*Award-winning Frame Relay connectivity*

# IBM 2218 Nways Frame Relay Access Device

- **Winner of the "Data Communi- cations" Tester's Choice Award, February 1997**

- **Upgradable models for a cost- effective Frame Relay solution for the remote branch office**

- **Full network management with NetView® and SNMP**

- **Optional, integrated DSU/CSU and ISDN BRI adapters**

- **Immediate line-cost savings and the advantages of Frame Relay transport for networks with SNA, bisynchronous, polled asynchronous and client/server protocols**

- **Interoperability ensured by RFC 1490 compliance**

- **SNA session resiliency—band- width priority allocation, exten- sive Frame Relay controls and alternate routing**

The IBM 2218 Nways Frame Relay Access Device (FRAD) is an excellent solution for the remote branch office, interconnecting devices and hosts across a Frame Relay or LAN network. It channels SNA, BSC, asynchronous and multiprotocol LAN traffic into a single Frame Relay PVC. The 2218 eliminates the need for separate WAN links for legacy and LAN traffic. With the 2218, networks with serial multipoint, leased-line protocols and LAN-based protocols can take advantage of the cost- savings and network consolidations inherent in Frame Relay networks.

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# Positioning and Benefits

**Problem: Need for consolidation of multiple serial protocols**

**Environment:** An 800-branch-bank network is based on leased lines connecting each branch location to centralized data and application resources. A separate leased line is required for each application or protocol.

**1.** *IBM S/370™*

**2.** *IBM 37xx*

**3.** *IBM 3x74*

**4.** *Automatic teller machine (ATM)*

**5.** *BSC host*
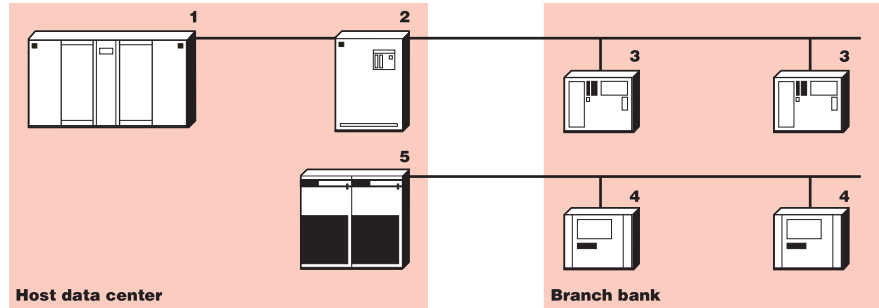
**Solution:** The 2218 supports the consolidation of the multiple serial protocols typically found in a branch-bank network over a common Frame Relay connection.

**1.** *IBM S/370*

**2.** *IBM 37xx*

**3.** *Token Ring*

**4.** *2218 FRAD*

**5.** *Frame Relay*

**6.** *IBM 3x74*

**7.** *Automatic teller machine*

**8.** *BSC host*
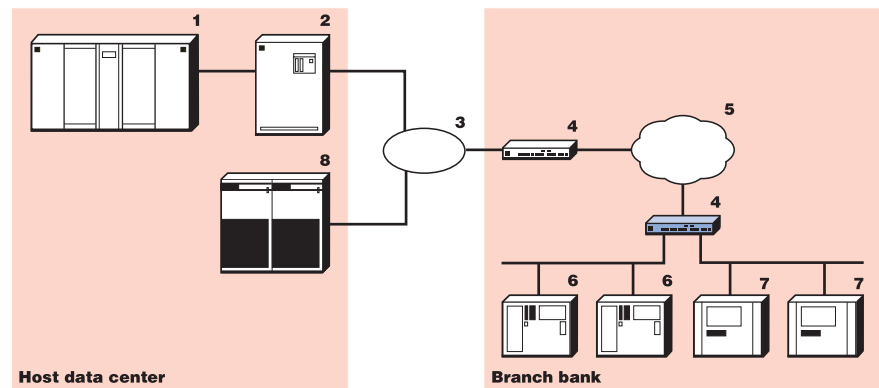
**Benefits**

- Optimized for Frame Relay, which meets the unique requirements of branch networks

- Supports mission-critical applications with robust application support, network management and world-class SNA

- Delivers lowest cost of ownership with lowest recurring network cost, lowest operating cost and an aggressive equipment price

**Wide Area Switch**

**Access and Transport**

## Problem: Need for integration of applications

**Environment:** A 50-branch retail organization uses an AS/400® network to support an integrated point-of-sale and inventory system. The company is adding a new TCP/IP client/server branch application to support customer queries for additional products.

