P R O D U C T
U P D A T E

IBM 2220 Nways BroadBand Switch

• **Optimized bandwidth for cost efficiency using Networking BroadBand Services (NBBS)**

• **Integration of applications with different quality-of-service (QoS) requirements (voice, video, data and image) to consolidate networks**

• **Existing and new wide area link support ranging from low to very high speeds**

• **Efficient voice server with compression (GSM, ADPCM), echo cancellation and Group 3 Fax transport**

• **ATM Bearer Services function for the support of several logical NBBS trunks over one physical ATM interface**

• **ATM/Frame Relay Interworking for seamless operation between a Frame Relay device and an ATM device (Service Interworking) or interconnection of two Frame Relay devices through an ATM network (Network Interworking)**

• **ATM switched virtual circuit (SVC) support for ease of connection configuration and optimal bandwidth utilization**

• **Euro-ISDN and ISDN for NTT INS-Net in Japan for cost-effective connection of remote establishments and transport of voice, video and data**

• **Euro-ISDN trunk backup support through the LIC 563 for more flexibility and reliability to the NBBS network**

• **Frame Relay over ISDN to establish a backup link for Frame Relay devices through ISDN**

• **Flexible PBX interworking in multivendor environments using Q.SIG**

• **Real-time Frame Relay support, a complementary solution for the deployment of voice Frame Relay Access Devices (FRADs) in small branches**

• **Non-reserved traffic support including notification of network congestion for Frame Relay/ATM and networking efficiency**

• **Switched carrier service for several NBBS trunks over a single E1/T1/J1/J2 link with Multiple Logical Trunk (MLT) reducing access line requirements**

• **Mixed multiprotocol capabilities on a single adapter for reduced hardware and configuration costs**

Strengthen your integrated data network with the enhanced voice capabilities of the IBM 2220 Nways® BroadBand Switch. The 2220 supports a wide range of access services, so you can take advantage of low-cost carrier services. Besides support for the European Telecommunication Standards (ETS), Euro-ISDN and European Computer Manufacturers Association (ECMA) Q.SIG, ISDN port protocol support is also available for NTT INS-Net in Japan.

Positioning and Benefits

Problem: European bank needs to consolidate data and voice traffic over a Frame Relay WAN and unify its network management systems.

Environment: The bank passes data over a leased-line SNA network between its 30 districts and 800 branch offices. As shown in Figure 1, voice traffic is switched through PBXs. Voice and data traffic require separate management systems.

Solution: A multi-node, 2220-backbone network integrates voice and data traffic, unifies network management via an RS/6000® server and provides end-to-end ATM connectivity. This bank is now equipped with one of the most advanced end-to-end ATM networks in the world.

1. *VTAM*®

2. *NV/6000*

3. *Token-Ring*

4. *3746 Nways Controller Model 950*

5. *Server*

6. *Frame Relay*

7. *PBX*

8. *2220 Broadband Switch*

9. *2210 Multiprotocol Router*

10. *ISDN*

11. *ISDN, public switched telephone network (PSTN)*
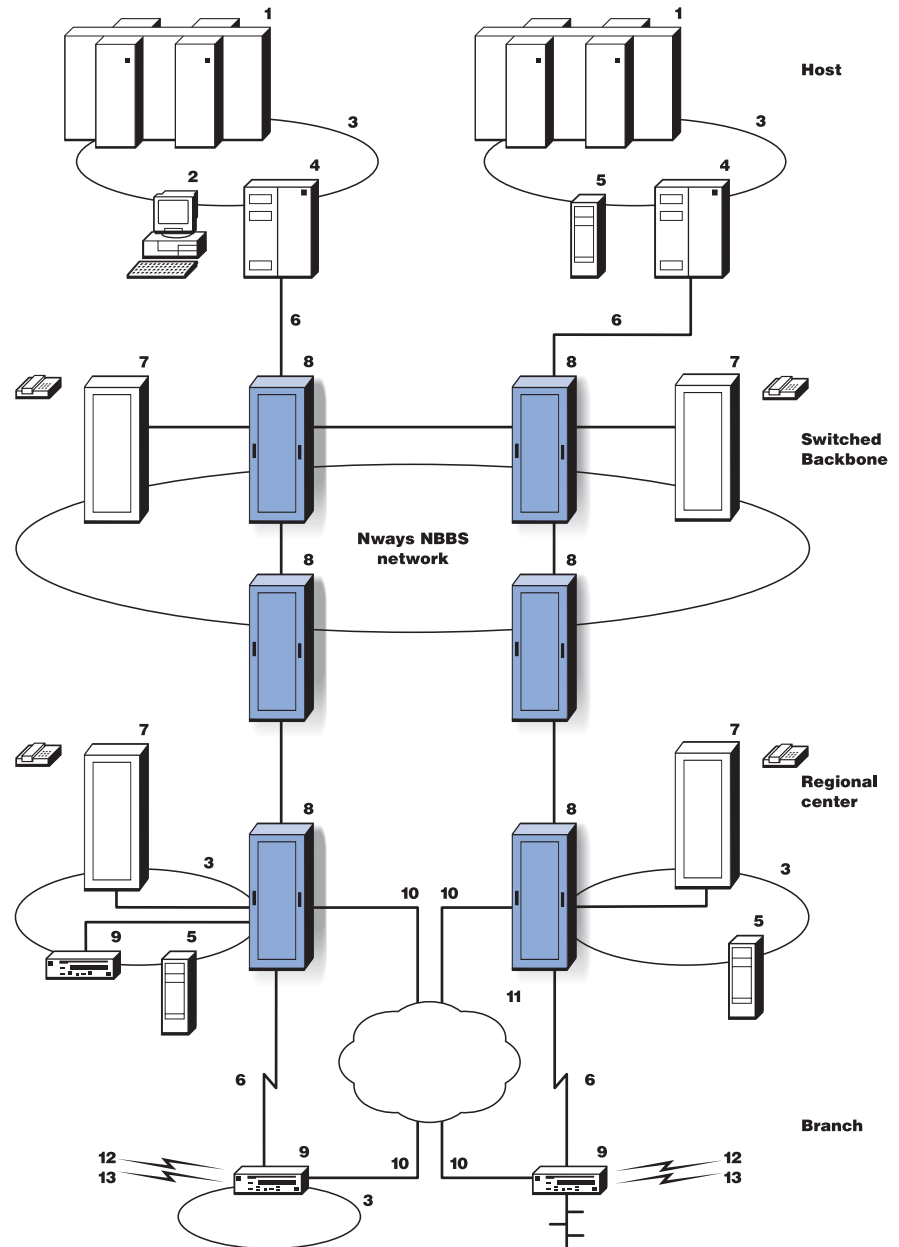
12. *ATM*

