

Technical documentation and user guide



Oslo Børs Fix Gateway

Important Note

This Service and Technical Description sets out the current position regarding the Oslo Børs cash equities and fixed income market migration to TradElect in partnership with the London Stock Exchange Group, "the Group", and, as a development project, is subject to change.

This document has been produced by Oslo Børs and the Group to assist customers of these Oslo Børs markets. While it has been prepared on the basis of the best information available, Oslo Børs and the Group accepts no liability for decisions taken, or systems work carried out by any party, based on this document. All liability for any loss incurred as a consequence of the FIX Gateway for any reason being unavailable is expressly disclaimed. Except for these liability clauses, this document does not form part of the contractual documentation between the Oslo Børs and its respective customers.

If you have any general queries relating to this document, please mail:
driftsenter@oslobors.no

Further copies of this document can also be downloaded from both the Oslo Børs and LSEG website at the following links:
http://www.oslobors.no/ob_eng/Oslo-Boers/Trade/Trading-in-equities-and-interest-bearing-instruments/The-TradElect-trading-system/Technical-documentation
<http://www.londonstockexchange.com/techlib>

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Appendix A: Trade types

1. Introduction

As part of their commitment to providing world-leading execution services, Oslo Børs has formed a strategic partnership with the London Stock Exchange Group (LSEG). This includes using the TradElect platform for the cash equities and fixed income markets with Infolect used for market data distribution and the SOLA trading and information platform. For derivatives the strategic partnership agreement will allow both exchanges to co-operate across their equities, fixed income and derivatives markets with a view to improving market efficiency and liquidity.

Other elements of the strategic partnership include:

- The LSEG and Oslo Børs will work closely on market surveillance, including related technological co-operation.
- The two companies also anticipate co-operation in areas such as regulatory policy, operational regulatory processes and the sharing of market information for regulatory purposes.

1.1 Scope of this document

This document covers the Oslo Børs Fix Gateway, an integration service created by Oslo Børs for providing a consolidated trade feed from TradElect. The service is a supplement to the functionality in TradElect.

The document will cover the following areas:

- The current solution (Background)
- The proposed technical solution
- Connectivity and security
- Session handling and messaging
- The AE FIX message

1.2 Other relevant documentation

Current technical specifications for TradElect and Infolect can be found via both the Oslo Børs and the LSEG website at the links below:

http://www.oslobors.no/ob_eng/Oslo-Boers/Trade/Trading-in-equities-and-interest-bearing-instruments/The-TradElect-trading-system/Technical-documentation

