Document title

REQUEST FOR CROSS

Document type or subject

Functional Overview

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PREFACE

PURPOSE

This document provides a functional overview of the Request for Cross (RFC) trading facility which is available for Euronext commodity, equity and index options.

TARGET AUDIENCE

This document is intended for developers aiming to implement this functionality in their systems as well as traders wishing to trade Requests for Cross on Euronext commodity, equity and index options.

This document must be read in conjunction with the documents below.

ASSOCIATED DOCUMENTS

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

- CCG Binary Client Specifications

- CCG FIX 5.0 Client Specifications

- CCG Error List

- Optiq MDG Client Specifications

- Optiq MDG Standing Data Specifications

- Derivatives – Market Data - Conformance Script

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CONTENTS

1   INTRODUCTION

The Request for Cross (RFC) trading facility is a trading facility that was initially implemented for commodity options in response to a request from market participants as a replacement of the standard Request for Quote (RFQ) mechanism. After the initial launch of the RFC for commodity options, the RFC was also made available for equity and index options (with the exception of flex contracts) and for all supported derivatives strategy types, including delta-neutrals. For the full list of strategy types available for commodity, equity and index options, please refer to the Annex Two to the Trading Procedures.

Important note:

Despite a major part of the RFC kinematics is common to commodity, equity and index options, readers should pay attention to the specific features that apply to commodity options.

With a RFC, a member is committed to a cross trade against a client. After the RFC is submitted by the **RFC Initiator** (the member submitting the RFC) there is a short auction period, so-called the **RFC Response period**, that is open to all other participants in the market. During this RFC auction period other participants so-called the **RFC Reactors** may choose to price-improve the cross level. After the RFC auction period the cross is executed. Depending on the prices of the RFC Reactor responses, one or more RFC Reactors can take part in the cross trade.

2   REQUEST FOR CROSS (RFC) KINEMATICS AND PROCESSING

It is important in the rest of this document to distinguish between the member initiating the RFC, so-called "**RFC Initiator"** and a member responding to the RFC, so-called "**RFC Reactor"**.

2.1   THE RFC KINEMATICS

When a RFC is submitted there are three periods to distinguish:

■ the RFC Submission, Validation and Publication;
■ the RFC Response Period;
■ the RFC Final Execution.

2.2   THE RFC SUBMISSION, VALIDATION AND PUBLICATION

2.2.1   RFC Submission

A RFC is submitted by a RFC Initiator by sending the standard New Order Cross ('s') message with:

■ the 'WholesaleTradeType' field (tag 8008) set to "**9**" (which is the identifier for the RFC trade type);
■ the 'OrderCapacity' field (tag 528) set to "1" (by doing this, the party submitting the RFC identifies itself as the RFC Initiator).

Both the Buy and Sell side of the RFC must be entered. Each side will be acknowledged with an Execution Report (8) in case of rejection or acceptance. Furthermore, one is allowed to send an RFC Initiator only if the instrument is in market open phase.

RFCs can be submitted in outright option contracts as well as in any type of supported option strategies, including delta-neutrals.

When submitting an RFC on a delta-neutral strategy:

■ The Delta Neutral strategy has to be created first if it does not already exist by using the Security Definition Request (c). Delta Neutral strategies are not carried over to the next trading day.

■   Both the delta and the price of the future/cash leg (as the case may be) will be subject to validation.

2.2.2   RFC Validation

Price Check

The price submitted by the RFC Initiator (including RFC on delta-neutral strategies) will be validated against the best bid and/or best offer in the central order book. Prices lower than the best bid or higher than the best offer will be rejected even if only one side is present in the book.

For strategies, the price will also be validated against the BBO prices for the strategy in the central order book. . Prices of the individual legs will not be validated against the BBO prices of the individual leg in the central order book.

For a RFC that is queued, the check is done once only upon the submission and will not be done again when the RFC is activated.

A RFC response submitted by the RFC Reactor is not subject to price validation.

Finally, the price of the RFC will need to be within the Matching Engine price limit range.

Volume Check

There are minimum volume thresholds for RFC submission, called the 'RFC Initiator minimum quantity' defined per contract in the XML standing data files under the 'WtrdTyp' section in the '**MinQtyIni**' field. Any RFC submission with a quantity below the RFC Initiator minimum quantity threshold will be rejected.

Acknowledgment

In response to the RFC submission, standard Execution Report ('8') messages are sent to acknowledge or reject the RFC.

Once the RFC is validated by UTP-D, it can either:

■ be activated if no RFC is currently active on the target instrument; when activated, the RFC Response Period begins;

■ be queued within the Matching Engine if there is an active RFC on the target instrument and/or already queued RFCs until one or all of them have gone through their respective RFC Response period and matching. The new RFC is added at the end of the RFC queue. All RFCs should be processed successively based on the timestamp registration. An RFC will only be activated after the process of the previous RFC is terminated. UTP-D will close the RFC activity when the end of the RFC queue is such that the last RFC executes just before market close. In other words, a RFC will not be accepted if its execution will occur outside the trading hours.

This means that only one RFC can be active in a given instrument or strategy (AMR Code).

Please pay attention that a RFC initiator cannot pull a queued RFC.

2.2.3   RFC Publication

The MDG Market Update (1001) message will be sent upon activation of an RFC. The message will be sent with an Update Type = '26' [Request for Cross (RFC)].

Publication rule for RFC on equity and index options

When at least one of the parameters RFC Initiator minimum quantity and RFC Reactor minimum quantity is below the LIS minimum volume of the contract, the price and quantity of the RFC will also be published. For more information please consult the Optiq MDG Client Specifications on the Euronext website.

Please note that the price and quantity of the RFC will not be sent when it is queued (a Market Update (1001) is sent with Update Type = '25' [Request for Cross (RFC) Queued without price and quantity]) until the RFC is activated and a Market Update message is sent again with Update Type '26' as described above.

Publication rule for RFC on commodity options

For RFC on commodity options and strategies, please note that the price and the quantity of the original RFC are not published through MDG.

2.3 THE RFC RESPONSE PERIOD

The RFC Response Period is a period of which the duration is defined by a specific parameter. This value is available in the XML standing data files per contract in the 'WtrdTyp' section in the '**SRFCPer**' field.

During this period, members other than the RFC Initiator can respond to the RFC. They can also cancel their responses. No execution occurs at this phase of the process. All responses are stored in a dedicated order book with a price-time priority.

