System 5000 Network Management Modules and DCEs

Simplify Network Monitoring

Improve Network Flexibility

Increase Network Visibility

System 5000™ Ethernet and Token Ring network management modules (NMMs) from Bay Networks™ deliver a robust solution for managing, troubleshooting and analyzing multiple networks in System 5000 network center applications. Residing in a Model 5000 or Model 5005 intelligent hub, the modules collect and process core performance statistics from segments and rings operating within the hub, enabling System 5000-based networks to be monitored and controlled with precision. With the addition of on-board Data Collection Engines (DCEs), the modules also provide a platform for performing high-performance RMON-based traffic analysis.

System 5000 network management modules provide the Optivity® network management system with information regarding the Model 5000 or Model 5005 and all supported media. All modules in a System 5000 hub, including the Model 5110 Supervisory Module and System 5000 host modules, regularly collect and maintain fault, performance and configuration data at the network, hub, board and port levels. This information is forwarded to the network management modules, which process and condense the data and, using the Simple Network Management Protocol (SNMP), forward it to the network management station for review.

The System 5000 represents the industry's most sophisticated intelligent hub platform, delivering a structured networking solution for today's legacy networks. The System 5000 simultaneously supports Ethernet, Token Ring and FDDI, while support for asynchronous transfer mode (ATM) allows shared-media LANs to incrementally evolve to switched backbone networks without sacrificing existing investments.

The System 5000 supports highly-segmented enterprise networks by providing a central point of integration and administration for distributed environments. Residing in the network center, the Model 5000 unites distributed Bay Networks Distributed 5000,™ System 3000,™ BayStack™ and System 2000™ Ethernet, Token Ring and FDDI networks as a single, cohesive system, optimizing centralized network resources such as servers, bridges and routers.

The System 5000 also works with Bay Networks Access Stack Node (ASN™), Backbone Link Node (BLN®) and Backbone Concentrator Node (BCN®) routers, providing access to high-speed wide area links for large internetwork applications.

Bay Networks

Benefits

Simplify Network Monitoring

The System 5000 network management modules collect core management statistics from all Ethernet segments and Token Rings within the Model 5000 or Model 5005 hub, providing detailed fault and performance data for monitoring and controlling the network. In a Model 5000 hub, the modules monitor up to 52 Ethernet segments and 26 Token Ring networks; in a Model 5005, the modules monitor a maximum of 28 Ethernet segments and 14 Token Rings.

Improve Network Flexibility

With on-board DCEs, the System 5000 network management modules deliver detailed fault, performance, configuration and traffic analysis data for specific network segments, rings or ports. The DCEs can be selectively assigned to any portion of the network through network management, offering the flexibility to monitor specific areas with precision.

Increase Network Visibility

The RMON and SuperRMON™ capabilities of the Data Collection Engines provide detailed traffic and protocol analysis, delivering tremendous visibility into the network's operation. Port-to-address mapping, available through SuperRMON, determines the cause of a specific fault as well as its physical location in the network, allowing highly-focused management operations that enable rapid fault identification and resolution.

Features

System 5000 Network Management Module Architecture

Two primary System 5000 network management modules — one Ethernet, one Token Ring — are available to gather core management statistics from System 5000 host modules within a common hub, providing the Optivity network management system with detailed network activity data (see Figure 1).

The System 5000 network management modules incorporate a 32-bit 68040 processor delivering high-speed, 22 million-instructions-per-second (MIPS) performance for computing detailed, complex traffic data. High-speed communications between the management modules and the host modules is accomplished out-of-band via a 32 megabit-per-second (Mbps) Common Management Bus (CMB) that spans all 14 slots in a Model 5000 hub and all eight slots in a Model 5005 hub. Utilizing the CMB and the intelligent host modules, the network management modules provide comprehensive, simultaneous management and core statistics gathering at near-line speeds for all hub segments, including local and isolated segments.
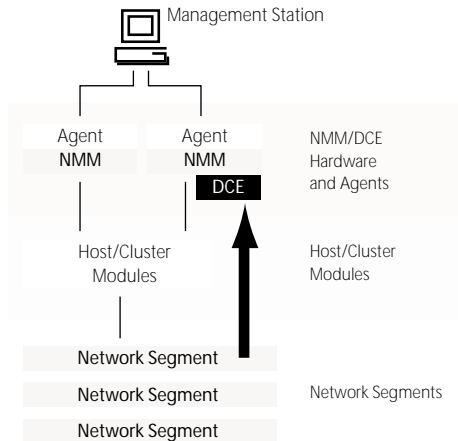
When equipped with DCEs, the System 5000 network management modules provide more powerful management capabilities on a per-segment or per-ring basis. Featuring a dedicated custom Frame Processing Unit (FPU), a 13 MIPS, 32-bit digital signal processor (DSP), and a network interface, DCEs capture frames and compute RMON-type statistics to provide greater visibility into network performance. The DCEs pass this data to the module's central processing unit (CPU), relieving the CPU from low-level packet processing chores.

