



Support Demanding Enterprise Network Applications

Improve Network Flexibility and Reliability

Protect Existing Network Investments

Support Switched Internetworking

System 5000™ intelligent hubs are the cornerstone of Bay Networks switched internetworking solutions. Featuring high reliability and configuration flexibility, System 5000 hubs deliver a proven, powerful solution for building enterprise networks that can easily evolve to support future requirements.

The System 5000 is the first intelligent hub family to provide a structured networking solution for today's legacy networks. Featuring a highly flexible backplane architecture, System 5000 hubs simultaneously support 10 and 100 megabit-per-second (Mbps) shared and switched Ethernet, 4 and 16 Mbps Token Ring, 100 Mbps Fiber Distributed Data Interface (FDDI), and 155 Mbps asynchronous transfer mode (ATM), as well as full routing and remote access capabilities. Support for multiple switched and shared media, routing, and remote access services provides a single-platform solution for nearly any networking environment. The addition of ATM and Layer 3 switching capabilities also enable the System 5000 to implement high-speed switched backbone solutions and support enterprise intranet switching applications from the existing platform without requiring new investments.

Two versions of the System 5000 hubs are available, featuring a total of eight different models that offer flexible solutions for

a variety of network applications. The 14-slot Model 5000 is designed for high-density network center, "power closet," and ATM backbone applications, while the eight-slot Model 5005 offers a compact solution for smaller power closet applications where space is at a premium. In the network center, System 5000 hubs support downlinks from multiple distributed networks, providing system-wide access to centralized resources such as servers, bridges, and routers. In the wiring closet, the hubs offer a powerful platform for supporting highly segmented networks.

System 5000 hubs feature a reliable, high-quality design that provides redundant cooling, power, and configuration storage, maximizing network availability. The System 5000 is fully compatible with the entire Bay Networks product family, including the BayStack™, Centillion 100™, System 3000™, and Distributed 5000™ hub and switch solutions. In addition, the System 5000 works with the Bay Networks Access Node, Access Stack Node, and Backbone Node router families, contributing to the industry's most complete enterprise networking solution.



**Model 5000
Intelligent Hub Platform**



**Model 5005
Intelligent Hub Platform**

Benefits

Support Demanding Enterprise Network Applications

The System 5000 chassis offer robust platforms for supporting today's most demanding network environments, integrating shared media, switching, routing, and remote access services in a single box. In the network center, the hubs provide a central point for linking multiple distributed network segments as a cohesive system while providing access to centralized network resources (see Figure 1). In the wiring closet, the hubs feature the density and flexibility required to support multiple segments sharing a common work area.

Improve Network Flexibility and Reliability

A unique backplane architecture enables a System 5000 chassis to support up to 52 Ethernet segments, three Fast Ethernet segments, 26 Token Rings, five FDDI paths, or 48 ATM ports, delivering tremendous configuration flexibility for demanding network environments. Integrated LAN switching and ATM support delivers additional flexibility and performance for implementing high-speed backbone architectures. Redundant cooling and configuration storage features, plus optional redundant power capabilities, eliminate all single points of failure to ensure maximum availability.

Protect Existing Network Investments

The System 5000 works with all existing Bay Networks hubs, switches, and routers, protecting existing investments in the network infrastructure. New capabilities can be implemented simply by adding the appropriate modules to the chassis, preserving the System 5000 platform without requiring any forklift upgrades during the network's evolution. And the System 5000 is based entirely on industry standards, ensuring it will work with other standards-based solutions from third-party vendors.

Support Switched Internetworking

The System 5000 represents the ideal platform for building switched internetworks. Built-in support for both shared media and switched technologies makes the System 5000 an efficient and cost-effective solution that allows networks to evolve incrementally as requirements dictate. From desktop Ethernet switching to ATM, the System 5000 supports the technologies that address current and future end-user requirements. Integrated LAN emulation (LANE) clients and services enable Ethernet and Token Ring networks and applications to run over an ATM network, extending the benefits of high-speed switching to the enterprise without requiring changes to existing hardware or software. Built-in support for Layer 3 capabilities also enables the System 5000 to support intranet switching applications, reserving expensive router ports for network security and firewalls.

