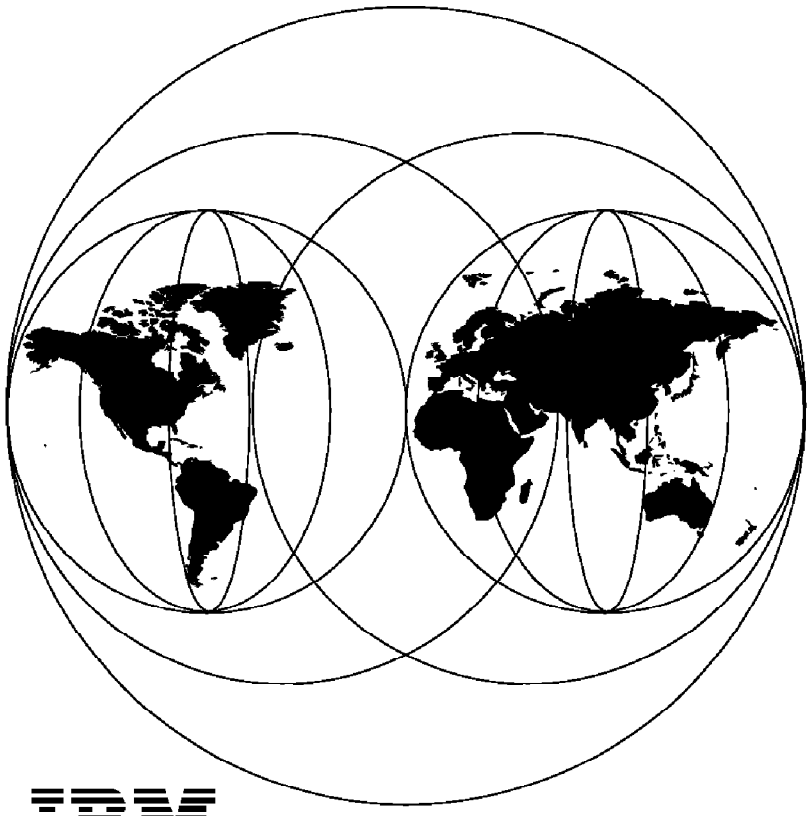
SG24-4899-00

Communication Solutions Guide for RS/6000 and AIX V4

December 1996



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Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix D, “Special Notices” on page 517.

First Edition (December 1996)

This edition applies to Version 4.1 and Version 4.2 of AIX for the IBM RISC System/6000.

Comments may be addressed to:
IBM Corporation, International Technical Support Organization
Dept. JN9B Building 045 Internal Zip 2834
11400 Burnet Road
Austin, Texas 78758-3493

Contents

Figures

Tables

Preface

This redbook is intended to help customers, IBM technical professionals, marketing representatives, network planners, and business partners to design a communication solution in the AIX V4 environment.

Albert Einstein said: *"There are no problems, there are only solutions".*

This book tries to demonstrate Einstein's premise! So, we do not explain how to configure adapter X, with bridge Y, and interface Z or what to do with protocol A on router B. Please refer to the appropriate IBM publication for these details. Also, since products change and new releases are frequent, please contact your IBM representative for the latest information on a product.

How This Redbook Is Organized

The document is organized as follows:

- **Chapter 1, "Introduction"**

  This chapter provides a brief overview of what you will find in this redbook and where to find particular information.

- **Chapter 2, "Networks and Communications: Concepts and Standards"**

  This chapter describes general communication concepts and the networking standards and protocols you need to know to design a communication solution.

- **Chapter 3, "Communication Services: Definition"**

  This chapter provides a brief description of common applications used in a communication environment.

- **Chapter 4, "Networking Hardware Offering"**

  This chapter provides a brief description of all the equipment you need to build the network: hubs, bridges, routers, switches, and so on.

- **Chapter 5, "RS/6000 Communication Adapters Offering"**

  This chapter describes all the adapters provided on the RS/6000 platform.

- **Chapter 6, "AIX V4 Communication Software Offering"**

  This chapter describes all the software provided on the RS/6000 platform running AIX V4.1 or V4.2.

- **Chapter 7, "Hardware and Software Offering For Other Systems"**

  This chapter provides a brief description of hardware and software products available on other platforms.

- **Chapter 8, "Methodology to Design a Communication Solution"**

  This chapter presents a methodology to help you in the elaboration of a communication solution.

- **Chapter 9, "Single Platform Communication Solutions"**

  This chapter provides a description of communication capabilities between one RS/6000 and one other platform using a combination of all the protocols and networks.

- **Chapter 10, "Complex Communication Solutions"**

  This chapter describes nine more complex communication solutions actually installed.

- **Appendix A, "TCP/IP IBM Offering"**

  This appendix summarizes the TCP/IP IBM offering on different platforms.

- **Appendix B, "PTY and TTY Architectures"**

  This appendix includes two figures that explain tty and pty architectures.

- **Appendix C, "AIX V4 Communications Architecture"**

  This appendix includes one figure summarizing the AIX V4 Communications Architecture.

The Team That Wrote This Redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization Austin Center.

Al Mitchell is a Senior SE Support Representative at the International Technical Support Organization, Austin Center. He writes extensively and teaches IBM classes worldwide on all areas of AIX Communications. Before joining the ITSO two years ago, he worked in USM&S as a Senior AIX Marking Support Specialist.

Pierre Liger is a Specialist System Engineer in France. He has seven years of experience in UNIX and RS/6000 fields. He holds a degree in Engineering and Computer Sciences from ESIEA. His areas of expertise include communications, networks, system management and project management. He has written extensively on communications and system management in France.

Andrei Romanovski is a Systems Engineer/Systems Architect at IBM EE/A (Russia). He has 7 years of experience in C/C++ Programming and Communications. He holds a degree in Computer Science from MSTU n.a. Bauman (Moscow). His areas of expertise include AIX & Communications/Networking.

Comments Welcome

We want our redbooks to be as helpful as possible. Should you have any comments about this or other redbooks, please send us a note at the following address:

redbook@vnet.ibm.com

Your comments are important to us!

Chapter 1. Introduction

This chapter is intended to explain:

- The *terminology* used in this book
- The *way to think* about this book
- *Where to find information* in this book

The objective of this document is to help you to elaborate a communication solution in RS/6000 environment. This document is solutions oriented; it does not explain software configuration, nor is it an implementation cookbook.

1.1 Terminology

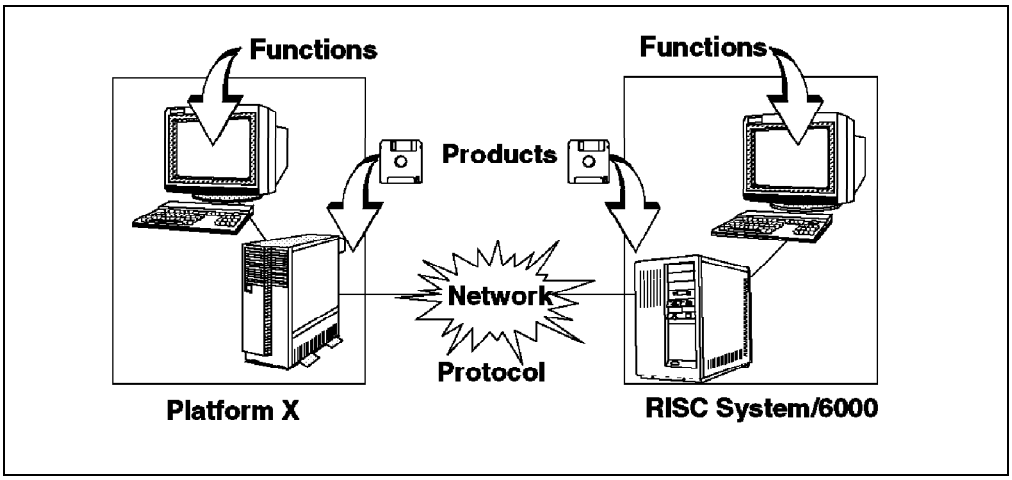


Figure 1. Terminology Used in a Communication Solution

Before explaining where to find information in this document and how use it, we have to agree on the terminology we will use. In some cases, the terminology used in this document is, perhaps, not the scientific or official definition, but it's the most common. Here are our definitions of common terms:

- **Platform**: a physical unit
  Examples: terminal, PC, S/390, RS/6000, Macintosh, printer, and so forth
- **Network**: a physical means for connecting two platforms
  Examples: SDLC, Ethernet, Token-Ring, ATM, X25, ISDN, and so forth
- **Protocol**: a method (most of the time, an implementation of an architecture) for communicating between two platforms
  Examples: TCP/IP, SNA, OSI, IPX/SPX, and so forth
- **Product**: the software implementation of a protocol (sometimes protocol and applications are in the same package)
  Examples: MacTCP, Communication Server, AIX Connections, and so forth
- **Function**: a service provided by a product on a network between two platforms using a protocol
  Examples: emulation, file transfer, remote command, shared disk, and so forth
- **Application**: an end-user-oriented program implemented as a set of functions, having a user interface, and designed to provide these functions to end users
  Examples: CATIA, CADAM, SAP/R3, OfficeVision, and so forth.

1.2 A General Way of Thinking

This figure describes the general approach of this document. The main rectangles (knowledge, know-how, and practice) are described in the next paragraph.

Whatever the topic is (finance, advertising, sports,...), whatever you do (build a plane, bake a cake, drive a car,...), you need:

- Knowledge
- Know-How
- Practice

This plan can be used for all subjects, especially in a computer-science-solutions approach (communication, OLTP, RDMS, graphic, and so forth).

At the beginning of each chapter, a figure like the one below will emphasize the topic being discussed.

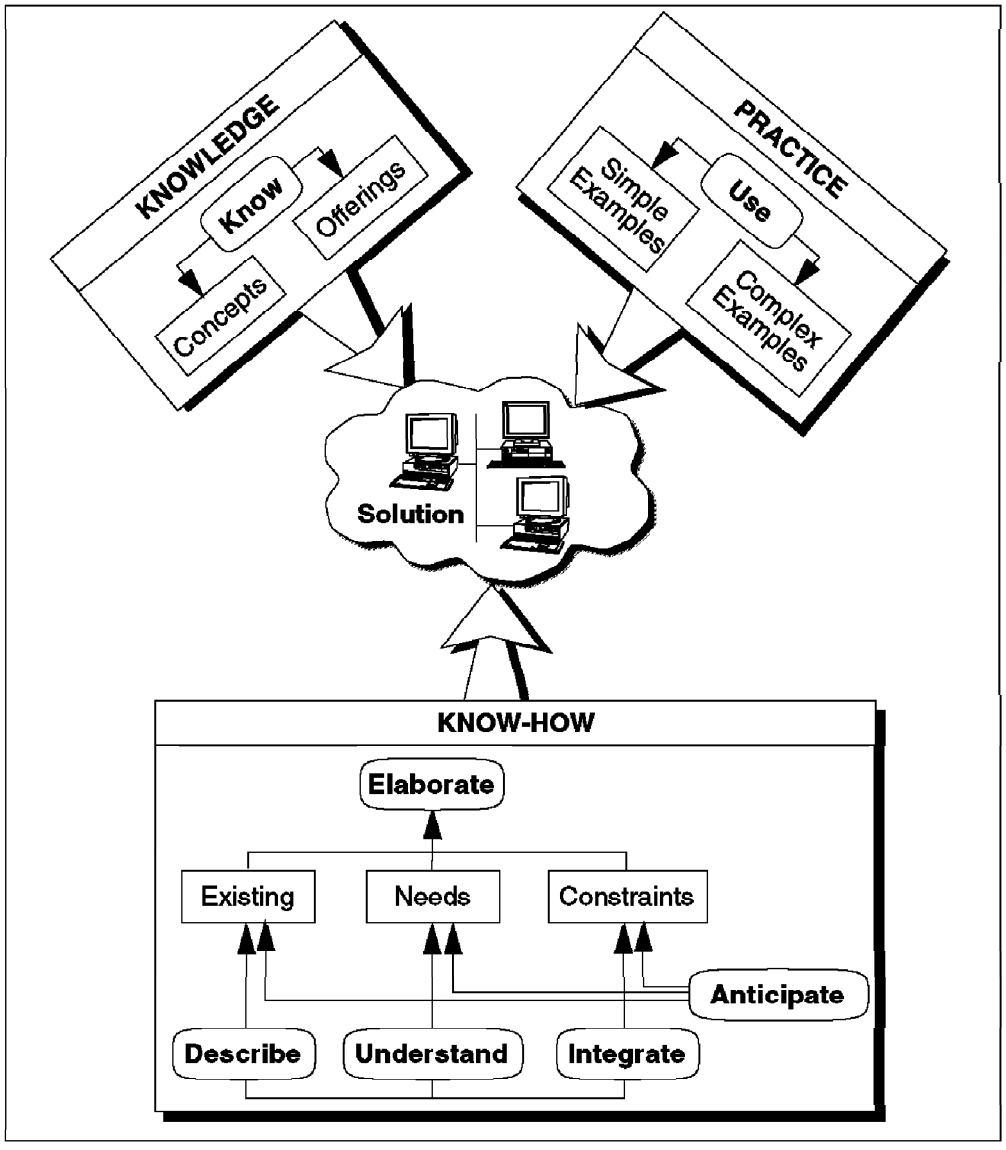


Figure 2. Position of Each Chapter in Solution Design

1.3 Where to Find Information

- If you are an expert of communication products and concepts, go directly to the "*practice*" chapters (at the end of the document).
- If you need some help in asking the right questions to design the right communication solution, go to the *"know-how"* chapters.
- If you need to know the right feature for the latest product, go the *"knowledge"* chapters.

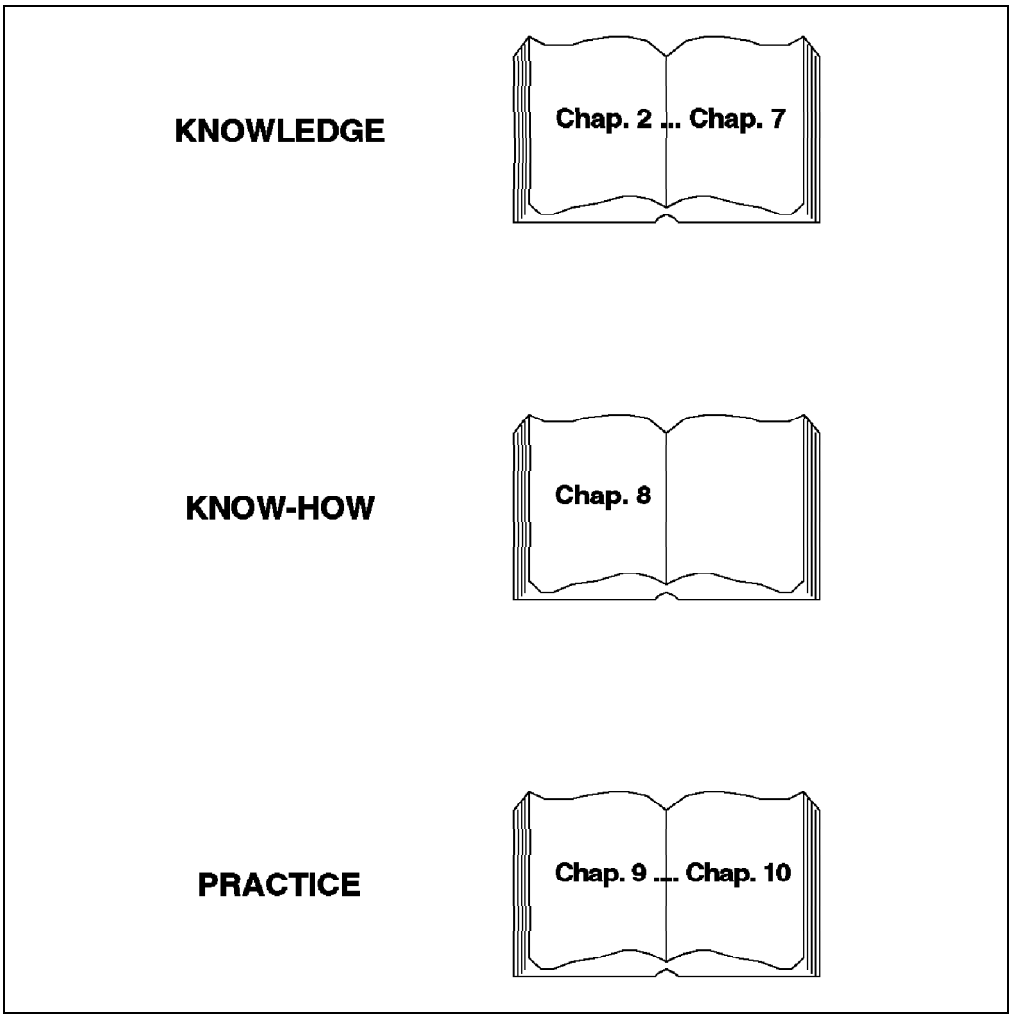


Figure 3. Knowledge, Know-How and Practice

1.3.1 Knowledge

First, you need to learn communication and network concepts in general.

You will be not an expert after reading these chapters, but you will be able to understand most of network concepts with more efficiency. This information is general and can be used with any platform (RS/6000, PC, S/390,...) and with any operating system (AIX, UNIX, DOS, OS/2, Windows NT,...).

- **Chapter 2** explains concepts about communications and networks. This chapter discusses networks, protocols, and the physical media used in communication projects.

- **Chapter 3** explains the principal services in a communication solution. It describes terminal emulation, file transfer, remote printing, and other things you need to understand before choosing products or components for the solution.

You also need to know what components you have to use to elaborate your solution. This information changes very often, and we suggest you have a look at the World Wide Web, IBM brochures, or other redbooks to be sure you choose the newest product.

- **Chapter 4** describes the networking hardware offering. This is what you need to build a network (hubs, routers, switches,...).
- **Chapter 5** describes the adapter offerings on RS/6000. This is what you need to connect the RS/6000 to the network.
- **Chapter 6** describes the software offerings on the RS/6000.
- **Chapter 7** describes more briefly the hardware and software capabilities of other platforms, such as the PC, S/390, AS/400, and Macintosh.

1.3.2 Know-How

After reading chapters 2 through 7, you will be able to understand networks and communications; you will know the difference between Ethernet and token-ring, and the products offered on the RS/6000 platform. Now, you need to implement a solution:

- **Chapter 8** is intended to give you a methodology to elaborate a communications solution. You will find lists of items and figures in it to help you collect the maximum information you will need later.

1.3.3 Practice

At this point, you understand communications and can ask sensitive questions. Chapters 9 and 10 will help you to choose the existing solution from the described examples or from combinations of the examples described.

- **Chapter 9** presents single platform solutions—that is, communication solutions between one RS/6000 and only one other system.
- **Chapter 10** presents complex solutions that are frequently installed.

Chapter 2. Networks and Communications: Concepts and Standards

This chapter describes general communication concepts and the networking standards and protocols you need to know to design a communication solution.

The key position in this chapter belongs to the OSI model. This model is used as a reference in comparing the different network protocols throughout this chapter and others. The communication protocols and standards discussed here are also referred to throughout this book. It is therefore recommended that this chapter be read first.

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

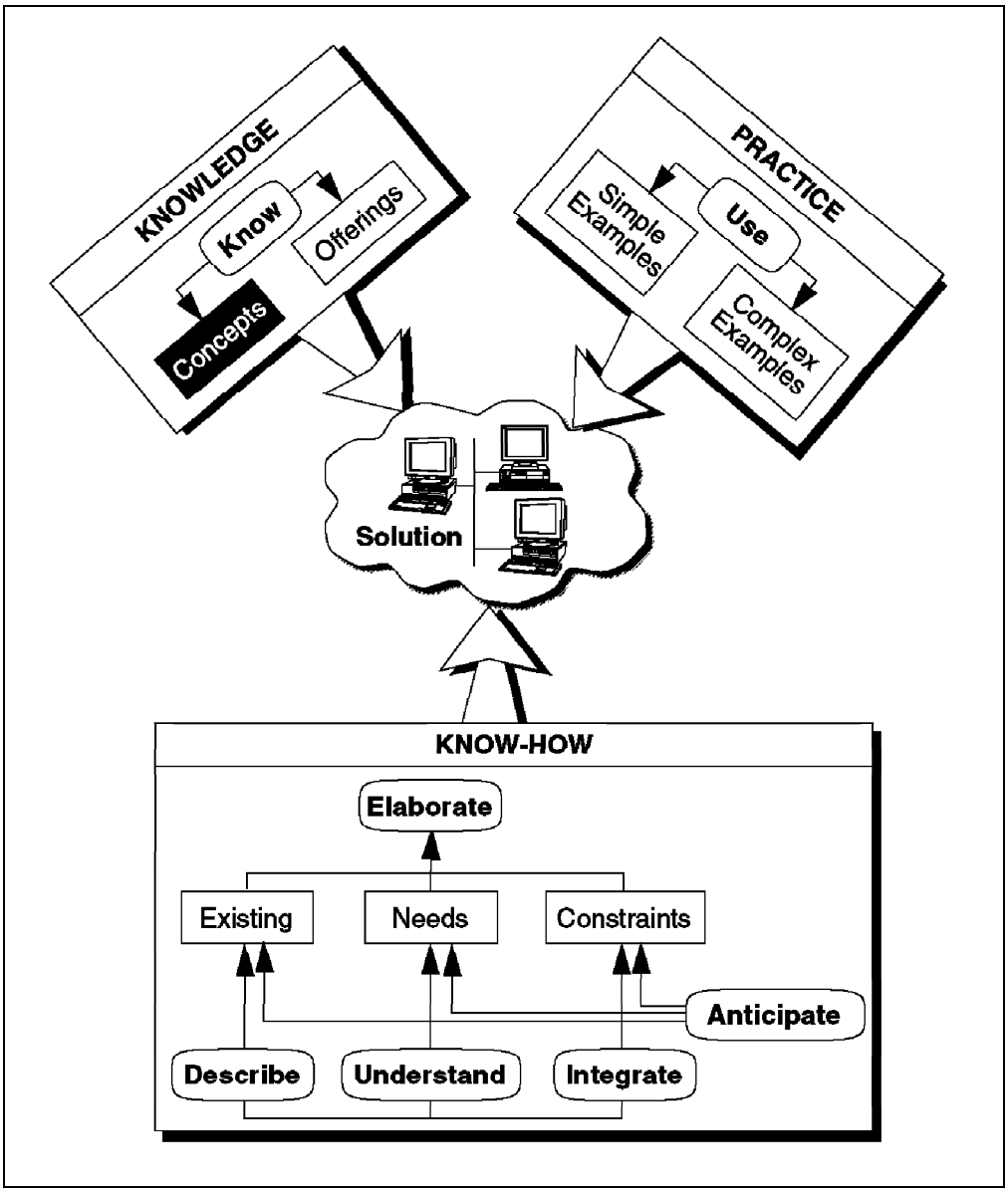


Figure 4. Position of Chapter 2 in Solution Design

2.1 OSI Model and Standards

The International Organization for Standardization (ISO) has proposed a standard communication model known as the Open Systems Interconnection (OSI) model. This model provides standards for communications between two or more computer systems.

In the OSI model, communication is broken into seven distinct functional layers. Each layer corresponds to a set of services and protocols that provide mutually agreed upon rules for the exchange of information.

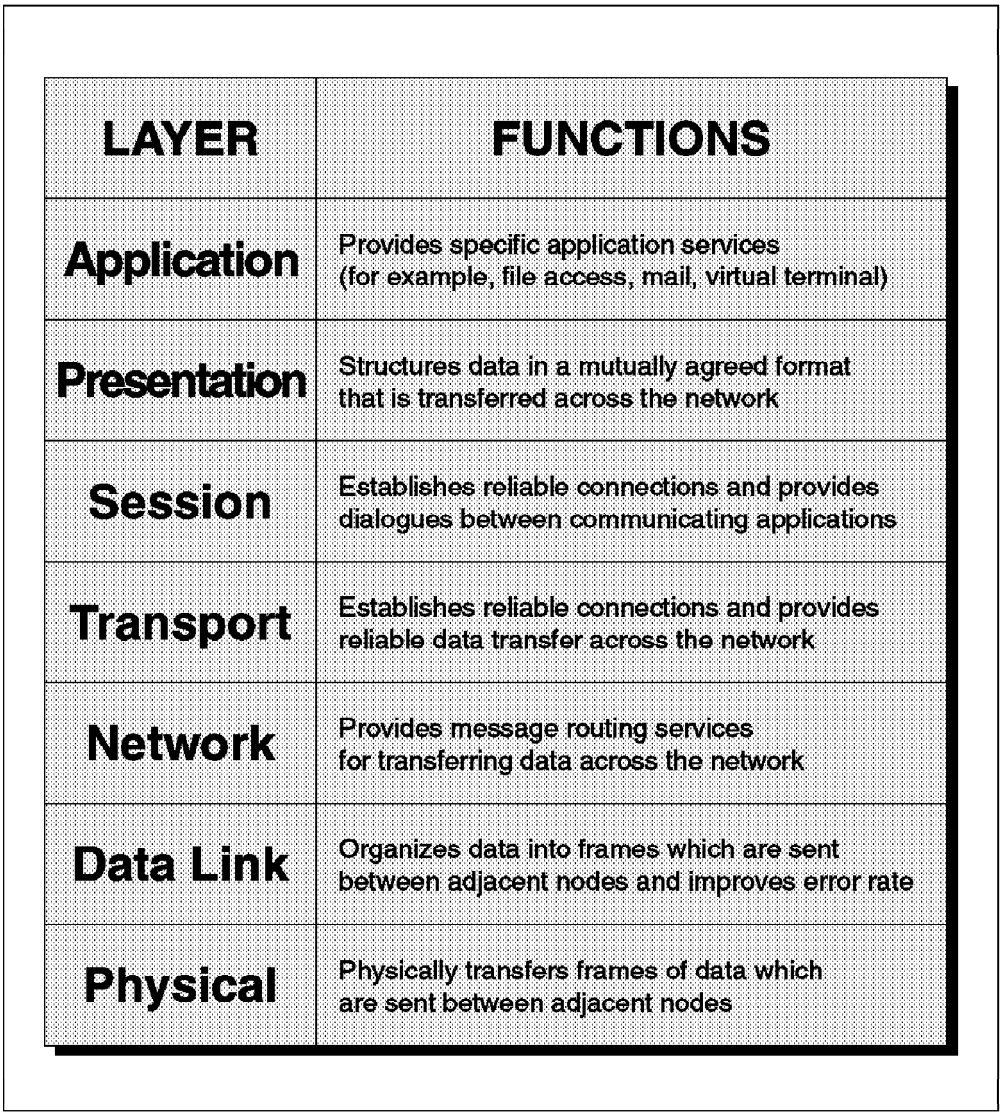


Figure 5. OSI Model

2.1.1 Description of the Model

1. **Physical Layer**

   This layer provides the physical interface between a data transmission device and a transmission medium and sets the rules by which bits are passed from one data transmission device to another.

   This is the only layer that has a physical connection to its partner layer.

   In an IBM Token-Ring LAN environment, this layer would correspond to the wire, the MAU or hubs, and the token-ring adapter in the node.

2. **Data Link**

   Layer 2 provides only a raw bit-stream service. The data link layer attempts to make the physical link reliable and provides the means to activate, maintain, and deactivate the link. This layer is concerned with techniques such as bit patterns, tokens, and error detection as data enters or leaves the wire between stations. Thus, with a fully functional data link layer protocol, the next higher layer may assume that there is error-free transmission over the link.

   Above the data link layer, all layers are hardware and media protocol independent.

3. **Network Layer**

   The network layer is responsible for coordinating data transmission between computer systems over one or more subnetworks. It relieves higher layers of the need to know anything about the underlying data transmission and switching technologies used to connect the systems.

   Layer 3 performs a routing and switching function. Within the routing node, there are two data link layers and two physical layers, corresponding to the links to the two end systems. The four upper layers are not involved in the routing. These upper layers are end-to-end protocols between systems.

4. **Transport Layer**

   The task of the transport layer is to guarantee that information from the network layer arrives in the proper sequence and is error free, with no losses or duplications.

   The size and complexity of a transport protocol depends on the reliability of the underlying network and the network layer services. Because of this, the ISO has developed five transport protocol standards, each tailored to a different level of reliability of the network layer software and of the network itself.

5. **Session Layer**

   This layer controls the dialogue between the two end systems. The services provided by session layer are dialogue discipline, grouping of the data flow, and retransmission of data.

6. **Presentation Layer**

   This layer is a translator for moving data to and from the computer and the network. For example, this layer may perform data encryption, byte order translation into a machine's native numerical format, or data compression.

7. **Application Layer**

The highest layer is the communication interface with the user. It is responsible for providing specific application services that enable the applications to communicate with each other at either end of the connection.

Examples of such services include transferring and accessing files, transferring virtual terminal information, and performing network management activities.

2.1.2 OSI Model vs. Existing Communication Protocols

The OSI layered structure serves well as a reference for other network protocols. It will be used many times in this chapter to position other network protocols and their functions in a clearly defined model of networking communications.

The figure below shows how major networking protocol suites cover the OSI model. More detailed descriptions of the layered structure of each of these protocols and their correlation with the OSI model are in the following sections of this chapter.

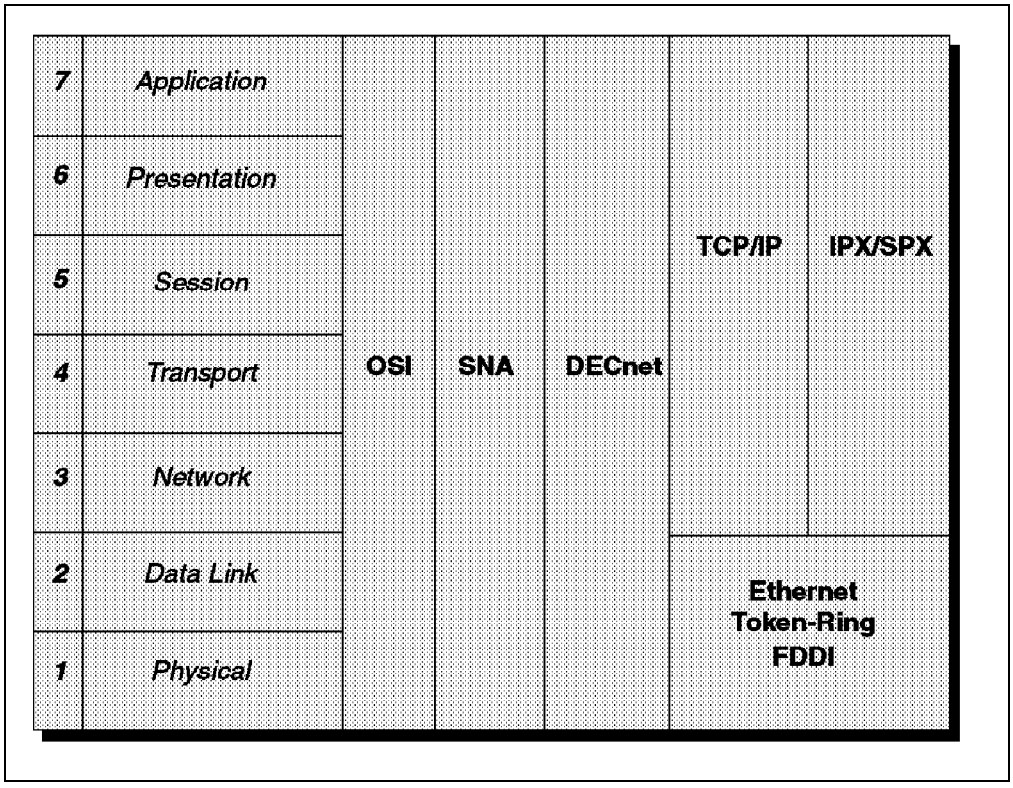


Figure 6. Network Protocols vs. OSI Model

2.1.3 IEEE Standards and Projects

In February 1980, the Institute of Electrical and Electronics Engineers (IEEE) computer society established “Project 802” to draft standards for local area networks. In keeping with this approach, IEEE Project 802 created a reference model with two layers (which correspond to the data link and physical layers of the OSI model). In the IEEE model the data link layer is further divided into two sublayers: the Logical Link Control (LLC) sublayer, and the Medium Access Control (MAC) sublayer.

