

# ATM Reaches Middle Age

Bob Bellman

## Carriers just keep on buying ATM equipment—for their data and voice backbones, and for wireless and DSL.

**A**fter more than a decade of development and deployment, asynchronous transfer mode (ATM) has reached middle age—mature enough to be dependable, experienced enough to be useful, but with years to go before retirement. Yesterday's ATM switches have evolved into today's multiservice WAN switches, and now provide a reliable, cost-effective foundation for frame relay, DSL, IP, ISDN, private line, wireless and, of course, native ATM services.

Because it is entrenched in public data networks and making inroads into telephony and wireless, ATM isn't about to yield to IP, MPLS or any other upstart technology. Instead, vendors and service providers continue to find new ways to depend on ATM.

### Surprising Growth

ATM is a data services mainstay for local exchange carriers (LECs), inter-exchange carriers (IXCs) and overseas carriers alike, producing \$2.4 billion in worldwide revenue in 2001, according to Vertical Systems Group. But that's only part of the story. Frame relay services, which ride almost entirely over ATM backbones, accounted for another \$12.7 billion, and DSL, which also depends nearly 100 percent on ATM, added another \$739 million. Add in the private line and IP VPN services that also use ATM, and the total for ATM-based service revenues exceeded \$16 billion in 2001.

**TABLE 1 U.S. ATM Services 2001 Market Share**

Service Provider	Market Share
AT&T	31.6%
WorldCom	25.5%
Sprint	17.1%
RBOCs	14.9%
Other IXCs	9.0%
Other LECs	1.9%

Source: Vertical Systems Group, September 2002

Growth in ATM-based services has been steady for years and promises to continue. Vertical Systems says revenue from native ATM services—ATM User-Network Interface (UNI), Frame UNI (FUNI) and Inverse Multiplexing of ATM (IMA)—grew at an annual rate of 59 percent from 1998 to 2001, and it's forecast to expand at a rate of 34 percent per year through 2004.

Anecdotal evidence bears out Vertical's numbers. AT&T, the leading provider of ATM services in the U.S. (Table 1), operates two ATM backbones, one based on switches from Cisco and another using gear from Lucent. The Cisco network carries mostly frame relay, while the Lucent network supports a rich set of ATM features. The two networks are connected, which allows AT&T to offer route diversity and to support interoperation between services. A DSL link on one network, for example, may connect to a frame relay interface on the other.

According to Trent Long, AT&T product manager for ATM services, revenue from native ATM services grew 98 percent in 2001, plus another 40 percent through August 2002. This does not include revenue from ATM-based services like frame relay and IP VPNs.

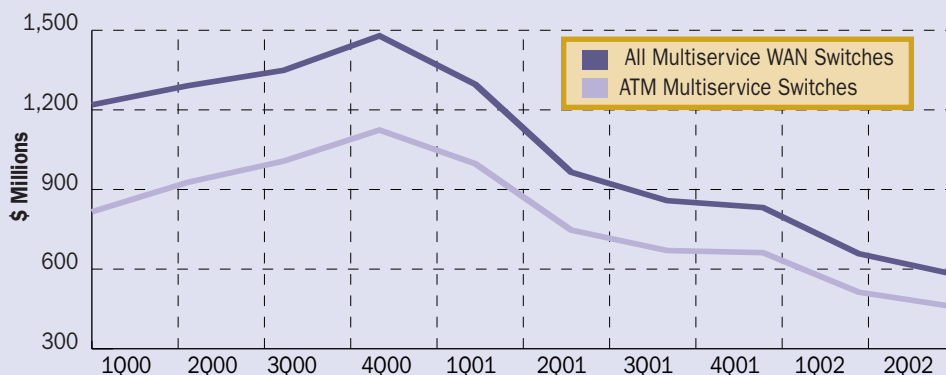
"We've been surprised at the growth in demand for ATM," said Long, "especially for high-speed services. It's held steady despite the economy." In fact, Long suspects the drooping economy may be helping demand. Customers want to provide application access to everyone in the company, he explained, but to save money they're also consolidating office space. This results in fewer sites, but more traffic per site. So, customers whose sites already have ATM service are asking for higher speeds, and those with frame relay at T1 (1.5 Mbps) are stepping up to multi-T1 IMA connections.