<http://www.londonstockexchange.com/techlib>

1.3 Enquiries and comments

Phone: +47 2234 1990

Mail: driftsenter@oslobors.no

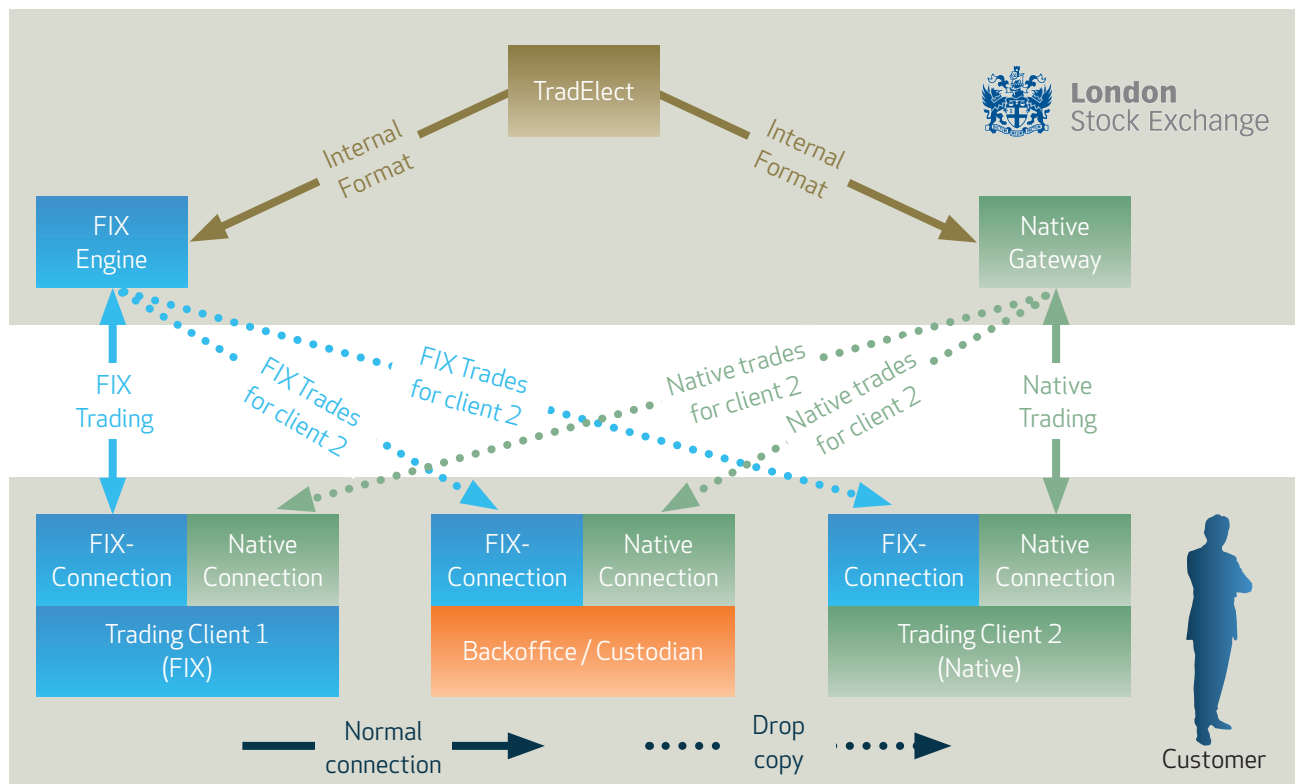
2.4 Revision record

Date	Comment
2/6-2010	Updated important note
7/4-2010	Updated Chapter 4 - Failover - Logon - Trade Report - Trade Cancellation - CCP description
29/3-2010	Chapter 5.7: Added "4:Auction" as an option for SideLiquidityInd (TAG=1444)
8/3-2010	Chapter 5.2: Changed description of failover and sequence number handling
8/3-2010	Chapter 5.3.1: We now create the AE message for the second leg as well
11/2-2010	FIX AE Specifications: - Fixed tag number for TransactTime. - Changed SendingTime (52) to TrdRegTimestamp (769) - Moved AccountType inside the NoSides group - Account is not a required field

2. Background

TradElect supports FIX in addition to the native SETS trading protocol. The FIX interface and the native interface are two separate systems which do not support cross communication (consolidated drop copy). Both interfaces are configured with their own set of separate TraderGroups to differentiate types of trading (Manual Equity, Algorithmic Trading, Automatic Order Routing, Direct Market Access, and so on). A TraderGroup specified for the FIX interface, is not accessible from the native interface.

TradElect has a solution for drop copy on both the native and the FIX interface. The solution is almost identical across the two interfaces, and user access restricted on TraderGroups. Since TraderGroups are assigned to one of the interfaces, drop copy cannot be done across the interfaces.