The IEEE Project 802 draft standards and subcommittees are:

IEEE 802.0: LAN and MAN (Metropolitan Area Network)

IEEE 802.1: Higher-level interface standard

IEEE 802.1k: Supplement to LAN and MAN management standard (6/93)

IEEE 802.2: Logical link control standard

IEEE 802.3: CSMA/CD standard

IEEE 802.4: Token-passing bus standard

IEEE 802.5: Token-passing ring standard

IEEE 802.6: Metropolitan Area Networks (MANs)

IEEE 802.7: Broadband Technical Advisory Group

IEEE 802.8: Fiber Technical Advisory Group

IEEE 802.9: Integrated Voice/Data on LAN

IEEE 802.10: Interoperable LAN security

IEEE 802.11: Wireless LAN

IEEE 802.12: 100Base-VG

IEEE 802.30: 100Base-X

A summary of the IEEE 802 standards is shown in Figure 7.

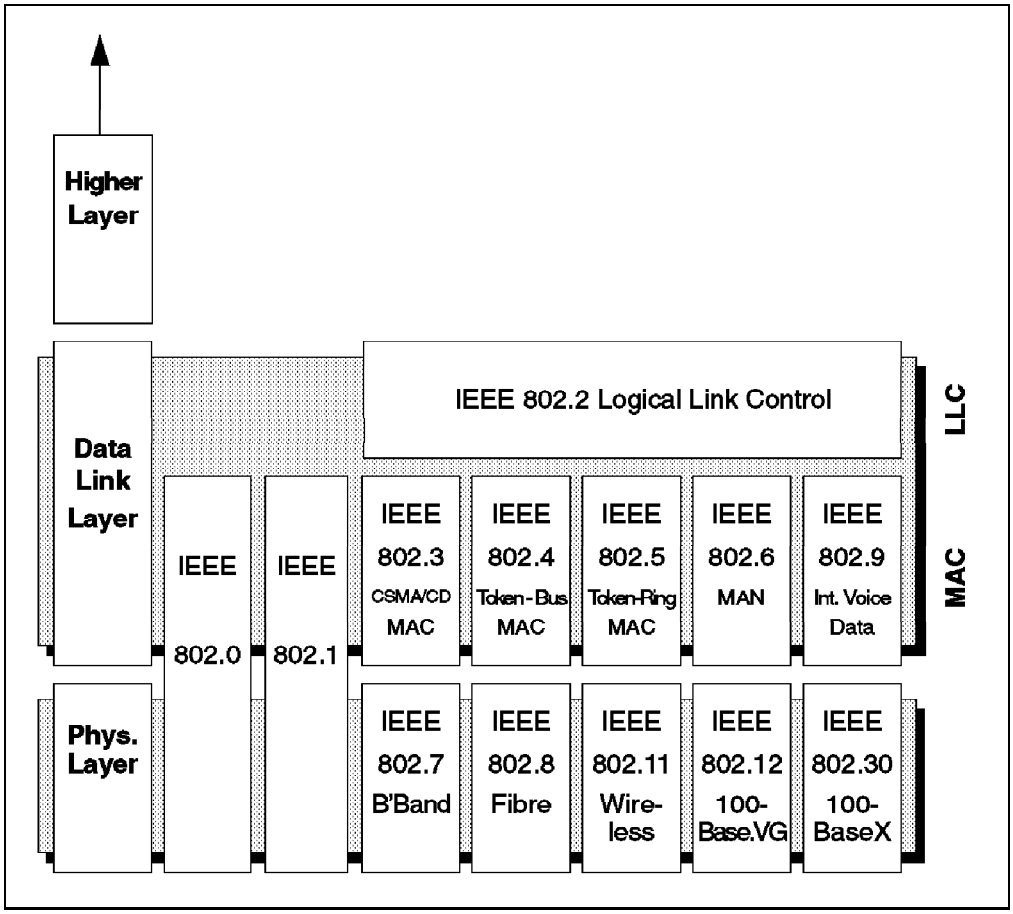


Figure 7. IEEE 802 Standard Summary

2.2 Physical LAN Attachment

The purpose of physical LAN attachments is to provide an interface that allows the transmission medium (cable) and the LAN station's access protocol to communicate. It provides mechanical, electrical, functional and procedural specifications for implementing a LAN.

The mechanical definition specifies the type of connectors to be used. The electrical definition, if applicable, states what voltages are to be used, while the functional definition defines the meaning of the voltages on the different pins. Finally, the procedural definition states the sequence of events to be followed to transmit and receive data, including the encoding scheme specifying how digital data is to be represented by electrical or optical pulses.

Many different types of media can be used for the physical layer. For example, telephone twisted pair, coax cable, shielded copper cable and fiber optics are the many types of media used for LANs.

Figure 8 shows examples of the cable types that are used in constructing networks. The following sections of this chapter, describing LAN implementations contain references on this cables. Specifications and characteristics of different cable types are covered in related publications.

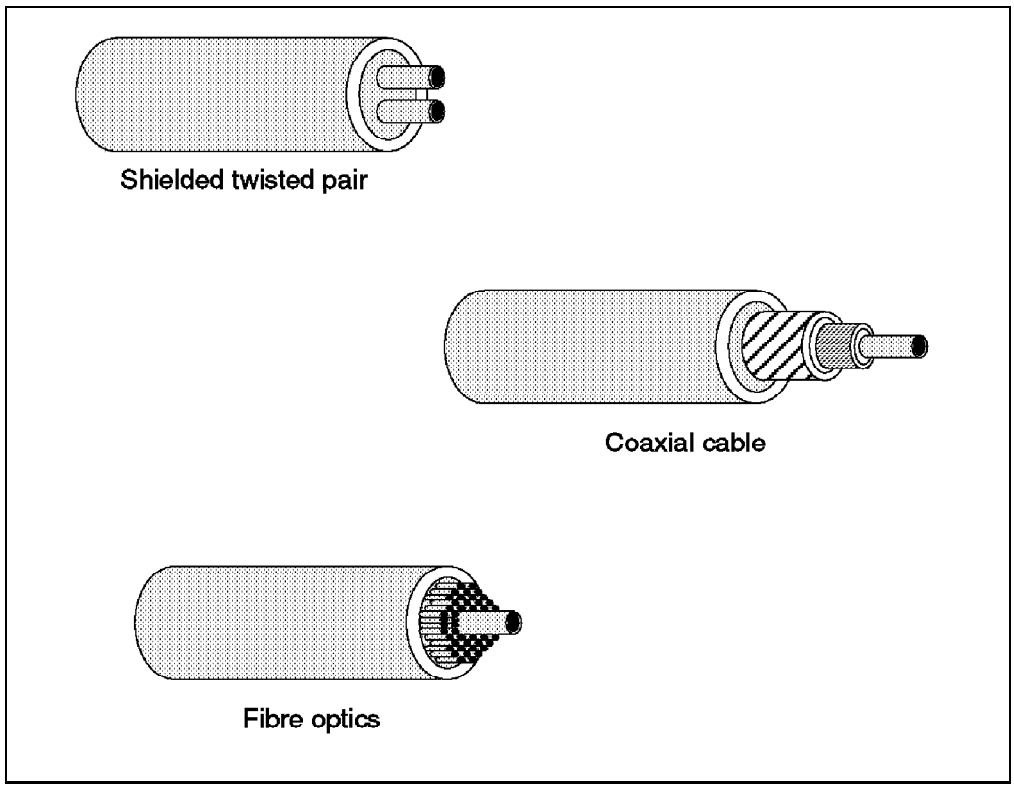


Figure 8. Examples of Cable Types

2.3 LAN Architectures & Standards (Topologies, Channel Access Methods)

Numerous topologies are used for local area networks and numerous channel access methods (or protocols) are used in these topologies. They are closely related to each other. The term *topology* refers to the way in which network devices are interconnected. The term *channel access method* refers to the way in which network nodes can access channel connecting devices on the network in order to start transmitting or receiving data.

Figure 9 shows the basic network topologies.

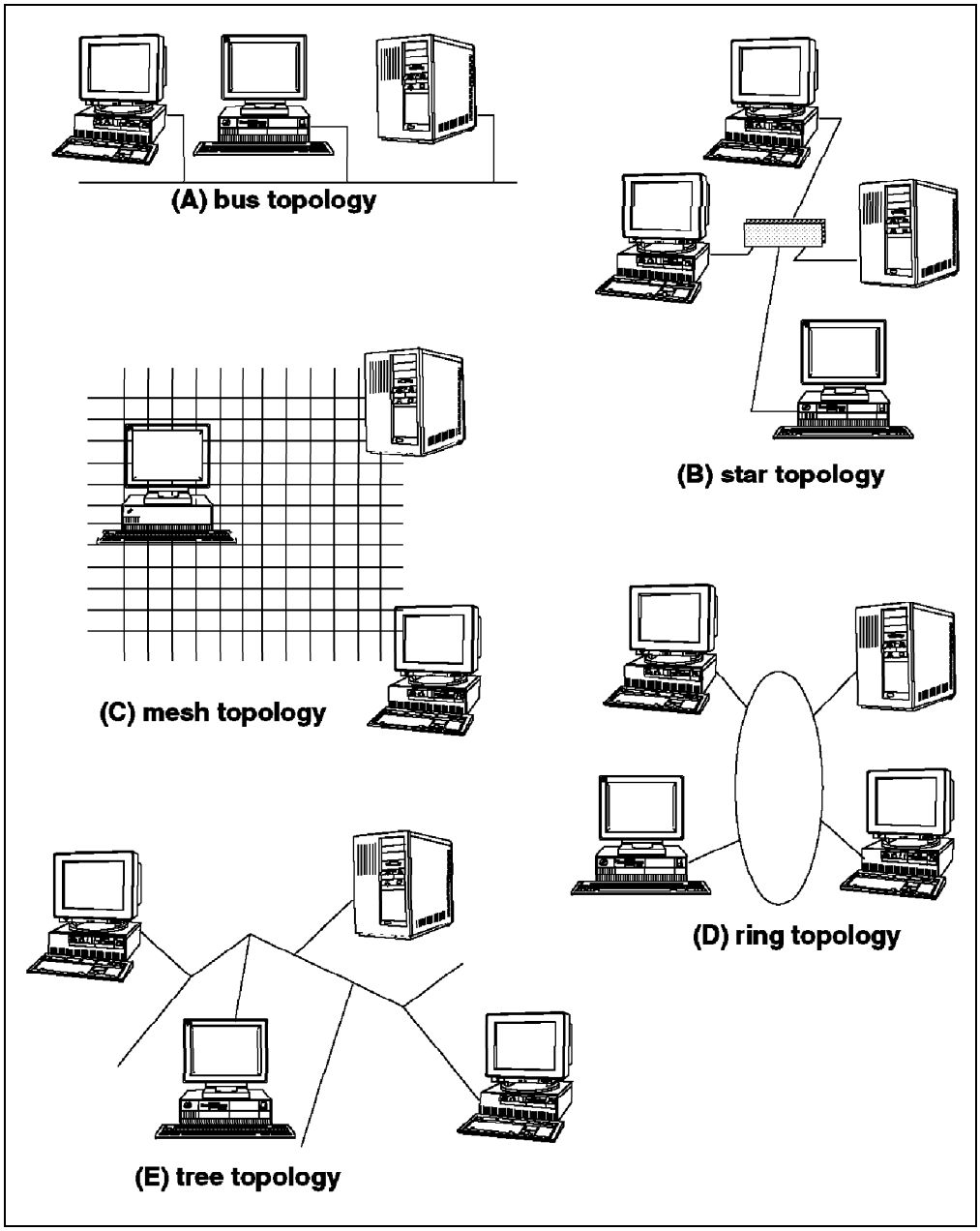


Figure 9. Common LAN Topologies

1. Bus and Tree Topology

   The bus topology is very common for local area networks. Part A of Figure 9 depicts a bus topology network. Network stations are attached to a transmission medium called a bus.

   A popular method used with this LAN topology is the Carrier Sense Multiple Access with Collision Detection (CSMA/CD). An example of the implementation of this topology and access method is Ethernet/ IEEE 802.3. There is another method used with this LAN topology; it is Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). An example of the implementation of this access protocol on a bus topology is LocalTalk (AppleTalk).

   The tree topology is a variation of the bus topology. A CSMA/CD protocol can be applied to both topologies, and in both cases transmitted frames are broadcast to all stations active on the shared medium. There is no controlling station on the bus and tree LAN topology. Part E of Figure 9 depicts a bus topology network.

2. Star Topology

   In network that has a star topology, each station is connected to a central controlling point (also called a switch) via point-to-point lines. Part B of Figure 9 shows a bus topology network. A PABX is a good example of this type of network.The 10Base-T and 1Base5 Ethernet networks are other examples of this topology, where the CSMA/CD access method is used.

3. Mesh Topology

   Part C of Figure 9 shows a bus topology network. This topology involves some wiring overhead since every network station is directly connected to all the other stations. It also means that each station has to have (N-1) I/O ports, where N is the number of stations in the network.

4. Ring Topology

   In a network that has a ring topology, each station is attached to its adjacent station by point-to-point links, thus forming a physical ring. Part D of Figure 9 shows a bus topology network.

   A popular channel access protocol used with the ring topology is Token Passing, where access to the medium is controlled by possession of a circulating token. Examples of the implementation of the ring topology network with the Token-Passing access method are FDDI and Token-Ring/IEEE 802.5.

   The Token-Passing access method is also applicable to a bus local area network. An example of the implementation of the bus topology network with the Token-Passing access method is IEEE 802.4.

2.3.1 Asynchronous Communications

Asynchronous communications is a special type of point-to-point connectivity. It is a simple way of connecting peripheral devices to a host computer or for connecting adjacent host computers together, but it is not a kind of local area network itself. Asynchronous communications are widely used in RS/6000 and AIX connectivity. Figure 10 shows examples of such communications. The different asynchronous connection techniques are discussed in great detail in Chapter 5 and Chapter 9 of this redbook.

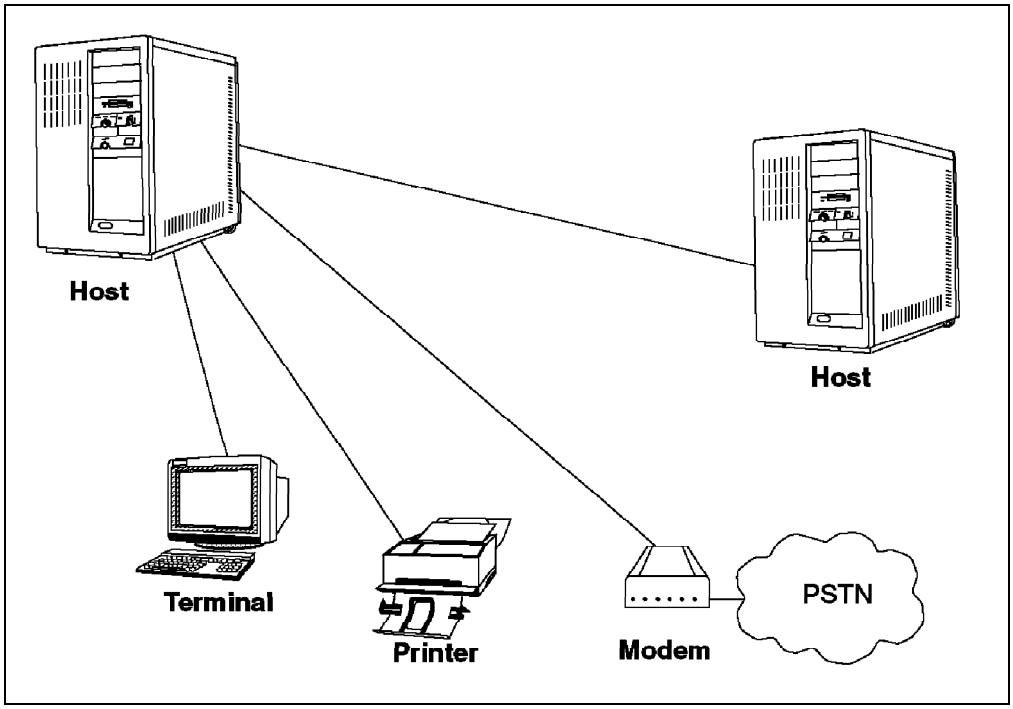


Figure 10. Examples of Asynchronous Communications

2.3.2 Ethernet/802.3

Initially invented by Xerox in the early 1970's and brought to the marketplace as Ethernet V.1, now it is adopted by IEEE as a standard IEEE 802.3. Ethernet (802.3) is currently the most widely used LAN protocol in the world.

As mentioned early, Ethernet (802.3) uses the CSMA/CD media access method, and various types of cables (topologies) can be used to provide physical links between the network nodes. The media used can be thick or thin coax, twisted pair, or fiber optic cable.

Thick coax is also known as *10Base5* or *Thicknet*. Thin coax is also referred to as *10Base2* or *Thinnet*. When using coax (thick or thin), this cable is the bus to which the network nodes are connected.

To enable the use of structured wiring in an Ethernet environment, a standard known as *10BaseT* has been developed that provides a point-to-point link between the network node and central hub over twisted pair wiring.

Fiber optic cables are used to provide point-to-point links, typically as a backbone between concentrators, to interconnect buildings or cross long distances within a building. There are various standards covering the use of

fiber optic in an Ethernet (802.3) environment, for example FOIRL (Fiber Optic Inter Repeater Link), 10BaseFL, or 10BaseFB.

Figure 11 shows an example of LAN using three main Ethernet topologies (10Base2, 10Base5, 10Base-T). Eternet (802.3) concepts, topologies and design rules are discussed in great detail in the *Local Area Network Concepts and Products: LAN Architecture, SG24-4753,* redbook.

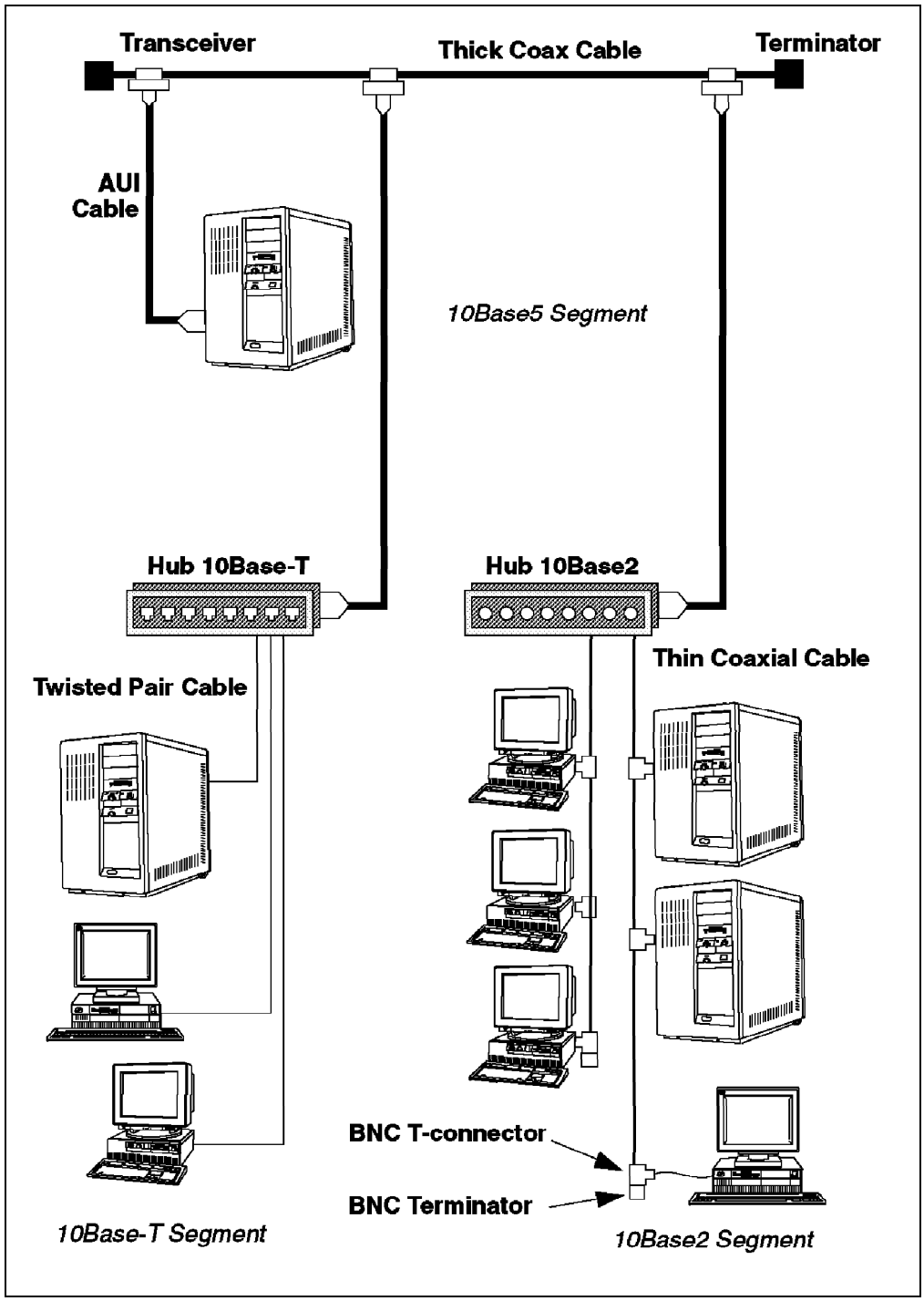


Figure 11. Ethernet (802.3) Topologies

2.3.3 Token-Ring/802.5

The IEEE 802.5 standard describes the token-ring medium access protocol and its physical attachments. In token-ring network the stations on the LAN are physically connected to a wiring concentrator usually in a *star-wired ring* topology. Logically, stations are connected in a pure ring topology. The standard does not prescribe the type of cabling to be used. In IBM's Token-Ring network implementation, shielded twisted pair (STP) cabling is recommended although unshielded twisted pair (UTP) may now be used.

Figure 12 shows an example of a token-ring (802.5) local area network. Read more about token-ring (802.5) concepts and topologies in the *Local Area Network Concepts and Products: LAN Architecture,* SG24-4753, redbook.

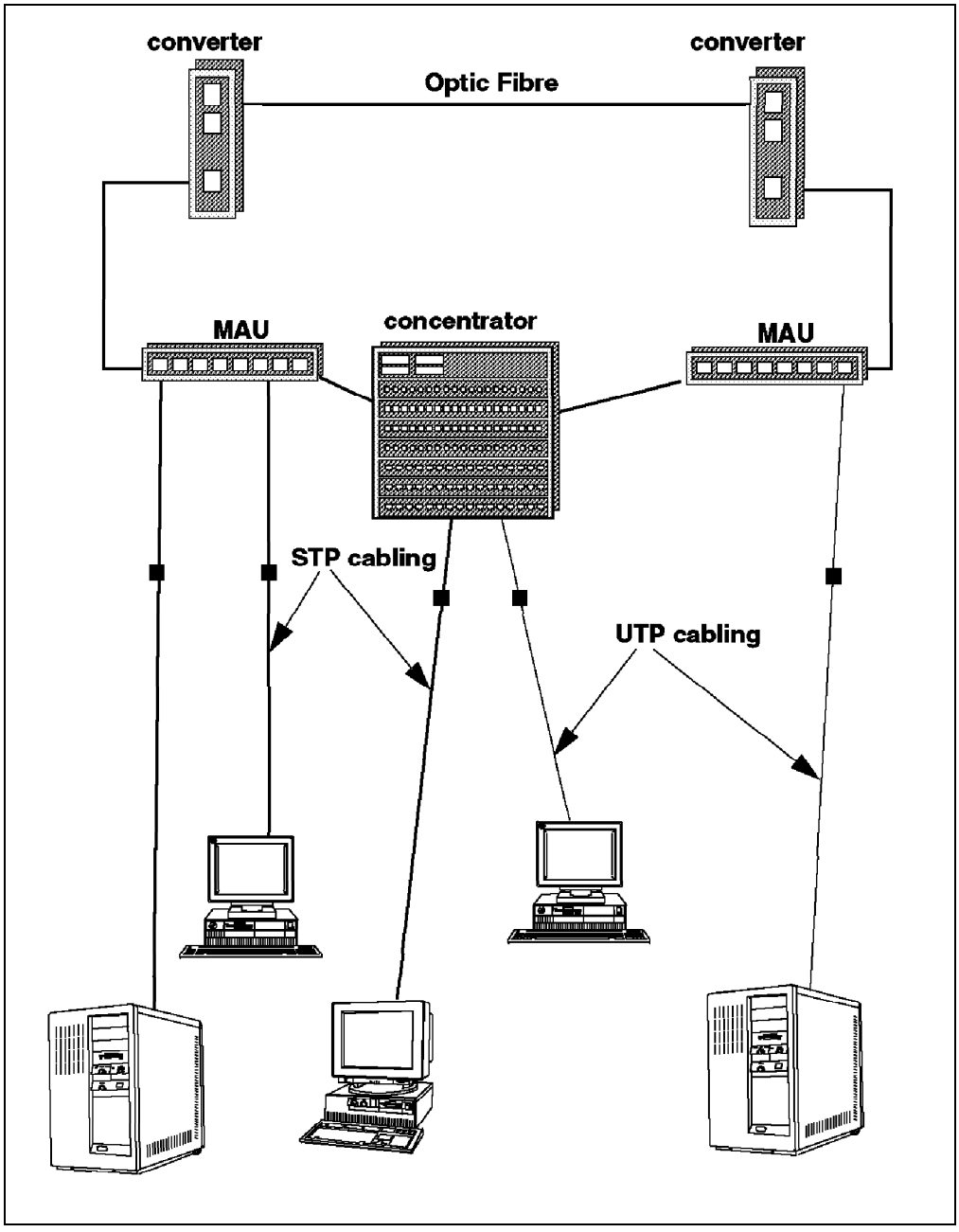


Figure 12. Token-Ring (802.5) LAN Implementation

2.3.4 FDDI

The American National Standards Institute (ANSI) standards working group X3T9.5 has formulated a draft proposal for an international standard called Fiber Distributed Data Interface (FDDI). In terms of current standards, FDDI is described by ISO 9314, which is subdivided into six parts. These are:

- 9314-1 - the physical layer
- 9314-2 - the MAC layer
- 9314-3 - the physical medium dependent layer
- 9314-4 - use of FDDI on single-mode fiber
- 9314-5 - Hybrid Ring Control - FDDI II (especially suitable for voice traffic)
- Station Management (9314 number has not been allocated)

The ANSI X3T9.5 and ISO 9314 committees describe FDDI as a dual counter-rotating ring which operates at a rate of 100 Mbps. In many ways, FDDI is similar to the IEEE 802.5 token-ring (FDDI uses a token-passing protocol in which each station has the chance to transmit data when a token passes), although there are some differences. The differences are:

- FDDI uses two rings: *Primary* (main) and *Secondary* (backup).
- Each ring consists of *single fiber path* which is equivalent to pair of copper conductors. NOTE: There is a *Shielded twisted pair Fiber Distributed Data Interface* (SDDP) for transmitting FDDI directly on copper wires without converting the electrical-pulse stream to optical signals at the rate of 100 Mbps.
- Network nodes can be attached to the ring via Multistation Access Unit (MAU) or directly (without MAU).
- FDDI defines two classes of network nodes: *Class A* (attaches to both of rings directly) or *Class B* (attaches to only one of the rings directly or through a concentrator).

Figure 13 shows example of FDDI network and stations using two types of attachment. FDDI concepts, port types, and topologies are discussed in great detail in the *Local Area Network Concepts and Products: LAN Architecture*, SG24-4753, redbook.

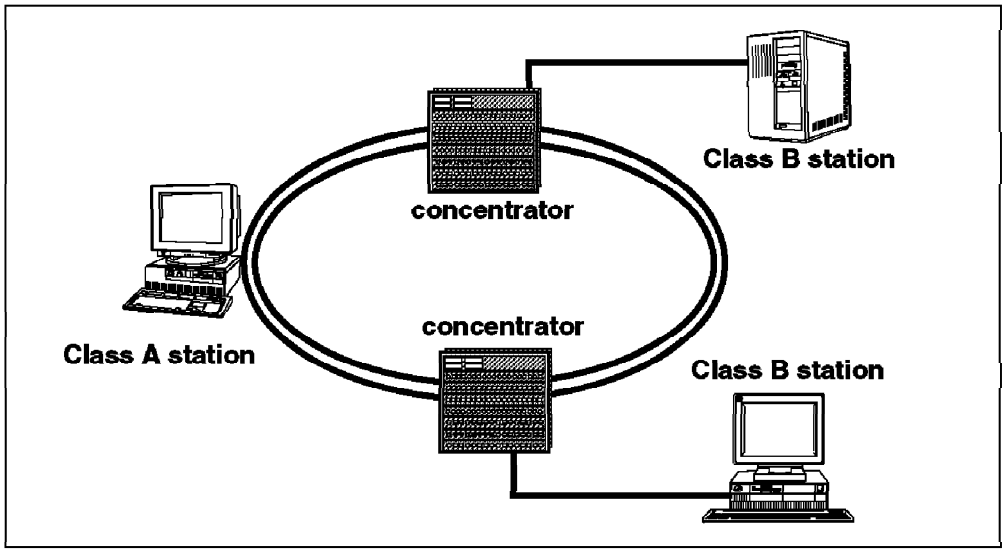


Figure 13. Example of an FDDI Network

2.3.5 ATM

Asynchronous Transfer Mode is the new, evolving standard that addresses the demand for high-speed, high bandwidth networks. ATM is seen as the new technology to fulfill these new business demands and is already touted as the definitive communication technology for the next decade. The ATM Forum is the organization responsible for driving the development of standards-based ATM specifications.

ATM is a cell relay technology; it draws on some of the benefits of fast packet switching and provides basic multiplexing and circuit switching with its main design aimed at supporting isochronous (voice, video) information communications. Cell relay is a technology designed to relay data, voice and video in fixed-size cells. ATM is the international standard for cell relay and defines a fixed length 53-byte packet or cell that consists of a 5-byte header and a 48-byte payload.

The ATM structure consist of several layers. They are:

ATM Adaptation Layer (layer 3). The ATM Adaptation Layer (AAL) provides an ATM service to applications of the same type, which can be any of five: Circuit Emulation, Video/Audio, Connection-Oriented data, Connectionless, Simple data. It also segments and reassembles data into 48-byte payloads and hands these across to the ATM layer.

ATM Layer (layer 2). The ATM layer then adds/removes the header to payload (which contains the virtual connection identifier (VCI) and/or virtual path identifier (VPI)) and multiplexes the payloads into virtual connections.

