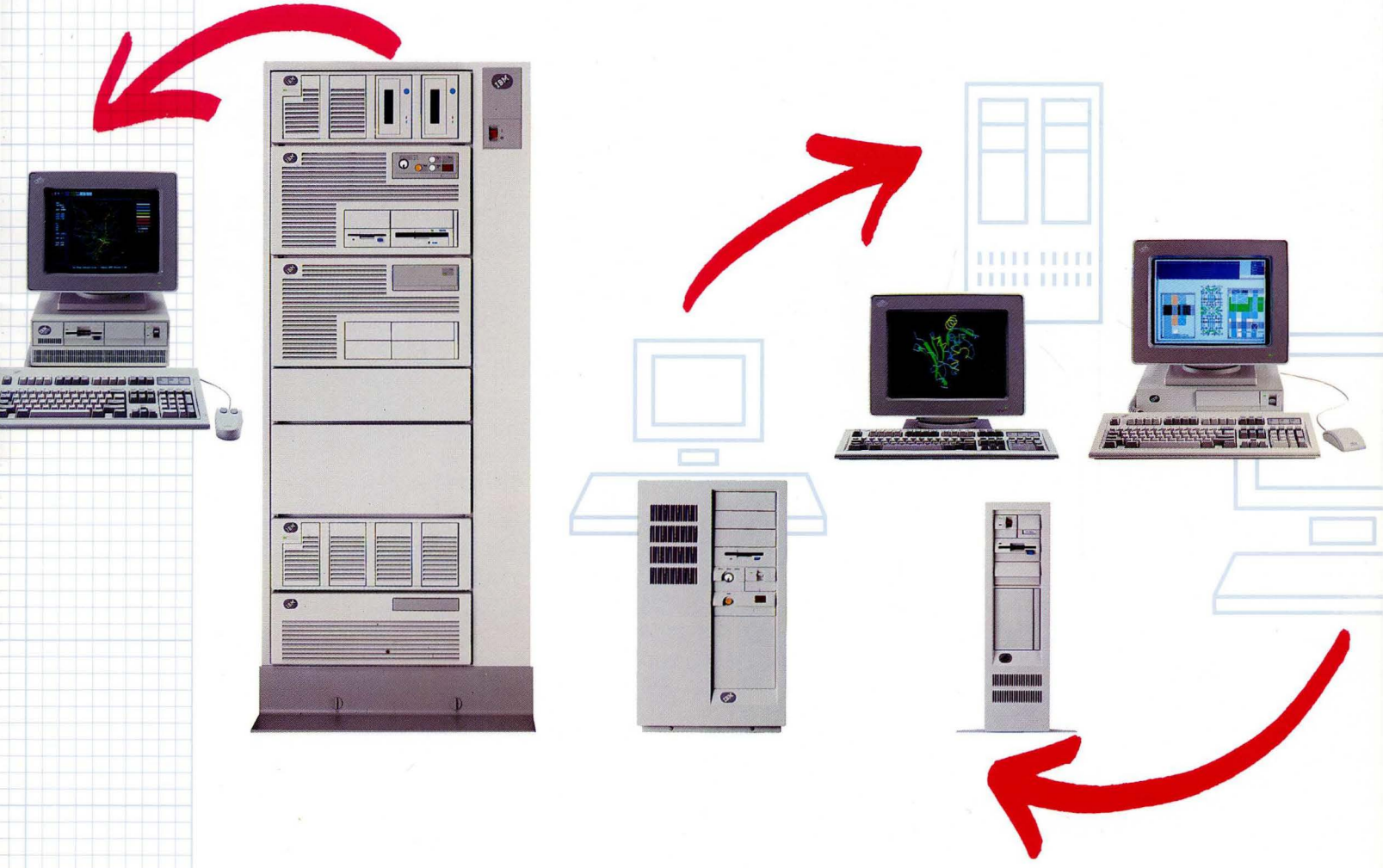
RISC System/6000

Communications Connectivity Overview



For the Power Seeker • TCP/IP • SNA • Ethernet/IEEE 802.3 • IBM Token-Ring • X.25 • SDLC • Asynchronous connections

IBM

First Edition (February 1990)

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Table of Contents

Introduction to RISC System/6000 Communications Offerings

The IBM RISC System/6000 system unit can communicate with many different systems over a variety of networks. This publication describes methods of connecting the RISC System/6000 system unit to the following systems and devices:

- Other IBM RISC System/6000 systems
- IBM RT system
- IBM Personal System/2
- IBM Personal Computers (IBM Personal Computer, IBM PC XT, and IBM Personal Computer AT)
- IBM Application System/400
- IBM System/370
- Other systems
- IBM Xstation 120
- ASCII terminals.

All communications methods listed in this publication require IBM AIX Version 3 for RISC System/6000 licensed program on the RISC System/6000 system unit. Additional software and hardware may be required, depending on the chosen communication applications and methods. Although this publication lists some software and hardware products as *required* for a particular connection type, other software and hardware that can be substituted for these products may be available.

Communications Documentation

For more details about the products mentioned in this publication, see *IBM RISC System/6000 Hardware Offerings Overview*, GC23–2188, *IBM RISC System/6000 Software Offerings Overview*, GC23–2189, and *IBM RISC System/6000 Documentation and Training Offerings Overview*, GC23–2192, or consult your IBM representative.

In addition, before ordering communications products, you should consult the publications for the system to which you are connecting.

For general background information about communications concepts, see *Data Communication Concepts,* GC21–5169.

Communication Methods

The RISC System/6000 system unit can communicate as a workstation, as a peer system, or as a host system, depending on the requirements of the connecting system and the chosen communication method. The RISC System/6000 system unit can use the following types of connections to communicate with other systems:

- Ethernet Version 2 local area network (LAN)
- IEEE 802.3 LAN
- IBM Token–Ring LAN
- X.25 wide area network (WAN)
- Synchronous Data Link Control (SDLC) WAN
- Control unit terminal (CUT) coaxial connection
- Non–SNA distributed function terminal (DFT) coaxial connection
- 5088 control unit coaxial connection
- Asynchronous connection.

For each of these types of communication connections, both the sending and the receiving systems must use the same data exchange rate and the same communication protocols. Thus, communications hardware and software must be compatible on the communicating systems. The following sections describe the RISC System/6000 support available for these types of connections.

Ethernet Version 2 and IEEE 802.3 LANs

Ethernet Version 2 and IEEE 802.3 LAN connections allow the RISC System/6000 system unit to participate in a 10M–bit Carrier Sense Multiple Access/Collision Detection (CSMA/CD) network. The LAN must adhere to the IEEE 802.3 standard or the Ethernet Version 2 standard.

RISC System/6000 Software Support for Ethernet Version 2 and IEEE 802.3 LANs

The following RISC System/6000 software provides the software base for IBM's Ethernet Version 2 and IEEE 802.3 support on the RISC System/6000 system unit.

- Transmission Control Protocol/Internet Protocol (TCP/IP) suite of communications protocols (included with AIX for RISC System/6000 licensed program)
- IBM AIX System Network Architecture (SNA) Services/6000 licensed program
- the DOS Server program (included with AIX for RISC System/6000)
- Various AIX for RISC System/6000 application programming interfaces (APIs).

TCP/IP and SNA Services can run separately or concurrently.

The TCP/IP communications protocols support several end user communication programs. Through these programs, users can perform such communication tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems. The following RISC System/6000 programs are some of the programs that use the TCP/IP communications protocols to communicate on an Ethernet LAN:

- Network File System (NFS) (included with AIX for RISC System/6000)
- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- Basic Networking Utilities (BNU/UUCP) (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000)
- Network Computing System (NCS) (included with AIX for RISC System/6000)
- Enhanced X–Windows interface (included with the IBM AIXwindows Environment/6000 licensed program).

The SNA Services licensed program supports communication on an Ethernet LAN through the advanced program–to–program communications (APPC) interface for logical unit 6.2 (LU 6.2). Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When the RISC System/6000 system unit communicates with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as peer SNA node.

The DOS Server program allows a user at an IBM Personal System/2 or an IBM Personal Computer to use the RISC System/6000 system unit as a file or print server, and to run AIX commands on the RISC System/6000 system unit.

