.

Advanced	
Automatically stop bridge after:	Time of automatic server shutdown. On specified time, ASTSBridge server will automatically stop and all connected clients will receive an appropriate message.
Disconnect clients idle more than: … sec	Maximum idle time (in seconds), after which the client will be forcibly disconnected. Clients, who do not query the server for a long time, are considered to be "hanged up". It's recommended not to set this parameter to less than 60 seconds.
Default language for messages:	Appropriate language to use in error messages. Possible values are: "English", "Russian" and "Ukrainian".
Compression level:	Compression of transmitted data: "No compression" – fast on wide network channels; "Zlib" – medium compression; "BZip2" – maximum compression. Recommended value – BZip2.

Add or edit connection profile

Press "Add" or "Edit" buttons in BridgeConfig main window.



Pic. 4 Add Trading System

"Add Trading System" window is divided into four tabs: "Trading System", "Security", "Advanced" and "Service".

Main interface elements of "Add/Edit Trading System" window:

Element	Description
Trading System	
System ID	Server ID (connection profile ID), for example EQ_TEST. This ID is defined by user at connection time in order to verify the connection to the needed server.
Description	Arbitrary server description. For example: "TEST Equities & Bonds market".
Broadcast addresses	List of Trading Server broadcast addresses. If not specified, the value from TSMR.INI will be used.
Server	Trading system server identifier.
Service	Trading System TCP and UDP services name.
Preferred broadcast address	Preferred broadcast address.
Security	
Secure connections with Validata profile	"Validata" profile name, which is used by the server for traffic encryption and digital signature validation, e.g. "Default profile". If encryption and digital signature is not required, this parameter should not be specified.
Do not accept clients without digital signature	Do not accept clients without Digital Signature.
Restrict user access to the Bridge	If this option is enabled – only specified users are allowed to connect, if disabled – all users are allowed to connect. - Only specified users allowed to connect – in this case, a full list of firms and their users with IP-addresses who are allowed to connect should be defined ("Define User List and IPs" button or <CryptoNames> container in XML configuration file). - Only Technical Center Members allowed – in this case, only members of specific Technical center are allowed to connect (list of users are configured by administrators of TS). To use this option, ID and password of firm-Technical center should be defined.
Allowed IP-addresses	A range of allowed IP-addresses can be defined for any client. Clients, for whom the range of IP-addresses is not specified, are allowed to connect from any IP.
Banned Users	Edit Banned Users list.
Advanced	
TSMR connect time	Timeout for UDP-reply from the Trading System during the connection in seconds. If set to 0 (zero) then the default value will be used (3 seconds).
TSMR timeout	Timeout of the TSMR connection in seconds. If set to 0 then the default value will be used (30 seconds).
TSMR buffer size	TSMR buffer size in bytes. If set to 0 (zero) then default value will be used. For better performance it is recommended to set this parameter to 60000.

Allow users to override TSMR buffer size	Allow users to choose TSMR buffer size, by specifying values from 10000 to 60000 in PACKETSIZE parameter, when calling MTEConnect.
Compress TSMR traffic to/from Trading System	If this option is enabled, TSMR traffic between Trading System and Bridge will be compressed. No compression used if disabled.
Connect from specified network interfaces in the following order	List of IP addresses of network interfaces that are allowed to connect to Trading Systems. The order of IP addresses in the list defines the priority.
Do not use network interfaces other than listed above	If this option is enabled, searching for Trading System Gateways will be performed only from network interfaces specified in the previous option. If disabled – all network interfaces will be involved.
Turn on internal TSMR logging	Level of TSMR.DLL internal logging. If this option is disabled no logging will be used. If enabled, then Logging level parameter defines logging detalization.
Service	
Log requests executed longer than …	Maximum time for Trading System to process the requests, in ms. On timeout, the warning will be given.
Check trading system availability at:	Time, after which the Trading System is supposed to be accessible. If the system is not accessible, then the notification will be sent to the administrator. 0:00:00 – do not send any notifications.
Turn on TSMR logging for the following users	A comma-separated list of Users' identifiers.

Note: Connection parameters values for different markets are given in Appendix 2.

XML configuration file structure

Element	<Tag> / Attribute	Description
<Bridge>		Root element.
<Settings>		ASTSBridge general settings.
	<Service>	Name or number of the TCP service of the server. For example "15005".
	<DisconnectIfIdleFor>	Maximum idle time (in seconds), after which the client will be forcibly disconnected. Clients, who do not query the server for a long time, are considered to be "hanged up". It's recommended not to set this parameter to less than 60 seconds.
	<AutoStopTime>	Time of automatic server shutdown. On specified time, ASTSBridge will automatically stop and all connected clients will receive an appropriate message. If empty or "00:00:00", the server will work non-stop.
	<Language>	Appropriate language to use in error messages. Possible values are: "English", "Russian" and "Ukrainian".
	<MinSupportedClientVer>	The minimum version of MTESRL.DLL, which is permitted to connect to the server. Default value is "6.71".
	<Compression>	Compression of transmitted data: "No compression" – fast on wide network channels; "Zlib" – medium compression; "BZip2" – maximum compression. Default value.
</Settings>		
<Logging>		ASTSBridge logging settings.
	<WorkingFolder>	Full path to ASTSBridge working directory, which will be used for storing log-files and TS interface caching. If value is not specified, or is an empty string, installation directory will be used.
	<KeepLogFiles>	Number of days to keep log files on the server hard drive. If set to 0, the log will never be removed.
	<SaveUserLogsToFile>	Values: "0" or "1". Forbids or allows collecting and storing statistics of users working in files. In case of high client applications activity, statistic data may require a large amount of memory and it is recommended to disable this function.
</Logging>		
<Monitoring>		ASTSBridge monitoring settings.
	<Service>	The name or number of the service, on which http-agent for server monitoring is running. Monitoring is available using a web-browser at: *http:///{server_address}:{service}* .
	<StatsInterval>	Interval to collect statistics on the client connections. For each client the following data is collected: bytes received and sent, number of requests, average time of request processing by the Trading System, packet delays.
	<KeyExpireDays>	A number of days before Validata key expiration, when system administrator will be informed about it. This parameter is valid only when cryptography is enabled.
	<LowDiskSpace>	The lowest free drive space (in MB) when the notification on the low disk space is sent to the system administrator.
	<MailServer>	Mail server IP or name (SMTP) to send diagnostic e-mail notifications to the administrators.
	<MailSender>	E-mail address to put in the FROM field of diagnostic notifications.
	<AdminEmails>	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the server startup & shutdown and other system messages. Empty value means not to send any such messages.

