

*SEE-Link Information for IT Providers, June 24 2015*

## INTRODUCTION

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The following document describes the most important features and technical details of the SEE –Link for IT providers of broker systems. Please note that the final solution may slightly differ from the one presented in this document due to the fact that the development process is on-going. The API specification of the system will be published during August 2015 and the expected go-live of the system is February 2016.

The main purpose of the description is to provide the firms with technical details on the expected development.

If you are not familiar with the SEE Link concept please read first the handout prepared in the matter available at <http://www.see-link.net/> (see Downloads, SEE Link handout).

## MARKETS AVAILABLE VIA SEE LINK

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The initial set of markets and market segments that will be covered by SEE-Link's System are:

### Bulgarian Stock Exchange - Sofia

- Premium Equity Segment
- Standard Equity Segment
- Special Purpose Vehicles Segment
- Subscription Rights Segment

### Macedonian Stock Exchange

- Super listing;
- Exchange listing
- Market of companies with special reporting obligations;
- Free market

### Zagreb Stock Exchange

- Prime Market
- Official Market
- Regular Market
- MTF-Fortis
- MTF-Alter
- MTF-X

## INITIAL SET OF INSTRUMENTS AVAILABLE VIA SEE LINK

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- Common shares
- Preferred shares
- Subscription rights
- Government bonds

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## TRADING SESSIONS

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Trading phase	Duration		
	BSE	ZSE	MSE
<b>Pre-trading</b>	8:00 – 9:00 CET		9:00 – 10:00 CET
<b>Opening auction</b>	9:00 – 9:10 CET	9:00 – 9:15 CET	9:00 – 10:00 CET
<b>Continuous trading</b>	9:10 – 15:55 CET	9:15 – 16:30 CET	10:00 – 13:00 CET
<b>Closing Auction</b>	15:55 - 16:00 CET		
<b>Post-trading</b>	16:00 – 16:30 CET	16:39 – 16:45 CET	

## ORDER TYPES

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Initially the System shall allow minimum the use of the following types of orders:

- **Market orders** - Unlimited bid/ask orders. They are to be executed at the next price determined.
- **Limit orders** - Bid/ask orders, which are to be executed at their specified limit or better.
- **Iceberg Orders** - Limit Order that contains a peak (disclosed) quantity and an overall quantity. Once the displayed quantity has been completely executed, a new peak is entered into the order book. In auction trading, iceberg orders participate with their overall volume.

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## EXECUTION CONDITIONS

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Initially the System shall allow the following types of execution conditions:

- **Immediate or Cancel Orders (IOC Orders)** - An order, which is executed immediately and fully or as fully as possible. Non-executed parts of an IOC order are deleted without entry in the order book.
- **Fill-or-Kill orders (FOK Orders)** - An order, which is executed immediately and fully or not at all. If immediate and full execution is not possible, the order is rejected without entry in the order book.

## VALIDITY CONSTRAINTS

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Initially the System shall allow minimum the following types of validity constraints:

- **Good-for-day** - Order only valid for the current exchange trading day.
- **Good-till-date** - Order only valid until a specified date (up to a maximum of 360 days (i.e. 360 calendar days including the current day (=T+359)) from the date of entry).
- **Good-till-cancelled** - Order only valid until it is either executed or deleted by the originator or the system on reaching its maximum validity of 360 days (i.e. 360 calendar days including the current day (=T+359)).

Since the validity constraints are different for the trading systems of the participating exchanges the System will allow setting different validity constraints profiles for each of the participating exchanges.

## DESCRIPTION OF THE EXPECTED FIX PROTOCOL & API

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The detailed specification of the API which will be used for communication between members (Originating and Executing brokers) and the SEE Link platform will be published at an early stage of the project (August 2015). Here we will state that all specified messages used for communication between members and SEE LINK platform are according to the FIX 4.4 standard.

