

Tech Talk

Eurex Scales Up for the Quotes Flood

By Bennett Voyles

Like its fellow derivatives exchanges in Europe and the U.S., Eurex is racing to keep up with the rapid rise in order message traffic on its electronic trading system.

Thanks to the popularity of computerized “black box” trading and the automated trading machines used by market makers, electronic exchanges all over the world are coping with unprecedented volumes of message traffic on their networks. While they welcome the additional liquidity, the challenge is to prevent the stream of electronic messages from overwhelming the capacity of their networks.

Eurex is no exception. At Eurex, the volume of quotes—which the exchange defines as any type of order book update, including order modifications and cancellations—have risen exponentially since January 2005, when the Frankfurt-based exchange introduced a market-maker program to provide continuous quoting on a number of its products. Average quotes per day rose from 10 million a day in January 2005 to 100 million a day in December 2005 and 145 million a day in May, with peaks of as much as 230 million in a single day.

Bringing this down to the level of a single second, which is a long time in the world of automated trading, the maximum load Eurex has seen is 3,600 quotes per second on its popular DAX option contract and 17,000 quotes per second across the entire system.

“The maximum load observed so far has not lead to performance degradation,” says Gerhard Lessmann, a member of the executive board of Deutsche Börse Systems, Eurex’s IT provider and a wholly-owned subsidiary of Deutsche Börse, one of Eurex’s primary shareholders.

In spite of the growth, Eurex seems to be staying ahead of the curve of capacity demand. Over the past year, Eurex IT developers have introduced a number of hardware and software upgrades to boost capacity and increase the system’s speed of response, and they plan some additional changes that should keep performance high. Thanks to these upgrades, the latency—the time between the user request

and the exchange’s response—is now down to about 40 milliseconds from 80 or 100 milliseconds, according to Lessmann.

Cluster Technology

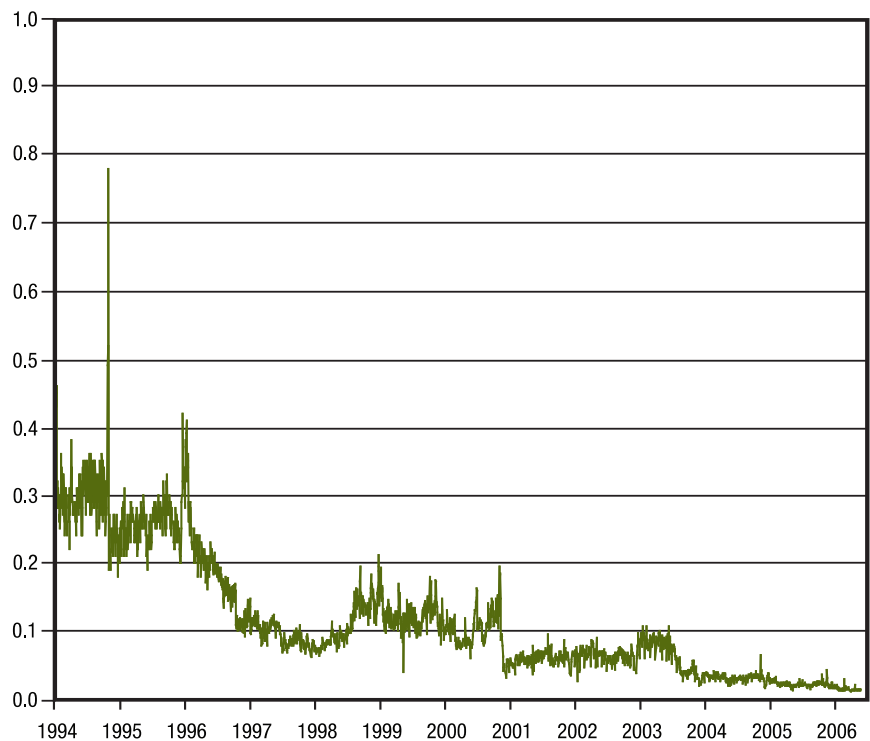
One crucial feature of the Eurex system is that it is configured in a very scalable way. As demands on the system have grown, the exchange has been able to add more machines, and the exchange says there is plenty of room for further growth. The key to this scalability is that the system relies on a computer cluster, rather than a single supercomputer.