Sprint tells a similar story. The company's long-distance division operates a single ATM network with NEC switches in the core and gear from several other vendors at the edges. "Demand for ATM services has been pretty steady, with low- to mid-20 percent growth," said Larry Adriano, Sprint's director of product management. "It's a bit surprising."

Moreover, demand for high-speed ATM is growing. Other service providers who are customers of Sprint are asking for direct ATM sup-

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**FIGURE 1 Worldwide Multiservice Switch Revenue**



Source: Synergy Research Group, August 2002

**Sales of used ATM switches hit 11 percent of the total market last year**

port at OC-12 (622 Mbps) rates and higher. Adriano cited the broadcasting industry and government customers who also are looking for higher-speed ATM. Broadcasting needs the capacity for video distribution, while the government likes ATM's reliability and security.

#### **A Dip In The Road**

However, these increases in service revenues have not been trickling down to ATM equipment suppliers. Instead, worldwide ATM switch sales have decreased steadily since 1Q01, according to Synergy Research Group. From a high of \$1.1 billion in 4Q00, total revenue dropped to \$457 million by 2Q02. Synergy notes that ATM switches make up 75 to 80 percent of the overall multiservice WAN switch market, which also has declined every quarter since the start of 2001 (Figure 1).

Service providers—who account for 90 percent of multiservice ATM switch sales—blame the slowdown in spending on preceding years' "irrational exuberance" and commensurate purchasing. One indication of the buying patterns at play: AT&T leads the market in service revenue, but it has stopped buying ATM switches. "We built out our networks in 1999 and 2000 based on demand forecasts," Trent Long explained. "Now we have enough switches, and we're just adding or swapping interface cards."

Likewise, Sprint scaled up its ATM backbone for the ill-fated ION project, an effort that has since gone kaput. "We're very fortunate to have enough capacity now for the next year or so," said a wry Adriano.

The collapse of the CLEC sector also has contributed to the downturn, not only by reducing the number of carriers who might buy ATM gear, but by releasing a flood of used equipment into the market. "Competitive fallout has created a secondary market for ATM equipment that is putting a damper on new sales," explained Rosemary Cochran, principal at Vertical Systems Group. For example, she noted that when NorthPoint Com-

munications folded, AT&T bought its assets, including its ATM gear.

In the past, secondary revenue has not been a significant portion of overall ATM equipment sales, but Vertical Systems found that in 2001, secondary revenue totaled 11 percent of the worldwide market for multiservice WAN switches. Most of that revenue came from sources like bankruptcy proceedings where the manufacturer did not derive any profit.

Leading equipment vendors are feeling the effects. Four manufacturers—Nortel Networks, Lucent, Cisco and Alcatel—dominate the multiservice ATM switch market, while Marconi struggles to stay on the chart. All have seen their ATM switch sales plummet since the beginning of 2001. Some, however, have suffered more than others, with Lucent and Nortel swapping market share positions (Figure 2, p.36).

Still, the downturn can't last forever. "The doldrums will continue into next year," predicted Rosemary Cochran, "but user demand is still growing, so pent-up equipment demand is soon to emerge." Earlier this year, Vertical forecast 25 percent annual growth in multiservice WAN switch sales to carriers starting in 2003. Lately, however, Cochran said she is less sanguine. Likewise Synergy Research, whose August 2002 forecast shows sales slowing through 2003, predicts a gradual upturn starting in 2004 (Figure 3, p. 37).

