To grow a new fiber-optics business at Internet speed, the Canadian giant gave up manufacturing and turned its vendors into strategic partners.

From Vertical to Virtual

How Nortel's Supplier Alliances Extend the Enterprise

by Lawrence M. Fisher

Founded in 1892, four years after the invention of the telephone, Canada's Nortel Networks Inc., known from the mid-1970s until recently as Northern Telecom, produced switches and other electronic hardware that long-distance carriers and local telephone companies used to route voice calls over copper wire. This was a solid, stable business in which sales growth reliably equaled population growth, about 3 percent a year, sometimes a little better.

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Nortel had a traditional line-of-business structure, with five units, differentiated by product, acting like semiautonomous companies, each with its own profit-and-loss responsibility. The company was heavily vertically integrated, producing everything from raw semiconductor components to circuit boards to finished products. Competitors, mostly captive manufacturing units of other telecommunications companies, had similar structures.

Then about two years ago Nortel's senior management had an epiphany: The future was in fiber-optic networks, which transmit data as pulses of laser light over optical fibers, rather than as electrical currents over copper wires. As the telecommunications companies raced to build out the Internet, Nortel saw an opportunity to steal a lead in this emerging market.

Its longtime competitor, Lucent Technologies Inc., was heavily married to the old telephone networks, and the upstart Cisco Systems Inc. was primarily a maker of equipment for managing networks within an enterprise, with scant credentials in the telecom fray.

Producing fiber-optic systems for high-capacity data and voice networks was a business with triple-digit growth potential. But it was a market in which the old Nortel could not hope to become a leader operating as a traditional manufacturer.

The customers for this new market were in many cases Nortel's old telecom customers, but they had a new sense of urgency, desperation not to be left behind in a once-in-a-lifetime market shift. Meanwhile, there was a new group of customers, aggressive startups moving at light speed, ordering first and asking questions later. The fast-moving competitors, exemplified by Cisco, were outsourcing heavily, and rapidly acquiring companies and capabilities to fill out their product portfolios.

"We had to get out of our customers' way," says Clarence Chandran, Nortel's chief operating officer. "We were constraining them."

Nortel decided it had to become more like Cisco. And it had to happen virtually overnight. "It was a strategic imperative," says Frank Dunn, Nortel's chief financial officer. "We asked, 'How could Nortel be a $20 billion company going to $40 billion within 24 months,'" he recalls. "Why do companies fail? They fail because their processes don't scale. We knew we'd never be a $40 billion company with our existing processes."

Becoming more like Cisco meant swapping vertical integration for virtual integration and using acquisitions to maintain a technological edge over competitors. Cisco is known for its aggressive acquisition record, but those acquisitions were nearly always for innovative technology and intellectual assets, not manufacturing or distribution capabilities. For those functions, Cisco leverages a web of alliance partners: suppliers, distributors, contract manufacturers, and commerce and infrastructure services providers. For this reason, until recently, Cisco's return on invested capital was about twice that of major competitors Nortel and Lucent.

Following the Cisco model, Nortel began aggressively selling off its production facilities to contract manufacturers like the Solectron Corporation, essentially revamping its entire production and supply chain management processes and building direct communication and response links from customers to suppliers.

Like many old-line manufacturers, Nortel traditionally had arms-length relationships with its parts vendors. But for the company to scale its business at Internet speed, these vendors had to become strategic partners. Nortel would still sell hardware, but the core of its value

would be in its proprietary technology, not in manufacturing. For manufacturing, Nortel has now turned to its network of subcontractor partners.

Clearly, Nortel's strategy is working: It now has a 43 percent share of the torrid market for optical networking equipment, which is expected to triple, from $31 billion in 1999 to $90 billion by 2003, according to RHK, a telecom research firm based in South San Francisco. Nortel expects optical Internet revenues to grow in excess of 125 percent in 2000 over 1999, to exceed $10 billion. Analysts say this is substantially greater than Cisco's optical revenues, and indeed Nortel's total revenues are higher as well, although this number still includes sizable sales of traditional electronic telecommunications equipment, a market in which Cisco does not participate.

Companies like Cisco and the Dell Computer Corporation are regularly, and rightfully, considered exemplars in building networks of strategic business partners collaborating via the Internet — variously known as a business web or an allianced enterprise. But Nortel's impressive conquest of the optical Internet equipment market is a classic case of how the allianced organizational and operational model helped a traditional manufacturer achieve rapid and transformative change.

