System 5000 ATMSpeed Switching Modules

Provide Flexible Migration Path to ATM

Boost Network Performance

Protect Network Investments

Simplify ATM Operation

Integrated with System 5000

System 5000™ ATMSpeed™ switching modules provide unparalleled scalability to System 5000-based campus LAN networks and backbones, improving performance and eliminating the need to constantly redesign the network for growth.

ATMSpeed modules enable System 5000 hubs to be directly connected over high-speed asynchronous transfer mode (ATM) links. When configured with ATMSpeed modules, a System 5000 platform can support multiple 155 megabit-per-second (Mbps) full-duplex connections to build a multigigabit backbone, minimizing complexity and cost.

The ATMSpeed modules work with the System 5000's 6.4 gigabit-per-second (Gbps) ATM backplane, based on the same ATM-core technology employed by the Centillion 100™ switching system. Combined with integrated support for standards-based Ethernet, Fast Ethernet, Token Ring, and FDDI, the System 5000 represents the industry's most powerful and flexible LAN and ATM switching platform.

ATMSpeed modules reside in the modular System 5000 chassis alongside Ethernet, Fast Ethernet, Token Ring, and FDDI modules. When used as a high-speed extension of the System 5000's ATM backplane, the ATMSpeed modules support scalable Ethernet, Fast Ethernet, and Token Ring port density that is unmatched by existing internetworking devices. The System 5000's ATM-core architecture and the ATMSpeed modules also allow existing LANs to migrate to ATM incrementally, deploying the technology where and when it is needed.

System 5000 ATMSpeed modules represent a critical component in the Bay Networks ATM strategy. Working within the System 5000 platform and with other ATM devices such as the Centillion 100 switching system, the ATMSpeed modules ensure a smooth migration from today's shared media environments to the ATM switched internetwork of the future.

Bay Networks

Benefits

Provide Flexible Migration Path to ATM
With the System 5000 chassis and ATMSpeed modules, ATM can be added to the enterprise network at any time, delivering 155 Mbps full-duplex connectivity between hubs as requirements dictate. The System 5000's built-in ATM-core architecture allows ATMSpeed ports to be directly connected, delivering simple high-bandwidth backbone connections without the need to retrain staff and purchase additional equipment.

As bandwidth demands increase, ATMSpeed modules can be added incrementally to scale backbone performance, eliminating time-consuming network redesigns. Built-in ATM LAN emulation (LANE) software means a System 5000 hub equipped with ATMSpeed modules can also support existing LAN-based power desktops and servers to create a bottleneck-free network. This incremental migration strategy allows powerful ATM technology to be deployed with minimal risk.

Boost Network Performance
Whether used for backbone connectivity or for supporting high-performance desktops and servers, ATMSpeed modules improve overall network performance and application response times. Each ATMSpeed module is equipped with a 1.2 Gbps cell switch for local switching; coupled with the System 5000's internal 6.4 Gbps backplane fabric, ATMSpeed modules deliver maximum throughput, providing one of the highest-performance LAN backbones available.

In the backbone, ATMSpeed modules automatically load balance over parallel ATM links for maximum bandwidth and scalability. Unlike frame-based devices with proprietary backplanes, traffic flows across the System 5000's ATM backplane to the ATMSpeed ports without protocol translation or reformatting overhead. As a result, an ATMSpeed-connected network is always a logical one-hop network. Each intermediate link adds only 10 microseconds of switch latency, minimizing end-to-end network delay and providing consistent performance, even as the network expands.

Protect Network Investments
ATMSpeed modules can be added to the System 5000 chassis as bandwidth requirements grow, offering a simple, low-cost migration to ATM while protecting investments in the existing network infrastructure. In addition, System 5000 hubs can be directly connected over ATM via ATMSpeed module ports, reducing network complexity and lowering equipment costs by eliminating the need for external ATM switches. Leveraging the ATM capabilities built into the System 5000, the ATMSpeed modules provide high-performance ATM connectivity at a fraction of the cost of edge switches.