Features

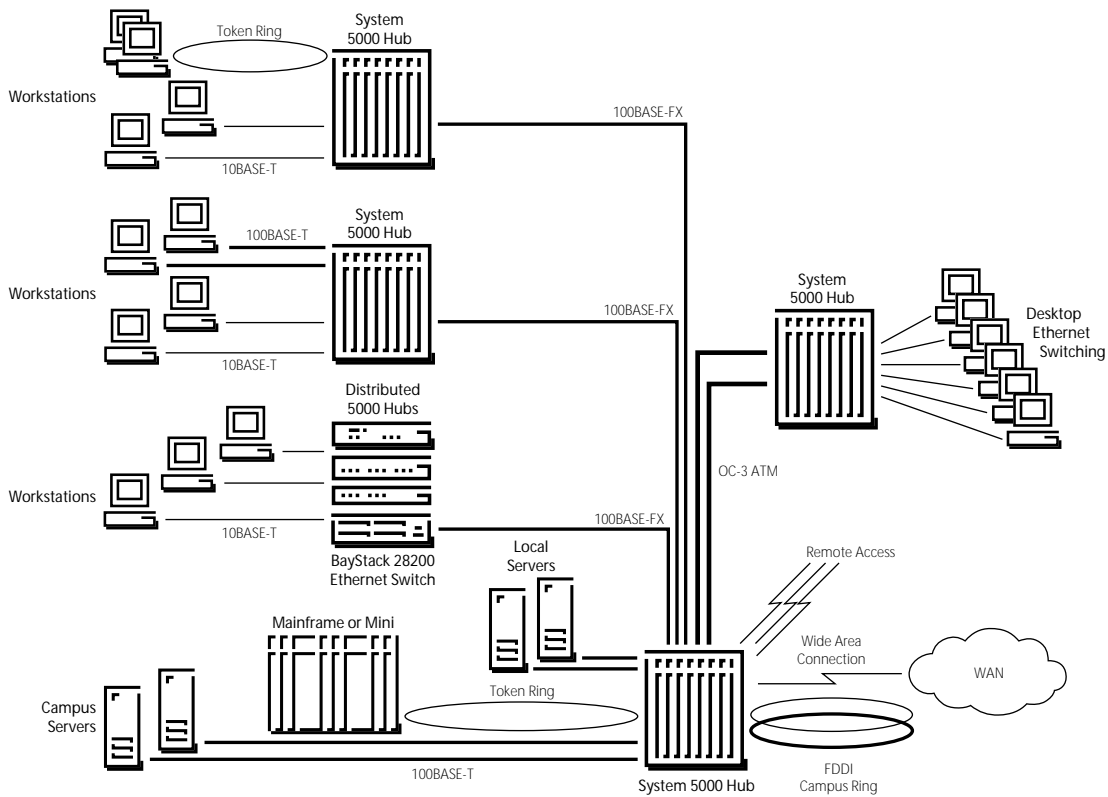
The System 5000 delivers a powerful, versatile platform for supporting today's legacy networks while providing a solid foundation for building networks of the future. Featuring a highly flexible backplane architecture, System 5000 hubs are capable of supporting multiple 10 Mbps Ethernet, 100 Mbps Fast Ethernet, 4 and 16 Mbps Token Ring, 100 Mbps FDDI, and 155 Mbps ATM networks simultaneously. Support for high-speed ATM and Fast Ethernet switching allows today's System 5000-based shared media networks to incrementally evolve to switched backbone solutions while preserving existing investments.

Two System 5000 chassis options are available: the Model 5000 and the Model 5005. Each model is designed for specific applications within the structured network.

Model 5000 Intelligent Hub Platform

The Model 5000 intelligent hub is designed for network center, switched backbone, and large wiring closet applications.

Figure 1 | System 5000 Intelligent Hubs Bring Distributed LANs and Centralized Resources Together



Featuring a high-density platform capable of supporting highly segmented enterprise networks, the Model 5000 provides a central point of integration and administration for distributed LANs. In the network center, the Model 5000 unites dispersed System 5000, Distributed 5000, System 3000, and BayStack-based Ethernet, Token Ring, and FDDI networks as a single, cohesive system, optimizing the use of centralized resources such as servers, bridges, and routers. When configured with an ATM backplane, the Model 5000 also works with Centillion 100 multi-LAN/ATM switches to build a scalable, high-speed switched infrastructure for workgroup and backbone connectivity. By supporting shared and switched Ethernet, as well as Token Ring, FDDI, ATM, routing, and remote access services on a single platform, the Model 5000 represents a critical link in the evolution to switched internetworking.

The Model 5000 offers 14 slots to hold any combination of Ethernet, switched Ethernet, Token Ring, FDDI, and ATM host and network management modules, plus System 5000 routing and remote access modules. To maximize front panel availability, the hub's power supplies and cooling system are located in the chassis' back panel assembly.

