Two years ago, Merrill Lynch had to tear down some long-standing IT and business silos before it put market data experts at the trading desks to monitor the speed and quality of all the data being piped in. "It was a new model for our business, as this had traditionally been completely an IT function," says Mike Stewart, managing director and head of global portfolio and automated trading at Merrill Lynch in New York. "This was done in partnership with IT."

Today, the surge in automated-trading strategies has put so much emphasis on getting fast and accurate - did we mention fast? - data that the kind of team approach to information technology that Merrill and other securities firms are taking has become necessary for survival. Financial institutions are measuring the speed at which data is delivered from the point when it leaves an exchange to the moment it arrives inside an analytic application and fires off an order. The slightest delay could make an automated trading application or algorithm price a security incorrectly, costing clients and the firm.

Because automated trading applications are so sensitive to data latency, an increasing number of Wall Street firms are bringing in direct-exchange feeds from stock exchanges and electronic communications networks (ECNs), as well as futures and options markets, to populate the data in specific trading applications more quickly. In the case of algorithms, brokers crunch real-time data continuously via analytic engines and generate "interval statistics," such as one-minute, five-minute and 10-minute bid-offer sizes, as well as spreads and volatilities, which then interact with historical databases. All of this must occur in milliseconds for the algorithm to capture opportunities before an order is canceled.

With little tolerance for latency, companies are investing in their market-data infrastructures and taking control of managing their data internally - even if this means installing ticker plants, feed handlers and middleware to process, cleanse and redistribute each exchange feed internally into trading applications.

The trend is being driven by the surge in program trading, algorithmic trading and other types of automated trading strategies that detect latency faster than a human eye. Programs that scan ECN order books - which display multiple price levels for each security - need to see every "tick" in order to make trading decisions in milliseconds. And, options market-makers use automatic quoting to calculate their bids and offers, which they transmit to the options exchanges, based on movement in the underlying stocks.

"Every time an order is entered or canceled in the order book, it changes market data," says Larry Tabb, founder and chief executive officer of The Tabb Group. "The inside bid changes, you recalculate a whole chain of options and those options are listed on multiple venues - plus you have puts and calls and multiple strike prices."

At Merrill, Stewart works in partnership with Ed Keenan, Merrill's chief technology officer for global equities, to make data a core competency of the business unit.

Over the past year, the firm has focused on the problem of market data latency in connection with the firm's build-up in options market-making and automated trading. It has tackled the issue with two different approaches.

First, the firm receives price feeds directly from exchanges and ECNs and uses them to build the equivalent of a montage, or consolidated view, of prices. Second, Keenan is exploring ways to continue utilizing feeds from data vendors while eliminating some of the hops that the vendor takes when it consolidates the data. That requires building systems across both companies' hardware, software and network architectures. "We're still working with some of the vendors to see if we can essentially eliminate the latencies of their standard feeds," Keenan relates.

Merrill isn't alone in its quest to reduce latency. Other brokerage firms, proprietary trading desks and hedge funds are looking for alternatives to circumvent traditional consolidated-quote vendors, too.

"Data is oxygen," says Rob Flatley, managing director of electronic trading services at Banc of America Securities. "We go right to the floor for ours." Flatley's group takes in direct-exchange feeds to fuel a direct-access trading service, which it provides to smaller broker-dealers and their clients. It acquired Direct Access Financial Corp. in February to launch a direct-access trading operation, and now it runs a data-access center in Dallas with screens that monitor the data coming in from all the ECNs and futures and options exchanges.

Firms have two choices when they bring in direct market data: build the IT factory of ticker plants, feed handlers and middleware platforms to manage it, or hire vendors to do it for them. Banc of America wrote its own feed handlers to receive Level I and Level II data direct from Nasdaq and other stock, options and futures exchanges. Flatley finds data from the exchanges "faster and cheaper," and the company prefers itself to manage all the cancels, replaces and update messages that come in from exchanges.
The trend could spell trouble for big-market data vendors such as Reuters and others that supply consolidated market-data feeds. Reuters recognizes the risk and is working on a direct-feed strategy of its own. But it's not panicking. "We've seen this movie before," says Peter Lankford, senior vice president and head of enterprise information systems at Reuters. Ten to 15 years ago, Wall Street firms spent millions to build their own ticker plants and did all the processing. "Gradually, it was no longer a competitive differentiator for them - if it ever was - and it became a cost issue," Lankford says. A lot of them had their own market-data system, and almost all of them now have a commercial system, he notes.