Note:

UTP-D applies the RFC Response Period in 'clock' seconds, this means that the RFC Response Period always ends on a UTP-D 'clock' second. Depending on the millisecond that the RFC is entered, the effective duration of the RFC Response Period can therefore be shorter than a time in full seconds.

This is outlined in the following example:

When the RFC Response Period is 1 second and an RFC is entered at 15:25:02.997, then the RFC Response Period ends at the next UTP-D 'clock' second (i.e. 15:25:03.000).

In order to ensure that the duration of RFC Response Period is never shorter than the required time in full seconds, an extra second has been added in the system setting. This has the following result:

■   For equity and index options, the duration of the RFC Response Period lasts between 1 and 2 seconds,

■   For commodity options, the duration of the RFC Response Period lasts between 10 and 11 seconds.

The submission of the RFC response is done by sending a New Order Cross ('s') message with

■   the 'WholesaleTradeType' field (tag 8008) set to "**9**";
■   the 'OrderCapacity' field (tag 528) set to "2" (by doing this, the party submitting the RFC response identifies itself as the RFC Reactor).

The submission of RFC responses is forbidden and therefore rejected if there are no RFCs active and is only possible in the RFC Response Period.

Members must pay attention that the ITM acting as the RFC Initiator cannot respond to its own RFC. However, please note that other ITMs belonging to the same MNE can respond.

Volume and price checks

There is a minimum volume threshold for RFC responses called the 'RFC Reactor minimum quantity' defined at the contract level in the XML standing data files under the 'WtrdTyp' section in the '**MinQtyRea**' field. Any RFC response with a quantity below that threshold will be rejected. Besides that, the price of the RFC response needs to be within the outer price limit range.

Acknowledgment

Note that only **one** side of the New Order Cross message needs to be entered in the RFC response. This side will be acknowledged with an Execution Report (8) in case of rejection or acceptance.

During the RFC Response Period, any RFC responses submitted by different Reactors can be cancelled by sending the Order Cancel Request (F) message. The OrderID or the OrigClOrdId can be used to identify the cancelled order. RFC responses cannot be amended.

2.3.1   Publication of RFC Responses (this section is not applicable for commodities)

MiFID II requires the market to be pre trade transparent (send available prices and quantities before execution) in the case where volumes are below specific Large-in-Scale (LIS) thresholds.
UTP-D applies two modes of treatment:

- When at least one of the parameters RFC Initiator minimum quantity and RFC Reactor minimum quantity is below the LIS minimum volume of the contract: at the end of the Response Period, just before the Final Execution, all RFC responses are published (aggregated by price). A Market Update Message is sent to market participants with the following update types:
  - '74' : New Bid on Wholesale RFC. A new bid price is available in the RFC Reactor book.
  - '75' : New Offer on Wholesale RFC. A new Offer price is available in the RFC Reactor book.

- When both parameters RFC Initiator minimum quantity and RFC Reactor minimum quantity are equal to or above the LIS minimum volume of the contract: the RFC initiator and RFC response prices and quantities are not published.

Publication rule for RFC on commodity options

For RFC on commodity options and strategies, please note that the price and the quantity of the RFC Responses are not published through MDG.

2.4   RFC MECHANISM ENHANCEMENT FOR RFC ON COMMODITY OPTIONS – INCLUSION OF CENTRAL BOOK ORDERS

For RFC on commodity options, Central Order Book (COB) orders will be included in the RFC Final Execution in addition to the RFC Reactor responses. This will enhance the current RFC algorithm by increasing the number of orders that are available to trade against the RFC Initiator and encouraging the development of the screen based market.

The same conditions will apply to COB orders that participate in the RFC as those for RFC Reactors. COB orders will participate in the RFC when their Minimum Volume is greater than or equal to the Reactor Minimum Volume and their price do allow to match with the RFC Initiator. Implied COB orders do not participate in the RFC. The eligible COB orders will be added to the RFC Reactor order book at the moment the RFC Response Period ends. COB orders and Reactors will be stored together in the order book with Price – Time logic.

Note:

COB Orders are not published at the end of the RFC Response Period as RFC Responses. COB Orders are already published when they are entered in the COB.

Trades will be flagged 'RFC' when there is a matching between a Reactor and a COB order.

2.5   THE RFC FINAL EXECUTION FOR FINANCIAL DERIVATIVES

Once the RFC Response Period has elapsed, the Final Execution step is triggered.

It is important to note that the uncrossing algorithm takes into account the Account Type i.e. 'Client' or 'House' of each leg of the RFC.

A RFC Initiator 'Client' will have an advantage compared to RFC Initiators that are not 'Client'. They will match 100% of their quantity.

Note:

The RFC Initiator is considered as Client when the New Order Cross message's AccountCode = 'C'.

There are three scenarios described below based on the Account Type of the RFC leg

2.5.1   RFC Initiator Client versus Non Client

Step 1: RFC Initiator Client Improvement

Any response that improves the RFC Initiator price matches with the Client side of the RFC Initiator with immediate effect on the balance of the RFC associated buy and sell orders, i.e.

- If it is a Buy response and its price is higher than the RFC Initiator Client price.
- If it is a Sell response and its price is lower than the RFC Initiator Client price.
- The trade price should be determined by the RFC responses submitted.

Following execution:

- Both the RFC Initiator Client and RFC Reactor receive a trade notification Execution Report ('8') message,

- Any trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Consequently, the Client side of the cross that has matched is decreased with the quantity of the trade (either equal to the selected order quantity or equal to the RFC quantity if the latter is fully filled), e.g. if a RFC with a sell quantity of 1000 lots is executed against a buy order of 100 lots, the remaining RFC sell quantity is 900.

Step 2: Execution of reactors at RFC price with RFC Initiator Client

■ Remaining RFC responses with a price equal to the RFC Initiator are matched with the RFC Initiator Client according to a FIFO rule.

  – The quantity of the RFC available for this matching is equal to the Remaining Tradable RFC Quantity after all price improvements have been executed. This Remaining Tradable RFC Quantity is calculated as follows:
  *Remaining Tradable RFC Quantity = Remaining RFC Client quantity * Pick Up Percentage*

  The Pick Up Percentage is aimed at providing the RFC Initiator a preference in the final execution process. The calculated quantity is rounded down so as to be in favour of the RFC Initiator. The value of the 'Pick Up Percentage' is available via the XML standing data files at the contract level in the 'WtrdType' section in the '**PckUpPct**' field.