13. *PU2*

Figure 1. An end-to-end ATM network

Benefits

- Network consolidation. The 2220 accommodates data and voice traffic in one network.

- Unified management. The 2220 manages voice and data.

- Cost-effectiveness. In this network the 2220 increased network capability while reducing leased-line costs.

- Stability during migration. The 2220's multiprotocol support protects investments in existing devices.

- ATM. The new network is capable of multimedia traffic, expandable to very high speeds and standards-based .

Problem: Interconnecting local retail establishments

Environment: In another application, shown in Figure 2, a large retailer has used the 2220 to consolidate an SNA network.

Solution: In the consolidated network, 2220s in headquarters and regional locations use a high-speed Frame Relay backbone to interconnect local stores.

1. *Network management*

2. *Headquarters site*

3. *SNA regional network with*

   2220 Frame Relay

   backbone

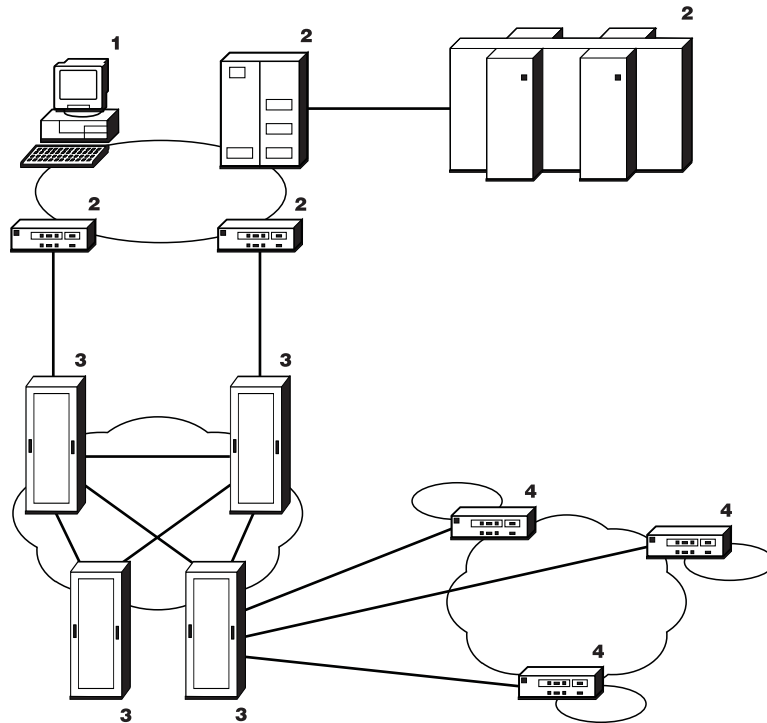**4.** *Local stores with 2210 and*

   Token-Ring networks

Figure 2. A retailer Frame Relay network

Benefits

- The new network lowered costs immediately, and the retailer is already planning further consolidation of voice and video networks using ATM in the future.

- The 2220 will be able to accommodate the new traffic and higher speeds when upgraded with the necessary adapters and voice-processing units.

Problem: A European telco needs to provide voice, data and video over one high-speed link.

Environment: This telecommunications company has an existing optical fiber infrastructure.

Solution: A package of 2220 digital BroadBand Switches, 8260 Nways Multiprotocol Switching Hubs, 2210 Routers, concentrators, and network management software enable the telco to provide voice, data and video services simultaneously over the same link. The 2220s link five nodes across optical fiber lines.