	<ConnectErrorEmails>	List of e-mail addresses (comma separated) of recipients who would like to get notifications on client connection problems. Empty value means not to send any such messages.
	<NetworkErrorEmails>	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the client's network problems. Empty value means not to send any such messages.
	<NetworkErrorEvent>	Condition for sending a network problem notification – number of failures during the specified time interval (minutes); for example: <NetworkErrorEvent>3,2</NetworkErrorEvent> .
	<SlowTsmrEmails>	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the slow connection to the ASTS Trading System or its absence. Empty value means not to send any such messages.
	<SlowTsmrEvent>	Condition for sending a slow connection notification – number of times the value of MaxProcessingTime was exceeded during the specified time interval (minutes); for example: <SlowTsmrEvent>5,5</SlowTsmrEvent> .
</Monitoring>		

<Engines>		Trade engines settings.

<Engine…	…Id="…">	Bridge connection profile ID for example EQ_TEST. This ID is defined by user at connection time in order to verify the connection to the needed server.
	…Name="…">	Random access server description. For example "Equities & Bonds Market".

<TSMR>		TSMR connection parameters.
	<Broadcast>	List of Trading Server broadcast addresses. If not specified, the value from TSMR.INI will be used.
	<Server>	Trading System server name.
	<Service>	Trading System TCP and UDP services name.
	<PrefBroadcast>	Preferred broadcast address.
	<MaxProcessingTime>	Maximum time for Trading System to process the requests, in ms. On timeout, the warning will be given.
	<ConnectTime>	Timeout for UDP-reply from the Trading System during the connection (seconds). If set to 0 (zero) then the default value will be used (3 seconds).
	<Timeout>	Timeout of the TSMR connection (seconds) in range [1... 300] If set to 0 then the default value will be used (30 seconds).
	<BufSize>	TSMR buffer size in bytes. If set to 0 (zero) then default value will be used. For better performance it is recommended to set this parameter to 60000.
	<IgnoreUserBufSize>	0 – allow users to choose TSMR buffer size, by specifying values from 10000 to 60000 in PACKETSIZE parameter, when calling MTEConnect, 1 – users' buffer size settings are ignored. TSMR buffer size, defined in BufSize parameter, is used. This is a default value.
	<TEUpTime>	Time, after which the Trading System is supposed to be accessible. If the system is not accessible, then the notification will be sent to the administrator. 0:00:00 – do not send any notifications.
	<LogUsers>	Enable logging for the following users. Comma-separated list of users' identifiers.
	<Compression>	Enable or disable internal TSMR compression: "0" – compression disabled; "1" – compression enabled.

	<IpSrcOrder>	Comma-separated list of IP addresses of network interfaces that are allowed to connect to Trading Systems. The order of IP addresses in the list defines the priority.
	<RestrictList>	If this option is enabled, searching for Trading System Gateways will be performed only from network interfaces specified in the previous option. If disabled – all network interfaces will be involved.: "0" – all network interfaces will try to connect to the Trading System; "1" - searching for Trading System Gateways will be performed only from network interfaces specified in `IpSrcOrder` parameter.
	<LogLevel>	Level of TSMR internal logging: "0" – logging disabled; "1".."30" – logging enabled with specified level of detalization.
</TSMR>		

<IPAddresses>		Allowed IP-addresses.
<Firms>		Firms.
<Firm…	…Id="…">	Firm identifier in the Trading system.
<IP…	…From="…" To="…"/>	A range of allowed IP-addresses for the firm.
</Firm>		
</Firms>		
<Users>		Users.
<User…	…Id="…">	User identifier in the Trading system.
<IP…	…From="…" To="…"/>	A range of allowed IP-addresses for the user.
</User>		
</Users>		
</IPAddresses>		

<Security>		Security settings.
	<ProfileName>	"Validata" profile name, which is used by the server for traffic encryption and digital signature validation, e.g. "Default profile". If encryption and digital signature is not required, this parameter should not be specified.
	<SignRequired>	0 –digital signature is not required; 1 - digital signature is required.
	<OnlyKnownUsers>	0 – all clients are allowed; 1 – a limited list of clients is allowed. (can be configured with BridgeConfig - "Define User List and IPs" button or <CryptoNames> container in XML configuration file).
</Security>		

<CryptoNames>		Allowed users. Is valid when OnlyKnownUsers = 1.
<Firm…	…Id="…" Name="…">	Firm identifier in the Trading system.
<User…	..Id="…" CryptoName="…"/>	User identifier in the Trading system and the name of certificate holder in the format of X.509: «CN=User,O=Company name,DC=pki,DC=micex,DC=ru» .
</Firm>		
</CryptoNames>		

<BannedUsers>		Banned users list.
<User…	…Id="…" Reason="…"/>	Banned user identifier in the Trading system.
</BannedUsers>		

<TC>		Technical center settings.
	<UserId>	Firm-Technical center identifier.
	<Password>	Firm-Technical center password.
</TC>		

</Engine>		

</Engines>		

</Bridge>		

Note: INI configuration file structure is given in Appendix 1.

Running ASTSBridge as Windows Service

To run ASTSBridge as Windows Service, it must be registered in the system, by executing a command:

ASTSBridge.exe /install [/name "{service_name}"] [/config "{config_file}"]

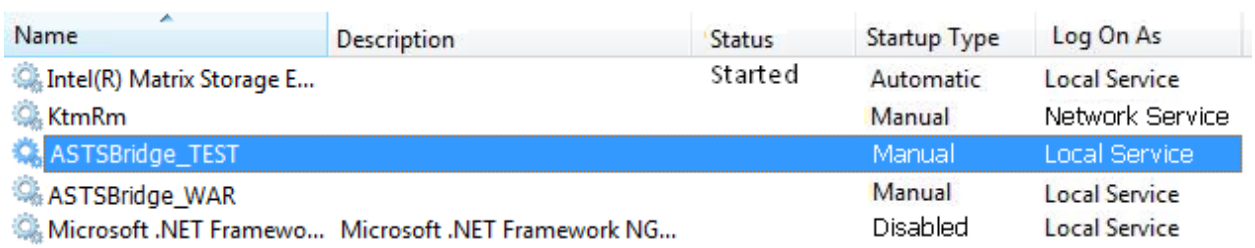
details:

service_name – The name of the Service. If not specified, "ASTSBridge" will be used by default. The service name must begin with a letter or an Underscore character, optionally followed by alphabetic characters, digits or Underscore characters. In case of specifying an invalid value, the message "Invalid service name specified" will be given.

config_file – Full path to configuration file. If not specified, ASTSBridge.xml (or ASTSBridge.ini) from the installation directory will be used by default.