RISC System/6000 Hardware Support for Ethernet Version 2 and IEEE 802.3 LANs

The IBM Ethernet High–Performance LAN Adapter supports communication on an Ethernet Version 2 or IEEE 802.3 LAN. This adapter can connect to either the standard 50–ohm (thick) coaxial cable or the standard RG–58A/U (thin) coaxial cable. Attachment to the thick coaxial cable requires an appropriate external transceiver. For attachment to the thin coaxial cable, the transceiver is included within the Ethernet High–Performance LAN Adapter.

IBM Token–Ring LAN

The IBM Token–Ring LAN connection allows the RISC System/6000 system unit to participate in a LAN adhering to the IEEE 802.5 Token–Passing Ring standard or the ECMA standard 89 for Token–Ring, baseband local area networks.

RISC System/6000 Software Support for the IBM Token–Ring LAN

The following RISC System/6000 software provides the software base for IBM's Token–Ring support on the RISC System/6000 system unit.

- TCP/IP suite of communications protocols (included with AIX for RISC System/6000)
- SNA Services licensed program
- The DOS Server program (included with AIX for RISC System/6000)
- Various AIX for RISC System/6000 APIs.

TCP/IP and SNA Services can run separately or concurrently.

The TCP/IP communications protocols support several end user communication programs. Through these programs, users can perform such communication tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems. The following RISC System/6000 programs are some of the programs that use the TCP/IP

communications protocols to communicate on a Token–Ring LAN:

- NFS (included with the AIX for RISC System/6000 licensed program)
- Standard TCP/IP application programs (included with the AIX for RISC System/6000 licensed program)
- BNU (included with the AIX for RISC System/6000 licensed program)
- Mail facilities (included with the AIX for RISC System/6000 licensed program)
- NCS (included with the AIX for RISC System/6000 licensed program)
- Enhanced X–Windows interface (included with the IBM AIXwindows Environment/6000 licensed program).

SNA Services supports communication on a Token–Ring LAN through a programming interface for LU 1, 2, 3, or 6.2. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When communicating with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

The DOS Server program allows a user at an IBM Personal System/2 or an IBM Personal Computer to use the RISC System/6000 system unit as a file or print server, and to execute AIX commands on the RISC System/6000 system unit.

RISC System/6000 Hardware Support for the IBM Token–Ring LAN

The IBM Token–Ring High–Performance Network Adapter supports communication on a Token–Ring LAN. The data interchange clock rate of the LAN can be either 4M bits per second or 16M bits per second.

X.25 WAN

The X.25 WAN connection allows the RISC System/6000 system unit to participate in a network that adheres to the Recommendation CCITT X.25 (1984) for the interface between data terminal equipment and packet–switching data networks. IBM supports connection to the X.25 WAN through the EIA–232D/V.24, X.21, and V.35 interfaces.

RISC System/6000 Software Support for the X.25 WAN

The following RISC System/6000 software provides the software base for IBM's X.25 WAN support on the RISC System/6000 system unit.

- TCP/IP suite of communications protocols (included with the AIX for RISC System/6000)
- SNA Services licensed program
- Various AIX for RISC System/6000 APIs, including the X.25 API.

TCP/IP and SNA Services can run separately or concurrently.

The TCP/IP communications protocols support several end user communication programs. Through these programs, users can perform such communication tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems. The following RISC System/6000 programs are some of the programs that use the TCP/IP communications protocols to communicate on an X.25 WAN:

- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- BNU (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000).

SNA Services supports communication on an X.25 WAN through a programming interface for LU 6.2/QLLC. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When the RISC System/6000 system unit communicates with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

X.25 facilities (included with AIX for RISC System/6000) include message and file transfer capabilities and a link control and line monitoring program. The X.25 API (also included with AIX for RISC System/6000) permits programmers to write their own X.25 applications.

RISC System/6000 Hardware Support for the X.25 WAN

The IBM X.25 Interface Co–Processor/2 supports communication on an X.25 WAN through any of the following selectable interfaces: X.21, EIA–232/V.24, or V.35. The maximum supported line speed for data interchange from the RISC System/6000 system unit depends on the type of physical connection: up to 19.2K bits per second for an EIA–232D/V.24 connection or up to 64K bits per second for an X.21 connection or a V.35 connection.

SDLC WAN

The SDLC WAN connection allows the RISC System/6000 system unit to participate in a wide area network for managing synchronous half–duplex, code–transparent, serial–by–bit information transfer over a link connection. The maximum supported line speed for data interchange from the RISC System/6000 system unit depends on the type of physical connection: up to 19.2K bits per second for an EIA–232D/V.24 connection or up to 64K bits per second for an X.21 connection, an EIA–422A connection, and a V.35 connection.

RISC System/6000 Software Support for the SDLC WAN

SNA Services and various AIX for RISC System/6000 APIs provide the software base for IBM's SDLC support on the RISC System/6000 system unit.

SNA Services supports communication on a SDLC WAN through a programming interface for LU 0, 1, 2, 3, or 6.2. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When communicating with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

RISC System/6000 Hardware Support for the SDLC WAN

The IBM 4–Port Multiprotocol Communications Controller, with the 4–Port Multiprotocol Interface Cable, supports communication on an SDLC WAN through any of the following selectable interfaces: X.21, EIA–232/V.24, EIA–422A, or V.35.

CUT Coaxial Connection

The CUT coaxial connection allows the RISC System/6000 system unit to connect to the System/370. Through this method of connection, a RISC System/6000 virtual terminal can emulate a subset of IBM 3278 or 3279 Display Station functions.

RISC System/6000 Software Support for the CUT Coaxial Connection

The IBM AIX 3278/79 Emulation/6000 licensed program provides the software base for IBM's CUT connection support on the RISC System/6000 unit. 3278/79 Emulation supports a subset of 3278/79 functions.

RISC System/6000 Hardware Support for the CUT Coaxial Connection

The IBM 3270 Connection Adapter supports communication through a CUT coaxial connection.

3278/79 Emulation does not provide support for ASCII terminals.

Non–SNA DFT Coaxial Connection

The non–SNA DFT connection allows the RISC System/6000 system unit to connect to the System/370. Through this method of connection, a RISC System/6000 virtual terminal can emulate a subset of IBM 3270 Display Station functions.

RISC System/6000 Software Support for the Non–SNA DFT Connection

The IBM AIX 3270 Host Connection Program/6000 licensed program provides the software base for IBM's non–SNA DFT connection support on the RISC System/6000. This program supports file transfer, multiple 3278 and 3279 terminal emulation sessions, an application programming interface, and 3286/3287 printer emulation.

RISC System/6000 Hardware Support for the Non–SNA DFT Connection

The IBM 3270 Connection Adapter supports communication through a non–SNA DFT coaxial connection.

AIX 3270 Host Connection Program provides support for ASCII terminals.

5088 Graphics Control Unit Connection

The 5088 Graphics Control Unit connection allows RISC System/6000 system unit to connect to the System/370 by way of the IBM 5088 Graphics Control Unit. Through this method of connection, a

RISC System/6000 virtual terminal can emulate a subset of 3270 Display Station functions.

RISC System/6000 Software Support for the IBM 5088 Graphics Control Unit Connection

The IBM AIX 3270 Host Connection Program/6000 licensed program supports the connection of the RISC System/6000 system unit to a System/370 by way of the IBM 5088 Graphics Control Unit. This program supports file transfer, multiple 3278 and 3279 terminal emulation sessions, an application programming interface, and 3286/3287 printer emulation.

RISC System/6000 Hardware Support for the IBM 5088 Graphics Control Unit Connection

The IBM System/370 Host Interface Adapter supports the connection of the RISC System/6000 system unit to a System/370 by way of the IBM 5088 Graphics Control Unit.

AIX 3270 Host Connection Program provides support for ASCII terminals.

Asynchronous Connection

Asynchronous connection allows the RISC System/6000 system unit to connect remotely to other systems through any of the following types of physical connections: EIA–232D/V.24, EIA–422A, or MIL–STD 188. The maximum supported line speed for data interchange from the RISC System/6000 system unit over an asynchronous connection is 38.4K bits per second.

RISC System/6000 Software Support for Asynchronous Connection

The following RISC System/6000 software provides the software base for IBM's asynchronous connection support on the RISC System/6000 system unit.

