



### Provides Flexible Migration Path to ATM

ATMSpeed™/155 switching modules for the Centillion 100™ modular switching system provide unparalleled scalability to campus LANs and backbones, improving performance and eliminating the need to constantly redesign the network for growth.

devices. The Centillion 100's ATM core architecture and the ATMSpeed modules allow installed networks to migrate to ATM incrementally, deploying the technology where and when it is needed.

### Boosts Network Performance

ATMSpeed modules enable Centillion 100s to be directly interconnected over high-speed ATM links. Using the modules, multiple 155 megabit-per-second (Mbps) full-duplex connections can be configured on each Centillion 100 to build a multigigabit backbone. No external ATM switches are required, minimizing complexity and costs.

Modular in design, the Centillion 100 integrated LAN/ATM switching hub supports up to six Ethernet, Fast Ethernet, Token Ring, or ATM modules. The modules can be mixed and matched in any combination, providing a custom switching solution that meets individual campus needs. Combined with other Bay Networks ATM switch and router products, the Centillion 100 contributes to the industry's most complete and powerful cell-switched solution.

### Protects Network Investments

ATM backbone links are simply logical extensions of the Centillion 100's powerful ATM backplane. When used as a high-speed bus extension to cascade Centillion 100s, the ATMSpeed modules offer scalable Ethernet and Token Ring port density that is unmatched by existing internetworking

## Benefits

**Provides Flexible Migration Path to ATM**  
An integral 3.2 gigabit-per-second (Gbps) ATM fabric in the Centillion 100 optimizes installed LANs while remaining transparent in networks that don't yet need ATM connections. When the network expands, ATMSpeed modules can be added to the Centillion 100 to deliver 155 Mbps full-duplex connectivity between switches. The Centillion 100's built-in ATM fabric allows ATM ports to be directly connected without external switches, 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 Centillion 100 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.

### Boosts Network Performance

Whether used for backbone connectivity or high-performance desktops, the built-in ATM capabilities of the Centillion 100 improve overall network performance and application response time. Each ATMSpeed module is equipped with a 1.2 Gbps cell switch for local switching; coupled with the switch's 3.2 Gbps backplane fabric, ATMSpeed modules deliver full wire-speed throughput, providing one of the highest-performance LAN backbones available.

In the backbone, the Centillion 100 automatically load balances over parallel ATM links for maximum bandwidth and scalability. Unlike frame-based devices with proprietary backplanes, traffic flows across the Centillion ATM backplane to the ATM ports without protocol translation or reformatting overhead. As a result, an ATMSpeed-connected network is always a logical one-hop network. Each intermediate switch adds only 10 microseconds of switch latency, minimizing end-to-end network delay and providing consistent performance, even as the network expands.

### Protects Network Investments

Edge switches require external ATM switches to form an ATM backbone. This calls for a high up-front investment and commitment to ATM technology. In contrast, Centillion 100s can be directly connected over ATM simply by incrementally adding ATMSpeed modules, lowering equipment costs and network complexity. Furthermore, by leveraging the ATM hardware built into the Centillion 100, the ATMSpeed modules provide high-performance ATM connectivity at a fraction of the cost of edge switches. As bandwidth requirements grow, ATM ports can be cost-effectively added to the Centillion 100, protecting the switched network investment while offering a simple, low-cost migration to ATM.

## Features

### *ATMSpeed/155 Switching Modules*

**Descriptions** Three ATMSpeed/155 switching modules are available, each offering different levels of functionality for pure ATM and mixed ATM/LAN environments. Up to six ATMSpeed modules can be installed in a single Centillion 100 switch, providing up to fourteen 155 Mbps full-duplex ATM connections to eliminate network and backbone bottlenecks.

### *ATMSpeed/155 Switching Host Module*

The ATMSpeed/155 Switching Host Module offers two ATM Forum-compliant OC-3c SONET multimode fiber interfaces to provide connectivity between Centillion 100s and other standards-based ATM switches. The ATMSpeed/155 host module also provides connectivity for other devices equipped with standards-based ATM OC-3c adapters.