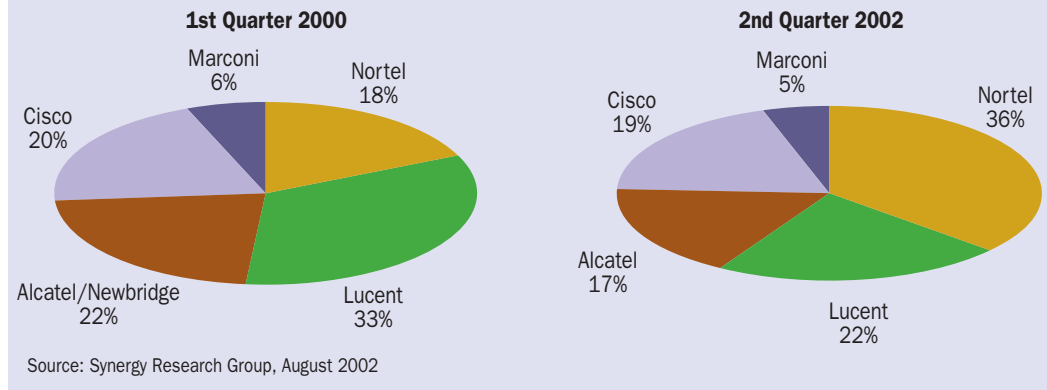
#### **The Devil You Know**

Pent-up demand and an upturn in sales are good news for the multiservice WAN switch market, but are they good news for ATM? After all, not all multiservice WAN switches are ATM switches. In particular, switch vendors have positioned MPLS as the successor to ATM. When carriers start buying lots of multiservice switches again, will they move to MPLS?

Conceived as a better way to carry IP, MPLS avoids ATM's infamous cell tax and is evolving into a multiservice architecture that can carry

**MPLS is coming, but ATM already consolidates diverse network services**

**FIGURE 2 Worldwide Multiservice ATM Switch Revenue Market Shares**



legacy ATM and frame traffic in addition to IP and IP-VPNs. Thus, MPLS offers a way to consolidate network services on a single architecture and optimize IP at the same time. With IP driving data services growth, MPLS could be a better long-term solution than ATM (also see this issue, pp. 26–30, and October 2002, pp. 8–9.)

On the other hand, ATM already consolidates diverse network services, and the urge to optimize IP may not be as strong as the need for reliable performance and guaranteed quality of service (QoS). ATM has proven its reliability and QoS capability; MPLS has not. So, while service providers are looking at and even using MPLS, they're not rushing to replace their ATM networks. For example, AT&T uses MPLS inside its IP-Enabled Frame Relay and IP-Enabled ATM services. "But MPLS is not robust enough to handle all our ATM services," said Trent Long. "Besides, MPLS has no equivalent to ATM's constant bit rate (CBR) mode."

Sprint is evaluating MPLS and has issued an RFI for an integrated switch/router, but has no plans to abandon ATM. Instead, the company is plans to upgrade its ATM backbone in the next 12 to 18 months. "We have one backbone, but lots of different endpoint elements," explained Jerry Adriano. "We want to reduce operating expense by consolidating next-generation voice, frame relay and other services on one platform."

Besides using ATM for revenue-bearing services, Sprint currently depends on ATM for much of its internal operations, including PCM signaling, SS7 signaling and various applications. "Sprint has a legacy of ATM," said Adriano. "At this point, MPLS is being evaluated from a research and architectural perspective. It may or may not be part of our future."

Multiservice switch vendors report similar findings. "We're not seeing a lot of real moves towards MPLS," said Chad Dunn, director of product management at WaveSmith Networks. "There's more talk than action. There's still a long way to go to straighten out the standards for MPLS traffic engineering and restoration of ser-

vices. There are still a lot of gotchas out there."

For Jake Power, Nortel's senior manager for Passport product marketing, MPLS is an open question. "Across the board, everyone agrees that MPLS will be there," said Power, "but when and for what applications? Passport has had MPLS for two years, but ATM is proven and trusted."

### Exploring New Territory

The lack of a proven successor isn't the only reason for ATM's continued reign. With the CLECs out of the way, the demand for alternative solutions has dried up and ATM is fashionable again, according to Marlis Humphrey, chairman of the board of the ATM Forum and director of technology and standards planning at Harris Corporation. "The downturn in the telecom industry has been good for ATM. CLECs rejected ATM because they didn't want to do what the ILECs were doing," she said. "That spurred the development of packet-based technologies like MPLS."

