

Marketview

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IDX will remain an independent stock exchange, for it is considered one of the icons of the Indonesian economy.

Indonesia Stock Exchange CEO Ito Warsito

Increased complexity for clearinghouses

Lessons learned:

Volatility management in 2011

Indonesia Stock Exchange:

A competitive market is

CRITICAL

■ Improve response time consistency ■ Balancing propriety and open protocols ■

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BRUCE AUST

Executive Vice President, Corporate Services, NASDAQ OMX

Commit to economic growth in 2012

AFTER NEARLY FOUR YEARS of financial and political crises and radical regulatory reform, it is no surprise that many of us are feeling weary. But the New Year is a time for optimism – wiping the slate clean, making resolutions and starting afresh. As exchanges, our core mandate is to provide companies with access to capital. We are committed to meeting this responsibility and doing our part to stimulate growth and create jobs in 2012.

While small and medium-sized businesses are a source of economic growth, over-regulation can hinder these firms from reaching their potential. In the U.S., the Sarbanes-Oxley Act of 2002 raised the standards for executive accountability, but the heavy compliance costs often deters companies from going public. This is particularly challenging for smaller companies because there are few exchanges around the world that cater specifically to their needs.

Exchanges should work with their regulators to break down these barriers. In the U.S., NASDAQ OMX has proposed changes to Sarbanes-Oxley that will support the economy, job creation and a capital market that enables small company growth. Our recommendations include moving from annual to biannual audits, reducing their scope to internal controls and vital risk-based measures, and exempting small companies. Elsewhere, exchanges must help their regulators understand the obstacles that prevent companies from going public and how that affects

economic growth in their region.

Launching specialized exchanges that address the capital-raising needs of smaller companies should also be considered. London-based AIM has been among the fastest growing marketplaces for 10 years. NASDAQ OMX

successfully launched First North in the Nordics, and the SEC approved its application to set up the BX Venture Exchange in the U.S.

Contributing to research to better understand the problems we face is important too. In 2011, NASDAQ OMX donated \$730,000 to the Edward Lowe Foundation to fund the Institute for Exceptional Growth Companies. This effort is focused on job growth and capital access for developing companies in

the U.S. both of which will help stimulate the economy.

Finally, we need to guide companies through the listing process. For example, NASDAQ OMX runs IPO boot camps and hosts events where top executives share their IPO experiences with private companies. Many firms in the U.S., Asia and Europe have taken advantage of these opportunities. In 2012, we will collaborate with Stanford University to sponsor corporate governance conferences in Beijing to educate management teams and board members about what it means to be publicly-traded. And post-IPO, we continue to extend support services in investor relations, corporate communications and governance. In 2012, we will continue our efforts to breathe life back into the global economy, and we encourage our exchange peers to do the same. ■



In 2012, we will continue our efforts to breathe life back into the global economy.



Brazil selects SMARTS Integrity

BMF&FBOVESPA, Latin America's largest stock exchange, and Bovespa Market Supervision (BSM), the Brazilian self-regulatory organization, announced that they will use NASDAQ OMX's SMARTS Integrity market surveillance platform to monitor trading activity across their equities and commodities platform. The BMF&FBOVESPA and BSM implementation of SMARTS Integrity will be the first in Latin American markets. The parties continue to explore opportunities where they can leverage synergies to further expand their partnership.



Strategic alliance with Bolsa Electrónica de Chile

Bolsa Electrónica de Chile (BEC) and NASDAQ OMX signed a strategic alliance which will provide BEC with the NASDAQ OMX market technology, X-stream Trading, and advisory services for product development and global visibility. BEC and its members will benefit from significant enhancements in performance, latency and throughput capacity by shifting to NASDAQ OMX's proven exchange technology. NASDAQ OMX will also advise BEC on their efforts to cross-list shares, develop new indices, improve existing indices and begin a case study to create peso-dollar futures for trading on NASDAQ OMX exchanges. In addition, NASDAQ OMX will provide global visibility resources for promotion and advertising.