1. *X.25 switch*

2. *2220 Nways BroadBand Switch*

3. *8260 Hub*

4. *LAN Emulation Server*

5. *Internet*

6. *2210 Nways Multiprotocol Router*

7. *Network management on an RS/6000 server*
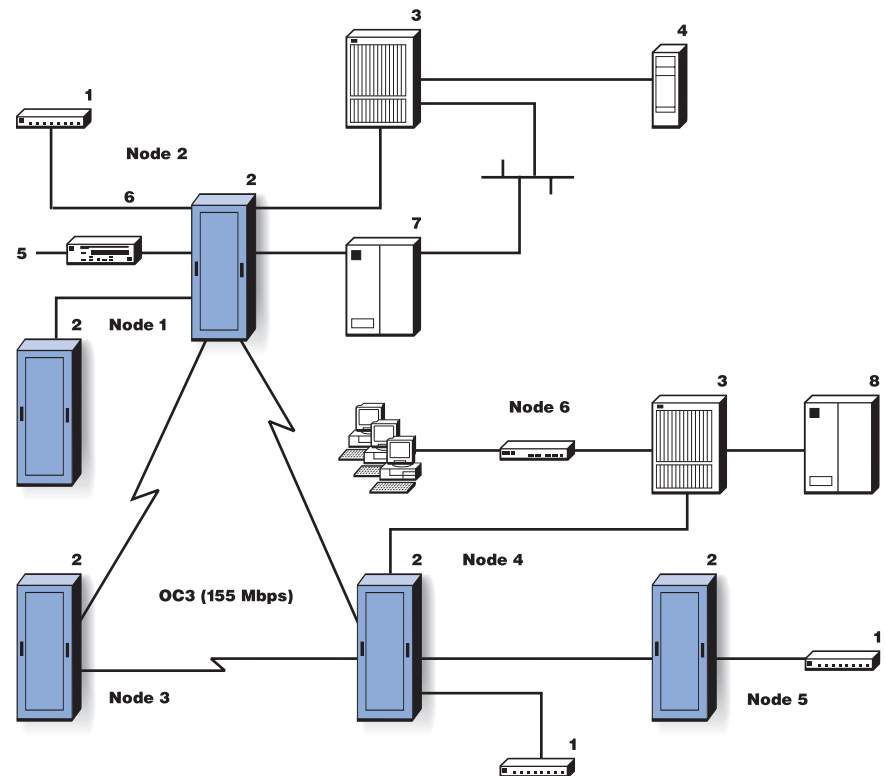
8. *Customer inventory on an RS/6000 server*

Figure 3. A Telco ATM network

Benefits

- The first telecommunications company in Eastern Europe to implement a 2220-based ATM network, the telco is able to provide ATM QoS, LAN Emulation (LANE), Frame Relay, connections to the country's existing X.25 network, video on demand and high-quality videoconferencing, interconnection of campus ATM networks and voice services via PBX.

- The new platform will allow large companies and their branches—such as banks and television operators—to take advantage of high-speed facilities.

- The new ATM backbone is a major improvement over current telecommunications infrastructure technologies. By making the network more flexible, the new backbone increases bandwidth efficiency and enables instantaneous service for each user.

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Wide Area Switches

Frame Relay/ATM/Multiservice

Product Overview

2220 Upgrades for e-business

The growth of e-business has placed unprecedented demands on WAN networks. The number of locations that must be serviced by the network as well as bandwidth consumption demands have both increased. In this era of e-business, Frame Relay and ATM are the transport protocols of choice and IBM's latest upgrades to the 2220 make it the switch of choice as well. The 2220 now has state-of-the-art ATM SVC and ATM/Frame Relay Interworking, providing new connectivity configuration flexibility, more bandwidth savings, and ease of Frame Relay and ATM migration.

With the support of the ATM Bearer Service function, the 2220 also enables you to divide a single ATM UNI or NNI physical interface into multiple logical NBBS trunks, allowing the interconnection of 2220s over public or private ATM services. The NBBS trunks are mapped over ATM virtual paths (VPs), supporting the definition of up to 32 logical trunks per ATM adapter.

Giving voice a high priority

Here's an excellent solution for small branch offices with a few voice calls and some data connections over a low-speed access line. Real-time Frame Relay support provides a complementary solution for the deployment of voice FRADs in small branches, because it lets you ensure the priority of voice over data traffic. Assigning real-time priority to voice traffic lowers the transport delay and improves the quality of voice communication, and at the same time reduces your costs per attached port. A Frame Relay connection can be assigned a
non-real-time (NRT) or real-time 2 (RT2) class of traffic.

Build your switched network with the 2220

When you want to build a single, switched broadband network that consolidates multiple access services, consider the 2220. It's designed for high-bandwidth transport networks with both constant and bursty traffic. It integrates voice, batch, real-time and image applications while providing cost-savings and quality of service. In fact using the 2220 to combine several protocols in the same adapter can reduce the cost of supporting multiple protocols. Each line interface can support a different protocol, such as Frame Relay, voice, HDLC, circuit emulation, X.25, ISDN or Q.SIG. Deployment is cost-effective and simple thanks to the 2220's modular design. Three 2220 models are currently available. Model 300 provides six adapter slots. Model 500 provides eight. Model 501 is an Expansion Frame that can be added to an existing Model 500, offering six additional adapter slots.

The 2220's scalable architecture and variety of interfaces support today's environments and prepare you for networks of the future. The 2220 can support any mix of services, circuits, fast-packet and cell-based switching, with a capacity of up to 9 million ATM cells per second. It offers a guaranteed level of service for time-sensitive traffic, such as voice and video, and maximizes bandwidth utilization for effective transport of large, less time-sensitive data and image traffic. The hardware-based 16 x 16 Switch-on-a-Chip allows transmission rates of up to 12.8 Gbps. A 2220 Model 500 with a Model 501 expansion frame provides a net switch aggregate throughput of 4.2 Gbps.

IBM's NBBS architecture is the basis for the 2220's fast-packet and ATM cell-switching capabilities. NBBS can effectively carry both variable-length packets and fixed-length ATM cells, making it possible to optimize transmissions according to data type. And nondisruptive path-switching, a function of NBBS architecture, finds alternate paths in the event of failures for increased reliability. A new network re-optimization feature optionally computes and reestablishes the best path for NBBS connections on a predetermined schedule.

