EURONEXT

Document title

EURONEXT CASH MARKETS - OEG CANCEL ON DISCONNECT (COD)

Document type or subject

Functional Overview

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PREFACE

PURPOSE

This document describes the (Auto-Mass) Cancel on Disconnect feature in Optiq. This functionality is made available on all Optiq Segments of Cash Market, and is available for management by clients for individual submitted order messages.

This document provides a general description of the functionality, how it works and how it behaves in different situations of day-to-day operations and business continuity cases.

Note: This document is for informational purposes only, and should be consulted alongside its associated documents, as outlined below.

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TARGET AUDIENCE

The primary audience for this document is this project's development group, as well as the development groups for interfacing client applications.

ASSOCIATED DOCUMENTS

The following list of the associated documents, which either should be read in conjunction with this document or which provide other relevant information for the user:

■   Euronext Cash Markets - Optiq OEG Client Specifications - SBE Binary Interface
■   Euronext Cash Markets - Optiq OEG Client Specifications - FIX 5.0 Interface
■   Euronext Cash Markets - Optiq Kinematics Specifications
■   Euronext Cash Markets - Optiq & TCS Error List

For the latest version of documentation please visit www.euronext.com/optiq.

WHAT'S NEW?

The following lists only the most recent modification made to this revision/version. Please see the Appendix for the document revision history

                                               1.1

Version	Date	Author	Change Description
1.1	August 2017	Euronext	▪ Clarified text of section "1.2.1 Rate of Triggering" ▪ Updated name of the Connectivity configuration document to be in line with published name "Euronext Cash Markets - Optiq OEG Connectivity Configuration specifications" ▪ Removed SBE **Extended Response** message ○ Removed reference to the message in section "1.3 How to activate or disable cancel on disconnect" ○ Removed section / table "Outgoing messages" in section "1.3.1 SBE Field & Values for Cancel on Disconnect" ○ Adjusted Notes for **ExecutionReport** (8) messages in section "1.3.2 FIX Field & Values for Cancel on Disconnect" ▪ In section 3.1 removed references to the **Reject** (07) (FIX 8) message, as in single partition there will be no reject from other partition. ▪ In section 3.2.3 Network Disconnection Between Partitions within a Single Optiq Segment: ○ Corrected the orders referenced in the text of Example 1 ○ Added a note on Timestamps provided in the Kill message ▪ Added section "Appendix A: Document Revision History"

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CONTENTS

1. CANCEL ON DISCONNECT FUNCTIONALITY

1.1 TERMS & ABBREVIATIONS

This section provides list of some terms & abbreviations commonly used in this document. Please note that some of these terms are described in more details in the dedicated sections within this document or in the associated Optiq specifications documents.

- **CoD**: Cancel on Disconnect mechanism, subject of this document

- **Optiq:** is Euronext's multi-market full trading chain technology platform.

- **Order Entry Gateway (OEG):** is the software that manages the access for clients, and acts as the private interface between the clients and the Optiq matching engine.

- **OE session**: The individual physical connection setup by the client via OEG to a single partition in an Optiq segment.

- **SBE**: Simple Binary Encoding, is the open source binary protocol and one of the protocols by which clients can exchange private trading messages with the exchange.

- **FIX**: is one of the protocols by which clients can exchange private trading messages with the exchange.

- **Persisted orders**: an order that is flagged by the client with CoD disabled and is therefore kept in the book once the CoD mechanism is triggered.

- **Original partition:** in cases described in this document, this indicates a partition that is failing over and to which the OE session is connected to. The OE session in question is the one that owns the orders impacted by the examples and explanations described in this document.

- **Meshed or Cross-linked partition**: In case a segment has multiple partitions, OEGs of different partitions will have connectivity to the Matching Engines of other partitions (cross-partition connectivity), allowing Optiq to route orders to the Matching Engine for instruments hosted on other partitions from the OEG of the "original" partition. In cases described in this document, this indicates partitions that are cross-connected to the partition that is failing over.