Although Nortel's shares took a significant hit when third-quarter 2000 results disappointed analysts last October, and the following month the company warned first-quarter 2001 revenue would fall below Wall Street estimates, sales are still growing faster than the industry as a whole. Further, analysts give Nortel high marks for its increasingly nimble and efficient operation. "The execution of supply chain management has been flawless," says Paul Johnson, an analyst with Robertson Stephens & Company. "Everyone gives them an A-plus for their bet on the technology, but the logistics are just as important."

From Vertical to Virtual

Nortel's first step was a controversial one. In August 1998, it paid $7 billion to acquire Bay Networks Inc., the number-two maker of computer networking equipment (behind Cisco). Buying Bay gave Nortel instant entry in the market for routers, specialized computers that direct traffic on a network, and the core of Cisco's business.

But Wall Street analysts hated the deal, and pummeled Nortel shares. They viewed Bay as a perennial chimp, to Cisco's triumphant gorilla, using marketing consultant Geoffrey Moore's popular analogy. The abrupt departure of David House, the charismatic ex-Intel executive who had spruced Bay up for sale, only confirmed

suspicions that Nortel had bought a loser. And in truth, Bay under Nortel is no closer to Cisco than it ever was.

But the deal inoculated Nortel with a bit of Silicon Valley, most importantly a culture where stock options are broadly held and a major part of employee compensation. Nortel executives say adopting Bay's options policy throughout the company helped overcome the risk aversion of many longtime employees because it gave them a share in the rewards. Buying Bay also taught Nortel executives how an acquisition is done, a lesson they have applied in subsequent deals. In short, Bay gave Nortel the springboard it needed to definitively move beyond old-line manufacturing.

In 1999 and 2000, Nortel continued to make headlines for its acquisitions, as it spent more than $11 billion in nine months to acquire a raft of technology companies. But like Cisco, what Nortel was buying was proprietary technology and talented people, not production capacity, and during that same period, the company divested 15 manufacturing sites and transferred 9,000 employees to contract manufacturers.

With much of its manufacturing capacity sold to contractors like Solectron, SCI Systems, and Sanmina, Nortel kept in-house production of only the most proprietary components, such as semiconductor lasers. These contract manufacturers allowed the company to ramp up production exponentially without massive capital outlays or new construction.

As a large original equipment manufacturer (OEM), Nortel had long farmed out tasks like circuit board assembly to contractors. But its relationships with these suppliers were distant and tactical in nature. For the new processes to work, Nortel's communication with its suppliers had to become much more frequent and open. It

fell to a team led by Chahram Bolouri, Nortel's vice president of global operations, to rewrite the book on supply chain management.

Despite Dell's success in handling supplier relationships, Mr. Bolouri says, the company's approach was not applicable to the optical networking market. "Relative to the Dell model, which we benchmarked, our needs are a lot more complex," says Mr. Bolouri, who is based in Saint-Laurent, Quebec, just outside Montreal. "When you talk about networks, it's significantly different from making boxes."

Nortel and its competitors produce a technology called DWDM, for dense wave division multiplexing, which boosts the amount of data that can be carried on a strand of optical fiber by dividing the light into dozens of different colors, or wavelengths. Each laser can produce light at only one wavelength, which must be specified by the customer early in the ordering process, often before it knows its complete system requirements.

"Our supply chain has to be customer-centric," says Mr. Bolouri. "How we push capacity and throughput has to be considered in every element of our thinking. It can't be done through inventory because no matter how much inventory you have, you're never going to have the right wavelength."

So out went the five lines of business. In Nortel's new customer-centric model, each major customer has its own dedicated supply chain management team, which Nortel calls an order house. The order house is a virtual unit, in that team members are typically geographically dispersed and there is no physical plant. The order house works proactively with customers to understand their current and future needs, and communicates this information in real time with all critical suppliers. Nortel now shares customer data on an up-to-the-minute basis with its key suppliers, and meets with all of them at the senior executive level at least quarterly.

"In the past a customer like AT&T would have had to deal with five different order houses," says Dave Grant, Nortel's vice president for supply chain operations. "They would give their order to the account team. Operations would spend their time trying to buy things from each other, and we would get into bidding wars about who got to recognize the revenues. We eliminated all that. I took all of the order management people identified by product, threw them up in their air, and said, 'Now you work for the customer.' "

Implicit in the new process was a blurring of the traditional lines between sales and procurement, which prompted some predictable cultural challenges. In the past, "if you were based in Raleigh [N.C., a Nortel manufacturing site], you were a carrier guy, and now all of a sudden you were buying optical components," Mr. Grant says. "We had different processes for different products. Now it's based on what customers need."

