Evolutionary steps to improved Token-Ring performance

IBM 8272 Nways Token-Ring LAN Switch

Highlights

- ***Additional network configuration options for increased flexibility and fewer network performance problems***
- ***Automatic configuration to the optimum operating level***
- ***Increased network capacity with minimal disruption to existing infrastructure***
- ***Source-route switching and internal source-route bridging maximize the benefits in source-routing environments***
- ***Adaptive cut-through, Token-Ring switching at an industry-leading price per port***
- ***GrandWinner (Overall) and Best in LAN Switch Category (Data Communications LAN Times– 1995)***
- ***Full-duplex***

New Features

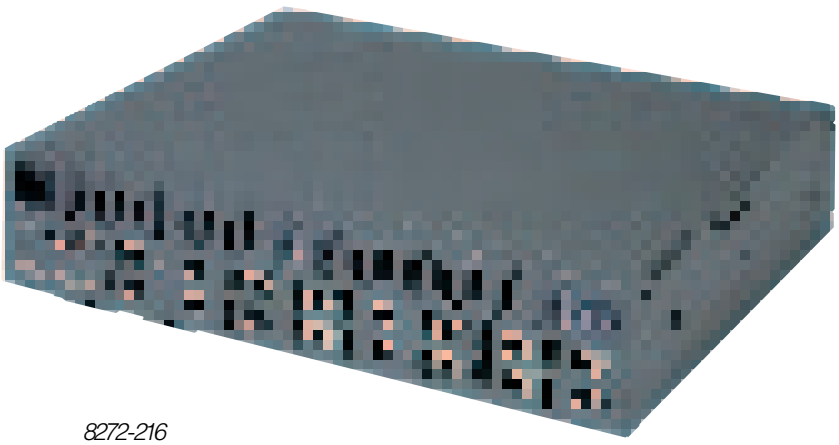
Internal source-route bridging function enhances the existing source-route switching capability.

Current features

The 8272 employs cut-through switching technology that provides the benefits of dedicated-media, high-speed switching to serve emerging, high-demand desktop applications. This switching technique delivers extremely low latency or delay. However, should your operating environment demand more error isolation between segments, the 8272 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*.

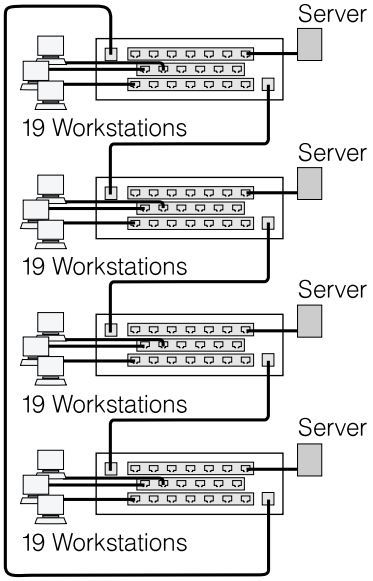
The Model 108 provides 8, fixed RJ-45 ports and one Universal Feature Card (UFC) slot. The Model 216 provides 16, fixed RJ-45 ports and two UFC slots. The UFC slots increase flexibility for either port expansion or connections to other switched or shared-media segments.

Additional fixed ports and UFC slots allow you to build larger and more complex switched networks using a common set of switch products. Many of the functions and features provided by the 8272 are common to other members of the IBM LAN switch family. Each of the fixed ports supports twisted-pair media (Token-Ring UTP/STP) via RJ-45 connectors. Any of the UFCs announced for the Model 108 can be used in the Model 216 UFC slots, allowing customers to construct a more varied set of configurations than is possible with the one UFC slot of Model 108.



8272-216

Figure 1



Staging your way to better performance

As shared-media LANs such as Token-Ring add stations to the network and generate more traffic, congestion increases and performance decreases. Some high-demand applications cannot run smoothly. The network and its users become less effective. Until now, the only solution has been to move to a higher data-rate network and wait for demand to catch up with the new capacity. Network administrators and planners face the prospect of rebuilding their entire networking infrastructure every few years.