ATM Physical Layer (layer 1). One principle of ATM is that it is not tied to any physical layer (that is, it is media independent), and therefore there are no new layers being proposed. One new function of this layer is to delineate the 53-byte cells within bits of payload. This layer supports coax, copper, single-mode, and multi-mode fiber at rates from 45 to 155 Mbps.

ATM LAN Emulation Service. There is one special high-level service in the ATM layered structure that emulates services of existing LANs across an ATM network. This service is called LAN emulation service and supports the interconnection of ATM networks with traditional LANs by means of today's bridging methods. The LAN emulation service provides not only the connectivity between ATM-attached end systems but also allows connectivity with LAN-attached stations. This includes connectivity both from ATM stations to LAN stations as well as LAN stations across ATM.

Figure 14 shows an example of an ATM network and three basic configurations (ATM-ATM, ATM-LAN, LAN-LAN). ATM concepts layered, structure and different configurations are discussed in great detail in the *Local Area Network Concepts and Products: LAN Architecture*, SG24-4753, redbook.

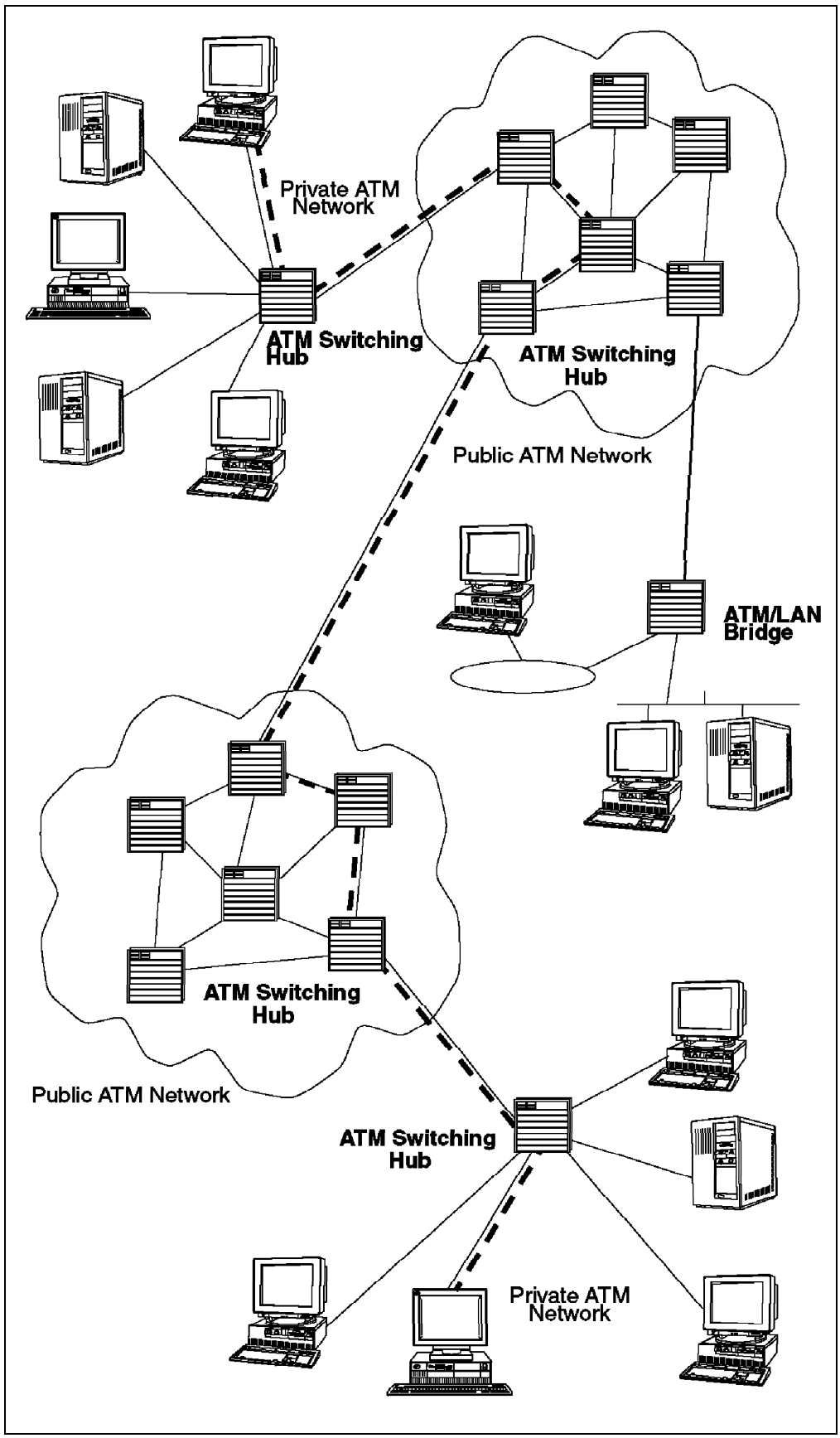


Figure 14. Example of an ATM Network

2.3.6 Network Technology Trends

There are two emerging Fast LAN technologies not covered in this chapter, Fast Ethernet and 100VG-AnyLAN. Fast Ethernet (802.30) marries a modified version of the IEEE 802.3 CSMA/CD protocol with the 100 Mbps ANSI TP-PMD twisted-pair signalling approach used in CDDI (FDDI over UTP). The 100VG-AnyLAN is a new IEEE 802.12 technology for transmitting Ethernet and token-ring frame information at 100 Mbps via UTP, STP, or optical fiber. The *Local Area Network Concepts and Products: LAN Architecture*, SG24-4753, redbook contains detailed descriptions of Fast Ethernet and 100VG-AnyLAN concepts.

Figure 15 positions all current and emerging networking technologies. The technologies regarding Wide Area Networks (for example, X.25 and ISDN) are described in the next section of this chapter.

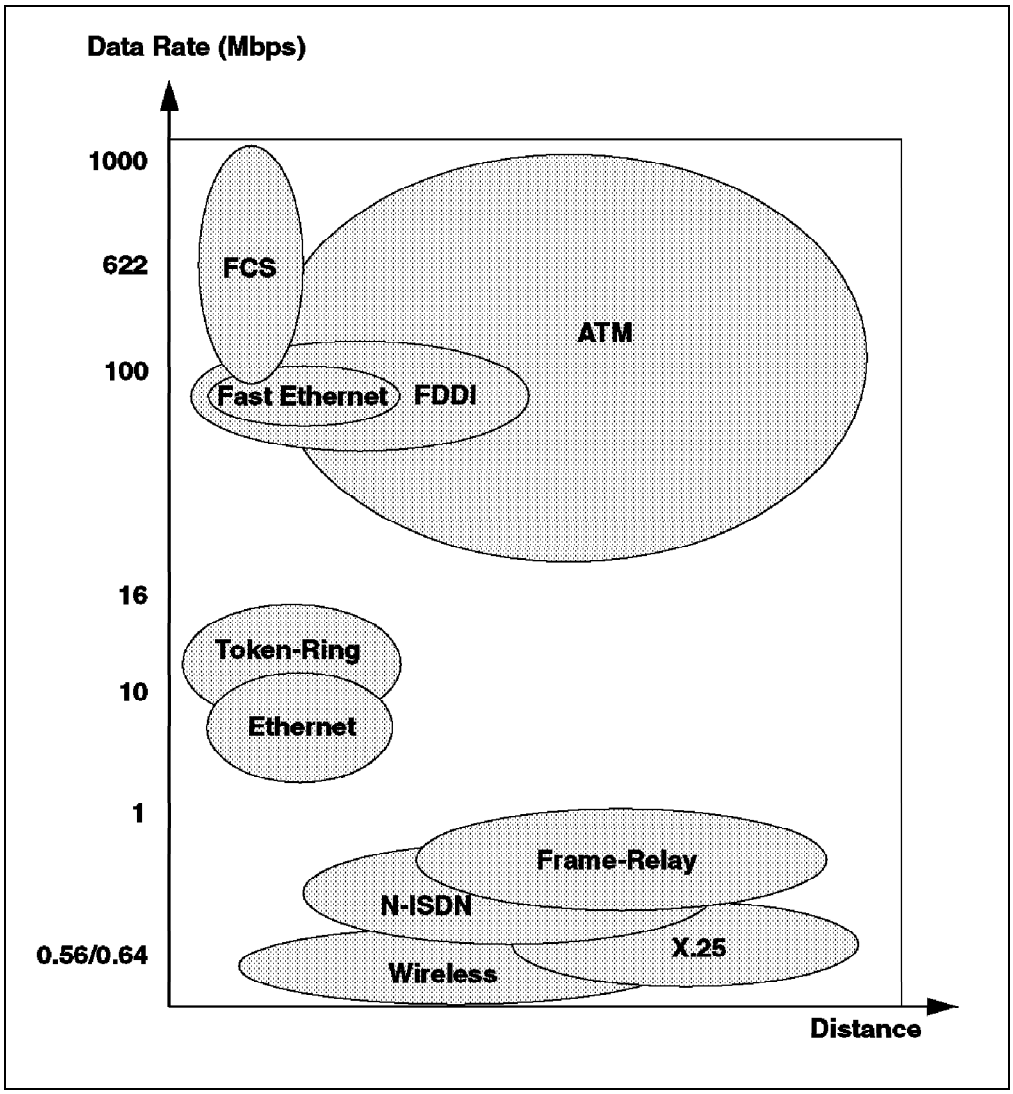


Figure 15. Network Technology Trends

2.4 WAN Architectures and Standards

Wide Area Networks (WANs) are another type of network. A WAN is a network providing data communications capability throughout geographical areas larger than those serviced by LANs (areas of 1 to 10 km), for example across countries or across continents. This section describes some of the existing WAN technologies.

2.4.1 Switched Lines, PSTN

Switched-line communication is the most popular of past methods for creating wide area connections. It based on the circuit-switching technology provided by all Packet-Switched Data Network (PSDN) providers, like telephone companies.

Circuit-switching technology has the following main characteristics:

- It directly connects the sender and receiver.
- It creates dedicated path between both ends until the connection is terminated.

This technology is used more now because of the high-speed and low-cost requirements of today's wide area networks. But it still is in use for point-to-point connections. These connections require only a modem (MOdulator/ DEModulator device, Data Circuit-terminating Equipment (DCE)) connected to telephone system (PSTN) and computer or other peripheral device serving as Data Terminal Equipment (DTE).

2.4.2 ISDN

Integrated Services Digital Network (ISDN) is a set of international standards initiated by CCITT. ISDN describes and specifies a (digital) user interface to a public (digital) communications network. It does not describe the internal operations of the communications network—just the interface to it and the services that it must provide.

Much of the impetus for ISDN comes from the desire to use the installed copper wire "subscriber loop" (two-wire connection between the telephone exchange and customer premises) at higher speeds, with more reliability and new services.

There are three generic types of ISDN.

- **Narrowband ISDN** is the form of ISDN that is becoming widely available today. There are two forms of access (Basic Rate and Primary Rate), and the service offered is the connection of 64 Kbps channels primarily on a switched service basis. There is also a low rate "connectionless" packet switching ability available through the "D" channel.
- **Wideband ISDN** is a form of ISDN where a user is able to access a wider synchronous data channel by using a group of adjacent slots on an ISDN Primary Rate interface. Thus if 6 slots are used, they may form a single 384 Kbps data channel (this is called an H0 channel).
- **Broadband ISDN** does not provide high-speed synchronous channels. It is a cell-based packet switching system. In fact broadband ISDN is based on Asynchronous Transfer Mode (ATM) cell switching and works in a very different way.

ISDN Basic Rate

ISDN Basic Rate Interface (BRI) uses the same twisted pair of copper wires (subscriber loop) as is currently used for a home telephone. This single pair of wires carries two (64 Kbps) B channels and a (16 Kbps) D channel.

- **"B" (Bearer) Channel** is 64 Kbps in both directions simultaneously (64 Kbps full-duplex) and is used for voice or for data. When a user places a "call" (for voice or for data), a continuous path is allocated to that call until either party "hangs up" (clears the call).
- **"D" Channel** is not an "end-end clear channel" like the B channels.

  This D channels carries data in short packets and is primarily used for signaling between the user and the network (when the user "dials" a number, the number requested is carried as a packet on the D channel).

  In Basic Rate the D channel operates at 16 Kbps.

The ISDN BRI allows for up to eight physical devices to be attached simultaneously to the network by means of a "passive bus", but a maximum of two devices can use a B channel simultaneously. However, all eight devices can simultaneously share access to the D channel for low-speed data applications.

ISDN Primary Rate

Primary Rate Interface (PRI) transmission uses two pairs of wires (subscriber loops)—one pair in each direction. In addition, service does not use unselected subscriber loops. Wire pairs carefully selected for quality have repeaters inserted approximately every 1.6 kilometers (mile). This allows a much higher transmission rate.

In Europe, the transmission rate used is two megabits per second. In the United States, the speed used is 1.544 Mbps. This results in the availability of 30 B channels and one (64 Kbps) D channel in Europe and 23 B channels and one D channel for the United States.

2.4.3 Frame Relay

Frame relay is a fast packet-switching technology. Because fast packet switching operates at layer 2 of the OSI Reference model, it is protocol independent. The fast packet switch examines each packet and is able to route packets based on a common addressing technique, allowing a reduction in the number of ports and lines through traffic consolidation.

The frame relay protocol can be used both locally and in a worldwide data network. It is available from public service carriers at speeds from 56 Kbps to 1.544 Mbps, but may be used effectively in private networks at lower or higher speeds and may even be used on good quality analog lines.

Frame relay is connection-oriented, with virtual circuits defined between end stations (the Frame-Relay Terminating Equipment or FRTE). The switching is done by a Frame-Relay Frame Handler (FRFH). The standards for Permanent Virtual Circuits (PVCs) are adopted and appear as recommendations in the ANSI and CCITT standards. Switched Virtual Circuit (SVC) standards are in the study groups.

Frame relay provides guaranteed bandwidth for each virtual circuit, which prevents any one user from consuming all the bandwidth. At the same time, it allows any unused bandwidth to be shared by the active users. Standards concerning Committed Information Rates (CIRs) have been adopted. Communication Network Management (CNM) is facilitated by the Local Management Interface (LMI) standards adopted for the User to Network Interface (UNI) and Network to Network Interface (NNI).

Frame relay networks can be either public, private, or hybrid. Frame relay equipment may be connected by using private, leased lines or by using a public service offered by a local or long distance telephone carrier. In addition, hybrid networks may be designed which interconnect privately owned networks with public services. This seamless operation is possible because of the defined frame relay network-to-network interface standard.

2.4.4 X.25

X.25 is a set of recommendations from the International Telegraph and Telephone Consultative Committee (CCITT) that defines a standard network access protocol for attaching diverse types of computer equipment to a Packet-Switched Data Network (PSDN). The CCITT consists of representatives from the Post Telegraph and Telephone authorities from nations around the world, nearly all of which offer X.25 networking services.

Although some corporations have created private networks, most companies subscribe to a public PSDN. A PSDN is an interconnecting set of intelligent switching nodes that enables subscribers to exchange data using a standard protocol and packet-switching technology. Such a network carries messages, divided into parts called packets, over circuits that are shared by many network users. A single physical line into an office can handle many concurrent connections. Each connection is called a virtual circuit. A packet consists of a sequence of data and control elements in a special format that is always transmitted as a whole. The network packet size is commonly 128 bytes (octets in X.25 terminology); however, this value can vary from 16 to 4096 bytes.

The CCITT has defined the following terminology:

- A switching node in a packet-switched data network is called Data-Switching Equipment (DSE).
- A computer that uses the network for communications is called Data-Terminal Equipment (DTE).
- A device at the point of access to the network is called Data Circuit-terminating Equipment (DCE).

Every DTE must have an associated DCE. The CCITT Recommendation X.25 defines a standard protocol for information exchange in packet mode between a DTE and a DCE (that is, between an individual user's equipment, such as a RISC System/6000 and the network provider's equipment). X.25 does not define the network; the network is often drawn as a *cloud* because the exact configuration and internetworking vary from network to network. They are implementation dependent.

The network is composed of DCEs and DSEs that route the packets of data through the network to the intended destination. The path that a user's data will take through the cloud might vary with every packet. All the user knows is that

the data goes from their DTE into the DCE and that it arrives at the other end in the correct order.

Operation and maintenance of DCEs and DSEs is the responsibility of the network provider. If a link between two DSEs goes down, the provider must reroute traffic. X.25 does not define the route through the network or the protocols employed within it. Figure 16 shows the elements of an X.25 packet-switched data network.

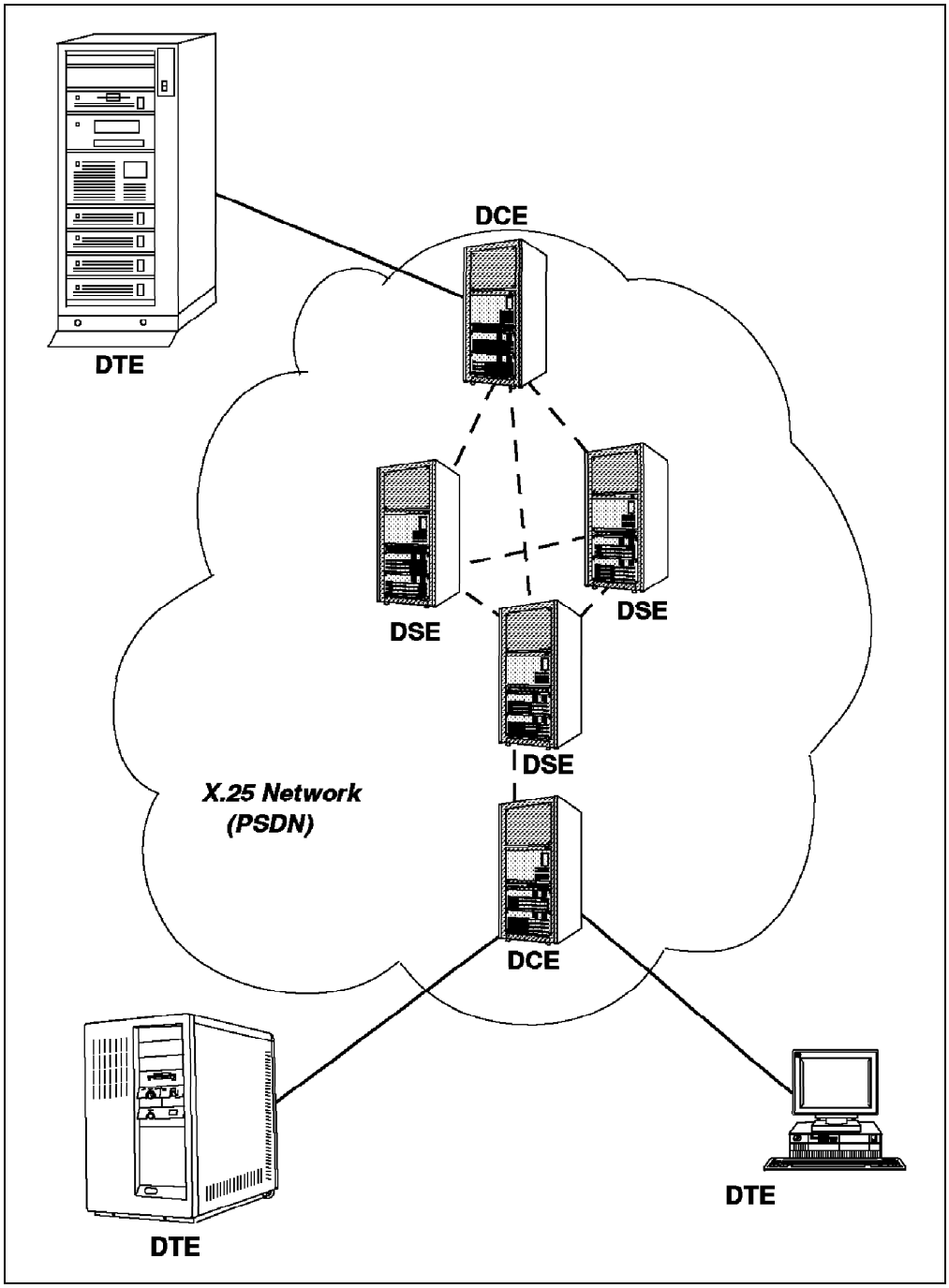


Figure 16. An X.25 Network

The X.25 protocol corresponds to three network-specific layers of OSI Reference model (layers: 1, 2, and 3). They are:

- **Physical** (equivalent to the OSI Physical layer)
  The physical layer is responsible for the transmission of raw bits of data across some physical medium. In the X.25 protocol the physical level activates, maintains, and deactivates the physical circuit between a DTE and a DCE. The physical level is defined in CCITT Recommendation X.21 and in CCITT Recommendations X.21 and X.21bis. CCITT Recommendation X.21bis defines the V.24 or V.35 interface between a DTE and a DCE.
- **Frame** (equivalent to OSI Data Link layer)
  The packet layer produces X.25 packets to establish calls and transfer data. All these packets are then passed to the frame layer for transmission to the local DCE. The link level uses a link access procedure to ensure that data and control information are accurately exchanged over the physical circuit between the DTE and DCE. Its provides recovery procedures and is based on a subset of the High-level Data-Link Control (HDLC) called LAP_B. This procedure is synchronous and full-duplex.
- **Packet** (equivalent to OSI Network layer)
  The packet-level protocol specifies how virtual circuits between DTEs are established, maintained, and cleared. This level defines how a single physical channel (the access link) can be treated as a set of multiple logical channels, each providing a virtual circuit. It also defines the structure of data packets, and control packets used to establish and manage a virtual circuit between two DTEs in a PSDN.

2.4.5 Choosing the Right WAN

Network providers offerings are so different in each country that it's very difficult to generalize this part! But, wherever the solution is installed, during the design of this one, you **must** include a financial analysis of the considered solution, including all scenarios (maintenance cost, simulation during 5 years, increase of users number or files size).

Most of the time, the three most important factors are:

- cost considerations
- technical considerations
- utilization considerations

In the following tables, these considerations are applied to France-Telecom offerings. Adapt these tables to your local network provider. The factors should be almost the same.

Table 1. Cost Considerations

		Monthly dues depend on				Communication costs depend on			
	Initial dues	Connection to the network	Distance	Data Rate	Modems rental	Distance	Duration	Volume	Hour
Classic Leased Line	expensive								
Transfix (leased line)	expensive								
Transpac (X.25)	moderate			PVC			CVC		
RTC (PSTN)	inexpensive								
RNIS (ISDN)	inexpensive								

Table 2. Utilization Considerations

Traffic	Low Volumes				Important Volume			
Connection Duration	Permanent >3.5H/day		Occasional <3.5H/day		Permanent >3.5H/day		Occasional <3.5H/day	
Distance (Kms)	<30	>30	<30	>30	<30	>30	<30	>30
Classic Leased Line								
Transfix (leased line)								
Transpac (X.25)								
RTC (PSTN)								
RNIS (ISDN)								

Table 3. Technical Considerations

	Rate (Kbps)	Muti-point	Synchron. Asynchr.	Transit duration	Reliability
Classic Leased Line	1.2-19.2	Yes	Both	0	10^{-5}
Transfix (leased line)	48-1920	No	Synchron.	0	10^{-8}
Transpac (X.25)	0.05-48	Yes	Both	200 ms	10^{-8}
RTC (PSTN)	0.3-9.6	No	Both	0	10^{-5}
RNIS (ISDN)	2x64	No	Synchron.	0	10^{-9}

2.5 Interconnection

This section discusses the methods used to interconnect networks of various types. The products used for interconnection are discussed in Chapter 4. For more details, please refer to the *Local Area Network Concepts and Products: Routers and Gateways,* SG24-4755, redbook.

2.5.1 Repeaters, Bridges, Routers, Gateways, and the OSI Model

LAN end nodes attach to a single LAN in an internetworking environment. End nodes are typically general-purpose computing devices, such as host computers, servers, and workstations.

Intermediate nodes connect two or more networks and allow information to be exchanged between them. Intermediate nodes provide the glue that connects individual networks into a network. Four types of intermediate nodes are available. They are:

- Repeaters
- Bridges
- Routers
- Gateways

Each intermediate node implements different levels of the OSI Reference Model, as can be seen in Figure 17.

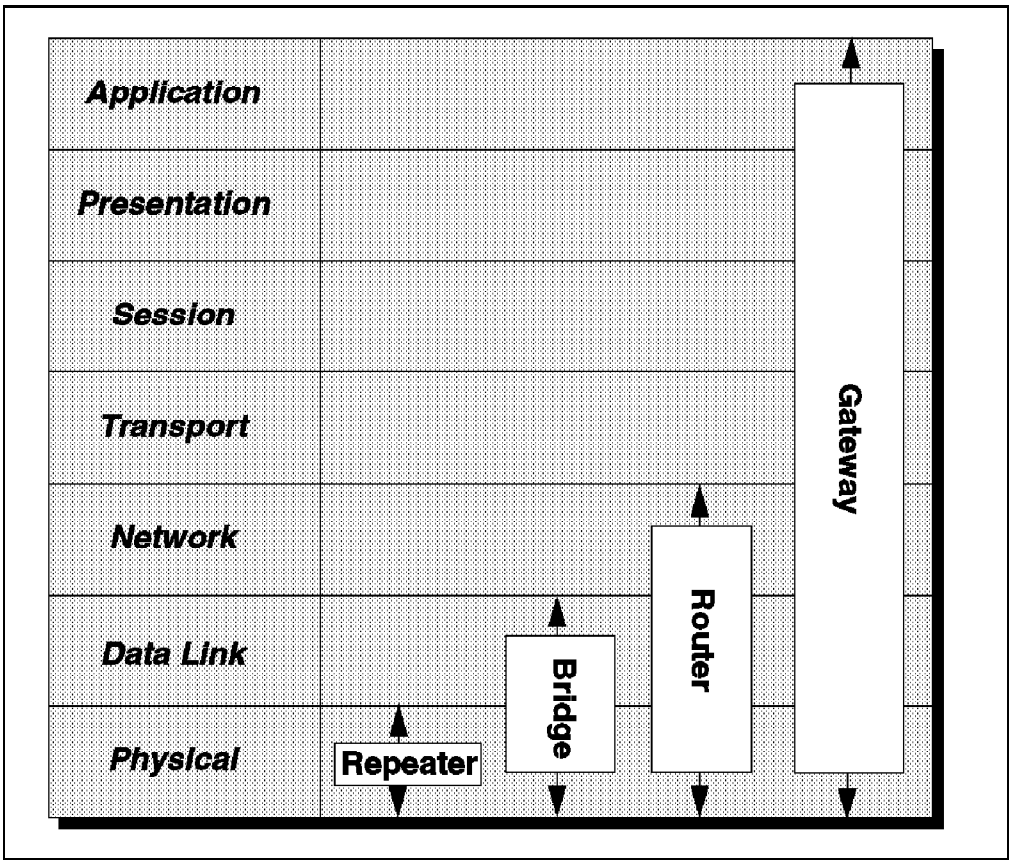


Figure 17. Repeaters, Bridges, Routers, Gateways, and the OSI Model

2.5.2 Repeater

The function of a repeater is to connect two network segments of the same media protocol together (Ethernet-Ethernet, Token-Ring-Token-Ring). A repeater simply repeats the signal it receives from one side to the other, and in so doing restores the signal to original strength.

In a LAN environment, repeaters are used when a segment reaches its physical limitations in providing reliable transmission of data. In a token-ring environment, each adapter functions as a repeater.

Using the OSI model, only the physical layer is involved in repeater function. A repeater is upper-layer-protocol independent. This is shown on Figure 18 as an example of a connection between a workstation and a server.

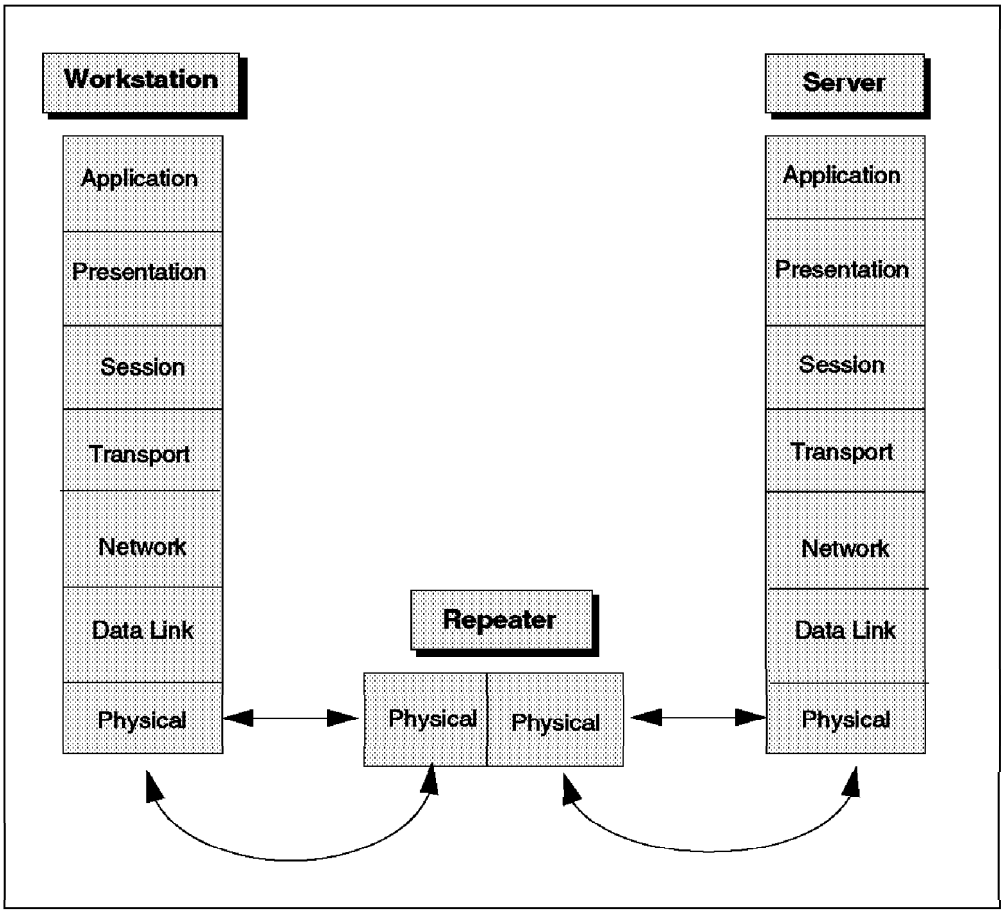


Figure 18. Repeater

2.5.3 Bridge

A bridge is a device that connects two LAN segments together. Using the OSI model, a bridge operates up to the data link layer (layer 2).

A bridge provides all the functions of a repeater, but because it can also read the data link layer information (MAC header/trailer, LLC header), it is able to provide several additional services. It can operate as a filter and pass only the packets that are destined for the other LAN segments. For this, and other reasons, bridges are useful for dividing LANs into segments. An example of a bridge connecting a workstation and a server from different segments is shown in Figure 19.

A bridge may also connect segments of different media protocols together such as Ethernet and token-ring. Examples of the bridges offered by IBM are provided in Chapter 4.