1.2 FUNCTIONALITY DESCRIPTION

Cancel on Disconnect (CoD) is a mechanism which triggers an automatic cancellation of all non-persisted orders upon disconnection of the client whether voluntary or due to an issue.

In typical day-to-day operations the CoD applies at the level of an OE Session (physical connection), which means that it is triggered per individual OE Session, for orders owned by this session, and it does not affect other OE Sessions that belong to the same Logical Access. Clients should review the details associated to the behavior and scope of CoD in case of failure situations provided in more details in this document.

This functionality is enabled system-wide, and for the orders is managed based on the values populated by clients in individual messages. In contrast to earlier implementation in UTP, Optiq will use only the data indicated in the messages to select orders for the scope of CoD, and will disregard the order characteristics (e.g. order types, order validity, etc.)

Quotes (08) (FIX i) messages do not have a separate field for selection whether to participate in CoD or not as in cases when CoD functionality is triggered all live quotes are mandatorily cancelled.

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Based on the principles above CoD functionality applies and behaves in the same manner for all clients, for all their Logical Accesses / OE Sessions and on all Optiq Segments for the Cash Markets.

This means that every single entering order message is checked for the Cancel on Disconnect setting.

The Cancel on Disconnect mechanism is triggered when the connection (physical) between a client and the Order Entry Gateway (OEG) is dropped, either due to client closing the connection or in case of a failure. If the client application is disconnected from the OEG, then all live quotes and orders not flagged to be persisted, belonging to the corresponding OE Session are cancelled for their remaining quantity, regardless of order type and validity type.

Scope of CoD only includes orders sent during the current day. Orders entered during a previous business day are not in scope of CoD and are not impacted.

In cases when CoD kicks in a **Kill** (05) (FIX 8) message is sent to the OE Session for which the mechanism is triggered, for each order and instrument (Symbol Index and EMM) in scope. During the same trading session until the client reconnects the messages will be queued and will be sent to the affected OE Session upon a client's return.

Scope of CoD functionality includes only the orders submitted during the current trading session. I.e. if an order is submitted with validity of one year during the trading session of day 1 with default value for CoD (which means - do not persist order in case of disconnection), during the trading session of day 2 this order will no longer be in scope of CoD.

Orders updated during a trading session after the original day of entry into the system would not re-activate eligibility of the order to CoD.

The next sections in this document list cases when Cancel on Disconnect is triggered and where associated exceptions are applicable.

1.2.1   Rate of Triggering

The CoD mechanism is triggered as soon as the disconnection is submitted by the client or triggered by other detection of disconnection. As soon as the disconnection is identified CoD is triggered.

The detection of client disconnection will depend on the activity on the associated OE session and maximum delay assigned to the Optiq Segment for the TestRequest / Heartbeat mechanism.

The CoD mechanism is checked based on the "*n*" value that is measured in seconds. The minimum possible value for the delay period "*n*" value that could be defined is one second.

The value *n* defined for the processes associated to the TestRequest and HeartBeat messages are made available in the *Euronext Cash Markets - Optiq OEG Connectivity Configuration specifications* document and are defined per Optiq Segment.

The behavior of check and validation of continued connection is done in two steps (1) TestRequest issued after inactivity that lasts at maximum for the period of delay "*n*", (2) followed by wait for the Heartbeat response, also, at maximum, lasting for the time period "*n*" defined for the delay.

Based on the behavior for the check of connection the maximum period for detection of disconnection is between zero seconds and twice the maximum delay assigned to the Optiq Segment.

1.2.2   Quote Messages & CoD

All LP **Quotes** (08) (FIX i) submitted by the Liquidity Provider (LP) using a specific OE Session (physical connection) are in scope of CoD if that physical connection is disconnected from Optiq.

LP quote messages do not have validities that allow them to be transferred to another day, and are always treated as "for current trading session" only.