In the computing world, the term cluster refers to a group of computers linked together so that they effectively function as if they were a single computer. Clusters are typically much more cost-effective than single computers of comparable speed or reliability.

Eurex currently runs on a cluster of eight host systems split across two data centers. The computers work together to keep loads balanced and mirror data between their drives to prevent any losses. The cluster could be expanded to 64 computers, Lessmann says, and those boxes could be joined by others—many others. “We could theoretically run 100

Faster than the Blink of an Eye

Recent improvements to Eurex technology have brought the average processing time for order messages down to 40 milliseconds. This measures the amount of time required for an order message to travel from a Eurex network gateway to the host system and return to the gateway. This does not include the amount of time the order message spends within a customer’s network.



Source: Eurex

clusters in parallel,” he says. “Scalability by adding machines will not be an issue for the foreseeable future.”

The exchange is looking at making an upgrade to the machines themselves, though more to further cut costs than to enhance performance, Lessmann says. After the next release of the Eurex system in November, the exchange is planning to begin replacing its Alpha boxes with Itanium machines. Both types of computers are provided by Hewlett-Packard, but the newer machines run on Itanium 2 chips. Lessman says the Itanium machines offer more capacity and more speed at a quarter of the price.

The upgrade, which is still in the planning stages, will affect the eight back-end hosts, which handle the matching and clear-

ing of trades, and 30 local access points located in various trading centers around the world.

The back-end operating system will continue to be Hewlett-Packard’s open VMS platform. Open VMS was the first platform that permitted clustering, he says, “and it is still in my opinion the best cluster you can have.”

Eurex is evaluating the demand for the Linux operating system for the customer side of the system, Lessman says. The exchange currently offers Windows and Solaris-based software for the MISS servers, which sit at the customer firm and function as the gateway to the network. Eurex currently serves around 2,000 MISS servers, which are connected to around 10,000 workstations worldwide.

Risk Management

Another project Lessmann is undertaking, which should help clearing members cope with today’s high-velocity trading, is a simpler way for clearing members to monitor the risk that individual traders are taking. “We will upgrade our risk management tools to better reflect today’s trading environment,” he says.

Lessmann explains that the exchange is working on an improved capability to stop trading in an account if a trader is suddenly in risky territory. How this “panic button” would work—whether the clearing member could trigger it on its own or after an alert from the exchange—is still being discussed with members of the exchange, according to Lessmann. “We are in discussion with customers about what solution we should implement,” he says. Completion of this project, he says, is no more than a year away.

