X-pand into the Future

e u r e x *circular 144/06*

Date: Frankfurt, June 28, 2006
Recipients: All Eurex members and vendors
Authorized by: Jürg Spillmann

Action Required

Eurex Release 8.0: Publication of Round Trip Times

Contact: Technical Helpdesk, tel. +49-69-211-1 12 00.

Content may be most important for:	**Attachments:**
➲ IT / System Administration	1. Example for the Provision of Round Trip Times 2. Performance Tuning Guideline

Speed in trading is a key factor of the Eurex® system which is becoming increasingly important for Eurex members. To provide Eurex customers with the opportunity to check processing times of their order and quote transactions, Eurex will make customers individual transaction round trip times available via internet from **July 3, 2006** onwards.

Round trip times will be available via the “Eurex Technical Connection Monitor” in the Member Section of the Eurex website. The section can be accessed by means of CC-Login and Password provided by your Central Coordinator.

The overview will provide individual average round trip times and volumes of futures and options messages for each single MISS on the last trading day. Also, values of the best and worst MISS connected to the same Access Point half is shown for information.

A more detailed description of the data provided on the internet page is contained in attachment 1.

Attachment 2 is a “Performance Tuning Guideline”, which contains recommendations for possible performance improvements.

Should you require any further details, please do not hesitate to contact the Technical Helpdesk at tel. +49-69-211-1 12 00.

Eurex Deutschland
D-60485 Frankfurt am Main
www.eurexchange.com

Customer Support
Tel. +49-69-211-1 17 00
Fax +49-69-211-1 17 01

Board of Management:
Daniel Gisler, Thomas Lenz,
Andreas Preuß, Peter Reitz,
Jürg Spillmann

Attachment 1 to Eurex-Circular 144/06

Example for the Provision of Round Trip Times

Illustration

Date and time			Own values				Comparative values per CS			
2006-04-18 8:00-22:00			Futures messages		Options messages		Futures average time		Options average time	
Member	MISS	CS	MS count	MS ave time[ms]	MS count	MS ave time[ms]	MS best [ms]	MS worst [ms]	MS best [ms]	MS worst [ms]
ABCDE	0101	0536-FRA	12525	74	40578	56	62	132	39	146
ABCDE	0102	0538-FRA	9852	76	35427	83	46	120	45	121
ABCDE	0103	0532-LON	2675	44	22642	87	44	139	47	145
ABCDE	0104	0534-LON	3351	52	1215	143	47	127	53	143

Legend

Static data

Date	Date of data collection and measurement
Time	Duration of data collection and measurement
Member	Eurex Member Identification
MISS	MISS Identification
CS	Access Point half the MISS is connected to

Own values	***Data for each member MISS and Access Point half***
Futures messages – MS count	Number of orders and quotes in futures per day [MISS-Backend-MISS]
Futures messages – MS ave time [ms]	Average Round Trip Time of order and quote transactions in futures [MISS-Backend-MISS] in milliseconds
Options messages – MS count	Number of orders and quotes in options per day [MISS-Backend-MISS]
Options messages – MS ave time [ms]	Average Round Trip Time of order and quote transactions in options [MISS-Backend-MISS] in milliseconds
Comparative values per CS	***Data for best/worst MISS on the Access Point half with 1000 or more transactions***
Futures average time – MS best [ms]	Best MISS: Average Round Trip Time of order and quote transactions in futures [MISS-Backend-MISS] in milliseconds

Futures average time – MS worst [ms]	Worst MISS: Average Round Trip Time of order and quote transactions in futures [MISS-Backend-MISS] in milliseconds
Options average time – MS best [ms]	Best MISS: Average Round Trip Time of order and quote transactions in options [MISS-Backend-MISS] in milliseconds
Options average time – MS worst [ms]	Worst MISS: Average Round Trip Time of order and quote transactions in options [MISS-Backend-MISS] in milliseconds

DEUTSCHE BÖRSE SYSTEMS

Performance Tuning Guidelines

In conjunction with the Eurex® Performance Initiative, please find below recommendations from the Technical Helpdesk which describe measures to improve overall performance and round trip times (RTTs) on Eurex® customer front end installations. Round trip time in this context designates the time needed for any given transaction (e.g. order add) to complete the round trip between the Eurex® MISS and back end including back end processing time.
Section 1 of this document provides core recommendations, while section 2 offers further optional proposals which may require additional resource allocation.