- TCP/IP suite of communications protocols (included with AIX for RISC System/6000)
- BNU (included with AIX for RISC System/6000)
- Asynchronous Terminal Emulation program (ATE) (included with AIX for RISC System/6000)
- The DOS Server program (included withAIX for RISC System/6000)
- Various AIX for RISC System/6000 APIs.

The TCP/IP communications protocols support several end user communication programs. Through these programs, users can perform such communication tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems. IBM offers the following RISC System/6000 programs that use the TCP/IP communications protocols to communicate through an asynchronous connection:

- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- BNU (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000).

BNU can also be used independently of TCP/IP to allow users to log in to connected systems, transfer files between systems, and execute commands and queue jobs at remote systems.

ATE provides an alternate application program for asynchronous communication. ATE allows users to connect and log in to connected systems. The user's display emulates a DEC VT 100 terminal. ATE supports file transfer and remote command execution.

The DOS Server program allows a user at an IBM Personal System/2 or an IBM Personal Computer to use the RISC System/6000 system as a file or print server, and to execute AIX commands on the RISC System/6000 system unit.

RISC System/6000 Hardware Support for Asynchronous Connection

IBM provides support for asynchronous communication through the EIA–232D/V.24, EIA–422A, and MIL–STD 188 interfaces. The following ports and adapters support asynchronous communication:

- The two standard EIA–232 ports in each RISC System/6000 system unit
- IBM 8–Port Async Adapter – EIA–232 with the IBM Multiport Interface Cable
- IBM 8–Port Async Adapter – EIA–422A with the IBM Multiport Interface Cable

- IBM 8–Port Async Adapter – MIL–STD 188 with the IBM Multiport Interface Cable
- IBM 16–Port Async Adapter – EIA–232 with the IBM 16–Port Interface Cable–EIA–232
- IBM 16–Port Async Adapter – EIA–422A with the IBM 16–Port Interface Cable–EIA–422A
- IBM 64–Port Async Controller with the IBM 16–Port Async Concentrator.

Communication using Modems

Modem support allows communication through common carrier telephone networks using dial–up or leased lines with either asynchronous protocols or synchronous SDLC or BSC protocols. *Hardware Offerings Overview* contains information on the modems supported by the RISC System/6000 system unit. Not all features supported by the listed modems are supported by the RISC System/6000 software.

Application Program Interfaces

Many of the IBM communications programs offer application programming interfaces (APIs) to allow application developers to use their own code with IBM software. Since some of the IBM communications programs work with a variety of connection methods (for example Ethernet LAN, Token–Ring LAN, and X.25 WAN), some APIs provide a programming interface to multiple connection methods.

APIs vary greatly. Some APIs are subroutine libraries, while others are systems calls. The *AIX Calls and Subroutines Reference for IBM RISC System/6000*, SC23–2198, provides information about many of the APIs available with RISC System/6000 communications programs. Information about these APIs is also available through the IBM RISC System/6000 CD–ROM Hypertext Information Base Library.

Communicating with Systems Running the AIX Operating System or Another UNIX–Based Operating System

IBM offers many software and hardware products that support communication between the RISC System/6000 system unit and other systems running a UNIX–based operating system. Figure 1 outlines the general communication methods that these products support.

The following sections detail the methods of connectivity that IBM products provide for communication between the RISC System/6000 system unit and the following systems:

- Another RISC System/6000 system unit running the IBM AIX Version 3 for RISC System/6000 licensed program
- An IBM RT (IBM 6150 or 6151) running Version 2.2.1 of the IBM Advanced Interactive Executive for the RT (AIX/RT) licensed program
- An IBM Personal Systems/2 running Version 1.1 of the IBM Advanced Interactive Executive for the Personal System/2 (AIX PS/2) licensed program
- An IBM System/370 running Version 1.0 of the IBM Advanced Interactive Executive for the System/370 (AIX/370) licensed program
- Other systems running a UNIX–based operating system.

Connectivity with Systems Running the AIX Operating System or Another UNIX–Based Operating System

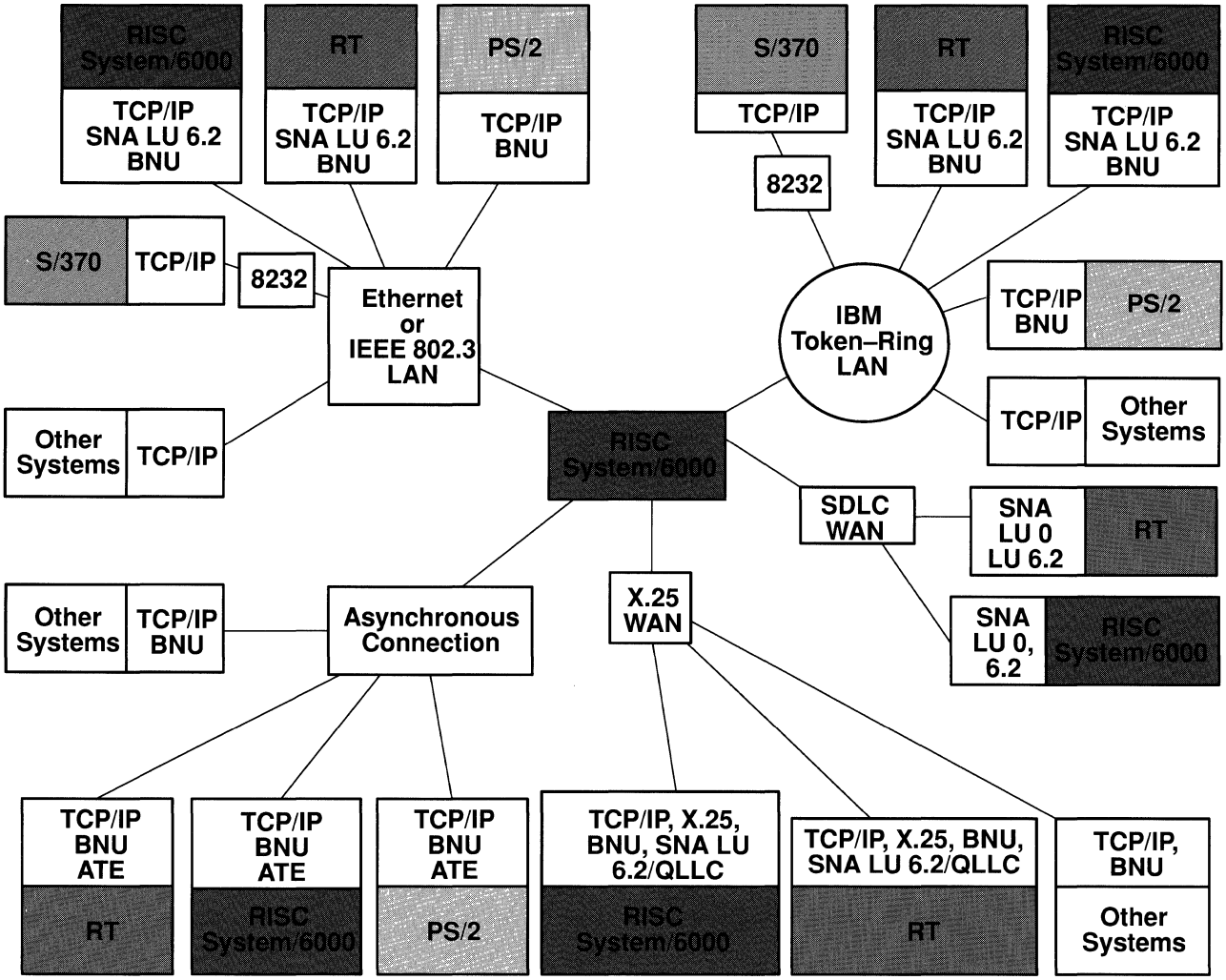

Figure 1. Methods of Connecting a RISC System/6000 System with Other Systems Running the AIX Operating System or Another UNIX–Based Operating System.

Note: The RISC System/6000 system, the RT System, the PS/2, and the System/370 shown in this figure are running the AIX operating system.

Communication between RISC System/6000 Systems

RISC System/6000 system units running IBM AIX Version 3 for RISC System/6000 can communicate with each other through an Ethernet Version 2, IEEE 802.3 or Token–Ring LAN, an X.25 or SDLC WAN, or an asynchronous connection. The following table lists the IBM products that support this connectivity.

