IBM 8271 Nways Ethernet LAN Switch

Evolutionary steps to improved Ethernet performance

Highlights

- New Model 216 with 16 fixed Ethernet ports and 2 Universal Feature Card (UFC) slots supporting any of the previously announced UFCs
- Support for Ethernet 10BASE-T and 100BASE-TX media via RJ-45 connectors
- Support for Ethernet 10BASE-FL and 100BASE-FX for multimode fiber connections via ST connectors
- Added flexibility and support for a more varied set of configurations using existing infrastructure and software
- Minimal disruption in solving network performance problems

New features

The 8271 employs cut-through switching technology that provides the benefits of dedicated-media, high-speed (less than 50 microseconds delay) switching to serve emerging, high-demand desktop applications. However, should your operating environment demand more error isolation between segments, the 8271 can be configured to alternate automatically between cut-through and store-and-forward switching based on user-specified thresholds. This IBM-patented technique is called *adaptive cut-through mode*.

Additionally, the 8271 can be configured to block the forwarding of small, incomplete frames or runts using runt-free mode, thus enhancing network operations.

Finally, the UFC slot increases flexibility for either port expansion or connections to other switched or shared-media segments.

Staging your way to better performance

The 8271 allows you to make incremental changes in your network to address both immediate and long-range performance challenges. For example, an Ethernet LAN of 24 stations and 2 servers is beginning to experience performance problems as a result of increased traffic. As it is currently structured, the LAN looks like the one in Figure 1. All of the stations are attached to four, eight-port, 10BASE-T repeaters located in a single wiring closet. Now let's install an 8271 in the same wiring closet. First we will divide the LAN into four segments of six stations each. The repeater for each segment will be connected to a port on the 8271 via a UTP patch cable. Finally, the two servers are removed from the repeaters to which they have been attached and their cables moved to two ports on the 8271, as shown in Figure 2.

Each group of six users attached to a repeater now shares a dedicated, 10-Mbps path to the server. Each of the servers now has a dedicated, 10-Mbps path upon which to service requests. The overall capacity of this solution is 30 Mbps, and all we have done to the network is install the 8271, install five new patch cables, and relocate the connection of two others. No building wiring has been changed. No new adapters have been installed. No software has been rewritten. Just plug the 8271 into your network and watch it go. The capacity for this particular network has been increased threefold, and there's more to come.

The next step

Typically, the first point of congestion in our newly configured network would be the servers. Because the normal mode of operation for an Ethernet adapter is half-duplex, the servers can either send or receive information with one other segment attached to the switch. However, if the servers are equipped with full-duplex adapters, such as the IBM EtherStreamer MC 32 Adapter, and are attached as a single-station segment as shown in Figure 2, they can send and receive data simultaneously. Each server now has a 20-Mbps access to the network. If you use an IBM Dual EtherStreamer MC 32 Adapter, which requires two ports on the 8271, each server now has a 40-Mbps access to the network, as shown in Figure 3.

The new threshold

As more and more high-demand LAN applications become available, users will migrate from shared-media LANs to dedicated-media LANs. A logical first step in that migration is to move users from the shared-media LAN segments shown in Figure 1 to single-station segments, each attached directly to the port of an 8271 switch. All that is required is removing the eight 8-port repeaters and replacing them with 8271 switches. Switches can be linked by connecting them port-to-port, as shown in Figure 3. The throughput for this configuration is 80 Mbps, an eightfold increase over the original 10BASE-T LAN. Of course, you can double the available capacity at each of the client stations by using full-duplex adapters, as shown at the bottom of Figure 3.

Once again, large efficiencies in network operations, especially for high-demand operations, have been achieved with only minor inconvenience and minimal expense.