In the old model, the procurement team responded to purchase orders from the sales team. In the new model, account managers work directly with network deployment staff at the customer to get an early read on what customer needs are. This information is given to the order management team, which shares it with key suppliers.

"Our focus is to make networks rather than products," Mr. Bolouri says. "We outsourced manufacturing; we did not outsource supply management. Contract manufacturers are doing the buying, but we now use our supply managers very differently. Their job is to understand the constraints they have with the suppliers on an end-to-end basis."

Intelligent Supply Chain

Major suppliers have noticed a rapid and substantive change in their relationships with Nortel. "Nortel managed to infuse intelligence in their supply chain, which to us was extremely valuable in terms of anticipating their needs and shifting our own mix," says David King, president of the semiconductor and optical amplifier group at the JDS Uniphase Corporation, in Ottawa. Before, he notes, "Nortel was an overwhelmingly large customer for DWDM components. Unless we had advance notice of their needs, we really wouldn't have even had the capacity in place. Because it was available nowhere else in the market, we did extremely well."

Other suppliers remember the old Nortel as very

"Everyone gives Nortel an A-plus for technology, but logistics are every bit as important," say analyst Paul Johnson.

bureaucratic and not particularly responsive. "It was a one-sided type of relationship. They would talk about partnership and a long-term commitment, but it really wasn't there," says Jure Sola, chairman and CEO of the Sanmina Corporation, a major contract manufacturer based in San Jose, Calif. "Today things are completely different," Mr. Sola says. "They tell you exactly what they're going to do, what they expect from you, and where you need to go." Because of more timely access to data, Sanmina has reduced its advance bidding phase with Nortel from six to eight months to four to six weeks. This way Sanmina can line up all the critical subcomponents from its suppliers in advance.

There has long been a dichotomy between how contract manufacturers view themselves and how they are actually used by OEMs. The contractors want to offer value-added services, like early product development consultation, but typically the OEMs use them purely to offload production, with little input in the process. Suppliers say the new Nortel has begun to listen and to implement their advice.

"They used to design in-house and you wouldn't know what they were doing, and then they would ask you to build it," Mr. Sola says. "Today they get you involved in early design, and you can go to production right away because the issues have all been resolved," he notes.

David Ticoll, a Canadian consultant with Toronto-based Digital 4Sight and coauthor with partners Don Tapscott and Alex Lowy of *Digital Capital: Harnessing the Power of Business Webs*, describes this capability as a shift from using supply chain management to constructing a customer fulfillment network. "This is a different mindset," says Mr. Ticoll. "An end-to-end fulfillment perspective moves the customer's demand signal all the way

upstream to raw materials suppliers. It provides downstream visibility into supplier inventory and capability, empowering the customer to make intelligent trade-offs and choices."

The Internet, of course, is what makes this end-to-end information visibility and sharing possible. As Mr. Ticoll explains it, a customer fulfillment network is created by the overarching organizational form he and his partners call a b-web — a business network of customers, suppliers, distributors, commerce services, and infrastructure providers that use the Internet to communicate and make transactions. "After examining the strategies of hundreds of digital economy organizations, we've concluded that b-webs are the new foundation for business model innovation," Mr. Ticoll says.

Strategic Partnerships

Gene Sapp, chairman and CEO of SCI Systems Inc., says Nortel now epitomizes what his company calls a strategic partnership. "Rather than have this happen piecemeal, Nortel bit the bullet with a very aggressive plan. They somewhat set the standard for companies that had traditionally been very vertically integrated but wanted to outsource."

For SCI, a Huntsville, Ala.-based company that supplies Nortel with electronic subassemblies, the major challenge of the new relationship was securing adequate supplies of chips and other basic components. "The supply chain was not quite robust enough, so we were constantly chasing raw materials," Mr. Sapp says. "We now collaborate with Nortel and our suppliers in real time using the Web and a lot of e-business tools," he says.

Indeed, Nortel is taking an active role in developing its e-business tools and service offerings. It is a founding

partner of e2open, a Web-based supply chain portal for the telecommunications industry. It also uses a variety of packaged e-business tools in its interactions with suppliers, including programs from Ariba, I2, and Calico. These programs, known as third-party tools in industry parlance, help Nortel's buyers manage component orders and aid Nortel customers in configuring systems.

But Nortel's day-to-day, real-time interaction with customers and suppliers is still managed by a homegrown program developed by Nortel's own software engineers. "In some cases the off-the-shelf packages outperform our own," says Ken Bradley, Nortel's vice president for supply chain management and procurement. "But they don't provide the capacity we need."