One element that's clearly changed from a decade ago is the volume of data that the entire market is attempting to digest. All those data messages generated by computerized trading create a tsunami of traffic, especially in options trading. The Options Price Reporting Authority (OPRA) - which aggregates all the quotes and trades from the options exchanges - estimates that peak rates will reach 62,000 messages per second by 2005, double the 31,000 messages per second it reached in February. Consolidated-quote vendors have capacity constraints and are beginning to use techniques known as "conflation" to filter the data so as not to transmit every quote update. This could push financial users that need to see every tick or canceled order toward direct-exchange feeds.

For all these reasons, the pendulum appears to be swinging back toward market-data management as a core competency.

Eliminating the Hops

The logic behind taking in direct-exchange feeds is that bypassing the consolidator reduces the number of "hops" that the feed makes before arriving at the client's premises. "Certainly, a vendor network is going to add tens of milliseconds, some add hundreds of milliseconds, and it could add up to thousands of milliseconds," contends Ron Vertappen, president and CEO at Wombat Financial Software, of Incline Village, Nevada. Wombat is one of the niche players, along with the likes of HyperFeed Technologies, Infodyne and CMS Web, that are competing to offer software and services to enable direct-exchange feed operations.

Latency is often most pronounced during peak times in market activity, such as at the market opening and just before the close. "Anytime there is a spike in activity, [that's] when the composite feeds are going to be slower, and that's where it's the most important because that's when there is the most opportunity," says Mark Frank, managing member of InTrade, a New York-based proprietary trading firm that engages in statistical arbitrage involving futures trades.

InTrade plans to use more direct data feeds. Currently, InTrade subscribes to a consolidated feed from Comstock (acquired by Interactive Data), which aggregates the feeds from the various market centers. Comstock pumps the feed into a price server that various automated trading applications log on to. InTrade also has a direct T1 line to the Chicago Mercantile Exchange's (CME) Globex electronic-trading workstation. Frank says the firm clearly sees latency on futures data between what it sees on the Globex screens versus Comstock.

In September, Aegis Software, which supplies InTrade's automated trading platform, Athena Gateway, plans to pick up a direct feed from the CME using Tibco middleware. InTrade will then plug the direct CME feed into the same price server that now receives Comstock's feed so that automated trading applications can process the direct feed.

InTrade's first priority is to bring in a CME feed for futures, since Frank says futures feeds are delayed more than securities feeds. Second would be to take in feeds from each of the ECNs, and the third priority would perhaps be to acquire Nasdaq's feed directly and potentially the NYSE's feed via SIAC.

Extra Costs: Formatting, Telecom & Backups

Though faster than traditional feeds, direct-exchange feeds are also more expensive and complex, and there's a lot of work that goes into processing, cleaning and formatting the disparate data sources. Traditional consolidated-feed vendors pull in the raw exchange feeds, deal with each exchange's protocol and then normalize the feeds into a single format. They also handle data cleansing.

For this reason, consultant Bill Cline, managing partner at Accenture, says direct-exchange feeds are not for everyone. "Sure, the big broker-dealers have invested and will probably continue to invest in on-site ticker plants," he says. "Only they are going to benefit from getting something 200 milliseconds faster." Cline notes that it's expensive and complicated to read exchange feeds, including sorting out bad ticks through range-checking and other means.

InTrade's Frank flags two additional costs: developing programs to interpret various formats for each data source, and the infrastructure cost of telecommunications and redundancy. "In today's world, you have to worry about all the things that go wrong. Backup systems and T1s multiply the cost," he says. So to replace one consolidated feed, a firm might need to bring in two T1s to its primary site - and two more into the backup site. "Now, you need four lines for every feed you're taking in. It gets very expensive," Frank warns.

Merrill's Keenan acknowledges that there's added cost, so a brokerage needs to be able to put the data to effective use. "The offset to that expense occurs when you are using those prices in real-time trading - potential mispricing is expensive as well," he says. "If I'm too late to market on my options quotes and others are there sooner, then that is going to be reflected in my P&L."