LP quote messages do not have a separate field for selection whether to participate in CoD or not as in cases when CoD functionality is triggered all live quotes of that physical connection are mandatorily cancelled.

The granularity of CoD is always that of an OE session (physical connection). A LP using the same Firm ID may choose to have multiple Logical access, and as such different OE sessions, connecting to a partition on which LP quote driven instruments are traded. If a particular such OE session gets disconnected from the specific partition, only the quotes owned by that OE session are cancelled.

LP Quote messages are restricted to sending quotes for instruments hosted on a single partition only. In case of multiple partitions being setup for the LP quote driven market, any cross partition failure cases described in this document would be treated the same way for quotes as they are for orders.

1.2.3   Controls in Case of Triggering of CoD

In case a client's system loses connection to the OEG, however the disconnection wasn't yet detected by the OEG, the client will be prevented from re-connecting, as multiple physical connections to the same partitions for the same Logical access are not allowed.

If OEG detects clients' disconnection, either upon request (via Logon message) or due to a technical issue, and CoD is triggered, any messages / requests submitted by the client following re-connection will be processed only after all the cancellations triggered by CoD are fully processed. This control is applied only to the OE session(s) impacted by the disconnection and should not impact performance of other OE sessions / clients, if they are not impacted by the disconnection, or do not have CoD enabled.

This is done in order to ensure that no new orders submitted upon re-connection are included into the scope of CoD.

1.2.4   Kinematics of Cancel on Disconnect

Optiq

For any reason the
connection between the
broker and the OEG is lost

The Cancel on
Disconnect is triggered
for this OE Session

| 1002 | **OrderUpdate** (Delete order on instrument ABC) |

| 1001 | **MarketUpdate** (limits) |

| 1002 | **OrderUpdate** (Delete order on instrument ABC) |

| 1001 | **MarketUpdate** (limits) |

| 1002 | **OrderUpdate** (Delete order on instrument DEF) |

| 1001 | **MarketUpdate** (limits) |

| 1002 | **OrderUpdate** (Delete order on instrument GHI) |

| 1001 | **MarketUpdate** (limits) |

Corresponding Kill (05)
messages are queued until the
broker reconnects to the OEG

Broker

OEG

MDG

Market

100 [A] Logon

101 Logon Ack

05 [8] Kill

Symbol Index: ABC
Order ID: X
KillReason : Order Cancelled due to Cancel
on Disconnect Mechanism

05 [8] Kill

Symbol Index: ABC
Order ID: X
KillReason : Order Cancelled due to Cancel
on Disconnect Mechanism

05 [8] Kill

Symbol Index: DEF
Order ID: X
KillReason : Order Cancelled due to Cancel
on Disconnect Mechanism

05 [8] Kill

Symbol Index: GHI
Order ID: X
KillReason : Order Cancelled due to Cancel
on Disconnect Mechanism

The diagram represents a generic case of loss of connection between broker and partition, however further details on various cases of CoD triggering are identified in this document.

The sending of messages due to cancellation of orders via public and private message is available at the same time, however the diagram represents delayed sending of private message to the broker, as this sending also depends on the broker's reconnection to the OE session.

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1.3   HOW TO ACTIVATE OR DISABLE CANCEL ON DISCONNECT

The implementation of CoD functionality is managed directly within the order message (please note that CoD behavior for LP **Quotes** (08) (FIX i) messages is described elsewhere in this document). No subscription or forms are required to use it, however checks that clients can correctly process CoD functionality are part of the regular conformance tests.

Clients can indicate within each order if they want the order to be persistent, i.e. not included in the scope of the Cancel on Disconnect mechanism. If the field associated to disabling / activation of Cancel on Disconnect feature is set to "CoD disabled" for an order, this order will not be cancelled even if the CoD is triggered for the OE Session it belongs to.