MLT support allows the definition of several NBBS trunks connecting a 2220 node to different 2220 destinations over E1, T1, J1 or J2 interfaces provided by a carrier using a single link optimized for bandwidth utilization.

With MLT, LIC 514 and 544 J1 service attachments offer support for J1 Multiple Access Sub-Rate speeds in Japan. The LIC 562 offers additional attachment flexibility by supporting J2 Multiple Access Sub-Rate in Japan.

The trunk function previously available on Low-Speed Adapter 2 (LSA2) has been extended to LSA3 with three times more connections. This makes T1/E1/J1 LICs (544, 545 and 546) with eight interface connections per LIC available for use as trunks.

Line cost savings through ISDN/Q.SIG

Both Euro-ISDN and ISDN support in Japan for E1 and J1 primary interfaces allow you to cost-effectively connect remote branches and transport voice, video and data. You can realize line-cost savings by using ISDN's switched-connection protocol instead of leased lines. You can save equipment and line costs by eliminating tandem PBXs and get the improved voice quality of one-hop transmission. The 2220 supports E.164 and private numbering plan (PNP), line bundling and virtual private networks (VPNs).

The 2220 also supports Frame Relay over ISDN for Euro-ISDN and ISDN support in Japan, enabling you to connect a Frame Relay device through a switched ISDN connection. By supporting this function, the 2220 offers Frame Relay remote access, Frame Relay backup and Frame Relay overflow over ISDN.

In addition, the 2220 supports Euro-ISDN trunk backup through the LIC 563. Using this function, a backup trunk can be established through the ISDN network and the Non-Disruptive Path Switching operation can be used to reroute connections. The ISDN trunk can also be used for occasional traffic support to absorb temporary peak traffic.

The 2220's support for Q.SIG, a standard PBX voice-signaling protocol, supporting E1 and T1, helps you efficiently establish switched services in private networks. Get flexibility through PBX interworking in a multivendor environment. Save bandwidth cost while providing additional, advanced switching services. And the 2220 can transport PABX proprietary protocols that are encapsulated in Q.SIG generic protocol. Digital Private Network Signaling System (DPNSS) support is provided by a DPNSS-to-Q.SIG external converter. And the 2220 can act as an ISDN gateway, allowing a Euro-ISDN PBX to interwork with a Q.SIG PBX.

The 2220's implementation of the ADPCM voice-compression algorithm enables you to cascade multiple PBXs by supporting multiple voice compression/decompression hops with ITU-T G.721 standard spaced voice quality.

Managing the 2220 network

2220 network management is provided by the IBM Nways 2220 Switch Manager (NSM) for AIX®, which runs on an RS/6000 system under TME 10 NetView® for AIX.

NSM uses the OSI Common Management Interface Protocol and Services (CMIP/CMIS) and provides fault management, accounting management, performance management, operational control and automation capabilities. It also includes alarm-filtering, thresholding, discrimination and logging.

In addition, NSM supports alarm forwarding to an SNMP platform such as NetView for AIX or HP/OpenView.

This allows for the consolidation of network management under the same platform, resulting in enhanced usability and network operation simplification.

TME 10 Software Distribution Manager (5697-SWD) remotely manages 2220 code changes.

A versatile switch for current and future applications

In a typical application, shown in Figure 1, the 2220 is being used by a European telecommunications carrier to offer the first high-speed ATM network in its country. Using the 2220 to build an ATM backbone network, the telecommunications company will be able to offer video on demand, high-quality video-conferencing, high-speed connections between campus networks and enhanced, high-speed data services to schools, hospitals, cable television and local industries.

In another application, shown in Figure 2, a large retailer has used the 2220 to consolidate an SNA network. In the consolidated network 2220s in headquarters and regional locations use a high-speed Frame Relay backbone to interconnect local stores. The new network lowered costs immediately, and the retailer is already planning further consolidation of voice and video networks using ATM in the future. The 2220 will be able to accommodate the new traffic and higher speeds when upgraded with the necessary adapters and voice-processing units.

Wide Area Switches

Frame Relay/ATM/Multiservice

Features	Benefits
Scalable architecture modular design	Protects investment; grows as your network grows.
NBBS architecture	Paves the way to ATM; optimizes transmissions by data type; increases reliability.
ATM Bearer Services support	• Optimizes the link bandwidth utilization. • Reduces the number of access lines required, providing ATM line and 2220 port cost savings.
ATM/Frame Relay Interworking	• Provides flexibility in Frame Relay traffic routing across multi-vendor networks. • Reduces overall network costs by migrating locations to ATM only when required to meet bandwidth or application needs.
ATM switched virtual circuit (SVC)	Provides user flexibility and ease-of-use in establishing connections and optimizes bandwidth for network cost savings.
Euro-ISDN and ISDN for Japan	Offer savings compared with leased-line costs; enhances flexibility, ease of use.
Frame Relay over ISDN	• Establishes a backup link to the 2220 through ISDN for Frame Relay devices, providing a cost-effective way to improve network availability. • Utilizes the ISDN network for temporary access when needed, taking advantage of economical dial-up ISDN tariffs and saving network costs.
Euro-ISDN trunk backup	• Offers a flexible and cost-effective way to ensure high network availability. • Helps absorb peak traffic, taking advantage of favorable ISDN tariff rates.
Q.SIG support (E1, T1)	Provides PBX interworking in multivendor environment; saves bandwidth cost.
Multiple Logical Trunk	Enables switched carrier service for several NBBS trunks over a single E1/T1/J1/J2 link, saving bandwidth costs.
Real-time Frame Relay support	Supports voice FRADs to reduce costs and improve flexibility by receiving voice and data traffic over the same Frame Relay link.
Non-reserved traffic support	• Optimizes utilization of excess network capacity for Frame Relay and ATM connections. • Improves the efficiency of non-reserved traffic transport in the network.
Voice server	Provides quality voice transport with compression and echo cancellation.
Protocol merge	Reduces costs of supporting multiple protocols by optimizing adapter use.
Network management through IBM	Simplifies network management; reduces cost of Nways Enterprise Manager for AIX.