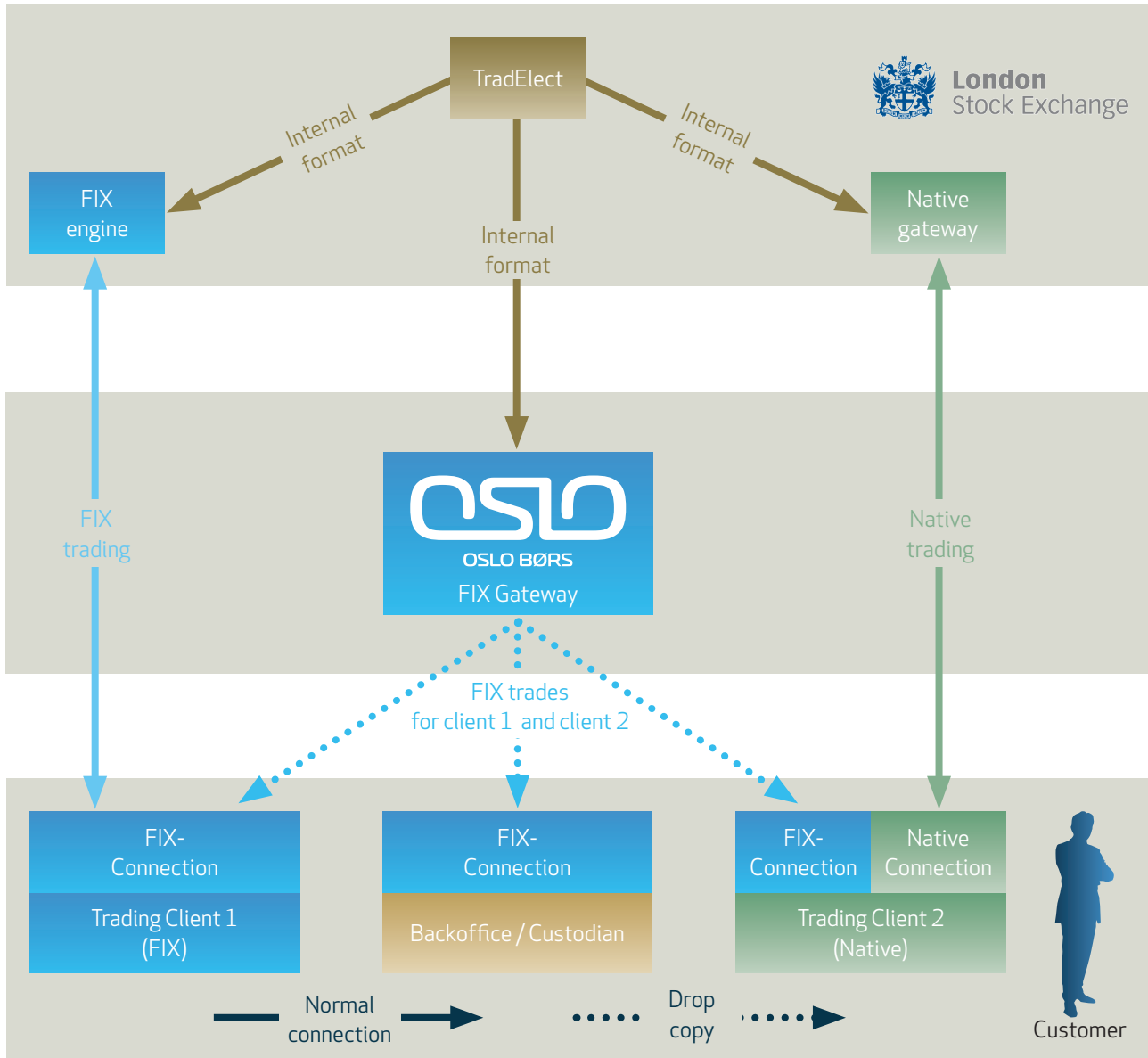


This system setup can be fairly complicated for members using both interfaces, as illustrated on the figure above.

3. Technical solution

Oslo Børs provides, as an addition to the trading services provided by TradElect and Infolect, a trade streaming gateway (the gateway). The gateway will consolidate trades across the FIX and the native interface through a single FIX connection. This will simplify connectivity for backoffice and custodian solutions.

The Oslo Børs FIX Gateway is categorized as a “real time system”, but compared to TradElect, there will be a small delay.