**1.** *IBM AS/400*

**2.** *Controller*

**3.** *IBM PS/2*

SDLC
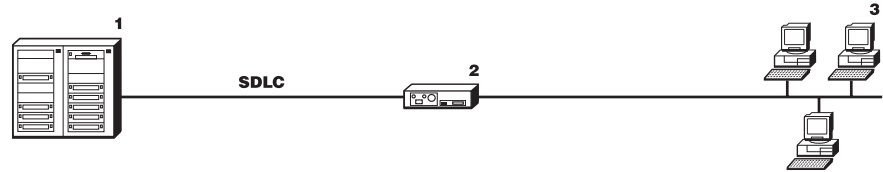
**Solution:** The 2218 provides the ideal solution for integrating these retail applications over a Frame Relay WAN. The 2218 FRAD provides the necessary WAN resources for both the SNA and IP applications.

**1.** *IBM AS/400*

**2.** *Token Ring*

**3.** *2218 FRAD*

**4.** *Frame Relay*

**5.** *IBM PS/2*

**6.** *IP server*
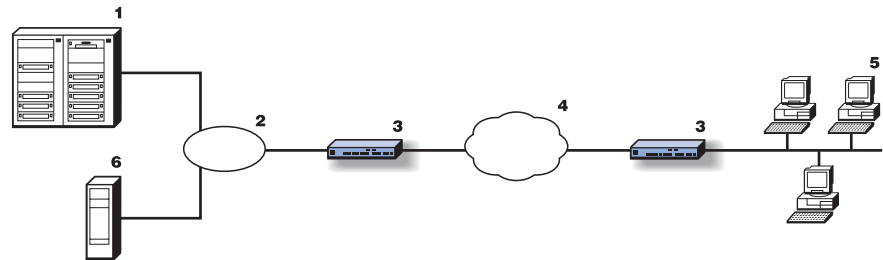
### Benefits

• Single platform provides support for existing SNA plus new client/server applications

• Integrated network management for NetView or SNMP or both

# Product Overview

The IBM 2218 Nways Frame Relay Access Device (FRAD) interconnects devices and hosts across a Frame Relay or LAN network. It channels SNA, BSC, asynchronous and multiprotocol LAN traffic into a single Frame Relay PVC. The 2218 eliminates the need for separate WAN links for traditional and LAN traffic. Using the 2218, customers with serial multipoint, leased-line protocols and LAN-based protocols can take advantage of the cost-savings and network consolidations inherent in Frame Relay networks.

The 2218 FRAD is based on the RFC 1490 Frame Relay definitions—your assurance of product interoperability with other RFC-compliant products, such as the 2216 Nways Multiaccess Connector, the 3746 Nways Controller and the 2210 Router from IBM. With the 2218 you can build new, multiprotocol networks while making the most of your existing investments in SNA equipment and skills. The 2218 integrates and supports traditional equipment and serial protocols such as:

- SDLC
- X.25 QLLC
- Binary Synchronous (BSC)
- Polled Asynchronous
- SNA Downstream Physical Units (DSPUs)

You'll get the advantages of immediate SNA, legacy and client/server protocol support, as well as the assurance of open-architecture interoperability. And the 2218 is well positioned as a Frame Relay feeder node into an ATM backbone.

The 2218 concentrates (local LLC2 termination) up to 120 LAN- and serial-link-attached controllers onto a single, high-speed Frame Relay circuit. At the enterprise, the 2218 attaches to the host through SDLC, LAN, BSC or Frame Relay circuit. Remote source-route and transparent bridging are supported across a Frame Relay network to compatible bridge partners such as the 2216 or 2210. The 2218 can also convert SDLC and X.25 QLLC into 802.2 LLC and BSC to SNA 3270. This option allows traditional equipment to be transported on a LAN-based network through bridges and routers.