### *ATMSpeed/155S Switching Host Module*

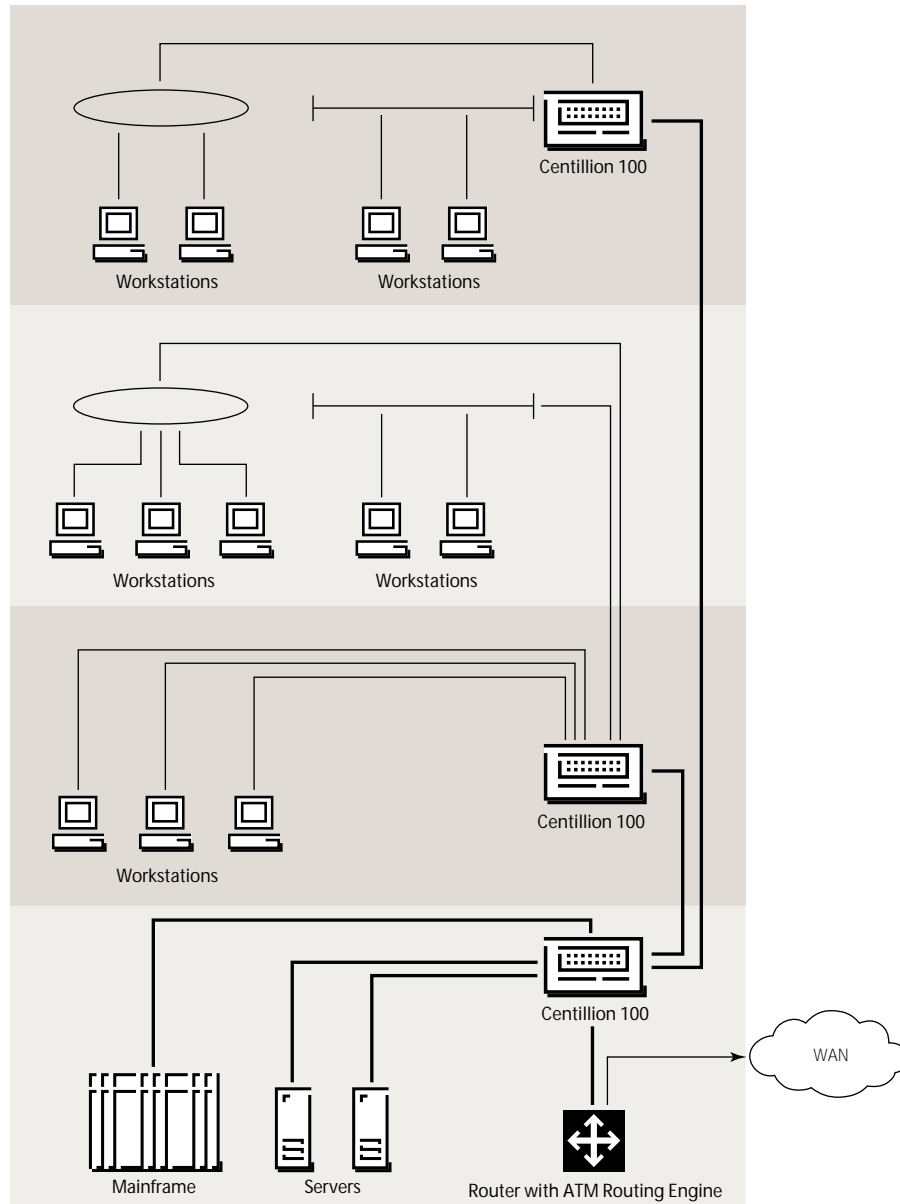
The ATMSpeed/155S Switching Host Module is identical to the the ATMSpeed/155 Host Module, with the exception that its OC-3c SONET interfaces are single-mode fiber.

### *ATMSpeed/155 Master Control Processor Module*

The ATMSpeed/155 Master Control Processor (MCP) Module offers four ATM Forum-compliant OC-3c SONET multimode fiber interfaces to support switch-to-switch trunk links and to connect edge devices such as routers and servers to the network. In addition, an integrated Master Control Processor provides the onboard intelligence required to support ATM Forum-compliant LANE services, User-to-Network Interface (UNI) signaling, and the Interim Interswitch Signaling Protocol (IISP), simplifying the construction of ATM networks.

Each port on the ATMSpeed/155 modules delivers a throughput rate of 350,000 cells per second, making the Centillion 100 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 switch's 3.2 Gbps ATM backplane, allows a single Centillion 100 to deliver up to 10 Gbps of switching capacity.

Figure 1 | ATM Backbone Using Centillion 100 Switches



#### Centillion GIGArray Capabilities

The ATMSpeed/155 modules include Centillion GIGArray™ technology. 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 Centillion 100s can be configured in a GIGArray to provide aggregate throughput of more than 10 million packets per second (pps).