The 8272 allows you to make incremental changes in your network to address both immediate and long-range performance challenges. For example, a Token-Ring LAN of 80 stations including 4 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 access units located in a single wiring closet. Now let's install an 8272 in the same wiring closet. First we will divide the LAN into 4 segments of 20 stations each. One access-unit port from each segment will be connected to a port on the 8272 via a patch cable. Finally, the four servers are removed from the access units to which they have been attached and their cables moved to four ports on the 8272 (Figure 2). Each group of 19 users attached to an access unit now shares a dedicated, 16-Mbps path to the server. Each server has a dedicated, 16-Mbps path upon which to service requests. The overall capacity of this solution is 64 Mbps, and all we have done to the network is install the 8272, install four new patch cables and relocate the connection of four others. No building wiring has been changed. No new adapters have been installed. No software has been rewritten. And the network capacity has been increased fourfold.

Relieving the overstressed backbone

Some large, multisegment, hierarchical Token-Ring networks experience congestion at the campus backbone level. Although this congestion can often be relieved by converting the backbone to a higher speed, shared-media protocol or by installing additional bridges or dual backbones to eliminate bottlenecks, the dedicated media offered by the 8272 might be more long-lived or more economical if either higher demand applications or an ATM WAN is in your future. Let's look at a couple of possible uses of 8272 switches in the network shown in Figure 3. This network is a three-level, hierarchical campus network.

Figure 2

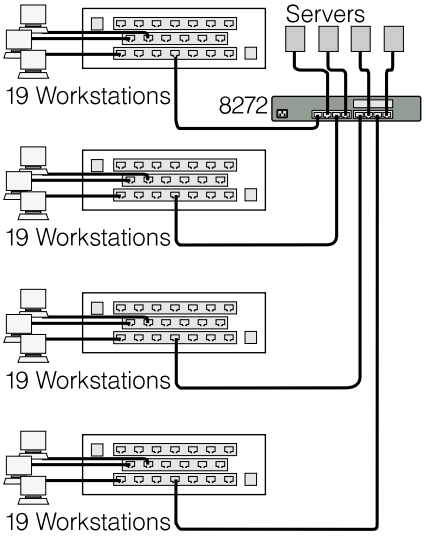
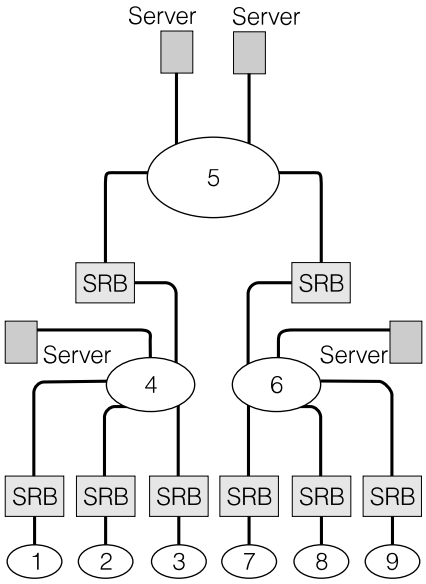


Figure 3



In Figure 4, the congested campus backbone and the source-routing bridges attached to it have been replaced by an 8272. As a transparent switch, all of the ports on the 8272 share the same ring number. Thus segments 4, 5 and 6 in Figure 4 have become a single logical segment (5 for purposes of identification).

The next step

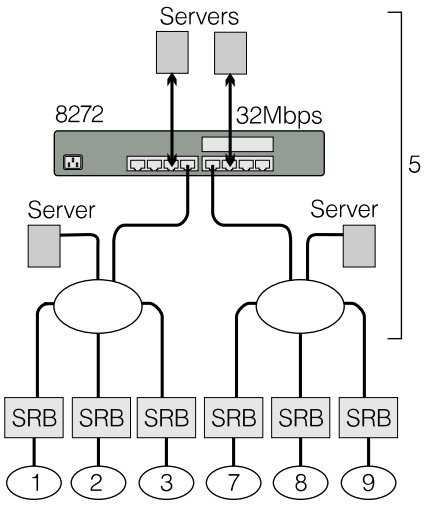
Typically the first point of congestion in our newly configured network would be the servers.

Because the usual mode of operation for a Token-Ring adapter is half-duplex, the servers can either send or receive information with one other segment attached to the switch. If the servers are equipped with full-duplex adapters, such as the IBM Auto LANStreamer PCI Adapter, the IBM 16/4 Token-Ring ISA Adapter, or the IBM Triple LANStreamer PCI Adapter attached as single-station segments as shown in Figure 4, they can send and receive data simultaneously. The capacity of each server is now 32 Mbps per port.