In a homogenous network environment, a single Model 5000 hub can support up to 52 Ethernet segments, three Fast Ethernet segments, 26 Token Rings, five FDDI paths, or 48 ATM ports, providing tremendous configuration flexibility for demanding networks. When multiple access methods must run on a single platform, the hub can simultaneously support up to 12 Ethernet segments, three Fast Ethernet segments, nine Token Rings, five FDDI ring paths, and 48 ATM ports.

Five specific versions of the Model 5000 hub are available: the Model 5000N, the Model 5000NT, the Model 5000CT, the Model 5000F, and the Model 5000BH.

Model 5000N The Model 5000N includes a backplane that offers full support for IEEE 802.3-compatible Ethernet.

Model 5000NT The Model 5000NT backplane supports both IEEE 802.3 Ethernet and IEEE 802.5 Token Ring.

Model 5000CT The Model 5000CT backplane supports IEEE 802.3 Ethernet, IEEE 802.3u Fast Ethernet, and IEEE 802.5 Token Ring networks.

Model 5000F The Model 5000F includes an IEEE 802.3 Ethernet, IEEE 802.5 Token Ring, and an ISO 9314-compatible FDDI backplane for supporting complex Ethernet/Token Ring/FDDI networks.

The FDDI backplane can also be added later as a simple field upgrade to a Model 5000N or Model 5000NT hub.

Model 5000BH The Model 5000BH is a core multi-LAN/ATM switch that supports standards-based Ethernet, Fast Ethernet, Token Ring, and ATM for highly demanding network center applications.

The Model 5000BH is identical to the Model 5000NT, with the addition of an integrated Parallel Packet Express (PPX®) bus and two ATM-core backplanes that provide a combined 6.4 gigabits per second (Gbps) of internal switching capacity. When equipped with System 5000 EtherSpeed™ and ATMSpeed™ modules, the Model 5000BH provides simultaneous LAN-to-LAN, LAN-to-ATM, and ATM-to-ATM switching, extending the life of installed shared media LANs while providing a safe, practical migration to a pure ATM switched environment.

In addition to the Ethernet, Token Ring, and two ATM backplanes, the Model 5000BH also includes two 400 Mbps control buses for handling network management and route control information. The Model 5000BH backplane's PPX enables the addition of scalable routing capabilities. In applications where FDDI or Fast Ethernet is required, an FDDI or Fast Ethernet backplane can also be added to the Model 5000BH as a simple field upgrade.

Model 5005 Intelligent Hub Platform

The Model 5005 intelligent hub platform offers a more compact and convenient solution for network center and power closet applications where space is at a premium.

The Model 5005 features eight front panel slots to hold any combination of System 5000 Ethernet, switched Ethernet, Token Ring, and FDDI host and network management modules. Power supplies and cooling units are front accessible, allowing

upgrades and maintenance to be accomplished quickly and easily. The 14-inch deep chassis also occupies less space than the Model 5000, making it ideal for particularly crowded wiring closet locations.

In homogeneous network environments, a single Model 5005 can support up to 28 Ethernet segments, 14 Token Rings, or five FDDI paths for maximum configuration flexibility. Where support for multiple access methods is required, a fully configured Model 5005 provides simultaneous support for 12 fully managed Ethernet segments, five Token Rings, and five FDDI paths.

Three versions of the Model 5005 are available: the Model 5005N, the Model 5005NT, and the Model 5005F.

- The Model 5005N includes a backplane for supporting IEEE 802.3-compatible Ethernet.
- The Model 5005NT backplane supports both IEEE 802.3 Ethernet and IEEE 802.5 Token Ring.
- The Model 5005F is identical to the Model 5005NT, with the addition of an ISO 9314-compatible FDDI backplane for diverse wiring closet applications supporting Ethernet, Token Ring, and FDDI. The FDDI backplane can also be added as a field upgrade to any existing Model 5005N or Model 5005NT hub.

System 5000 Power Supplies

System 5000 intelligent hubs employ a unique -48-volt dc power source, providing a cost-effective system capable of delivering up to 100 watts per slot to support redundant configurations and future power-hungry switched technologies. The power supplies, which tolerate wide power swings to maintain stable performance during hot-swap operations, also offer an easy migration to -48-volt battery-backed environments.

The Model 5000 hubs utilize the Model 5001 Power Supply, which delivers 950 watts (60 watts per slot) in single and redundant configurations, and 1,550 watts (100 watts per slot) in a dual, nonredundant configuration.

