Milliseconds Do Matter: Using Extranets to Reduce Latency

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Jan 2007

Reference # ViewPoint Issue 178

TowerGroup Take-Aways

- Securities firms can reduce market data latency in four primary ways: receive market data directly from exchanges; increase bandwidth; upgrade the feed handlers, ticker plant, and distribution platform; and collocate applications.
- The use of an extranet solution could provide securities firms with the requisite services to reduce market data latency for each of the primary sources of latency.
- Rather than relegating the decision of using an extranet to the technology department responsible for each facet of the business, brokerage firms should be looking at their market data infrastructure holistically and making centralized decisions.
- Extranets have become more than just private networks connecting data sources and data consumers; they also guarantee data delivery within established time frames and offer hosted services for consuming applications.
- Extranet solutions are not new, but in the market data arms race, using them has become an alternative to buying bigger pipes and acquiring expensive real estate.

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Report Coverage

The securities industry is facing the challenge of dealing with the tremendous volumes of real-time market data required to feed algorithms, automated trading systems, and other applications. The sell side, the buy side, and the exchanges have all become involved in the pursuit of low-latency market data. But speed comes at a cost, and extranet providers offer an alternative to building or buying the required components. This TowerGroup ViewPoint examines the top four ways firms can reduce market data latency and the ways extranet providers can make a difference. For more information on market data latency and solutions providers, see TowerGroup Research Notes V47:07S, *Market Data Vendor Landscape: Content Is Fuel but It's What's Under the Hood That Matters*, and V47:06S, *Market Data Arms Race: Latency as the New Battleground*.

Four Ways to Address the Market Data Challenge

The financial services industry faces challenges related to handling market data that run the gamut of sourcing content, accepting content, distributing data, and generating orders as they hit price points and get the orders to the appropriate execution venue. The ability to perform all of these processes at the highest possible speeds has become a competitive differentiator for market participants. This need for speed has created a market data arms race in which the enemy is latency. Latency is defined as the time delay between the moment something is initiated and the moment its first effect begins. For market data, it is the time between receiving potentially actionable content and delivering it to consuming applications so that they can take meaningful actions based on it.

There are four primary ways to reduce market data latency:

- Receive market data directly from exchanges
- Increase bandwidth
- Upgrade the feed handlers, ticker plant, and distribution platform
- Collocate applications

Each option has the potential to reduce latency and help firms cope with the ever-increasing volumes of data coming in from more and more sources. But what institutions have not recognized is the common thread running through these solutions, which is that the use of an extranet could provide the requisite services to reduce latency. Rather than relegating the decision of using an extranet to the technology department responsible for each facet of the business, brokerage firms should be looking at their market data infrastructure holistically and making centralized decisions.

Solution #1: Receive market data directly from exchanges

Market data content can be received either consolidated from a vendor or directly from an exchange. The exchanges have offered direct feeds for quite some time, but until now, only the major firms like Merrill Lynch and Credit Suisse had the appetite and deep pockets to take the data directly. Electronic trading methodologies have created a larger demand for direct feeds, and the consolidator vendors and extranet providers have responded by offering direct and collocated exchange feeds. By connecting directly to an exchange, as opposed to a data consolidator, market participants can gain 150 to 500 milliseconds in transmission times. There is no arguing that direct-exchange feeds eliminate data hops and thus reduce latency, but the source and means of connection largely determine the cost benefit. The major exchanges offer the most listings, deep liquidity, and the best markets the majority of the time. For institutions with deep pockets actively trading electronically, direct connectivity to the major exchanges has become a required weapon in the market data arms race. By the same token, establishing direct connectivity to smaller regional exchanges that do not offer the same market opportunities would not be a judicious use of budgetary resources. For firms that cannot afford that level of direct connectivity and for access to secondary markets, the decision to adopt a third-party extranet solution would provide the most flexibility at the best price point. Broker-dealers most likely to choose an extranet solution include regional firms like Janney Montgomery Scott and Morgan Keegan as well as midtier firms like CIBC and Jefferies. Retail firms like AG Edwards and Charles Schwab are also likely extranet candidates, bringing the number of potential US broker extranet users to an estimated 750 to 1,000.

Fortunately, for brokerage firms contemplating the use of extranets, they can choose from several providers and shop around for a good deal. Any decision for other than an aggregator feed assumes a business model that requires low latency, so the metrics would be the cost of service against clocked data receipt by the consuming application.