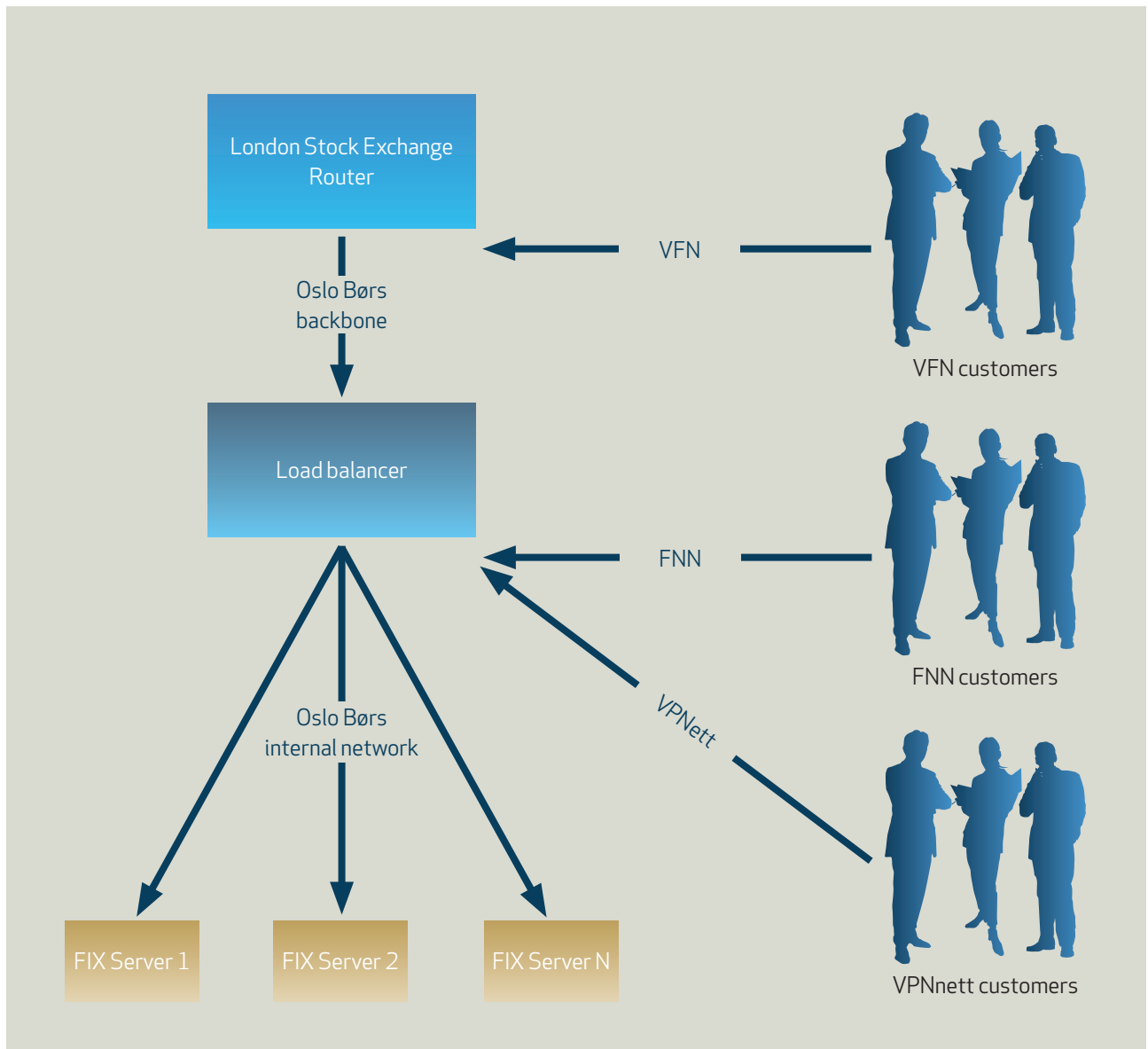


This solution will not fully solve all limitation with the drop copy configuration in TradElect. As illustrated in the figure above, native clients still needs to have an additional FIX connection if they want to receive the consolidated trade stream from the Oslo Børs FIX Gateway.

3.1 Network

Oslo Børs will host the Oslo Børs FIX Gateway at two different geographical locations in Oslo and it is accessible through the same networks that connects members to TradElect.

A load balancer will handle all the network traffic in front of the gateway as well as routing clients to different instances of the gateway. If one gateway goes down, the load balancer will handle failover and transfer clients to another instance. All running instances of the gateway will contain the same set of data, but sessions will not be handled between different instances. If a failover occurs, clients need to connect and login to the new instance.



The figure above illustrates how clients can connect to the gateway.

3.2 Environments

There will be two different environments available, one for test and one for production. The test environment is connected to TradElect CDS environment. Production is connected to TradElect production environment. The production and test environment are separated by IP address and TCP port.