Simplify ATM Operation
System 5000 ATMSpeed modules simplify ATM network operation through Bay Networks GIGArray™ technology, which enables users to build high-performance backbones by treating ATM connections as high-speed serial links. GIGArray technology enhances network performance by automatically load balancing across multiple interswitch ATM links. As a result, backbone bandwidth can scale to the maximum offered load, providing aggregate throughput of up to 10 million packets per second (pps).

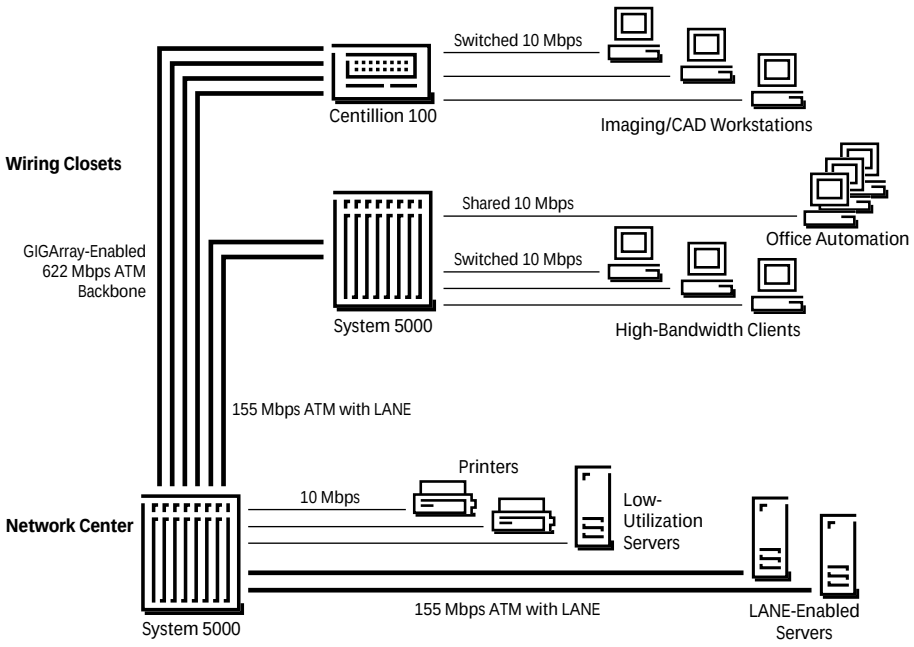
Integrated with System 5000
ATMSpeed modules are fully integrated with the System 5000 platform, adding critical ATM switching capabilities to the industry's most comprehensive, full-featured networking platform. Installed alongside existing shared media, switching, routing, and remote access modules, the ATMSpeed modules allow simple migration to ATM, protecting existing investments while preparing the network for the future.

Features

System 5000 ATMSpeed Switching Modules Description
Two System 5000 ATMSpeed switching modules are available: the Model 5724M ATMSpeed Master Control Processor Module and the Model 5724 ATMSpeed Switching Module.

Model 5724M ATMSpeed Master Control Processor Module The ATMSpeed Master Control Processor (MCP) Module offers four ATM Forum-compliant OC-3c SONET/SDH fiber interfaces to support switch-to-switch trunk links and to connect edge devices such as routers and servers to the network. In addition, the integrated MCP provides the onboard intelligence required to support ATM Forum-compliant LANE services, User-Network Interface (UNI) signaling, and the Interim Interswitch Signaling Protocol

Figure 1 | **System 5000 ATMSpeed Modules in a LAN Backbone and the Network Center**



(IISP), simplifying the connection of existing network devices such as servers and routers. At least one MCP module is required per System 5000 to support ATM operations.

Model 5724 ATMSpeed Switching Module

The ATMSpeed Switching Host Module offers four ATM Forum-compliant OC-3c SONET/SDH multimode fiber interfaces to provide connectivity between System 5000 hubs and other standards-based ATM switches. The Model 5724 also provides connectivity for other devices such as servers and power workstations equipped with standards-based ATM OC-3c adapters.