The new threshold

However, network congestion is not always at the backbone level. In Figure 5, we have replaced rings 4 and 6 and all of the bridges around them with 8272s. All of the stations in the former rings 1 through 9 are now seen as part of a single logical segment. Bottlenecks between users and departmental servers have been markedly decreased.

Figure 4



Finally, when the traffic on the backbone increases, the optional ATM uplink feature of the 8272 will allow you to connect to a scalable ATM network through the 8272, as shown in Figure 6.

Virtual switching magnifies your hardware

As an alternative to connecting LANs as a single large segment, the 8272 ports may be allocated through configuration to as many as eight separate domains. Each domain acts as a separate switch that is independently managed and has its own IP address. Packets are transparently forwarded between ports in the same domain, or to ports of another domain via the internal source-route bridge.

Source-routing technologies to suit

Suitable for either transparent or source-routing environments, the 8272 can be configured for source-route switching mode, a new patented technology developed by IBM. With source-route switching, explicit configuration of ring and bridge numbers is not required, substantially reducing the burden on the network administrator, for both initial setup as well as ongoing network changes. Redundant paths can easily be supported by using external source-routing bridges for each redundant path.

To further enhance the advantages of source-route switching, the 8272 provides a built-in source-route bridge function. This capability allows any combination of 8272 virtual switch domains to be interconnected internally by an internal multiport source-route bridge. In this way the 8272 can have the appearance of a single bridge with multiple ports. Figure 7 shows an example of an 8272 configured with multiple domains, three of which are enabled for source-route bridging. In this example, the 8272 uses source-route switching within domains and source-route bridging between domains.

Automatic configuration makes setup simple

The 8272 will automatically sense all of the following connection characteristics on each of its ports.

Type: Concentrator, LAN workstation, or another 8272
Data rate: 4 Mbps or 16 Mbps
Duplex mode: Half or full

The 8272 will automatically configure (requiring no operator action) each port to operate at the highest level of capability possible. No special crossover cables are required for stations on dedicated-media segments or for switch-to-switch connections; these connections can use the same cabling as can be used to connect the 8272 port to shared-media segments. This auto-sense and auto-configure capability minimizes the network administrative burden associated with both initial installation and ongoing network changes and helps ensure that customers can easily get optimum use of their networks without always having to manage the large number of configuration variables.

Figure 5

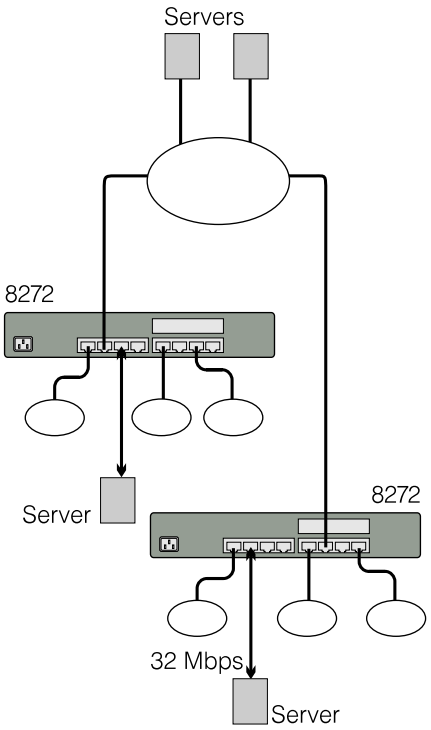
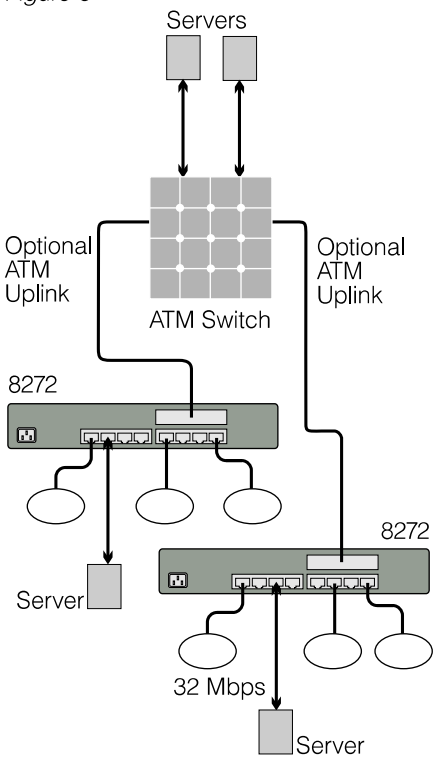


