Building cost-effective multiservice broadband networks

IBM 2220 Nways BroadBand Switch

Highlights

- ***Optimized bandwidth for cost efficiency using Networking BroadBand Services (NBBS)***
- ***Integration of applications with different quality-of-service 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***



IBM 2220 Nways BroadBand Switch Models 300 and 500

Voice comes through loud and clear

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.

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.



IBM 2220 with internal components visible

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.

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, while it 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.

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.

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.

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.

Managing the 2220 network

2220 network management is now 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 (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.

1. *Voice connections from local PBX*
2. *2220 Nways Broadband Switch*
3. *Video on demand from cable company*
4. *High-speed ATM data services for university students*
5. *RS/6000 running TME 10 NetView for AIX*
6. *Enhanced data services on Ethernet networks for local entry*
7. *Router to access call*

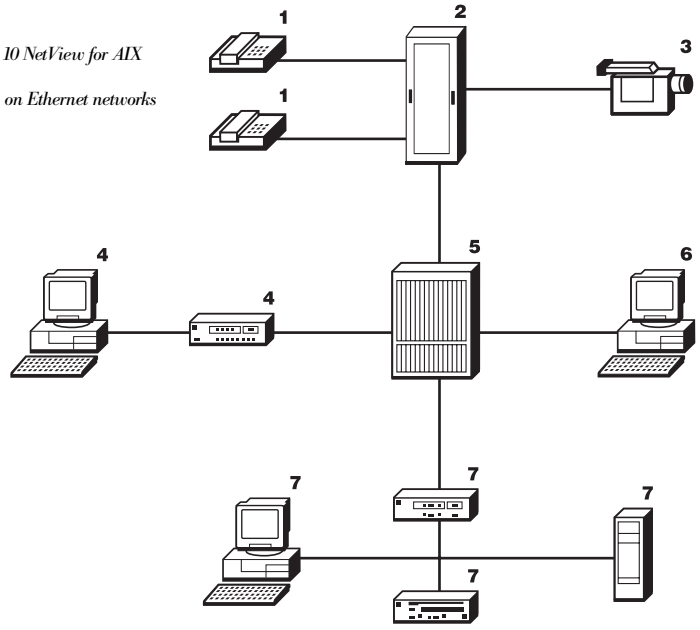


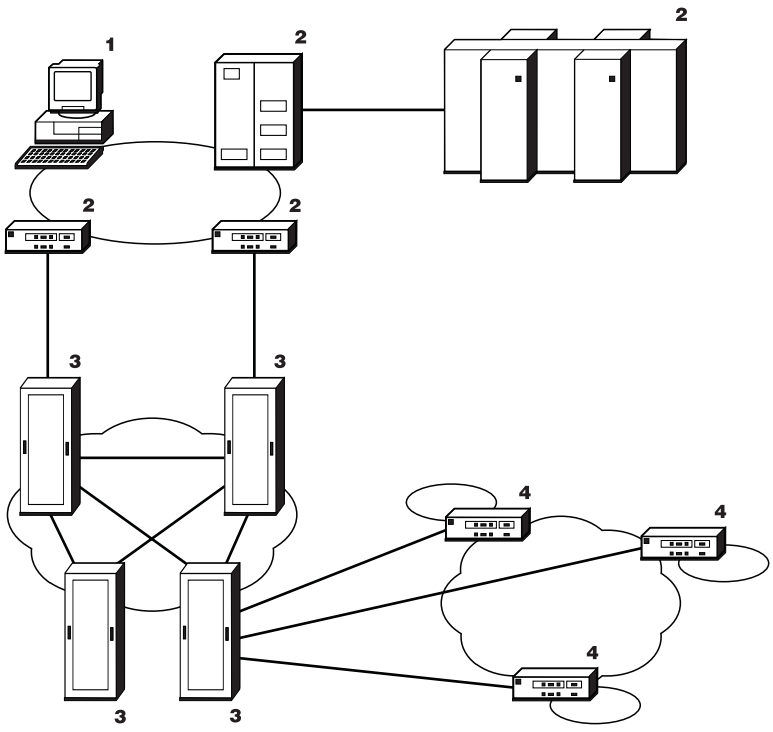
Figure 1. A city ATM network

IBM 2220 Nways BroadBand Switch at a glance

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

Figure 2. A retailer Frame Relay network

1. *Network management*
2. *Headquarters site*
3. *SNA regional network with 2220 Frame Relay backbone*
4. *Local stores with 2210 and Token-Ring networks*



IBM 2220 Nways BroadBand Switch at a glance, continued

Low-speed adapters	4-port V.35/V.36/X.21 (up to 60 V.24/V.35/X.21lines) 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

IBM 2220 Nways BroadBand Switch at a glance, continued

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
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

IBM 2220 Nways BroadBand Switch at a glance, continued

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 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
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

IBM 2220 Nways BroadBand Switch at a glance, continued

Operating environment

- Model 300

  Temperature: 10° to 40°C (50° to 104°F)
  Relative humidity: 8% to 80%
  Maximum wet-bulb temperature: 27°C
  Calorific value: 1035 kcal/h (2230 BTU/h)
  Electrical power: 0.9 kVA
  Capacity of exhaust: 7.2 m^3/min
  Noise level: 70 dB LWA
  Leakage current: < 3.5 mA
  Starting current (inrush): 35 A maximum
- Model 500

  Temperature: 10° to 40°C (50° to 104°F)
  Relative humidity: 8% to 80%
  Maximum wet-bulb temperature: 27°C
  Caloric value: 1035 kcal/h (4100 BTU/h)
  Electrical power: 1.5 kVA
  Capacity of exhaust: 7.2 m^3/min
  Noise level: 70 dB LWA
  Leakage current: < 3.5 mA
  Starting current (inrush): 35 A maximum
- Model 500 with Model 501 Expansion Frame

  Temperature: 10° to 40°C (50° to 104°F)
  Relative humidity: 8% to 80%
  Maximum wet-bulb temperature: 27°C
  Caloric value: 2070 kcal/h (8200 BTU/h)
  Electrical power: 3.0 kVA
  Capacity of exhaust: 14.4 m^3/min
  Noise level: 70 dB LWA
  Leakage current: < 7 mA
  Starting current (inrush): 35 A maximum

Software included

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

For more information

To find out more about the IBM 2220 Nways BroadBand Switch and other high-performance IBM communications and networking products, contact your IBM representative or call IBM Direct at 1 800 IBM-CALL (1 800 426-2255). You can also access the IBM Networking Home Page at:
www.networking.ibm.com

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