OSE introduces Corporate Intelligence

Osaka Securities Exchange (OSE) announced the addition of Corporate Intelligence to the suite of products JASDAQ and OSE can offer OSE listed companies. Corporate Intelligence is a leading provider of integrated financial information and analytical applications to the global investment community and is an integral part of the NASDAQ OMX Corporate Solutions offering. "The presence of foreign investors has been steadily increasing in Japan. The Corporate Intelligence service will be a key part of the tools offered to companies listed on OSE to help them deliver more effective, timely and strategic IR activities," said Manabu Matsumoto, Deputy of President, OSE.

Corvil provides latency measurement to NASDAQ OMX

Corvil, a latency management systems provider for high performance trading and market data, announced an agreement to support NASDAQ OMX's suite of market technology trading platforms with its CorvilNET Latency Management System.

Under the agreement, Corvil will provide full latency measurement and performance visibility across NASDAQ OMX's Genium INET, CLICK XT and SECUR trading platforms.

Multi-asset risk management platform launched

NASDAQ OMX launched a new state-of-the-art risk management platform for its Nordic clearinghouse. The real-time solution includes new tools for improved risk monitoring and incident handling for derivatives clearing, as well as capital-efficient risk models for fixed income and equities. "Our clearinghouse will have Europe's first risk management system capable of integrating all asset classes, and with the ability to handle both OTC and exchange traded instruments," says Hans-Ole Jochumsen, President of NASDAQ OMX Nordic. In March 2012, the NASDAQ OMX Commodity business will migrate to the new platform, thus achieving full integration of the Commodity and Financial markets.

Indonesian ICON

Founded 100 years ago, IDX has grown to become a powerhouse in the Asia-Pacific region.

PHOTO ANDRI TAMBUNAN

INDONESIA'S CAPITAL MARKET existed even before the country proclaimed independence on August 17, 1945.

The first stock exchange was established in 1912 in Batavia (now Jakarta) to support the interests of the Dutch government and local companies. The capital market became inactive during the two world wars and the Indonesian independence war. It was reactivated in 1977 with its first IPO by PT Semen Cibinong.

The exchange has grown rapidly since then. The Jakarta Stock Exchange (JSX) was privatized in 1992, and in 2007 it merged with the Surabaya Stock Exchange to create the Indonesia Stock Exchange (IDX). Until 1982, JSX had a mere 24 listed companies. Today, IDX's cash equity market comprises 440 listed stocks and two ETFs. And with the help of the capital markets, PT Semen Cibinong is now one of the largest cement producers in Indonesia with an annual production capacity of 5,700,000 tons and a global customer base.

IDX's vision is to become a world-class exchange by attracting investors and listed companies, empowering members and participants, as well as

delivering value, cost efficiency and good governance. According to the World Federation of Exchanges, in 2010 IDX was the fifth best performing stock exchange in the world. The fact that IDX is the only stock market that offers Indonesian equities is a source of strength.

"The Indonesian economy and the issuers' financial performance have grown steadily compared to other markets, and our return has been among the best globally since 2009," notes Ito Warsito, CEO of the exchange. "We believe that our market will outperform other markets in the region for the foreseeable future and eventually become the biggest equity market in Southeast Asia."

THERE ARE MYRIAD opportunities for IDX. Indonesia has one of the fastest growing economies globally. The country is rich in minerals and other commodities and, at 250 million, has the fourth largest population in the world, making it a key investment target in Southeast Asia.

The exchange's market capitalization to GDP ratio is around 50%, the lowest in the region. Its domestic

capital market investor base, which at about 1.1 million investors represents less than 0.5% of the population, is also the lowest in the region. Although these numbers indicate strong growth potential, IDX is not immune from external events.

"The financial crisis in the U.S. and Europe hampered our growth in 2011 and also increased volatility in our market," says Warsito. "However, our economy proved highly resilient during the 2008/09 financial crisis, and we believe the strength of Indonesian economic growth and the fundamental financial performance of our issuers will help us weather future financial crises."

Given the recent successes and future prospects of Indonesia's economy, IDX enjoys strong interest from overseas investors. At year end 2011, 60% of all tradable shares on IDX were owned by international investors. Although this was down from almost 70% at year-end 2008, the market capitalization tripled during the same period. While domestic investors have steadily increased their participation, IDX remains focused on growing its domestic market and investor base, where there is still substantial untapped potential.

