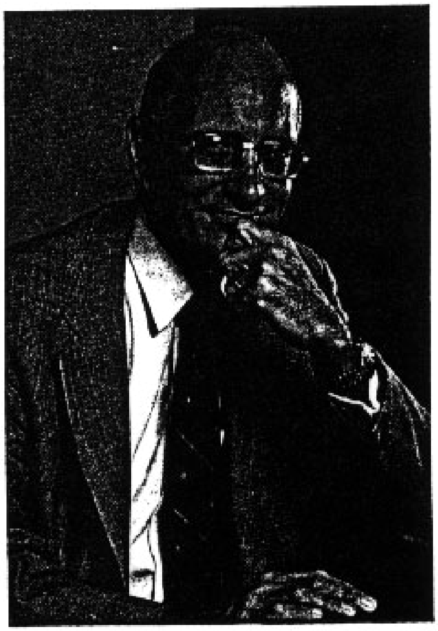
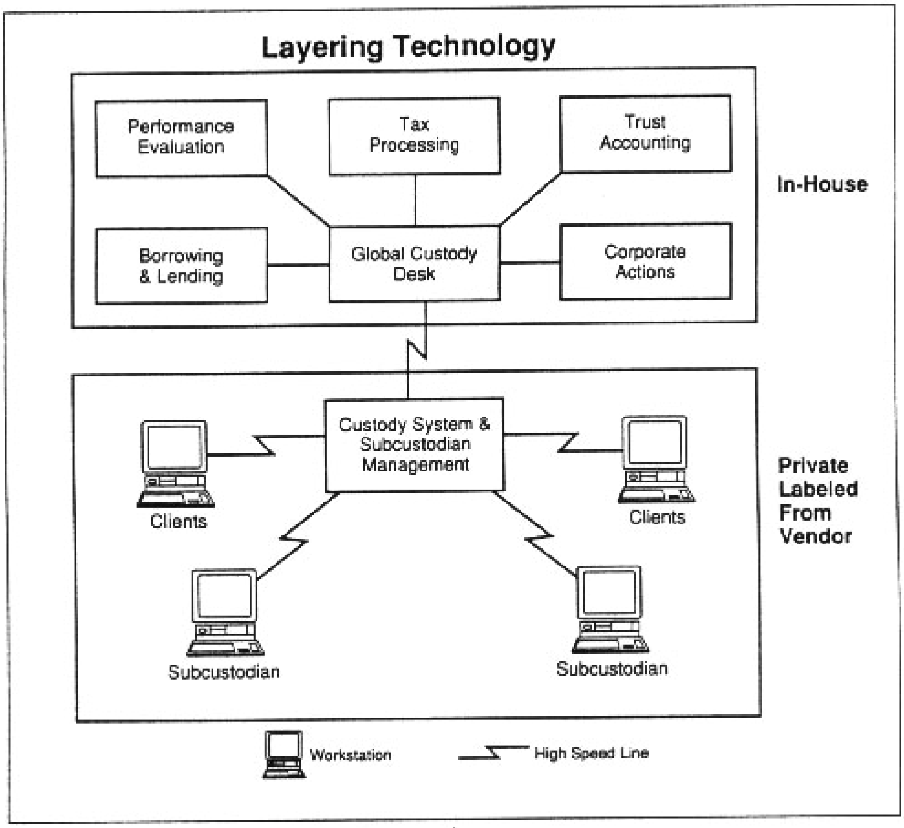
 By Geoffrey Heal & Graciela Chichilnisky

THE WONDER YEARS

NEW COMMUNICATIONS TECHNOLOGY IS SET TO ALTER THE WAY INTERNATIONAL INVESTORS DO BUSINESS.



Goldman's Mann: international must catch up with domestic



NEW YORK—Two major technological breakthroughs—mini-supercomputers and high-speed networks—are forever altering today's data and communications landscapes. Together, they will revolutionize global custody services and cut costs to a fraction of what they are today. In fact, the price war has already begun; IBM has led the way, slashing the price of their mini-supercomputers by 60%. Expense aside, these new technologies will soon make available the myriad of services that global custody customers desire but that no one is currently offering.