The CoD values may be updated by the client using **Cancel Replace** (06) (FIX G). As indicated above, the modification of the indicator will be taken into consideration by the CoD functionality only during the trading session during which the order is entered into the system.

IMPORTANT NOTE:

It is important to note that the request for information on the order (via **OpenOrderRequest** (15) (FIX AF) message) results in sending of ExecutionReport (FIX 8) message to Drop Copy, which will contain the values set when the order was originally submitted, or last modified. The value received may still indicate eligibility of the order to CoD, however if the order was persisted over at least one day, or longer, it will no longer be in scope of the cancellation.

1.3.1   SBE Field & Values for Cancel on Disconnect

In SBE protocol the data for the CoD in the order messages is to be specified as one of the values of a bitmap. The details of the messages, fields and values are described in the table below. **Quotes** (08) (FIX i) messages do not have a separate field for selection whether to participate in CoD or not, as in cases when CoD functionality is triggered all live quotes are mandatorily cancelled.

Incoming Messages:

Message Code	Message Name	Field	Value	Notes
01 / 06	New Order / Cancel Replace	Execution Instruction (bitmap) Position 3 - Disabled Cancel On Disconnect Indicator	0: Cancel on Disconnect enabled	Default Value Order included in the scope of cancellations when CoD mechanism is triggered
			1: Cancel on Disconnect disabled	If selected, order is persisted, and it **_not_** included in the scope of cancellations when CoD mechanism is triggered

1.3.2   FIX Fields & Values for Cancel on Disconnect

In FIX protocol the details of the order messages, fields and values are described in the table below. Quotes (08) (FIX i) messages do not have a separate field for selection on whether to participate in CoD or not, in cases where the CoD functionality is triggered, all live quotes are mandatorily cancelled.

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Incoming Messages:

Message Code	Message Name	Field	Value	Notes
D / G	NewOrderSingle / OrderCancelReplaceRequest	CancelOnDisconnectionIndicator Tag: 21018	0 = Per Default Configuration	Default Value Order included in the scope of cancellations when CoD mechanism is triggered
			1 = Order not in the scope of Cancel On Disconnect	If selected, order is persisted, and it **not** included in the scope of cancellations when CoD mechanism is triggered

Outdoing Messages:

Message Code	Message Name	Field	Value	Notes
8	ExecutionReport	CancelOnDisconnectionIndicator Tag: 21018	0 = Per Default Configuration	Provided only as a response to the Open Order Request [message OrderMassStatusRequest (AF)] via Drop Copy
			1 = Order not in the scope of Cancel On Disconnect	

2.   CLIENT DISCONNECTS FROM OEG

2.1   NORMAL DISCONNECTION AT THE END OF SESSION / LOGOUT MESSAGE FROM CLIENT

In Optiq, clients are encouraged to send a Logout message per OE Session (physical connection) in order to close their connection with the Exchange. The **Logout** (103) (FIX 5) message should be used for these purposes.

Sending of this message will trigger the Cancel on Disconnect mechanism, and will issue a cancellation of any orders submitted during the trading session that are flagged not to be persisted.

When the system shuts-down in a scheduled manner (i.e. not due to a failure; system reaches the Inaccessible phase) Cancel on Disconnect mechanism will no longer apply. For clients connected to the system when system reaches this phase any orders that haven't been cancelled due to their normal expiration or client triggered cancellation, will be transferred to the next trading session and will no longer be in scope of CoD.

Please note – order transferred to the next trading session may still be subject to cancellation by mechanisms other than CoD; i.e. at the start of the session in cases of a corporate event or expiration of GTD orders during start of day processing.

2.2   CLIENT APPLICATION DOES NOT REPLY TO THE TEST REQUEST

After a predefined time of inactivity (delay value set per Optiq segment) from the client's OE Session (physical connection), the OEG sends a **TestRequest** (107) (FIX 1) message to that OE Session. In case client does not reply to this message within a pre-set amount of time with either a **Heartbeat** (106) (FIX 0), or any other application message, OEG will close the connection for the impacted OE Session.