Key to this strategy is increasing the number of new listings and encouraging existing issuers to improve liquidity by increasing their free float. In addition, a national promotion campaign is underway to attract more domestic investors. Through an education program, prospective investors can learn about the benefits of stocks, bonds and mutual funds compared to traditional bank deposit accounts. IDX also conducts road shows for global investors in East Asia and Japan, Europe and the U.S.

The outlook for 2012 looks positive. IDX estimates that the average daily trading value will reach IDR5.80 trillion (US\$641.24 million). It expects 25 new listings, 50 rights issues and bonus shares, 42 new corporate bond and 46 new government bond issuances.

Like other traditional stock

"Our economy proved highly resilient during the 2008/09 financial crisis."

Ito Warsito, CEO of the Indonesia Stock Exchange



SMARTS Integrity for surveillance

IDX has been using SMARTS Integrity from NASDAQ OMX since 1997 to conduct surveillance and research. The exchange originally selected SMARTS Integrity because it was looking for a technology provider with domain expertise, who could help its surveillance team better understand market behavior and how to detect market abuse. The system also offers superior alerting and visualization capabilities.

Since then, various enhancements have improved IDX's surveillance program. Nowadays, all historical and real-time trading data is instantly available down to a granular level. IDX is better equipped to understand and assess securities using SMARTS Integrity's interactive market visualizations. It has access to automated alerting algorithms, which are

evolving with the market; in 2010, IDX implemented a new set of complex pattern-based alerts tailored to Indonesian market characteristics. In 2011, IDX launched a single investor identifier to track investor trading patterns, so now it can automatically analyze market activity and monitor for illegal trading behavior at the investor level. Having this in place allows the exchange to collaborate with regulators and brokers to ensure market integrity.

"Over the years, we have provided advice and consulting to IDX with regard to trends in market surveillance and regulation, and this has helped us forge a strong relationship with our client," says Lorne Chambers, Head of Sales and Account Management, SMARTS Integrity, at NASDAQ OMX. "We believe this good relationship contributed to a smooth simultaneous upgrade of IDX's trading and surveillance systems in 2011."

Statistics Indonesia

	2008	2009	2010	2011 (E)
Real GDP Growth	6.01%	4.57%	6.10%	6.40%
GDP per capita (in IDR)	IDR 21.65 Million	IDR 24.22 Million	IDR 27.02 Million	IDR 30.03 Million
GDP per capita (in USD)	USD 2237	USD 2327	USD 2974	USD 3469
Monthly Inflation Rate (average)	9.77%	4.81%	5.13%	5.69%
Monthly Inflation Rate (end of period)	11.06%	2.78%	6.95%	5.00%

Source: IMF Global Economic Outlook Database September 2011

GDP Composition by Sector	2008	2009	2010	2011 1H
Agriculture, Livestock, Forestry & Fishery	14.5%	15.3%	15.3%	15.5%
Mining and Quarrying	10.9%	10.6%	11.2%	11.8%
Manufacturing Industry	27.8%	26.4%	24.8%	24.2%
Electricity, Gas, and Water Supply	0.8%	0.8%	0.8%	0.8%
Construction	8.5%	9.9%	10.3%	10.1%
Trade, Hotel & Restaurant	14.0%	13.3%	13.7%	13.7%
Transport and Communication	6.3%	6.3%	6.5%	6.5%
Financial, Ownership & Business Services	7.4%	7.2%	7.2%	7.3%
Other Services	9.7%	10.2%	10.2%	10.2%

Source: BPS Statistics Indonesia August 2011

	2008	2009	2010	2011 (Feb)
Labor Force	111.94 Million	113.83 Million	116.52 Million	119.39 Million
Unemployment Rate	8.39%	7.87%	7.14%	6.80%

Source: BPS Statistics Indonesia August 2011

exchanges, IDX's business is built on systems and technology, and the exchange is continuously improving its trading, market surveillance and risk management systems. It provides an integrated network to brokers and other market participants and helps brokers implement risk management and regulatory reporting systems. Moreover, the brokers offer direct market access to global investors and online trading to their domestic and foreign clients. They also use Internet and multimedia technology to educate investors.

IDX's trading platform is known as the Jakarta Automated Trading System - Next Generation (JATS-NG). Built by NASDAQ OMX, JATS-NG was intro-

duced in March 2009 to replace the previous JATS, which had been used for equities trading since 1995.