Section 1 – Core Recommendations

1. Place an even number of MISSes into a MISS group.

   The Eurex® back end splits the delivery of broadcast data across all MISSes in a group. This splitting is more effective with an even-numbered MISS group configuration (per installation) leading to a more equally balanced bandwidth utilization.

2. Create MISS groups dedicated to broadcast and MISS groups dedicated to request/response.

   This separation of data leads to more efficient bandwidth utilization. Please refer to Appendix A.

3. Subscribe each broadcast stream only once per installation to avoid duplicate network traffic.

   When using more than one MISS group per installation, only one MISS group should receive broadcast streams and share this information with the other MISS groups in the LAN. This leads to lower overall bandwidth utilization, as each broadcast stream will only be sent once via the Eurex® connections. Please refer to Appendix A.

As an alternative configuration with lower complexity, larger MISS groups (>2 MISSes) can be used to avoid duplicate broadcast subscriptions.

4. Exclude functionally non-essential broadcast subgroups from the Eurex® Public Inside Market broadcast stream.

   The Eurex® broadcast exclusion feature allows the exclusion of product groups from the public broadcast data. This will lower the overall bandwidth utilization.

   Detailed information on the Eurex® broadcast exclusion list feature and product assignments can be found in section 6.4 “Broadcast Exclusion File eurexexclist.dat" in the "Eurex Front End Operations Guide". The respective information has been included in Appendix B.

5. Implement flat 100 Mbit/s full duplex LAN.

   To provide a robust and efficient transport in the LAN, it should be ensured that all components in the LAN are running at a minimum of 100 Mbit/s in full duplex mode.

6. Avoid usage of the auto-negotiation feature.

   The speed and duplex mode should be set on all LAN components to avoid network interface configuration errors.

7. Avoid firewalls between exchange routers and MISSes.

   As described in the document “Common MISS Based Front End Technical Overview”, the use of firewalls between MISSes and the exchange routers is not recommended and introduces additional latency.

8. Evenly allocate Workstations to MISSes.

   The number of Workstations allocated to each MISS should be balanced by configuring the "Primary MISS position" parameter. Please refer to Appendix C.

9. Ensure optimal network configuration and traffic separation.

   Networks components should be configured for optimal performance. One example would involve not changing the router default for the fair-queue feature.
   The trading network should be separated from other networks in the LAN and from data traffic generated by other applications.

Section 2 – Optional Proposals

1. Use MISSes for specific product ranges; add further MISSes if necessary.

   The dedicated use of MISSes per product range, e.g. for futures or options, allows a MISS resource allocation adapted to product-specific requirements.

2. Use one Eurex® network connection per MISS, i.e. order further connection-pairs if necessary.

   As an enhancement to point 1 above, a dedicated Eurex® network connection should be used per MISS for maximum bandwidth availability.

3. Upgrade Eurex connection type to Multi-Channel.

   The Multi-Channel option can be used to increase the standard bandwidth of a Eurex® connection from 256 Kbit/s to 2 x 256 Kbit/s or 4 x 256 Kbit/s. For ordering details please refer to Appendix D.

4. Avoid firewalls between MISSes and Workstations.

   Please refer to section 1, point 7.

5. VALUES applications should employ techniques to minimize network traffic generation:

   (a) If available, broadcast data should be utilized for public price reception instead of repeated “Inquire Inside Market” and “Inquire Market Depth” application requests.

   (b) For entering and deleting mass-quotes the “suppQuoConfInd” field should be used where appropriate. For details please refer to Appendix E.

DEUTSCHE BÖRSE SYSTEMS

Appendix A

Example of broadcast sharing across MISS groups.