For more long-term strategic communications, Nortel has instituted a twice-a-year suppliers' forum, featuring the company's senior management, product development teams, and outside speakers. Mr. Bradley says the forum is an occasion for suppliers to hear the company's direction from its chief executive, John Roth, or Mr. Chandran; to give Nortel feedback on how it is performing as a customer; and even for competitors to network among themselves.

In the old days, Mr. Bradley says, Nortel tried unsuccessfully to hold events for suppliers — most did not come because they found it stressful being with competitors. Now, "they actually like the opportunity to see each other in a noncompeting forum," Mr. Bradley says. "Everyone told us we'd have a good first one, and then attendance would slide, but we just held our fourth and had more people than ever."

Suppliers say a key value of the forum is the visibility it gives them into Nortel's plans, which in turn gives them greater confidence in committing manufacturing capaci-

ty to Nortel's needs. "They show us where their particular market is going, their strategy, and what key roles people are playing," says Walid Maghribi, group vice president and general manager of the memory group at Advanced Micro Devices Inc. in Sunnyvale, Calif., which supplies Nortel with flash memory chips.

Mr. Maghribi also notes suppliers used to meet only with purchasing managers, or maybe the head of procurement. "Now you're listening to the head of the business. So when he presents the business's plans, you can make your own decision whether you believe him or not."

The forums are "a wonderful opportunity for Nortel to ask us how we think they're performing as a customer, and what they should be doing," adds Kurt Colehower, corporate vice president and general manager of the Nortel Networks global business unit for Solectron in Milpitas, Calif.

Forums are also a place where Nortel can explain its own challenges to suppliers. "We've been in this business a number of years, so we have suppliers that have grown with us. As a result of their association with us, they do well. The next step is to give them as much visibility as we have, so they understand we're not just asking for impossible stuff," says Nortel's Mr. Bolouri. "It's not us, it's the market."

Measures of Success

Nortel has used a variety of metrics to gauge the success of its new supply chain management process. For example, the time between receiving a purchase order and generating a shipping date used to be two weeks; now it's as little as 48 hours. Day sales outstanding, a measure of outstanding receivables as a proportion of sales, has dropped from 114 at the end of the second quarter of 1999 to 80

in the comparable period in 2000.

The sheer number of suppliers has dropped, too. "In 1996, we had 40,000 active suppliers," says Mr. Bradley. "Now 90 percent of our material purchases comes from fewer than 200 suppliers," he says. Total suppliers are still numbered in the thousands, but down by a factor of 10.

Nortel also has vastly fewer people working in the supply chain management function. "We had 2,000 people in supply management. We are down to 950 to 1,000," Mr. Bolouri says. "But the 950 are totally different people, with different skill sets."

In the old model, supply chain often meant commodities management, bargaining with multiple sources for the best price on raw components. Today, Nortel's supply chain staff works as a communications link between the company's customers and its suppliers, to determine proactively where the constraints are and find ways to work around them.

Unlike Dell, Nortel has not driven down inventory levels, which remain at about two months; it has shifted about half of its inventory from the factory floor to 41 logistics centers located around the globe. Delayed configuration, made possible by better communications with customers, allows the company to respond quickly to unexpected demand.

"Rather than worrying about gross inventory sitting on my balance sheet, I am worried about inventory sitting in my customers' networks waiting to be turned on," says Mr. Chandran.

Despite its dedication to transparent communications, Nortel's interaction with customers is not always just right. Nortel shares fell in November after the company warned that first-quarter 2001 revenue and earnings would fall below Wall Street estimates. The explanation was that major telecommunications carriers were scaling back orders after double-booking earlier in the year to avoid possible shortages.

Some suppliers say that while Nortel's speed and agility have improved dramatically, it is not a Cisco yet, especially in terms of transparent communication and rapid access to empowered employees. Decisions that are made in days by relatively mid-level management at Cisco can still take weeks to reach the top of the company at Nortel, one supplier says. Still, all agree the company has made impressive progress in a brief time.

"If you compare Nortel to some of the folks it views as its fiercest competitors, the company still has a long way to go," says Mr. Colehower of Solectron. "If you compare it to other 100-year-old, very traditional telephone companies, the change has been dramatic. There is a commitment at the highest level of the company to keep the momentum for the change."

Mr. Ticoll, of Digital 4Sight, says the comparison to Cisco is not entirely fair. "Cisco got to start with a much cleaner slate because Cisco was basically building a business, whereas Nortel had to first dismantle the old way of doing things," he says. "It has proven extremely successful at it, probably exemplary for an old line company. So in a way, Nortel's achievement is much greater than Cisco's." **+**

Resources

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