Closure of connection by the OEG will trigger the Cancel on Disconnect mechanism for the impacted OE Session, and will issue cancellation of any orders submitted and owned by the impacted physical connection during the trading session and flagged not to be persisted.

While Optiq is detecting the failover, orders that belong to the impacted connection could be matched. As a consequence, members could receive trade Fill messages when reconnecting.

2.3   DISCONNECTION DUE TO TECHNICAL ISSUES BETWEEN CLIENT APPLICATION & OEG

In case client's OE session loses connectivity to an OEG, and depending on the activity of the OE session (physical connection) in question, Optiq may detect a client's disconnection sooner than the maximum time identified as the delay for the TestRequest / Heartbeat mechanism. As such the maximum period for detection of disconnection is between zero seconds and twice the maximum delay assigned to the Optiq Segment. In all cases, the CoD mechanism is triggered as soon as the disconnection is detected.

While Optiq is detecting the failover, orders that belong to the impacted connection could be matched. As consequence members could receive trade Fill messages when reconnecting.

3.   EXCHANGE BUSINESS CONTINUITY CASES

3.1   SIMPLE PARTITION FAILOVER (SINGLE PARTITION IN SEGMENT, NON-MESHED CASE)

Simple partition failover triggers cancelation of orders and quotes that have been sent during the current day, and were flagged as not to be persisted, from the impacted OEG. Simple partition failover covers the following cases:

■   when the failover occurs on a single non-meshed partition, or

■   when the connection on the partition that failed over does not own any orders on other partitions of the same Optiq segment, while the node B of an OEG is taking over

While Optiq is detecting the failover, orders that belong to the impacted connection could be matched. As a consequence, members could receive trade Fill messages when reconnecting.

3.2   MULTIPLE MESHED (CROSS-LINKED) PARTITIONS & ASSOCIATED CASES

Clients have the ability to send orders from one partition to another meshed (or cross-linked) partition residing within the same Optiq Segment. Instruments identified by Symbol Index and EMM allow one OEG to route the required messages to the ME of the partition where the instrument is hosted. Orders on the different (meshed) partition(s) are owned by the OE Session (physical connection) which submitted them, i.e. the session physically connected to the "original" sending partition. Such connections and orders are subject to the cases of failure described below (e.g. disconnect between partitions within a single Optiq Segment, failover of one of the partitions).

3.2.1   Failover on the Partition to Which OE Session is Connected To

In case of failover, the scope of CoD is defined by the partition and any orders submitted from it to other partitions. CoD scope spans all instruments and orders for these instruments (that are flagged as CoD), that are hosted by the partition failing over. This includes any orders in scope, whether they are owned by the OE sessions connected to the partition failing over (original partition), or by the OE sessions connected to a meshed partition(s).

This section describes the case of failure on the partition to which the owner of the orders is connected to.
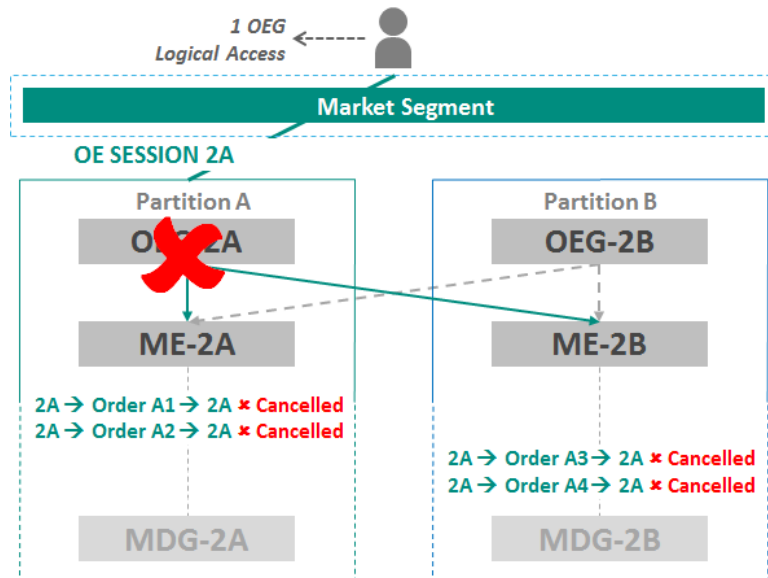
For any existing orders, owned by the OE Sessions connected to the original partition, that were submitted to the instruments hosted on the original partition, the OE session will receive **Kill** (05) (FIX 8) messages once the partition becomes once again available. When the start-up of the partition commences, any orders in scope of CoD are cancelled and **Kill** (05) (FIX 8) messages will be sent once clients reconnect to the partition.