The following scenarios use the following example naming convention:

MISS Group	LAN Name	WAN Name	Logical Device ID	MISS Group ID
MISS Group 1	MISS1	EMMISS1	3460	R
	MISS2	EMMISS2	3461	
MISS Group 2	MISS3	EMMISS3	5340	E
	MISS4	EMMISS4	5341	

Scenario: One installation comprising 4 MISSes in 2 MISS groups and 2 Eurex® connections. Both MISS groups subscribe to all available broadcast streams, therefore the Eurex® broadcast data (public and private) is being delivered twice over the 2 Eurex® connections.

Aim: One MISS group will receive all of the broadcast data and the second MISS group will be used to manage the request/response data. In this configuration, the member will receive broadcast data only once from Eurex®, with this data then being shared between the 2 MISS groups across the LAN.

MISS group 1 (3460 & 3461), will subscribe to all broadcast streams (recoverable and unreliable). On these MISSes, the recoverable streams are stored in the ROB log files – these MISSes will therefore be configured to provide the Eurex® Retransmission Xervice. This MISS group will be assigned the MISS group ID “R”.
MISS group 2 (5340 & 5341), will not subscribe to any broadcast stream (the eurexsublist.dat is empty). This MISS group will be assigned the MISS group ID “E”.

DEUTSCHE BÖRSE SYSTEMS

The following extracts show only the relevant sections within the *.ini files which need to be updated in order to achieve our aim:

I. Configmbr.ini

```
[MISS] [1]
;LAN hostname,  logicalDevideId (1 -  9999),   primaryMissPosition
MISS1, 3460, 1
MISS2, 3461, 2
MISS3, 5340, 3
MISS4, 5341, 4

[Workstation] [2]
; LAN hostname,  logicalDeviceId (20000 - 29999),  primaryMissPosition, [opt. computer name]
ws2k1, 21001, 3
ws2k2, 21002, 4
winxp1, 21003, 3
winxp2, 21004, 4

[MulticastGroups] [3]
; multicast address, index
239.255.30.3, 1

[RepublisherInLan] [4]
; logical deviceId 1, logical deviceId 2, ..., logical deviceId
3460, 3461, 5340, 5341

[SECURITY.Misses] [5]
MISS1,
MISS2,
MISS3,
MISS4,
```

[1] All 4 MISSes must be registered here (even though they are not in the same MISS group).

[2] Only MISSes MISS3 and MISS4 are used as primary MISSes (request/response load balancing) as they are listed on position 3 and 4 in the respective MISS sections; please refer also to Appendix C.

[3] If Xetra or EurexUS is also installed on these MISSes, the respective Multicast Addresses for these markets need to be taken into account.

[4] All 4 MISS logical device IDs must be listed here.

[5] All 4 MISSes must be listed here.

Please note: The configmbr.ini file should be copied to all MISSes and Workstations.

DEUTSCHE BÖRSE SYSTEMS

II. EUREXmbr.ini

```
[EUREX.Misses] [1]
MISS1,
MISS2,
MISS3,
MISS4,

[EUREX.WanHostNames] [2]
; WAN hostname, deviceId
EMMISS1, 3460,
EMMISS2, 3461,
EMMISS3, 5340,
EMMISS4, 5341,

[EUREX_RETRANSMISSION.Misses] [3]
MISS1,
MISS2,

[EUREX_BROADCAST_SERVER]
MissGroupId=R [4]

[EUREX.StreamGroups]
; enter stream types and assign a valid multicast index
; multicast index must be defined in configmbr.ini
1,1
2,1
[...]
22, 1
```

[1] All 4 MISS LAN names must be listed here (even though they are not in the same MISS group).

[2] All 4 MISS WAN names must be listed here.

[3] List only LAN names of MISSes 3460 & 3461.

[4] The MISS group ID must be unique for each MISS Group **(for MISS group 2, this must read "MissGroupId=E")**.