Each port on the System 5000 ATMSpeed modules delivers a throughput rate of 350,000 cells per second, enabling the System 5000 to deliver one of the highest-capacity LAN backbones available (see Figure 1). Both modules also feature a 1.2 Gbps CellManager™ cell switch ASIC to provide high-speed local switching, which, combined with the System 5000's 6.4 Gbps ATM backplane, allows a single hub to deliver up to 20 Gbps of switching capacity.

ATMSpeed GIGArray Capabilities

The ATMSpeed modules include Bay Networks GIGArray technology, which simplifies ATM operation by supporting point-to-point connections. GIGArray enhances performance by providing automatic load balancing across multiple interswitch ATM links, enabling backbone bandwidth to scale to the maximum offered load. Up to 16 System 5000 hubs equipped with ATMSpeed modules can be configured in a GIGArray to provide aggregate throughput of more than 10 million pps.

Networks that require more than one 155 Mbps ATM link can also use GIGArray to aggregate backplane bandwidth on multiple links between switches. Frame traffic is segmented and encapsulated into standard ATM cells automatically, allowing a System 5000 with ATMSpeed modules to treat ATM interswitch connections as very fast serial links for building a scalable, high-performance backbone network.

The ATM links act as an extension of the hub's ATM backplane, increasing interswitch bandwidth and enabling consistently low latency between switches. System 5000 hubs connected in a GIGArray also provide scalable port density. A GIGArray of switches provides the performance of a single multiport switch. In addition to improving network performance, the use of redundant ATM links increases network reliability by automatically rerouting traffic in the event of a link outage.

System 5000 hubs configured with an ATMSpeed MCP may employ standards-based signaling (LANE, UNI, and IISP) and/or GIGArray technology to interconnect two or more switches, depending on their specific needs. The standards-based approach is best for connecting existing routers and servers directly to the ATM backbone, while the GIGArray configuration is most effective in backbones where the ultrafast failover of the GIGArray system provides the reliability required for mission-critical applications. Some

network configurations can utilize both the standards-based and GIGArray approaches, leveraging the strengths of both where necessary.

Standards-Based ATM Software Support

The ATMSpeed modules support a full complement of ATM Forum standards, such as UNI switched virtual circuit (SVC) signaling, IISP, and LANE, to extend ATM capabilities in networks where multivendor interoperability is a requirement.

UNI SVC signaling provides support for a wide variety of multivendor ATM configurations, enabling the System 5000 to interoperate with other ATM router interfaces, server interfaces, and LAN-to-ATM switches. The switch supports SVCs for both UNI 3.0 and UNI 3.1 signaling protocols and translates between the two versions, allowing connections to any other standards-based ATM switch.

The ATMSpeed's IISP implementation offers several important advantages when deployed in an edge switch. Unlike other edge switches that use UNI interfaces, the ATMSpeed modules with IISP can support standards-based load sharing over multiple ATM links, increasing network performance. IISP also allows the creation of multivendor switched ATM networks. IISP provides a standards-based method for connecting ATM switches from a variety of vendors, each optimized for a specific application.

The ATMSpeed modules also feature the industry's most comprehensive implementation of the ATM Forum's LANE specification, which provides a standards-based method for connecting LAN-attached file servers and routers directly to the ATM network. Both Ethernet and Token Ring LANE clients and services are supported, preserving investments in existing technology while increasing bandwidth and improving network performance.

The LANE implementation is fully compatible with GIGArray through a feature known as GIGALANE™, which allows a single network to support both a GIGArray backbone and ATM-attached devices. Only the switch or hub directly connected to ATM-attached servers or routers needs to run the LANE software, enabling networks to leverage the simplicity, resiliency, and scalability of the GIGArray while permitting standards-based connection of ATM resources via LANE. The GIGALANE architecture also benefits existing GIGArray users by allowing ATM-based devices to be added to the network without requiring extensive network reconfiguration.

ATMSpeed Performance

Unlike traditional routers and frame switches that convert data formats repeatedly at each hop, System 5000 ATMSpeed modules are simply a logical extension of the System 5000 ATM backplane, forwarding traffic from switch to switch instantaneously with no protocol translation overhead. This reduces network latency and enables the network to deliver consistent response time regardless of switch paths.