Figure 6



Management to smooth the way

In addition to supporting the industry-standard SNMP-management MIBs that allow the 8272 to be managed by any SNMP-based management system, we also support, through separate programs, Nways Manager for Windows, Nways Campus Manager LAN for AIX, and Nways Campus Manager LAN for HP-UX network management applications for their respective environments. These applications allow you to assess the status and configuration of the 8272 through a point-and-click interface. 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.

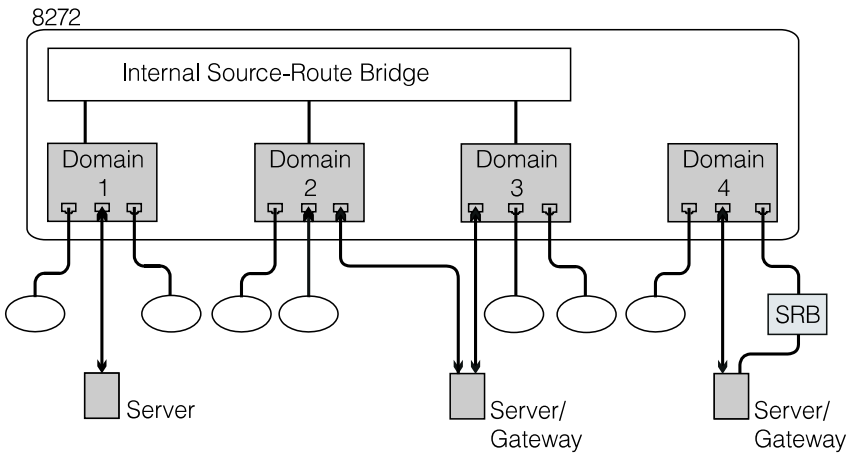
The 8272's TokenProbe support can be used to monitor traffic on any of the Token-Ring ports on the 8272 using a customer-supplied monitoring device such as the IBM DatagLANce Network Analyzer or the IBM Token-Ring Network 16/4 Trace and Performance Program. Even full-duplex traffic can be monitored by looking at the transmit and receive paths separately. Configuration for this feature can be changed dynamically via the console, SNMP facilities of the 8272 or an Nways manager.

Support for BootP and TFTP helps you manage the 8272 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 8272 microcode.

But management isn't simply monitoring the network. The 8272 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, TokenPipe, allows you to connect up to 4, parallel, 32-Mbps paths between any 2 8272s so that you can provide as much capacity between switches as you need.

Figure 7



Universal Feature Card slot and cards

The long-term usefulness of the 8272 is in large part due to the flexibility offered by the UFC slot. IBM offers optional, field-installable UFCs that provide additional twisted-pair (UTP/STP) ports, high-speed uplink connections or connections to other shared-media LANs. Ordering information for these port extension UFCs is available immediately:

- 4-Port Token-Ring UTP/STP
- 2-Port Token-Ring Fiber
- 1-Port ATM (155 Mbps SONET)

For details about these UFCs, refer to the IBM 8272 Universal Feature Cards Specification Sheet, G224-4439.

What you get

The 8272 package includes:

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

Cables for each of the eight ports on the 8272 are required but are not included with the switch. The 8272 uses the following types of cabling:

- Category 3, 4 or 5, 100-ohm, UTP cables with RJ-45 connectors wired to support Token-Ring
- 150-ohm, STP cables with shielded RJ-45 connectors wired to support Token-Ring or optical fiber segments
- Any current Token-Ring lobe cabling support for all types of connectors
- EIA 232-C cable with a DB-9 connector for connection to the management port

UFC connections might require other additional types of cable. With appropriate connectors, any type of cabling media currently supported for lobe connection of Token-Ring workstations into current, shared-media segments is supported.

For more information

To find out more about the IBM 8272 product and other high-performance IBM communications and networking products, contact your IBM representative or call IBM Direct at 1800 IBM-CALL (1 800 426-2255). You can also access the IBM Networking Home Page at http://www.raleigh.ibm.com.