Please note: As there is a difference in the MISSGroupId, the correct EUREXmbr.ini should be copied to the corresponding MISSes and Workstations in the MISS group.

DEUTSCHE BÖRSE SYSTEMS

III. eurexsublist.dat (using member ID ABCDE)

This file should be updated only on MISS 3460 & 3461.

```
ABCDEA
ABCDEB
ABCDEC
ABCDED
ABCDEE
ABCDEF
ABCDES
ABCDET
ABCDEU
ABCDEV
ABCDEW
XXXXXX
XXXXXF
```

On MISSes 5340 & 5341, the eurexsublist.dat file MUST be empty as it has no subscriptions (but the file must exist nonetheless).

The MISSes 3460 & 3461 (broadcast MISS group) should be scheduled to start first, followed by the MISSes 5340 & 5341 (request/response MISS group).

DEUTSCHE BÖRSE SYSTEMS

Appendix B

Broadcast Exclusion File eurexexclist.dat

The streams X ("Public Inside Market") and T ("Single Leg Quote Confirmation broadcast stream") are split into smaller broadcast stream groups. Each broadcast stream group relates to a specific group of Eurex® products. The exclusion file eurexexclist.dat allows excluding specific broadcast stream groups from the subscription specified in the sublist.dat. This will further increase the overall performance and minimize network congestion.
Broadcast stream groups are defined by Market Supervision and are subject to change after due announcement. Broadcast stream groups are identified by a one-letter code, the "short group name". The current broadcast stream group definitions are encoded in the ref.dat file of the Eurex® MISS. By default the exclusion list is empty, i.e. by default no broadcast stream group is excluded.
The exclusion list is configured via the Configuration utility or a text editor. A valid ref.dat is a prerequisite. Since the distribution of the subscribed broadcast streams is dynamically balanced between the MISSes of a MISS group, all MISSes of the group have to use the same subscription and exclusion list. Currently the following broadcast stream groups are defined:

- Eurex® Public Inside Market (X) & Private Single Leg Quote Confirmation (T) stream:

Groups	Interest Rate Futures & Options incl. Money Market	EEX	German Index Products	Supra-national Index Products	German Equity Products	Swiss Index & Equity Products	Other Products (HEX, Europe, USA)	Dutch Products	Futures
Short Group Names	A	B	C	D	E	F	G	H	Z
Share in X-stream*	0,9 %	0,1 %	9,5 %	5,2 %	32,5 %	14,6 %	13,0 %	7,5 %	13,0 %

- Ticker stream:

Groups	All current Ticker data	Reserved for future use
Short Group Names	1	2-9
Share in X-stream*	3,7 %	n/a

The broadcast exclusion list (eurexexclist.dat) consists of one exclusion entry per line, each line being a concatenation of Member name, Stream name and Short Group name.

Example:
ABCDE**XA** -> exclude "Interest Rate Futures & Options incl. Money Market" stream group "**A**" from the Public Inside Market broadcast ("**X**")

* *indicative snapshot of May, 2006*

DEUTSCHE BÖRSE SYSTEMS

Appendix C

Static load balancing using the primaryMissPosition parameter

Within the configmbr.ini the primaryMissPosition parameter has to be specified in the MISS and Workstation section for each MISS and Workstation. The parameter defines, which MISS is to be primarily used for the GATE Security Xervice and the exchange specific Xervices (in case of Eurex®: the Eurex and the Eurex Retransmission Xervice) for the respective GATE client processes of a given MISS or Workstation. In case the respective primary MISS is not able to provide the requested Xervice, the other configured MISSes are tried.

Please note: The "primaryMissPosition" parameter in the MISS section of the configmbr.ini does not designate, but rather defines, which primary MISS is to be used in the case that a MISS is acting as a GATE client (i.e. running a VALUES application locally).

The MISS positions are designated for each Xervice by the order of the MISSes listed in the respective MISS section; the "SECURITY.Misses" section in case of the GATE Security Xervice, the "EUREX.Misses" section in case of the Eurex Xervice and the "EUREX_RETRANSMISSION.Misses" section in case of the Eurex Retransmission Xervice.