Securities trading necessitates a marriage of communications and data handling. Data handling is primarily a matter of collecting, saving, retrieving, and disseminating information swiftly, safely, and efficiently. Communications cannot drive the business by itself. Messages to and from the broker, instructions to foreign exchange banks, custodians, and subcustodians are important; but a rationale, a ritual as to how things must be done—in what order, and by whom—is vital as well. Intelligent instructions are at least as important as electronic speed.

This coordination is particularly important in regard to global custody. Global custodians must orchestrate communications between many banks—collecting, saving, interpreting, and distributing the information they provide to a vast number of clients. These operations are complex and demanding—the sort of "orchestrated" parallel ritual that may best make use of high-speed networks and powerful desktop machines.

The back office expert may be modeled electronically. In fact, Salomon Brothers seems to have accomplished just that. "Salomon's new DOGS systems faces the user every morning with a screen that alerts him to possible delivery problems and prioritizes the tasks to be completed," says Robin Lauezzari, vice president of international operations at Salomon. "Say that Salomon has sold $500,000 of Japanese equities to institutional investor X that in turn Salomon had bought from institutional investor Y for delivery in Tokyo. Delivery of the yen equity from Y to Salomon is expected two days before the settlement date of the trade with X. Such short positions are highlighted first thing in the morning, and the user will be offered a menu of actions. The screen also shows the probability that firm Y will not deliver the yen equity on time. This probability is evaluated from experience. If the probability exceeds a certain value, the system will automatically flash a red light at the user and prompt him to ini-

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The supermodem factor

It's a bird! It's a plane! It's...

Modems are the heart of any communications system. The word itself is an abridgment of "modulator demodulator"—a device that transmits data by modulating a carrier wave, and that receives data by demodulating the wave. Data is transmitted in the form of vibrations—similar in manner to the way phonograph records convey music. Forthcoming, but not yet available, are ISDNs (Integrated Services Digital Networks), which will transmit digitized data—the form used for storing music on compact disks.

Until recently, the only interesting characteristic of a modem's performance was how swiftly it could transmit data. This is measured in baud, or bits per second. Eight bits are used by a computer to designate a letter or a number, so a 1,200-baud modem sends 150 letters or numbers per second. Twelve-hundred baud is the typical speed for modems used with desktop machines today. At this speed, in principle, a SWIFT format settlement instruction can be sent in under ten seconds. This theoretical speed is seldom achieved because of the headers and trailers used in file transfers. (Headers and trailers are labels used to identify and route data in networks.) Also slowing down transmission is the frequent need to resend, because data is corrupted in transfer. To appreciate this, think of the problems that you can have with a telephone conversation on a noisy international line—echoes, noise, and static. Any of these can corrupt computer-to-computer transfer of data, because the data is transmitted as a series of electrical impulses.

Communicating computers overcome this problem by running software called error checking communications protocols. These programs check whether what B received from A is in fact what A sent to B, and they resend the data if there is a discrepancy.

The latest PC and workstation modems—supermodems—take over from the software the function of checking and correcting errors in transmission. This is done by hardware—specially programmed chips—not software. Hardware is always a faster and more reliable way of achieving complex tasks than software, as it is specialized to a particular function. In addition, supermodems practice data compression. Again, this is a function performed today by specialist software, making it slow and complex and hence seldom used. Data compression involves recoding the data so that it can be represented in fewer symbols and so transmitted in a shorter time. It repacks the symbols to be transmitted so as to use the electronic space more efficiently. Data compression can compress a typical text file to one-quarter to one-third of its initial size, and so save two-thirds to three-quarters of communications time and costs.

With error correction and data compression built in, a 2,400-baud modem can send data to a similar modem at an effective rate approaching 9,600 baud without error. This is probably ten times faster than the effective transfer rate with the currently standard 1,200-baud modems. This in turn means that your network usage can be cut by 90%. For a firm using public data networks to transmit large numbers of settlement instructions internationally, the payback period to replace a 1,200-baud modem with a 2,400-baud supermodem costing $300 to $600 could be as little as a few weeks. With 9,600-baud error correcting and data compression modems selling for $500 to $1,000, the savings can be even more striking.