For any existing orders, owned by the OE Sessions connected to the original partition, that were submitted to instruments hosted on the other meshed (cross-linked) partition(s), the orders will be cancelled as soon as the disconnection between the partition is detected, however the client's OE Session will receive the associated **Kill** (05) (FIX 8) messages only when the original partition becomes available.

Please note: The timestamp fields provided in the **Kill** (05) (FIX 8) messages will be set to the time when partitions becomes available again.

For any messages submitted by the client, during the failover of the original partition, to the original or meshed partition, a client's connection will receive a "Technical Error" (5001) error message for those messages.

Messages for instruments hosted on the partitions unaffected by the failover, and submitted by the OE Sessions connected to those unaffected partitions, will be processed normally and won't be subject to CoD.

While Optiq is detecting the failover, orders that belong to the impacted connection could be matched. As a consequence, members could receive trade Fill messages when reconnecting.

3.2.2   Failover on the Partition to Which OE Session is NOT Connected To

In case of failover, the scope of CoD is defined by the partition, and not individual OE sessions. CoD scope spans all instruments and orders for these instruments (that are flagged as CoD), that are hosted by the partition failing over. This includes any orders in scope, whether they are owned by the OE sessions connected to the partition failing over (original partition), or by the OE sessions connected to a meshed partition(s).
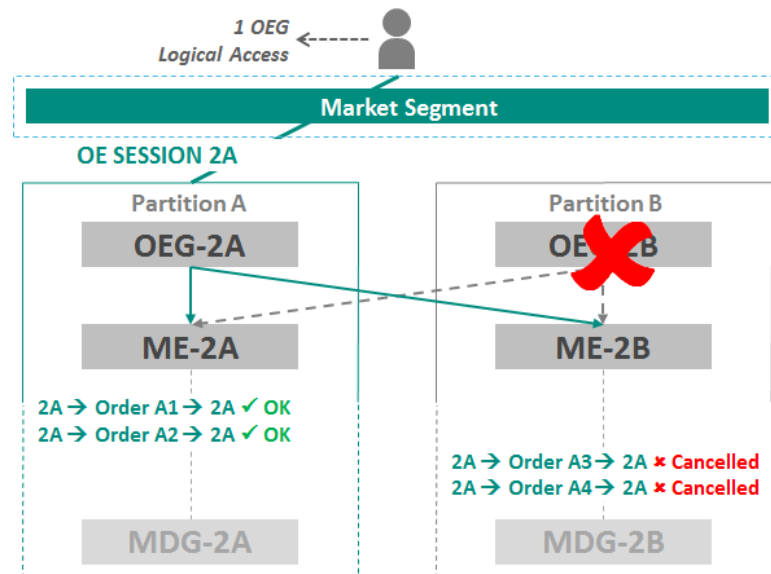
This is the case of failure of the partition to which the owner of the orders is NOT connected to, but has submitted orders via other partitions.

For any existing orders, owned by the OE Sessions connected to the original partition, that were submitted to the instruments hosted on the original partition, there will be no impact, and they will not be in scope of CoD triggered in this case.