Solution #2: Increase bandwidth

A need for best execution and an increasing number of quote sources will continue to drive the amount of published data that market participants will have to consume. Market data volumes rose 1,750% from 2003 to 2006 because of decimalization. In response, Archipelago, for example, increased the bandwidth requirements of binary ArcaBook from 1.5 megabytes per second (MBps) in 2003 to 8 MBps in 2006. This represents an 81% increase in required bandwidth in three years. Firms are faced with the prospect of continually upgrading their telecommunications structure to handle the constantly increasing flow of message traffic. The costs involved are not just for the lines. Every time a firm increases bandwidth, it must open a portal, get through firewalls, and run extensive tests, all of which multiplies costs.

Options are available for managing bandwidth pressure. Data compression examines the format of the data being sent and then reduces the size and number of market data messages without

removing any of the content, thus decreasing the amount of traffic and making more efficient use of available bandwidth. Another option would be to adopt the FAST (Financial Information eXchange [FIX] Adapted for Streaming) Protocol, which uses implicit tagging, field encoding, and serialization to shrink the message packet being sent. By adopting FAST, which reduces message size and introduces variable-length fields, firms could conserve bandwidth and realize considerable cost savings. For example, ArcaBook's FAST feed requires bandwidth of only 3 Mbps.

Each option is a stopgap measure at best and will not be sufficient to cope with the volume of data that spikes up significantly at certain times of the day, such as at market open and close. Again, the argument is against building a structure when a more flexible solution is available. In order to handle peak loads in an environment where the requirements are constantly changing, an extranet solution would provide the necessary pipes enabling firms to securely receive and forward large volumes of data in a number of configurations. The metrics are also straightforward; the number and depth of feeds will determine the number of T-lines and in some cases E-lines (Metro Ethernet) required. The resulting cost needs to be weighed against the cost of an extranet solution.

Solution #3: Upgrade the feed handlers, ticker plant, and distribution platform

The half life of market data is now measured in milliseconds and in some cases microseconds. To be effective, electronic trading demands content feeds with the lowest possible latency. It is not enough to have a structure that can consume massive amounts of low-latency data; it must also be normalized and distributed to the consuming applications, and that is where the market data infrastructure comes in.

The market data infrastructure is composed of three main components: feed handlers, ticker plants, and distribution platforms. To receive market data, firms have established telecommunication interfaces feeding data to the feed handler servers. With the proliferation of feeds, firms like CIBC and Morgan Stanley have established relationships with multiple providers, which created large server farms to support each exchange's application programming interface (API). The multiple feed handlers reside in the ticker plant, where the data is normalized, entitlements are maintained, and the data is distributed to the market data distribution platform. The distribution platform is the backbone of the infrastructure where, based on entitlements, information is published to downstream consuming applications such as trading programs, workstations, and enterprise databases.

There is no getting around that the speed of transmission to consuming applications is restricted by the technology being employed, and depending on the technology, firms could be giving up as much as three seconds in latency. So the obvious solution is to build or buy a solution that includes low-latency feed handler and ticker plant combinations along with new data distribution technology. But it does not end there; as in the real estate business, it is about location, location, location. Ticker plants can be maintained proprietarily or outsourced to a ticker plant vendor, or either solution can be used in conjunction with an extranet provider. By using an extranet provider to host the ticker plant along with low-latency messaging, firms can reduce latency by getting physically closer to the source of data. They also have the added benefit of potential cost savings because real estate in major market cities is expensive. The cost-to-benefit equation in this scenario would have to clock the size and location of the current ticker plant and extranet-provided feeds against data receipt by the consuming applications.

Solution #4: Collocate applications

Today's "black box trading" requires low-latency direct exchange feeds, sufficient bandwidth, and an upgraded infrastructure. But it also requires the ability to establish and maintain FIX connectivity to clients and execution venues. Under the laws of physics, data cannot travel faster than the speed of light, which is 186 miles per millisecond. This means that data sent 5 miles away will probably not be affected, but data that has to travel 50 miles could be, and a firm that must send data 1,000 miles will be sacrificing over 5 milliseconds. In an effort to reduce the latency caused by physical distance, the Deutsche-Bourse recently began offering a hosting service that would allow

user firms to collocate trading servers within exchange data centers. By utilizing a hosted service, offered by both traditional extranet vendors and exchanges, firms locating in the same center as the execution venue firms will reduce latency and realize a competitive differentiator.

By using an extranet service, firms can locate their trading servers as close as possible to the execution point and connect via a cross connection rather than a telephone line, thus reducing latency to less than 2 milliseconds in most cases. The trading application would reside at the hosted site, ideally as close to the venue as possible, and send orders as price points trigger the various trading models. This arrangement provides speed and economies to firms of all sizes and effectively levels the playing field. The cost benefit in this scenario is harder to quantify because markets are moving faster and faster, and triggering an order only blocks away from the venue is no guarantee that a firm will get the posted bid or offer. However, distance does matter, and the closer trading applications are to the execution venue, the more likely a firm will get to that pool of liquidity before the competition.