Communication between RISC System/6000 Systems		
Network or Connection Type	**RISC System/6000 Software Offerings**	**RISC System/6000 Hardware Offerings**
Ethernet Version 2 or IEEE 802.3 LAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • SNA Services licensed program.	Ethernet High–Performance LAN Adapter.
Token–Ring LAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • SNA Services licensed program.	Token–Ring High–Performance Network Adapter.
X.25 WAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX. • SNA LU 6.2/QLLC in SNA Services licensed program. • X.25 API and the X.25 facilities in AIX.	X.25 Interface Co–Processor/2.

Communication between RISC System/6000 Systems		
Network or Connection Type	**RISC System/6000 Software Offerings**	**RISC System/6000 Hardware Offerings**
SDLC WAN	SNA Services licensed program.	4–Port Multiprotocol Communications Controller with the 4–Port Multiprotocol Cable Assembly.
Asynchronous Connection	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX. • ATE in AIX. • BNU in AIX – Mail facilities in AIX.	• Two standard EIA–232D ports in the RISC System/6000 system unit • 8–Port Async Adapter – EIA–232 with the IBM Multiport Interface Cable • 8–Port Async Adapter –EIA–422A with the IBM Multiport Interface Cable • 8–Port Async Adapter–MIL–STD 188 with the IBM Multiport Interface Cable • 16–Port Async Adapter–EIA–232 with the IBM 16–Port Interface Cable–EIA–232 • 16–Port Async Adapter–EIA–422A with the IBM 16–Port Interface Cable–EIA–422A • 64–Port Async Controller with the 16–Port Async Concentrator.

Communications between the RISC System/6000 System and the RT System

The RISC System/6000 system unit can communicate with the IBM RT system (IBM 6150 and IBM 6151) running Version 2.2.1 of IBM AIX operating system through an Ethernet Version 2, IEEE 802.3, or Token–Ring LAN, an X.25 or SDLC WAN, or an asynchronous connection. The following table lists IBM software that supports this connectivity.

Communication between the RISC System/6000 System and the RT System (6150 and 6151)		
Network or Connection Type	**RISC System/6000 Software Offerings**	**RT Software Offerings**
Ethernet Version 2 or IEEE 802.3 LAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – NFS in AIX – TCP/IP application programs in AIX – BNU in AIX – Mail facilities in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • SNA Services licensed program.	• TCP/IP protocols in AIX/RT. The following programs can be used with TCP/IP: – IBM AIX/RT Network File System licensed program – TCP/IP application programs in AIX/RT – BNU in AIX/RT – Mail facilities in AIX/RT – AIX X–Windows licensed program. • SNA Services in AIX/RT.
Token–Ring LAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – NFS in AIX – TCP/IP application programs in AIX – BNU in AIX – Mail facilities in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • SNA Services licensed program.	• TCP/IP protocols in AIX/RT. The following programs can be used with TCP/IP: – IBM AIX/RT Network File System licensed program – TCP/IP application programs in AIX/RT – BNU in AIX/RT – Mail facilities in AIX/RT – AIX X–Windows licensed program. • SNA Services in AIX/RT.

Communication between the RISC System/6000 System and the RT System (6150 and 6151)		
Network or Connection Type	**RISC System/6000 Software Offerings**	**RT Software Offerings**
X.25 WAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP application programs in AIX – BNU in AIX – Mail facilities in AIX. • SNA LU 6.2/QLLC in SNA Services licensed program. • X.25 API and the X.25 facilities in AIX.	• TCP/IP protocols in AIX/RT and AIX/RT X.25 Communications Support (PRPQ). The following programs can be used with TCP/IP: – TCP/IP application programs in AIX/RT – BNU in AIX/RT – Mail facilities in AIX/RT. • SNA Services in AIX/RT and AIX/RT X.25 Communications Support (PRPQ). • X.25 API and the X.25 facilities in AIX/RT X.25 Communications Support (PRPQ).
SDLC WAN	SNA Services licensed program.	SNA Services in AIX/RT.
Asynchronous Connection	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP application programs in AIX – Mail facilities in AIX. • ATE in AIX. • BNU in AIX – Mail facilities in AIX.	• TCP/IP protocols in AIX/RT. The following programs can be used with TCP/IP: – TCP/IP application programs in AIX/RT – Mail facilities in AIX/RT. • ATE in AIX/RT. • BNU in AIX/RT – Mail facilities in AIX/RT.

Ethernet Connection to the RT System

On the RT system, the IBM RT Baseband Adapter supports communication over an Ethernet Version 2 or IEEE 802.3 LAN. The RT Baseband Adapter can connect to either the standard 50–ohm (thick) coaxial cable or the standard RG–58A/U (thin) coaxial cable. For the RT system, attachment to either the thick or thin coaxial cable requires an appropriate external transceiver.

Token–Ring Connection to the RT System

On the RT system, the IBM RT Token–Ring Adapter supports communication over a Token–Ring LAN. On the RISC System/6000 system unit, the IBM Token–Ring High–Performance Network Adapter must be set to the 4M bps mode.

X.25 Connection to the RT System

On the RT system, the IBM RT X.25 Communications Adapter (RPQ) supports communication over an X.25 WAN.

SDLC Connection to the RT System

On the RT system, the IBM RT Multiprotocol Adapter supports communication on an SDLC WAN.

Asynchronous Connection to the RT System

On the RT system, IBM provides support for asynchronous communication through the EIA–232D/V.24, EIA–422A, and MIL–STD 188 interfaces. The following ports and adapters support asynchronous communication:

- The two standard EIA–232D ports on RT 6150 models
- IBM 4–Port Asynchronous RS–232C Adapter
- IBM 4–Port Asynchronous RS–422A Adapter
- IBM 8–Port Async Adapter – EIA–232 with the IBM 8–Port RS–232/RS–422A/MIL–STD 188 Cable Assembly
- IBM 8–Port Async Adapter – EIA–422A with the IBM 8–Port RS–232/RS–422A/MIL–STD 188 Cable Assembly
- IBM 8–Port Async Adapter – MIL–STD 188 with the IBM 8–Port RS–232/RS–422A/MIL–STD 188 Cable Assembly.

Communications between the RISC System/6000 System and the PS/2

The RISC System/6000 system unit can communicate with the IBM PS/2 Model 70 or 80 running Version 1.1 of the IBM AIX for the Personal System/2 (AIX PS/2) licensed program through an Ethernet Version 2, IEEE 802.3, or Token–Ring LAN or an asynchronous connection. The following table lists IBM software that supports this connectivity.

Communication between the RISC System/6000 System and the PS/2		
Network or Connection Type	**RISC System/6000 Software Offerings**	**PS/2 Software Offerings**
Ethernet Version 2 or IEEE 802.3 LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • TCP/IP application programs in AIX • Mail facilities in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.	TCP/IP protocols in the IBM AIX PS/2 TCP/IP licensed program. The following programs can be used with TCP/IP: • TCP/IP application programs in the IBM AIX PS/2 TCP/IP licensed program • Mail facilities in AIX PS/2 • IBM AIX PS/2 X–Windows licensed program.
Token–Ring LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • TCP/IP application programs in AIX • Mail facilities in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.	TCP/IP protocols in the IBM AIX PS/2 TCP/IP licensed program. The following programs can be used with TCP/IP: • TCP/IP application programs in the IBM AIX PS/2 TCP/IP licensed program • Mail facilities in AIX PS/2 • IBM AIX PS/2 X–Windows licensed program.
Asynchronous Connection	• ATE in AIX. • BNU in AIX – Mail facilities in AIX.	• ATE in AIX PS/2. • UUCP in AIX PS/2 – Mail facilities in AIX PS/2.

Ethernet Connection to the PS/2

On the PS/2 workstation, the Ungermann–Bass NICps/2 Adapter 1542 supports communication over an Ethernet Version 2 or IEEE 802.3 LAN. The adapter connects to either the standard 50–ohm (thick) coaxial cable or the standard RG–58A/U (thin) coaxial cable. Attachment to either the thick or thin coaxial cable requires an appropriate external transceiver.

Token–Ring Connection to the PS/2

On the PS/2 workstation, the IBM Token–Ring Network Adapter/A or the IBM Token–Ring Network16/4 Adapter/A (only supported in the 4M bits per second mode) support communication over a Token–Ring LAN.