IN 2011, IDX made a significant strategic investment to enhance the trading system. It is now developing its derivatives platform in JATS-NG with the goal of expanding its offerings to domestic and global investors in the second half of 2012. The exchange is planning new product launches including stock options, index futures, interest rate futures, structured warrants and more ETFs.

Anticipating future growth, IDX is also adding more capacity. "When JATS-NG first launched in 2009, we only handled 250,000 trades and



"The financial crisis in the U.S. and Europe hampered our growth in 2011 and also increased volatility in our market," says Ito Warsito, CEO of the Indonesia Stock Exchange.

"Given current growth trends, we are in the process of increasing capacity to 2.5 million trades and 5 million orders."

Ito Warsito, CEO of the Indonesia Stock Exchange

500,000 orders. Shortly thereafter, we increased capacity to 500,000 trades and 1 million orders," says Warsito. "Given current growth trends, we are in the process of increasing capacity to 2.5 million trades and 5 million orders."

Also during 2011, IDX invested in developing its data warehouse and the members' Disaster Recovery Center as well as revitalizing the trading floor. Plans for 2012 include investing in hardware, the IDXnet e-reporting system and the complaint handling system. Further, IDX is improving its systems for clearing and settlement, networking and communications.

Going forward, IDX will offer a wide range of products demanded by domestic and global investors. While regional and global economic cooperation may provide the opportunity for IDX to partner with other exchanges, there are no plans to merge.

"IDX will remain an independent stock exchange, for it is considered one of the icons of the Indonesian economy," says Warsito. ■

Managing volatility

The financial markets were better prepared for volatility in 2011 having learned from a similar experience in 2008.

OCTOBER 2008 was the worst month in living memory for the financial markets. Lehman Brothers collapsed, the first U.S. stimulus package failed to pass in Congress, and volatility soared as traders and exchanges struggled to cope with the disruption. In August 2011, the financial markets were thrown into turmoil again as the U.S. Congress haggled over raising the debt ceiling, and the Eurozone sank deeper into a debt crisis of its own. Although few people look back on 2008 with fondness, the experience taught important lessons.

Between 2008 and 2011, some measures were taken and certain trends emerged that better equipped the markets for volatile conditions and improved market liquidity. The number of market participants increased as high frequency trading proliferated, and the migration from bilateral to centralized clearing – not offered in the Nordic markets prior to 2008 – accelerated. At the same time, automation helped the markets cope with spikes in volume, and exchange

circuit breakers gave participants the chance to pause and digest events that caused high volatility.

A study conducted by NASDAQ OMX illustrates the effects of these measures. In October 2008, NASDAQ OMX Stockholm declined 16.9%; the largest single day decline was 7.25%. The markets hit a traumatic period again in August 2011, falling 10.8%. This time, the largest single day decline was 6.75%. Essentially, the price volatility in the index is comparable, but intra-day volatility was significantly lower in 2011.

“In 2008, the micro volatility in the market ranged from about 12% to 20% on an annualized basis,” explains Frank Hatheway, Chief Economist at NASDAQ OMX. “It was much lower in the summer of 2011, ranging from around 5% to 9%.”

While some pundits believe that political and financial uncertainty will have less impact than in 2011, these issues will continue to fuel volatility in 2012. The high level of indebtedness and the inability of governments to stabilize fiscal policy are under-

Key lessons learned:

- Firms need a capital cushion as a buffer in volatile conditions.
- They must be cognizant of liquidity and funding alternatives.
- Stress tests should be conducted regularly and contingency plans updated as new risks emerge.
- It is critical to know your counterparties' position regarding capital, liquidity and risk management.



“Policy-makers are less likely to make policy mistakes in 2012 as serious as those they made in 2011.”

Mark Zandi, Chief Economist, Moody's Analytics

mining private sector confidence and thus limiting the investments necessary to resume economic growth. This has a negative impact on the environment for capital formation, and companies are having difficulty launching successful IPOs.

That said, Mark Zandi, Chief Economist at Moody's Analytics, is more optimistic for 2013 and 2014. The market already expects political acrimony in the U.S. in the run up to the November 2012 presidential election; however, over the past year the European Union has recognized the extent of its problems and has committed to addressing them.