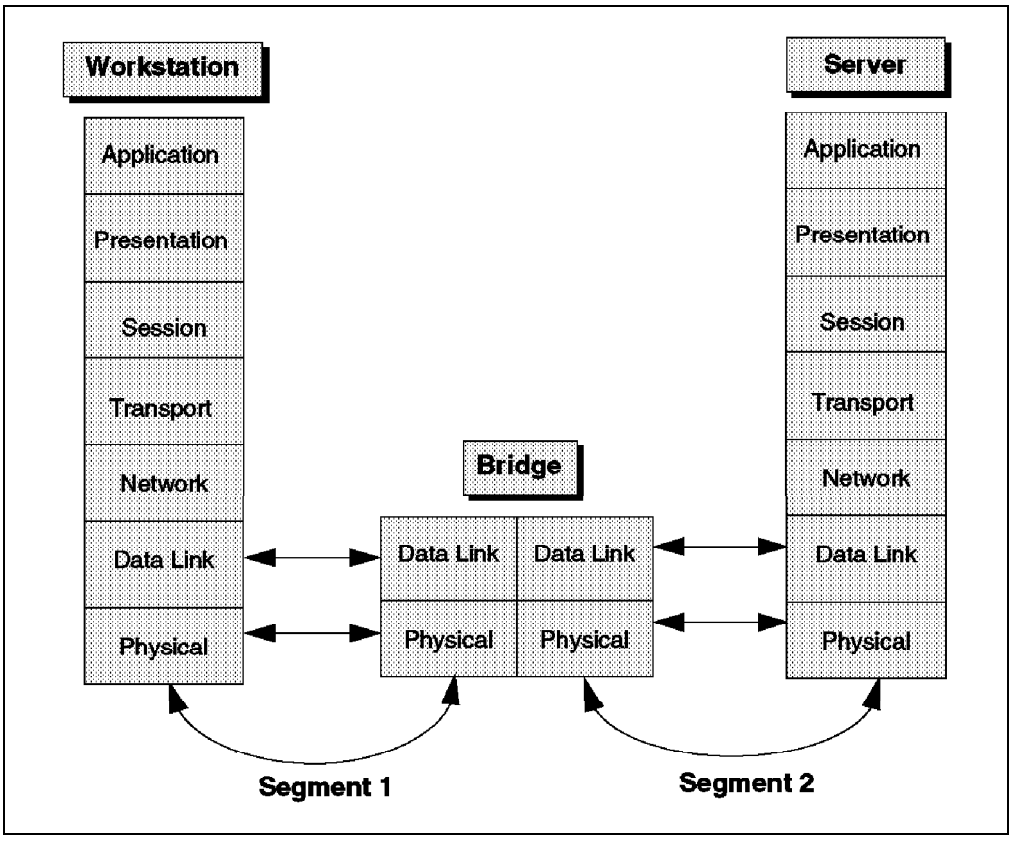


Figure 19. Bridge

2.5.4 Router

A router is able to connect subnetworks together. Using the OSI model, it operates up to the network layer. A router is independent of physical media and physical media protocols. Many routers may be involved in delivering a packet from its source to its destination. A packet may travel from a token-ring network across an Ethernet and an X.25 network before reaching its final destination. This is possible because the router is using the node addresses located in the network layer header.

To be able to route packets, a router must be aware of the network topology. Routers must communicate with each other in order to obtain this information. This router communication is network-protocol dependent.

There are several routers that can route more than one protocol. For example, an AIX server may act as a TCP/IP router and as a NetWare-protocol router. This is only possible because all the different network protocol stacks are implemented. Figure 20 shows an example of an AIX Server working as a router between a workstation and another server residing in different subnetworks.

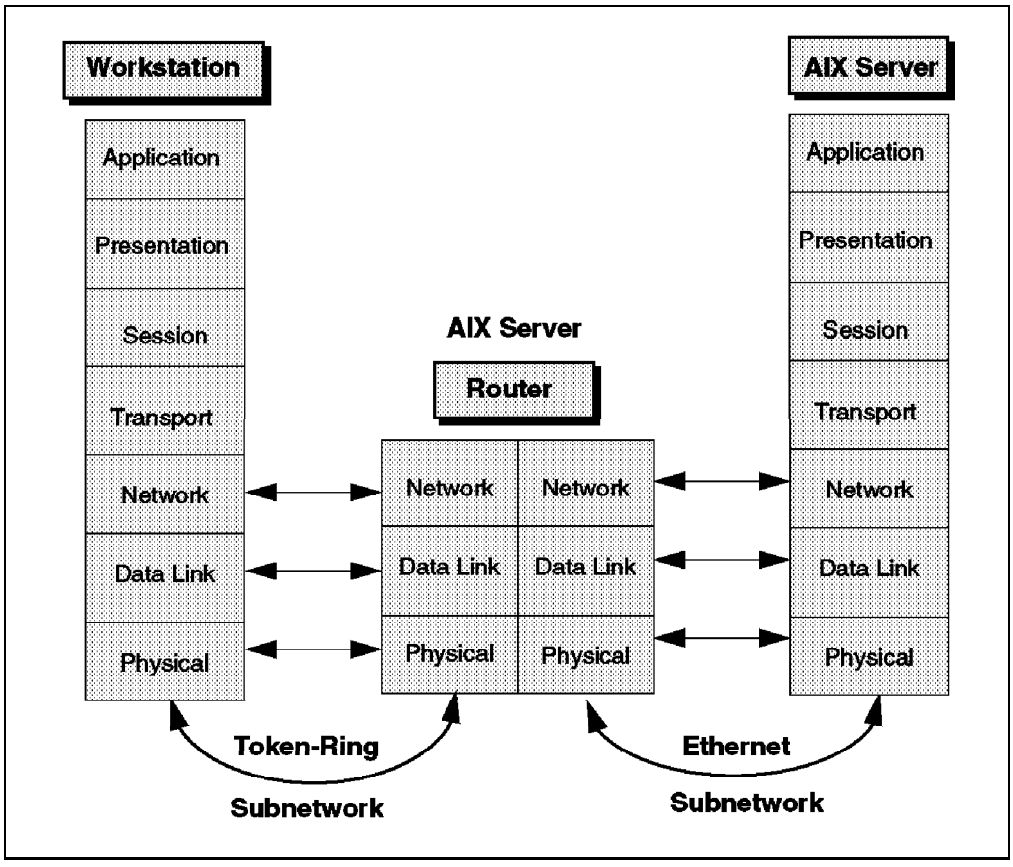


Figure 20. Router

2.5.5 Gateway

The function of a gateway is to connect different networks together. Using the OSI model, all seven layers are involved.

An example of a gateway is the Mail gateway, which connects a mail application in an SNA network together with a mail application in an TCP/IP network. This example is shown in Figure 21.

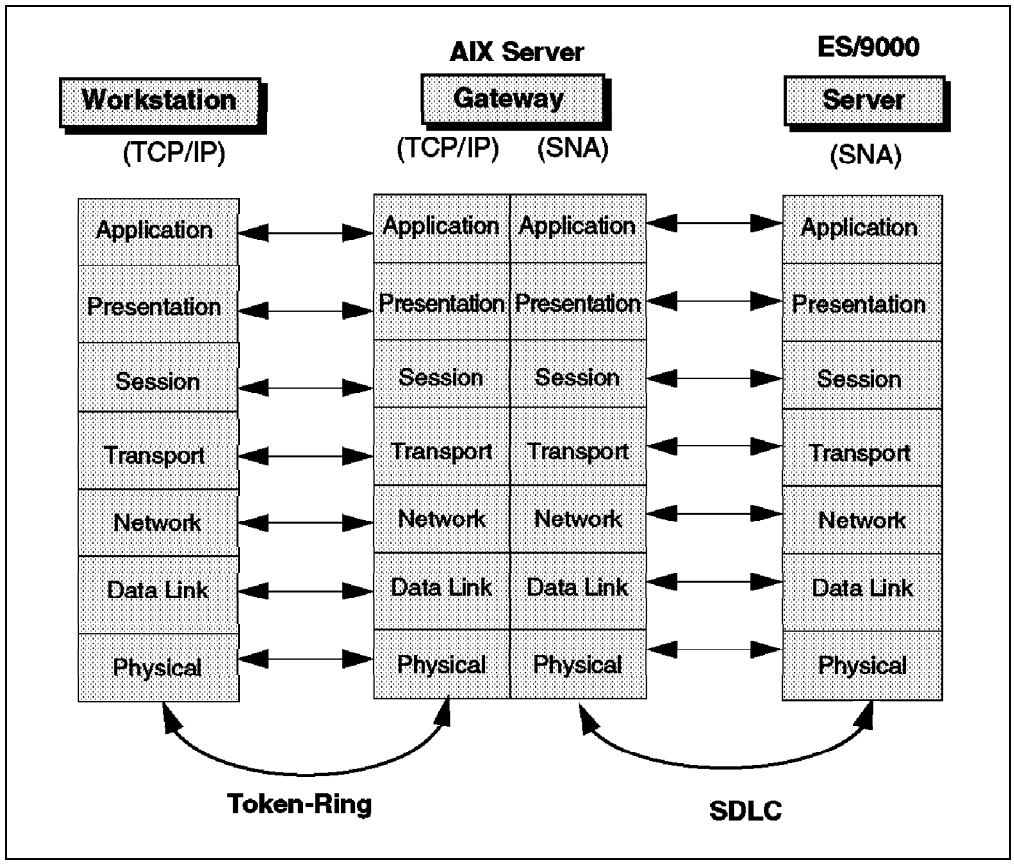


Figure 21. Gateway

2.6 Protocol Suites

The purpose of this section is to present a short description of major protocol suites (or protocol stacks) that make up the network environment. We use the term suite here because every described protocol suite consists of several actual protocols covering different OSI model layers.

Notes

For more details, please refer to the *Local Area Network Concepts and Products: LAN Architecture,* SG24-4753, redbook or to other, related books.

2.6.1 OSI

The OSI protocol suite was developed by International Standards Organization (ISO). It covers all seven layers of the OSI model. Figure 4 offers an overview of the currently available and accepted set of OSI network services as well as the required underlying OSI networking protocols and standards that provide these services. A set of OSI standards is defined for each layer.

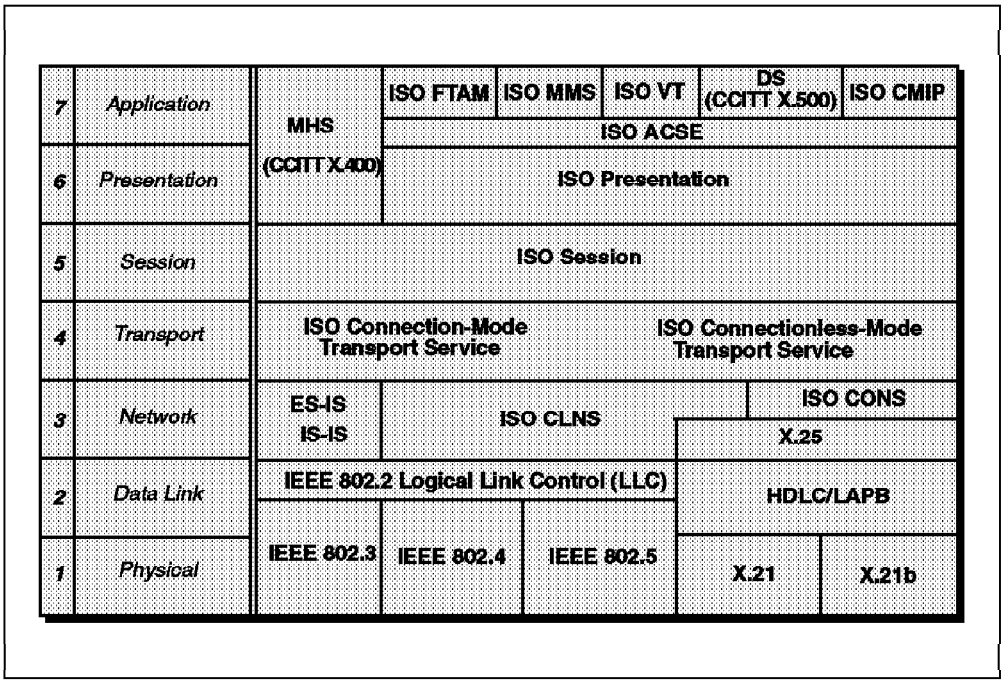


Figure 22. OSI Protocols Architecture

- **Data Link and Physical layers** The OSI protocol suite can use many of the existing standards and protocols of these layers. They are: IEEE 802.2, IEEE 802.3, IEEE 802.4, and IEEE 802.5 (described early in this chapter). X.21and X.21b are the physical layer specifications developed by CCITT. V.24 and V.35 also can be used here. HDLC (High-level Data-Link Control) and LAPB (Link Access Procedure Balanced) are Data Link layer protocols that can be used here to access the X.21 or X.21bis physical environment.
- **Network layer** There are several protocols defined in the OSI protocol suite. ES-IS is End System to Intermediate System protocol, and IS-IS is the Intermediate System to Intermediate System protocol. CONS

(Connection-Oriented Network Service) and CLNS (Connectionless Network Service) are ISO standards for this layer. They can use the IEEE 802.2 Logical Link Control service or X.25 as underlying network services (described earlier in this chapter).

- **Transport layer** The OSI protocol suite offers two standards here: ISO Connection-Mode Transport Service and ISO Connectionless-Mode Transport Service.
- **Session layer** The ISO Session specification represents this layer.
- **Presentation layer** The ISO Presentation specification represents this layer.
- **Application layer** All application layer protocols use common service ACSE (Association Control Service Element). RTSE (Reliable Transfer Service Element) and ROSE (Remote Operations Service Element) also can be used instead of ACSE. MHS (Message Handling System) provides a transport mechanism for e-mail messages or other information; it was derived from the CCITT X.400 specification and uses its own presentation layer service. FTAM (File Transfer, Access, and Management) provides file transfer and access services as follows from its name. MMS (Manufacturing Message Specification) defines an application service used for device-to-device communication. The VT (Virtual Terminal) application layer protocol provides terminal emulation. DS (Directory Services) was defined from CCITT X.500 specification and provides distributed directory services. The CMIP stands for Common Management Information Protocol.

2.6.2 SNA

During the 20 years since its announcement in 1974, IBM's Systems Network Architecture (SNA) has undergone continual improvements. Originally, SNA was hierarchical, but gradually, this model was modified, culminating in 1980 when IBM SNA introduced LU6.2 (peer-to-peer) communications. In 1980, SNA was enriched by the Advanced Peer-to-Peer Networking (APPN) function. SNA is also a seven-layered architecture. Basic functions of each of the seven layers are very similar to the OSI specifications. These layers are:

- **Physical (layer 1)**
- **Data Link Control (layer 2)**
- **Path Control (layer 3)**
- **Transmission Control (layer 4)**
- **Date Flow Control (layer 5)**
- **Presentation Services (layer 6)**
- **Transaction Services (layer 7)** or Application Services

Although SNA has been considered proprietary, it is still the most popular and heavily used networking scheme. Today, its emphasis is on program-to-program communications and peer-to-peer-oriented control and interaction.

2.6.3 TCP/IP

TCP/IP is a networking protocol suite with a large community of users and over 400 supporting vendors. It is a big family of many protocols. It is used in very large networks, including the Internet. It is built into UNIX and is available for most other operating systems.

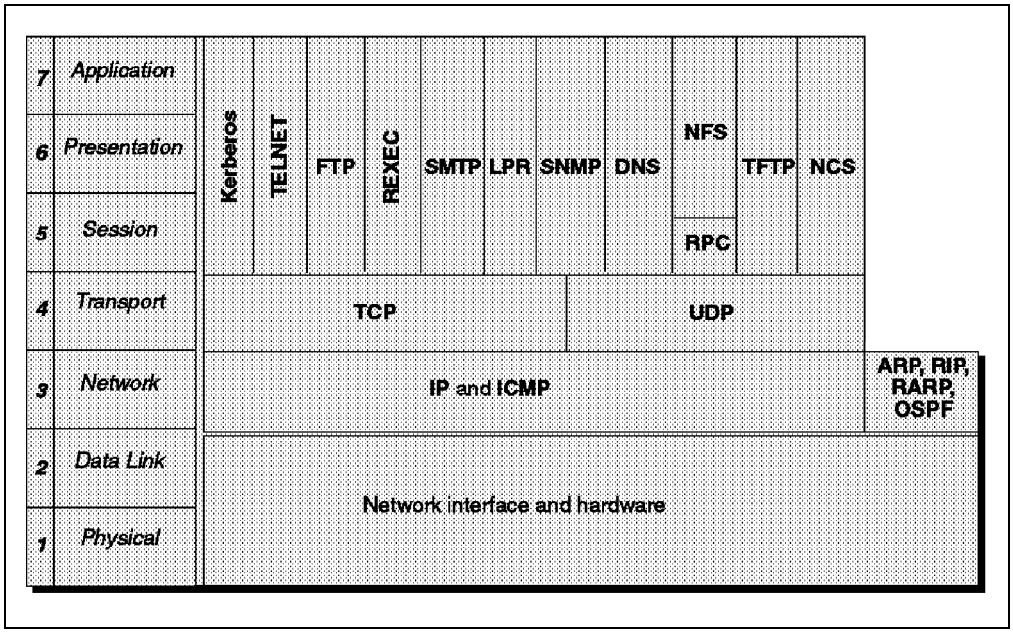


Figure 23. TCP/IP Protocols Architecture

The TCP/IP protocol suite defines several functional layers closely related to the OSI model layers, as shown in Figure 22. They are:

- **Network Interface and Hardware**—Network Interface is the interface to the actual network hardware. In fact, TCP/IP does not specify any protocol here, but can use almost any network interface available (for example, IEEE 802.3 Ethernet, IEEE 802.5 Token-Ring, and X.25), which illustrates the flexibility of the Internetwork layer.
- **Internetwork**—This layer shields the higher levels from the network architecture below it. The protocols of this layer are:
  - *Internet Protocol* (IP) is the most important protocol of this group. It is an unreliable, best-effort, connectionless, packet-delivery protocol that moves data between the intermediate nodes, referred to as routers.
  - *Internet Control Message Protocol* (ICMP) is the protocol used to report errors and control messages at the IP layer. Although ICMP uses IP as if it were a higher level protocol, it is actually part of the IP protocol.
  - *Address Resolution Protocol* (ARP) is used to dynamically map Internet addresses to physical (hardware) addresses.
  - *Reverse Address Resolution Protocol* (RARP) is used by a diskless host to find its Internet address.
  - *Open Short Path First* (OSFP) is a proposed standard routing protocol.
  - *Routing Information Protocol* (RIP) is today's most widely used routing protocol.

- **Transport**—Transport provides the end-to-end data transfer. The two protocols at this layer are:
  - *Transmission Control Protocol* (TCP), the end-to-end reliable connection-oriented protocol. It also implements some functions of the Session layer of the OSI model.
  - *User Datagram Protocol* (UDP) is connectionless and adds no reliability or flow control to IP.
- **Application**—Protocols of this layer cover functionality of three upper layers of the OSI model: Session (some functions are implemented in TCP protocol), Presentation, and Application. Some of them are based on TCP, and some others are based on UDP, as shown in Figure 22. They are:
  - *Kerberos* is the authentication mechanism for network security.
  - *Telnet* is the terminal emulation protocol.
  - FTP is the *File Transfer Protoco*l.
  - REXEC is the *Remote Execution Protocol*.
  - SMTP is the *Simple Mail Transfer Protocol*.
  - LPR, *Line Printer Remote*, is a remote print server protocol.
  - SNMP is the *Simple Network Management Protocol*.
  - (DNS)*, Domain Name System*, is a name resolution protocol.
  - NFS, *Network File System,* and its underlying service - *Remote Procedure Call* (RPC)
  - TFTP is the *Trivial File Transfer Protocol*.
  - NCS, *Network Computing System*, is a distributed computer environment.

2.6.4 Novell's Network Protocol (IPX/SPX)

Novell's Network Protocol suite (IPX/SPX) is an implementation of Xerox's Internetwork Datagram Packet (IDP) protocol. IPX/SPX allows applications running on DOS, Windows, or OS/2 workstations to access the NetWare network drivers and communicate directly with workstations, servers, or other devices.

Novell's network protocol suite (IPX/SPX) uses a variety of peer protocols to communicate between workstations and file servers (for example, Novell's NetWare file server and AIX Connections file server). Figure 23 illustrates the Novell's NetWare protocol stack, as an example of an IPX/SPX implementation. There is no direct correlation between the OSI protocol stack and the NetWare protocol stack.

The protocols are the following:

- *Internetwork Packet Exchange* (IPX) is the Network layer protocol.
- *Sequenced Packet Exchange* (SPX/SPX II) is the Transport layer protocol.
- *NetWare Core Protocol* (NCP/Burst Mode) encapsulates the Transport-, Session-, and Presentation-layer functions of the OSI model.
- *Service Advertising Protocol* (SAP) allows service-providing nodes to advertise their services and addresses.
- *Routing Information Protocol* (RIP) is the routing protocol.

- *NetWare Link Services Protocol* (NLSP) performs functions of the SAP and RIP protocols.

To give applications that use NetBIOS the ability to use IPX as a network protocol, Novell has also implemented a NetBIOS emulator (more about NetBIOS protocol is in the next section). Two additional protocols used for internal maintenance are the Echo and Error protocol.

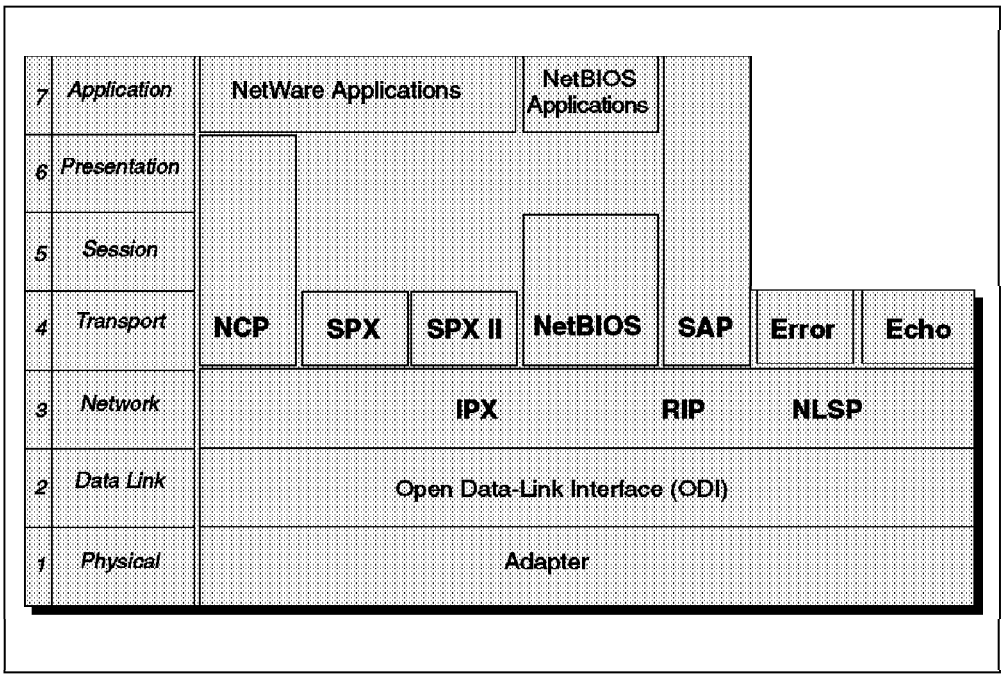


Figure 24. Novell's NetWare Protocol Stack

2.6.5 NetBIOS

When IBM developed its PC Network and NetBIOS (Network Basic Input/Output System) was introduced, there were no LAN protocol standards available in the LAN networking environment. NetBIOS has become a defacto standard for the LAN application interface. Most networking vendors have implemented the specification given by IBM that allows almost any application written to the NetBIOS interface to operate in any environment.

A common problem with the NetBIOS specification, however, is that it only deals with the upper layer functions of the interface. It does not specify what communications protocol should be used underneath it. As a result, almost every networking vendor has written NetBIOS on top of their own proprietary communications protocol, which cannot communicate with other vendors' protocols (for example, Novell NetWare implementation or IBM LAN Server implementation). But NetBIOS applications are easily ported from one system to another (for example, from the PC to a powerful workstation).

2.6.6 AppleTalk

The AppleTalk network protocol is used to connect Apple Macintosh computers together to form a local area network. AppleTalk is a proprietary protocol stack designed and developed by Apple Computer, Inc. There are two release of AppleTalk protocol suite. AppleTalk Phase 1 and AppleTalk Phase 2. Phase 2 is the new release of AppleTalk. Figure 24 illustrates the AppleTalk protocol stack, which is a layered suite of protocols that easily fit into the OSI Reference Model.

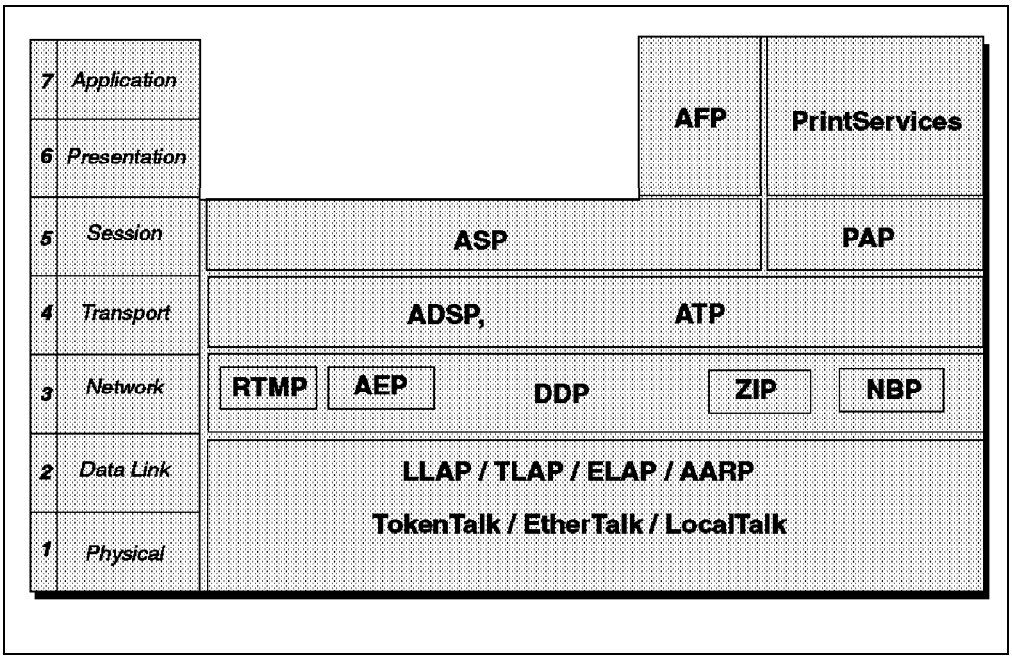


Figure 25. AppleTalk Protocol Stack

These protocols are:

- **Data Link and Physical layers** —Standard network hardware, such as Ethernet (here called EtherTalk) and Token-Ring (here called TokenTalk), can be used with AppleTalk. LocalTalk is Apple's own network hardware, and it uses a synchronous RS-422A bus for communications. Corresponding Data Link protocols are LocalTalk Link Access Protocol (LLAP), TokenTalk Link Access Protocol (TLAP), EtherTalk Link Access Protocol (ELAP), and AppleTalk Address Resolution Protocol (AARP).
- **Network layer**—Datagram Delivery Protocol (DDP) represents this layer. Other protocols are Name Binding Protocol (NBP), Zone Information Protocol (ZIP), Routing Table Maintenance Protocol (RTMP), and AppleTalk Echo Protocol (AEP).
- **Transport layer**—AppleTalk Transaction Protocol (ATP) and AppleTalk Data Stream Protocol (ADSP) are major transport protocols.
- **Session layer**—AppleTalk Session Protocol (ASP) and Printer Access Protocol (PAP) are session layer protocols.
- **Presentation layer**—The ISO Presentation specification represents this layer.
- **Application and Presentation layer**—AppleTalk Filing Protocol (AFP) and Print Services implement functions of these layers.

2.6.7 DECnet

Digital Network Architecture (DNA) was developed by Digital Equipment Corporation in the early 1970, and the DNA specification was published at about the same time that IBM announced SNA. In 1991, Digital introduced the last release of DECnet, Phase V, which integrates OSI and DECnet products and allows them to coexist and interoperate with TCP/IP. Here are key points of Phase V:

- Developed DECnet/OSI products from 1987-1991
- Is available on VMS and ULTRIX operating systems
- Incorporates the ISO standards into DECnet
- Support millions of interconnected nodes, which is an enhancement over DNA Phase IV
- Introduces many networking enhancements, which include: Link state route and Enterprise Management Architecture (EMA) for network management

2.7 IBM Open Blueprint and MPTN

This section discusses the IBM Open Blueprint and the Multiprotocol Transport Network.

2.7.1 Introduction

With the growth of networking in general and local area networking in particular, it is not uncommon to see configurations with many different networks using four or five different protocols, such as TCP/IP, NetBIOS, SNA, IPX/SPX, or AppleTalk. One of the problems in these environments is interoperability, since applications that run on one network often do not run with applications on other networks. Besides interoperability, applications need to be transport independent because of the increased use of single-protocol endpoints and migration to new transport networks.

The IBM Open Blueprint (or Networking Blueprint) addresses these problems by structuring applications' interfaces and support protocols, transport network, and subnetworking layers.

2.7.2 Multiprotocol Transport Network (MPTN)

The Multiprotocol Transport Network (MPTN) is a solution framed within the blueprint. It defines an interface to a set of transport services that concatenate connections across multiple networking protocols. In addition to logical connections across heterogeneous networks, MPTN separates applications from networks by providing a common transport interface so that messages from the application can be transported over any protocol under the interface.

In order to build a multiprotocol network, several functions are needed:

- Function Compensation

  The function compensation bridges the gap between the needs of the transport user and the services provided by the underlying transport provider.

- Address Mapping

This MPTN transport function allows transport users to continue to use accustomed transport address formats, even if a transport provider uses a different address format (for example, mapping an SNA LU name to a TCP/IP address).

- Transport Gateways

  The MPTN transport gateway allows two different transport networks to be concatenated so they appear to the user as one logical network.

2.7.3 MPTN Implementations

IBM has a different implementation of the MPTN architecture. Products differ in what protocols they support.

- **AnyNet**—The AnyNet product family is IBM's implementation of the MPTN architecture. AnyNet products benefit users of mainframes and workstations (for example, PS, RS/6000) on interconnected LANs and WANs by accommodating a variety of combinations of application programs and transport networks.
- **Multiprotocol Transport Service (MPTS)**—Another example for an MPTN implementation is Socket/MPTS (Multiprotocol Transport Service) that comes with the IBM OS/2 LAN Server 4.0 and Requester. Socket/MPTS supports TCP/IP and NetBIOS protocols, but does not include the MPTN gateways.

Chapter 3. Communication Services: Definition

This chapter provides a description of common services used in a communication environment. These descriptions will help you to understand solution needs in terms of communication needs.

These concepts are general. You can use them with any platform.

The position of this chapter in the whole process of designing communication solution is shown in the following figure.