Asynchronous Connection to a PS/2

On the PS/2 workstation, IBM provides support for asynchronous communication through the EIA–232D/V.24 interface. The following PS/2 ports and adapters support asynchronous communication:

- The standard EIA–232D port on the PS/2 system units
- IBM Dual Port Asynchronous RS–232 Adapter/A.

Communications between the RISC System/6000 System and the System/370

The RISC System/6000 system unit can communicate with the IBM System/370 running version 1.0 of the IBM AIX/370 licensed program through an Ethernet Version 2, IEEE 802.3, or Token–Ring LAN. The following table lists the IBM RISC System/6000 products that support these communication methods.

Communication between the RISC System/6000 System and the System/370		
Network or Connection Type	**RISC System/6000 Software Offerings**	**System/370 Software Offerings**
Ethernet Version 2 or IEEE 802.3 LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • NFS in AIX • TCP/IP application programs in AIX • Mail facilities in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.	TCP/IP protocols in AIX/370. The following programs can be used with TCP/IP: • AIX/370 Network File System licensed program • TCP/IP application programs in AIX/370 • Mail facilities in AIX/370 • X–Windows client function in AIX/370.
Token–Ring LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • NFS in AIX • TCP/IP application programs in AIX • Mail facilities in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.	TCP/IP protocols in AIX/370. The following programs can be used with TCP/IP: • AIX/370 Network File System licensed program • TCP/IP application programs in AIX/370 • Mail facilities in AIX/370 • X–Windows client function in AIX/370.

Ethernet Connection to the System/370

The RISC System/6000 system unit can communicate over an Ethernet Version 2 or IEEE 802.3 LAN to a channel–attached IBM 8232 Local Area Network Channel Station. The 8232 can then communicate with the System/370.

Token–Ring Connection to the System/370

The RISC System/6000 system unit can communicate over a Token–Ring LAN to a channel–attached IBM 8232 Local Area Network Channel Station. The 8232 can then communicate with the System/370.

Communications between the RISC System/6000 System and Other UNIX–Based Systems

This section is intended to give information on connecting to IBM systems other than the RISC System/6000 system unit, the IBM RT system, the IBM PS/2, and the IBM System/370. It is also designed to outline the possible communications between the RISC System/6000 system unit and offerings from other companies. Hardware and software information for the other system should be obtained from the manufacturer of that other system. This section assumes the RISC System/6000 system unit is running IBM AIX Version 3 for RISC System/6000, and that the other system is running a UNIX–based operating system.

Communication between the RISC System/6000 System and Other UNIX–Based Systems	
Network or Connection Type	**RISC System/6000 Software Offerings**
Ethernet Version 2 or IEEE 802.3 LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • NFS in AIX • TCP/IP application programs in AIX • BNU in AIX • Mail facilities in AIX • NCS in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.
Token–Ring LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • NFS in AIX • TCP/IP application programs in AIX • BNU in AIX • Mail facilities in AIX • NCS in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.
X.25 WAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • TCP/IP application programs in AIX • BNU in AIX • Mail facilities in AIX.
Asynchronous Connection	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP application programs in AIX – Mail facilities in AIX. • BNU in AIX – Mail facilities in AIX.

Communicating with IBM Systems Running Non–UNIX Operating Systems

IBM offers many software and hardware products that support communication between the RISC System/6000 system unit and systems running non–UNIX–based operating systems. Figure 2 outlines the general communication methods that these products support.

The following sections detail the methods of connectivity that IBM products provide for communication between the RISC System/6000 system unit and the following systems:

- IBM Personal System/2 running either version 1.2 (or later) of the IBM Operating System/2 Extended Edition (OS/2 EE) licensed program or version 3.3 (or later) of the IBM Disk Operating System (DOS) licensed program
- IBM PCs running either version 1.2 (or later) of the IBM Operating System/2 Extended Edition (OS/2 EE) licensed program or version 3.3 (or later) of the IBM Disk Operating System (DOS) licensed program.

  Throughout this section, PC refers to the IBM Personal Computer, the IBM PC XT, and the IBM Personal Computer AT.
- IBM AS/400 running version 1.2 of the Operating System/400 (OS/400) licensed program
- IBM System/370 running the VM or MVS operating systems.

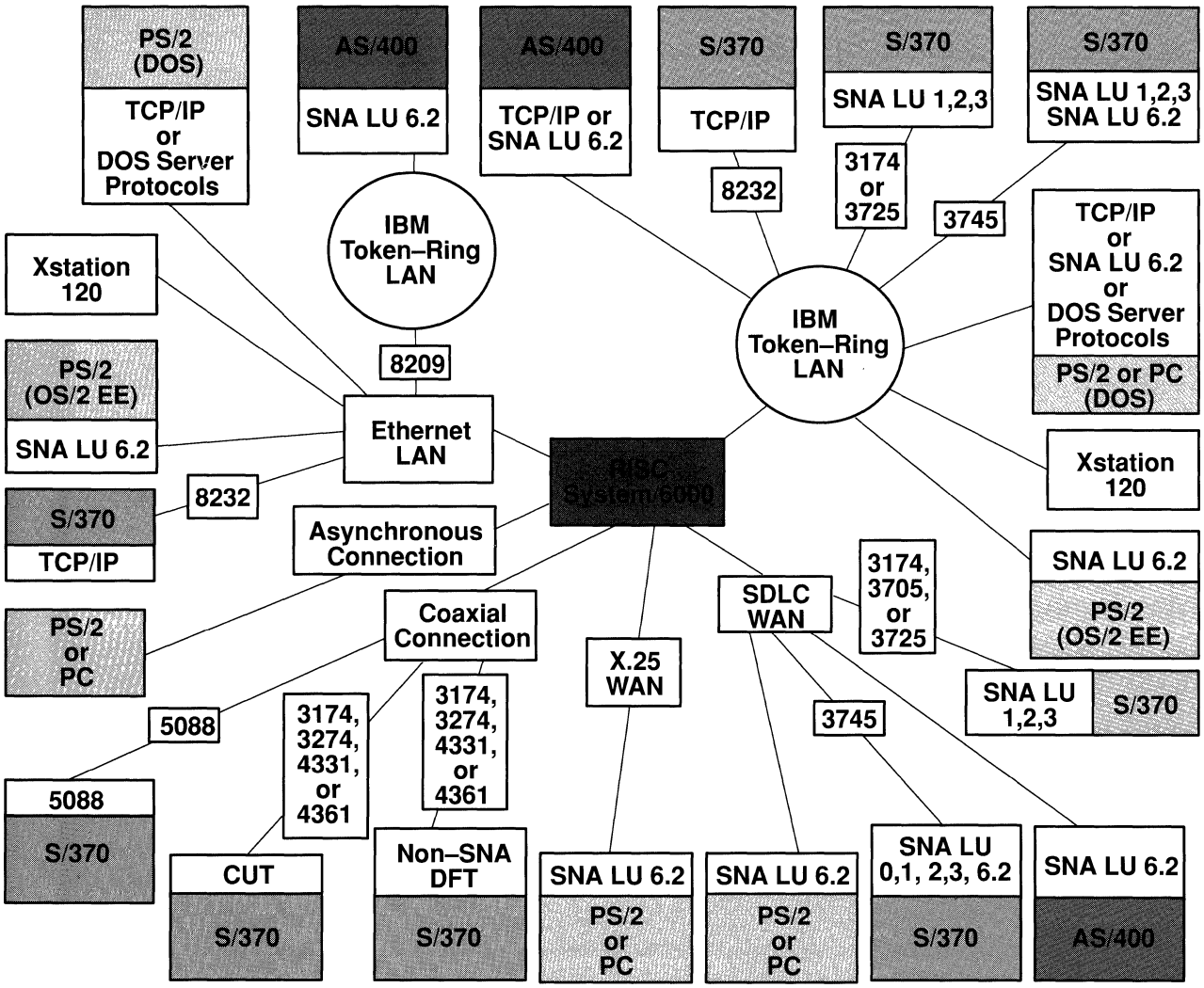

Figure 2. Methods of Connecting the RISC System/6000 System with IBM Systems Running Non–UNIX–Based Operating Systems.