## Frame Relay branches out

The 2218 offers modular models—so you can buy what you need, when you need it, for even greater cost-savings. All of the 02x models provide:

- Two EIA-232 ports
- Either a Token-Ring or Ethernet LAN interface or no LAN interface
- Two network management ports
- An optional, synchronous adapter with Two universal serial ports
- An optional, integrated 1-port 56- or 64-Kbps DSU/CSU adapter
- An optional, 1-port ISDN BRI adapter
- 4 MB of optional, pluggable memory
- Support for four optional code packages, including conversion node and Frame Relay node functions

## Upgradable models for remote branch offices provide cost-savings and ease of configuration

These models are designed for Plug and Play installation and operation in remote branch locations—especially helpful when there are no trained support personnel on-site. They can provide connectivity for up to 30 controllers at speeds up to 64 Kbps—with session integrity comparable to that of leased lines.

The 2218 has a single, stackable platform for space-saving convenience. The 02x models offer upgradable features you can purchase when you need them, whereas the 3xx models offer predetermined, factory-installed hardware configurations and functional capabilities. The 3xx models provide two, four or eight general-purpose serial ports with single Ethernet, Token-Ring or no LAN options. These models can be configured as a conversion node or Frame Relay node.

- Conversion node: Serial protocols are converted to LLC2 for transport over a Token-Ring or Ethernet LAN. Optionally the traffic can be transported to another 2218 FRAD for conversion back to the native protocol.

  Conversion node functions:
  - Support for SDLC or BSC hosts
  - Support for SDLC, BSC or asynchronous terminal units
  - SDLC- or BSC-to-LLC2 conversion
  - BSC-to-SNA 3270 conversion
  - SNA and SDLC boundary network node (BNN)
  - NetView/390 Service Point
  - SNMP agent
  - BootP
  - BSC RJE
  - X.25 QLLC

- Frame Relay node: Serial protocols are converted to RFC 1490 Frame Relay and optionally transported to another 2218 using the Frame Relay network. And SNA sessions can be locally terminated to provide increased session resiliency.

Frame Relay node basic functions:
- Single LAN protocol
- SDLC point-to-point or multidrop with primary and secondary emulation
- BSC 3270 point-to-point or multidrop with primary and secondary emulation
- Transparent multipoint polled asynchronous
- SNA-to-LLC2 conversion with local termination
- LLC2-to-Frame Relay
- SNA and SDLC BNN
- Annex A, Annex D and LMI
- RFC 1490 BNN and BAN
- PDQ and PDT priority control
- Committed Information Rate (CIR) conformance
- Plug and Play installation
- Auto UNI
- NetView/390 Service Point
- SNMP Agent
- BootP
- Auto LLC
- BSC RJE

Frame Relay node internetworking functions:
- All of the above basic functions
- Multiple LAN protocols
- IP routing (RIP) over Frame Relay or LAN interfaces
- IPX routing (RIP) over Frame Relay or LAN interfaces
- Source-route or transparent bridging across Frame Relay
- IPX BR + RIP/SAP pacing
- IP Virtual Route Switching
- SNA Network Interconnect (SNI) support
- Dedicated Dial Backup
- ISDN support

Frame Relay node enterprise functions:
- All of the above internetworking functions plus:
  - X.25 Passthrough*
  - X.25 QLLC*
  - X.25 WAN*

* Requires 4-MB DRAM Memory Expansion Feature, available on 0xx and 3xx models

## The predictable response times, session integrity and network manageability of proven leased-line support

You can use NetView on a System/390® platform—the same tools you use to manage your mission-critical SNA networks—to manage 2218 networks and their attached devices. Protect your investment in training and applications by using SNA services to manage devices supported by the 2218— services such as NetView Performance Monitor (NPM) for link performance monitoring, NetView command emulation and LLC2 test commands for SDLC problem determination. And the 2218 allows NetView users to see past the FRAD to downstream devices, unlike other FRADs—or even some router solutions.