“Policymakers are less likely to make policy mistakes in 2012 as serious as those they made in 2011,” says Zandi. “There will be lots of volatility, but it shouldn't be quite the roller coaster we experienced in 2011.”

The good news is that exchanges and market participants alike are ready for whatever comes their way. ■



Fair game

Clearinghouses need ever more sophisticated risk management solutions to survive and thrive in the new world order.

PHOTO GETTY IMAGES

THE FINANCIAL CRISIS revealed that the industry's approach to risk management was flawed. Since then, new regulations have been created to push more activity onto regulated marketplaces and clearinghouses. A clearinghouse's integrity rests on its expertise in establishing and enforcing risk policies. Yet clearinghouse members face some significant challenges. For starters, it is not easy to know their customers in a globalized market. In

addition, customers want to trade and clear more products faster than ever before. This introduces a new level of complexity, especially in margining.

Real-time information plays a critical role in post-trade risk management, but real-time does not necessarily mean that data updates occur in milliseconds and microseconds. More often, updates take several seconds, or even several minutes. However, the definition of real-time has implications for the infrastructure.

“To future proof their infrastructure, clearing firms need to strive toward extremely high update frequency, where the definition of real-time may be a matter of minutes,” says Paul Rowady, Senior Analyst at Tabb Group. “Clearing firms that develop capabilities at the higher end of that update frequency can potentially be far more innovative in margining and collateral management.”

Clearinghouses need to aggregate data flow from various exchanges and liquidity pools. New, updated and historical data enables them to perform sophisticated risk calculations that determine margin levels and influence the degree of leverage and amount of capital that can be committed to positions. Computational power plays a role. Although clouds and multi-core servers are getting cheaper, getting the data to flow at the proper speed and in the right format can be complicated.

DEFAULT MANAGEMENT capabilities are also important. Clearinghouses need to set automatic limits according to their risk policy and promptly act on any breaches.

Clearing members are selected based on criteria including capital, expertise, size and the nature of the firm’s portfolio. Clearinghouses also maintain a waterfall mechanism whereby various safeguard levels protect against member default. Ultimately, member quality determines the strength of the waterfall and the default process. Member firms post margin with the clearinghouse, which maintains a default or guarantee fund. When guarantee fund levels are higher, margin levels tend to be lower.

Clearinghouses need sophisticated modeling and stress testing capabilities to analyze the size, nature, diversity and volatility of member firms’ portfolios and strike the right balance between margin and guarantee fund levels. The objective is to obtain a detailed and comprehensive statistical

footprint of the market and its players. The clearinghouse can then determine how the pieces of the waterfall fit together and when margin levels should change.

Over the last few years, firms have been deleveraging. Space on the balance sheet is becoming more precious as standardized bilateral transactions migrate to exchanges and centralized clearing. In the future, more collateral will need to be posted, putting additional pressure on the deleveraging process. Margin offsets will likely be the best weapon against accumulating those capital burdens.

“This is more reason for clearinghouses to have world-class data management capabilities as the foundational element for risk management,” notes Rowady. “These capabilities help them navigate the current environment, as well as lead and innovate to gain competitive advantage.”

Moreover, multi-asset trading has made post-trade risk management more complicated. The alpha on plain vanilla products has been mined away, and only the fastest and nimblest are



“It’s not an easy space to innovate in. That said, the stakes are high.”

**Paul Rowady,
Senior Analyst at
Tabb Group.**

still capturing it. Firms are looking for other opportunities globally and in more complex mixtures of products and asset classes. Clearinghouses now need data management and analytics capabilities that allow them to understand the risk associated with new permutations. Clearinghouses that already handle diverse products are higher up the learning curve than those that are niche-oriented. Still, there is room for innovation in areas such as combining cash and futures positions to offset margin.

“It’s not an easy space to innovate in,” says Rowady. “That said, the stakes are high, and there seems to be some indication that there’s at least some steps being taken to try and minimize some of the margin and collateral burdens.”

New regulations and multi-asset trading are two factors driving the demand for more sophisticated post-trade risk management systems. In today’s world, they are an essential component in the clearinghouse survival kit. ■

Real-time risk monitoring

UNTIL RECENTLY, the Nordic clearinghouse, NASDAQ OMX Clearing, used end-of-day abstracts to create risk reports, but the process was manual, and its risk was not known until the next day.