Communications between the RISC System/6000 System and the IBM PS/2 or IBM PC

The RISC System/6000 system unit can communicate with a PS/2 or PC through an Ethernet Version 2, IEEE 802.3, or Token–Ring LAN, an X.25 or SDLC WAN, or an asynchronous connection. For most of these network and connection types, IBM offers support for PS/2s and PCs running either version 1.2 (or later) of the IBM Operating System/2 Extended Edition (OS/2 EE) licensed program or version 3.3 (or later) of the IBM Disk Operating System (DOS) licensed program.

Throughout this section, PC refers to the IBM Personal Computer, the IBM PC XT, and the IBM Personal Computer AT.

The following table lists IBM products that support communications between the RISC System/6000 system unit and a PS/2 or PC.

Communication between the RISC System/6000 System and a PS/2 or PC		
Network or Connection Type	**RISC System/6000 Software Offerings**	**PS/2 and PC Software Offerings**
Ethernet Version 2 or IEEE 802.3 LAN (IEEE 802.3 support is not available for PS/2 systems running DOS)	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP application programs in AIX – Mail functions in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • DOS Server in AIX. • SNA LU 6.2 protocol in SNA Services licensed program.	• For the DOS environment on the PS/2, the IBM Transmission Control Protocol for the PS/2 licensed program. – Version 3.3 of the X–Windows for IBM DOS licensed program. • For the DOS environment on the PS/2, the IBM AIX Access for DOS Users licensed program. • For the OS/2 EE environment, the SNA support in Communication Manager included with OS/2 EE.
Token–Ring LAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – TCP/IP application programs in AIX – Mail functions in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • DOS Server in AIX. • SNA LU 6.2 protocol in SNA Services licensed program.	• For the DOS environment, the IBM Transmission Control Protocol for the PS/2 licensed program – Version 3.3 of the X–Windows for IBM DOS licensed program. • For the DOS environment, the IBM AIX Access for DOS Users licensed program. • For the DOS environment, the IBM PC SNA Support licensed program; for the OS/2 EE environment, the SNA support in Communication Manager part of OS/2 EE.

Communication between the RISC System/6000 System and a PS/2 or PC		
Network or Connection Type	**RISC System/6000 Software Offerings**	**PS/2 and PC Software Offerings**
X.25 WAN	SNA LU 6.2 protocol in SNA Services licensed program.	For the DOS environment, the IBM PC SNA Support licensed program; for the OS/2 EE environment, the SNA support in Communication Manager part of OS/2 EE.
SDLC WAN	SNA LU 6.2 protocol in SNA Services licensed program.	For the DOS environment, the IBM PC SNA Support licensed program; for the OS/2 EE environment, the SNA support in the Communication Manager part of OS/2 EE.
Asynchronous Connection	• DOS Server in AIX. • ATE in AIX.	• For the DOS environment, the IBM AIX Access for DOS Users licensed program. • For the OS/2 EE environment, the Communication Manager part of OS/2 EE.

Ethernet Connection between a RISC System/6000 System and a PS/2

For PS/2 models containing Micro Channel architecture, the Ungermann–Bass NICps/2 Adapter 1542 supports communication over an Ethernet Version 2 or IEEE 802.3 LAN. This adapter can connect to either the standard 50–ohm (thick) coaxial cable or the standard RG–58A/U (thin) coaxial cable. Attachment of this adapter to either the thick or thin coaxial cable requires an external transceiver.

Token–Ring Connection between a RISC System/6000 System and a PS/2 or PC

For the PS/2 models containing Micro Channel architecture, IBM offers the following adapters that provide support for connection to a Token–Ring LAN:

- IBM PS/2 Token–Ring Adapter/A
- IBM PS/2 Token Ring Adapter/A 16/4.

For PCs and non–Micro Channel PS/2s, the IBM Token Ring Network 16/4 Adapter provides support for connection to a Token–Ring LAN.

For PCs, the following IBM adapters also support connection to a Token–Ring LAN:

- IBM Token–Ring Network PC Adapter
- IBM Token–Ring Network PC Adapter II.

X.25 Connection between a RISC System/6000 System and a PS/2 or PC

For the PS/2 models containing Micro Channel architecture, the IBM X.25 Co–Processor/2 Adapter provides hardware support for connecting to an X.25 WAN.

For PCs and non–Micro Channel PS/2s, the IBM PC X.25 Communication Adapter provides hardware support.

SDLC Connection between a RISC System/6000 System and a PS/2 or PC

For PS/2 models containing Micro Channel architecture, the IBM Personal System/2 Multi–Protocol Adapter/A provides hardware support for connecting to an SDLC WAN.

For PCs and non–Micro Channel PS/2s, the IBM SDLC Communications Adapter provides hardware support for connecting to an SDLC WAN.

Asynchronous Connection between a RISC System/6000 System and a PS/2 or PC

The following ports and adapters support asynchronous communication on the PS/2 system unit:

- The standard EIA–232D port in PS/2 system units
- IBM Dual Port Asynchronous EIA–232D Adapter/A (only for PS/2 models that contain Micro Channel architecture).

For the Personal Computer AT, the IBM Personal Computer AT Serial/Parallel Adapter provides hardware support for communicating through an asynchronous connection.

Communicating with the IBM AS/400

The RISC System/6000 system unit can communicate with the AS/400 running version 1.2 of the Operating System/400 (OS/400) licensed program over an Ethernet Version 2, IEEE 802.3, or Token–Ring LAN, or an SDLC WAN. The following table lists IBM products that support these communication methods.

Communication between the RISC System/6000 System and the AS/400		
Network or Connection Type	**RISC System/6000 Software Offerings**	**AS/400 Software Offerings**
Ethernet Version 2 or IEEE 802.3 LAN	SNA LU 6.2 in SNA Services licensed program.	SNA LU 6.2 in the OS/400 licensed program.
Token–Ring LAN	• TCP/IP protocols and application functions in AIX – TCP/IP application programs in AIX – Mail functions in AIX. • SNA LU 6.2 in SNA Services licensed program.	• TCP/IP protocols in the AS/400 TCP/IP licensed program – TCP/IP application programs in the AS/400 TCP/IP licensed program (ftp and ping only) – SMTP support in the OS/400 licensed program. • SNA LU 6.2 in the OS/400 licensed program.
SDLC WAN	SNA Services licensed program.	SNA LU 6.2 in the OS/400 licensed program.

Ethernet LAN Connection to the AS/400

The RISC System/6000 system unit can communicate over an Ethernet Version 2 or IEEE 802.3 LAN to the AS/400 residing on an IBM Token–Ring LAN. The IBM 8209 serves as the bridge between the Ethernet Version 2 or IEEE 802.3 LAN and the IBM Token–Ring LAN.

Token–Ring LAN Connection to the AS/400

The RISC System/6000 system unit can communicate over an IBM Token–Ring LAN to the AS/400 through a local or remote attachment.

SDLC WAN Connection to the AS/400

The RISC System/6000 system unit can communicate over a SDLC WAN to the AS/400 through a local or remote attachment.

Communicating with the IBM System/370

The RISC System/6000 system unit can communicate with the System/370 running the VM or MVS operating system over an Ethernet Version 2 LAN, a Token–Ring LAN, an SDLC WAN, a Control Unit Terminal (CUT) connection, a non–SNA Distributed Function Terminal (non–SNA DFT) connection or a 5088 Graphics Control Unit connection. The following table lists IBM products that support these communication methods.

Communication between the RISC System/6000 System and the System/370		
Network or Connection Type	**RISC System/6000 Software Offerings**	**System/370 Software Offerings**
Ethernet Version 2 LAN	TCP/IP protocols in AIX. The following programs can be used with TCP/IP: • NFS in AIX (client support only) • TCP/IP application programs in AIX (ftp, tftp, and telnet functions only) • Mail functions in AIX • Enhanced X–Windows in AIXwindows Environment/6000 licensed program.	TCP/IP protocols in IBM TCP/IP for VM licensed program or IBM TCP/IP for MVS licensed program. The following programs can be used with TCP/IP: • VM/NFS feature of the VM operating system or MVS/NFS feature of the MVS operating system (server support only without the NFS Yellow Pages feature) • TCP/IP application programs in TCP/IP for VM or TCP/IP for MVS • SMTP protocol in TCP/IP for VM or TCP/IP for MVS (available for CMS and TSO users only) • X Window System (Version X.11) API (client support only) in TCP/IP for VM or TCP/IP for MVS.