Note: Registration as a Service must be performed by a user with administrative privileges.

In case of successful ASTSBridge registration as a service, an appropriate message will be given. Installed service will appear in "Services" MMC:



Pic. 5 ASTSBridge as Windows service

Multiple services can be registered in the system, by giving them different names and specifying different configuration files. It's important to specify different numbers of listen-ports and working directories in configuration files.

When ASTSBridge operates as a service, *AutoStopTime* parameter in configuration file is ignored, so Bridge can't be stopped on a schedule. Bridge in the service mode can be monitored with its usual method: using a web-browser. To configure ASTSBridge in a service mode BridgeConfig utility can be used, along with specifying configuration file name in a command line. All changes take effect automatically and do not require a restart of the service.

```
BridgeConfig.exe {config_file}
```

When Bridge is started by an operating system, following parameters are used:

```
ASTSBridge.exe /service [/name "{service_name}"] [/config "{config_file}"]
```

To uninstall the service, execute a command:

```
ASTSBridge.exe /uninstall [/name {service_name}]
```

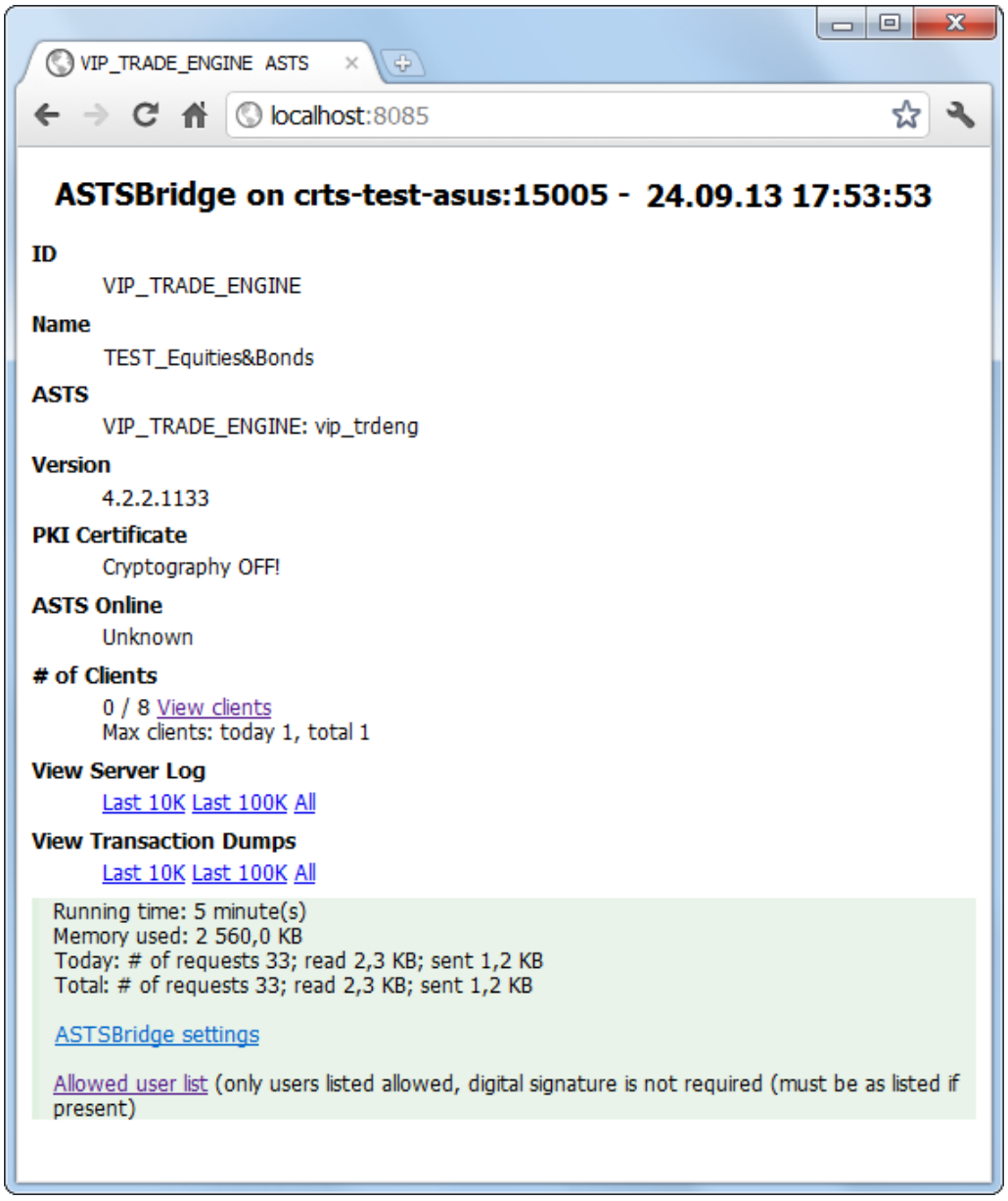
Monitoring

ASTSBridge server supports monitoring using an ordinary web-browser. The default port for monitoring is 8085. Server status, logs, connected clients can be viewed at **http://{server_address}:8085** . Direct link is available in ASTSBridge maun window.

Server operation protocols and clients' transaction logs are stored in a **Logs** subdirectory of the server working directory.