Please note: To avoid unnecessary re-routing of transactions each MISS should be configured to use itself as a primary MISS.

For Workstations with comparable transaction load the "primaryMissPosition" should be evenly distributed across the available MISSes in a MISS group. If the transaction load is significantly different between Workstations, this should be accounted for in the "primaryMissPosition" configuration. To determine the Workstation transaction load, the transaction counter can be utilized. For details please refer to section "5.4 Transaction Counter" in the "Gate 3.4 Front End Operations Guide".

Example:

The following configmbr.ini and EUREXmbr.ini extracts show an example static load balancing configuration:

DEUTSCHE BÖRSE SYSTEMS

I. Configmbr.ini

```
[MISS] [1]
;LAN hostname,  logicalDevideId (1 -  9999),   primaryMissPosition
MISS1, 3460, 1
MISS2, 3461, 2

[Workstation] [2]
; LAN hostname,  logicalDeviceId (20000 - 29999),  primaryMissPosition, [opt. computer name]
ws2k1, 21001, 1
ws2k2, 21002, 2

[SECURITY.Misses] [3]
MISS1,
MISS2,
```

[1] MISS1 has been configured to **use** the MISS on position 1 for it's GATE client functionality (this is resolved to MISS1 for the Security, Eurex and Eurex Retransmission Xervice – see below); MISS2 has been configured to **use** the MISS on position 2.

[2] Workstation ws2k1 has been configured to **use** the MISS on position 1 for it's GATE client functionality; Workstation ws2k2 has been configured to **use** the MISS on position 2.

[3] MISS1 is **designated** as the MISS on position 1 for the Security Xervice (which validates the first login of VALUES applications (VCI_CONNECT)); MISS2 is **designated** as the MISS on position 2 for the Security Xervice.

II. EUREXmbr.ini

```
[EUREX.Misses] [1]
MISS1,
MISS2,

[EUREX_RETRANSMISSION.Misses] [2]
MISS1,
MISS2,
```

[1] MISS1 is **designated** as the MISS on position 1 for the Eurex Xervice; MISS2 is **designated** as the MISS on position 2 for the Eurex Xervice.

[2] MISS1 is **designated** as the MISS on position 1 for the Eurex Retransmission Xervice; MISS2 is **designated** as the MISS on position 2 for the Eurex Retransmission Xervice.

DEUTSCHE BÖRSE SYSTEMS

Appendix D

Eurex Multi-Channel connection type

The ordering details for the Multi-Channel connection type can be found on the official Eurex website – "Member section" – "FWB Equity Clearing Forms" – "Technical" – "Connection" – "Eurex-Access Order Form: Order/ Cancellation".

Direct link to the order form:

https://www.eurexchange.com/members/download/derivativesforms/EUREX_Access_Order_Cancellation_Form_04_06_d_e.pdf

For further information please contact the Eurex Technical Member Readiness (TMR) department:

+49-(0) 69-2 11-1 17 10
+49-(0) 69-2 11-1 17 11

tmr@deutsche-boerse.com

DEUTSCHE BÖRSE SYSTEMS

Appendix E

Suppress Quote Confirmation Flag

If the suppress quote confirmation flag, “suppQuoConfInd”, is set to “EXCH_CONST_YES” for the “Enter Mass Quote” application request, then no quote confirmation broadcasts will be sent for all quotes which are not matched immediately. Thus, high-volume quote machines can achieve significant backend-to-MISS bandwidth savings. Subsequent executions or quote deletions will still be confirmed by a Quote Confirmation broadcast.

If the suppress quote confirmation flag, “suppQuoConfInd”, is set to EXCH_CONST_YES for the “Delete Mass Quote” application request, then no quote confirmation broadcasts will be sent while deleting the quotes.

For further details please refer to the “Eurex Release 8.0 - VALUES API Member Front End Development Guide Volume 2 - Eurex Application Requests Final Version - Update 1”.