The Promise of the Financial Extranet

Extranets have become more than just private networks connecting data sources and data consumers. They also guarantee data delivery within established time frames and offer hosted services for consuming applications. By establishing a connection with a private network that uses Internet protocols and network connectivity, brokerage firms can access information from exchanges and other market data suppliers. Therefore, they would not have to establish connectivity with a multitude of sources and constantly upgrade bandwidth.

Extranet solutions are being utilized by not just sell-side and buy-side firms. The extranet providers also are working closely with order management systems (OMS) to provide the required network connectivity. BT Radianz is participating in that area by white-labeling its network as the infrastructure for the Charles River Network. Another OMS, Linedata, does not view connectivity as a primary differentiator and utilizes TNS and SAVVIS for different aspects of its offerings.

Exhibit 1 illustrates how an extranet solution could reduce market data latency. It starts with extranet connectivity for direct exchange feeds to hosted trading applications and feed handlers collocated as close as possible to the point of origin. From the applications within the hosted site, orders are generated and routed to the appropriate execution point. At the same time, market data is being fed to the distribution platform for dissemination across the enterprise.

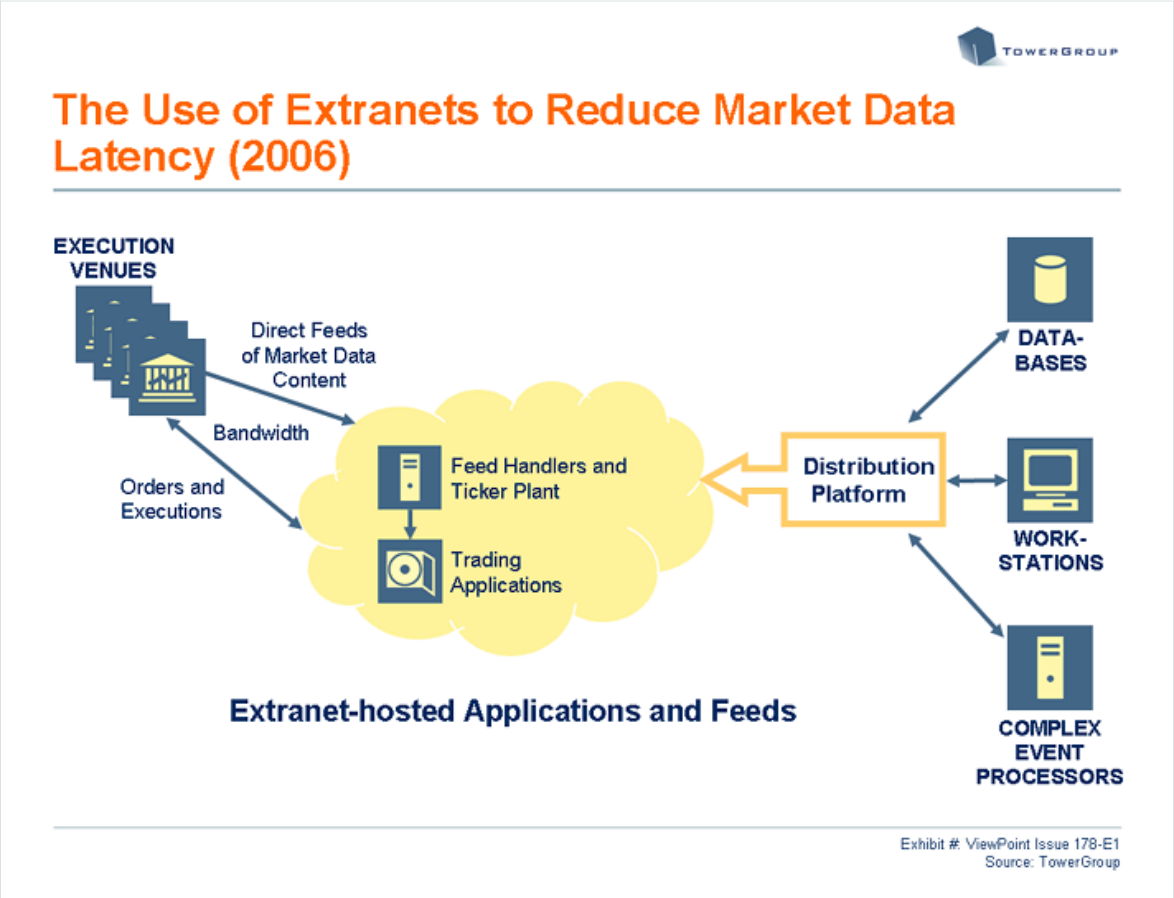

Exhibit 1
The Use of Extranets to Reduce Market Data Latency (2006)
Source: TowerGroup