  – The RFC Initiator remaining quantity *((1-Pick Up percentage) * Remaining Tradable RFC Quantity)*, is rounded up so as to be in favour of the RFC Initiator.

Following execution:

- RFC Initiator Client receives a trade notification Execution Report ('8') message. Any trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Note: Pick Up ratio should be considered only in case of equality to the RFC Initiator price, not for any price improvements.

Step 3: RFC Initiator Non Client Improvement and/or execution at RFC price with reactors

Any response that improves the RFC Initiator price matches with the Non Client side of the RFC Initiator with immediate effect on the balance of the RFC associated buy and sell orders, i.e.

- If it is a Buy response and its price is higher than the RFC Initiator Non Client price.
- If it is a Sell response and its price is lower than the RFC Initiator Non Client price.
- The trade price should be determined by the RFC responses submitted.

Note: RFC Initiator Non Client can match with reactors at most for the **same quantity** matched by RFC Initiator Client in Step 1 and 2. It includes the Non Client side improvement and the execution of reactors at RFC price.

Following execution:

- Both the RFC Initiator Non Client and RFC Reactor receive a trade notification Execution Report ('8') message,

- Any trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Consequently, the Non Client side of the cross that has matched is decreased with the quantity of the trade (either equal to the selected order quantity or equal to the RFC quantity if the latter is fully filled), e.g. if an RFC with a sell quantity of 1000 lots is executed against a buy order of 100 lots, the remaining RFC sell quantity is 900.

Step 4: Final cross execution

Remaining RFC Initiator Client quantity is matched as a cross trade. Unfilled RFC Initiator Non Client quantity is cancelled by UTP-D without sending any acknowledgement to the RFC initiator Non Client.

Step 5: Final RFC Reactors execution

Remaining RFC responses with prices crossed are matched amongst themselves according to the algorithm PET (Price Explicit Time). Any remaining RFC responses from the above matching process are cancelled by UTP-D.

2.5.2   RFC Initiator Client versus Client

Step 1: RFC Initiator Client Improvement

The minimum matchable quantity for each Client order is 350 in the example below:

Time Stamp	Firm	Quantity	Price	Ask Price	Quantity	Firm	Time stamps
			Bid	**Ask**			
01	MBR1 (C1)	1000	1.00	1.00	1000	MBR1 (C2)	01

Time Stamp	Firm	Quantity	Price	Ask Price	Quantity	Firm	Time stamps
			Bid	**Ask**			
04	MBR4	200	1.10	0.90	150	MBR3	03
06	MBR6	850	1.00	1.00	200	MBR5	05
TOTAL Qty		**1050**			**350**		

Any response that improves the RFC Initiator price matches with each Client side of the RFC Initiator, for the same quantity, with immediate effect on the balance of the RFC associated buy and sell orders, i.e.

Following execution:

Same rules apply than is Step 1 <u>RFC Initiator Client versus Non Client</u> scenario.

Step 2: Execution of reactors at RFC price with RFC Initiator Client

Same rules apply than in Step 2 <u>RFC Initiator Client versus Non Client</u> scenario.

Step 3: RFC Initiator other Client Improvement and/or execution at RFC price with reactors

Same rules apply than in Step 3 <u>RFC Initiator Client versus Non Client</u> scenario.

Step 4: Final cross execution

Remaining RFC Initiator Client quantity is matched as a cross trade.

Step 5: Final RFC Reactors execution

Same rules apply than in Step 5 <u>RFC Initiator Client versus Non Client</u> scenario.

2.5.3   RFC Initiator Non Client versus Non Client

Step 1: RFC Initiator Improvement

Any response that improves the RFC Initiator price matches with the relevant side of the RFC Initiator with immediate effect on the balance of the RFC associated buy and sell orders, i.e.

- If it is a Buy response and its price is higher than the RFC Initiator price.
- If it is a Sell response and its price is lower than the RFC Initiator price.
- The trade price should be determined by the RFC responses submitted.

Following execution:

- Both the RFC Initiator and RFC Reactor receive a trade notification Execution Report ('8') message,

- Any trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Consequently, the side of the cross that has matched is decreased with the quantity of the trade (either equal to the selected order quantity or equal to the RFC quantity if the latter is fully filled), e.g. if an RFC with a sell quantity of 1000 lots is executed against a buy order of 100 lots, the remaining RFC sell quantity is 900.

Step 2: Execution of reactors at RFC price

- Remaining RFC responses with a price equal to the RFC Initiator are matched with the RFC Initiator remaining Bid and Ask quantities according to a FIFO rule.
  - The quantity of the RFC available for this matching is equal to the Remaining Tradable RFC Quantity after all price improvements have been executed. This Remaining Tradable RFC Quantity is calculated as follows:
  Remaining Tradable RFC Quantity = min (RFC quantity left on each side) * Pick Up Percentage

  The Pick Up Percentage is aimed at providing the RFC Initiator a preference in the final execution process. The calculated quantity is rounded down so as to be in favour of the RFC Initiator. The value of the 'Pick Up Percentage' is available via the XML standing data files at the contract level in the 'WtrdType' section in the '**PckUpPct**' field.
  - The RFC Initiator remaining quantity ((1-Pick Up percentage) * Remaining Tradable RFC Quantity), is rounded up so as to be in favour of the RFC Initiator.

Following execution:

- RFC Initiator receives a trade notification Execution Report ('8') messageAny trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Note:

Pick Up ratio should be considered only in case of equality to the RFC Initiator price, not for any price improvements.

Step 3: Final cross execution

Remaining RFC Initiator quantity is matched as a cross trade. Unfilled RFC initiator quantity is matched with a RFC Reactor if possible, otherwise it is cancelled by UTP-D without sending any acknowledgement to the RFC initiator.

Step 4: Final RFC Reactors execution

Remaining RFC responses with prices crossed are matched amongst themselves according to the algorithm PET (Price Explicit Time). Any remaining RFC responses from the above matching process are cancelled by UTP-D.

2.6 THE RFC FINAL EXECUTION FOR COMMODITIES

Once the RFC Response Period has elapsed, the Final Execution step is triggered.

The following events occur in chronological order:

Step 1: RFC Initiator Improvement

Any response that improves the RFC Initiator price matches with the relevant side of the RFC Initiator with immediate effect on the balance of the RFC associated buy and sell orders, i.e.

- If it is a Buy response and its price is higher than the RFC Initiator price.
- If it is a Sell response and its price is lower than the RFC Initiator price.
- The trade price should be determined by the RFC responses submitted.