But Merrill isn't applying this low-latency philosophy to all its data needs. It will continue to lean on consolidated data feeds where speed isn't vital. "We're leaning to the low-latency feed for a set of applications that are very sensitive to real-time pricing for quote generation, but not pushing it for other applications where it's not needed," Keenan says.

InTrade's Frank says that not every user needs low-latency data, so he expects firms to continue to subscribe to consolidated data feeds as well. "Program trading and algorithmic trading is definitely on the rise, but it's not the only thing," he says. Frank says InTrade still finds the Comstock feed very valuable, though he acknowledges its role could change over time. "We're looking to address each component of our consolidated feed and remove any latency," he says. If that succeeds, InTrade still would likely use Comstock, but it may become more of a backup source.

Data Latency Busters

The financial industry's interest in low-latency data and direct exchange feeds has given rise to a new breed of market-data infrastructure provider: firms with expertise in ticker plants, data cleansing and middleware to distribute feeds in-house.

The main players include HyperFeed Technologies, Infodyne, Wombat Financial Software (formerly Wombat Consulting) and CMS Web. They're competing with the traditional consolidated feed vendors such as...
Reuters is working on its own direct-exchange feed product, set to make its debut next year. It is planned to run over Reuters Market Data System (RMDS), Reuters' latest middleware platform, and will enter into testing with clients in the fourth quarter, says Peter Lankford, senior vice president and head of enterprise information solutions for Reuters.

Reuters is working with customers to integrate direct-feed technology from independent software developers, many of which are members of Reuters' Developer Program, which enables them to write to Reuters' RMDS platform. The developers say they can bring direct feeds into all of Reuters' middleware platforms - Triarch, TIB Market Data Distribution System, TIB Rendezvous and the current RMDS.

The challenge vendors have to address is taking the direct-exchange feeds into a system and normalizing their formats to look like a consolidated feed, then integrate that with the customer's infrastructure without slowing it down. "You're not talking about one feed handler feeding one application," says Guy Tagliavia, president of Infodyne, based in Park Ridge, Ill. Tagliavia says the value proposition is to take in multiple data feeds through a ticker plant and feed a broad base of applications.

As you might expect, which vendor has the fastest update rates is a considerable bone of contention. But buyers generally do their own analysis. "We tend to apply real market conditions and benchmark it against existing internal solutions," says Ed Keenan, chief technology officer, global equities, at Merrill Lynch.

Reuters' Lankford says that Reuters' direct-feed product is on schedule, and he contends it will let companies get the direct-feed option without a lot of the hassles. "The model in the direct-feed solution that we are working on is to provide these feeds as appliances, where it is completely offered as a managed service," Lankford says. Several niche vendors say they're exploring options for offering managed services as well.

**Direct Feeds Create Considerable IT Challenges**

A company that wants direct data from various exchanges and other venues, such as ECNs, has to buy or build an information factory that can gather data from various sources and put it into an accurate and useful form. Then, notes Larry Tabb, CEO of research firm The Tabb Group, it must redistribute the data to the automated trading applications - all within milliseconds and without going down.

It's easy to see why only firms that have very specific needs for truly real-time data would take on the IT expense and complexity of direct-data feeds. And even those that opt for direct feeds often turn to vendors to provide the technology necessary to pull it in and integrate it with internal systems.

The IT system necessary to grab market data from various sources and route it directly to a firm, called a ticker plant, consists of a number of distributed applications that sit on several servers. First, firms need feed handlers that read each information source's format. Then, they need to convert the feeds into a single data format. The next element is a middleware layer that provides integration with the ability to feed the data into customers' existing systems.

Tabb points out that ticker plants generally are built into cache memory and aren't written to disk, so there must be a way to recover data if the system goes down in order to avoid losing any ticks. In addition, firms need to purchase a tick database to store the real-time as well as historical data.

Error checking also is very important if a firm is trying to trade directly off the data. That's something traders can assess intuitively, but it is a complex computing task, according to Tabb.

"If someone looks at the data, they will usually see if there is an erroneous tick," Tabb says. "However, if it is being used directly by an algorithm or a trading model, erroneous data may generate erroneous trades."