For any existing orders, owned by the OE Sessions connected to the original partition, that were submitted to instruments hosted on the other meshed (cross-linked) partition(s), the OE session will receive **Kill** (05) (FIX 8) messages when the partition becomes available again. When the start-up of the partition commences, any orders in scope of CoD are cancelled and **Kill** (05) (FIX 8) messages will be sent once clients reconnect to the partition.

For any messages submitted by the client to the original or meshed partition, after failure has been detected and before a partition is available again, a client's connection will receive a "Technical Error" (5001) error message for those messages.

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Messages for instruments hosted on the original partition, or any other partitions within the Optiq Segment unaffected by the failover, and submitted by the OE Sessions connected to those unaffected partitions, will be processed normally and won't be subject to CoD.

While Optiq is detecting the failover, orders that belong to the impacted connection could be matched. As a consequence, a member could receive trade Fill messages when reconnecting.

3.2.3 Network Disconnection Between Partitions within a Single Optiq Segment

Any orders that belong to the meshed partitions (crossed-linked between partitions) will be subject to CoD if the connectivity between the partitions is lost between them. Orders existing on both partitions, even if the partitions themselves remain active, will be considered as being in scope of CoD and will be cancelled.
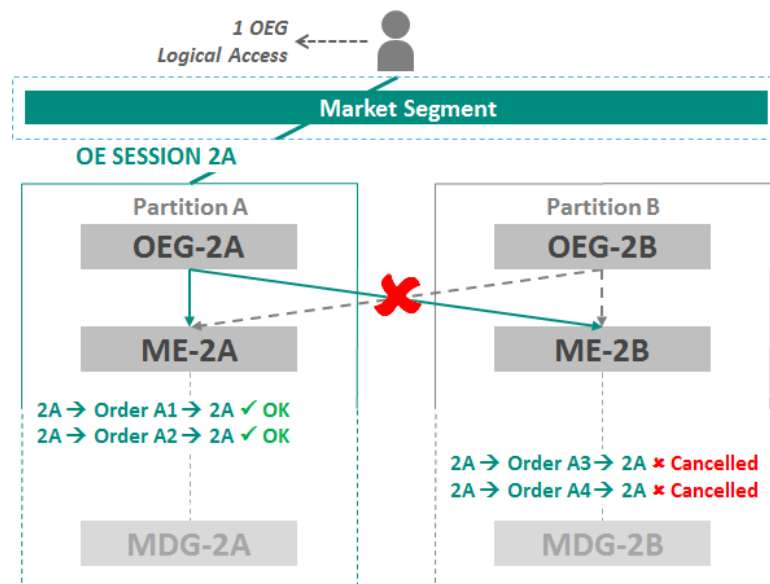
Partitions within the same segment monitor their connectivity to each other, and if connection is lost, and CoD is triggered, OE sessions on each partition will receive the associated Kill messages when the two partitions reconnect to each other.

If client attempts to submit new messages to the instruments hosted on the meshed partition(s) clients will receive a "Technical Error" (5001) error message for those messages.

Examples below provide more details on how the associated mechanisms will function. These examples in all cases assume that orders were submitted during that day's trading session and are flagged with default setting of CoD set to Yes (orders not persisted).

Example 1: Single connection to one partition, with orders submitted to multiple meshed partitions