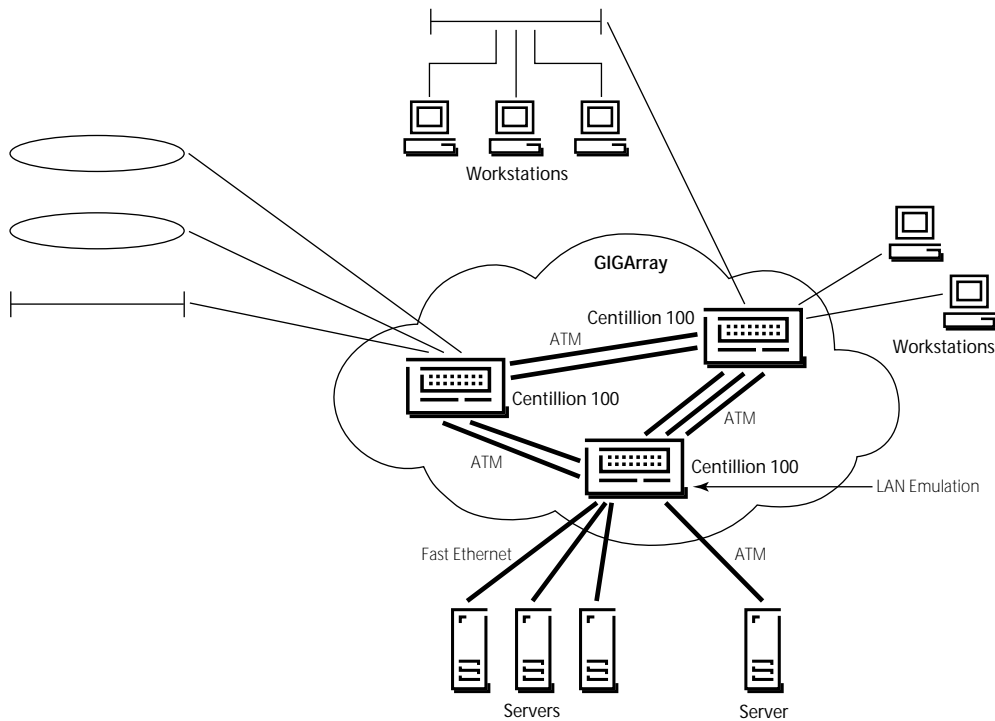
Centillion 100 switches configured with an ATMSpeed/155 MCP Module may employ standards-based signaling (LANE, UNI, and IISP) and/or GIGArray technology to interconnect two or more switches, depending on their specific needs. The standards-based approach is best for connecting existing routers and servers 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.

#### ATMSpeed/155 Performance

Unlike traditional routers and frame switches that convert data formats repeatedly at each hop, the ATMSpeed/155 modules are simply a logical extension of the Centillion 100 ATM backplane,

Figure 2 | GIGArray: Scalable Bandwidth and Port Density



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.

With a Centillion 100, backbone traffic is packaged in uniform-sized cells. This reduces variable delays that are caused when a small frame, such as LLC or IPX acknowledgment, is queued behind a large data frame. The consistent, low latency performance of the Centillion 100 minimizes network design complexity, reduces network reengineering, and increases staff productivity.

#### ATMSpeed Applications

*GIGArray: The Most Robust, Scalable Campus Backbone Technology* Networks that require more than one 155 Mbps ATM link can use GIGArray to aggregate backplane bandwidth on multiple links between switches (see Figure 2). Frame traffic is segmented and encapsulated into standard ATM cells automatically,

allowing the Centillion 100 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 Centillion ATM backplane, increasing interswitch bandwidth and enabling consistently low latency between switches. Centillion 100s 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.

#### 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 Centillion 100 to interoperate with 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 device.

The ATMSpeed's IISP implementation 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 switches directly connected to ATM-attached servers or routers need 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 reconfiguration.

## Technical Specifications

Technical specifications for the Centillion 100 ATMSpeed/155 Switching Modules appear in Table 1.

Table 1 | Centillion 100 ATMSpeed/155 Switching Modules Technical Specifications

<b>Number of Ports</b>	
ATMSpeed/155 Switching Host Module	2
ATMSpeed/155S Switching Host Module	2
ATMSpeed/155 MCP Module	4
<b>Local Switching Capacity</b>	1.2 Gbps
<b>Buffers</b>	
ATMSpeed/155 Switching Host Module	4,000 cells
ATMSpeed/155S Switching Host Module	4,000 cells
ATMSpeed/155 MCP Module	4,000 cells
<b>Priorities</b>	2 levels
<b>Interfaces</b>	
ATMSpeed/155 Switching Host Module	OC-3c multimode fiber
ATMSpeed/155S Switching Host Module	OC-3c single-mode fiber
ATMSpeed/155 MCP Module	OC-3c multimode fiber
<b>Multimode Fiber Specifications</b>	
	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
<b>Single-Mode Fiber Specifications</b>	
	1310 nm LED
	Duplex 9/125 micron fiber
	Duplex SC connector
Mean Launched Power	-15 to -8 dBm
Minimum Receive Sensitivity	-28 dBm
Link Budget	13 dB
<b>Connection Types</b>	
	UNI and NNI
	Permanent and Switched Virtual Circuits
	Permanent Virtual Paths

## Ordering Information

Ordering information for the Centillion 100 ATMSpeed/155 Switching Modules appears in Table 2.

Table 2 | Centillion 100 ATMSpeed/155 Switching Modules Ordering Information

Order Number	Description
AS1304001	2-Port ATMSpeed/155 Switching Host Module for OC-3c SONET over Multimode Fiber
AS1304002	2-Port ATMSpeed/155S Switching Host Module for OC-3c SONET over Single-Mode Fiber
AS1304005	4-Port ATMSpeed Switching Host Module for OC-3c SONET over Multimode Fiber with Master Control Processor



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