2220 Nways BroadBand Switch Specifications

Models	2220 Model 300, with 6 adapter slots
	2220 Model 500, with 8 adapter slots
	2220 Model 501, an expansion of Model 500 that provides an additional 6 adapter slots
Capacity	Up to 14 slots available for media interfaces (user or network access) on Models 500 and 501
	Two slots for control and administration functions (optional)
Port interfaces	ATM DS3 (CCITT G.804, Bellcore TR-TSV-773, G.703, ANSI T1.102, T1.107/107A), 75-ohm, 150-m (492-ft) coaxial
	ATM E3 (CCITT G.804, G.832), 75-ohm, 150-m (492-ft) coaxial
	ATM (155-Mbps) SONET STS3c/SDH STM1 SMF (T1-105, G.708/G.709/G.957), 20 km (12.4 mi.)
	ATM (155-Mbps) SONET STS3c/SDH STM1 SMF (T1-105, G.708/G.709/G.957), 40 km (24.8 mi.)
	ATM (155-Mbps) SONET STS3c/SDH STM1 MMF (T1-105, G.708/G.709), 2 km (1.24 mi.)
	ATM (155-Mbps) SONET STS3c/SDH STM1 (T1-105, G.708/G.709), electrical
	Serial Data Interfaces EIA 232/V.24, V.35/V.36, X.21, HSSI up to 52 Mbps
	T1 (DS1, DSX-1 interface)
	J1 NTT HSDS I interface at UNI J1 Multiaccess/ Sub-rate
	E1 (G.703, G.704), E2 (G.703, G.742/G.745), E3 (G.703, G.751/G.753)
	J2 NTT HSDS I interface at UNI
	T3 clear channel
	Fractional E1, J1 and T1
	JJ-20, 2-Mbps TTC
ATM adapters	1-port SONET STS3c/SDH STM1 SMF, 20 km (12.4 mi.)
	1-port SONET STS3c/SDH STM1 SMF, 40 km (24.8 mi.)
	1-port SONET STS3c/SDH STM1 MMF
	1-port SONET STS3c/SDH STM1, electrical
	2-port ATM DS3
	2-port ATM E3
High-speed adapters	1-port T3
	1-port E2/E3/J2
	1-port HSSI
Low-speed adapters	4-port V.35/V.36/X.21 (up to 60 V.24/V.35/X.21 lines)
	4-port E1 75/120 ohms
	8-port E1 75/120 ohms
	4-port T1/J1
	8-port T1/J1
	4-port JJ-20, 2-Mbps TTC
Trunk interfaces	ATM DS3 (CCITT G.804, Bellcore TR-TSV-773, G.703, ANSI T1.102, T1.107/107A), 75-ohm, 150-m (492-ft) coaxial
	ATM E3 (CCITT G.804, G.832), 75-ohm, 150-m (492-ft) coaxial
	ATM (155-Mbps) SONET STS3c/SDH STM1 SMF (T1-105, G.708/G.709/G.957), 20 km (12.4 mi.)
	ATM (155-Mbps) SONET STS3c/SDH STM1 SMF (T1-105, G.708/G.709/G.957), 40 km (24.8 mi.)
	ATM (155-Mbps) SONET STS3c/SDH STM1 MMF (T1-105, G.708/G.709), 2 km (1.24 mi.)
	ATM (155-Mbps) SONET STS3c/SDH STM1 (T1-105, G.708/G.709), electrical
	Serial Data Interfaces V.35/V.36, X.21, HSSI from 56 Kbps to 52 Mbps
	T1 (DS1, DSX-1 interface)
	J1 NTT HSDS, J1 Multiaccess/Sub-Rate
	E1 (G.703, G.704), E2 (G.703, G.742/G.745), E3 (G.703, G.751/G.753)
	J2 NTT HSDS, J2 Multiaccess/Sub-Rate
	T3 clear channel
	Fractional E1, J1 and T1
	ATM Bearer Service
	ISDN Access