There is one catch with supermodems—the standardization problem. A 2,400-baud modem can only communicate at 2,400 baud with another modem rated at 2,400 baud or more. If your agents have 1,200-baud modems, then your investment may be wasted. Be assured, however, that a 2,400-modem can talk, albeit slowly, to slow modems. So if some agents have fast modems, and some slow modems, an investment in fast modems may still pay off.

Note also that a modem with error correction can only practice error correction when communicating with another modem with error correction built in. Worse still, there are two widely used error correction standards—MNP4 and CCITT V.42. A modem with MNP4 error correction can only practice error correction with another modem using the MNP4 error correction standard. Fortunately a CCITT V.42 error correction modem can error correct with either type of modem. Exactly the same is true of data compression—there is an MNP5 standard and a CCITT V.24bis standard. The CCITT V.42bis modems can compress data with either type of modem, but the MNPs only compress data between each other.

The bottom line

Supermodems can slash communications bills and cut hours off the time needed to download data from agents and clients. They are a good investment, but agents and clients have to use compatible modems. In the main financial centers, this will not be a problem. But a Turkish agent may have difficulty in getting the right modem. It could even be worth a banker's while to take one to Istanbul when next visiting there!

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tiate the process of borrowing the Yen equity for delivery before the settlement with X."

This procedure represents more than mere communications; it represents smart business too. Instructions must follow a precise order, a rigid business rationale. Above all, logic must prevail: for example, if you haven't heard from your subcustodian confirming your instructions on a trade to settle in two days, then send another set of instructions and request confirmation. If for any reason the trade is in limbo, delay the necessary forex transaction. Double check, try to prevent known problems, follow through on your checklist of problem areas. This "intelligent communications task" is by nature one in which record-keeping and information must be shared with others, in which databases must be simultaneously updated on several continents, and in which it really pays to process trades simultaneously in New York, London, and Tokyo. Indeed, the more decentralized your information is, the more efficient your experts will be. Your Tokyo office will perform better if it has immediate access to the same information as your New York office. Mini-supercomputers—small, fast, inexpensive, and flexible—are made to order for these parallel tasks.

Yet any decentralized system is only as efficient as its communications channels. Supermodems multiply many times the speed of communication between existing processors via existing networks. This is accomplished through data compression and error correction, as well as through

Continued on page 142

Speed merchants

High-speed networks come of age

Nothing will lower the costs and raise the potential of communications as much as the effective integration of fiber-optics into long-distance networks. Currently, most long-distance communications signals are sent as electrical impulses down copper wire.

In a fiber-optic network, the signal travels as a pulse of light along a thin glass fiber. As Einstein taught the world, nothing goes faster than light—186,000 miles per second. At that rate, it takes only eight minutes to get from the sun to the earth. The data throughput that can be achieved with fibreoptics borders on the incredible: for example, with a fiber-optic link the entire *Encyclopedia Britannica* can be sent from London to Tokyo in two seconds.

With such extraordinary performance available, network capacity will be superabundant. Equally striking, glass fiber is cheaper than copper. So the expectation is that widespread use of fiber will lead to almost unlimited low-cost high-speed communications. Everything that is now done with communications will be done at a fraction of the current cost and in a fraction of the current time.

More important will be the new possibilities opened up. Clearly there will be an enormous boost to distributed and decentralized processing architectures: it will be cheap and easy to send information to anyone (agent, client, trader), anywhere, for them to work on it themselves. Processing on networks of small machines communicating with each other will replace centralized processing on large machines. It will become realistic to maintain separate but fully synchronized databases in London, New York, and Tokyo.

Equivalent decreases are occurring in the cost of desktop computing. The amount of computer power bought per dollar spent on workstations roughly doubles every 18 months. IBM recently announced decreases of up to 60% in the prices of its workstations.