Communication between the RISC System/6000 System and the System/370		
Network or Connection Type	**RISC System/6000 Software Offerings**	**System/370 Software Offerings**
Token–Ring LAN	• TCP/IP protocols in AIX. The following programs can be used with TCP/IP: – NFS in AIX (client support only) – TCP/IP application programs in AIX (ftp, tftp, and telnet functions only) – Mail functions in AIX – Enhanced X–Windows in AIXwindows Environment/6000 licensed program. • SNA Services licensed program.	• TCP/IP protocols in IBM TCP/IP for VM licensed program or IBM TCP/IP for MVS licensed program. The following programs can be used with TCP/IP: – VM/NFS feature of the VM operating system or MVS/NFS feature of the MVS operating system (server support only without the NFS Yellow Pages feature) – TCP/IP application programs in TCP/IP for VM or TCP/IP for MVS – SMTP protocol in TCP/IP for VM or TCP/IP for MVS (available for CMS and TSO users only) – X Window System (Version X.11) API (client support only) in TCP/IP for VM or TCP/IP for MVS. • A compatible user–provided program is required.
SDLC WAN	SNA Services licensed program.	A compatible user–provided program is required.
CUT Connection	3278/79 Emulation licensed program.	For file transfer, the IND$FILE program is required.
DFT (Non–SNA) Connection	AIX 3270 Host Connection Program licensed program.	For file transfer, the IND$FILE program is required.
5088 Connection	AIX 3270 Host Connection Program licensed program.	For file transfer, the IND$FILE program is required.

Ethernet Connection to the System/370

The RISC System/6000 system unit can communicate over an Ethernet Version 2 LAN to a locally–attached IBM 8232 Local Area Network Channel Station. The 8232 can then communicate with the System/370. Support for communication over an IEEE 802.3 LAN is not available.

Token–Ring Connection to the System/370 using TCP/IP or SNA

A user–provided application is required by both the RISC System/6000 system unit and the System/370 for LU 6.2 support. For LU 1, 2, 3 support; a user–provided application is required by the System/370 and a user–provided emulation program is required by the RISC System/6000 system unit.

The RISC System/6000 system unit can use SNA protocols to communicate over the IBM Token–Ring LAN to an IBM 3174 Subsystem Control Unit or an IBM 3725 or 3745 Communication Controller connected to the System/370. Appropriate versions of software are required on the host. The 3174, 3725, and 3745 support SNA LU 1, 2, and 3. The 3745 controller also supports SNA LU 6.2.

The RISC System/6000 system unit can use TCP/IP protocols to communicate over the IBM Token–Ring LAN to a locally–attached IBM 8232 Local Area Network Channel Station. The 8232 can then communicate with the System/370.

SDLC Connection to the System/370

A user–provided application is required by both the RISC System/6000 system unit and the System/370 for LU 6.2 support. For LU 1, 2, 3 support; a user–provided application is required by the System/370 and a user–provided emulation program is required by the RISC System/6000 system unit.

The RISC System/6000 system unit can use SNA protocols to communicate over an SDLC WAN to an IBM 3705, 3725, or 3745 Communication Controller or an IBM 3174 Subsystem Control Unit. The controller or control unit can then communicate with the System/370. Appropriate versions of software are required on the host. The 3705, 3725, 3745, and 3174 support SNA LU 1, 2, and 3. The 3745 controller also supports SNA LU 0 and 6.2.

CUT Coaxial Connection to the System/370

The RISC System/6000 system unit can communicate with the System/370 through a CUT coaxial connection by way of the following devices:

- IBM 3174 Display Control Unit
- IBM 3274 Display Control Unit
- IBM 4331 or 4361 Integrated Work Station Adapter
- IBM 4331 or 4361 Integrated Display/Printer Adapter.

Non–SNA DFT Coaxial Connection to the System/370

The RISC System/6000 system unit can communicate with the System/370 through a non–SNA DFT coaxial connection by way of the following devices:

- IBM 3174 Display Control Unit
- IBM 3274 Display Control Unit
- IBM 4331 or 4361 Integrated Work Station Adapter
- IBM 9370 Work Station Subsystem Controller.

5088 Connection to the System/370

The RISC System/6000 system unit can communicate with the System/370 through the IBM 5088 Graphics Control Unit. The 5088 Graphics Control Unit can be locally or remotely connected to the System/370.

Communication with the IBM Xstation 120

The RISC System/6000 system unit can communicate with the Xstation 120 through an Ethernet Version 2, IEEE 802.3, or Token–Ring LAN. The Xstation 120 cannot function as a gateway.

Software Support for Communication with the Xstation 120

In order to communicate with the Xstation 120, the RISC System/6000 system unit requires the following software:

- IBM AIX Version 3 for RISC System/6000 licensed program
- TCP/IP component of the AIX for RISC System/6000 licensed program
- IBM AIXwindows Environment/6000 licensed program
- IBM AIX Xstation Manager/6000 licensed program.

Hardware Support for Communication with the Xstation 120

For an Ethernet Version 2 or IEEE 802.3 connection, the Xstation 120 comes standard with one Ethernet Version 2/IEEE 802.3 port. This port can connect to either the standard 50–ohm (thick) coaxial cable or the standard RG–58A/U (thin) coaxial cable.

For a Token–Ring connection, the Xstation 120 can use the IBM Token–Ring Network 16/4 Adapter/A (available optionally).

Communication with Attached ASCII Terminals

The RISC System/6000 system unit supports communication with locally attached ASCII terminals that have been defined to AIX for RISC System/6000 by way of the **terminfo** file. A RISC System/6000 system unit can communicate with IBM 3101, IBM 3151, IBM 3161, IBM 3162, IBM 3163, and IBM 3164ASCII terminals and with other devices that can emulate an IBM 3101 or IBM 3161. In addition, a RISC System/6000 system unit can communicate with terminals from other companies that meet the ANSI X3.64 standard such as the DEC VT 100 and VT 220, as well as the WYSE 30 and 50.

Software Support for Communication with ASCII Terminals

The AIX for RISC System/6000 licensed program includes software to communicate with supported ASCII terminals.

Hardware Support for Communication with ASCII Terminals

The following ports and adapters support communication with ASCII terminals:

- The two standard EIA–232 ports in each RISC System/6000 system unit
- IBM 8–Port Async Adapter – EIA–232 with the IBM Multiport Interface Cable
- IBM 8–Port Async Adapter – EIA–422A with the IBM Multiport Interface Cable
- IBM 8–Port Async Adapter – MIL–STD 188 with the IBM Multiport Interface Cable
- IBM 16–Port Async Adapter – EIA–232 with the 16–Port Interface Cable–EIA–232
- IBM 16–Port Async Adapter – EIA–422A with the IBM 16–Port Interface Cable–EIA–422A
- IBM 64–Port Async Controller with the IBM 16–Port Async Concentrator.

Some terminals can use both the EIA–232D and EIA–422A interfaces, while others can use the EIA–232D interface only.

Glossary

adapter. (1) A mechanism for connecting two unlike parts or machines. (2) A printed circuit card that modifies the system unit to allow it to operate in a particular way. See *communications adapter.*

Advanced Program-to-Program Communication (APPC). A communications architecture that allows transaction programs to exchange information on a peer-to-peer basis. SNA LU 6.2 allows APPC architecture to operate on an SNA network.

American National Standard Code for Information Interchange (ASCII). The code developed by ANSI for information interchange among data processing systems, data communications systems, and associated equipment. The ASCII character set consists of 7-bit control characters and symbolic characters.

American National Standards Institute (ANSI). An organization sponsored by the Computer and Business Equipment Manufacturers Association through which accredited organizations create and maintain voluntary industry standards.

ANSI. See *American National Standards Institute.*

API. See *Application Program Interface.*

APPC. See *Advanced Program–to–Program Communications.*

Application Program Interface (API). A set of run time routines or system calls that allows an application program to use a particular service provided by either the operating system or another licensed program.

ARPA. See *Advanced Research Projects Association.*

ASCII. See *American National Standard Code for Information Interchange. (ASCII).*

asynchronous transmission. Data transmission in which transmission of a character or block of characters can begin at any time but in which the bits that represent the character or block have equal time duration.

baseband LAN. A local area network in which information is encoded and is transmitted without modulation of a carrier. See also broadband LAN.