Voice server adapter	Up to 140 voice communications supported per adapter
	• GSM:
	20 voice-compression channels (base)
	80 voice-compression channels (base plus extension 1)
	140 voice-compression channels (base plus extension 2)
	• ADPCM:
	16 voice-compression channels (base)
	64 voice-compression channels (base plus extension 1)
	112 voice-compression channels (base plus extension 2)
ISDN	• ETS 300 011: subset of ITU-T I.431 for Layer 1; G.703/G.704/G.706
	• ETS 300 125: subset of ITU-T Q.921 for Layer 2
	• ETS 300 102: subset of ITU-T Q.931 for Layer 3
	• Euro-ISDN supplementary services:
	Direct dialing-in (DDI)
	Calling-line identification presentation (CLIP)
	Calling-line identification restriction (CLIR)
	Connected-line identification presentation (COLP)
	Connected-line identification restriction (COLR)
	Subaddressing (SUB)
	User-to-user signaling (UUS)
	Terminal portability (TP)
	When applicable, facilities are transported.
	• Numbering-plan support (configuration-dependent):
	E.164 and PNP subscriber numbers for private subscriber access
	E.164 numbers for access to public network
	E.164 and PNP numbers for access to private network
	E.164 subscriber numbers for public subscriber access
	• Attachment of Nways switch port to ISDN equipment through PRI access (30 B + D):
	DCE
	DTE
	• Support for NTT INS-Net in Japan
Q.SIG (fully interoperable with ISDN)	• ECMA 141 for Layer 2
	• ECMA 143 for Layer 3
	• ECMA 165 for generic function protocol (GFP)
	• ETS 300 011: Subset of ITU-T I.431 for Layer 1; G.703/G.704/G.706
	• Q.SIG supplementary services:
	Direct dialing-in (DDI)
	Calling-line identification presentation (CLIP)
	Calling-line identification restriction (CLIR)
	Connected-line identification presentation (COLP)
	Connected-line identification restriction (COLR)
	Subaddressing (SUB)
	Terminal portability (TP)
	• Numbering-plan support (configuration-dependent):
	E.164 and private numbering plan (PNP) subscriber numbers for private subscriber access
	E.164 numbers for access to public network
	E.164 and PNP numbers for access to private network
	E.164 subscriber numbers for public subscriber access
	• For building a private telecommunication network (PTN):
	Transit PTN exchanges (PTNX)
	Gateway PTNX
	• Signaling modes:
	Basic call
	Call-related Generic Functional Transport (GFT)
	Call-independent GFT

IBM 2220 Nways BroadBand Switch, continued

X.25 DCE	• From 2.4 Kbps to 2 Mbps
	• LAPB: Modulo 8
	• PLP: SVC, X.21 addressing, Modulo 8
	• Optional facilities:
	Nonstandard default packet size
	Nonstandard default window size
	Incoming or outgoing call barred
	One-way logical channel
	Default throughput class assignment
	Throughput class negotiation
	Flow Control Parameter negotiation
	Fast select and fast-select acceptance
	Subaddressing
	Hunt group
ATM	VP/VC switching
	PVC mode support
	SVC mode support (IISP, UNI public or private DCE, UNI public or private DTE, Q.2931)
	ITU-T Rec. I.432 B-ISDN UNI Physical Layer Specification
	ITU-T Rec. G.708 Network Node Interface for the SDH
	ITU-T Rec. G.709 Synchronous Multiplexing Structure
	ITU-T Rec. G.957 Optical Interfaces for Equipment Relating to SDH
	ITU-T Rec. I.361 B-ISDN ATM Layer Specification (UNI/NNI)
	ITU-T Rec. I.610 Operation and Maintenance Principles and Functions
	ATM Forum UNI Specifications V3.1 and 4.0
	Compliant with B-ICI NNI cell formats
	ATM standard counters
Circuit emulation	Bit-transparent connection for video, voice and data
	From 2.4 Kbps to 2 Mbps
	T1, E1, J1, JJ-20, V.35, V.36, X.21, V.24, EIA 232
Voice support	Cell-based switching
	Common Channel Signaling (CCS)
	Channel-Associated Signaling protocol continuous signaling E&M Wink Start
	GSM-based compression at 15.2 Kbps
	ADPCM-based compression at 32 Kbps
	A-to-m law conversion
	Speech activity detection and silence removal
	Voice-idle removal
	Integrated Digital Echo Cancellation
	G3/G4 fax detection
	G3 fax demodulation in voice-compression services
	T1, E1, JJ-20 2-Mbps TTC
Frame Relay	UNI up to 52 Mbps
	ANSI T1.617 Annex D Signaling
	ITU-T Q.933 Annex A Signaling
	ANSI T1.618 Data Transfer Protocol
	ITU-T Q.922 Data Transfer Protocol
	NNI up to 52 Mbps
	PVC mode support
	Frame Relay/ATM Interworking: Network and Service Interworking (FRF.5 and FRF.8)
	Frame Relay port overbooking
	Frame Relay standard counters
	ITU-I.122
	Frame Relay over ISDN

IBM 2220 Nways BroadBand Switch, continued

HDLC	• HDLC-based traffic with idle removal • From 2.4 Kbps to 52 Mbps
Protocol merge support (using low-speed adapter type 3)	• LIC 511 (V.24/X.21/V.35 up to 256 Kbps): Frame Relay, HDLC, CES • LIC 514 (4xT1/J1): Frame Relay, HDLC, CES, voice • LIC 515 (4xE1 75 ohms): Frame Relay, HDLC, CES, voice, ISDN, Q.SIG • LIC 516 (4xE1 120 ohms): Frame Relay, HDLC, CES, voice, ISDN, Q.SIG • LIC 517 (4xJJ-20, Japan): voice, CES • LIC 522 (X.21/V.35/V.36 up to 2 Mbps): Frame Relay, HDLC, CES • LIC 544 (8xT1/J1): Frame Relay, HDLC, CES, voice • LIC 545 (8xE1 75 ohms): Frame Relay, HDLC, CES, voice, ISDN, Q.SIG • LIC 567 (4xE1 ISDN 120 ohms; planned to attach to public ISDN networks): Frame Relay, HDLC, CES, voice (except CAS), ISDN, Q.SIG
Electrical requirements	• For ac installations the input range is 208 to 240 V ac, 50 to 60 Hz • For dc installations the input range is -39 V to -60 V • Each Nways switch ac power supply includes a battery backup.
Physical specifications	• Width: 660 mm (26 in.) for Model 300 or 500; 1270 mm (50 in.) for Model 500 with 501 Expansion Frame • Depth: 905 mm (37 in.) • Depth with stabilizer: 1105 mm (46 in.) • Height: 1803 mm (71 in.) • Weight: 400 kg (882 lb) including rack and Models 300 or 500; 780 kg (1716 lb) including racks and Model 500 with 501 Expansion Frame

Operating environment

The 2220 BroadBand Switch ships with a desktop PC Nways Switch Administration Station (NAS). There are two possible operating environments: 1) in a separate room, and 2) in the same room.