Monitoring Web interface

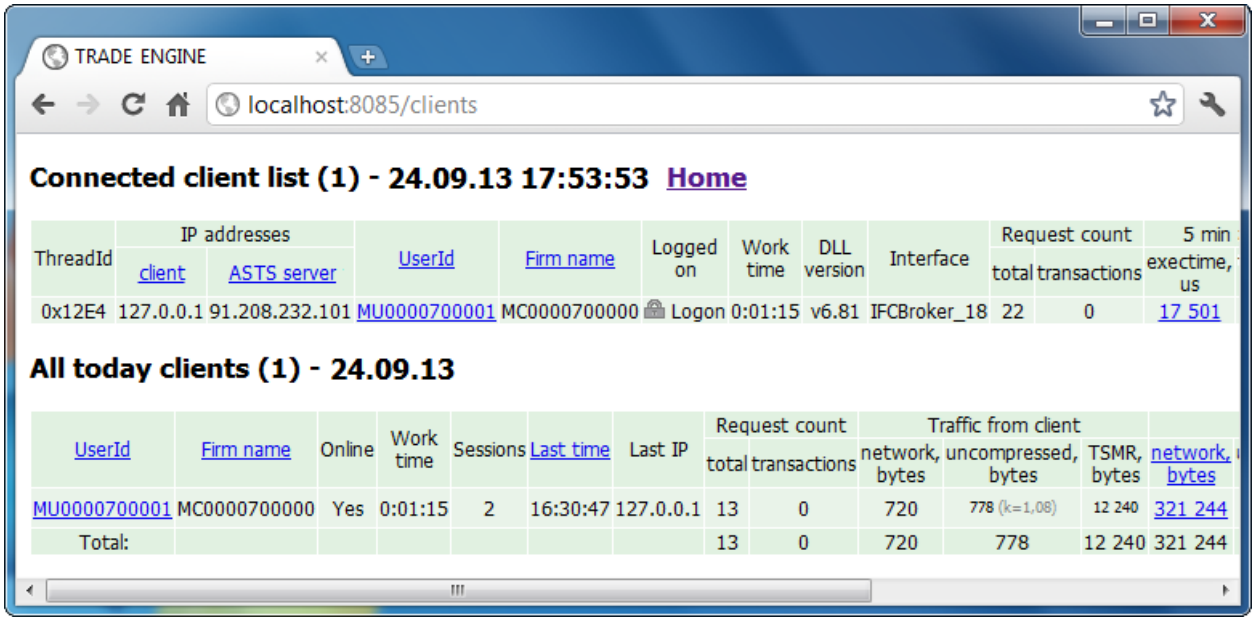
The main monitoring page displays the brief connection information (see ***ASTSBridge user interface***) and provides links to pages with more details on current settings, transactions, server log and connected clients.



Pic. 6 ASTSBridge monitoring main page

Connected clients

Click "View clients" link on the main monitoring page to open the page with details on client connections.



Pic. 7 Connected clients monitoring page

Click "Home" button to return to the main monitoring page.

Connected client list

This table lists currently connected clients. The number in brackets is the total number of active connections, it's followed by the date and time when the table has been refreshed.

Column	Description
ThreadId	Unique connection ID.
IP addresses	IP address of the client and of the ASTS Trading Server.
UserId	Client User ID in the ASTS Trading System. Click this ID to show the user transaction log (see below).
Firm name	Client firm name.
Logged on	The client has connected to the Trading System: - the client uses encryption; - the client has established a non-secured connection.
Work time	Client work time in the Trading System in the current session (i.e. since the last login).
DLL version	Version of the client access protocol.
Interface	ID of the interface to the Trading System.
Request count	Number of requests: total number of requests and number of transactions.

Column	Description
N min avg.	Average time for processing requests for the last N minutes. N is a value of StatsInterval parameter from the ASTSBridge configuration; exectime – time to execute in ms; triptime – packet trip time in ms. Click the exectime value to view the client transaction log (see ***Client transaction log***).
Last request	Information about the last request: time of the request, its code and execution time in ms.
Feedback Info	Additional information, defined by the client in Feedback field.

Click an underlined column title to sort the table by the corresponding parameter.

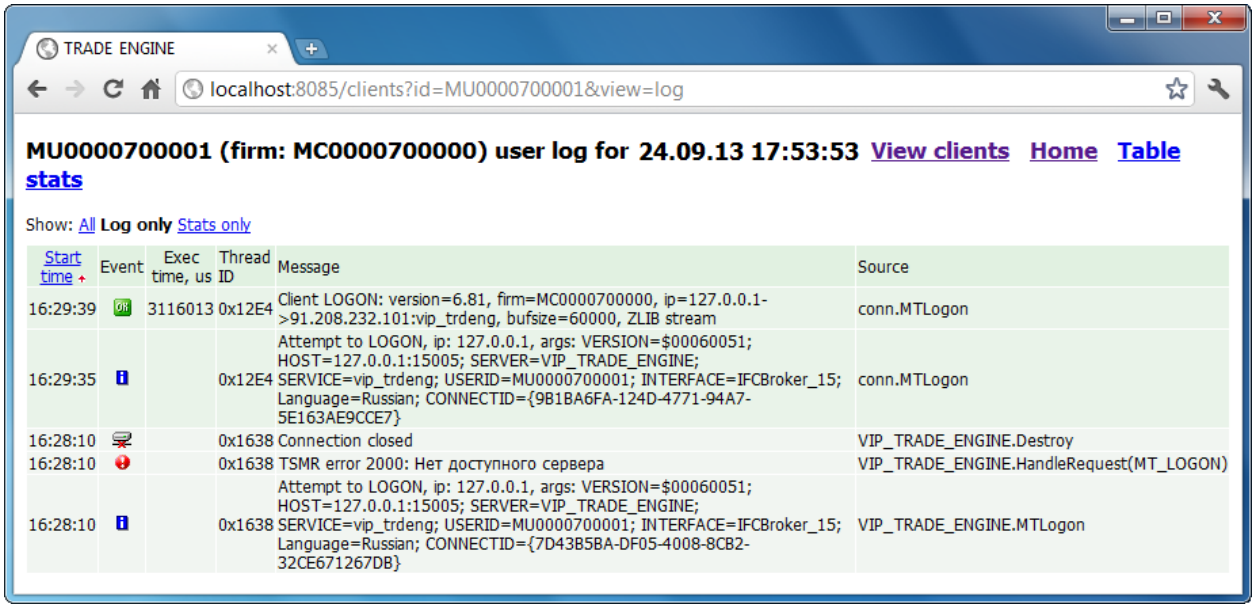
All today clients

This table lists all the today's client connections. The number in brackets is the total number of connections for the current whole day, it's followed by the date and time when the table has been refreshed.

Column	Description
UserID	Client User ID in the Trading System. Click this ID to view the client's transaction log (see Client's transaction log).
Firm name	Client firm name.
Online	Shows whether the client is currently connected to the Trading System or not. indicates that client has been disconnected because of some error.
Work time	Total client's work time in the Trading System.
Sessions	Number of connection sessions during this day.
Last time	Last time the client was seen in the Trading System.
Last IP	IP address, from which the client connected to the Trading System last time.
Request count	Number of requests: total number of requests and number of transactions.
Traffic from client	Statistics for traffic from the client to the server, in bytes: • real amount of transferred data (network); • amount of uncompressed data (uncompressed), compression ratio is indicated in brackets; • amount of data, transferred to TS via TSMR protocol.
Traffic to client	Statistics for traffic from the server to the client, in bytes: • real amount of transferred data (network); • amount of uncompressed data, compression ratio is indicated in brackets; • amount of data, transferred from TS via TSMR protocol.