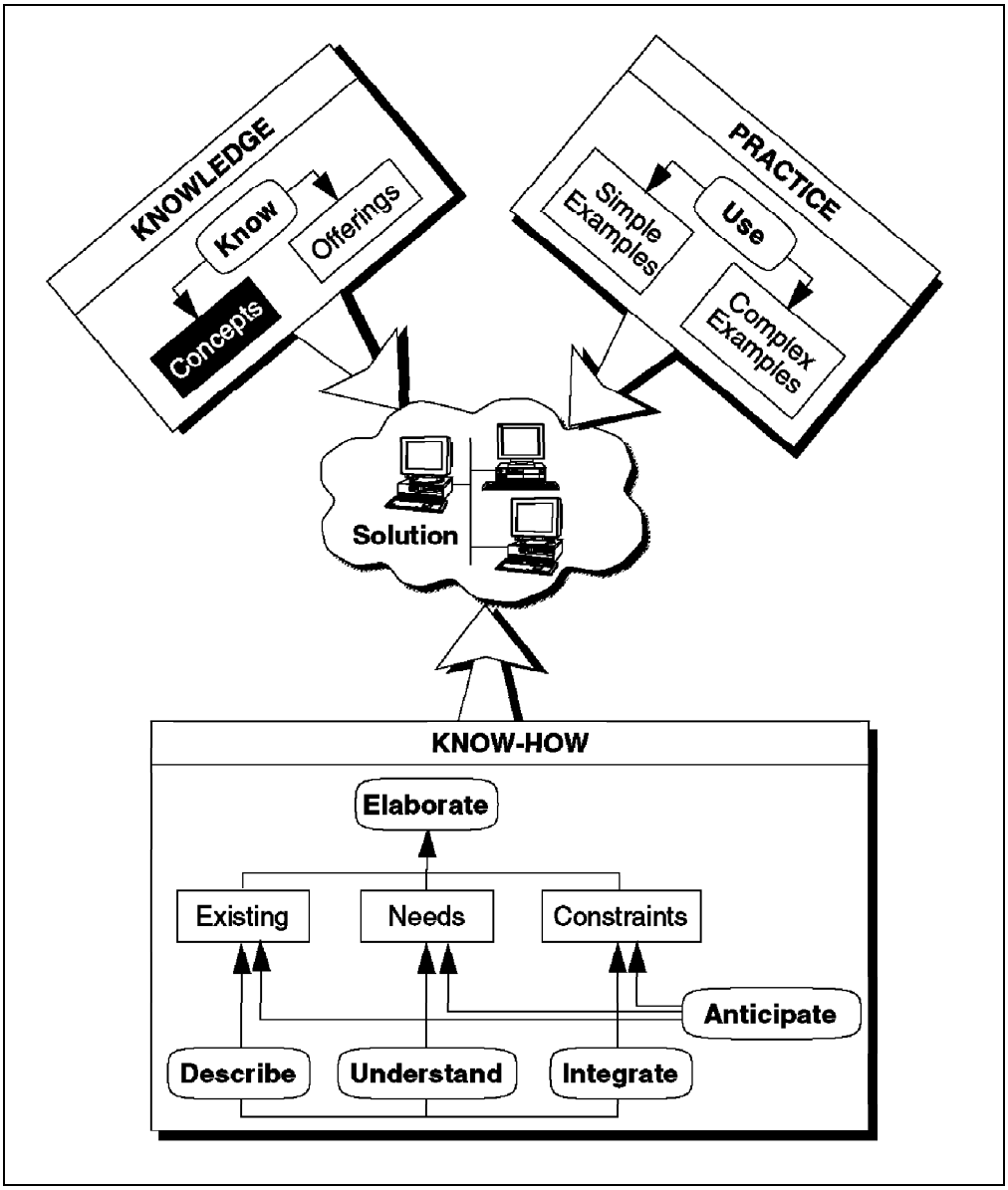


Figure 26. Position of Chapter 3 in Solution Design

3.1 Introduction

In a computing environment, the client/server concept is used very often. Most of the applications are based on this concept. To access a service:

- The client talks to the server
- The server responds to the client

That's why we talk about *"client/server"* applications.

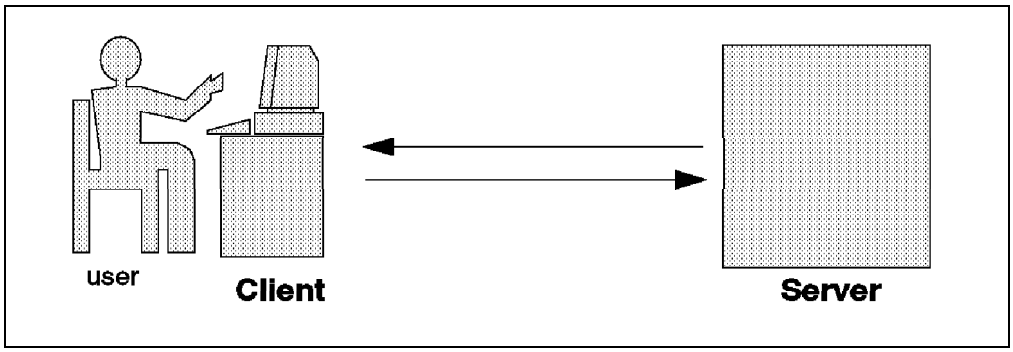


Figure 27. Client/Server Principles: User's Point of View

A computer can serve as:

- Client only
- Server only
- Client and Server

On a computer, we can find:

- One or more client applications
- One or more server applications
- A mix of client and server applications

One type of client can only talk to a similar type of server, and this type of server can also only talk to a similar type of client.

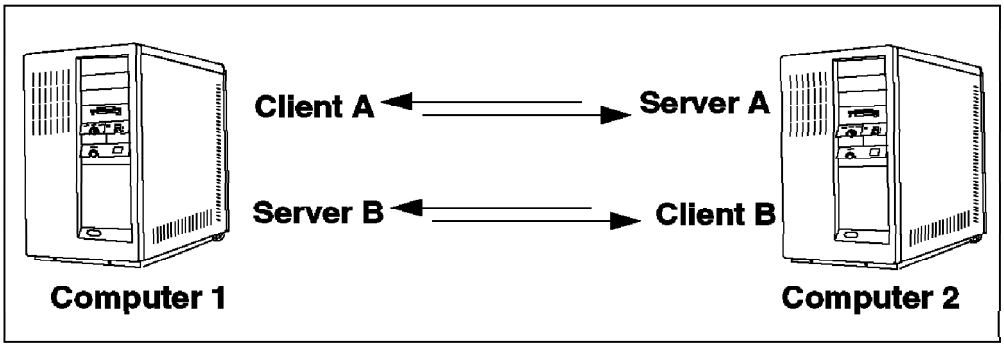


Figure 28. Client/Server Principles: Computer's Point of View

In a communication environment, a *service* (terminal emulation, file transfer,...) is provided by an *application* (Telnet, e789, FTP,...) included or not included in the *communication product*. This communication product is based on a *protocol* (TCP/IP, SNA,...).

Actually, to call a service between two computers, you need:

- A network (physical infrastructure)
- Two adapters (to connect each computer to the network)
- Two drivers (most of the time included in the operating system)
- Two communication product packages (implementation of a protocol)
- Extensions of each product package, if necessary, to dispose applications chosen

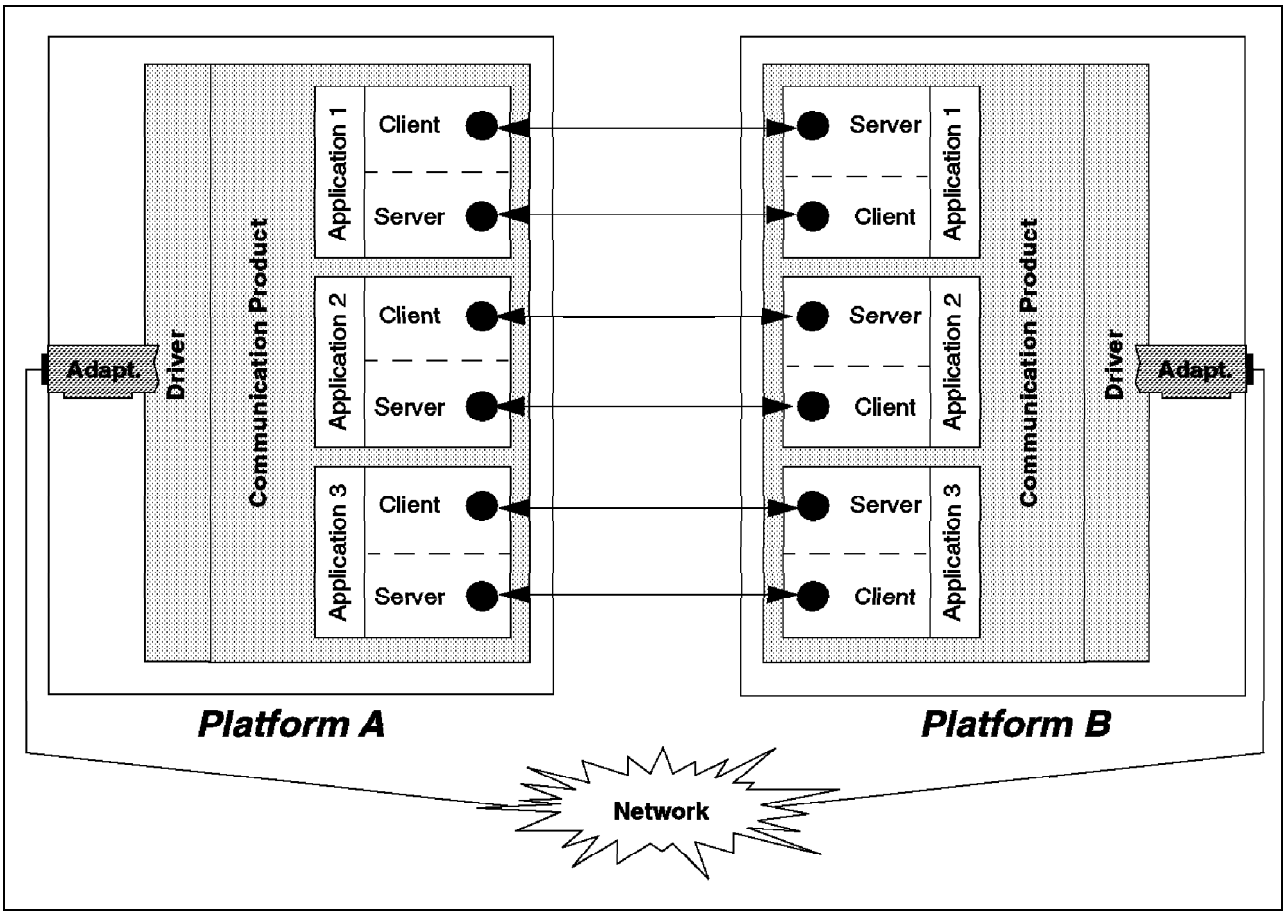


Figure 29. A Full, Generic Client/Server Communication Environment

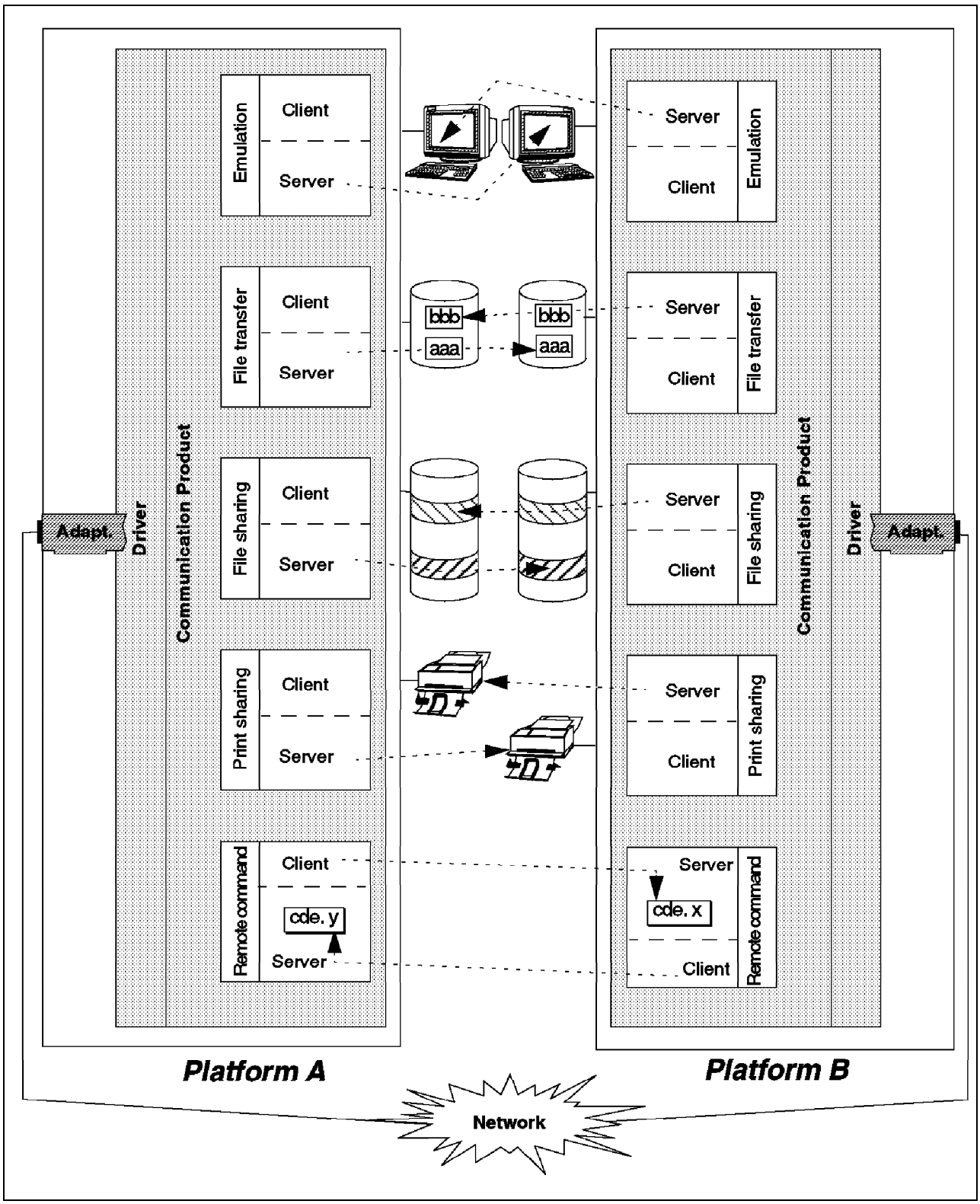


Figure 30. A Real, Symmetric Sample of a Client/Server Communication Environment

3.2 Terminal Emulation

Terminal emulation is the most simple application used when two computers are connected together.

User A (logged on the computer A) wants to connect on the computer B, that means he wants to use his/her terminal as if he/she was connected to the computer B. To accomplish this, he/she has to call a service provided in the communication product A, a service called “terminal emulation”.

1. The *Client emulation* program A talks to the *Server emulation* program B.
2. The Server emulation program B responds to the Client emulation program A.
3. Finally, Server emulation program B displays a logon connection or a shell environment on terminal A.

   In the opposite situation, a user connected to the computer B can access to the computer A.
4. The Client emulation program B talks to the Server emulation program A.
5. The Server emulation program A responds to the Client emulation program B.
6. Finally, Server emulation program A displays a logon connection or a shell environment on terminal B.

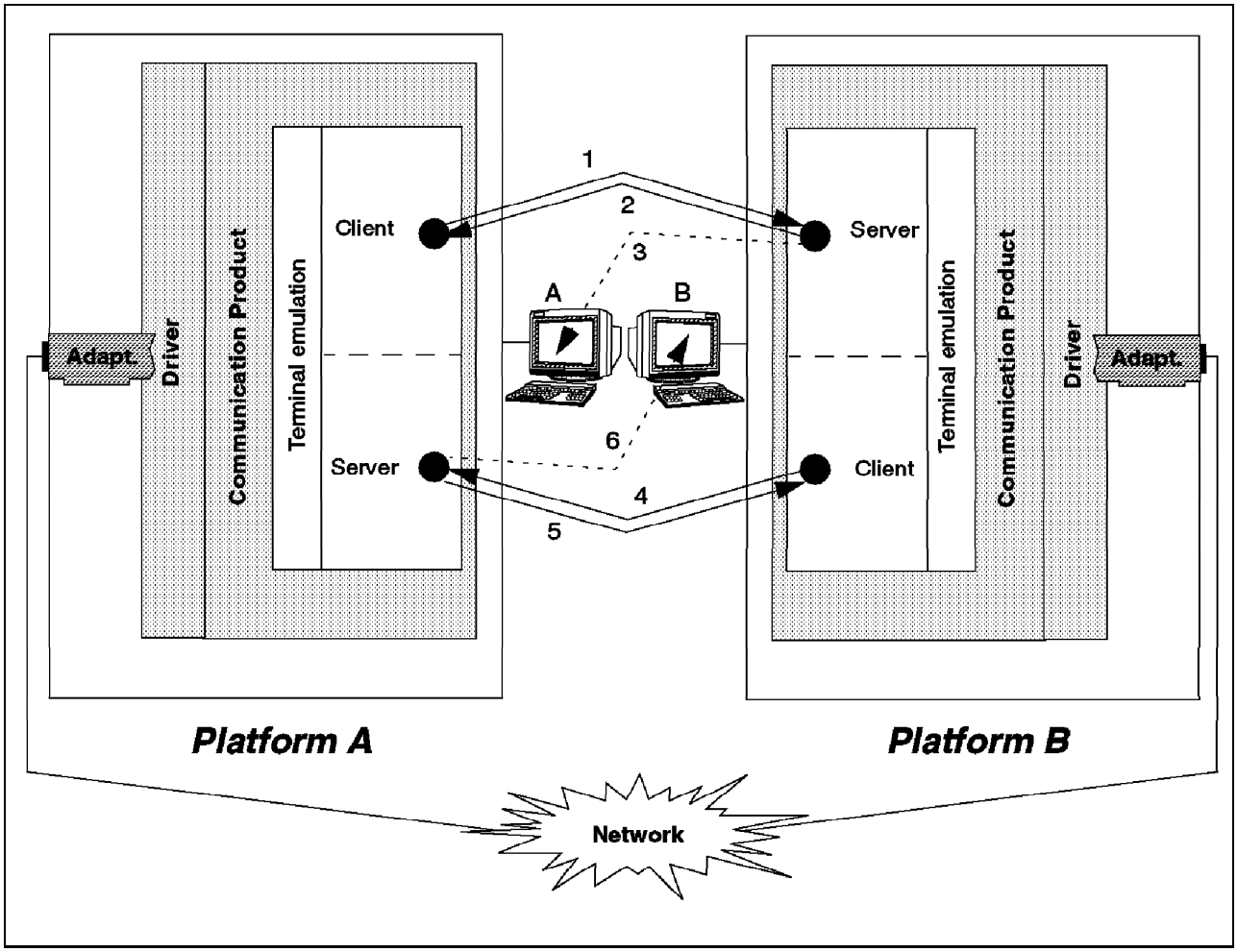


Figure 31. Emulation: How Does It Work?

3.3 File Transfer

File transfer is a common application used when two computers are connected.

User A wants to transfer files from computer B to computer A; that means he/she wants to copy files from computer B's disk to computer A's disk. To do this, he/she has to call a service called "file transfer" from communication product A.

1. The *Client file transfer* program A asks for a file from the *Server file transfe***r** program B.
2. The Server file transfer program B sends the file to the Client file transfer program A.
3. Finally, Client A writes data on its local disk.

   User B wants to transfer files from computer A to computer B; that means he wants to copy files from computer A's disk to computer B's disk. To do this, he/she has to call a service called "file transfer" from communication product B.
4. The Client file transfer program B asks for a file from the Server file transfer program A.

5. The Server file transfer program A sends the file to the Client file transfer program B.
6. Finally, Client B writes data on its local disk.

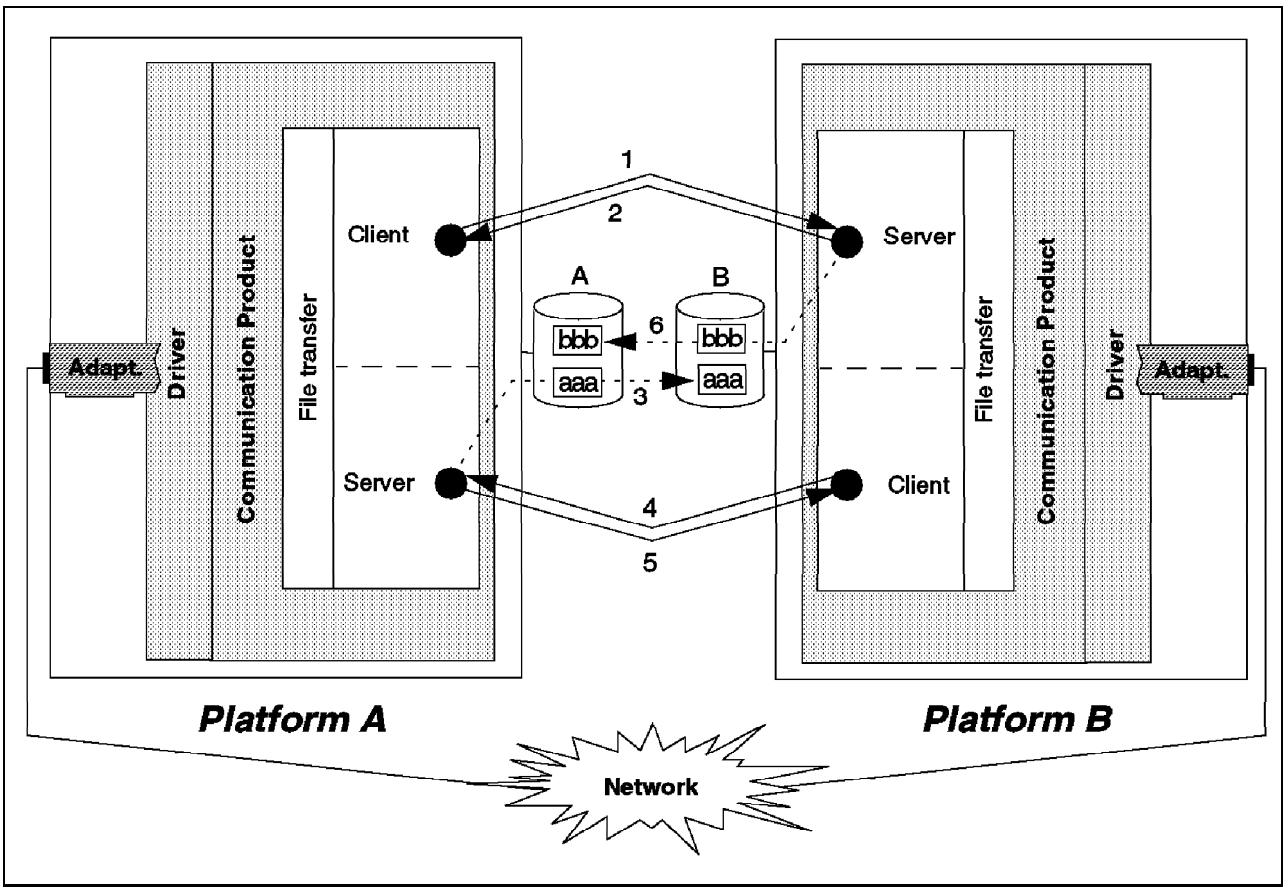


Figure 32. File Transfer: How Does It Work?

3.4 File Sharing

File transfer is the first step before file sharing. When user A wants to access continuously computer B's files; that means he/she wants to see on his/her disk a partition (virtual disk) where computer B's files can be found. These files can be data or application files. To do this, he/she has to call a service called "file sharing" from communication product A.

1. The *Client file sharing* program A asks access to the *Server file sharing* program B.
2. The Server file sharing program B qualifies the Client file sharing program A.
3. Finally, the Server file sharing program B authorizes access of one part of its disk to computer A. Actually, user A can access these files as local files.

   Conversely, if user B wants to access continuously computer A's files, he/she has to call a service called "file sharing" from communication product B.
4. The Client file sharing program B asks access to the Server file sharing program A.

5. The Server file sharing program A qualifies the Client file sharing program B.
6. Finally, the Server file sharing program A authorize access of one part of its disk to computer B. Actually, user B can access these files as local files.

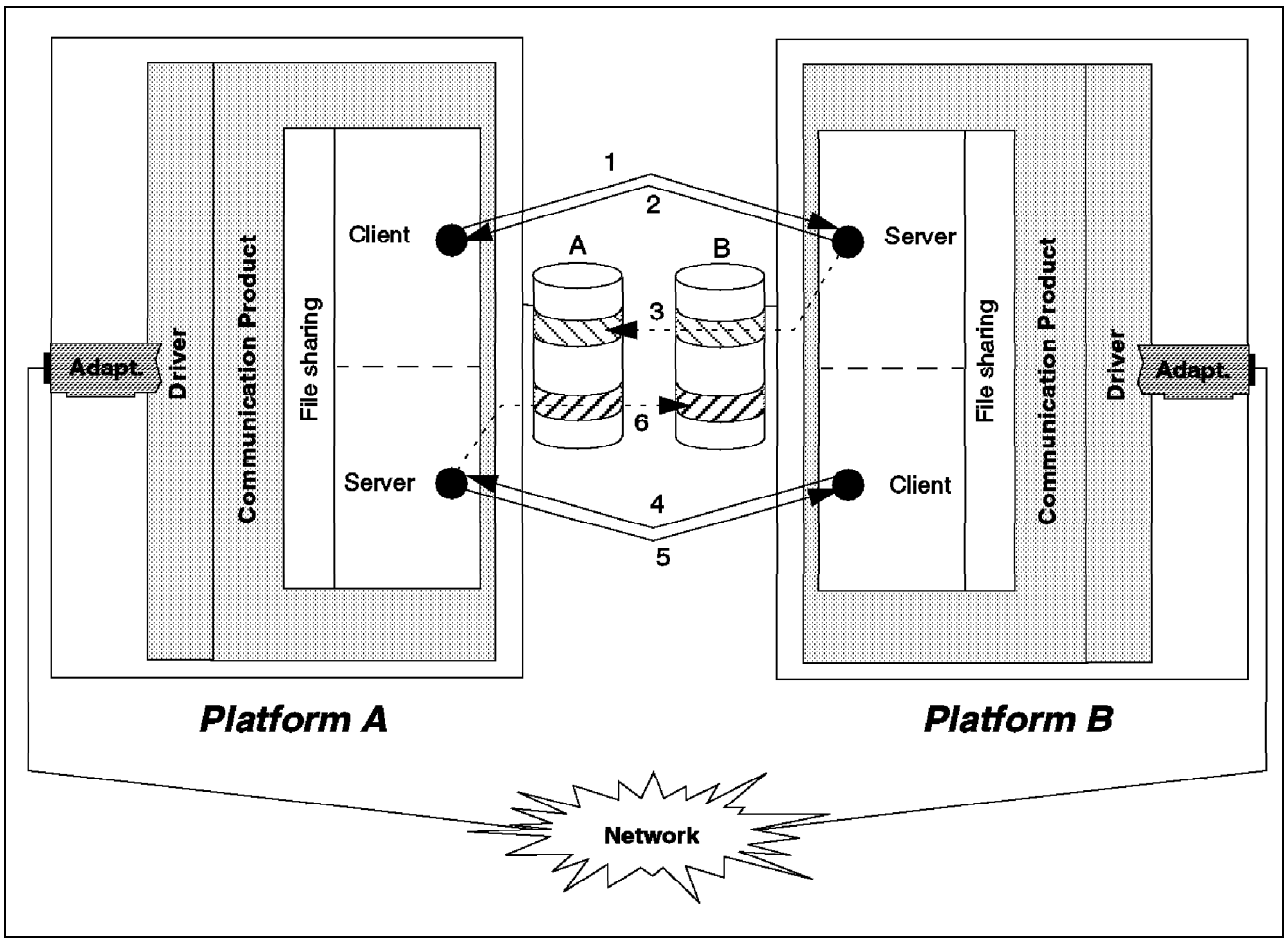


Figure 33. File Sharing: How Does it Work?

3.5 Print Sharing

Print sharing is the most popular client/server application. User A wants to call printer B; that means application A has to print on printer B as if it was printer A. To do this, the user has to call a service called “print sharing” from communication product A.

1. The *Client print sharing* program A asks access to the *Server print-sharing* program B.
2. The Server print-sharing program B qualifies the Client print-sharing program A.
3. Finally, the Server print-sharing program B will print on printer B what application A asked from the Client print-sharing program A.

   Conversely, if user B wants to call printer A, he/she has to call a service called “print sharing” from communication product B.
4. The Client print-sharing program B asks access to the Server print-sharing program A.

5. The Server print-sharing program A qualifies the Client print-sharing program B.
6. Finally, the Server print-sharing program A will print on printer A what application B asked from Client print-sharing program B.

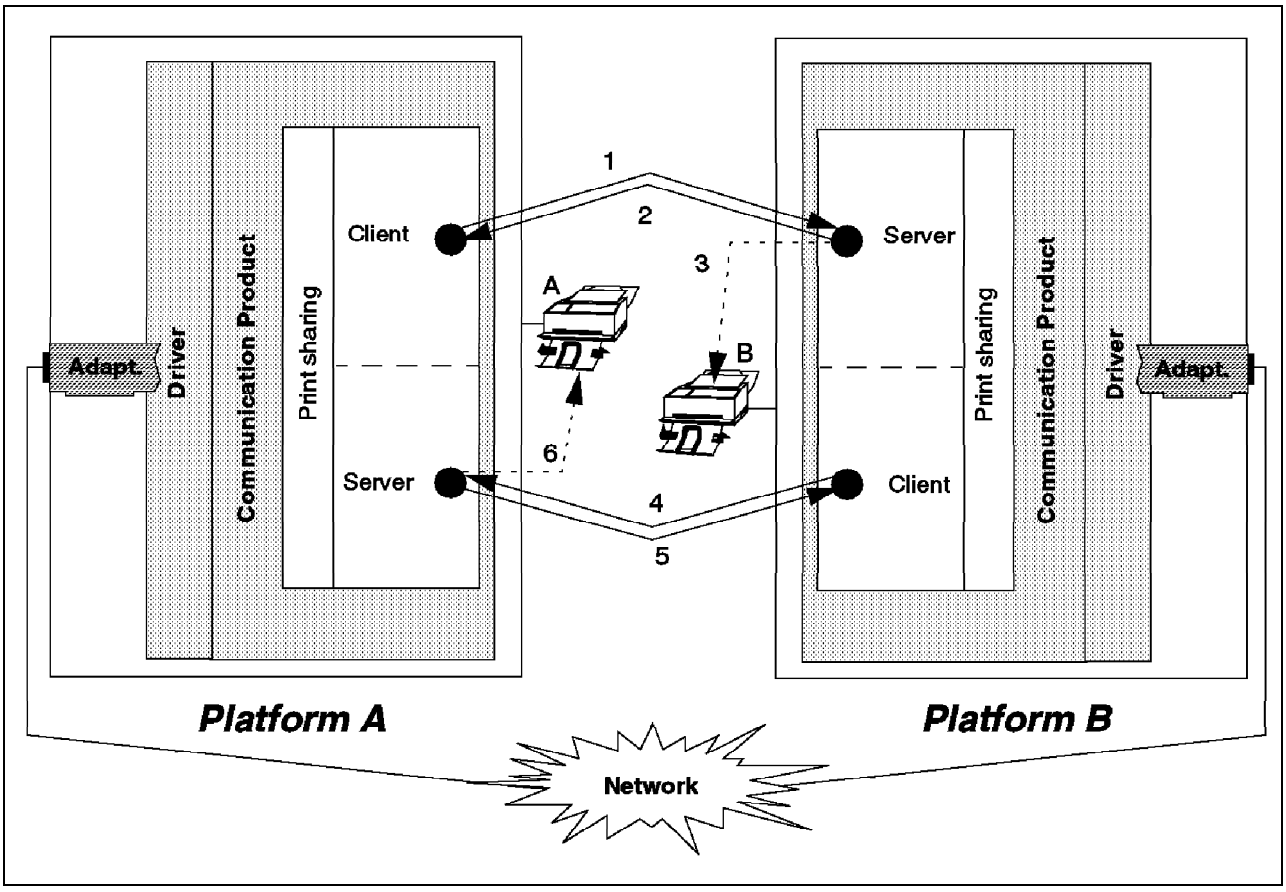


Figure 34. Print Sharing: How Does It Work?