To automate the process and gain the ability to calculate risk in real-time across a wide range of asset classes, NASDAQ OMX recently implemented significant enhancements to its Genium INET Clearing platform. It also integrated Sentinel Risk Manager from NASDAQ OMX to the enhanced solution. Now NASDAQ OMX Clearing has Europe’s first risk management system capable of integrating all asset classes and handling both OTC and exchange traded instruments. Managers can monitor risk in real-time using a browser-based dashboard, customize risk models and parameters for different types of asset classes and

credit risks and produce reports automatically.

“In the very worst case, the Nordic clearinghouse knows its risk one hour after an event,” says Malcolm Warne, Vice President and Product Manager, Risk Management at NASDAQ OMX. “Hourly feeds enable the setting of limits and alarms, so they are notified of any problems straight away and can take action immediately.”

NASDAQ OMX Clearing runs Sentinel Risk Manager on a single server, so it is inexpensive and maintains a low footprint. Functionally, it addresses the enterprise risk needs of a clearinghouse and supports OTC clearing. Further, the solution was implemented in about six months.

In March 2012, the NASDAQ OMX commodity business will migrate to Sentinel Risk Manager, thus achieving full integration of the Nordic Commodity and Financial markets.



A question of protocol

Both proprietary and open standards and protocols have roles in facilitating easy connectivity to exchanges.

ILLUSTRATION VALERO DOVAL

NOWADAYS, MULTIPLE global exchanges and trading venues compete for order flow. As exchanges build their systems, they also need to build protocols that enable customers to connect to them easily across all their marketplaces worldwide. A few proprietary protocols are well established, but there is a push to migrate to open protocols and standards. The challenge

for the industry is to figure out the best way for proprietary and open protocols to co-exist.

ITCH and OUCH are among the most widely adopted proprietary protocols. OUCH provides customers with a fast and efficient way to connect to exchanges, enter orders and receive executions. ITCH is a direct data-feed interface that allows customers to observe or disseminate information about stock trading activities. It facilitates the display of data related to added, executed, modified or cancelled orders. These protocols have been widely available and used by exchanges since the late 1990s, and a few ECNs used them in the early 2000s to share liquidity. New exchanges use variants of ITCH and OUCH not only for equities, but also for foreign exchange and derivatives. Another proprietary protocol, OMNeT, has also been widely adopted by exchanges, and many independent software vendors support it.

Critics of proprietary protocols and APIs maintain that to some extent they

make it more difficult for competitors to enter the market. In contrast, open standards and protocols enable common access to market implementations, which is where differentiation and competition occurs, so they are a catalyst for market innovation.

A widely adopted open protocol is the Financial Information eXchange (FIX) protocol which was developed for the international real-time exchange of securities transactions. FIX is typically used for standardized access, whereas ITCH and OUCH are binary low latency options well-suited for high frequency trading.

“WHEN I HELP exchanges implement their interfaces, market participants usually want FIX for order routing,” says Jim Northey, Co-Founder of LaSalle Technology Group and Co-Chair of the FIX Protocol Americas Regional Committee. *“If it is an equities market, firms focused on trading usually ask for ITCH and OUCH.”*

FIX Protocol Ltd. (FPL), the organization that oversees FIX, is strug-



gling with the issue of “proprietary” protocols. It is also challenging the definition of “proprietary standard” in the hope of gaining further insights to help the overall FIX community. For example, industry IT professionals question whether ITCH and OUCH are proprietary protocols or de facto industry standards.

“As an individual committed to open standards, I see proprietary standards as an anathema and an unnecessary contributor to overall costs and market inefficiencies,” says Northey.

However, he admits that the re-emergence of proprietary protocols indicates that the existing open standards no longer meet the needs of a rapidly changing market structure, especially when it comes to high performance trading. As a result, FPL is leaning toward using proprietary standards as sources for requirements.

While the FIX community has expertise in defining and implementing market interfaces, it may not make sense to create another high performance protocol or binary rep-

resentation. A better alternative may be to provide a forum where market interface builders can address issues and benefit from a best practices guide that would lead to a core commonality across various market interfaces.