Environment	IP address	Host name	TCP Port
CDS (Test)	146.72.206.11	fixgw-test.oslobors.no	10002
Production	146.72.206.10	fixgw.oslobors.no	10001

3.3 Enablement

Before any customer is granted access to the Oslo Børs FIX Gateway, an enablement procedure must be completed. One form is needed for CDS and one form is needed for production.

The enablement process:

1. The customer fills out the Request For Enablement form and sends it to enablement@oslobors.no
2. Oslo Børs validates the form.
 - A) If OK, the customer is granted access.
 - B) If not OK, the form is returned with an explanation.
3. The customer gets technical connection details and is ready to use the service.

The enablement form must contain at least one filter before it is validated as OK. More information about filtering can be found in section 3.5 Filtering.

3.4 On behalf of-enablement

The FIX Gateway supports on behalf of streaming, which gives a third party access to a members trades.

Oslo Børs must have a signed and approved confirmation (Request For On Behalf Of form), and an approved enablement form from the third party, before any on behalf of dissemination is completed. The two forms must be coherent before they are approved.

The member can at any time stop the dissemination of on behalf messages without confirmation from the third party, by a written request to Oslo Børs, enablement@oslobors.no

The member is responsible to ensure that the information distributed through the FIX Gateway legally is made available to the third party. The members and third parties should enter into relevant legal agreements between each other.

3.5 Filtering

The FIX Gateway supports filtering and routing of messages to make sure that all messages with the right content are sent to the correct client.

Each client will need to specify its own set of filter rules. It is possible to specify the granularity of each rule based on a combination of filter keys. Members are only allowed to specify filter rules where their Member Id is one of the keys. Hence, Member ID is always present.

There are three possible filter keys when specifying filters:

- Trader Group ID
- Member ID
- Client Reference

Example with filtering on Member ID:

Filter #	Filter Field Name	Filter Field Value
1	Member ID	AA

Example with more than one filter and several criteria:

Filter #	Filter Field Name	Filter Field Value
1	Member ID	AA
2	Member ID	BB
2	Trader Group	TG
2	Client Reference	Client 1
3	Member Id	BB
3	Trader Group	TG
3	Client Reference	Client2

Each trade in TradElect results in two FIX messages from the gateway, one for the sell side and one for the buy side. For a message to be approved by the filter, all keys in the set must match. A filter can consist of more than one set, but it is enough that one of the sets in the filter matches for a message to be disseminated.

3.6 Operations

The FIX Gateway opening hours:
Monday – Friday: 07:30 to 19:00 CET
Saturday & Sunday: Closed

The FIX Gateway is implemented on a fully redundant infrastructure. In case of downtime, all trades will be made available after recovery. The service is will be maintained regarding to Oslo Børs' market model.

In case of disaster, the service will be made available as soon as possible.

3.7 Support

Support for the FIX Gateway will be given at normal opening hours: 08:00 – 18:30 CET

Phone: +47 2234 1990

Mail: driftsenter@oslobors.no - Mark mail with subject "OB FIX Gateway".

4. FIX Messaging

Before any client is allowed to connect to the gateway, several requirements must be fulfilled:

- The enablement process has to be completed successfully.
- The client has to login with correct SenderCompld (username) and TargetCompld (password) defined in the standard header.
- The client has to connect from a specified known IP address.

The FIX version of our gateway is 5.0 SP2, and uses FIXT.1.1 as protocol. This means that the BeginString(8) has to be "FIXT.1.1".

4.1 Session handling

The gateway creates and initiates (as acceptor) all sessions on startup, based on enabled client profiles. The created session is set up with all the specified Filter Rules, SourceCompld, TargetCompld and source IP addresses.

Sessions can be created based on enablements with:

- One Compld
- One TargetCompld
- Many source IP addresses (minimum one)
- Many Filter Rules (minimum one)

All sessions in the gateway will be held until the gateway shuts down. Since there are more than one instance of the gateway running and clients are routed to one instance through a load balancer, it is not guaranteed that a client will have the same session after a reconnect.