3.6 Remote Command

The Remote command service is also used when two computers are connected.

User A wants to execute a remote command; that means he/she wants execute a command on computer B from his/her computer A. To do this, he/she has to call a service called “remote command” from communication product A.

1. The *Client remote command* program A asks access to the *Server remote command* program B.
2. The Server remote command program B qualifies the Client remote command program A.
3. Finally, the Server remote command program B executes the command (cde. x) on computer B. The result can be stored (file) or displayed on terminal A.

   Conversely, if user B wants to execute a command on computer A, he/she has to call a service called “remote command” from communication product B.

4. The Client remote command program B asks access to the Server remote command program A.
5. The Server remote command program A qualifies the Client remote command program B.
6. Finally, the Server remote command program A execute the command (cde. y) on computer A. The result can be stored (file) or displayed on terminal B.

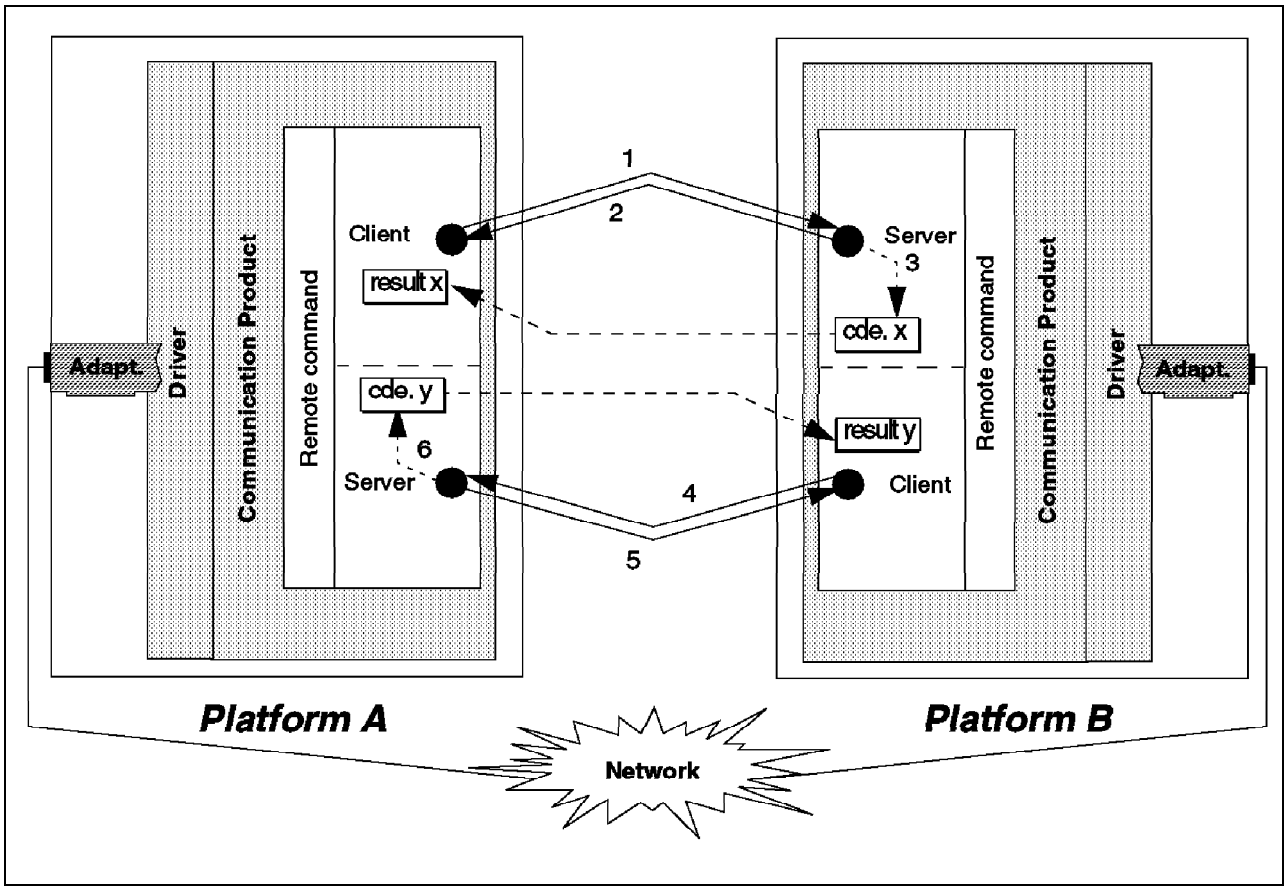


Figure 35. Remote Command: How Does It Work?

3.7 Other Services

This section discusses other services that work in conjunction with networks.

3.7.1 Mail

Electronic mail is widely used nowadays. It's cheaper than "paper mail" and it's very efficient. In fact, you have a mailbox, and you are identified by an address. Others can send you a message (or a file with pictures, data, or sound). You can read when you have the time, wherever you are. Electronic mail is also a client/server application.

3.7.2 Security

Security services are used when you want to secure a transmission. When you want to transfer important files or private data or when you want to buy something using a credit card on the Internet, you will use secure network services. Security is also a client/server application.

3.7.3 Graphic

When you use a graphic application, you can split the application's kernel and application's display. Some services, such as X-Windows, will provide you this ability. The server (where application is displayed) talks to the client (where application is running). In this case, the *client* and *server* are used oppositely from their usual meaning.

3.8 Application Programming Interfaces

If you want to develop your own application, divided into two parts (client and server), you will use an API (Application Programming Interface) to communicate between the client and server.

APIs allow you to develop applications by using function calls (or interface) provided by communications-enabler programs (for example, use communication services, and transport services to write your own communications applications).

Chapter 4. Networking Hardware Offerings

This chapter provides a brief description of all the equipment you need in order to build the network: hubs, bridges, routers, switches, and so forth. At the beginning of this chapter, tables describe characteristics of almost all IBM network products.

The Internet can help you

You can find more information on the WWW at this address:

`http://www.raleigh.ibm.com`

The position of this chapter in the whole process of designing a communication solution is shown on the following figure.

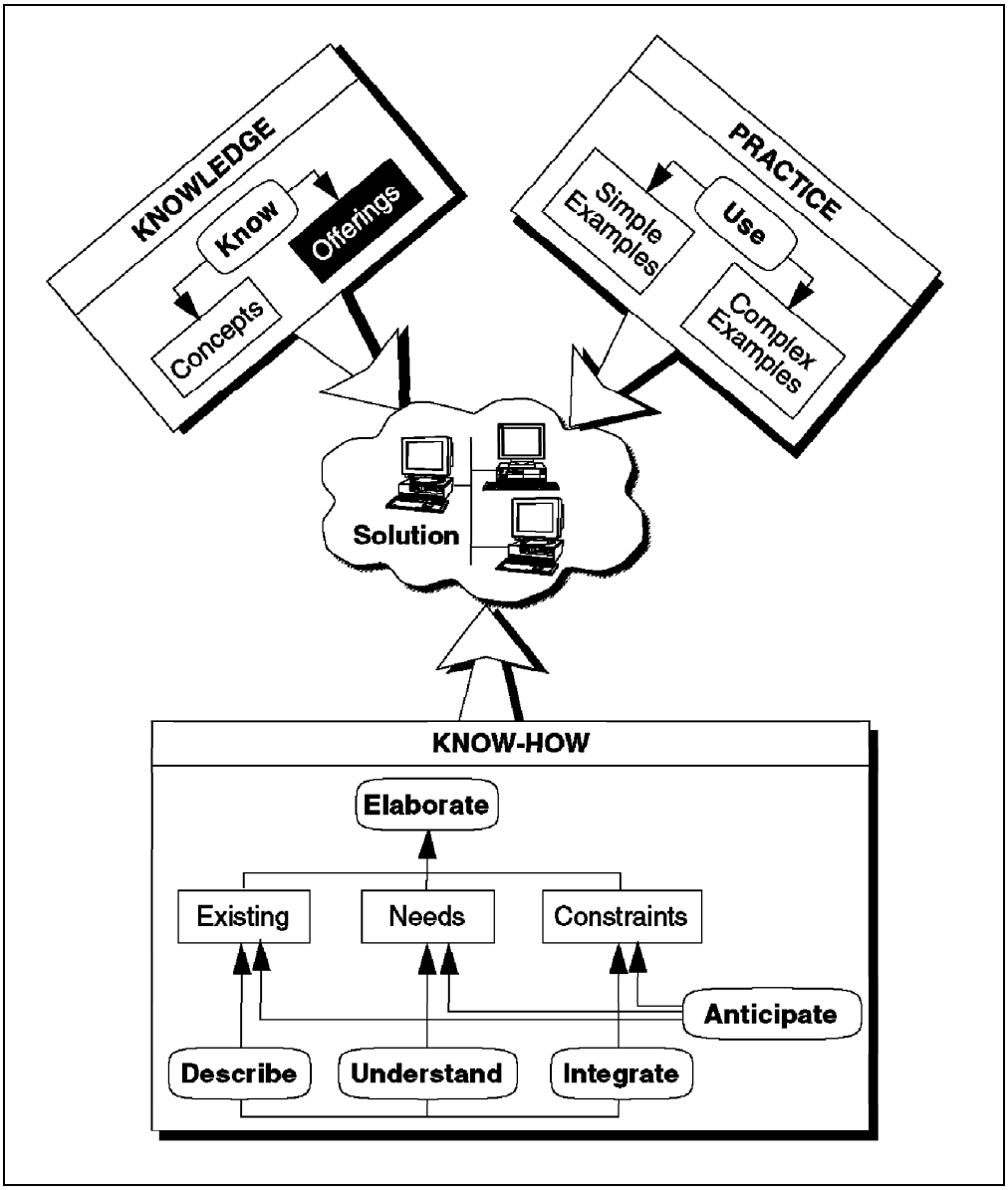


Figure 36. Position of Chapter 4 in Solution Design

4.1 Overview

These tables give you a brief technical comparison of hubs, concentrators, switches, remote LAN-access server, bridges, routers, Serial Communication Network server and LAN connections for printers.

Table 4. Comparison of IBM's Hubs and Concentrators

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of Lobe Ports		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
8222-008		X								6	7	X		
8222-016		X								16	18	X		
8223-008			X							8	8	X		
8224-001		X								16	17	X	by a model 002	Windows NetView for Windows Novell NMS NetView for AIX
8224-002		X								16	17		SNMP	Windows NetView for Windows Novell NMS NetView for AIX
8225-001			X							12	13	X	by a model 002 by a model 003	Nways Manager for Windows Nways Campus Manager LAN for AIX Nways Campus LAN for HP-UX
8225-002			X							12	13		SNMP	Nways Manager for Windows Nways Campus Manager LAN for AIX Nways Campus LAN for HP-UX
8225-003			X							12	13		SNMP RMON	Nways Manager for Windows Nways Campus Manager LAN for AIX Nways Campus LAN for HP-UX
8226-001	X									8	8	X		
8228-001	X									8	8	X		
8230-213	X									0	80		SNMP CMOL	NetView for Windows LAN Network Manager for OS/2 NetView for AIX
8230-04P	X									0	80		SNMP CMOL RMON	NetView for Windows LAN Network Manager for OS/2 NetView for AIX
8238-xxx	X									16	128		SNMP (3 levels)	IBM Intelligent Hub Management Program DOS Entry Version 2 IBM Nways Manager for Windows+

Table 5. Comparison of IBM's Hubs and Concentrators (continued)

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of Lobe Ports		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
8244-06F				X						6	12		SNMP	LAN Network Manager for AIX NetView for AIX
8244-06S				X						6	12		SNMP	LAN Network Manager for AIX NetView for AIX
8244-06U				X						6	12		SNMP	LAN Network Manager for AIX NetView for AIX
8244-12F				X						12	12		SNMP	LAN Network Manager for AIX NetView for AIX
8244-12S				X						12	12		SNMP	LAN Network Manager for AIX NetView for AIX
8244-12U				X						12	12		SNMP	LAN Network Manager for AIX NetView for AIX
8250	X	X		X						2	384		SNMP	Windows NetView for Windows NetView for AIX
8260	X	X		X	X					2	600		SNMP	Windows NetView for Windows NetView for AIX
2217-200	X	X					X		X	2	2		SNMP	NetView for OS/2 NetView for AIX
2217-300	X	X					X		X	2	3		SNMP	NetView for OS/2 NetView for AIX
8282-001					X					8	12		SNMP	Windows NetView for Windows NetView for AIX

Table 6. Comparison of IBM's Switches

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of Lobe Ports		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
2220-300					X						6		SNMP CMIS/CMIP	Nways BroadBand Switch Manager for AIX with NetView for AIX
2220-500					X						10		SNMP CMIS/CMIP	Nways BroadBand Switch Manager for AIX with NetView for AIX
2220-501					X						+6		SNMP CMIS/CMIP	Nways BroadBand Switch Manager for AIX with NetView for AIX
8271-108		X			Uplink					8	12		SNMP	NetView for Windows *NetView for* AIX
8271-216		X			Uplink					16	20		SNMP	NetView for Windows NetView for AIX
8272-108	X				Uplink					8	12		SNMP	NetView for Windows NetView for AIX
8272-216	X				Uplink					16	20		SNMP	NetView for Windows NetView for AIX
8285					X								SNMP	Nways Campus Manager ATM for AIX Nways Campus Manager ATM for HP-OpenView Nways Campus Manager for Windows+
7319-110						X				4	16	X		

Table 7. Comparison of IBM's Remote LAN-Access Servers

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of connectors		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
8235-021	X						X			8	8		SNMP	Windows
8235-031	X						X		X	0	8		SNMP	Windows
8235-051	X						X			2	2		SNMP	Windows
8235-022		X					X			8	8		SNMP	Windows
8235-032		X					X		X	0	8		SNMP	Windows
8235-052		X					X			2	2		SNMP	Windows

Table 8. Comparison of IBM's Bridges

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X25	ISDN	Number of connectors		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
8229-001	X									2			SNMP	LAN Network Manager NetView for AIX
8229-002	X	X								2			SNMP	LAN Network Manager NetView for AIX
8229-003	X						X			2			SNMP	LAN Network Manager NetView for AIX
8281-001	X	X			X							X		

Table 9. Compariison of IBM's Routers

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of connectors		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
2210-12T	X						X	X		2	3		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-12E		X					X	X		2	3		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-127	X						X	X	X	2	4		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-128	X	X					X	X	X	2	4		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-14T	X						X	X		2	5		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-24E		X					X	X		3	6		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-24T	X						X	X		3	6		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
2210-24M	X	X					X	X		3	6		SNMP	NetView for AIX, HP OpenView Campus Manager LAN for AIX Nways Manager for Windows LAN Network Manager
6611-120	X	X					X	X	X	2	2		SNMP	NetView for AIX AIX Router and Bridge Manager/6000
6611-125	X	X					X	X	X	2	2		SNMP	NetView for AIX AIX Router and Bridge Manager/6000
6611-145	X	X					X	X	X	2	4		SNMP	NetView for AIX AIX Router and Bridge Manager/6000
6611-175	X	X					X	X	X	2	7		SNMP	NetView for AIX AIX Router and Bridge Manager/6000

Table 10. Comparison of IBM's Serial Communications Network Servers

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of connectors		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
7318-P10		X					X			16	16	X		
7318-S20		X					X			16	16		SNMP	NetView for Windows NetView for AIX

Table 11. Comparison of Lexmark's LAN Connection for Printers and Plotters

Model/ Type	Token-Ring	Ethernet	Fast Ethernet	FDDI	ATM	FCS	PSDN	X.25	ISDN	Number of connectors		Managed (SNMP, CMOL, RMON,...)		Graphical Management Platform
										Min	Max	No	Yes	
MarkNet-001	X									2	2	X		
MarkNet-002		X								2	2	X		
MarkNet-003		X								2	2	X		

4.2 Hubs/Concentrators

4.2.1 8222 Nways Ethernet Workgroup Hub

The IBM 8222 Nways Workgroup Hubs are two Ethernet hubs that offer a low-cost establishment of a small Ethernet network or easy entry into an existing one. These hubs provide attachment for 10BASE-T, 10BASE2, 10BASE5, or fiber network segments.

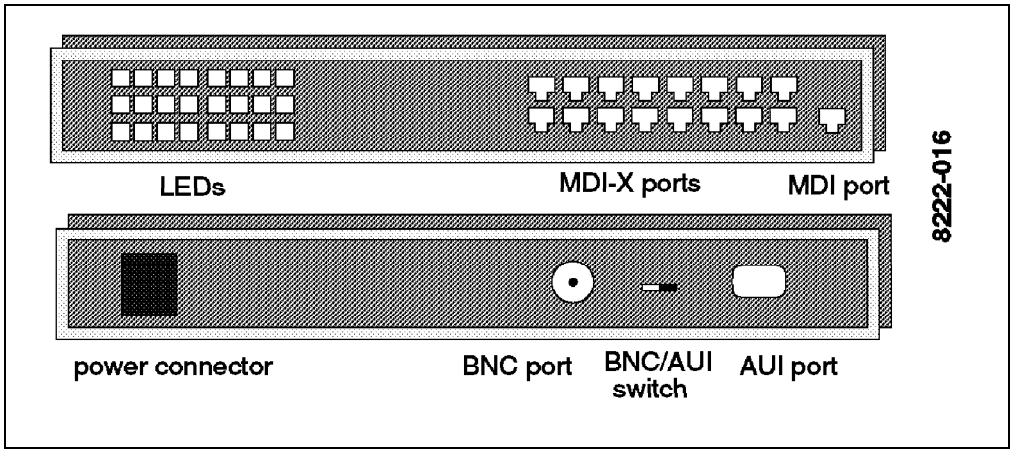


Figure 37. 8222 Nways Ethernet Workgroup Hub: Front and Rear Views

They can also be cascaded to expand an already existing Ethernet network. These two hubs offer many new features that enable you to create a small Ethernet network at a reasonable cost, such as:

- 10BASE-T ports: eight on the Model 008 and sixteen on the Model 016.
- Automatic detection of polarity reversals of cables connected to these ports.
- An MDI (uplink) port that is used for cascading other 8222s. This port eliminates the need for crossover cables.
- An AUI port that connects to 10BASE5, 10BASE2, and fiber network segments.
- A BNC port that connects to 10BASE2 segments.
- LEDs that indicate power and collision status. In addition, Link/Activity and Partition LEDs are provided for the 10BASE-T, AUI, and BNC ports.
- Automatic partitioning of a port that experiences excessive collisions or is jabbering. The hub then re-enables the port when the problem ceases.

The 8222 Model 008 is equipped with a selector switch that determines which port, AUI or BNC, is currently being used. The Model 016 does not have this switch since both the AUI and BNC ports can be used simultaneously

Table 12. 8222: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8222	008	Ethernet Workgroup Hub - 8 ports
8222	016	Ethernet Workgroup Hub - 16 ports

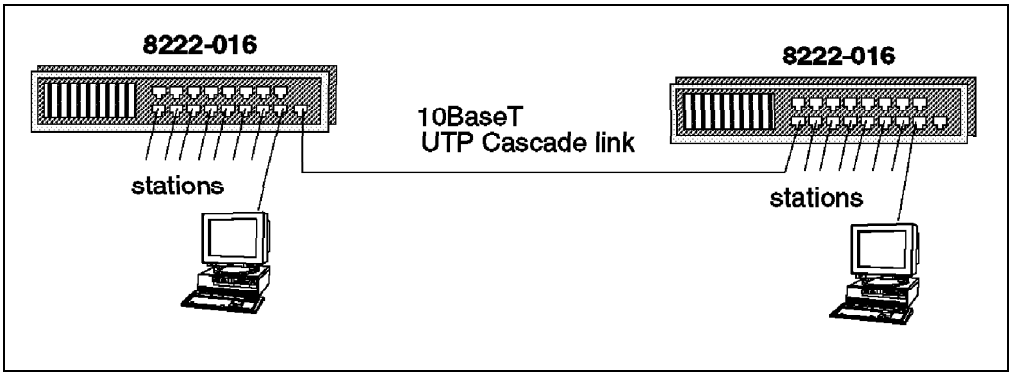


Figure 38. 8222 Ethernet Workgroup Hub: UTP Cascade Link

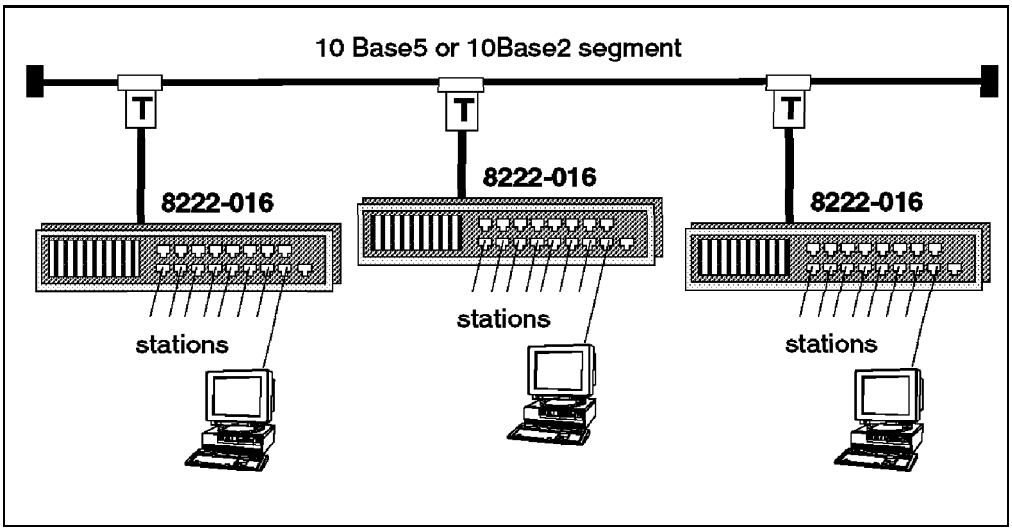


Figure 39. 8222 Ethernet Workgroup Hub: with Coaxial Segments

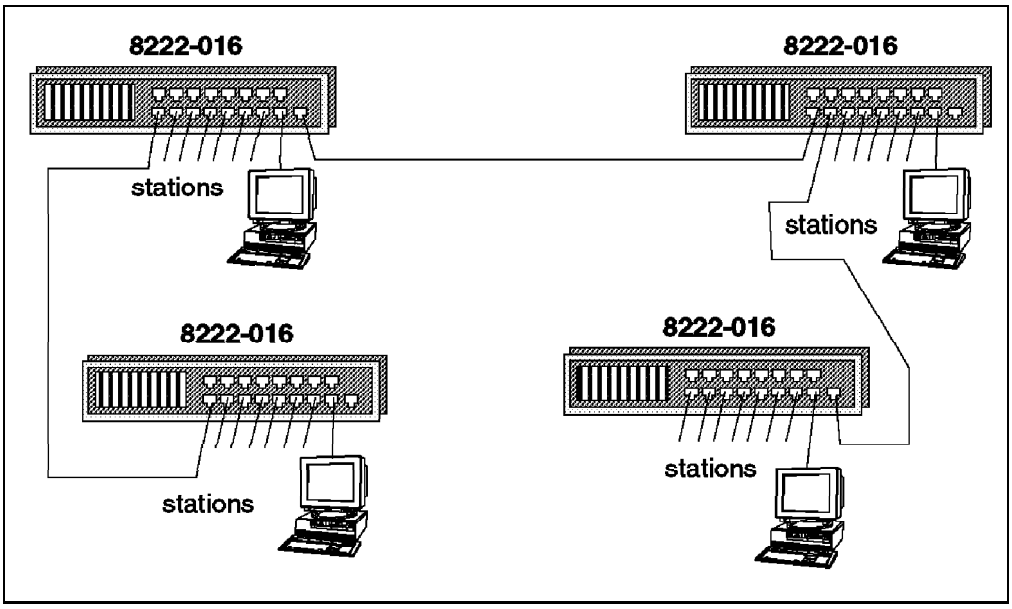


Figure 40. 8222 Ethernet Workgroup Hub: 10BaseT Network with Cascaded Hubs

4.2.2 8223 Fast Ethernet Workgroup Hub

The IBM 8223 is a stand-alone IEEE802.3u 100BaseTX unmanaged workgroup hub. It contains eight 100BaseTX ports. The eighth port supports both MID (Medium-Dependent Interface) and MDI-X (Medium-Dependent Interface-Crossed) wiring configurations, allowing connection to workstations or other Class II hubs with standard straight-through UTP cables.

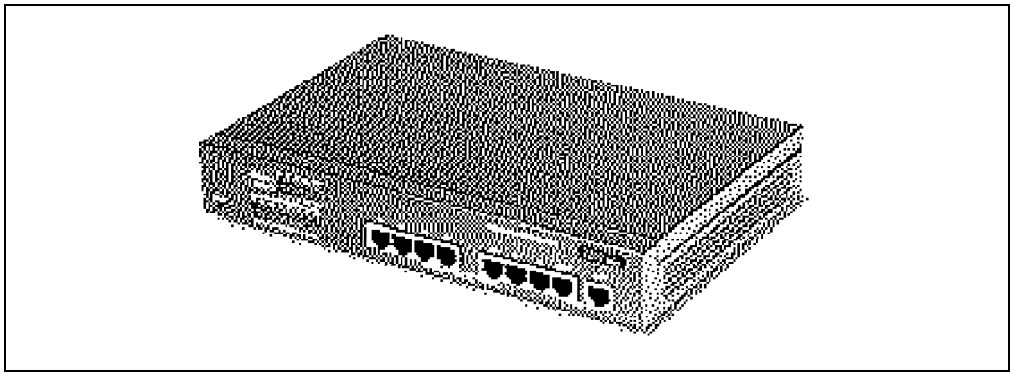


Figure 41. 8223 Fast Ethernet Workgroup Hub

The 8223 hub includes an advanced network monitoring LED display that provides utilization and collision rates as well as per port status. The IBM 8223 Fast Ethernet Workgroup Hub delivers the following benefits:

- Low-cost Fast Ethernet hub capability.
- Attachment of up to eight stations in a 100BaseTX Ethernet network.
- Comprehensive LED display for ease in assessing activity.
- Simple plug-and-go installation.
- Expandability through a cascading capability that allows additional 8223s to be added to the network as the number of network users increases.
- Convenient, attractive tabletop, shelf, or wall-mount placement.
- The 100 Mbps Fast Ethernet transmission bandwidth offers 10 times the bandwidth capability of the IBM 8222.
- The 8223 is compatible with all current products which comply with the IEEE 802.3u standard.
- The 8223's internal auto-ranging power supply eliminates the inconvenience of clumsy external 'brick' power supplies that competitors use.
- The IBM 8223's 'EtherWatch' performance indicators provide 'at-a glance' indication of network utilization and collision levels.
- Because the IBM 8223 meets the more stringent Class II Repeater requirements of the IEEE 802.3u standard, it can be cascaded to other 8223s. This scalability provides an easy mechanism for customers to expand their Fast Ethernet network without having to replace existing equipment.

Table 13. 8223: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8223	008	Fast Ethernet Workgroup Hub

4.2.3 8224 Ethernet Stackable Hub

IBM's 8224 Ethernet Stackable Hubs allow you to create a flexible Ethernet environment that grows as your networking needs grow. Each 8224 provides up to 17 ports of Ethernet connectivity: sixteen 10Base-T ports and one optional media expansion port for connectivity to an existing 10Base2, 10Base5, or fiber Ethernet network. In addition, the 8224 can be placed in a stack of up to ten units, set on a table top or desk top, or rack-mounted.

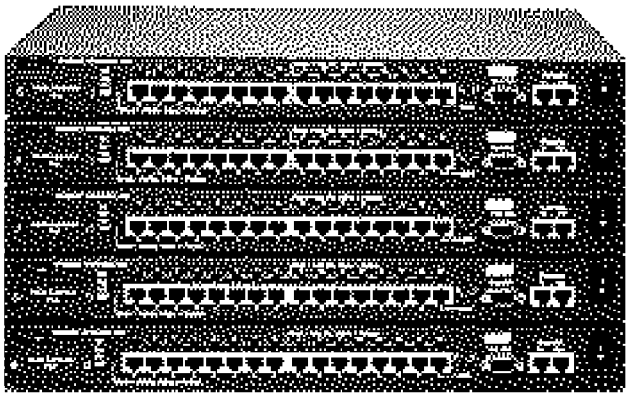


Figure 42. 8224 Ethernet Stackable Hub

The 8224 Model 001 is an unmanaged unit that can be managed by an 8224 Model 002 in a stack. The 8224 Model 002 is an SNMP management unit that can manage up to nine Model 001s in a stack. Stacked units can be separated by a distance of up to 250 feet.

In addition to the stackable function, the 8224:

- Supports segmentation. The 8224 stack can be divided into several segments (collision domains). Stacked 8224s can be segmented while maintaining management capability through a single management unit (Model 002).
- Supports cascading through its media expansion ports or 10Base-T ports.
- Provides centralized management of remote sites and branch offices through its out-of-band management support via the Serial Line Internet Protocol (SLIP). Information systems managers can dial-up a remote site or branch office and receive the management information from the 8224 at that site.
- Supports SNMP MIB II (RFC 1213), the hub repeater MIB (RFC 1516), and the Novell Repeater MIB through the SNMP agent in the 8224 Model 002.