The System 5000's ATM backplane packages backbone traffic in uniform-sized cells. This reduces variable delays that are caused when a small frame, such as logical link control (LLC) or Internet Packet Exchange (IPX) acknowledgment, is queued behind a large data frame. The consistent, low-latency performance minimizes network design complexity, reduces network reengineering, and increases staff productivity.

ATMSpeed Applications

System 5000 ATMSpeed modules provide high-performance switched solutions for both high-density wiring closets and network centers.

Backbone Connectivity for High-Density Wiring Closets System 5000 ATMSpeed modules provide high-speed backbone access for large groups of switched desktops in the wiring closet. Operating in GIGArray mode or using LANE, the ATMSpeed modules support load sharing capabilities that effectively increase backbone connections to 622 Mbps.

Network Center Switching System 5000 ATMSpeed modules are designed to support powerful, high-speed ATM backbones. Operating in either LANE or GIGArray mode, the ATMSpeed modules can scale to support large-scale backbones extending throughout the enterprise. Integrated LANE services enable customers to build ATM backbone networks that preserve existing investments in both equipment and applications.

Technical Specifications

Technical specifications for the System 5000 ATMSpeed switching modules appear in Table 1.

Table 1 | **System 5000 ATMSpeed Switching Modules Technical Specifications**

Number of Ports	
Model 5724M ATMSpeed Master Control Processor	4
Model 5724 ATMSpeed Switching Host Module	4
Local Switching Capacity	1.2 Gbps
Buffers	
Model 5724M ATMSpeed Master Control Processor	16,000 cells
Model 5724 ATMSpeed Switching Host Module	16,000 cells
Priorities	2 levels
Interfaces	
Model 5724M ATMSpeed Master Control Processor	OC-3c multimode fiber
Model 5724 ATMSpeed Switching Host Module	OC-3c multimode fiber
Processor Memory	
Model 5724M	10 MB, expandable to 20 MB
Multimode Fiber Specifications	1310 nm LED
	Duplex 62.5/125 micron fiber
	Duplex SC connector
Mean Launched Power	-20 to -14 dBm
Minimum Receive Sensitivity	-30 dBm
Link Budget	10 dB
Connection Types	UNI and NNI
	Permanent and switched virtual circuits
	Permanent virtual path
Physical Dimensions	(H) 19.0 in. x (W) 1.2 in. x (D) 11.0 in. [(H) 48.3 cm x (W) 3.0 cm x (D) 28.0 cm]
Environmental Specifications	
Operating Temperature	5˚ to 40˚C
Operating Humidity	85% max relative humidity, noncondensing
Operating Altitude	10,000 ft (3,048 m) max
Storage Temperature	-25˚ to 70˚C
Storage Humidity	95% max relative humidity
Free Fall/Drop	ISO 4180-2, NSTA 1A
Vibration	IEC 68-2-6/34
Stock/Bump	IEC 68-2-27/29

Table 1 | **System 5000 ATMSpeed Switching Modules Technical Specifications (continued)**

Weight	3.87 lb (1.74 kg)
Safety Agency Approvals	UL 1950 with D3 deviations CSA 22.2 #950 with D3 deviations IEC 950 / EN 60 950 (TUV) PCB designed to meet UL94-V1 flammability requirements
Electromagnetic Emissions	
Meet Requirements of	FCC Part 15, Subparts A and B, Class A EN 55 022 (CISPR 22:1985), Class B General License VDE 0871, Class B (AmtsblVfg No. 243/1991 and Vfg 46/1992) VCCI Class 1 ITE

Ordering Information

Ordering information for the System 5000 ATMSpeed switching modules appears in Table 2.

Table 2 | **System 5000 ATMSpeed Switching Modules Ordering Information**

Order Number	Description
CL1304001	Model 5724 4-Port ATMSpeed Switching Host Module for OC-3c SONET over Multimode Fiber
CL1304002	Model 5724M 4-Port ATMSpeed Switching Module for OC-3c SONET over Multimode Fiber with Master Control Processor

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