Client's transaction log

Click the UserID in the clients table to show the client's transactions and requests log.



Pic. 8 User log

The page title shows: User ID in the Trading System, ID of the user firm (in brackets), date and time when the table has been refreshed, followed by the links to the clients table (**View clients**), main monitoring page (**Home**) statistics per loaded table (**Table stats**).

Click the **All**, **Log only** or **Stats only** to switch between different levels of details in the following table.

Column	Description
Start time	Time of transaction or event start.
End time	Time of event end.
Event	Event type: - connection statistics; - warning; - successful transaction execution; - important event; - error.
Requests	Total number of requests.
Exec time, us.	Time of request execution in microseconds.
Avg. trip time, us	Average packet trip time in microseconds.
Read, bytes	Size of data received by the client in bytes.
Sent, bytes	Size of data sent by the client in bytes.
Thread ID	Unique ID of this client connection.
Message	Description of a transaction and the list of arguments that were passed to the server.
Source	Name of the function which invoked the transaction.

Click the Start time column header to sort the table either in ascending or descending order.

Statistics

To view statistics on tables, opened by the client, click the **traffic to the client** value in the client table or the **table stats** link in the client transaction log.

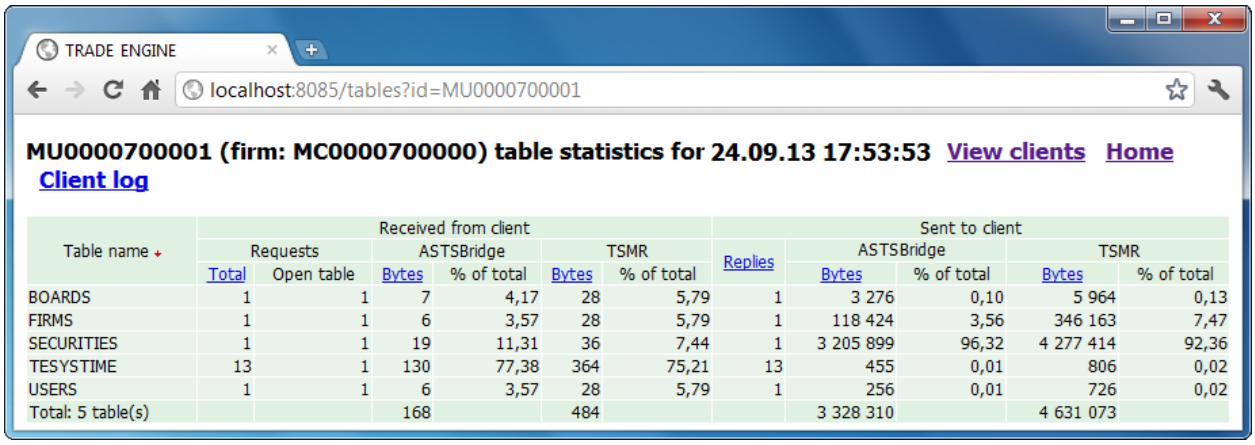


Table name	Received from client						Sent to client				
	Requests		ASTSBridge		TSMR		Replies	ASTSBridge		TSMR	
	Total	Open table	Bytes	% of total	Bytes	% of total		Bytes	% of total	Bytes	% of total
BOARDS	1	1	7	4,17	28	5,79	1	3 276	0,10	5 964	0,13
FIRMS	1	1	6	3,57	28	5,79	1	118 424	3,56	346 163	7,47
SECURITIES	1	1	19	11,31	36	7,44	1	3 205 899	96,32	4 277 414	92,36
TESYSTIME	13	1	130	77,38	364	75,21	13	455	0,01	806	0,02
USERS	1	1	6	3,57	28	5,79	1	256	0,01	726	0,02
Total: 5 table(s)			168		484			3 328 310		4 631 073	

Pic. 9 Clients operation statistics

The page title shows: User ID, firm ID (in brackets), date and time when the table was refreshed; followed by the links to the clients table (**View clients**), main monitoring page (**Home**) and client transaction log (**Client log**). The bottom row displays summary of data transmitted over the network.

Column	Description
Table name	Name of the table in Trading System.
Received from client	Data received from the client:
Requests	Total number of requests; number of requests to open the table;
ASTSBridge	Size of data transferred from the client to ASTSBridge server in bytes and in % of the total;
TSMR	Size of data transferred via TSMR protocol to the Trading System in bytes and in % of the total.
Sent to client	Data received by the client:
Replies	A number of replies to client's requests;
ASTSBridge	Size of data transferred from the ASTSBridge server to the client in bytes and in % of the total;
TSMR	Size of data, transferred via TSMR protocol from the Trading System in bytes and in % of the total.

Click an underlined column title to sort the table.

Server log

To view the server log, click one of the links under the **View Server Log** title on the main monitoring page: **Last 10K** – to view the last 10 Kbytes of the log; **Last 100K** – to view the last 100 Kbytes of the log; **All** – to open the whole log.

The server log is opened as plain text which shows the event time, connection ID, ID of the event source, event type, description, name of function which caused the event:

```
[10:42:41 thrd:0x0988 id:<server>     evn] New connection accepted
(ip=127.0.0.1, threadid=0x0CA0) {serv.AuthorizeClient}
```