Following execution:

- Both the RFC Initiator and RFC Reactor receive a trade notification Execution Report ('8') message,

- Any trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Consequently, the side of the cross that has matched is decreased with the quantity of the trade (either equal to the selected order quantity or equal to the RFC quantity if the latter is fully filled), e.g. if an RFC with a sell quantity of 1000 lots is executed against a buy order of 100 lots, the remaining RFC sell quantity is 900.

Step 2: Execution of reactors at RFC price

■ Remaining RFC responses with a price equal to the RFC Initiator are matched with the RFC Initiator remaining Bid and Ask quantities according to a FIFO rule.
  – The quantity of the RFC available for this matching is equal to the Remaining Tradable RFC Quantity after all price improvements have been executed. This Remaining Tradable RFC Quantity is calculated as follows:
    Remaining Tradable RFC Quantity = min (RFC quantity left on each side) * Pick Up Percentage

  The Pick Up Percentage is aimed at providing the RFC Initiator a preference in the final execution process. The calculated quantity is rounded down so as to be in favour of the RFC Initiator. The value of the 'Pick Up Percentage' is available via the XML standing data files at the contract level in the 'WtrdType' section in the '**PckUpPct**' field.
  – The RFC Initiator remaining quantity ((1-Pick Up percentage) * Remaining Tradable RFC Quantity), is rounded up so as to be in favour of the RFC Initiator.

Following execution:

- RFC Initiator receives a trade notification Execution Report ('8') messageAny trade in this step is published via the 1001 MDG message with the Update Type = '56' [Request for Cross Trade] or '57' [Request for Cross Strategy Leg Trade].

Note: Pick Up ratio should be considered only in case of equality to the RFC Initiator price, not for any price improvements.

Step 3: Final cross execution

Remaining RFC Initiator quantity is matched as a cross trade. Unfilled RFC initiator quantity is cancelled by UTP-D without sending any acknowledgement to the RFC initiator.

Step 4: Final RFC Reactors execution

Remaining RFC responses with prices crossed are matched amongst themselves according to the algorithm PET (Price Explicit Time). Any remaining RFC responses from the above matching process are cancelled by UTP-D.

2.6.1   RFC Final Execution with COB

As previously mentioned in section RFC mechanism enhancement for RFC on commodity options – Inclusion of Central Book orders, COB orders will participate to the RFC mechanism.

In the below example, seven Reactors will participate to the RFC after the end of the RFC Response Period. In addition, one COB order will also participate since its Minimum Volume is greater than or equal to the Reactor Minimum Volume and its price does allow a matching.

	CLIENT	HOUSE
RFC Initiation	Buy 1000 lots @ 1.00	Sell 1000 lots @ 1.00

RFC Response Period

RFC Reactor → Buy 200 lots @1.05

RFC Reactor → Sell 150 lots @0.92

RFC Reactor → Buy 200 lots @1.02

RFC Reactor → Sell 150 lots @0.95

RFC Reactor → Buy 100 lots @1.00

RFC Reactor → Sell 250 lots @1.05

RFC Reactor → Sell 100 lots @0.90
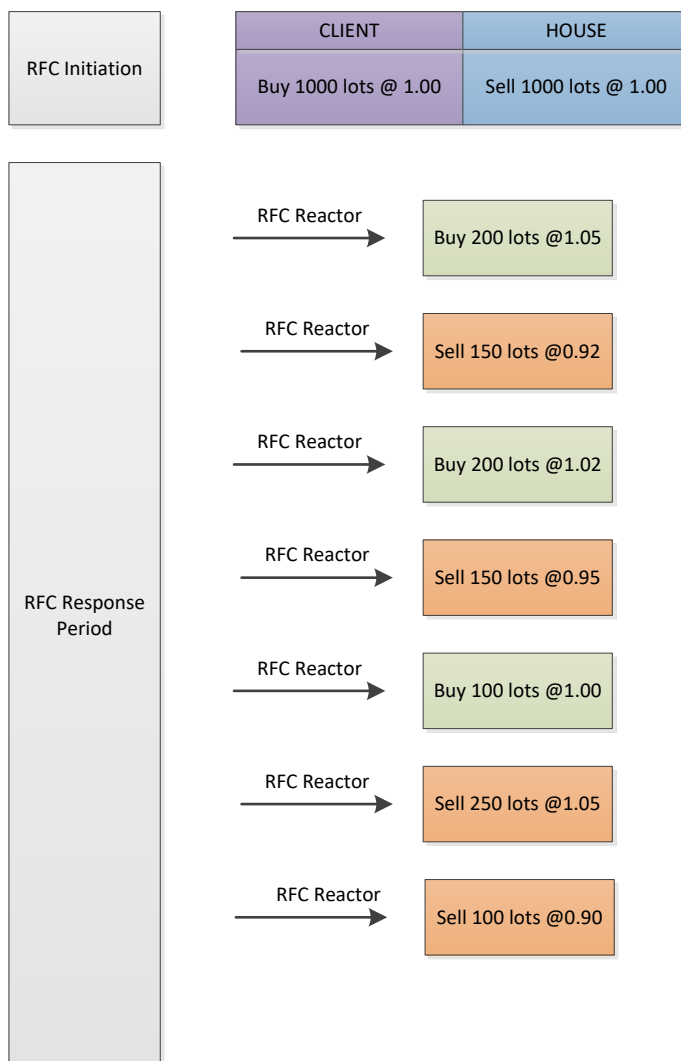
The following Order book is built:

- Buy side with one COB Order and three Reactors

- Sell side with four Reactors

These orders will not participate to the RFC since:
- **their Minimum Volume is less than the 'Reactor Minimum Volume' (100) AND/OR**
- **their price does not allow a matching**

2.7 RFC TRADING HOURS

RFCs are tradable during the standard trading hours from market opening of the contracts.

Before market close, UTP-D checks that all queued RFCs can effectively trade before market close. All RFCs with a Final Execution time post market close will be rejected.

If a contract goes into a Closed or Pre-Open session state during the RFC Response Period, the RFC process is immediately stopped. The RFC and the associated responses are cancelled. Moreover, queued RFCs in the contract are also cancelled.

Note that an additional optional parameter '**MbefCls**' available in the XML standing data files allows the setup of the number of minutes from market close from which the RFC submission would be deactivated. Similarly, another optional parameter '**DBefExp**' defines the number of days from expiry from which the RFC will no longer be available.