In addition, new products have fractured the myth that ATM had topped out speed-wise. With the advent of POS (packet-over-SONET) and Gigabit Ethernet, ATM had begun to look slow. Some detractors even claimed that ATM SAR chips—the segmentation-and-reassembly engines that turn packets into cells and *vice versa*—had reached their maximum speed.

Of course, declaring that a high-tech widget can't go any faster is a fool's game. Early this year, Cisco released the MGX 8950 multiservice switch with a chipset that supports ATM at speeds up to OC-192—as fast as 10-Gigabit Ethernet and the fastest POS devices. Marconi demonstrated an OC-192c ATM card in September, and Équipe Communications is in trials with an OC-192-capable ATM switch.

Most importantly for its future, ATM transport is essential to more than just frame relay and ATM services. For example, nearly all DSL providers use ATM to backhaul user traffic to hub sites. As DSL usage grows, so does the need for more and bigger ATM switches, especially for more virtual-circuit capacity. With relatively low-speed

applications like Internet access, older ATM switches tend to run out of VCs before they fill up the backhaul trunk. So to keep bandwidth costs down, carriers are looking for newer switches that support tens or hundreds of thousands of VCs.

WaveSmith Networks' Distributed Node multiservice switch, for example, provides for 32,000 ATM VCs per port. At the high end, Cisco's MGX 8950 multiservice switch allows up to 128,000 VCs per blade, with each blade supporting options ranging from a single, unchannelized OC-192c port to 64 separate OC-3c channels.

ATM also is a key component of wireless phone networks. Once captured from the airwaves, both signaling data and voice traffic travel over ATM VCs between cell sites and PSTN gateways. Regardless of the wireless generation—2G, 3G or whatever—the underlying networks all use ATM. So ATM demand can be expected to grow in parallel with wireless buildouts.

Suraj Shetty, Cisco's marketing manager for multiservice switching, expects the fastest growth in the Asia/Pacific area. "In Asia/Pac, wireless is driving ATM, more so than frame relay and ATM UNI services," said Shetty. Demand is particularly strong in China, and India is building a national Layer-1 infrastructure that could result in another burst of ATM procurements.

In addition to wireless voice, ATM is creeping into more landline phone networks. GlobalNAPs Networks, a national voice and data carrier, is installing WaveSmith switches to carry voice calls over ATM switched virtual circuits. Sprint's local division, which serves more than 8.2 million access lines, is moving all of its interexchange voice traffic (both bearer and signaling) onto Nortel ATM switches. Sprint's C2P (circuit-to-packet) project calls for the first ATM local exchange to go

online in 2003. Sprint's long-distance division, which already sends its voice signaling data over the ATM network, is evaluating moving its voice bearer traffic to ATM as well.

Looking to reduce operating costs, Verizon is adding ATM too, in what it describes as a "first step toward widespread deployment of packet-switching technology" in its voice network. In July of this year, Verizon announced the conversion of its Newark and Tampa tandem-switching centers to ATM. Using Nortel Passport 15000 Multiservice Switches and related Nortel voice gateways, the Newark tandem-switching center already had switched nearly 2 million calls over ATM by early July.