Transaction dump

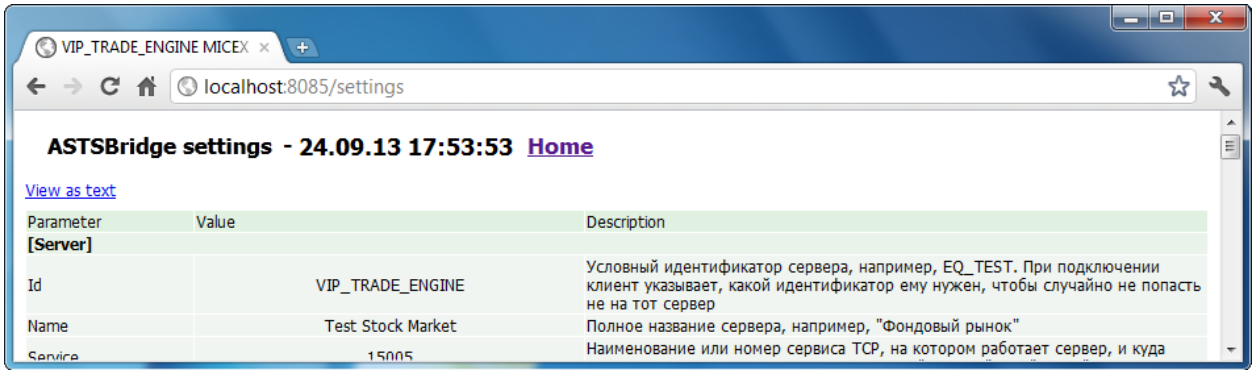
To view the binary transaction dump click one of the links under the **View Transaction Dumps** title on the main monitoring page: **Last 10K** – to view the last 10 Kbytes of the transaction log; **Last 100K** – to view the last 100 Kbytes of the transaction log; **All** – to view the whole transaction log. The log opens as plain text.

```
----- BEGIN TRANSACTION -----
User ID: MU0000500003
Exec time:       22.12.11 11:50:26.574916
Recv time:       22.12.11 11:50:26.357852
Client time:     22.12.11 11:50:26.354000
Command: MT_LOGON
Transaction:     "LOGON"
Arguments:
        "VERSION=$00060047..HOST=localhost:15005..SERVER=trd_TEST..USERID=
MU0000500003..PASSWORD=..INTERFACE=IFCBroker12..FEEDBACK=some
info..CONNECTID={9BB02D27-E73F-45A5-BC77-73213F02338C}"
ASTS OK  (4172 ms): "(206) Connection established (firm: MC0000500000)"
----- BEGIN HEX DUMP -----
0000:  D6 07 04 00 04 00 1B 00  0A 00 2A 00 29 00 44 03   Ц.........*.).D.
0010:  00 00 00 00 05 00 00 00  4C 4F 47 4F 4E B5 00 00   ........LOGONµ..
0020:  00 56 45 52 53 49 4F 4E  3D 24 30 30 30 36 30 30   .VERSION=$000600
0030:  34 37 0D 0A 48 4F 53 54  3D 6C 6F 63 61 6C 68 6F   47..HOST=localho
…
----- END HEX DUMP -----
----- END TRANSACTION -----
```

Field	Description
User ID	ID of the user, who performs the transaction.
Exec time	Time when the transaction or request has been executed. Fixed by the ASTSBridge at the moment of receiving a reply from Trading system.
Recv time	Time when the request to perform a transaction has been received from client.
Client time	Time when client has sent a request to ASTSBridge, according to his local machine time.
Command	Function which submitted the transaction or request.
Transaction	Name of the transaction or request.
Arguments	Arguments that were sent to the Trading System.
HEX Dump	Hexadecimal dump of the transmitted packet.

Current ASTSBridge settings

Click the ASTSBridge settings link, to view the current TEAP server configuration (see ***Settings***).

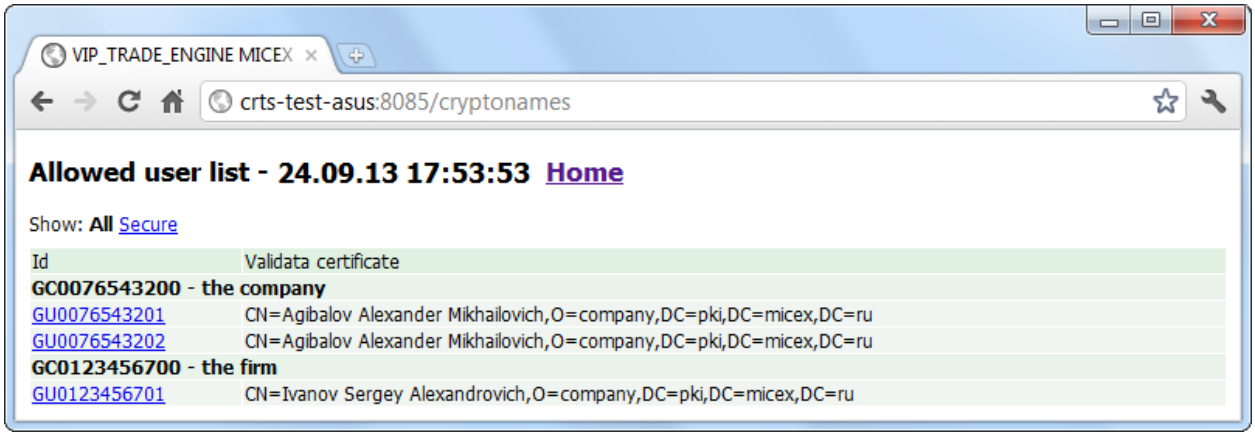


Pic. 10 ASTSBridge configuration parameters

The page title shows the date and time when the page has been refreshed, followed by the link to return to the main monitoring page (**Home**). Click the **View as file (teap.ini)** link to open the configuration file in the system default text editor.

Allowed users

Click **Allowed user list** link in the main window, to load a form with a list of clients, which are allowed to connect to the Trading System.