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## PLANNED LIST OF FIX MESSAGES

The planned list of FIX messages used for establishing the communication between SEE LINK and SEE LINK member are separated in two major sections:

- **Messages used for establishing the communication between SEE LINK and Originating brokers (OrBr)**

*Session Layer – OrBr requests to SEE LINK*

Message	Message Type (FIX specific MsgType)
Heartbeat	0
Login	A
Logout	5
ResendRequest	2
SequenceReset	4
TestRequest	1

*Session Layer - SEE LINK responses to OrBr*

Message	Message Type (FIX specific MsgType)
Reject	3

*Trade Messages- single general order handling – OrBr requests to SEE LINK*

Message	Message Type (FIX specific MsgType)
NewOrderSingle	D
OrderCancelRequest	F
OrderCancelReplaceRequest	G
OrderMassCancelRequest	q
OrderMassStatusRequest	AF
OrderStatusRequest	H
SecurityListRequest	x
MarketDataRequest	V
TradeCaptureReportRequest	AD

*Trade Messages- single general order handling – SEE LINK responses to OrBr*

Message	Message Type (FIX specific MsgType)
ExecutionReport	8
SecurityList	y
MarketDataSnapshotFullRefresh	W
TradeCaptureReportRequestAck	AQ

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- **Messages used for establishing the communication between SEE LINK and Executing brokers (ExBr)**

*Session Layer - SEE LINK request to ExBr*

<i>Message</i>	<i>Message Type (FIX specific MsgType)</i>
Heartbeat	0
Login	A
Logout	5
ResendRequest	2
SequenceReset	4
TestRequest	1

*Session Layer - ExBr responses to SEE LINK*

<i>Message</i>	<i>Message Type (FIX specific MsgType)</i>
Reject	3

*Trade Messages- single general order handling - SEE LINK request to ExBr*

<i>Message</i>	<i>Message Type (FIX specific MsgType)</i>
NewOrderSingle	D
OrderCancelRequest	F
OrderCancelReplaceRequest	G
OrderMassCancelRequest	q
OrderMassStatusRequest	AF
OrderStatusRequest	H

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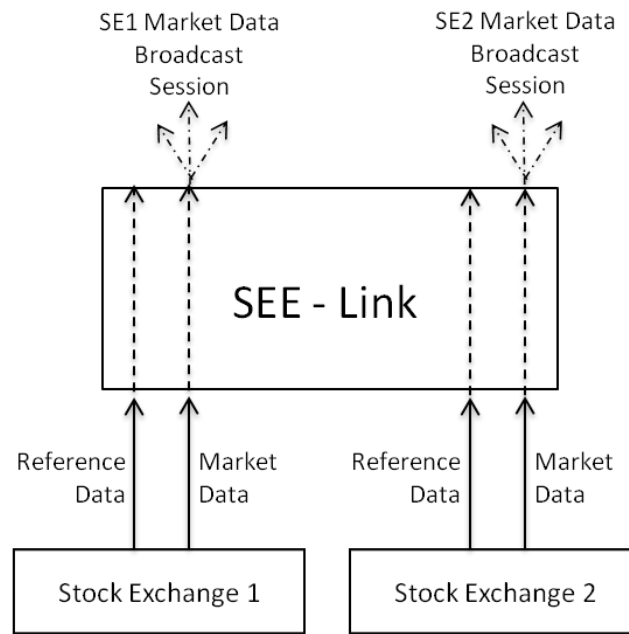
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*Trade Messages- single general order handling - ExBr responses to SEE LINK*

<i>Message</i>	<i>Message Type (FIX specific MsgType)</i>
ExecutionReport	8

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## MARKET DATA DISSEMINATION CONCEPT



**Market Data dissemination model**

The Real-time market data is obtained by the OrBr by sending a Market Data Request message to the System to connect to the System's re-routed market data broadcasts for each participating exchanges. The request should specify the market for which the data is requested. Separate requests will be made for each market the OrBr is eligible to receive market data from.

If the respective ExBr disconnects during the opening hours from the System – the System will automatically disconnect all its contracted originating brokers from the market data broadcast (for the corresponding market).