Copies of this and other related product specification sheets can be obtained from the IBM FAX Information Service by dialing 1 800 IBM-4-FAX (1 800 426-4329) in the U.S. or Canada or by dialing (415) 855-4329 outside the U.S. and Canada and requesting any of the following document numbers:

- *3470 IBM 8272 NWays Token-Ring LAN Switch* specification sheet
- *4798 IBM 8270 and 8272 Universal Feature Cards* specifications sheet

IBM 8272 Nways Token-Ring LAN Switch at a Glance

Machine type	8272	
Part number	Model 108	PN 13H9170
	Model 216	PN 55H7160
LAN ports		Support for 1700 active MAC addresses per port and 10 000 per 8272.
	Model 108	Offers 8 token-ring, twisted pair (UTP/STP) ports for shared or dedicated LAN segments.
	Model 216	Offers 16 token-ring, twisted pair (UTP/STP) ports for shared or dedicated LAN segments.
Cabling		Supports STP Token-Ring cabling and supports UTP category 3, 4 or 5 Token-Ring cabling (external filters not required). No special cabling is required to connect the 8272 to dedicated media segments or to another 8272.
Data rate		• 4 or 16 Mbps (half-duplex) • 32 Mbps (full-duplex)
Standards compliance		Supports IEEE 802.5 network components.
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 Nways Manager for Windows, Nways Campus Manager LAN for AIX, and Nways Campus Manager LAN for HP-UX, 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. Adaptive cut-through mode automatically alternates between cut-through and store-and-forward switching based on user-specified error thresholds.
Token-Ring environments		• Suitable for transparent or source-routing environments. • Configurable for source-route switching or source-route bridging.
Dimensions		Model 108: Width: 440 mm (17.3 in.); Depth: 356 mm (14 in.); Height: 66 mm (2.6 in.); Weight 6.5 kg (14.3 lb) Model 216: Width: 440 mm (17.3 in.); Depth: 356 mm (14 in.); Height: 88 mm (3.5 in.); Weight 7.8 kg (17.0 lb)
Operating environments		Temperature: 10° to 40°C (50° to 104°F); Relative humidity: 8% to 80%; Electrical power: 0.2 KVA; Leakage and starting current: 0.5 mA/40 A, 6 ms; Capacity of exhaust: 0.6 m 3/min.; Noise level: 56 dB
Standards		• 8272 Safety Standards: EN 60950, UL 1950, CSA 950 • 8272 Electromagnetic Compliance Standards: FCC Class A (USA), VCCI Class 1 (Japan), ICES-003 Class A (Canada), European Community Mark of Conformity (CE Mark), EN 55022 Class B (CISPR-22 B) • ISO 9000
Installations		Can be placed on desktop or installed in standard 19-inch rack
Enhanced management tools		Address filters, virtual switch support, TokenPipe, and BootP and TFTP, TokenProbe
Warranty		One year
Publication		IBM 8272 Nways Token-Ring LAN Switch Models 108 and 216 Planning and Installation Guide, GA7-4982

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 LAN segments on any port. • Delivers high performance at lower cost where bridge or router technologies are not required.
Universal Feature Card slots	• Expansion of Token-Ring capacity • Uplinks to high-speed, switched, and shared-media backbones
IBM-patented adaptive cut-through switching	Provides the speed of cut-through switching and the error-checking capability of store-and-forward switching.
Ease of use	Automatic sensing and automatic configuring of connection types
Award-winning physical package	• Single-sided front access • Easy racking or stacking facilitated by integrated rack-mounting brackets • Rugged, all-metal enclosure • Switch-less configuration for 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.
Source-routing technologies	• Ease of use with source-route switching • Economy with source-route bridging — redundant paths without external hardware
Interconnectivity	Permits greater LAN segmentation by allowing you to interconnect multiple IBM LANStreamer switches.
SNMP management	Supports remote network management by SNMP-compliant applications, such as Nways Manager for Windows, Nways Campus Manager LAN for AIX, and Nways Campus Manager LAN for HP-UX.
Standards support	Protects your investment by interoperating with existing IEEE 802.5 Token-Ring adapters, hubs and other components.



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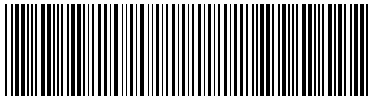
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