UFC slot and cards

The long-term usefulness of the 8271 is in large part due to the flexibility offered by the UFC slot. IBM offers optional, field-installable UFCs that provide additional 10-Mbps Ethernet ports (twisted-pair and fiber), or high-speed uplink connections. Ordering information for these UFCs is available immediately:

- 100BASE-TX
- 1-Port 100BASE-FX
- 4-Port 10BASE-T
- 3-Port 10BASE-FL

These UFCs and others will be available in the near future:

- 1-Port FDDI (DAS multimode fiber)
- 1-Port FDDI (SAS multimode fiber)
- 1-Port FDDI (SAS UTP)
- 1-Port ATM (155 Mbps SONET)

The UFCs are explained in detail in the *IBM 8271 Universal Feature Cards Specification Sheet, G224-4438*.

Management to smooth the way

In addition to supporting the industry-standard, SNMP management MIBs that allow the 8271 to be managed by any SNMP-based management system, we also support, through separate programs, NetView for Windows, NetView for AIX, and HP OpenView network management applications for their respective environments. These applications allow you to assess the status and configuration of the 8271 through a point-and-click interface as shown in Figure 4.

In addition, switch performance can be monitored through user-defined, rate-of-change graphs that show the peak, mean, and actual number of frames per user-specified polling period.

The Model 108's EtherProbe monitoring port can be used to monitor traffic on any of the 10BASE-T ports on the 8271 using a customer-supplied monitoring device such as the IBM DatagLANce Network Analyzer or similar products from Network General Corporation. Even full-duplex traffic can be monitored by looking at the transmit and receive paths separately. Configuration for this feature can be changed dynamically via the console or SNMP facilities.

Support for BootP and TFTP helps you manage the 8271 from a remote location in RFC 951-compliant environments by virtually eliminating the need to go to the switch for configuration or to download the 8271 microcode. But management isn't simply monitoring the network. The 8271 offers a number of features and configuration options that can help you easily build a robust, efficient network. For example, to help you with security or traffic management, our configuration program allows you to filter frames by MAC address and related switch-port number to prevent frames originating at or destined for these addresses from being forwarded to any other switch port. Another capacity management feature allows you to connect up to four, parallel, 20-Mbps paths between any two 8271s so that you can provide as much capacity between switches as you need. This EtherPipe feature is compatible with any spanning-tree features that might also be configured. The virtual switch feature allows you to divide the switch into from two to four, non-overlapping broadcast domains to help manage traffic and isolate some users from certain network resources.

What you get

The 8271 package includes:

- Cable and mounting brackets
- Planning and Installation Guide
- Power cord
- Service Information Card
- MIB diskette

Cables for each of the ports on the 8271 are required but are not included with the switch. The 8271 uses the following types of cabling:

- Category 3, 4 or 5, 100-ohm, UTP cables with RJ-45 connectors wired to support 10BASE-T.
- 150-ohm, STP cables with shielded RJ-45 connectors wired to support 10BASE-T.
- AUI cable with external transceivers for connecting to 10BASE2, 10BASE5, or optical fiber segments.
- EIA 232-C cable with a DB-9 connector for connection to the management port.

UFC connections might require other additional types of cable.

For more information

The 8271 is the first in a new generation of low-cost, high-data-rate switches that provide the benefits of dedicated-media, high-speed (less than 50 microseconds delay) switching to serve emerging, high-demand desktop applications. To learn more about the 8271 Nways Ethernet LAN Switch and other high-performance IBM communications and networking products, contact your IBM marketing representative or your local IBM-authorized remarketer.