The focus has shifted from homogenized market data content to the infrastructure that delivers the data. The ability to consume massive amounts of data, translate it into actionable opportunity, and get orders to the appropriate execution venue ahead of the competition is driving the need for speed. The winners in the current arms race will be determined by the depth of their pockets. TowerGroup estimates that US spending on the market data infrastructure will reach $3.7 billion (USD) in 2006 and by 2008 will exceed $4.3 billion as firms bolster their infrastructures to support electronic trading, new regulations, and increasing volumes of market data.

The Extranet Value Proposition Redefined

Extranet solutions have been available for years, so what makes them suddenly attractive now? Extranets have expanded and improved their level of service over time, but that is not the answer. The consumption of increasingly larger amounts of market data requires the largest trading houses (Morgan Stanley, Goldman Sachs, and Credit Suisse) to expand bandwidth or invest in bigger pipes. However, constantly upgrading the plumbing to accommodate the increasing flow of data and at the same time keeping latency to a minimum is expensive. That's where extranets come in. Extranet providers have already built the necessary infrastructure. They are specialists in networking and know when and how to scale to meet demand. Bigger pipes are only part of the answer, though; successful electronic trading strategies require the delivery of market data at the highest possible speeds. Direct exchange feeds reduce latency, but if that information is being transmitted over any distance, it loses its effectiveness. Ideally, the pipes need to be shorter, bringing the consuming application as close as possible to the data source. But real estate in major

market cities is expensive. Again, that's where extranets come in. They offer the ability to collocate feed handlers, ticker plants, trading applications, and order management systems close to the data source to further reduce latency. Extranet solutions are not new, but in the market data arms race, using them has become an alternative to buying bigger pipes and acquiring expensive real estate.

As with any decision to build or buy a solution, there is the element of control. Rather than being one of many customers and giving control of mission-critical applications to a third party, larger firms have crafted composite solutions. Although these firms may not use an extranet, they still rely on the same level of technology, raising the question of how much expertise should be on the payroll.

When considering whether or not to use an extranet provider to reduce market data latency and trade-related latency, decision makers should look closely at the ability of their extranet provider to deliver a scalable and flexible solution. In the equity markets with increased transparency, spreads are tightening, resulting in more transactions for smaller share amounts. Market dynamics are changing as more and more asset classes trade electronically, creating even more market data and requiring greater bandwidth. Any decision to select an extranet provider must factor in current and future capacity requirements.

The extranet providers are sometimes charged with having out-of-date telecommunications technology that they have not upgraded as quickly as they should. Whether or not this is true, any client-to-vendor relationship is all about managing expectations. Service-level agreements set expectations and provide metrics by which the extranet vendors can be tracked. Extranet users must have the discipline to monitor throughput speeds and latency levels to ensure that they remain within those initially agreed upon. Any deviation needs to be brought to the providers' attention for remediation.

The downside of using an extranet is potentially having less control, depending on how the firm utilizes it, and needing to make sure that the vendor selected has the capacity to keep up with bandwidth requirements. While not trivial, these concerns are largely ameliorated by the potential benefits of reducing latency and achieving economies of scale through extranet utilization across the four primary points of latency.

Summary

Firms are focusing on minimizing market data latency and as a result are questioning how they can get the most bang for their buck. Determining whether or not the infrastructure improvement is beneficial depends on the business model of the firm. For firms that are transacting business within an electronic model like algorithms, the improvement costs have to be weighed against missing executions because of millisecond delays. Clients such as hedge funds require speed, and if a broker-dealer cannot satisfy their requirements, they will find another one that will.

The cost of initiating and maintaining direct exchange connections is not trivial; each connection is different from the last and will require its own plumbing. And although the costs for direct connectivity and proprietary infrastructures do provide an element of control, that same control has to be evaluated against cost and time to market. Charges of using legacy telecommunications technology aside, extranet solutions can provide institutions with options to upgrade their technological capabilities because the most effective integration of internal and external solutions permits consistent incremental enhancements to their systems. Successful integration with extranet solutions would not only allow firms to concentrate their resources on core businesses but also enable a market data infrastructure that will become the model for the future success of the brokerage business.