The Model 5005 hubs employ the Model 5051L Power Supply, which provides 600 watts (60 watts per slot) in single and redundant configurations, and up to 900 watts (100 watts per slot) in a dual, nonredundant configuration.

Supervisory Modules

Each Model 5000 and Model 5005 requires a Supervisory Module, which performs a rich set of management and status functions within the hub. The module regularly inventories and monitors hub components, storing configuration data in nonvolatile memory. By redundantly storing the information, the Supervisory Module ensures the hub's configuration will never be lost, even following a power cycle. The modules also include a front panel DB-9 Service Port that provides access to all hub slots, enabling users to collect specific configuration and status information from installed Ethernet, Token Ring, FDDI, and ATM host and management modules.

In a Model 5000 hub, a Model 5110 Supervisory Module resides in a slot on the back of the hub. In a Model 5005, a Model 5115 Supervisory Module is installed in the front of the hub, adjacent to the host modules, for easy access.

Internal Management Bus

Each System 5000 hub includes a 32 Mbps Common Management Bus (CMB) that supports large block transfers and internal communications between all installed modules. The CMB also plays a key role in transmitting core management statistics between host and network management modules and provides the link between

distributed software applications running on modules installed in the hub.

Reliability

The System 5000's high-quality design makes the Model 5000 and Model 5005 the industry's most reliable hub platforms. In the unlikely event of a component failure, a number of backup systems eliminate any single point of failure. These include:

- **Redundant cooling.** Dual fan units evenly distribute airflow to all installed components, even if only one of the two fans is operating.

- **Redundant power supplies.** Full load sharing power supplies can be configured to support redundant power configurations. The Supervisory Module actively monitors power usage and, through an LED display, reports when a redundant configuration is no longer present.
- **Redundant clocks.** Should the primary source fail, the Supervisory Module activates a backup unit to monitor and distribute module clock rates to all slots.

- **Redundant configuration storage.** Backup copies of hub configuration data are stored on each individual module, protecting against a Supervisory Module failure. If the Model 5110 or Model 5115 does fail, the module will shut down without affecting LAN performance. A new module can be hot-swapped to replace the failed unit, and network operations will continue without ever losing the hub's configuration.

LED Indicators

The System 5000 hubs offer a series of front and back panel LEDs that provide at-a-glance indications of power, cooling, Supervisory Module, redundant power configuration, and overall system health status.

Technical Specifications

Technical specifications for the System 5000 intelligent hubs appear in Table 1.

Table 1 | System 5000 Intelligent Hubs Technical Specifications

Network Protocols	
Ethernet, Fast Ethernet	IEEE 802.3
Token Ring	IEEE 802.5 Token Ring Access Method and Physical Layer Specifications
FDDI	ISO 9314-1 FDDI Physical Protocol (PHY) standard; ISO 9314-3 FDDI Physical Medium Dependent (PMD) standard; ANSI FDDI X3T9.5 Station Management specification (V7.3)
ATM	
Model 5000BH	CCITT 1.361 ATM Layer Specification; ATM Forum UNI V3.0 and V 3.1
Standards Support	
	IEEE AUI (for connections via 10BASE5)
	IEEE 802.3 10BASE-T
	IEEE 802.3 10BASE2
	IEEE 802.3 FOIRL
	IEEE 802.5 Token Ring
	IEEE 802.3 100BASE-T
	ANSI FDDI X3T9.5 FDDI
	ISO 9314-1 FDDI Physical Protocol (PHY) standard
	ISO 9314-3 FDDI Physical Medium Dependent (PMD) standard
	ATM Forum UNI V3.0 and V3.1
	ATM Forum LAN Emulation V1.0
	ATM Forum Interim Interswitch Signaling Protocol (IISP)
Physical Dimensions	
Model 5000	(H) 22.7 in. x (W) 17.7 in. x (D) 21 in. [(H) 57.7 cm x (W) 44.9 cm x (D) 53.3 cm]
Model 5005	(H) 22.7 in. x (W) 17.7 in. x (D) 14 in. [(H) 57.7 cm x (W) 44.9 cm x (D) 35.5 cm]

Table 1 | System 5000 Intelligent Hubs Technical Specifications (continued)