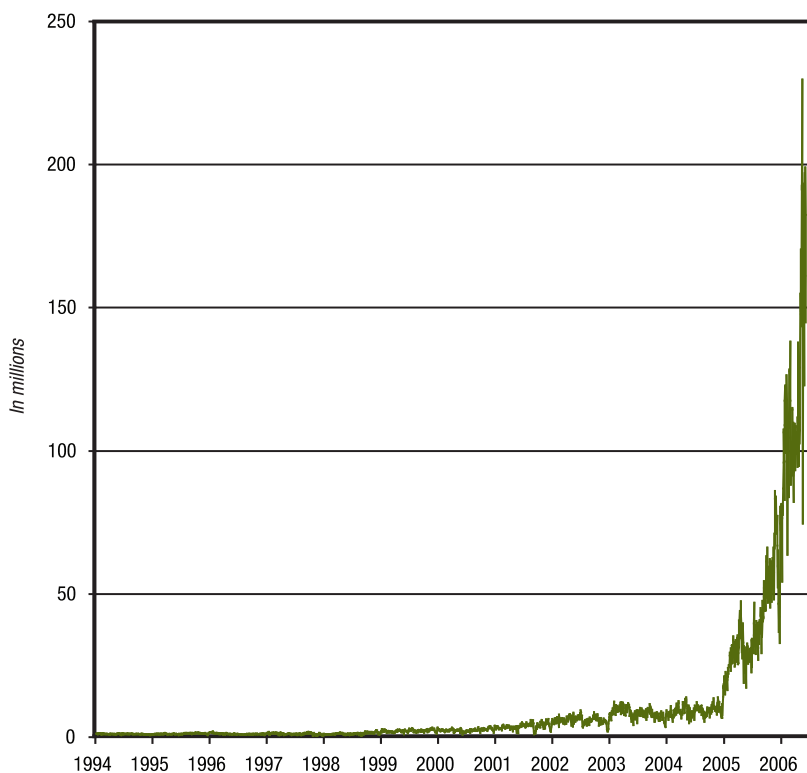
In a related project, Eurex would like to speed up the processing of intraday margin calculations. Currently the exchange does the calculations every 15 minutes, but given how quickly the black box traders move in and out of the market, the exchange wants to develop a process that is faster and eventually real time. Lessman concedes, however, “That is a bit far off.”

While the current quote tsunami seems to have come out of nowhere, it’s actually a problem that Lessmann says he first observed in the early nineties. The problem then was caused by a single client who had configured a machine to transmit quotes and was consuming 90% of the system’s resources. “We talked to that firm and explained the difficulties they were causing. They understood the situation, and it gave us enough time to upgrade the hardware and the system in order to deal with this,” he says.

In the near term, Lessmann seems confident that Eurex can keep up with the growth of algorithmic trading. However, if quotes continue to rise, Lessmann says he is unsure whether Eurex will always be able to continue this trick of adding more capacity without adding any extra costs. While business is good at Eurex, actual numbers of trades have not kept pace with quote growth. In 2000, Eurex

Quote Traffic

The increasing activity of automated trading systems connected to Eurex, combined with a shift to continuous marketmaking for options products, has resulted in an explosion in the number of order messages transmitted to the exchange. The average number of quotes processed each day has risen from 10 million in January 2005 to 145 million in May 2006, with peaks of as much as 230 million.



Source: Eurex

had 1.2 quotes per contract. In 2004, 2.16. By 2005, this had risen to 7.88, and by 2006 it had climbed to 17.09 – eight times as many quotes per contract as in 2001.

Like other exchanges, Eurex collects transaction revenues based on the number of orders that are filled, rather than the number of order messages traveling over its lines. Some exchanges have responded to the rise in the quote-to-fill ratio by charging extra fees for firms that go over a certain quote-to-fill ratio.

Lessmann hopes that Eurex will not have to follow suit. “Quoting is good for the market. It helps liquidity; it makes for more attractive prices. Our goal is to support it and not to punish it,” he says.

To keep performance up, Lessmann and his team also are working with customers to

examine how well their systems are set up, which can have as much of an effect on performance as anything that happens on the Eurex side. “The configuration of the customer environment can have a huge impact on the performance,” he explains.

Lessmann says that his team is undertaking two initiatives to help customers improve their configuration. The first is to write a booklet giving customers some tips on the best ways to configure their equipment and avoid common mistakes, such as having too many firewalls, overloading the local area network, and assigning lines to the MISS server in an inefficient way.