OE Session (physical connection) 2A on partition A submits orders A1 and A2 on instruments hosted on partition A, and orders A3 and A4 on instruments hosted on partition B. When connection is lost between the two partitions, orders A3 and A4 are in scope of CoD and are cancelled.
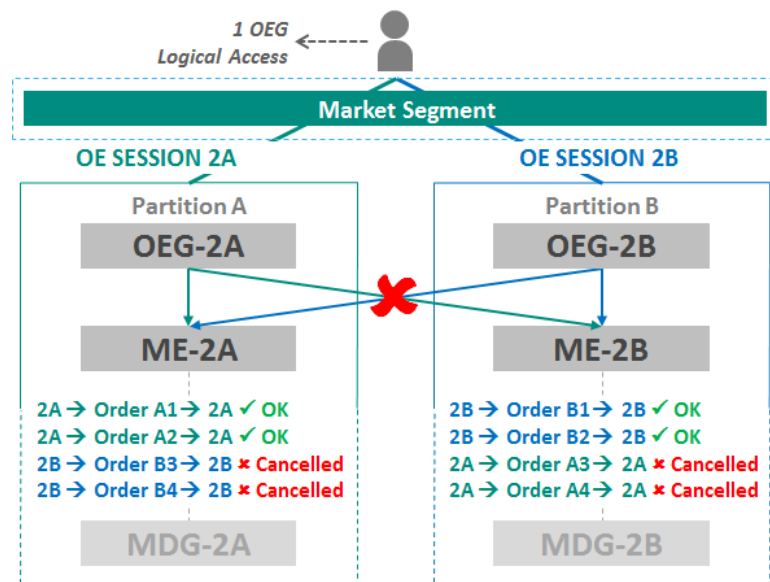
Example 2: Connections to multiple partitions, with orders submitted to multiple meshed partitions

OE Session (physical connection) 2A on partition A submits orders A1 and A2 on instruments hosted on partition A, and orders A3 and A4 on instruments hosted on partition B.

OE Session (physical connection) 2B on partition B submits orders B1 and B2 on instruments hosted on partition B, and orders B3 and B4 on instruments hosted on partition A.

When connection is lost between the two partitions, orders B3 and B4 owned by connection 2A, AND orders A3 and A4 owned by connection 2B, are all in scope of CoD and are cancelled.

Any orders on the partition that is not meshed, and which itself didn't lose connection from the client, will be maintained and will not be in scope of CoD.

While Optiq is detecting the failover, orders that belong to the impacted connection could be matched. As a consequence, member could receive trade Fill messages when reconnecting.

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3.3   CANCEL ON DISCONNECTION FOR CASES OF DISASTER RECOVERY

3.3.1   Pre-scheduled Disaster Recovery Testing

During pre-scheduled, agreed Disaster Recovery (DR) tests, the Exchange has the ability to disable CoD functionality to facilitate testing. Whether this option is taken for individual DR tests will be communicated by the exchange for the individual instances of tests.

3.3.2   Business Continuity Event with Failover to the Secondary Data Center

In case of an event which triggers failover to the secondary data center (Disaster Recovery infrastructure) CoD functionality will be triggered according to the policy, rules and cases defined for Disaster Recovery policy.

APPENDIX A: DOCUMENT REVISION HISTORY

REVISION HISTORY

Version	Change Description
1.1	▪ Clarified text of section "1.2.1 Rate of Triggering" ▪ Updated name of the Connectivity configuration document to be in line with published name "Euronext Cash Markets - Optiq OEG Connectivity Configuration specifications" ▪ Removed SBE **Extended Response** message o Removed reference to the message in section "1.3 How to activate or disable cancel on disconnect" o Removed section / table "Outgoing messages" in section "1.3.1 SBE Field & Values for Cancel on Disconnect" o Adjusted Notes for **ExecutionReport** (8) messages in section "1.3.2 FIX Field & Values for Cancel on Disconnect" ▪ In section 3.1 removed references to the **Reject** (07) (FIX 8) message, as in single partition there will be no reject from other partition. ▪ In section 3.2.3 Network Disconnection Between Partitions within a Single Optiq Segment o Corrected the orders referenced in the text of Example 1 o Added a note on Timestamps provided in the Kill message ▪ Added section "Appendix A: Document Revision History"
1.0	First Version for Optiq

DOCUMENT HISTORY

REVISION NO.	DATE	AUTHOR	CHANGE DESCRIPTION
1.1	15 September 2017	Euronext	Second Release
1.0	13 July 2017	Euronext	First Release