Table 14. 8224: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8224	001	Ethernet Stackable Hub: Unmanaged Model
8224	002	Ethernet Stackable Hub: SNMP Management Model
	9730	AUI Media Expansion Port
	9731	10Base2 Media Expansion Port
	9732	Fiber Media Expansion Port

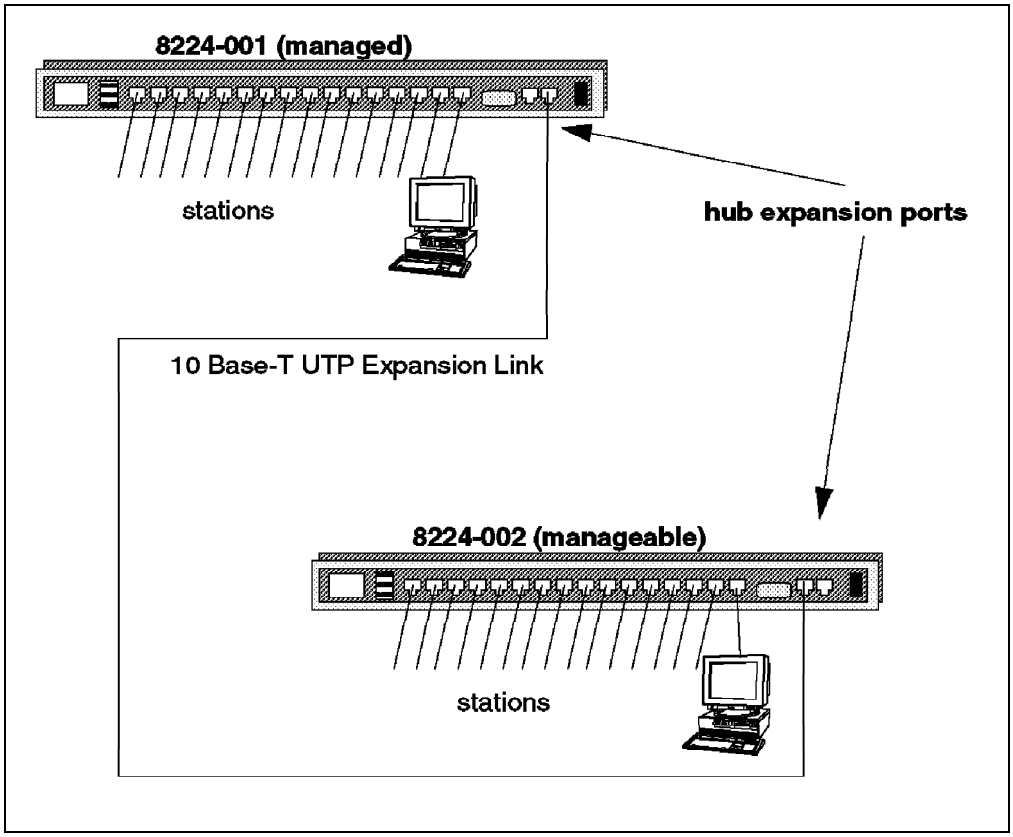


Figure 43. 8224 Ethernet Stackable Hub: Interconnecting 8224 Hubs

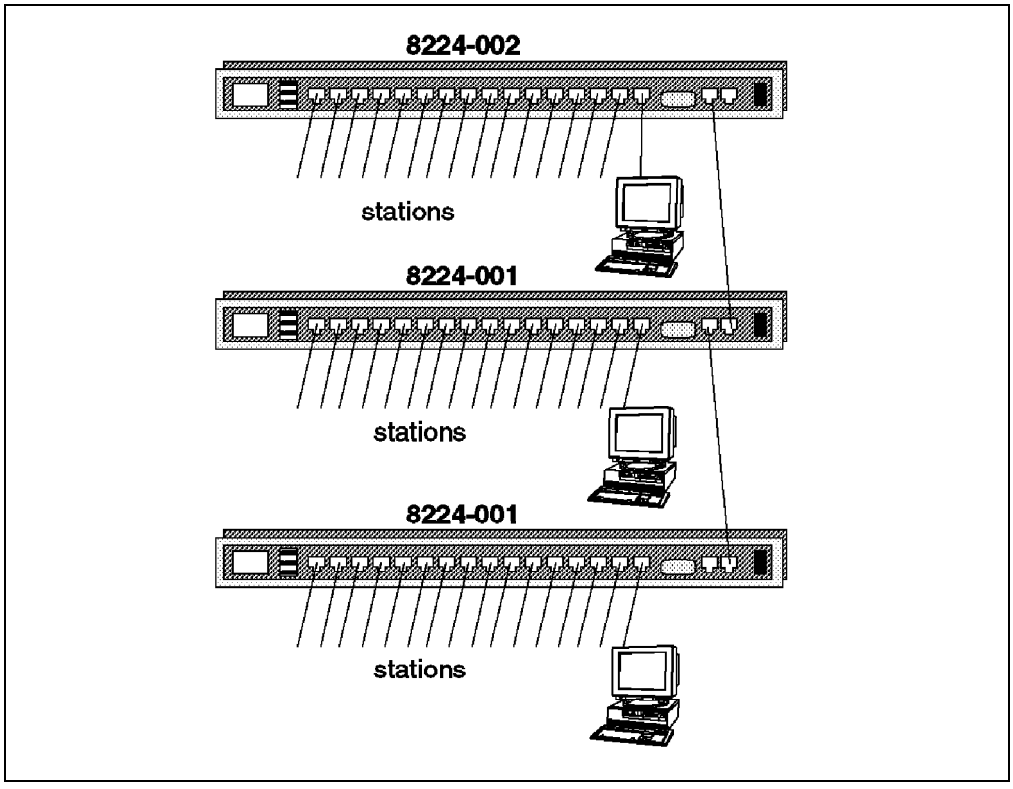


Figure 44. 8224 Ethernet Stackable Hub: A Stack of Three Hubs

4.2.4 8225 Fast Ethernet Stackable Hub

IBM's 8225 Fast Ethernet Stackable Hub provides a simple, high-performance, cost-effective solution to the bandwidth bottleneck of small- and medium-size legacy LANs.

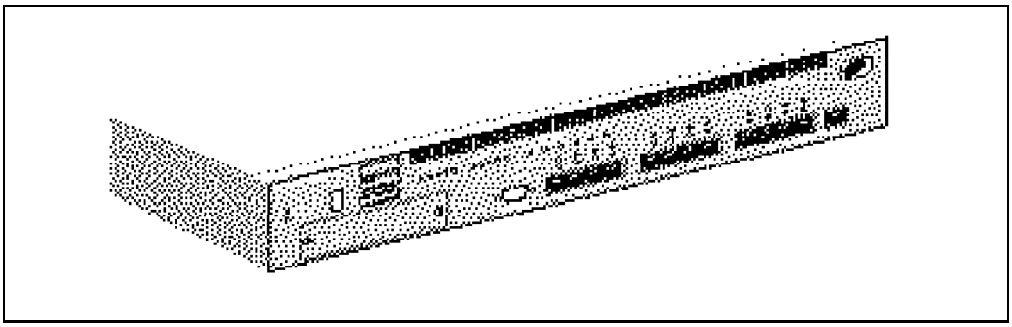


Figure 45. 8225 Fast Ethernet Stackable Hub

It conforms to the IEEE 802.3u Ethernet standard for Class I repeaters, which ensures interoperability with other 100Base-Tx compatible products, including network interface adapters, switches, routers, and other internetworking equipment.

The 8225 is available in three models, allowing users to start small and upgrade seamlessly. The three 8225 models are:

- Model 001, a stackable multi-port Fast Ethernet repeater that provides 12 100Base-Tx ports plus a very flexible expansion port. It is a manageable unit that can be managed by a Model 002 or 003.
- Model 002, a stackable multi-port Fast Ethernet repeater that provides 12 100Base-Tx ports plus a very flexible expansion port. It contains an SNMP management agent that provides extensive in-band and out-of-band management tools for itself and up to five Model 001s in a stack.
- Model 003, a stackable multi-port Fast Ethernet repeater that provides 12 100Base-Tx ports plus a very flexible expansion port. It contains an SNMP management agent that provides extensive in-band and out of band management tools for itself and up to five Model 001s in a stack. In addition it contains a remote monitoring (RMON) device that is able to monitor a single Fast Ethernet segment.

Each model has 13 ports. Twelve are for 100Base-Tx, and the last is a modular port for optional extender modules that support various media interfaces. The twelfth port supports both Medium-Dependent Interface (MDI) and Medium-Dependent Interface-Crossed (MDI-X) wiring configurations, allowing connection to workstations or other hubs with standard, straight-through UTP cables.

The maximum number of ports in a fully populated stack is 78, of which 72 are repeater ports and six are switched ports. The 8225's hot-swappable redundant power module feature provides users with extra reliability.

The IBM 8225 also offers the following three optional media extender modules: 100Base-T4, 100Base-Fx, 10Base-T/100Base-Tx.

The 8225's advanced network monitoring LED display provides utilization and collision rates as well as per-port status.

- Full Network Management: The Model 002 and 003 hubs are intelligent hubs with management capability, and thus both of them are management units for the 8225 system. The management unit, either Model 002 or Model 003, supports both Telnet and SNMP and is capable of monitoring and controlling the various network components of the 8225 system. It can manage up to six stacked repeater hubs. Together, the entire installation acts like a single repeater. The management unit supports both in-band and out-of-band management.
- For in-band management, it permits the 8225 system that has at least one management unit installed to be monitored and controlled from a network management center. Both Model 002 and 003 contain a resident SNMP agent, which can operate with network management software for network monitoring and control. IBM offers network management applications for the IBM 8225 via Nways Manager for Windows, Nways Campus Manager LAN for AIX, and Nways Campus LAN for HP-UX.
- In-Band Management: When an SNMP-compliant network management software package, such as IBM's NetView, is installed on any networked station, the management unit allows in-band network management. Through this workstation and using the SNMP-based NetView program, you can monitor or control the whole network. For NetWare users, the 8225 system supports SNMP over IPX and Novell HMI specifications, which enables this system to be integrated into a NetWare environment seamlessly. In addition, the management unit supports Telnet to provide a text-based menu-driven interface.
- Out-of-Band Management: Each management unit provides one 9-pin EIA-232 port for connecting the unit to a local computer directly by using a null modem cable or to a remote computer using a modem. A computer running the terminal emulation program or network management program and SLIP can be used to access the SNMP agent.

Table 15. 8225: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8225	001	Fast Ethernet Stackable Hub Fast Ethernet Manageable Unit
8225	002	Fast Ethernet Stackable Hub Fast Ethernet Basic Management Unit
8225	003	Fast Ethernet Stack. Hub Fast Ethernet Advanced Management Unit
	3744	10Base-T/100Base-Tx Expansion Module
	3748	100Base-Fx Expansion Module
	4527	100Base-T4 Expansion Module
	4530	Management Upgrade To 002
	4534	Management Upgrade To 003
	3751	Redundant Power Module
	3754	Hub Interconnect Cable Assembly

4.2.5 8226 Token-Ring RJ45 Connection Multistation Access Unit

The IBM 8226 Model 001 provides eight port attachments to a 4- or 16-Mbps token-ring local area network.

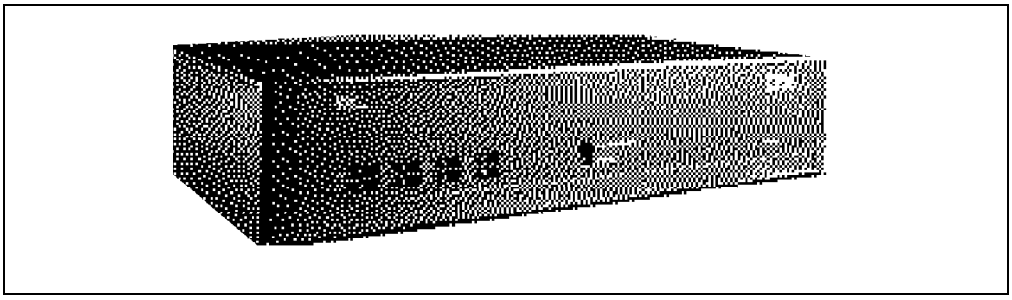


Figure 46. 8226 Token-Ring RJ45 Connection Multistation Access Unit

It offers a splitter function that exceeds the capabilities of the IBM 8228. While offering increased function, the IBM 8226 will not be a replacement for the IBM 8228, but an addition to the product line.

The 8226 supports Unshielded Twisted Pair (UTP), Shielded Twisted Pair (STP), and Foiled Twisted Pair (FTP) cabling for both lobe and main ring paths.

The 8226 Model 001 may be used as a splitter device to connect up to eight workstations to a single port of another hub or to a concentrator/access unit.

The other major functions are:

- The IBM 8226 is powered by an integrated auto-ranging power supply.
- The IBM 8226 does not require a set up or initialization tool.
- The IBM 8226 will coexist with all other IBM token-ring concentrators and hubs.

Table 16. 8226: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8226	001	Token-Ring RJ45 Connection Multistation Access Unit

The IBM 8226 can be used as a stand-alone ring, by attaching up to eight workstations or devices to the 8226's RJ-45 ports. This, coupled with the 8226's ease of installation and use, makes it an excellent choice for small office environments such as professional offices, branch banks, stores, and classrooms. A high level of technical expertise is not necessary. All you have to do is connect your equipment to the 8226 and let it do the rest. There are no installation procedures to run.

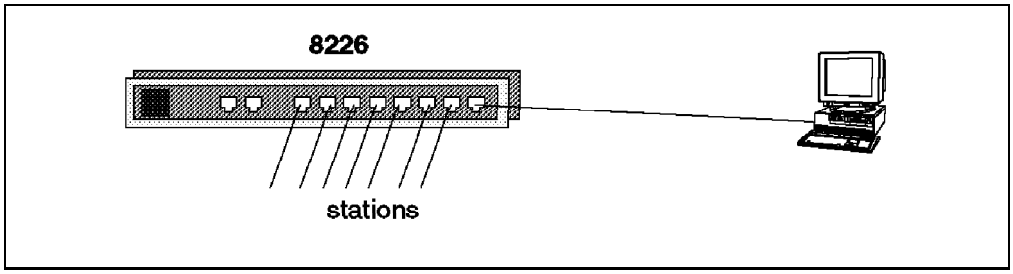


Figure 47. 8226 Token-Ring MAU: The Stand-Alone Ring

IBM 8226s can also be used together by cabling up to ten 8226s via their Ring-In/Ring-Out (RI/RO) ports and then attaching up to eight workstations to each 8226's RJ-45 ports. By using this configuration, you can quickly and easily expand your token-ring network as your business expands.

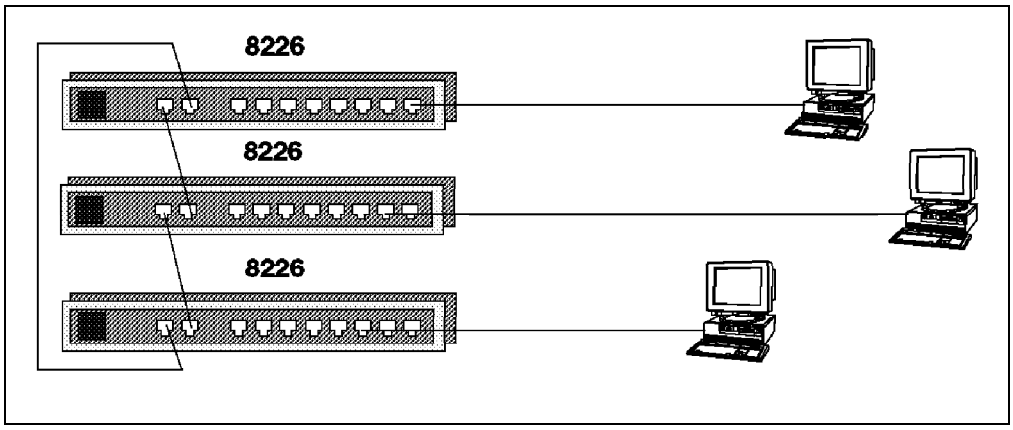


Figure 48. 8226 Token-Ring MAU: Serving Your Growing Organization

As your growing business requires continued growth of your network, the 8226 can be used with a hub or concentrator to serve additional workstations without changing your building cabling. Instead of using a separate hub or concentrator port for each device you want to connect, you can attach the 8226 to an existing hub or concentrator port, set the switch on the front of the 8226 to "Splitter," and connect up to eight additional devices to the 8226.

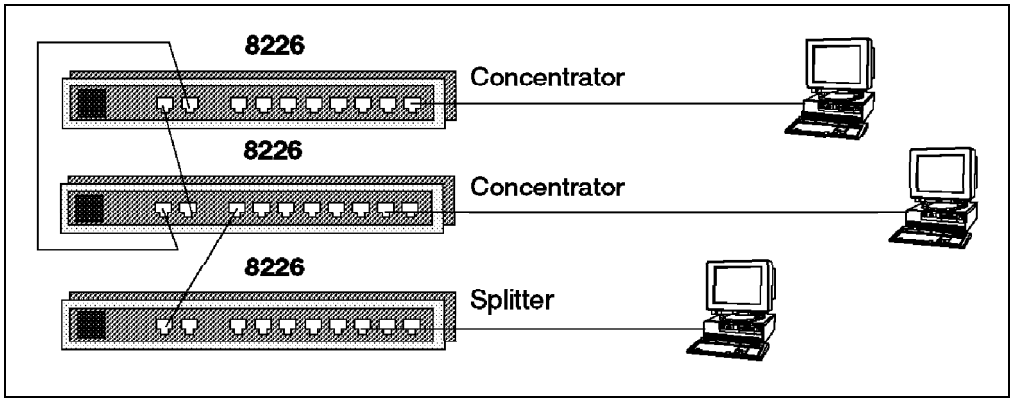


Figure 49. 8226 Token Ring MAU: Accommodating Continued Growth

4.2.6 8228 Token-Ring Multistation Access Unit

This section discusses the 8228 Token-Ring Multistation Access Unit.

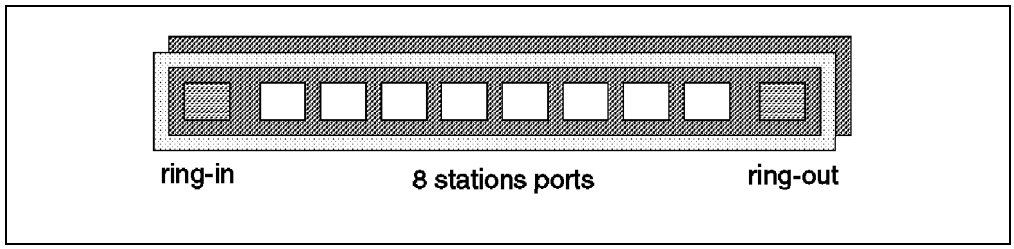


Figure 50. 8228 Token-Ring Multistation Access Unit

- The IBM 8228 Token-Ring Multistation Access Unit supports up to eight token-ring LAN-station-device-attachment ports and the interconnection of multiple 8228 access units via Ring-In and Ring-Out ports.
- The IBM 8228 Token-Ring Multistation Access Unit is a passive wiring concentrator that can bypass attached devices by reacting to the presence (or absence) of a signal from the device attachments.
- Each of the eight device attachments ports includes a relay mechanism that is powered by a phantom current from the attaching adapter.
- A maximum of 33 IBM 8228 Token-Ring Multistation Access Units are supported on a single ring running at 4 Mbps or 16 Mbps (using shielded twisted pair or Category 4 or 5 unshielded twisted pair).
- The maximum number of currently active device on a 4- or 16-Mbps token-ring network is 260.

Table 17. 8228: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8228	001	Token-Ring Multistation Access Unit
	1078	Protection box

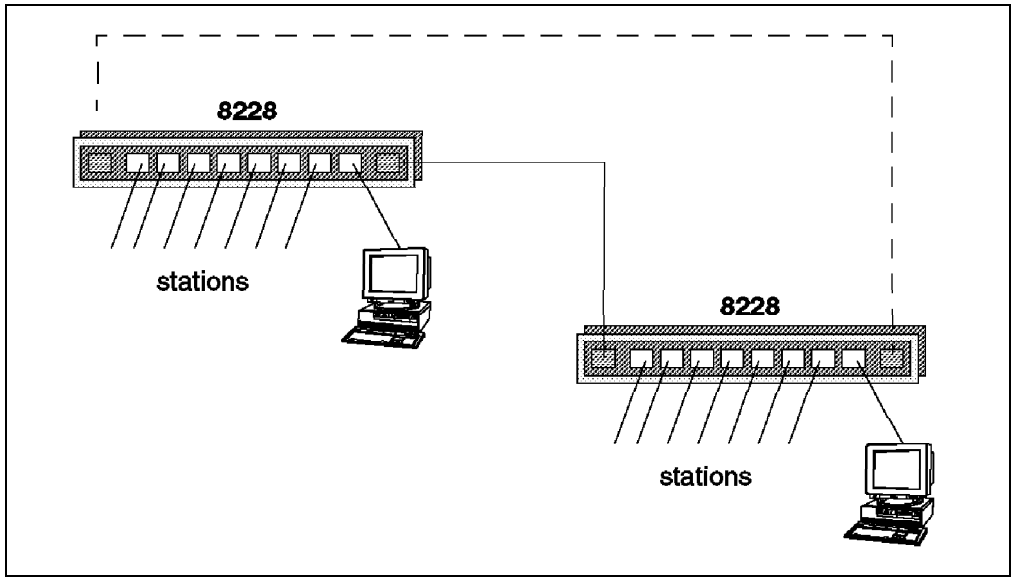


Figure 51. 8228 Token-Ring Multistation Access Unit

4.2.7 8230 Token-Ring Network-Controlled Access Unit

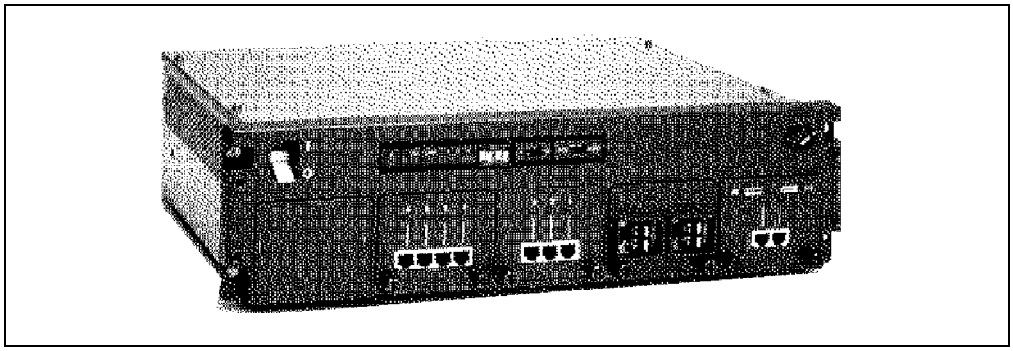


Figure 52. 8230 Token-Ring Network Controlled Access Unit: Model 013

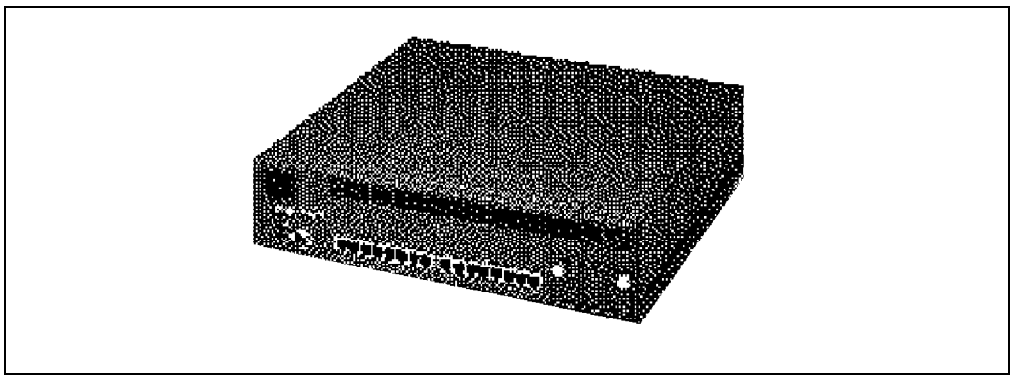


Figure 53. 8230 Token Ring Network Controlled Access Unit: model 04x

Table 18. 8230: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8230	04A	Token-Ring Network-Controlled Access Unit Active Model 04A
8230	04P	Token-Ring Network-Controlled Access Unit Passive Model 04P
8230	213	Token-Ring Network-Controlled Access Unit Model 213
	5450	RJ45 Ring In/Ring Out for model 4 (04A/04P)
	5458	Optical Fiber Ring In/Ring Out for model 4

The IBM 8230 Controlled Access Unit models 003, 013, and 213 are intelligent token-ring workgroup concentrators that provide flexible connectivity for anywhere from 2 to 92 devices (operating at 4- or 16-Mbps) on a token-ring network.

- Models 003, 013, and 213 are the most granular and modular, intelligent, token-ring concentrators on the market. They can provide economical, intelligent access for as few as two device attachments and as many as 92 devices in 2-, 3-, or 4-port increments using a selection of Lobe Insertion Units (LIUs) and Lobe Attachment Modules (LAMs).

- The Dual-Ring Redundancy feature is standard for Models 013 and 213. Ring-In/Ring-Out enables connection of the 8230 to other network devices on the main ring path.
- Models 003, 013,and 213 accept and integrate a variety of cable types, offer a broad range of attachment options, support industry-standard Simple Network Management Protocol (SNMP) or Common Management Information Protocol over Logical Link Control (CMOL), and provide enhanced reliability.
- Because they combine low cost and high functionality, these 8230 models are ideal for use in locations such as branch offices with workgroup concentration, with or without management.
- You can connect remote sites to corporate networks for centralized network management and improved reliability while gaining immediate access to remote data.
- By using a collapsed network, you can also use 8230s to provide distributed concentration for offices spanning several floors of a building.

The IBM 8230 Controlled Access Unit Models 04A and 04P are suitable for a variety of environments in which low-end token-ring concentration is required. Like the IBM 8228 and 8226, they offer basic concentration at a reasonable price per port.

- Model 04A is an active model, in which the token-ring signal is retimed and amplified. Model 04P is for a passive configuration in which retiming is not a requirement. Both models have 16 shielded, RJ-45 ports for device attachment, an EIA 232 port for out-of-band management, and a slot for the optional Ring-In/Ring-Out feature.
- The copper Ring-In/Ring-Out feature has shielded RJ-45 connectors; the optical fiber feature has ST connectors for multimode fiber. Models 04A and 04P can be installed as desktop concentrators or can be rack mounted.
- Network management is available for either a CMOL application, such as LAN Network Manager for OS/2, or for an SNMP platform, such as LAN Network Manager for AIX. In addition, four token-ring Remote Monitoring (RMON) groups will be supported.

In summary, these models bridge the gap in product offerings between the limited-function, low-price, single-media, unmanaged offerings like the 8228 and 8226, and the higher function, fully managed, multiple-media models like the 8230 Models 003, 013, and 213.

4.2.8 8238 Nways Token-Ring Stackable Hub

With the 8238 Nways Token-Ring Stackable Hub, IBM brings many of the functions of large, chassis-based hubs to a cost-effective, stackable unit. The 8238 allows you to install only the number of local area network (LAN) ports needed, and easily increase capacity as required, from a minimum of 16 to a maximum of 128 active or passive ports. Each hub unit supports 16 ports. This capability makes the 8238 perfect for workgroups and remote sites.

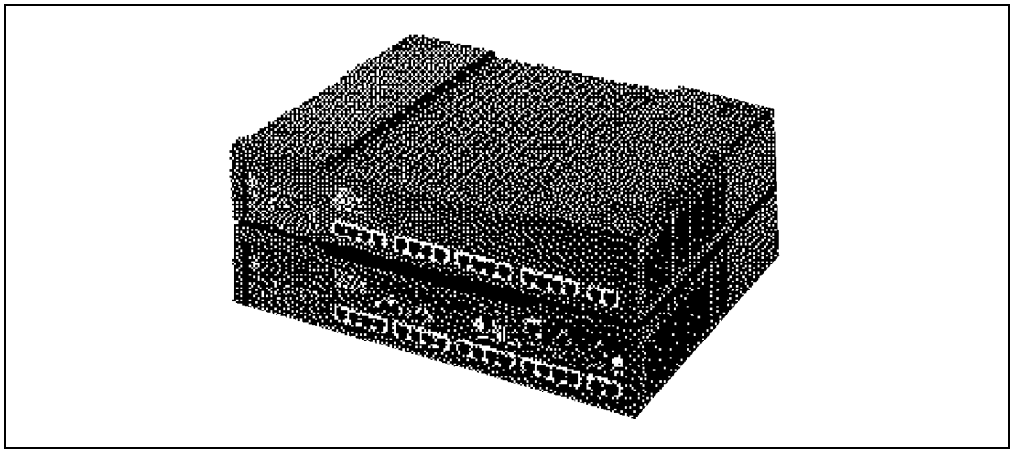


Figure 54. 8238 Token-Ring Stackable Hub

The 8238 stack consists of a management base and up to seven expansion units. These units are connected with IntraStack cables, giving the stack a single system appearance. Simple Network Management Protocol (SNMP) is used to manage the network. Three levels of management support—Bronze, Silver, and Gold—allow you to select the management capabilities that meet your needs.

Using the 8238, network administrators can avoid problems, easily isolate problems that do occur, and quickly initiate repairs. Network managers will be in full control with the IBM Intelligent Hub Management Program DOS Entry Version 2 and the IBM Nways Manager for Windows+.

- RS232 port for out-of-band management
- Optional Ring-In/Ring-Out module

Table 19. 8238: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8238	AB1	Nways Token-Ring Stackable Hub
8238	AS1	Nways Token-Ring Stackable Hub
8238	AG1	Nways Token-Ring Stackable Hub
8238	PB1	Nways Token-Ring Stackable Hub
8238	PS1	Nways Token-Ring Stackable Hub
8238	PG1	Nways Token-Ring Stackable Hub

4.2.9 8244 FDDI Workgroup Concentrator

The IBM 8244 Fiber Distributed Data Interface Workgroup Concentrator is the primary attachment to the FDDI dual ring for attaching workstations to the backbone.

Table 20. 8244: Machine Type, Model, Feature Number and Description

Machine Type	Model / Feature Number	Description
8244	06F	FDDI Concentrator (2 fiber + 4 fiber ports)
8244	06S	FDDI Concentrator (2 fiber + 4 STP ports)
8244	06U	FDDI Concentrator (2 fiber + 4 UTP5 ports)
8244	12F	FDDI Concentrator (2 fiber + 10 fiber ports)
8244	12S	FDDI Concentrator (2 fiber + 10 STP ports)
8244	12U	FDDI Concentrator (2 fiber + 10 UTP5 ports)
	8201	Fiber kit (2 ports)
	8202	Copper STP kit (2 ports)
	8203	Copper UTP5 kit (2 ports)

The 8244 FDDI Concentrator allows attaching up to 12 devices to a 100 Mbps network. These devices may be connected via:

- Multimode optical fiber
- IBM Cabling System's shielded twisted pair (STP) copper cable
- Unshielded twisted pair (UTP-5) copper cable

The 8244 can provide connection for FDDI devices that are based on the ANSI and ISO standards. The 8244 will operate with management entities that support the ANSI Station Management (SMT) 7.3 frame-based protocols.

Customers can now achieve greater bandwidth than existing LANs such as Token-Ring and Ethernet by using the 8244 for attachment to the FDDI network. The 8244, therefore, can be used for small, dedicated workgroups or as a backbone unit for LAN extension and total network interoperability.