Environment 1

• Model 300 with NAS in a separate room*:
Temperature: 10° to 40°C (50° to 104°F)
Relative humidity: 8% to 80%
Maximum wet-bulb temperature: 27°C (80°F)
Calorific value: 563 kcal/h (2230 BTU/h)
Electrical power: 0.9 kVA
Capacity of exhaust: 7.2 m³/min
Noise level: 70 dB LWA
Leakage current: < 3.5 mA
Starting current (inrush): 35 A maximum
Voltage: 208 to 240 V, 50 to 60 Hz

• Model 500 with NAS in a separate room*:
Temperature: 10° to 40°C (50° to 104°F)
Relative humidity: 8% to 80%
Maximum wet-bulb temperature: 27°C (80°F)
Caloric value: 1035 kcal/h (4100 BTU/h)
Electrical power: 1.5 kVA
Capacity of exhaust: 7.2 m³/min
Noise level: 70 dB LWA
Leakage current: < 3.5 mA
Starting current (inrush): 35 A maximum
Voltage: 208 to 240 V, 50 to 60 Hz

Environment 2

• Model 300 with NAS in same room:
Temperature: 10° to 32°C (50° to 90°F)
Relative humidity: 8% to 80%
Maximum wet-bulb temperature: 27°C (80°F)
Calorific value: 563 kcal/h (2230 BTU/h)
Electrical power: 0.9 kVA
Capacity of exhaust: 7.2 m³/min
Noise level: 70 dB LWA
Leakage current: < 3.5 mA
Starting current (inrush): 35 A maximum
Voltage: 208 to 240 V, 50 to 60 Hz

• Model 500 with NAS in same room:
Temperature: 10° to 32°C (50° to 90°F)
Relative humidity: 8% to 80%
Maximum wet-bulb temperature: 27°C (80°F)
Caloric value: 1035 kcal/h (4100 BTU/h)
Electrical power: 1.5 kVA
Capacity of exhaust: 7.2 m³/min
Noise level: 70 dB LWA
Leakage current: < 3.5 mA
Starting current (inrush): 35 A maximum
Voltage: 208 to240 V, 50 to 60 Hz

*Current distance option is 15 m (49 ft) using the interconnection cable for the desktop PC to APC card contained in the ship group.

IBM 2220 Nways BroadBand Switch, continued

Operating environment (continued)

Environment 1	Environment 2
•Model 501 with NAS in a separate room*:	• Model 501 with NAS in same room:
Temperature: 10° to 40°C (50° to 104°F)	Temperature: 10° to 32°C (50° to 90°F)
Relative humidity: 8% to 80%	Relative humidity: 8% to 80%
Maximum wet-bulb temperature: 27°C (80°F)	Maximum wet-bulb temperature: 27°C (80°F)
Caloric value: 2070 kcal/h (8200 BTU/h)	Caloric value: 2070 kcal/h (8200 BTU/h)
Electrical power: 3.0 kVA	Electrical power: 3.0 kVA
Capacity of exhaust: 14.4 m³/min	Capacity of exhaust: 14.4 m³/min
Noise level: 70 dB LWA	Noise level: 70 dB LWA
Leakage current: < 7 mA	Leakage current: < 7 mA
Starting current (inrush): 35 A maximum	Starting current (inrush): 35 A maximum
Voltage: 208 to 240 V, 50 to 60 Hz	Voltage: 208 to 240 V, 50 to 60 Hz

Software included	The IBM Nways BroadBand Switch Control Program operates in the 2220 and implements NBBS.
Agency approvals	• IEC 950, 60950; FCC Part 15, Part 68; European Union (EU) Council Directive 89/336/EEC; VCCI; JEIDA; U.K. General Approval Number NS/G/1234/J/100003 • LIC 516 complies with the following EU directives: 89/336/EEC; 73/23/EEC; 91/263/EEC.
Publications	*2220 Nways BroadBand Switch Models 300, 500, and 501 At A Glance, an Overview*, GA33-0292 *2220 Nways BroadBand Switch Models 300, 500, and 501 Planning Guide*, GA33-0293 *2220 Nways BroadBand Switch Models 300, 500, and 501 Setup Guide*, SY33-2105 *2220 Nways BroadBand Switch Models 300, 500, and 501 Service Guide*, SY33-2106 *2220 Nways BroadBand Switch Models 300, 500, and 501 Configuration Guide*, GA33-0474 *2220 Switch Manager Version 1 Installation Guide*, SH11-3088 *2220 Nways BroadBand Switch Frame Relay Interface Specifications*, GA33-0374 *2220 Nways BroadBand Switch HDLC Interface Specifications*, GA33-0375 *2220 Nways BroadBand Switch CES Interface Specifications*, GA33-0376 *2220 Nways BroadBand Switch ATM Interface Specifications*, GA33-0378 *2220 Nways BroadBand Switch Physical Lines Interface Specifications*, GA33-0379 *2220 Nways BroadBand Switch X.25 Interface Specifications*, GA33-0413 *2220 Nways BroadBand Switch ISDN/Q.SIG Interface Specifications*, GA33-0447
Warranty	The IBM 2220 Nways BroadBand Switch is backed by a 1-year warranty. The warranty and subsequent IBM Maintenance Agreements include IBM Onsite Repair. Media are covered by a 3-month warranty. Central Service from the IBM Support Center is also available.
Country of origin	USA