Each managed segment or ring requires its own dedicated DCE to provide detailed packet analysis. System 5000 network management modules include expansion slots that allow up to three DCEs to be installed on a single module, providing expanded management capabilities for highly-segmented networks. The DCEs can also be selectively assigned to different segments via network management, providing a "roving" feature that leverages existing hardware.

Model 5310A Ethernet Network Management Module

The Model 5310A Ethernet Network Management Module comes preconfigured with Bay Networks Advanced management agent, providing simultaneous advanced management for up to 52 Ethernet segments in a Model 5000 hub and 28 segments in a Model 5005 hub.

Figure 1 | **System 5000 Embedded Management Architecture**

The Advanced Analyzer also supports Bay Networks' unique SuperRMON port-to-address mapping feature, which delivers unprecedented visibility into the network. SuperRMON not only determines the cause of a network problem, but also its physical port location, network address, and fault and performance information. Working with the Optivity network management system, as well as Network General Corp.'s Distributed Sniffer System (DSS), the Advanced Analyzer delivers integrated troubleshooting, network design and protocol decode capabilities.

The Model 5310SA's DCE can be selectively moved, via network management, to any backplane Ethernet segment within the hub, providing a roving RMON probe for the System 5000 network. The Model 5310SA can also support two additional DCEs, providing the flexibility to assign a DCE to a specific network segment for constant monitoring.

Model 5510 Token Ring Network Management Module

The Model 5510 Token Ring Network Management Module gathers ring-level performance and activity data from intelligent host modules, providing core management for up to 26 Token Rings in a Model 5000 hub and 14 rings in a Model 5005 hub.

The Model 5510 also includes 4 MB of DRAM, 1 MB of Flash EEPROM, 128K of non-volatile RAM and 256K of Boot EPROM for on-board storage of agent software and configuration images. All memory capacities are field-upgradeable.

Each Model 5310A features 4 MB of DRAM, 1 MB of Flash EEPROM, 128K of non-volatile RAM, and 256K of Boot EPROM for on-board storage of agent software and configuration images. DRAM is provided via an industry-standard SIMM.

The Model 5310A comes preconfigured with a Management Communications Engine (MCE), which provides the SNMP communications path with no promiscuous data collection. The MCE can be replaced with a DCE to provide more detailed packet gathering and analysis capabilities. The Model 5310A also includes two additional expansion slots, allowing up to three DCEs to be installed on a single module.

All management information collected by the Model 5310A is sent to the Optivity network management system in-band using SNMP. An external RS-232-C port

on the module is also available to support out-of-band SNMP management operations at speeds up to 38.4 kilobytes per second (Kbps). Module configuration and diagnostic testing can be performed at the hub site using a front-panel DB-9 service port maintained by the hub's Supervisory Module.

Model 5310SA Ethernet Network Management Module

The Model 5310SA Ethernet Network Management Module is identical to the Model 5510A, with the exception of an on-board DCE in place of the Model 5310A's MCE.

The DCE provides the Model 5310SA with Bay Networks' Advanced Analyzer™ management capabilities. The Advanced Analyzer agent includes an integrated probe that supports full RMON functionality (all nine groups as defined by RFC 1271), providing sophisticated network troubleshooting and problem resolution capabilities.

The Model 5510 comes preconfigured with one DCE, providing built-in packet capture and analysis capabilities. An additional expansion slot is also available, allowing a single module to support a total of two DCEs.

In-band SNMP communications for the Model 5510 are supported for sending management data to the Optivity network management system. A front-panel RS-232-C port is also available to support out-of-band SNMP management operations at speeds up to 38.4 Kbps. Module configuration and diagnostic testing can be performed at the hub site using a front-panel DB-9 service port maintained by the hub's Supervisory Module.

Data Collection Engines
Two versions of the System 5000 Data Collection Engines are available: the Model 5311A DCE, designed for use with the Model 5310A and Model 5310SA; and the Model 5511, designed for use with the Model 5510.

Model 5311A Ethernet DCE: The Model 5311A Ethernet DCE incorporates a 32-bit digital signal processor (DSP), providing a dedicated engine for processing frame segments and computing MAC-level statistics at speeds up to 11,000 packets per second. A unique dual National

Semiconductor network interface controller (NIC) design dedicates one NIC to promiscuous packet capture, while the second is reserved for in-band SNMP communications.

The Model 5311A DCE, which supports Bay Networks Advanced Analyzer management agent, works with both the Model 5310A and Model 5310SA Ethernet network management modules. Replacing the Model 5310A's MCE with the Model 5311A DCE upgrades the module to a Model 5310SA.