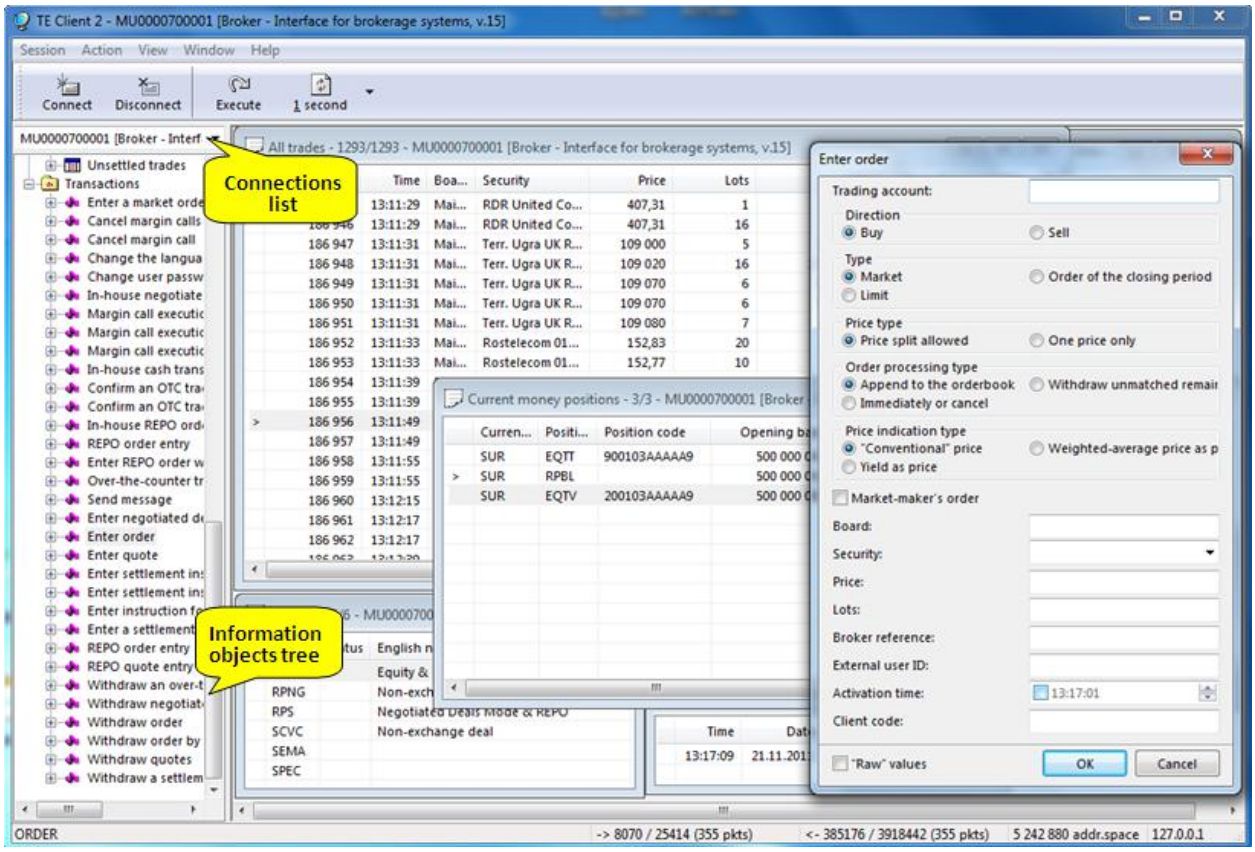
Pic. 11 Allowed users

The list is grouped by firms and contains the user IDs and titles of their digital certificates Click user ID to load **User Transaction Log.** The page title shows the date and time when page was refreshed followed by the link to return to the main monitoring page (**Home**). Allowed users list can be configured using BridgeConfig.exe configuration utility.

SAMPLE CLIENT APPLICATION: TECLIENT

ASTSBridge distribution package contains TEClient – demo client application, useful as an example of Bridge features and for testing purposes.

TEClient User Interface



Pic. 12 TEClient user interface

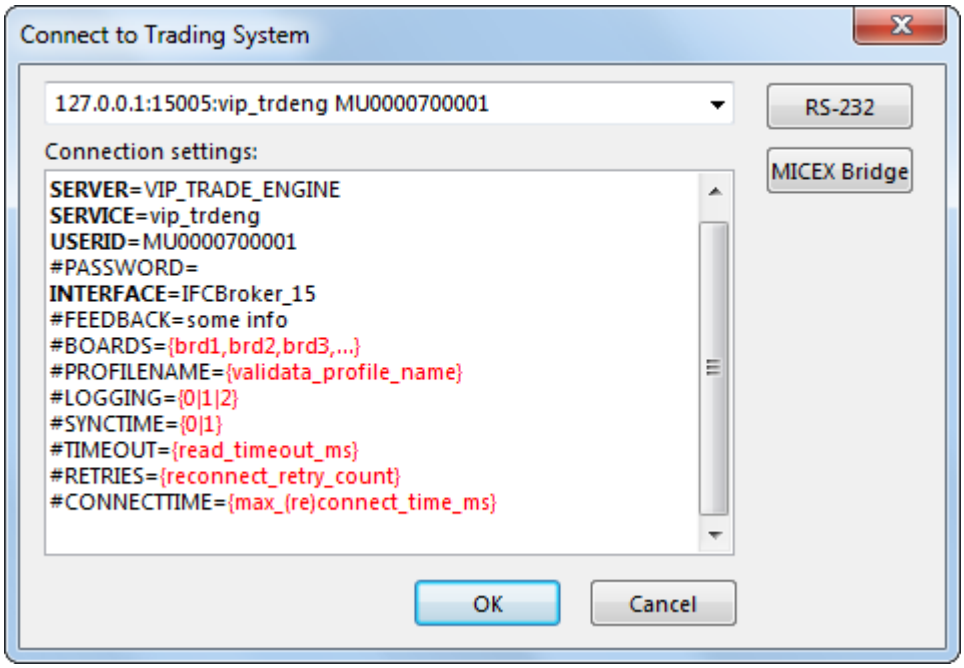
Main interface elements:

Element	Description
Title	Application title contains current Bridge server name and service number or user identifier in the Trading System (depends on connection scheme) and name and type of currently used interface.
Main menu	Main menu contains basic application commands.
Toolbar	Toolbar contains a shortcut buttons to call major functions of main menu.
Connections list	Bridge lets connect to the Trading System via multiple interface servers, using different user identifier simultaneously. The drop-down list lets switch between multiple connections.
Information objects tree	Information objects tree contains enumerated types, table and transactions, available for the Trading System user. Double-click a table name to open it on a desktop. Double-click a transaction name to open a dialog window for appropriate operation.

Element	Description
Desktop	The desktop contains information windows (tables), opened by user.
Status bar	Status bar displays the service information: table opening time, amount of transferred data, access server IP-address, data compression indicator, field values of tables and transactions, selected in information objects tree.

Connecting to bridge server

Use **Connect** command in **Session** menu or button on a toolbar, to connect to one of the interfaces of the bridge server.



Pic. 13 Connection to ASTSBridge parameters entry

Choose one of previously used configurations from a drop-down list at the top of the window, if they exist.

If connecting first time, or in order to create a new configuration, click a button of appropriate connection type (RS-232 or ASTSBridge) on the right side of the window to load a template of connection parameters. It's necessary to fill all parameters in the template according to values, specified when configuring ASTSBridge or TEServer.

A list of valid parameters and their purposes is detailed in "*MTESrl API Guide – ENG.pdf*".