Installation information

Software and operating systems	• IBM Nways BroadBand Switch Control Program V1 R5 (5622-388) V2 R3 (5765-C71) • IBM Nways 2220 Switch Manager for AIX V1.1 (5765-D45)
Hardware requirements	IBM 2220 Nways BroadBand Switch

IBM 2220 Nways BroadBand Switch continued

Protocol merge support (using low-speed adapter type 3)	FC
LIC 511 (V.24/X.21/V.35 up to 256 Kbps): Frame Relay, HDLC, CES	5511
LIC 514 (4xT1/J1): Frame Relay, HDLC, CES, voice	5514
LIC 515 (4xE1 75 ohms): Frame Relay, HDLC, CES, voice, ISDN, Q.SIG	5515
LIC 516 (4xE1 120 ohms): Frame Relay, HDLC, CES, voice, ISDN, Q.SIG	5516
LIC 517 (4xJJ-20, Japan): voice, CES	
LIC 522 (X.21/V.35/V.36 up to 2 Mbps): Frame Relay, HDLC, CES	5522
LIC 544 (8xT1/J1): Frame Relay, HDLC, CES, voice	5544
LIC 545 (8xE1 75 ohms): Frame Relay, HDLC, CES, voice, ISDN, Q.SIG	5545
LIC 567 (4xE1 ISDN 120 ohms; planned to attach to public ISDN networks):	
Frame Relay, HDLC, CES, voice (except CAS), ISDN, Q.SIG	5567

Ordering information	FC
Large hard disk for NAS	3000
NAS replacement (large hard disk and faster processor)	3100
Rack for Models 300 and 500 with air filter	4501
Rack for Models 300 and 500 with air filter and seismic hardening kit	4502
Rack for Model 501 with air filter	4601
Rack for Model 501 with air filter and seismic hardening kit	4602
Clock tailgate	5100
Back-up switch	5340
Back-up switch redrive module (request with Model 501)	5341
Back-up switch Model 300	5350
Clock for Models 300 and 500	5355
Clock for Model 501	5356
Connection to RS/6000 management station	5370
Voice server adapter	5400
Low-speed adapter type 2	5440
High-speed adapter type 2	5445
High-speed adapter type 3	5446
ATM adapter	5450
ATM adapter type 2	5451
Low-speed adapter type 3	5460
Dual power supply input	5500
Voice server ext 1	5501
Voice server ext 2	5502
LIC 511 port RVX<256 Kbps (up to 60 interfaces)	5511
LIC 513 port/trunk T3 (1 interface)	5513
LIC 514 port/trunk T1/J1 (4 interfaces)	5514

Ordering information	FC
LIC 515 port/trunk E1 75 ohms (4 interfaces)	5515
LIC 516 port/trunk E1 120 ohms (4 interfaces)	5516
Dual power supply dc/dc -48 V	5520
LIC 522 port V.35/X.21/V.36 (4 interfaces)	5522
LIC 523 port/trunk E2/E3/J2 (1 interface)	5523
LIC 530 port/trunk HSSI (1 interface)	5530
LIC 544 T1/J1 port/trunk (8 interfaces)	5544
LIC 545 E1 port/trunk 75 ohms (8 interfaces)	5545
LIC 546 E1 port/trunk 120 ohms (8 interfaces)	5546
LIC 551 DS3 port/trunk ATM (2 interfaces)	5551
LIC 552 E3 port trunk ATM (2 interfaces)	5552
LIC 553 ATM SONET/SDH electric 155 Mbps (1 interface)	5553
LIC 554 ATM SONET/SDH SMF 155 Mbps (1 interface)	5554
LIC 555 ATM SONET/SDH SMF 155 Mbps (1 interface)	5555
LIC 556 ATM SONET/SDH MMF 155 Mbps (1 interface)	5556
LIC 562 J2 Multi-access/sub-rate interface (1 interface)	5562
LIC 563 ISDN Trunk Backup (2 interfaces); E1 port/trunk 75 ohms (2 interfaces)	5563
LIC 567 E1 port ISDN 120 ohms (4 interfaces)	5567
Line connection box (LCB)	5600
LCB expansion	5610

Wide Area Switches

Frame Relay/ATM/Multiservice

Key Customer Benefits

- Scalable, NBBS architecture
- ATM Bearer Services support
- Euro-ISDN and ISDN for Japan
- Frame Relay over ISDN
- Frame Relay/ATM Internetworking
- Euro-ISDN trunk backup
- Q.SIG support (E1,T1)
- MLT
- Real-time Frame Relay support
- Non-Reserved Traffic support
- Voice server
- Protocol merge
- Reliability
- Network management and administration features
- Investment protection
- Guaranteed Level of Service
- Easy, cost-effective deployment

Supplementary Information

The following sales tools are available for the 2220:

- Specification sheet:
  IBM 2220 Nways Broadband Switch, G325-3503
  IBM Nways 2220 Switch Manager for AIX Version 1, G224-4534

- Application briefs:
  Integrated Network for Canada's Largest Railroad (CN), G224-4498
  Nways 2220 Opens Vast Possibilities for South Africa's Leading Retailer, G224-4536

- Information on the 2220 is available at:
  www.networking.ibm.com/222/222prod.html