In addition, the 2218 can be fully managed on either an SNMP or a NetView/390 platform. So you can reduce the costs of operator training, streamline network management and move easily to other SNMP-based management platforms. There is the ability to monitor or control a 2218 from a PC or workstation, using one of the several optional applications:

• FRAD/Manager is a Windows-based application recommended for configuring the 2218. It also works with NetView and SNMP to manage and monitor the 2218.

• FRAD/Manager for UNIX is a UNIX-(AIX-) based graphical and menu-driven interface recommended for configuring the 2218. It also monitors the 2218s in an SNMP management environment.

• FRAD NetView Command Facility uses a set of CLIST commands to allow NetView operators to control 2218s.

## Network topology

• Convergence of SNA, legacy and client/server protocols provides immediate line-cost savings and investment protection.

• RFC 1490 compliance provides interoperability with IBM and other RFC-compliant products.

• A wide range of protocols and functions handles SDLC, Ethernet, Token Ring, BSC 3270, X.25 QLLC and polled asynchronous.

• Virtual Route Switching (VRSw) provides a scalable client/server architecture for large branch networks, eliminating router overhead from branch locations and the WAN. It eliminates per-branch routing topology updates and provides faster switching between routes to optimize for large branch networks.

• TCP/IP routing supports client/server applications with optimized TCP/IP routing and protocol bridging.

## Mission-critical applications

• Priority Dependent Queuing and Transmission (PDQ/PDT) provides guaranteed bandwidth and network resources on a single PVC.

• Explicit and Parallel Virtual Routes enable routing around network and equipment failures without loss of session.

• Alternate Virtual Route provides automated disaster recovery scenarios, eliminating the need for manual reconfiguration of branch locations.

• Adaptive Congestion Control dynamically adjusts to network congestion notification to maximize application throughput and minimize response time fluctuations.

- SNA support offers SNA session resiliency—bandwidth priority allocation, extensive Frame Relay controls and alternate routing.

### Network management

- Full network management with NetView or SNMP simplifies network management and cuts costs.

- Two domain-independent NetView Service Points enable management from both the primary and disaster recovery data centers.

- Integral VTAM commands incorporate important VTAM SDLC line handler commands such as LLC2 and LPDA-2.

- The integral protocol analyzer provides remote protocol-tracing capability

without additional equipment or local technical support personnel.

- DSU/CSU management provides network management of external modems or DSU/CSUs (LPDA-2, RACAL, SLIP).

- Plug and Play installation with self-configuring installation and configuration retrieval eliminates all configuration by remote personnel.

### SNA application support

- Logical Link Switching provides a scalable data link (level 2) switching architecture for SNA, which eliminates level 3 processing overhead at both the branch and data center. It provides local LLC2/SDLC termination/poll spoofing.

- BSC-to-SNA conversion enables connectivity for BSC controllers to SNA hosts.

- Coupled polling provides consistent application state changes across an SNA internetwork.

# 2218 Nways Frame Relay Access Device Specifications

| Physical specifications | Width: 440 mm (17.3 in.) |
| --- | --- |
| | Depth: 287.3 mm (11.3 in.) |
| | Height: 43.5 mm (1.7 in.); 47.5 mm (1.87 in.) with mounting feet |
| | Weight: 3.64 kg (8 lb) |
| Operating environment | Temperature: 0° to 40°C (32° to 104°F) |
| | Relative humidity: 10% to 90% noncondensing |
| | Electrical power: 120 VA |
| | Capacity of exhaust: 0.207 m³/min (7.3 ft³/min) |
| | Noise level: 55 dB (A) measured 1 m (3.3 ft) away from unit |
| | Leakage and starting current: 26 PK/A |

### *02x modular models*

Supports 30 link- or LAN-attached controllers; 4 Frame Relay node or conversion node microcode features; 2 EIA-232 ports standard; optional 1-port ISDN BRI, 1-port DSU/CSU or 2-port universal serial port adapters available. The universal serial ports can be personalized by attaching cable. These ports can act as either a DTE or DCE. Physical interfaces are EIA 232, V.35 or X.21, Token Ring (STP or UTP, 4 or 16 Mbps), Ethernet 10BASE-T.