4.2 Failover and sequence number handling

The gateway is running on one active and one passive server, both behind a load balancer. This means that any connecting client will be routed through to the same active server, unless this server is unavailable. If the active server is unavailable, the client will be routed to the passive server.

The gateway servers are not synchronized! Sequence numbers on messages sent from the active server, will not match sequence numbers on messages sent from the passive server.

All clients logging on to the Fix gateway are strongly recommended to logon with logon message containing *MsgSeqNum=1 and ResetSeqNumFlag=Y*. This behavior will assure that all AE messages are disseminated on every logon and resolve any synchronization problem, if there is a failover from the active to the passive server.

Clients logging in with a logon message containing *MsgSeqNum=1 and ResetSeqNumFlag=Y* will receive duplicate messages in situations where message have been received before a disconnection.

4.2.1 Logon scenarios

1. First logon:
 - A) Client connects with MsgSeqNum=1
 - B) Server answers with MsgSeqNum=1
 - C) Server disseminates all AE messages to the connected client
2. Client connects in the middle of the day, with MsgSeqNum=1:
 - A) Client connects with MsgSeqNum=1
 - B) Server answers with MsgSeqNum=1
 - C) Server disseminates all AE messages to the connected client
3. Client connects in the middle of the day, with MsgSeqNum different than 1:
 - A) Client connects with the last used MsgSeqNum+1
 - B) Server answers with the last outbound MsgSeqNum+1 (from last session)
 - C) Server may ask for a ResendRequest, if the client connects with a higher MsgSeqNum than expected
 - D) Client may ask for a ResendRequest
4. Client connects in the middle of the day, with MsgSeqNum different than 1, and a **failover has been done by Oslo Børs** (you will now be connected to the passive site):
 - A) Client connects with the last used MsgSeqNum+1
 - B) Server answers with **MsgSeqNum=1**
 - C) Client has to log off
 - D) Client must log in again with MsgSeqNum=1
 - E) Server disseminates all AE messages to the client
 - >> Client has to filter the received messages, to check for messages already received

4.3 Trade reporting

4.3.1 Singel sided trade reporting with another member as counterparty

Single sided trade reports against another (real) member will result in dissemination the usual two TradeCaptureReport messages (one for each counterparty involved).

Please note! Depending on your current filter setup, you may not receive this message - if you are the counter party. We have a fix for this, which will available from the 26th of April 2010.

4.3.2 Dual sided trade reporting

The TradeCaptureReport messages will not be generated until both sides have reported successfully. The gateway will disseminate two TradeCaptureReport messages (one for each of the counterparties involved).

4.4 New trade reporting functionality from the 26th of April

Both single sided and dual sided trade reports will be filtered on MemberId and not the default TraderGroup that appears on the messages. This will resolve problems where members do not receive trade reports due to filters lacking the default TraderGroup.

The gateway will, if possible, mark duplicated messages with a PossDupFlag = Y;

- If there is a disconnection, all messages already sent out from the active server (due to restart) will contain the PossDupFlag = Y.
- If there is a failover, all messages sent from the passive server will contain the PossDupFlag = Y.

4.4.1 Single sided trade reporting with NMBR as counterparty (internal trade)

A member will report a trade against the NMBR as a single sided trade report. This message will result in two populated AE messages for the reporting member, one sell side and one buy side. TraderID, TraderGroup and ClientReference (if not entered for both sides when reporting) will be copied on both messages.

4.5 Trade cancellation / Contra trade

There are two Contra trade / Cancel trade situations; Cancellation of auto matched trades, and cancellation of manually reported trades.

4.5.1 Auto match trade cancellation (Contra trade)

In addition to the first regular TradeCaptureReport (the actual trade), the gateway will disseminate one or two additional TradeCaptureReport messages; one as the request for cancel and one cancel OK.

Steps:

1. The trade is completed and a regular TradeCaptureReport message (one for each of the counterparties) is generated, with ExecType = "F".
2. If one part of the trade do a request for Contra Trade against TradElect, the gateway will disseminate an additional TradeCaptureReport message (one for each of the counterparties) with ExecType = "H". This is a request, and the Contra trade is not yet accepted by the other counterparty!
3. If the second part agrees to the Contra trade request, one additional TradeCaptureReport messages (one for each of the counterparties) with ExecType = "H" will be disseminated. The Contra trade is now accepted.