APPENDIX 1 – INI CONFIGURATION FILE STRUCTURE

Parameter	Description
[Server]	
Id	Server ID, for example EQ_TEST. This ID is defined by user at connection time in order to verify the connection to the needed server.
Name	Full server name. For example "TEST Equities & Bonds market".
Service	Name or number of the TCP service of the server. For example "15005".
DisconnectIfIdleFor	Maximum idle time (in seconds), after which the client will be forcibly disconnected. Clients, who do not query the server for a long time, are considered to be "hanged up". It's recommended not to set this parameter to less than 60 seconds.
ProfileName	"Validata" profile name, which is used by the server for traffic encryption and digital signature validation, e.g. "Default profile". If encryption and digital signature is not required, this parameter should not be specified.
MinSupportedClient Ver	The minimum version of MTESRL.DLL, which is permitted to connect to the server. If not specified, version 6.71 is used by default.
AutoStopTime	Time of automatic server shutdown. On specified time, ASTSBridge will automatically stop and all connected clients will receive an appropriate message. If empty or "00:00:00", the server will work non-stop.
[TSMR]	
Broadcast	List of Trading Server broadcast addresses. If not specified, the value from TSMR.INI will be used.
PrefBroadcast	Preferred broadcast.
BufSize	TSMR buffer size in bytes. If set to 0 (zero) then default value will be used. For better performance it is recommended to set this parameter to 60000.
Server	Trading System server name.
Service	Trading System TCP and UDP services name.
ConnectTime	Timeout for UDP-reply from the Trading System during the connection, in seconds. If set to 0 (zero) then the default value will be used (3 seconds).
Timeout	Timeout of the TSMR connection in seconds in range [1…300]. If set to 0 then the default value will be used (30 seconds).
SignRequired	0 – transactions digital signature is not required; 1 - transactions digital signature is required.
OnlyKnownUsers	0 – all clients are allowed; 1 – a limited list of clients is allowed. (can be configured with BridgeConfig.exe).
MaxProcessingTime	Maximum time for Trading System to process the requests in ms. On timeout, the warning will be given.
TEUpTime	Time, after which the Trading System is supposed to be accessible. If the system is not accessible, then the notification will be sent to the administrator. 0:00:00 – do not send any notifications.
IgnoreUserBufSize	0 – allow users to choose TSMR buffer size, by specifying values from 10000 to 60000 in PACKETSIZE parameter, when calling MTEConnect, 1 – users' buffer size settings are ignored. TSMR buffer size, defined in BufSize parameter, is used. This is a default value.

Parameter	Description
Compression	Enable or disable internal TSMR compression: "0" – compression disabled; "1" – compression enabled.
IpSrcOrder	Comma-separated list of IP addresses of network interfaces that are allowed to connect to Trading Systems. The order of IP addresses in the list defines the priority.
RestrictList	If this option is enabled, searching for Trading System Gateways will be performed only from network interfaces specified in the previous option. If disabled – all network interfaces will be involved.: "0" – all network interfaces will try to connect to the Trading System; "1" - searching for Trading System Gateways will be performed only from network interfaces specified in `IpSrcOrder` parameter.
LogLevel	Level of TSMR internal logging: "0" – logging disabled; "1".."30" – logging enabled with specified level of detalization.
[Monitoring]	
Service	The name or number of the service, on which http-agent for server monitoring is running. Monitoring is available using a web-browser at: http://{server_address}:{service} (see ***Monitoring***).
StatsInterval	Interval to collect statistics on the client connections. For each client the following data is collected: bytes received and sent, number of requests, average time of request processing by the Trading System, packet delays.
MailServer	Mail server IP or name (SMTP) to send diagnostic e-mail notifications to the administrators.
MailSender	E-mail address to put in the FROM field of diagnostic notifications.
AdminEmails	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the server startup & shutdown and other system messages. Empty value means not to send any such messages.
ConnectErrorEmails	List of e-mail addresses (comma separated) of recipients who would like to get notifications on client connection problems. Empty value means not to send any such messages.
SlowTsmrEmails	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the slow connection to the Trading System or its absence. Empty value means not to send any such messages.
SlowTsmrEvent	Condition for sending a slow connection notification – number of times the value of MaxProcessingTime was exceeded during the specified time interval (minutes); for example: SlowTsmrEvent=5,5.
NetworkErrorEmails	List of e-mail addresses (comma separated) of recipients who would like to get notifications on the client's network problems. Empty value means not to send any such messages.
NetworkErrorEvent	Condition for sending a network problem notification – number of failures during the specified time interval (minutes); for example: NetworkErrorEvent=3,2.
LowDiskSpace	The lowest free drive space (in MB) when the notification on the low disk space is sent to the system administrator.
KeyExpireDays	A number of days before Validata key expiration, when system administrator will be informed about it. This parameter is valid only when cryptography is enabled.
[Logging]	

Parameter	Description
KeepLogFiles	Number of days to keep log files on the server hard drive. If set to 0, the log will never be removed.
SaveUserLogsToFile	Values: "0" or "1". Forbids or allows collecting and storing statistics of users working in files. In case of high client applications activity, statistic data may require a large amount of memory and it is recommended to disable this function.
WorkingFolder	Full path to ASTSBridge working directory, which will be used for storing log-files and TS interface caching. If value is not specified, or is an empty string, installation directory will be used.

APPENDIX 2 – CONNECTION PARAMETERS

Adding parameters to the `services` system file

This step should be performed by a user with administrative privileges.

Before configuring ASTSBridge server, it's necessary to add appropriate parameters to the `services` system file. Path to `services` file: `/Windows/system32/drivers/etc/services` .

WARNING:
An empty line must be added in the end of the `services` file (after all parameters). Do not forget to add a line break.

Market	Connection Parameters
Equities & Bonds ("Main Market" sector)	`gateway 8011/tcp` `gateway 8012/udp`
Government Securities	`gko_gateway 9011/tcp` `gko_gateway 9012/udp`
FX	`cur_gateway 8111/tcp` `cur_gateway 8112/udp`

Connecting ASTSBridge to ASTS Trading System

WARNING:
`BROADCAST` addresses must be **divided by comma, without gaps**.

Market	[TSMR] Server	[TSMR] Broadcast	[TSMR] Service	[BRIDGE SERVER] Service
Equities & Bonds ("Main Market" sector)	`GATEWAY`	195.1.1.255,195.1.2.255,196.1.2.255,196.1.5.255	`gateway`	15004
Government Securities	`GKO_GATEWAY`	195.1.1.255,195.1.2.255,196.1.2.255,196.1.5.255	`gko_gateway`	15002
FX	`CUR_GATEWAY`	95.1.3.255,195.1.4.255,196.1.5.255,196.1.11.255	`cur_gateway`	15000

To obtain information on connecting to test environment, please contact our technical support team: help@micex.com .