| Model 02x | 2 EIA 232 serial ports, no LAN |
| --- | --- |
| Model 02T | 2 EIA 232 serial ports, 1 Token-Ring port |
| Model 02E | 2 EIA 232 serial ports, 1 Ethernet port |

### 3xx models

Supports 60 link-attached controllers (if there are no link-attached PUs on a Model 3xx, the number of LAN-attached PUs can be 120); 60 LAN-attached controllers; microcode for configuration as Frame Relay node or conversion node included; remote bridging and IP and IPX routing code included. X.25 code included when 4-MB memory option ordered. Universal serial ports standard. The universal serial ports can be personalized by attaching cable. These ports can act as either a DTE or DCE. Physical interfaces are EIA 232, V.35 or X.21, Token Ring (STP or UTP, 4 or 16 Mbps), Ethernet AUI and 10BASE-T.

| | |
|---|---|
| Model 32T | 2 univeral serial ports, 1 Token-Ring port |
| Model 32E | 2 univeral serial ports, 1 Ethernet port |
| Model 34T | 4 univeral serial ports, 1 Token-Ring port |
| Model 34E | 4 univeral serial ports, 1 Ethernet port |
| Model 38T | 8 univeral serial ports, 1 Token-Ring port |
| Model 38E | 8 universal serial ports, 1 Ethernet port |

| 2218 microcode levels | Models | FC |
|---|---|---|
| Conversion Node | 02E, 02T | 5020 |
| Frame Relay Node: Basic Functions | 02E, 02T, 02X | 5000 |
| Frame Relay Node: Internetworking Functions | 02E, 02T, 02X | 5005 |
| Frame Relay Node: Enterprise Functions | 02E, 02T, 02X | 5100 |
| Upgrade Basic to Internetworking | 02E, 02T, 02X | 5010 |
| Upgrade Basic to Enterprise | 02E, 02T, 02X | 5011 |
| Upgrade Internetworking to Enterprise | 02E, 02T, 02X | 5012 |

| Management and configuration kits | Models | FC |
|---|---|---|
| Communication Port Adapter | All models | 2408 |
| FRAD/Manager for Windows | All models | 2421 |
| FRAD/NetView Command Facility | All models | 2423 |
| FRAD/Manager for UNIX Platforms | All models | 2428 |
| Rack Access | 02x models only | 2500 |

| Memory | Models | FC |
|---|---|---|
| 4-MB DRAM Memory Expansion | 02x models only | 3005 |
| 4-MB DRAM Memory Expansion | 3xx models only | 3110 |

| Cable features | FC |
|---|---|
| Universal connector cable EIA 232 DTE (with modem) female DB-25 | 2401 |
| Universal connector cable EIA 232 DCE (without modem) female DB-25 | 2402 |
| Universal connector cable V.35 DTE (with modem) female Winchester | 2403 |
| Universal connector cable V.35 DTE (with modem) male Winchester | 2404 |
| Universal connector cable V.35 DCE (without modem) female Winchester | 2405 |
| Universal connector cable V.21/V.11 DTE (with modem) female DB-15 | 2406 |
| Universal connector cable V.21/V.11 DCE (without modem) female DB-15 | 2407 |

# Key Customer Benefits

- Convergence of SNA, legacy and client/server protocols into a Frame Relay for immediate line-cost savings
- Frame Relay 1490 compliance, ensuring interoperability
- SNA session resiliency—bandwidth priority allocation, extensive Frame Relay controls and alternate/disaster routing
- Full network management
- Support of prevalent SDLC, Ethernet, Token Ring, BSC 3270, X.25 QLLC and polled asynchronous protocols
- Conversion of BSC 3270 to SNA 3270
- Optimized TCP/IP routing and protocol bridging for client/server application support

# Supplementary Information

The following sales tools are available for the 2218:

- Specification sheet:
  *IBM 2218 Nways Frame Relay Access Device*, G325-3581-01

- Information in the IBM 2218 is available at:
  *www.networking.ibm.com/netprod.html*
  *www.networking.ibm.com/228/228prod.html*