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
Shock/Bump	IEC 68-2-27/29
Weight	
Model 5000	Chassis without rear card cage assembly: 24 lb (10.8 kg) Chassis with rear card cage assembly and fan unit: 43 lb (19.3 kg) Chassis with three power supplies and Model 5110 Supervisory Module: 86.7 lb (39 kg) Fully loaded chassis: Approximately 138.7 lb (62.4 kg)
Model 5005	Chassis assembly, without access panel and module filler panels: 42.5 lb (19.1 kg) Chassis with two power supplies and Model 5115 Supervisory Module: 65.5 lb (29.5 kg) Fully loaded chassis: Approximately 84 lb (37.8 kg)
Power Supply Specifications	
Electrical	
Line Frequency	47 to 63 Hz
Volt Amperes Rating	1260 VA
Input Voltage	100 V to 240 V
Input Current Rating	12 A to 6 A
Fuses	Internal; not accessible to user
Thermal Rating	
One Power Supply	4265 Btu/hr max
Two Power Supplies	6585 Btu/hr max
Physical Dimensions	
Model 5001	(H) 12.7 in. x (W) 5 in. x (D) 8 in. [(H) 32.2 cm x (W) 12.7 cm x (D) 20.3 cm]
Model 5051L	(H) 6.2 in. x (W) 5.4 in. x (D) 12 in. [(H) 15.7 cm x (W) 13.7 cm x (D) 30.5 cm]
Handle Projection	
Model 5001	1.7 in. (4.4 cm)
Model 5051	0.85 in. (2.2 cm)
Weight	
Model 5001	14 lb (6.3 kg)
Model 5051L	10 lb (4.5 kg)

Table 1 | System 5000 Intelligent Hubs Technical Specifications (continued)

Supervisory Module Specifications	
Electrical	
Requires 5 Volts from Power Supply	
Power Dissipation	2.4 A at 5 V typical
Physical Dimensions	
Model 5110	(H) 14 in. x (W) 1.6 in. x (D) 9 in. [(H) 35.6 cm x (W) 4.1 cm x (D) 22.7 cm]
Model 5115	(H) 19 in. x (W) 1.2 in. x (D) 11 in. [(H) 48.2 cm x (W) 3.0 cm x (D) 27.9 cm]
Weight	
Model 5110 Supervisory Module	1.7 lb (.76 kg)
Model 5115 Supervisory Module	3 lb (1.4 kg)
Cooling System Specifications	
Number of Fans	Two
Thermal Sensors	One intake; two exhaust; one in each power supply
Airflow	200 CFM/50-1000 LFM
Air Temperature Rise Through Chassis	17°C max
Noise	
Model 5000	58 dB front; 65 dB rear
Model 5005	62 dB front; 61 dB sides and rear
	Requires 48 V at 0.7 A (Model 5000) or 48 V at 1 A (Model 5005)
Backplane Specifications	
Model 5000	
Hub Backplane Power Dissipation	2.0 A at 5 V typical
Supply Backplane Power Dissipation	0.2 A at 5 V typical
FDDI Backplane Power Dissipation	0 A
ATM Backplane Dissipation	1.0 A
Model 5005	
Hub Backplane Power Dissipation	1.0 A at 5 V typical
Supply Backplane Power Dissipation	0.1 A at 5 V typical
Clock Module Specifications	
Common Management Bus Clocks	10 MHz 20 MHz
FDDI Clocks	12.5 MHz 25 MHz
ATM Clock	50 MHz

Ordering Information

Ordering information for the System 5000 intelligent hubs appears in Table 2.

Table 2 | System 5000 Intelligent Hubs Ordering Information

Order Number	Description
Model 5000 Chassis	
5000N	Model 5000N Ethernet Chassis
5000NT	Model 5000NT Ethernet/Token Ring Chassis
5000F	Model 5000F Ethernet/Token Ring/FDDI Chassis
AD1402001	Model 5000BH ATM/Ethernet/Token Ring Chassis
Model 5005 Chassis	
5005N	Model 5005N Ethernet Chassis
5005NT	Model 5005NT Ethernet/Token Ring Chassis
5005F	Model 5005F Ethernet/Token Ring/FDDI Chassis
Supervisory Modules	
5110	Model 5110 Supervisory Module for Model 5000 Chassis
5115	Model 5115 Supervisory Module for Model 5005 Chassis
Power Supplies	
5001	Model 5001 AC Power Supply for Model 5000 Chassis
AD0005002	Model 5002 DC Power Supply for Model 5000 Chassis
5051L	Model 5051L AC Power Supply for Model 5005 Chassis
AD0005001	Model 5052 DC Power Supply for Model 5005 Chassis



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