3   RFC EXAMPLES FOR FINANCIAL DERIVATIVES

Example 1 : Client versus Non Client

- RFC pick up percentage : 60%

- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

- Pre Trade Transparency mode is On the contract.

- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000

Price limit checks are applicable to validate the RFC, including on delta price limit checks

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	1000	1.00	1.00	1000	MBR1 (Non Client)	01

The following responses are received in the following order during the RFC improvement period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR2 (Time stamp 02): Buy 100 lots @ € 0.90 No Market Data Sent

- 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.90 No Market Data Sent

- 3rd response n°03 of MBR4 (Time stamp 04): Buy 200 lots @ € 1.10 No Market Data Sent

- 4th response n°04 of MBR5 (Time stamp 05): Sell 1000 lots @ € 1.00 No Market Data Sent

- 5th response n°05 of MBR6 (Time stamp 06): Buy 850 lots @ € 1.00 No Market Data Sent

At the end of the response period, the following Market Update messages are sent just before improvement step 1 (there is no predefined order of publication) :

Update Type	Price	Quantity	Number of orders
74 = New Bid on Wholesale RFC	1.10	200	1
74 = New Bid on Wholesale RFC	1.00	850	1
74 = New Bid on Wholesale RFC	0.90	100	1
75 = New Offer on Wholesale RFC	0.90	150	1
75 = New Offer on Wholesale RFC	1.00	1000	1

Step 1: RFC Initiator Client Improvement

Once the RFC improvement period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
04	MBR4	200	1.10	0.90	150	MBR3	03
06	MBR6	850	1.00	1.00	1000	MBR5	05
02	MBR2	100	0.90				

The following transaction is executed with the cross:

■ First trade of 150 lots MBR3 @ € 0.90 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
01	MBR1 **(Client)**	850	1.00	1.00	1000	MBR1 **(Non Client)**	01

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
04	MBR4	200	1.10	0.90	0	MBR3	03
06	MBR6	850	1.00	1.00	1000	MBR5	05
02	MBR2	100	0.90				

Step 2: Execution of reactors at RFC Price with RFC Initiator Client

The following transaction is executed:

■ Second trade of 510 lots MBR5 @ € 1.00 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 850 * 60% = 510

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
01	MBR1 **(Client)**	340	1.00	1.00	1000	MBR1 **(Non Client)**	01

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
04	MBR4	200	1.10	1.00	490	MBR5	05
06	MBR6	850	1.00				
02	MBR2	100	0.90				

MatchQty possible for MBR1 (Non Client) with Reactor = 150 + 510 = 660

Step 3: RFC Initiator Non Client Improvement

- Third trade of 200 lots MBR4 @ € 1.10 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty)

- Forth trade of 460 lots MBR6 @ € 1.00 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	340	1.00	1.00	340	MBR1 (Non Client)	01

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
04	MBR4	0	1.10	1.00	490	MBR5	05
06	MBR6	390	1.00				
02	MBR2	100	0.90				

Step 4: Final Cross Execution

- Fifth trade of 340 lots MBR1 **(Client)** @ € 1.00 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	0	1.00	1.00	0	MBR1 (Non Client)	01

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
06	MBR6	390	1.00	1.00	490	MBR5	05
02	MBR2	100	0.90				

MatchQty possible for MBR6 with MBR5 = 390

Step 4: Uncrossing of the RFC Reactor book

- Sixth trade of 390 lots MBR6 @ € 1.00 with MBR5. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
06	MBR6	0	1.00	1.00	100	MBR5	05
02	MBR2	100	0.90				

Step 5: Cancellation of remaining orders

The following orders are cancelled:

- Order of 100 lots MBR2 @ € 0.90

- Order of 100 lots MBR5 @ € 1.00

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
~~02~~	~~MBR2~~	~~100~~	~~0.90~~	~~1.00~~	~~100~~	~~MBR5~~	~~05~~

Example 2 : Client versus Client

- RFC pick up percentage : 60%

- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

- Pre Trade Transparency mode is On the contract.

- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000

Price limit checks are applicable to validate the RFC, including on delta price limit checks

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
01	MBR1 (Client 1)	1000	1.00	1.00	1000	MBR1 (Client 2)	01

The following responses are received in the following order during the RFC improvement period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR3 (Time stamp 02): Sell 150 lots @ € 0.90 No Market Data Sent
- 2nd response n°02 of MBR4 (Time stamp 03): Buy 200 lots @ € 1.10 No Market Data Sent
- 3rd response n°03 of MBR5 (Time stamp 04): Sell 200 lots @ € 1.00 No Market Data Sent
- 4th response n°04 of MBR6 (Time stamp 05): Buy 850 lots @ € 1.00 No Market Data Sent

At the end of the response period, the following Market Update messages are sent just before improvement step 1 (there is no predefined order of publication) :

Update Type	Price	Quantity	Number of orders
74 = New Bid on Wholesale RFC	1.10	200	1
74 = New Bid on Wholesale RFC	1.00	850	1
75 = New Offer on Wholesale RFC	0.90	150	1
75 = New Offer on Wholesale RFC	1.00	200	1

Step 1: RFC Initiator Client 1 Improvement

Once the RFC improvement period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

Time Stamp	Firm	Quantity	Price	Bid Ask Price	Quantity	Firm	Time stamps
03	MBR4	200	1.10	0.90	150	MBR3	02
05	MBR6	850	1.00	1.00	200	MBR5	04

Min total reactor Qty = min (850, 350) = 350 so we start with side 'Ask'

The following transaction is executed with the cross:

■ First trade of 150 lots MBR3 @ € 0.90 with MBR1 **(Client 1)**. Market Update sent with update type= 56 (with price and qty)

Time Stamp	Firm	Quantity	Price	Bid Ask Price	Quantity	Firm	Time stamps
01	MBR1 (Client 1)	850	1.00	1.00	1000	MBR1 (Client 2)	01

Time Stamp	Firm	Quantity	Price	Bid Ask Price	Quantity	Firm	Time stamps
03	MBR4	200	1.10	0.90	0	MBR3	02
05	MBR6	850	1.00	1.00	200	MBR5	04

Step 2: Execution of reactors at RFC Price with RFC Initiator Client 1

The following transaction is executed:

■ Second trade of 200 lots MBR5 @ € 1.00 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 850 * 60% = 510

Time Stamp	Firm	Quantity	Price	Bid Ask Price	Quantity	Firm	Time stamps
01	MBR1 (Client 1)	650	1.00	1.00	1000	MBR1 (Client 2)	01