Please note that if you only receive a Contra trade for an auto matched trade, the trade is not cancelled.

4.5.2 Manual trade report cancellation

In addition to the first regular TradeCaptureReport (the actual trade), the gateway will disseminate a TradeCaptureReport message (one to each part), which tells that the trade is cancelled.

Steps:

1. First regular TradeCaptureReport messages are generated, with ExecType = "K"
2. A Contra trade is initiated, and an additional TradeCaptureReport with ExecType = "4" will be generated. The Contra trade is now accepted.

4.5.3 Delayed trade reporting, with prerelease afterwards

A trade is first reported with delayed publication. A regular TradeCaptureReport will be generated (one to each part), with TradePublishIndicator="2" (delayed, not published). When the trade is ready to be released, an additional TradeCaptureReport message will be generated (one to each part), with ExecType = "G" and TradePublishIndicator="1" (published).

4.6 CCP / Clearing type / Settlement venue

After the CCP go live, trades done in instruments not relevant for CCP clearing such as manual reported trades, Bond trades (Trades not marked with the 'CSC' code) shall be settled within VPO.

SettlementVenue = 'NCL' will be the only correct value from TradElect go live and until CCP go live. There is one exception, and that is when a single side trade reporting is done for equities. Only the reporting participant will receive SettlementVenue = 'NCL', the other part (leg) will not receive settlementVenue.

In some of the 'older' documentation in Infolect, we have a message called 5SV (Settlement Venue). In the newer documentation this message is called Clearing Type. The only clearing type as for now is 'NCL'. The clearing type 'CSC' (Oslo Clearing) will soon be added (production). Later on, LCH (London Clearing House) will be an option.

4.7 FIX AE message

This is the TradeCaptureReport FIX message that the gateway prepare and disseminates. The gateway will produce two AE message for each trade, one for the buyer side and one for the seller side. The message contains both sides of the trades. The filtering mechanism will decide which trade message the client will receive.

FIX Field	Values	FIX Tag	Required
SecurityID	Concatenation of : - tradable instrument code - country of register - currency code - market segment code LSE refers to this as the "Four Way Key"	48	Y
SecurityIDSource	Always "8" (Exchange Type)	22	Y
TradeID	Trade Code	1003	Y
LastPx	Trade Price	31	Y
LastQty	Trade Size	32	Y
NoRootPartyIDs	If Trader Group ID && Trader ID <> NULL then "2" If Trader Group ID <> NULL && Trader ID == NULL then "1" If Trader Group ID == NULL && Trader ID <> NULL then "1" Else "0" This is a Group, containing the following RootParty* fields.	1116	Y
*RootPartyID	Trader Group ID Buyer for the B side Trader Group ID Seller for the S side	1117	N
*RootPartyIDSource	"D"	1118	N
*RootPartyRole	"76"	1119	N
*RootPartyID	Trader ID Buyer for the B side Trader ID Seller for the S side	1117	N
*RootPartyIDSource	"D"	1118	N
*RootPartyRole	"12"	1119	N
TransactTime	Trade Date and Time. Concatenated date + time, to UTC format (yyyymmdd-hh:mm:ss)	60	Y
ExecType	Broadcast Update Action "F" = Automatic Execution "K" = Manual Add "G" = Manual Update "4" = Delete "H" = Contra	150	Y
TrdRegTimestamp	Trade Report Date and time Concatenated date + time, to UTC format (yyyymmdd-hh:mm:ss)	769	Y
TrdSubType	Trade Type Indicator. See APENDIX A for trade types.	829	Y
Trade Type	Bargain Conditions. "30" = Special price (usually net- or all-in price) (SP)	828	N