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With immense data handling power on each desk, and instantaneous and inexpensive communications links, there will be little advantage to centralized processing. A global custodian will no longer produce reports for its clients on its mainframe and download them to the clients. Clients will have powerful database systems on their desks, and the custodian will just send all data relating to a client to that database, and leave the client to analyze it in whatever way is convenient.

Large centralized global custody systems will become things of the past: the global custodian will become more of an electronic post office and sorting office, routing data to and from agents and clients after making basic consistency checks against positions. The cost differential between global and domestic custody will decrease, and custodians will be looking for new services to maintain their margins.

These cheap, ultra-fast communications and cheap, super-powerful desktop computers are changing totally the preferred architecture for global custody computer and communications systems. Some foresee that the global custodian will do less for clients: it will pass entire data sets on to them and leave them to do their own analysis in-house. Here less is more, for although the custodian will do less work, the client equipped with its own workstation and database will get more value from the data then it previously got from the custodian's reports.

So global custodians need to improve client interfaces, encourage decentralization to client desktops, and focus on where they can really add value. Probably this is in arcane areas like tax reclamation, in managing and monitoring subcustodians, and in providing banking and trading services in an integrated package.

Continued from page 93

higher basic data transmission speeds. SWIFT messages are transmitted in a universal payments language; but some are asking whether the SWIFT network is as speedy, efficient, and cost-effective as that offered by mini-supercomputers, and whether SWIFT will be superfluous when high-speed networks become available. Here, one must distinguish between the two communications services offered by SWIFT. One is a universal language, the so-called "standardization" that is so valuable when parties wish to understand each other's messages without translating them. The second is the actual message delivery. Yet SWIFT's networks are by no means the state-of-the-art when speedy communications are called for. Even as SWIFT 2 is made to run on Northern Telecom's X.25 network, fiber-optic networks are stealing the show. Fact is, in five to ten years time—approximately the time it took to bring SWIFT 2 to life—virtual networks running on fiber-optic cables will outstrip by a large margin the speed and delivery capacity of today's X.25 networks—at the same time undercutting the cost.

Installation costs remain the principal reason for using SWIFT. Interfaces are in place already. Most correspondent banks use SWIFT, as do most broker clients. New installations take time.

As more subcustodians install automated systems and more markets conform to the Group of Thirty's recommendations, clearance and custody may become more of a buyer's market. At that point, it will be possible to private-label a specialized network management facility without buying expensive network services from an established bank. Inexpensive high-speed networks will enable specialized vendors to offer "turnkey" global custody networks at a fraction of today's prices, and even give them an information provision capability that today's global custody services lack.

For instance, few custodians today can give a client access to the same type of portfolio information on a client's own terminal that a custodian has. Fewer still can give clients corporate action reports and the ability to query them on-line. A client which wants portfolio reports in all currencies, updated for market changes throughout the day for all countries in which it trades, is bound to be disappointed. Likewise the client which wants the ability to analyze this data historically over a two- to three-year timespan, or who wants to monitor its position in each geographical area or in each stock sector will be frustrated. There will be no joy either for clients wanting immediate reports of all settlements in all the relevant currencies and of all open positions, or for clients wanting to analyze their portfolio of bonds versus equities for risk.

Clearly, clients would switch to a service that offered such capabilities. Nor need it cost that much. Indeed, the new technologies of mini-supercomputers and high-speed networks will make this simple and easily affordable if the overall technology architecture adopted by the global custodian is right. The key is getting it all straight, doing it in a coordinated fashion, meshing properly in-house accounting and analysis systems with decentralized processing in all offices and with all clients and subcustodians. Brokers must get the technologies right as well. "The analysis of international synthetic asset-based securities and multi-currency trading must be updated on a par with domestic techniques," says Goldman Sach's David Mann.

The technology layers of such a decentralized system are straightforward [see "Layering technology"]. The key issue is that, while accounting and analysis systems may live physically at a client's site, communications and subcustodian management systems may live at the site of a vendor who can utilize increasing returns by servicing many users at once and charging rock-bottom prices. This way, one of the largest costs of the global custody industry today—the spare capacity of global custody systems that can run up to 50% to 60% even at busy custodians—can be eliminated.

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