Time Stamp	Firm	Quantity	Price	Bid Ask Price	Quantity	Firm	Time stamps
03	MBR4	200	1.10	0.90	0	MBR3	02
05	MBR6	850	1.00				

MatchQty possible for MBR1 (Client 2) with Reactor = 150 + 200 = 350 which is the same quantity than for Client 1

Step 3: RFC Initiator Client 2 Improvement

- Third trade of 200 lots MBR4 @ € 1.10 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty)

- Forth trade of 150 lots MBR6 @ € 1.00 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
01	MBR1 (Client 1)	650	1.00	1.00	650	MBR1 (Client 2)	01

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
03	MBR4	0	1.10				
05	MBR6	700	1.00				

Step 4: Final Cross Execution

- Fifth trade of 650 lots MBR1 Client 1 @ € 1.00 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
01	MBR1 (Client 1)	0	1.00	1.00	0	MBR1 (Client 2)	01

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
05	MBR6	700	1.00				

Step 4: Uncrossing of the RFC Reactor book

This step is triggered only in the case where the RFC Reactor book is crossed. In this example, the RFC Reactor book is uncrossed.

Step 5: Cancellation of remaining orders

The following orders are cancelled:

- Order of 100 lots MBR2 @ € 0.90

- Order of 100 lots MBR5 @ € 1.00

Time Stamp	Firm	Quantity	Price	Bid	Ask Price	Quantity	Firm	Time stamps
05	MBR6	700	1.00					

Example 3: Non Client versus Non Client

- RFC pick up percentage : 25%

- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

- Price and quantity is published

- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000

Price limit checks are applicable to validate the RFC, including on delta price limit checks

Time Stamp	Firm	Quantity	Price	Bid	Ask Price	Quantity	Firm	Time stamps
01	MBR1	1000	1.00		1.00	1000	MBR1	01

- The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.
  - 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90 No Market Data Sent
  - 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92 No Market Data Sent
  - 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00 No Market Data Sent
  - 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02 No Market Data Sent
  - 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05 No Market Data Sent
  - 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05 No Market Data Sent
  - 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00 No Market Data Sent
  - 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95 No Market Data Sent
  - 9th response n°09 of MBR8 (Time stamp 10) cancels previous order No Market Data Sent
  - 10th response n°10 of MBR8 (Time stamp 11): Buy 150 lots @ € 1.10 No Market Data Sent

At the end of the Response Period, the following Market Update messages are sent just before step 1 (there is no predefined order of publication) :

Update Type	Price	Quantity	Number of orders
74 = New Bid on Wholesale RFC	1.10	150	1
74 = New Bid on Wholesale RFC	1.05	200	1
74 = New Bid on Wholesale RFC	1.02	200	1
74 = New Bid on Wholesale RFC	1.00	100	1
75 = New Offer on Wholesale RFC	0.90	100	1
75 = New Offer on Wholesale RFC	0.92	150	1

75 = New Offer on Wholesale RFC	0.95	150	1
75 = New Offer on Wholesale RFC	1.05	250	1

Step 1: RFC Initiator Improvement

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
11	MBR8	150	1.10	0.90	100	MBR2	02
06	MBR6	200	1.05	0.92	150	MBR3	03
05	MBR5	200	1.02	0.95	150	MBR9	09
04	MBR4	100	1.00	1.05	250	MBR7	07

The following transactions are executed with the cross:

- First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty)

- Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty).

- Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty).

- Fourth trade of 150 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty).

- Fifth trade of 200 lots MBR6 @ € 1.05. Market Update sent with update type= 56 (with price and qty).

- Sixth trade of 200 lots MBR5 @ € 1.02. Market Update sent with update type= 56 (with price and qty).

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
04	MBR4	100	1.00	1.05	250	MBR7	07

Step 2: Execution of reactors at RFC Price

The following transaction is executed:

- Seventh trade of 100 lots MBR4 @ € 1.00. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 450 * 25% = 112.5

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1	600			350	MBR1	01

Step 3: Final Cross Execution

The following transaction is executed with the cross:

■ Eighth trade of 350 lots @ € 1.00. Market Update sent with update type= 56 (with price and qty).

The following is cancelled:

■ Unfilled MBR1 order for the remaining quantity of Buy 250 lots @ € 1.00. No Market Update Sent

Step 4: Uncrossing of the RFC Reactor book

This step is triggered only in the case where the RFC Reactor book is crossed. In this example, the RFC Reactor book is uncrossed.

Step 5: Cancellation of remaining reactors responses

The following transaction is cancelled.

■ Order of 250 lots MBR7 @ € 1.05

Market Update Sent with Update Type = 78: Clear Wholesale RFC

Example 4: Non Client versus Non Client

■ RFC pick up percentage : 25%

■ MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

■ Price and quantity is published

■ A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000

■ Price limit checks are applicable to validate the RFC, including on delta price limit checks

			Bid	**Ask**			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
01	MBR1	1000	1.00	1.00	1000	MBR1	01

■ The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.
  – 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90. No Market Data Sent.
  – 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92. No Market Data Sent.
  – 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00. No Market Data Sent.
  – 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02. No Market Data Sent.
  – 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05. No Market Data Sent.
  – 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05. No Market Data Sent.
  – 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00. No Market Data Sent.
  – 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95. No Market Data Sent.
  – 9th response n°09 of MBR8 (Time stamp 10) cancels previous order. No Market Data Sent.
  – 10th response n°10 of MBR8 (Time stamp 11): Buy 1100 lots @ € 1.10. No Market Data Sent.

At the end of the RFC Response Period, the following Market Update messages are sent just before step 1 (there is no predefined order of publication) :

Update Type	Price	Quantity	Number of orders
74 = New Bid on Wholesale RFC	1.10	1100	1
74 = New Bid on Wholesale RFC	1.05	200	1
74 = New Bid on Wholesale RFC	1.02	200	1
74 = New Bid on Wholesale RFC	1.00	100	1
75 = New Offer on Wholesale RFC	0.90	100	1
75 = New Offer on Wholesale RFC	0.92	150	1
75 = New Offer on Wholesale RFC	0.95	150	1
75 = New Offer on Wholesale RFC	1.05	250	1

Step 1: RFC Initiator Improvement

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses without the RFC initiator front loaded trade:

Time Stamp	Firm	Quantity	Bid Price	Ask Price	Quantity	Firm	Time stamps
11	MBR8	1100	1.10	0.90	100	MBR2	02
06	MBR6	200	1.05	0.92	150	MBR3	03
05	MBR5	200	1.02	0.95	150	MBR9	09
04	MBR4	100	1.00	1.05	250	MBR7	07

The following transactions are executed with the cross:

- First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty)

- Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty)

- Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty)

- Fourth trade of 1000 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty)

Time Stamp	Firm	Quantity	Bid Price	Ask Price	Quantity	Firm	Time stamps
11	MBR8	100	1.10	1.05	250	MBR7	07
06	MBR6	200	1.05				
05	MBR5	200	1.02				
04	MBR4	100	1.00				

Step 2: Execution of reactors at RFC Price

No trade to be executed since the RFC Initiator residual quantity after all price improvements have been executed is zero.