FIX Field	Values	FIX Tag	Required
TradePublishIndicator	"1" = Published "2" = Delayed "0" = Not published	1390	Y
StartDate	Settlement Due Date (yyyymmdd)	916	N
AgreementCurrency	Set to either blank or the same value as CurrencyCode (in the SecurityID). If blank, then a currency change has taken place.	918	N
NoSides	Always "2", which means it contains 2 NoPartyIDs-groups, one for the B side and one for the S side. This is a Group, containing the following Sides fields and NoPartyIDS groups	552	Y
*Account	Client Reference Buyer for the B side Client Reference Seller for the S side	1	Y
*AccountType	CCP Account Type Buyer for the B side CCP Account Type Seller for the S side "1" = Account is carried on customer side of the books "3" = House trader	581	N
*OrderCapacity	Dealing Capacity Buyer for the B side Dealing Capacity Seller for the S side "A" = Agency "P" = Principal	528	N
*Side	Set to "1" for the B side Set to "2" for the S side This field describes if the message is for the Buyer side or the Seller side.	54	Y
NoPartyIDs	"1" = MemberID only "2" = MemberID and one of Clearer of Settlement Venue "3" = MemberID, Clearer and Settlement Venue This is a Group, containing the following PartyID fields.	453	Y
*PartyID	MemberID Buyer	448	Y
*PartyIDSource	"D"	447	Y
*PartyRole	"1"	452	Y
*PartyID	Settlement Venue Buyer	448	N
*PartyIDSource	"D"	447	N
*PartyRole	"10"	452	N
*PartyID	Clearer Buyer	448	N
*PartyIDSource	"D"	447	N
*PartyRole	"4"	452	N
*Side	Set to "2" for the B side Set to "1" for the S side This field describes if the message is for the Buyer side or the Seller side.	54	Y
NoPartyIDs	Same values as the last NoPartyIDs field. This is a Group, containing the following PartyID fields.	453	Y
*PartyID	MemberID Seller	448	Y
*PartyIDSource	"D"	447	Y
*PartyRole	"1"	452	Y
*PartyID	Settlement Venue Seller	448	N
*PartyIDSource	"D"	447	N
*PartyRole	"10"	452	N
*PartyID	Clearer Seller	448	N
*PartyIDSource	"D"	447	N
*PartyRole	"4"	452	N
SideLiquidityInd	Trade Seller Type "1" = Added Liquidity "2" = Removed Liquidity "3" = Liquidity Routed Out "4" = Auction	1444	N
Yield	Bond Yield.	236	N
EndDate	Settlement Date (yyyymmdd)	917	N

Appendix A: Trade types

FIX	SETS	
Trade Sub Type (829)	Trade Type Indicator	Common FIX Values
17	LC	Late Trade Correction
20	NM	Not to Mark
24	PC	Previous Day Contra. Used when reporting a Contra Trade when the contra date is not the trade date.
LSE Shared Trade Types Values 1000+		
1000	O	Ordinary Trade
1001	UT	Uncrossing Trade
1002	AT	An automatic trade generated by the system
1003	CT	Contra Trade. Used to publish a contra trade
1004	IF	INTER FUND CROSS DELAYED PUBLICATION REQUESTED
1005	NK	NEGOTIATED TRADE DELAYED PUBLICATION REQUESTED
1006	NT	NEGOTIATED TRADE IMMEDIATE PUBLICATION
1007	OC	OTC LATE CORRECTION
1008	OK	ORDINARY TRADE DELAYED PUBLICATION REQUESTED
1009	OT	OTC TRADE IMMEDIATE PUBLICATION
1010	SC	SI LATE CORRECTION
1011	SI	SI TRADE IMMEDIATE PUBLICATION
1012	SK	SI TRADE DELAYED PUBLICATION REQUESTED
1013	TK	OTC TRADE DELAYED PUBLICATION REQUESTED
Oslo Trade Types Values 3000+		
3000	ON	Non Standard Settlement
3001	OR	Repo
3002	OH	Other
3003	OL	Odd lot
3004	OU	Outside opening hours
3005	OE	Exchange granted trade
3006	DE	Exchange granted trade delayed publication
3007	DN	Non standard settlement delayed publication
3008	DR	Repo delayed publication
3009	DH	Other delayed publication
3010	DL	Odd lot delayed publication
3011	DU	Outside opening hours delayed publication
3012	DT	Derivatives Trade
3013	VW	VWAP Trade



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