Model 5511 Token Ring DCE: The Model 5511 Token Ring DCE incorporates a 32-bit digital signal processor (DSP), providing a dedicated engine for processing frame segments and computing ring-level statistics at speeds up to 11,000 packets per second. The Model 5511 utilizes a Bay Networks-developed application specific integrated circuit (ASIC) to serve as an FPU that promiscuously captures and passes frames to the DSP at full network speeds.

The Model 5511 DCE works with the Model 5510 Token Ring Network Management Module. Up to two Model 5511 DCEs can be installed on a single Model 5510, providing detailed analysis and management for up to two Token Ring networks. The Model 5511 can also be selectively assigned to specific rings, delivering additional management flexibility.

LED Displays
The Model 5310A Ethernet, Model 5310SA Ethernet and Model 5510 Token Ring network management modules include an LED matrix display to indicate the modules' operational status at a glance.

All three modules include a top-level annunciator LED to report the modules' overall status. In addition, the Model 5310A and Model 5310SA include a bi-color LED matrix display to indicate which of the Model 5000 or Model 5005 hub backplane Ethernet segments are in use and their current status.

The Model 5510 offers a bi-color LED display to report which of the Model 5000 or Model 5005 hub backplane Token Ring networks are being used, as well the rings' speeds.

In addition, all three modules include a four-character alphanumeric display associated with each DCE to report current module status, network utilization and network error conditions.

Technical Specifications

Technical specifications for the System 5000 network management modules and Data Collection Engines are shown in Tables 1 and 2.

Table 1 | **System 5000 Ethernet and Token Ring Network Management Module Specifications**

Network Protocol	Model 5310A/5310SA: IEEE 802.3 CSMA/CD
	Model 5510: IEEE 802.5 Token Ring access method and physical layer specifications
Microprocessor	32 bit Motorola 68040 25 Mhz CPU
Memory	4 MB DRAM (upgradeable to 16 MB)
Flash EEPROM	1 MB (upgradeable to 2 MB)
Non-Volatile RAM	128K (upgradeable to 256K)
Boot EPROM	256K (upgradeable to 512K)
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˚C to 40˚C
	Operating humidity: 85% max relative humidity, non-condensing
	Operating altitude: 10,000 ft (3,048 m) max
	Storage temperature: -25˚C 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
Weight	Model 5310A/5310SA: 4.4 lbs (1.9 kg)
	Model 5510: 4.1 lbs (1.8 kg)
Safety	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 FCC Part 15, Subpart B, Class A
	Meet VCCI Class 1 ITG (CISPR 22 A limits)
	Meet EN 55 022, Class B and Vfg 243 Class B with shielded cable

Table 2 | **Model 5311A and Model 5511 DCE Technical Specifications**

Microprocessor	32-bit TMS 320C31 Digital Signal Processor 25 MHz
Memory	1 MB shared RAM buffer between DSP and 68040
	64K high-speed SRAM buffer between National NIC and DSP
	64K SRAM frame buffer between NIC and 68040
Network Interface Chip	Model 5310A/5310SA/5311A: Two DP8390 National Ethernet Network Controllers
	Model 5510/5511: Texas Instruments TMS 380 Token Ring Chip Set
Data Rate	Model 5311A: 10 Mbps Manchester encoding
	Model 5511: 4 Mbps or 16 Mbps Differential Manchester Encoding
Physical Dimensions	(H) 8.7 in x (W) 6.0 in x (D) 0.6 in [(H) 22.3 cm x (W) 15.3 cm x (D) 1.5 cm]
Weight	Model 5311A: 6.5 oz (.18 kg)
	Model 5511: 6.9 oz (.19 kg)

Ordering Information

Ordering information for the System 5000 network management modules and DCEs is shown in Table 3.

Table 3 | **System 5000 Network Management Module and DCE Ordering Information**

Order Number	Description
5310A	Model 5310A Ethernet Network Management Module with Pre-installed Management Communications Engine (MCE) and Sockets for Two Additional Model 5311A Data Collection Engines (DCEs)
5310SA	Model 5310A Ethernet Network Management Module with Pre-installed Model 5311A Data Collection Engine (DCE) and Sockets for Two Additional Model 5311A DCEs
5311A	Model 5311A Ethernet Data Collection Engine (DCE) for Model 5310A and Model 5310SA Ethernet Network Management Modules
5510-06	Model 5510 Token Ring Network Management Module with Pre-installed Model 5511 Data Collection Engine (DCE) and Socket for One Additional Model 5511 DCE
5511	Model 5511 Token Ring Data Collection Engine (DCE) for Model 5510 Token Ring Network Management Module

Bay Networks

For more sales and product information, please call **1-800-8-BAYNET**.

12/95 DA508-431WC-B   Printed on recycled paper.