After the execution broker logs again into the System, the System will send to all the subscribed originating brokers information for its status. Then all the connected originating brokers can send to the System market data requests to connect once again to its market data broadcast feed.

If the System disconnects from one of the stock markets' market data broadcast streams the corresponding system's market data broadcast (for the respective market) should not stop.

If between 8:00 and 17:00 CET an originating broker disconnects from a System's market data broadcast another request for connection shall be sent. Before allowing the connection the System will verify that the OrBr's contracted ExBr from the respective stock market is logged into the System.

## DESCRIPTION OF THE PREFERRED EVENTS' SEQUENCE

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### **Between 7:30 and 8:00 a.m. CET**

1. The exchanges will send/upload reference data into the System. The data will be saved in the System's database.
2. The System will establish connection with the participating exchanges market data dissemination channels and start receiving market data messages.
3. The System will open a market data broadcast session for each participating exchange market data.

### **Between 7:30 and 17:00 CET**

1. All broker type users can logon to the system after 8:00a.m. CET. The Logon will be with username and password (provided by the administrator).
2. After 8:00 a.m. CET OrBr will be allowed to send a subscription requests to the System to receive information whether their contracted executing brokers are logged into the System (information about the connection between an originating broker and execution broker(s) is available in their user profiles).
3. Upon the receipt of the request the System will check (in the OrBr's profile) which execution brokers are connected with the originating broker and verify whether they are logged into the System. After receiving information whether or not they are connected the System will start sending the originating broker information about the availability of its contracted executing brokers (ExBr list and status).
4. The originating broker sends to the System requests for reference data (security list & status). The system will verify for each request (against the information in the user's profile) whether the originating broker is eligible to receive reference data from the respective market. Separate requests will be made for each stock market.
5. The System sends to the originating broker the reference data from the eligible markets.
6. The OrBr initiates market data channel connection with the System for the markets (participating exchanges) its contracted ExBr's are members of. Upon the receipt of the market data subscription request the System will check which executing brokers are contracted with the originating broker (information available in the OrBr's user profile) and whether they are logged in.

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7. If the respective execution broker is logged into the System, the System allows the originating broker to connect to the corresponding market data broadcast stream.
  - a. If the respective ExBr is not logged into the System the System will reject the request.
  - b. If, after the market data connection has been established, the ExBr disconnects from the System – the System will automatically disconnect all its contracted originating brokers from the market data broadcast (for the corresponding market). After the execution broker logs into the System and upon a request by an originating broker the System will re-enact the access of those originating brokers to the market data channel for the respective market.
  - c. If the System disconnects from one of the stock markets' market data broadcast stream the corresponding system's market data broadcast stream for the respective market does not stop. The system will attempt to recover the connection with the stock markets' market data broadcast stream, and after receiving the lost data will re-stream it through the system's market data broadcast to the connected originating brokers.
  - d. If between 8:00 and 17:00 CET an originating broker disconnects from a system's market data broadcast another request for connection will be sent and before allowing the connection the System will verify that the OrBr's contracted ExBr from the respective stock market is logged into the System.

After the OrBr is connected to the System, has received the reference data and established connection with the market data broadcast stream for the respective market, it can start sending messages. The types of messages that the System will facilitate includes at least:

- OrderStatusReuquest
- OrderMassStatusReuquest
- NewOrderSingle
- OrderCancelRequest
- OrderCancelReplaceRequest
- OrderMassCancelRequest

#### **OrderStatusRequest**

1. The originating broker sends OrderStatusRequest messages to its execution brokers. Separate request will be made for each ExBr the OrBr is connected with.
2. Upon receiving an OrderStatusRequest message the System will first check whether the addressee ExBr is logged into the System. If the ExBr is not logged into the System shall send a reject message to the Or Br, if the ExBr is logged in then the System will perform validation of the order identifiers comparing them with the identifiers of the previously received orders from the originating broker.
  - a. If a match is found the OrderStatusRequest message will be processed by the System by applying to it the unique system identifier applied to the previously received original order.
  - b. If a match is not found the System will send an ExecutionReport to the originating broker stating that no order with the respective identifiers is found in the System's database.