### Glory Days

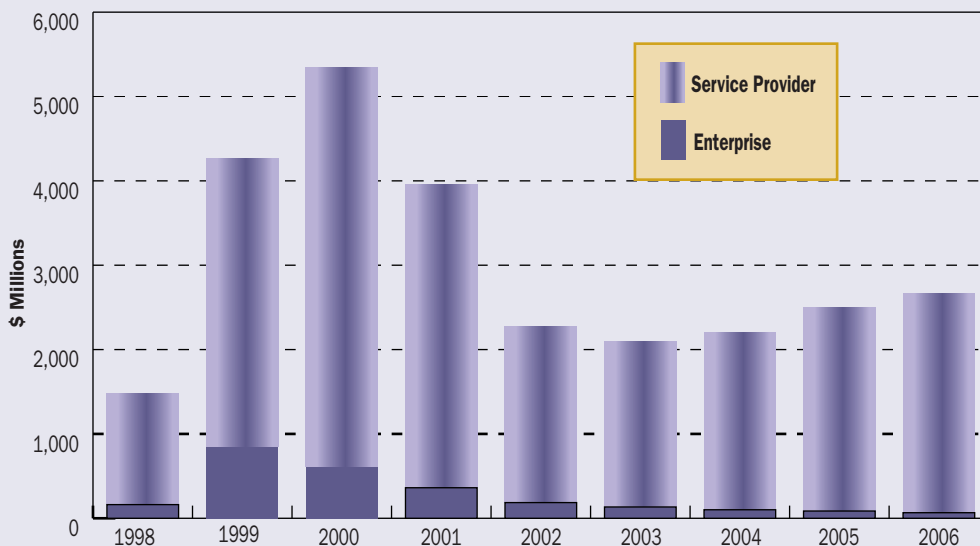
Customers believe in ATM, demand is increasing and new markets are opening. So what could possibly go wrong? The worst-case scenario seems to be stagnation, as the telecom industry implodes and the survivors grow complacent.

According to Marlis Humphrey, the ATM Forum arrived at a crossroads about 18 months ago, around its 10-year anniversary. The Forum completed all its core work in the 1990s. In March, 2000, it standardized the OC-192 SAR. Since then, the forum's most significant output was a specification for local-loop emulation service based on AAL2. This service would carry "voice, voice-band data, fax traffic, ISDN B-channels and D-channels over a broadband subscriber line connection such as xDSL, HFC or wireless between customer premises and a Service Node," according to the official ATM Forum description. In other words, the specifications would make a broadband ATM VC behave like a voiceband local loop, plus compression.



## Wireless and DSL have given ATM additional duties to fulfill in carrier networks

**FIGURE 3 Worldwide Multiservice WAN Switch Sales Forecast**



Source: Synergy Research Group, August 2002



**It's easy to  
imagine ATM  
joining TDM and  
SONET at the  
foundation of  
public networks**

“At that point,” said Humphrey, “the Forum was asking itself: Are we all done?” Now, however, the Forum is investigating six new areas—3G/4G wireless, content delivery services, homeland security, converged network services, next-generation networks and optical networks—to determine what ATM work, if any, needs doing in each area. Whatever they find, it seems clear that ATM’s technological growth is winding down.

ATM also may be approaching steady-state as an industry. Cisco, Nortel and Marconi have put out bigger, faster switches—the MGX 8950, the Passport 20000 and the BXR-48000 respectively—but former market leader Lucent hasn’t upgraded its ATM family in years. The top of its multiservice line, the TMX 880, is billed as an MPLS core switch.

With all the vendors facing financial problems to varying degrees, something’s got to give. Ideally, a host of new companies would be waiting in the wings, ready to enter as the old guard exits. But the number of viable multiservice switch startups is shrinking fast. A few, like WaveSmith and Équipe, may make it, but most of the others are either going or gone.

On the demand side, the major carriers are also strapped for money, and consolidation talk is in the air. So it’s easy to imagine a world with just

one or two switch vendors serving a handful of service providers. In that case, expect ATM to take its place next to TDM and SONET as a venerable, but stagnant foundation technology for public network services□

**Companies Mentioned In This Article**

- Alcatel ([www.alcatel.com](http://www.alcatel.com))
- ATM Forum ([www.atmforum.com](http://www.atmforum.com))
- AT&T ([www.att.com](http://www.att.com))
- Cisco ([www.cisco.com](http://www.cisco.com))
- Équipe Communications  
([www.equipecom.com](http://www.equipecom.com))
- GlobalNAPs Networks ([www.globalnaps.net](http://www.globalnaps.net))
- Lucent ([www.lucent.com](http://www.lucent.com))
- Marconi ([www.marconi.com](http://www.marconi.com))
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