Step 3: Final Cross Execution

The following is cancelled with the cross:

- Unfilled MBR1 order for the remaining quantity of Buy 600 lots @ € 1.00 No Market Update Sent

Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
			Bid	**Ask**			
11	MBR8	100	1.10	1.05	250	MBR7	07
06	MBR6	200	1.05				
05	MBR5	200	1.02				
04	MBR4	100	1.00				

Step 4: Uncrossing of the RFC Reactor book

The following transactions are executed since the reactors' book is crossed:

- Sixth trade of 100 lots @ € 1.10 where MBR8 order matches fully for 100 lots @ € 1.10 with MBR7. MBR7 order remains for Sell 150 lots @ € 1.05 Market Update sent with update type= 56 (with price and qty)

- Seventh trade of 150 lots MBR6 @ € 1.05 Market Update sent with update type= 56 (with price and qty)

Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
			Bid	**Ask**			
06	MBR6	50	1.05				
05	MBR5	200	1.02				
04	MBR4	100	1.00				

Step5: Cancellation of remaining reactors responses

The following orders are cancelled:

- Order of 50 lots MBR6 @ € 1.05

- Order of 200 lots MBR5 @ € 1.02

- Order of 100 lots MBR4 @ € 1.00

Market Update Sent with Update Type = 78: Clear Wholesale RFC.

Example 5: Client versus Non Client with COB

- RFC pick up percentage : 60%

- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

- Pre Trade Transparency mode is On the contract.

- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000

Price limit checks are applicable to validate the RFC, including on delta price limit checks

Time Stamp	Firm	Quantity	Price **Bid**	**Ask** Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	1000	1.00	1.00	1000	MBR1 (Non Client)	01

The following responses are received in the following order during the RFC improvement period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR2 (Time stamp 02): Buy 100 lots @ € 0.90 No Market Data Sent

- 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.90 No Market Data Sent

- 3rd response n°03 of MBR5 (Time stamp 05): Sell 1000 lots @ € 1.00 No Market Data Sent

- 4th response n°04 of MBR6 (Time stamp 06): Buy 850 lots @ € 1.00 No Market Data Sent

At the end of the response period, the **Central Order Book** of the same series as the RFC is as follows:

Time Stamp	Firm	Quantity	Price **Bid**	**Ask** Price	Quantity	Firm	Time stamps
04	MBR-D	200	1.10	1.50	90	MBR-C	03
06	MBR-F	50	0.80	1.60	80	MBR-E	05
02	MBR-B	70	0.70	1.70	50	MBR-G	07
01	MBR-A	90	0.60				

The orders marked red will not participate in the RFC because their minimum volume is less than the 'Reactor Minimum Volume', which is 100 in this example, and/or their price does not allow to match with the RFC Initiator.

At the end of the response period, the following Market Update messages are sent just before improvement step 1 (there is no predefined order of publication) :

Update Type	Price	Quantity	Number of orders	Flag
74 = New Bid on Wholesale RFC	1.00	850	1	
74 = New Bid on Wholesale RFC	0.90	100	1	
75 = New Offer on Wholesale RFC	0.90	150	1	

75 = New Offer on Wholesale RFC	1.00	1000	1	

Step 1: RFC Initiator Client Improvement

Once the RFC improvement period is finished, the following order book is built based on accepted reactors responses and COB orders, without the RFC initiator trade:

Time Stamp	Firm	Quantity	Price	Bid	Ask			
					Price	Quantity	Firm	Time stamps
04	MBR-D	200	1.10		0.90	150	MBR3	03
06	MBR6	850	1.00		1.00	1000	MBR5	05
02	MBR2	100	0.90					

The following transaction is executed with the cross:

■ First trade of 150 lots MBR3 @ € 0.90 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty)

Time Stamp	Firm	Quantity	Price	Bid	Ask			
					Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	850	1.00		1.00	1000	MBR1 (Non Client)	01

Time Stamp	Firm	Quantity	Price	Bid	Ask			
					Price	Quantity	Firm	Time stamps
04	MBR-D	200	1.10		0.90	0	MBR3	03
06	MBR6	850	1.00		1.00	1000	MBR5	05
02	MBR2	100	0.90					

Step 2: Execution of reactors with RFC Initiator Client side at RFC Price

The following transaction is executed:

■ Second trade of 510 lots MBR5 @ € 1.00 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 850 * 60% = 510

Time Stamp	Firm	Quantity	Price	Bid	Ask			
					Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	340	1.00		1.00	1000	MBR1 (Non Client)	01

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
04	MBR-D	200	1.10	1.00	490	MBR5	05
06	MBR6	850	1.00				
02	MBR2	100	0.90				

MatchQty possible for MBR1 (Non Client) with Reactor = 150 + 510 = 660

Step 3: RFC Initiator Non Client Improvement and/or execution at RFC price with reactors

- Third trade of 200 lots MBR-D @ € 1.10 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty)

- Forth trade of 460 lots MBR6 @ € 1.00 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	340	1.00	1.00	340	MBR1 (Non Client)	01

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
04	MBR-D	0	1.10	1.00	490	MBR5	05
06	MBR6	390	1.00				
02	MBR2	100	0.90				

Step 4: Final Cross Execution

- Fifth trade of 340 lots MBR1 **(Client)** @ € 1.00 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1 (Client)	0	1.00	1.00	0	MBR1 (Non Client)	01

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
06	MBR6	390	1.00	1.00	490	MBR5	05
02	MBR2	100	0.90				

MatchQty possible for MBR6 with MBR5 = 390

Step 5: Uncrossing of the RFC Reactor book

- Sixth trade of 390 lots MBR6 @ € 1.00 with MBR5. Market Update sent with update type= 56 (with price and qty)