BNU. UNIX–to–UNIX basic networking utilities, such as the **uucp** command.

bps. Bits per second. In serial transmission, the instantaneous bit speed with which a device or channel transmits a character.

cable. The physical media for transmitting signals; includes copper conductors and optical fibers.

carrier sense multiple access with collision detection (CSMA/CD). The generic term for a class of medium access procedures that allows multiple stations to access the medium at will without explicit prior coordination, avoids contention by way of carrier sense and deference, and resolves contention by way of collision detection and transmission; for example, Ethernet.

CCITT. See *Consultative Committee on International Telegraphy and Telephone (CCITT).*

coaxial cable. A cable consisting of one conductor, usually a small copper tube or wire, within and insulated from another conductor of larger diameter, usually copper tubing or copper braid.

communications adapter. A card that enables a computer or device to become a part of a data communications network. See *adapter.*

communications line. The line over which data communications takes place; for example, a telephone line.

Consultative Committee on International Telegraphy and Telephone (CCITT). A United Nations Specialized Standards group, whose membership includes common carriers concerned with devising and proposing recommendations for international telecommunications representing alphabets, graphics, control information, and other fundamental information interchange issues.

control unit terminal (CUT) mode. An IBM protocol used for communications with an IBM 3174 or 3274 Control Unit or other appropriate interface unit. In this protocol, a program in the workstation is emulating a 3278/79 terminal for a user at a virtual terminal, and the interface unit is responsible for enforcing the protocol.

CSMA/CD. See *carrier sense multiple access with collision detection).*

CUT. See *control unit terminal (CUT) mode.*

data circuit–terminating equipment (DCE). The equipment installed at the user's premises that provides all the functions required to establish, maintain, and terminate a connection, and the signal conversion and coding between the data terminal equipment and the communication line.

data transfer. The movement or copying of data from one location and the storage of the data at another location.

data terminal equipment (DTE). A data processing unit that is generating or receiving data that is transmitted across a communications network.

DCE. See *data circuit–terminating equipment (DCE).*

DFT. See *distributed function terminal (DFT).*

distributed function terminal (DFT). A terminal or program at a workstation that performs operations previously accomplished by the processor or control unit, such as managing data links, controlling devices, and formatting data.

DTE. See *data terminal equipment (DTE).*

ECMA. European Computer Manufacturers' Association.

EIA. Electronic Industries Association.

emulation. (1) The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (2) Imitation. For example, when one computer imitates the characteristics of another computer.

Ethernet. A 10-megabit baseband local area network using CSMA/CD (Carrier Sense Multiple Access with Collision Detection). The network allows multiple stations to access the medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission.

host. (1) The primary or controlling computer in the communications network. (2) A computer attached to a network.

IBM personal computer. A member of the family of personal computers offered by IBM. In this document, IBM personal computer refers to the following products offered by IBM: the IBM Personal Computer, IBM PC/XT, and IBM Personal Computer AT.

Internet Protocol (IP). For TCP/IP networks, the protocol that provides the interface from the higher level host-to-host protocols to the local network protocols. Addressing at this level is usually from host to host.

IP. See *Internet Protocol (IP).*

ISO. International Organization for Standardization.

kilobyte (KB). 1024 bytes in decimal notation when referring to memory capacity; in all other cases, it is defined as 1,000.

LAN. See *local area network (LAN).*

licensed program. A software program that remains the property of the manufacturer, for which customers pay a license fee.

line speed. The number of binary digits that can be sent over a telecommunication line in one second, expressed in bits per second (bps).

link connection. In SNA, the physical equipment providing two-way communications between one link station and one or more other link stations, such as between a telecommunications line and data circuit-terminating equipment (DCE).

local area network (LAN). A network in which communications are limited to a moderate-sized geographic area (1 to 10 km) such as a single office building, warehouse, or campus. A local network depends upon a communications medium capable of moderate to high data rate (1 to 20 MB per second), and normally operates with a consistently low error rate.

logical unit (LU). In SNA, a port through which an end user accesses the SNA network in order to communicate with another user, and through which the end user accesses the functions provided by system services control points (SSCPs). An LU can support at least two sessions, one with an SSCP and one with a another LU, and may be capable of supporting many sessions with other LUs.

Logical Unit (LU) type 6.2 (LU 6.2). The LU type used for SNA advanced program-to-program communications (APPC).

LU. See *logical unit (LU).*

LU 6.2. See *Logical Unit (LU) type 6.2 (LU 6.2).*

Mbit. Megabit.

megabyte (MB). 1,048,576 in decimal notation (two to the twentieth power (2^{20}))when referring to

memory capacity; in all other cases, it is defined as 1,000,000.

modem. See *modulator–demodulator.*

modem eliminator. A type of DCE device that connects a terminal directly to a computer port through a wired connector with a specific pin arrangement. When two devices both function as DTEs (data terminal equipment), the cable that connects them must transmit send/receive signals using a modem eliminator. Synonym for *null modem.*

modulator-demodulator (modem). A type of DCE device that converts data from the computer to an analog signal for transmission on a telecommunications line, and converts the analog signal received to data for the computer.

network. A collection of data processing products that are connected by communication lines for information exchange between locations.

NFS. Network File System.

nonswitched line. A connection between computers or devices that does not have to be established by dialing. A dedicated line. Contrast with *switched line.*

null modem. See *modem eliminator.*

packet switching. Routing and transferring data by addressing packets so that a channel is occupied only during packet transmission. On completion of the transmission, the channel is available for transfer of other packets.

peer. In network architecture, any functional unit that is in the same layer as another entity.

port. (1) A part of the system unit or remote controller to which cables for external devices (display stations, terminals, printers) are attached. The port is an access point for data entry or exit. (2) An entrance to or exit from a network. (3) An access point for data input to or data output from a computer system.

protocol. A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication.

SDLC. See *Synchronous Data Link Control (SDLC).*

serial transmission. The sequential transmission of the signal elements of a group representing a character or other entity of data.

server. (1) An application program that usually runs in the background (daemon) and is controlled by the System Program Controller. (2) On a network, the computer that contains the data or provides the facilities to be accessed by other computers on the network. (3) A program that handles protocol, queuing, routing, and other tasks necessary for data transfer between devices in a computer system. (4) Provides the basic windowing mechanism. In X-Windows, it handles IPC connections from clients, demultiplexes graphics requests onto screens, and multiplexes input back to clients.

SNA. See *Systems Network Architecture (SNA).*

SNMP. Simple Network Management Protocol.

switched line. In data communications, a connection between computers or devices established by dialing. Contrast with *nonswitched line.*

Synchronous Data Link Control (SDLC). (1) A form of communications line control using commands to control the transfer of data over a communications line. (2) A discipline conforming to subsets of the ADCCP of the ANSI and the HDLC of the International Organization for Standardization. It manages synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or non-switched links. The configuration of the link connection may be point-to-point, multipoint, or loop.

Systems Network Architecture (SNA). (1) An IBM architecture for controlling the transfer of information in a data communications network. (2) The description of the logical structure, formats, protocols, and operating sequences for transmitting information units through, and controlling the configuration and operation of, networks.

TCP. See *Transmission Control Protocol (TCP).*

token ring. A token access procedure used with a sequential (ring) topology.

Transmission Control Protocol (TCP). Used in ARPA Internet and any network following the U.S. Department of Defense standards for inter-network protocol. Provides a reliable host-to-host protocol between hosts in a communications network. It assumes that Internet Protocol is the underlying protocol.

user interface. (1) The means by which a user communicates with a system, program, or device. (2) The hardware, software, or both that implements a user interface, allowing the user to interact with and perform operations on a system, program, or device. Examples are a keyboard, mouse, command language, or windowing subsystem.

WAN. See *wide area network*.

wide area network (WAN). A network that provides data communication capability in geographic areas larger than those serviced by local area networks.

Yellow Pages. A standard database look–up facility designed to operate as a remote procedure call that is part of NFS.

X.21. In data communications, a specification of the CCITT that defines the connection of data terminal equipment to an X.21 public data network for digital leased and circuit switched services.

X.25. In data communication, a specification of the CCITT that defines the interface between data terminal equipment and packet–switching data networks.

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