EXCHANGE IT PROFESSIONALS are also reconsidering the pure software approach to connectivity. As ultra low latency becomes more important, hardware is being emphasized, leveraging a technology called Field-Programmable Gate Array (FPGA). An FPGA is an integrated circuit designed to be configured after manufacturing. FPGA development requires simple protocols like ITCH and OUCH to be parsed by hardware to achieve even lower latency.

“Low latency and standardized access protocols need to work in harmony,” Michael O’Rourke, Director at NASDAQ OMX concludes. “Not every customer needs 60 to 70 microsecond round trip response times. Some would prefer the trade off for richer functionality.” ■

Virtual speedometer

The FIX Inter-Party Latency Working Group currently is testing FIX IPL, a standard for measuring data latency between brokers, buy-side firms and trading venues. FIX IPL can be used to measure the speed of messages based on proprietary protocols such as ITCH and OUCH down to the nanosecond. Until now, the latency measurement solutions from leading vendors such as Corvil, Correlix and TS-Associates have not been interoperable.

“We don’t want our customers to be forced to choose our products because of some lock in on a protocol,” says Raymond Russell, the CTO and Founder of Corvil. “We want our customers to choose us because it’s the best fit for their needs.”

Technically, it is difficult to time stamp. An advantage of standardization is that time stamping can be done consistently and less expensively. Once latency measurement solutions are interoperable, vendors will be able to put their efforts into providing value-added features. For instance, they can layer analytics on top of raw latency measurements.

“I certainly welcome standardization because I hope it will bring down costs,” says Vitali Vinokour, Consulting Engineer at Lime Brokerage. “It will also open the ecosystem to a richer field of monitoring solutions.”

The FIX Inter-Party Latency Working Group believes the standard will have applications in areas outside of finance, such as high performance computing, and hopes it will be promoted to an Internet Engineering Task Force recommendation.

For good measure

Standardized latency measurement adds predictability and validity to the trading process.

ILLUSTRATION VALERO DOVAL

EXCHANGES GENERALLY commit to a level of consistency in message response times. For some firms every microsecond counts, so they calibrate their orders to that response time and build these calculations into their executing algorithms. Firms that have invested in co-location and the most advanced hardware and networks expect exchanges to meet their commitments.

If an exchange commits to 100 microsecond response time, firms assume that limit orders will appear in the order book within that time frame. If a response is delayed, the firm will not know whether or not the order made it into the order book, but another market participant may see it and take advantage.

"If the gateway connection is creating delays, customers are going to feel that they're at a disadvantage compared to others whose gateways are acting more predictably," says Björn Carlson, Vice President of Software Architecture at NASDAQ OMX. "That would be a concern for someone who is sensitive to latency and jitter."

In the days when latency was not a major consideration, queuing and bulk operations in the system were not problematic. But times have changed. As a rule, queuing contributes to inconsistent response times. Mixing complex functionality with simple functionality is also a potential problem because complex algorithms tend to take longer to process.



"Exchanges are moving away from that model now toward simple matching engines and gateways and consistent response times," says Carlson. "At the same time, they need to offer interesting functionality, which is not as predictable as the simple limit order."

This is a challenge.

He recommends reducing complex functionality wherever possible and moving away from legacy features. For example, operations that perform massive order book updates in one transaction create jitter for everyone. Exchanges should avoid adding complex trigger functionality because it has a negative effect on predictability and should focus instead on high-speed networks that have ultra-fast switching capabilities. Careful design of the gateway topology is also important to predict where queuing may occur.

"Exchanges need to keep in mind that no trading system is 100% real-time, so there will always be some variance in response time," says Carlson. "It's almost impossible to get down to no jitter; however, exchanges should be able to commit to consistency." ■

The distribution curve

Exchanges use statistical analysis to monitor jitter. Let's say out of 1,000 transactions, 750 return within 100 microseconds, and the remaining 250 return at various time intervals. They plot the transactions on a distribution curve and calculate 99% and 95% confidence levels as well as minimum and maximum response times. Ideally, a distribution curve should show a high number of

values centered around the mean with a few values in the tails. Latency is very deterministic. The system could have an average delay of two microseconds, where the minimum and maximum would be 1.98 microseconds and 2.1 microseconds. But people still want to know the exact latency they're going to achieve, whether it's 200 microseconds or 2 microseconds.

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