8271 at a Glance	
Machine type	8271 Model 108 and Model 216
Part number	Model 108: PN 13H9150 Model 216: PN 55H7131
LAN ports	Eight or sixteen 10BASE-T MDI-X ports for shared or dedicated Ethernet segments; one AUI port (instead of one 10BASE-T port) for shared or dedicated 10BASE2, 10BASE5, or optical fiber segments. Support for 1700 active MAC addresses per port and 10000 per 8271.
Cabling	A crossover Ethernet 10BASE-T cable (UTP Category 3, 4, or 5) can be used to connect an MDI-X port on the 8271 to MDI-X ports on Ethernet hubs (repeaters). A standard Ethernet 10BASE-T cable is required to connect an MDI-X port directly to a LAN workstation adapter. When using port 8 on a Model 108, its MDI/MDI-X switch allows the more common, standard Ethernet 10BASE-T cable to be used for these connections. Model 216 provides a selection between MDI and MDI-X as port 16. For STP (150-ohm STP or STP-A) cabling, impedance-matching baluns should be used at each workstation or repeater attached to the 8271, as well as at each 8271 port to which STP cabling is attached.
Data rate	10 Mbps (half duplex) or 20 Mbps (full duplex, port configurable)
Standards compliance	Supports IEEE 802.3u network components, including external 10BASE-T hubs and concentrators
Configuration and management	Direct (VT-100-compatible terminal) or remote (modem) management via front panel EIA 232-C port. Console function is also available via Telnet. SNMP management for network management platforms such as NetView for Windows, NetView for AIX, and HP OpenView, capable of accessing SNMP (MIB-II compliant) management agent.
Low-latency design	High-speed switch efficiency achieved by forwarding immediately upon detection of a valid address, without waiting for the end of the frame, to reduce delay without increasing the likelihood of forwarding a bad packet. Latency: less than 50 microseconds. Adaptive cut-through mode automatically alternates between cut-through and store-and-forward switching based on user-specified error thresholds. Runt-free mode blocks small, invalid packet fragments.

Physical specifications	Width: 17.3" (440 mm); Depth: 14" (356 mm); Height: 2.6" (66 mm); Weight: 14 lb (6.4 kg) Height: 3.5" (88 mm); Weight: 14 lb (7.8 kg) (Model 216)
Operating Environments	Temperature: 50 to 104F (10 to 40C); Relative humidity: 8% to 80%; Electrical power: 0.16 KVA; Leakage and starting current: 0.5 mA/40 Ampere, 6 milliseconds; Capacity of exhaust: 0.4 m^3/min.; Noise level: 56 dB.
Certifications	8271 Safety Certifications: EN 60950, UL 1950, CSA 950 8271 electromagnetic compliance certification: FCC Class A (USA), VCCI Class 1 (Japan), ICES-003 Class A (Canada), European Community Mark of Conformity (CE Mark), EN55022 Class B, (CISPR-22B)
Installations	On a desktop or a standard 19-inch rack
Enhanced management tools	Address filters, virtual switch support, EtherPipes, and BOOTP and TFTP, EtherProbe
Warranty	One Year
Publication	*IBM 8271 Nways Ethernet LAN Switch Models 108 and 216 Planning and Installation Guide*, GA27-4984

Feature	**Benefit**
8- or 16-port switch	Extends network bandwidth for data-intensive applications such as multimedia, CAD, and client/server. Interconnects dedicated or shared Ethernet segments on any port. Delivers high performance at lower cost where bridge or router technologies are not required.
Universal Feature Card slot	Increased flexibility over Model 1. Expansion of the 10BASE-T capacity. Uplinks to high-speed, switched, and shared-media backbones.
IBM-patented adaptive cut-through switching	The self-correcting, self-optimizing technique that provides either the speed of cut-through switching or the error-checking capability of store-and-forward switching.
Award-winning physical package	Front-end access. Easy racking or stacking facilitated by integrated rack mounting brackets. Rugged, all-metal enclosure. SNMP, Telnet, or local console connection for switch-less configuration and better reliability. Common to many IBM Networking products.
Full-duplex operation	Permits simultaneous, two-way transmission between the switch and a device with a full-duplex-capable adapter. Improves server throughput by doubling available bandwidth when used on a dedicated LAN segment. Relieves congestion at network access point or server adapter.
Interconnectivity	Permits greater LAN segmentation by allowing you to interconnect multiple IBM Nways Ethernet LAN Switches.

AUI attachment port	Lets you connect one 10BASE2, 10BASE5, or optical fiber segment to support longer distances to the switch using an external transceiver.
SNMP management	Supports remote network management by SNMP-compliant applications, such as NetView for Windows, NetView for AIX, and HP OpenView.
Standards support	Protects your investment by interoperating with existing IEEE 802.3u Ethernet adapters, hubs, and other components. Supports spanning tree protocol that allows alternate paths between interconnected devices.

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Department A78
PO Box 12195
Research Triangle Park, NC 27709
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