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3. The system will save the message and route the processed message to the addressee execution broker.
4. After receiving the ExecutionReport message from the execution broker the System will change in each report the system unique identifier with the order identifier of the original order shall save the message and then route it to the originating broker.

#### **OrderMassStatusRequest**

1. The originating broker sends OrderMassStatusRequest messages to its execution brokers. Separate request will be made for each ExBr the OrBr is connected with.
2. The System will first check whether the addressee ExBr is logged into the System. If the ExBr is not logged into the System will send a reject message to the Or Br, if the ExBr is logged in then the System will save the received message and route it to the addressee execution broker.
3. After receiving the response ExecutionReport messages from the execution broker the System will perform validation of the system unique identifiers comparing them with the order identifiers of the previously received orders from the originating broker.
  - a. If a match is found the OrderMassStatusRequest message will be processed by the System by applying to it the order identifiers of the previously received original orders.
  - b. If a match is not found the System will send an ExecutionReport to the executing broker stating that no order with the respective identifiers is found in the System's database.
4. The system will save the original the message and route the processed message to the addressee originating broker.

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#### **NewOrderSingle**

1. The OrBr will be able to input in the System orders for buying and selling of securities.
2. Upon receiving the messages the System will check whether the addressee ExBr is logged into the System. If the ExBr is not logged into the System shall send a reject message to the Or Br, if the ExBr is logged in then the System will perform verification procedures on at least two levels:
  - a. Whether the required fields in the messages are correctly fulfilled;
  - b. Whether the information in the required fields complies with the system constrains on:
    - Allowed instrument
    - Allowed order types
    - Allowed execution conditions
    - Allowed validity constrains
  - c. The verification of the orders will be made against the information in the System's reference data and order validation databases.
    - The information (ISIN code, Ticker and others) for the instrument which is object of an order will be checked against the data in the list of instruments (reference data) provided by the relevant participating exchange for the current day.
    - The characteristics of the order (type, validity, conditions) will be checked against the admissible order characteristics in the System's database for the respective market that the order is addressed to.

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3. If the submitted order fails to pass one of the validation checks the message will not be routed and the System will send an ExecutionReport message to the OrBr.
4. If the submitted order passes the validation checks the System will save it and then modify it by adding to it a unique system identifier that will be recognizable by the participating exchanges for monitoring and billing purposes.
5. The ExBr shall send execution reports to the OrBr. Upon receiving the report the System will save it, process it and change the unique system identifier with the order identifier of the original order and re-route it to the addressee OrBr.

**Order modification and deletion messages (OrderCancelRequest, OrderCancelReplaceRequest, OrderMassCancelRequest)**

1. The originating broker will be able to send via the System to his contracted execution broker orders for modification and/or deletion of previously submitted orders.
2. Upon receiving the messages the System will check whether the addressee ExBr is logged into the System. If the ExBr is not logged into the System shall send a reject message to the Or Br, if the ExBr is logged in then the System will perform verification procedures on at least two levels:
  - a. Whether the required fields in the messages are correctly fulfilled;
  - b. Whether the information in the required fields complies with the system constrains on:
    - Orders database
    - Allowed order types
    - Allowed execution conditions
    - Allowed validity constrains
  - c. The verification of the orders will be made against the information in the System's submitted orders and order validation.
    - The information (ISIN code, Ticker and others) for the instrument which is object of an order modification will be checked against the data in the submitted orders database.
    - The characteristics of the order (type, validity, conditions) will be checked against the admissible order characteristics modifications in the System's database for the respective market that the order is addressed to.
3. If the submitted order fails to pass one of the validation checks the message will not be routed and the System will send an ExecutionReport message to the OrBr.
4. If the submitted order passes the validation checks the System will save it, and then shall modify it by adding to it a unique system identifier of the original (NewOrderSingle) order.
6. The ExBr will send execution reports to the OrBr. Upon receiving the report the System will save it, process it (change the unique system identifier with the order identifier of the original order) and re-route it to the addressee OrBr.