The next step is to introduce a system that will enable clients to track their order performance against their peers. Surprisingly, perhaps,

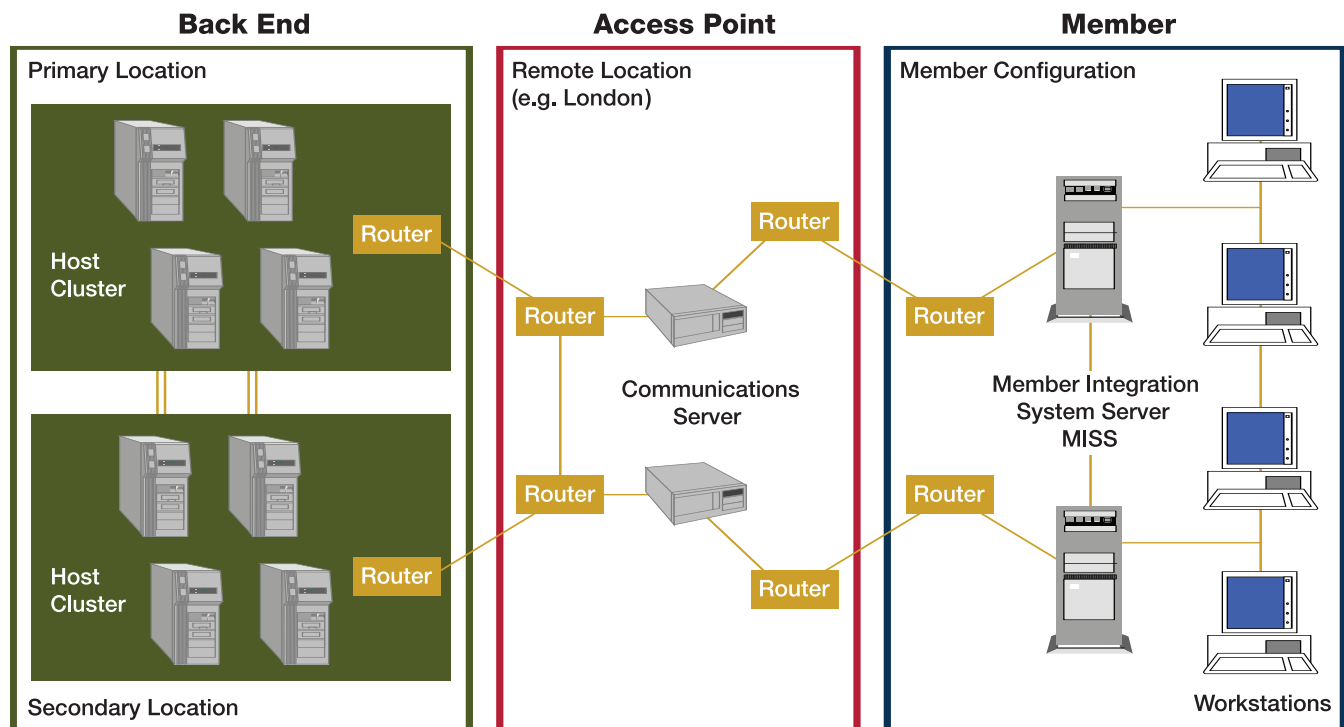
Eurex clients’ IT staff liked the idea. “They were very happy,” Lessmann says. “I was surprised, because the benchmarking also makes very transparent how they do their job.”

There are some limits that even Lessmann’s team can’t engineer around: if two commands are coming in equally fast, the geographically closer order will likely be filled first. High-velocity traders are putting their machines as close as possible to the matching engine, and will experiment with different access points to see if one provides faster access than another. “There is no denying the speed of light,” he says.

Bennett Voyles is a free-lance reporter based in New York.

System Architecture

The network operated by Eurex is organized into three main tiers. At the core of the network are the host systems, which provide central functions such as trade matching and processing. The host systems reside at two locations in Frankfurt linked by using clustering techniques. The next tier contains the access points through which member firms connect to the exchange. Eurex currently operates access points in New York, Chicago, Dublin, London, Gibraltar, Madrid, Paris, Amsterdam and Helsinki, and is preparing to launch an access point in Singapore. Lastly there is the Member Integration System Server, which resides at the client sites and operates the applications that provide the exchange’s functionality to market participants.



Source: Eurex