Time Stamp	Firm	Quantity	Price	Bid / Ask Price	Quantity	Firm	Time stamps
06	MBR6	0	1.00	1.00	100	MBR5	05
02	MBR2	100	0.90				

Step 6: Cancellation of all remaining reactor orders

The following orders are cancelled:

- Order of 100 lots MBR2 @ € 0.90

- Order of 100 lots MBR5 @ € 1.00

Time Stamp	Firm	Quantity	Price	Bid / Ask Price	Quantity	Firm	Time stamps
~~02~~	~~MBR2~~	~~100~~	~~0.90~~	~~1.00~~	~~100~~	~~MBR5~~	~~05~~

4   RFC EXAMPLES FOR COMMODITIES

Example 1

- RFC pick up percentage : 25%

- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

- A Market Update message is sent to participants with update type = 26 without price and quantity

Price limit checks are applicable to validate the RFC, including on delta price limit checks

Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
		Bid		**Ask**			
01	MBR1	1000	1.00	1.00	1000	MBR1	01

- The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.
  - 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90 No Market Data Sent
  - 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92 No Market Data Sent
  - 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00 No Market Data Sent
  - 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02 No Market Data Sent
  - 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05 No Market Data Sent
  - 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05 No Market Data Sent
  - 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00 No Market Data Sent
  - 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95 No Market Data Sent
  - 9th response n°09 of MBR8 (Time stamp 10) cancels previous order No Market Data Sent
  - 10th response n°10 of MBR8 (Time stamp 11): Buy 150 lots @ € 1.10 No Market Data Sent

Step 1: RFC Initiator Improvement

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
		Bid		**Ask**			
11	MBR8	150	1.10	0.90	100	MBR2	02
06	MBR6	200	1.05	0.92	150	MBR3	03
05	MBR5	200	1.02	0.95	150	MBR9	09
04	MBR4	100	1.00	1.05	250	MBR7	07

The following transactions are executed with the cross:

- First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty)

- Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty).

- Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty).
- Fourth trade of 150 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty).
- Fifth trade of 200 lots MBR6 @ € 1.05. Market Update sent with update type= 56 (with price and qty).
- Sixth trade of 200 lots MBR5 @ € 1.02. Market Update sent with update type= 56 (with price and qty).

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
04	MBR4	100	1.00	1.05	250	MBR7	07

Step 2: Execution of reactors at RFC Price

The following transaction is executed:

- Seventh trade of 100 lots MBR4 @ € 1.00. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 450 * 25% = 112.5

			Bid	Ask			
Time Stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamps
01	MBR1	600			350	MBR1	01

Step 3: Final Cross Execution

The following transaction is executed with the cross:

- Eighth trade of 350 lots @ € 1.00. Market Update sent with update type= 56 (with price and qty).

The following is cancelled:

- Unfilled MBR1 order for the remaining quantity of Buy 250 lots @ € 1.00. No Market Update Sent

Step 4: Uncrossing of the RFC Reactor book

This step is triggered only in the case where the RFC Reactor book is crossed. In this example, the RFC Reactor book is uncrossed.

Step 5: Cancellation of remaining reactors responses

The following transaction is cancelled.

- Order of 250 lots MBR7 @ € 1.05

Market Update Sent with Update Type = 78: Clear Wholesale RFC

Example 2

- RFC pick up percentage : 25%
- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.
- A Market Update message is sent to participants with update type = 26 without price and quantity.

■ Price limit checks are applicable to validate the RFC, including on delta price limit checks

Time Stamp	Firm	Quantity	Price	Bid	Ask Price	Quantity	Firm	Time stamps
01	MBR1	1000	1.00		1.00	1000	MBR1	01

■ The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.
  – 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90. No Market Data Sent.
  – 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92. No Market Data Sent.
  – 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00. No Market Data Sent.
  – 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02. No Market Data Sent.
  – 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05. No Market Data Sent.
  – 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05. No Market Data Sent.
  – 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00. No Market Data Sent.
  – 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95. No Market Data Sent.
  – 9th response n°09 of MBR8 (Time stamp 10) cancels previous order. No Market Data Sent.
  – 10th response n°10 of MBR8 (Time stamp 11): Buy 1100 lots @ € 1.10. No Market Data Sent.

Step 1: RFC Initiator Improvement

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses without the RFC initiator front loaded trade:

Time Stamp	Firm	Quantity	Price	Bid	Ask Price	Quantity	Firm	Time stamps
11	MBR8	1100	1.10		0.90	100	MBR2	02
06	MBR6	200	1.05		0.92	150	MBR3	03
05	MBR5	200	1.02		0.95	150	MBR9	09
04	MBR4	100	1.00		1.05	250	MBR7	07

The following transactions are executed with the cross:

■ First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty)

■ Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty)

■ Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty)

■ Fourth trade of 1000 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty)

Time Stamp	Firm	Quantity	Price	Bid	Ask Price	Quantity	Firm	Time stamps
11	MBR8	100	1.10		1.05	250	MBR7	07
06	MBR6	200	1.05					

05	MBR5	200	1.02				
04	MBR4	100	1.00				

Step 2: Execution of reactors at RFC Price

No trade to be executed since the RFC Initiator residual quantity after all price improvements have been executed is zero.

Step 3: Final Cross Execution

The following is cancelled with the cross:

- Unfilled MBR1 order for the remaining quantity of Buy 600 lots @ € 1.00 No Market Update Sent

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
11	MBR8	100	1.10	1.05	250	MBR7	07
06	MBR6	200	1.05				
05	MBR5	200	1.02				
04	MBR4	100	1.00				

Step 4: Uncrossing of the RFC Reactor book

The following transactions are executed since the reactors' book is crossed:

- Sixth trade of 100 lots @ € 1.10 where MBR8 order matches fully for 100 lots @ € 1.10 with MBR7. MBR7 order remains for Sell 150 lots @ € 1.05 Market Update sent with update type= 56 (with price and qty)

- Seventh trade of 150 lots MBR6 @ € 1.05 Market Update sent with update type= 56 (with price and qty)

			Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamps**
06	MBR6	50	1.05				
05	MBR5	200	1.02				
04	MBR4	100	1.00				

Step5: Cancellation of remaining reactors responses

The following orders are cancelled:

- Order of 50 lots MBR6 @ € 1.05

- Order of 200 lots MBR5 @ € 1.02

- Order of 100 lots MBR4 @ € 1.00

Market Update Sent with Update Type = 78: Clear Wholesale RFC.