The 8244 FDDI Work Group Concentrator complements the existing IBM FDDI Ring attachment products as an entry concentrator. In addition, it:

- Provides "Plug and Play" for easy installation and maintenance
- Allows mixing optical fiber and copper attachments (by field upgrade only)
- Complies with robust standards-based SMT 7.3 for proven interoperability with already available IBM FDDI equipments or within a multivendor network
- Includes an SNMP agent supporting FDDI MIB-2
- Also ships with the IBM FDDI SNMP Proxy Agent Program which is supported by the AIX NetView/6000 network management system

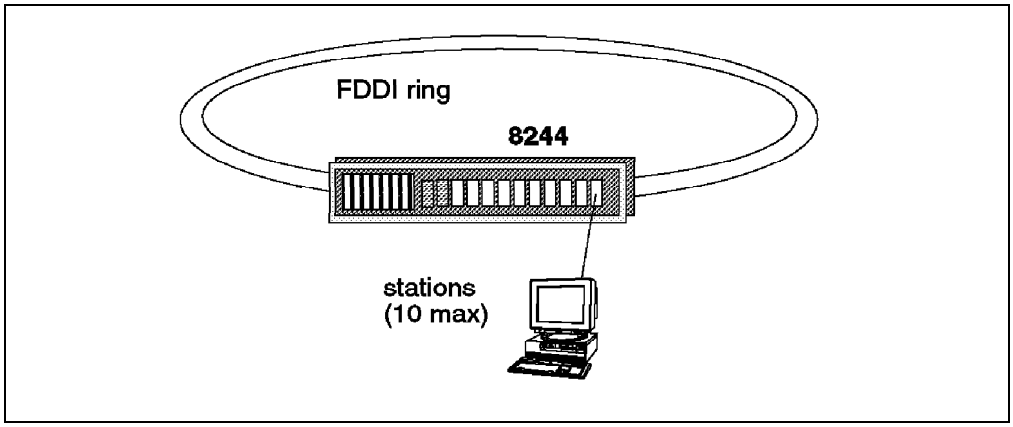


Figure 55. 8244 FDDI Workgroup Concentrator: Integrating Single-Attachment Stations

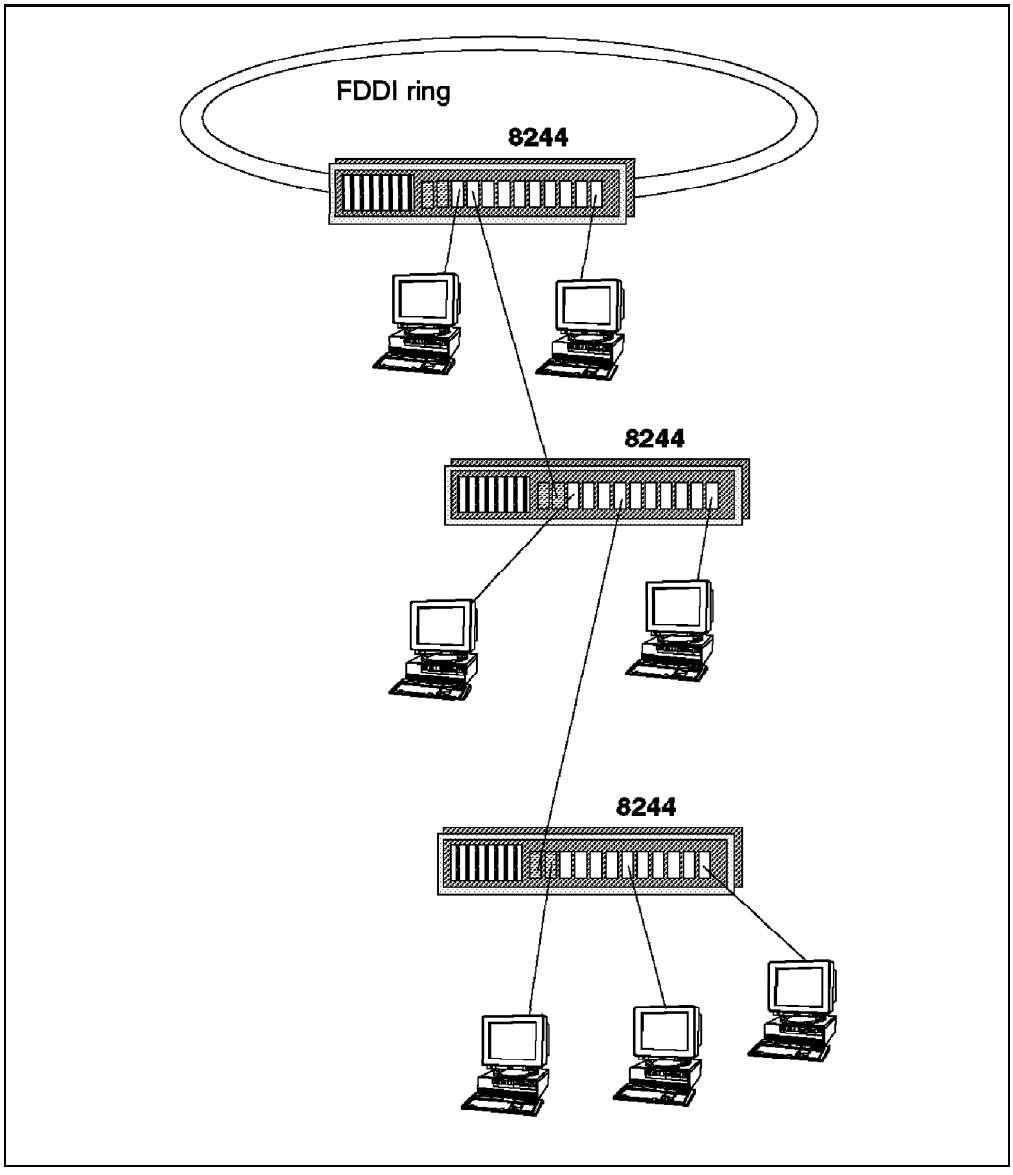


Figure 56. 8244 FDDI Workgroup Concentrator: Using a Cascaded Concentrator

4.2.10 8260 Multiprotocol Intelligent Switching Hub

The IBM 8260 provides true ATM switching capabilities within the hub chassis, using the IBM Switch-on-a-Chip technology to provide more than 4.2 Gbps, full-duplex, nonblocking switching capacity.

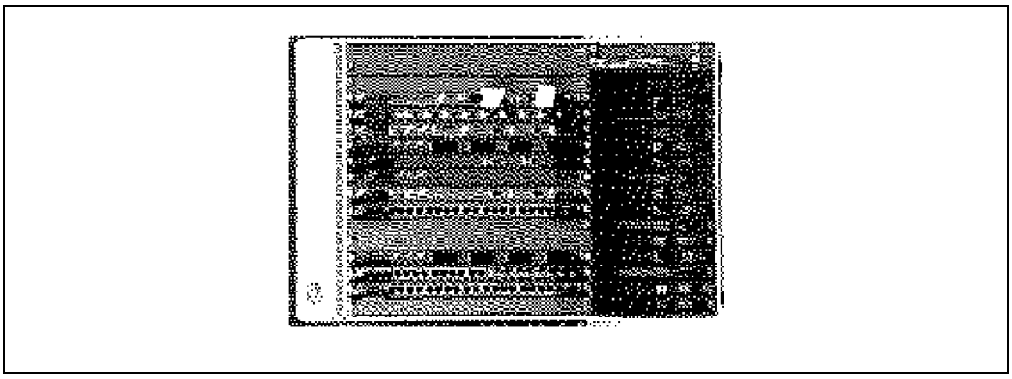


Figure 57. 8260 Multiprotocol Intelligent Switching Hub

The multitalented 8260 can be an Ethernet, a token-ring, or an FDDI hub, an ATM switch, or a combination hub and switch.

Table 21. 8260: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8260	010	model 10 slots
8260	017	model 17 slots
8260	A10	model 10 slots with ATM backplane
8260	A17	model 17 slots with ATM backplane

The 8260 comes in a 10-slot size and a 17-slot size to cover a range of configurations. In addition to modules designed for the 8260, the 8260 also has slots that accept 8250 modules.

The 8260 uses an integrated switch and control point module along with one or more concentration modules to support up to 168 ATM ports in a single, 17-slot hub. ATM concentration modules for 25-Mbps (12 ports each), 100-Mbps (4 ports each), and 155-Mbps ATM (1 or 2 ports each) are available.

IBM also offers an ATM LAN bridge module, based on the IBM 8281, and has an open ATM Kit Development Program that assists other suppliers in developing ATM modules of their own for the 8260. The 17-slot 8260 Model A17 can accommodate two ATM switch/control point modules for switching redundancy and highly available operation. The integrated Nways Campus Managers suite of applications support both the LAN and ATM features of the 8260. Unlike many other ATM switches, the versatile 8260 can be used as a work-group switch, a campus backbone, or a feeder for ATM wide area networks, making the 8260 a keystone for campus ATM implementations.

The 8260 also provides LAN switching with the award-winning 8271 and 8272 LAN switch modules for Ethernet and token-ring networks. These modules provide an integrated, high-performance, low-cost solution for interconnecting LAN segments, while including all of the functions of the 8271 Nways Ethernet LAN Switch and the 8272 Nways Token-Ring LAN Switch.

4.2.11 2217 Nways Multiprotocol Concentrator

The IBM 2217 Nways Multiprotocol Concentrator (MpC) family provides a unique routing solution for networks with significant mission-critical SNA/APPN traffic that supports multiprotocol transport of TCP/IP, IPX, and NetBIOS traffic between geographically dispersed LANs.

Table 22. 2217: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
2217	300	Nways Multiprotocol Concentrator Pentium 75 MHz
	2216	Token-Ring 16/4 ISA Adapter
	222	Ethernet ISA Adapter
	2905	X.21 WAC ISA Adapter
	2906	X.21 WAC IS 2nd Interface
	2915	V.35 WAC ISA Adapter
	2916	V.35 WAC IS 2nd Interface
	2925	EIA 422/499 WAC ISA Adapter
	2926	EIA 422/449 WAC ISA 2nd Interface
	2928	EIA 232/V.24 WAC ISA Adapter
	2927	EIA 232/V.24 WAC ISA 2nd Interface
	3000	Mod 200 Perf Pkg 1—100 MHz & 16 MB Memory
	3001	Mod 300 Perf Pkg 2—16 MB Parity RAM
	3905	X.21 WAC ISA Adapter
	3915	V.35 WAC ISA Adapter
	3925	EIA 422/499 WAC ISA Adapter
	3928	EIA 232/V.24 WAC ISA Adapter
	3930	ISDN Basic Rate Interface Adapter
	3932	ISDN BRI Interface Adapter and Modem

It enables our customers with traditional SNA/APPN backbones (Frame Relay, X.25, SDLC, and ISDN) to converge their multiple protocols while they preserve and leverage their investment in networking skills and equipment.

The IBM 2217 Nways MpC's solution is built upon AnyNet protocol conversion technology. NonSNA protocols (for example, TCP/IP) are converted and then routed across the WAN. At the destination, the AnyNet technology is used again to convert the messages back into their native protocol.

High-Performance Routing (HPR) in the 2217 provides an effective solution to today's complex and changing networking requirements. HPR, an advanced open technology, quickly and smoothly routes data across a network and offers a combination of advantages not available with other networking solutions. These advantages include: increased network availability (non-disruptive reroute) and reduced bandwidth requirements (state-of-the-art congestion control).

Dependent displays and printers can benefit from the Dependent LU Requester (DLUR) function, which provides the advantages of dynamic topology updates, route selection, and traffic prioritization to hierarchical SNA devices.

Transparent to both the devices and applications, 2217 and DLUR provide flexible and affordable migration. The microcode is included with the 2217 and is shipped preloaded onto the hard file. The Remote Configuration Utility (RCU) is used to configure the 2217 to the network topology.

Model Abstract 2217-200

The multiprotocol solution packaged in the IBM 2217 Nways MpC Model 200 supports either one token-ring adapter or Ethernet local area network (LAN) adapter, one wide area connector (WAC) and an external V.34 asynchronous modem. An optional additional interface for the WAC adapter allows for a second WAC port. The standard is a 50-MHz 486-DX2 processor and 16 MB of parity memory. A performance option provides a 100-MHz 486-DX4 processor and an additional 16MB of parity memory. An ISDN Basic Rate Interface adapter is a supported option.

Model Abstract 2217-300

The IBM 2217 Model 300 provides increased processing power and connectivity. A standard 75 MHz Pentium processor and 16MB of memory provide an increased data handling capacity that may be advantageous in larger branch offices or regional concentrators. The Model 300 comes standard with one LAN, one Wide Area Connector (WAC) and an external V.34 asynchronous modem. An additional WAC or ISDN adapter is a supported customer option. A performance option provides an additional 16 MB of parity memory.

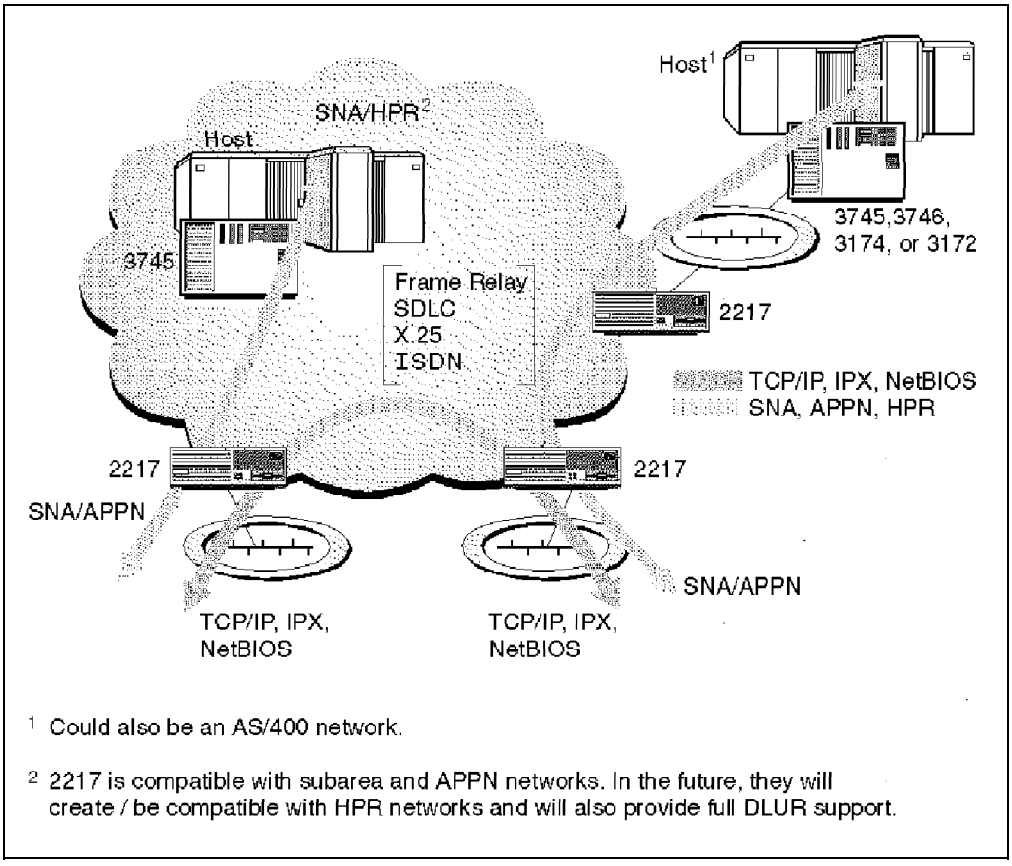


Figure 58. 2217 Nways Multiprotocol Concentrator

4.2.12 8282 Nways ATM Workgroup Concentrator

The IBM Turboways 8282 ATM Workgroup Concentrator allows the connection of 25Mbps ATM devices to higher-speed (100 Mbps) ATM Switches.

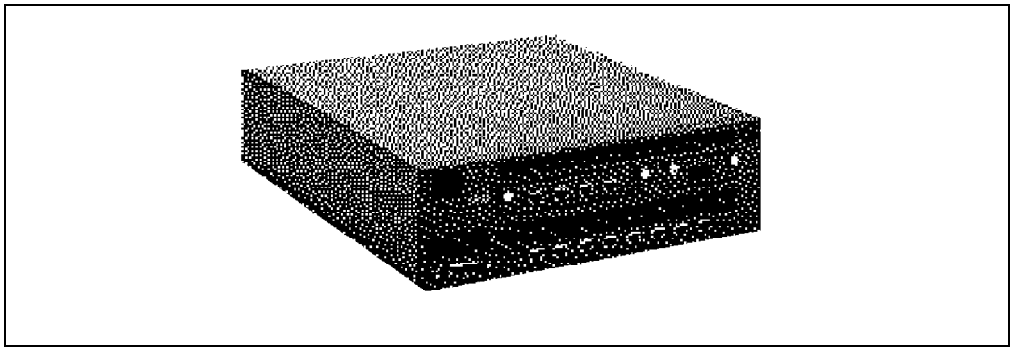


Figure 59. 8282 Nways ATM Workgroup Concentrator

The Turboways Concentrator allows users with high bandwidth or quick response time requirements to migrate from their current shared LAN environment to a dedicated ATM environment without replacing the wiring to the office or changing the applications on the workstation.

The 8282 ATM Workgroup Concentrator highlights include the following:

- Attachment of eight or twelve 25Mbps full-duplex ATM workstations using installed UTP or STP cables
- Attachment to an ATM Switch at 100 Mbps full-duplex using multimode fibre
- Support of SVC and PVC ATM networks
- Support of SNMP (over IP) and ILMI (SNMP over AAL) Network Management
- PC-based configuration tool for Configuration Management
- Front connectors, including power

Table 23. 8282: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8282	001	Nways ATM Workgroup Concentrator
	4720	4-Port 25 Mbps ATM Module

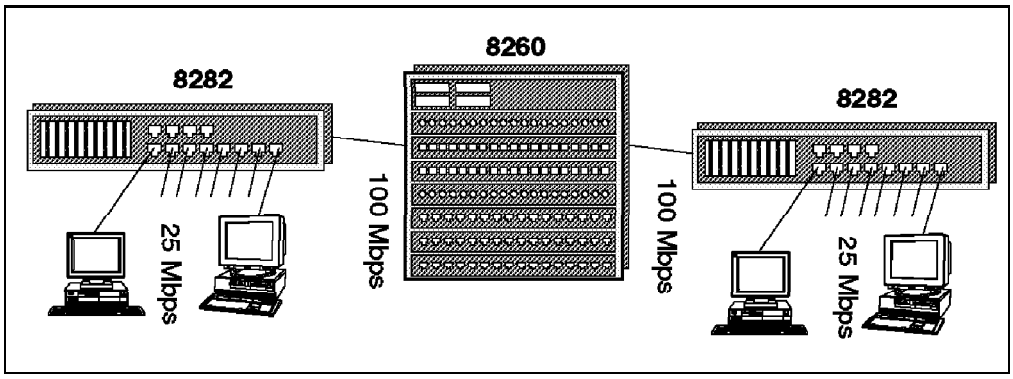


Figure 60. 8282 Nways ATM Workgroup Concentrator: Interconnection

4.3 Switches

4.3.1 2220 Nways BroadBand Switch

The IBM 2220 Nways BroadBand Switch (Nways Switch) family helps you build high-bandwidth transport networks that meet the requirements of fixed-rate and bursty traffic, as well as traditional lower-speed applications.

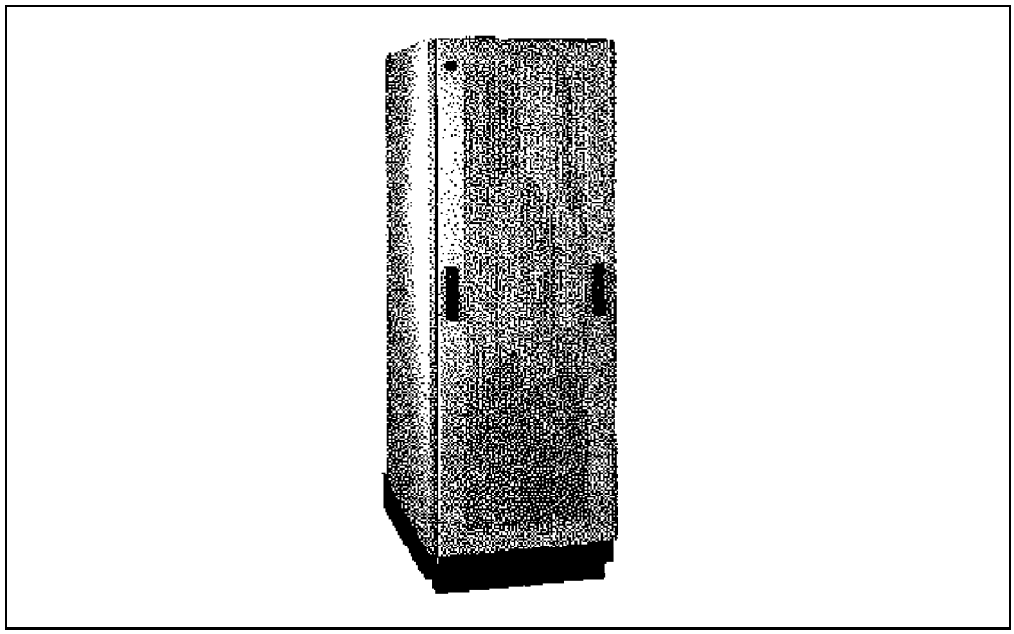


Figure 61. 2220 Nways BroadBand Switch

You can also integrate voice, batch, real-time, and multimedia. It is a cost-effective solution, providing network access, transport, and switching for frame/cell applications.

The Nways Switch family offers fast-packet and ATM cell switches based on IBM's Networking BroadBand Services (NBBS) architecture. This state-of-the-art architecture was designed specifically to meet the challenges of broadband, multiservices transport networks. NBBS ensures that the required quality of service is guaranteed to handle a lot of traffic and still obtain bandwidth savings.

The Nways Switch family brings the following advantages to broadband transport networks:

- Supports existing and new networking devices with a standard interface
- Supports existing and new wide area links from low- to very-high speed
- Supports existing and emerging applications
- Supports digital private branch exchanges (PBXs)
- Integrates applications with different quality-of-service requirement (voice, video, data, and image) into a consolidated network
- Reduces costs with bandwidth optimization
- Provides continuous network availability through a distributed architecture, integrating redundancy and nondisruptive system operations features

To manage the Nways Switch family, a number of applications that gather and consolidate management data for the Nways Switch family is provided on the NetView for AIX platform.

Nways Switch description

- The IBM 2220 Nways BroadBand Switch Models 300 and 500/501 are the first members of the Nways Switch family of wide area multiservices broadband transport nodes. They provide frame relay, circuit emulation service (CES), voice, and HDLC access services. In the future, the Nways Switch family will support ATM, X.25, and ISDN.

In the future, the Nways Switch family will expand to include high-end models and a low-end multiservices ATM access node with integrated LAN routing support.

- Architecture: The Nways Switch Models 300 and 500/501 are built around a 16x16 cell switch fabric called Switch-on-a-Chip. It is a nonblocking, self-routing switch, offering a maximum throughput of 4.2 Gbps.
- Reliability: The Nways Switch provides a robust and flexible approach to system reliability. It offers optional redundancy for all key elements, such as switch, clock, control point, and power. It also offers online performance monitoring, diagnostics, and maintenance. Nondisruptive path switching is a function provided by the NBBS architecture.

Nways Switch functions

- Operation: The IBM Nways BroadBand Switch Control Program operates in the Nways Switch. The program implements the NBBS architecture, provides access services for the protocols and data streams, and ensures continuous node and network availability.
- Node and network management: The Nways Switch network management is accomplished through the applications provided by the IBM Nways BroadBand Switch Manager for AIX (Nways Switch Manager) licensed program, which runs on a RS/6000 under NetView for AIX. These applications are based on the OSI CMIP/CMIS. In the future, SNMP capability will also be available.
- Nways Switch Manager provides fault management, accounting management, performance management, operational control, and automation capabilities. It also includes alarm filtering, thresholding, discrimination, and logging. Topology maps include nodes and links presented as color-coded icons. The change management for the Nways Switch Control Program code uses NetView Distribution Manager/6000.
- Traffic flow control: The Nways Switch family of products integrates a unique set of bandwidth management algorithms that effectively optimize bandwidth use while also meeting the full range of application needs in the network. You can request, for each connection at call setup time, a particular quality of service class (end-to-end delay, cell loss probability) and a set of traffic descriptors, consistent with the characteristics of the traffic type.

Table 24. 2220: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
2220	300	Nways BroadBand Switch / six adapter slots
2220	500	Nways BroadBand Switch / ten adapter slots
2220	501	Nways BroadBand Switch / expansion of Model 500 providing an additional six adapter slots

4.3.2 8271 Nways Ethernet LAN Switch

LAN segmentation is a popular technique for improving LAN performance by reducing contention, and LAN switches offer a high performance, low cost alternative method for interconnecting LAN segments.

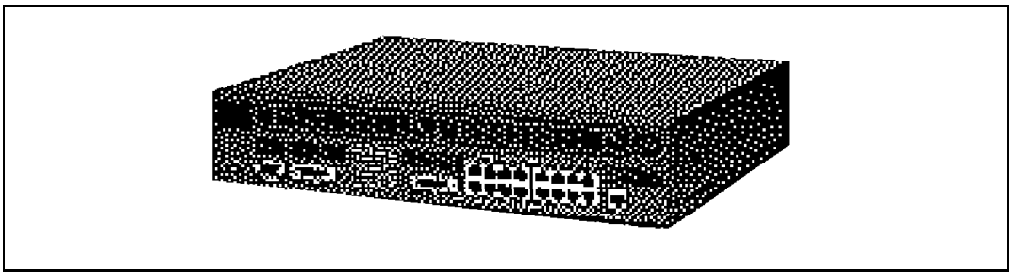


Figure 62. 8271 Nways Ethernet LAN Switch

The IBM 8271 creates multiple, concurrent paths among the connected Ethernet LAN segments, each path supporting the full 10 Mbps Ethernet bandwidth. Depending on traffic patterns, total bandwidth of Ethernet networks segmented using IBM 8271s could be expanded to up to 400-800 percent of that available in the unsegmented network. The IBM 8271 can be easily added to an existing network to improve its performance while maintaining customer investment.

The IBM 8271 EtherStreamer Switch Model 108:

- Provides a cost-effective alternative for addressing customers' requirement for improving Ethernet LAN performance. Transports Ethernet frames among up to eight shared or dedicated Ethernet LAN segments via 10Base-T or AUI connections.
- Will double bandwidth to the single LAN station on a dedicated LAN segment from the usual 10 Mbps to up to 20 Mbps by using the full duplex capabilities of the IBM 8271 and full duplex Ethernet adapters.
- Includes out-of-band console management facilities (accessible via serial port and Telnet) and an SNMP agent that allows control from a central SNMP management station, such as one running IBM NetView for AIX or IBM NetView for Windows.
- Includes an EtherProbe network monitor port.
- The IBM 8271 Model 108 provides one Universal Feature Slot.
- Feature cards that will provide additional connections, such as a high-speed ATM uplink to interconnect IBM 8271s via a backbone network.

8271 Nways Ethernet LAN Switch Model 216 delivers the following benefits:

- Allows you to build larger, more complex switch networks using a common set of switch products
- Supports the same functions and features available on the IBM 8271 Model 108
- Offers 16 fixed 10Base-T Ethernet ports
- Offers two Universal Feature Slots
- Provides up to 240 Mbps aggregate bandwidth

Table 25. 8271: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8271	108	IBM EtherStreamer Switch
8271	216	IBM EtherStreamer Switch
	9195	4-Port 10Base-T UFC
	7020	3-Port 10Base-FL UFC
	6995	100Base-Tx UFC
	7000	100Base-Fx UFC

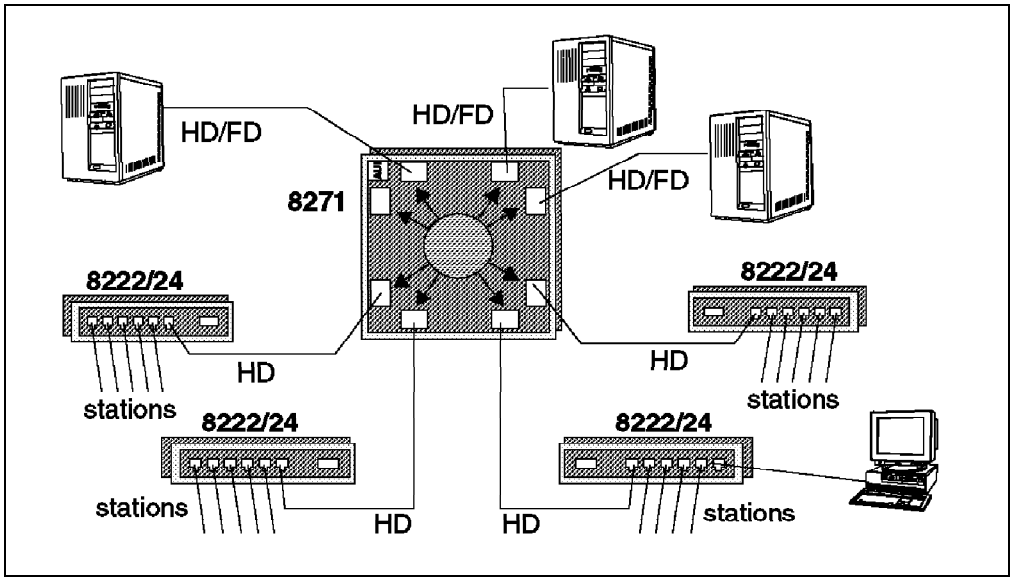


Figure 63. 8271 Nways Ethernet LAN Switch: Three Servers and Four Repeaters

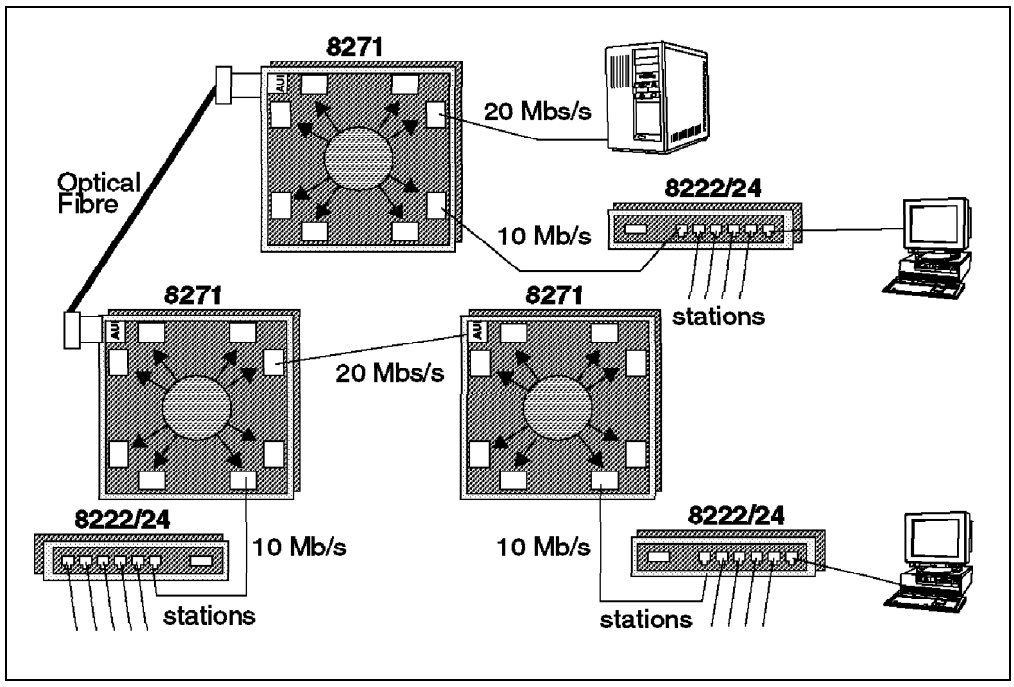


Figure 64. 8271 Nways Ethernet LAN Switch: Three Switches Interconnected

4.3.3 8272 Nways Token-Ring LAN Switch

IBM expands its family of token-ring LAN switches with the new, 16-port IBM 8272 Nways Token-Ring LAN Switch Model 216.

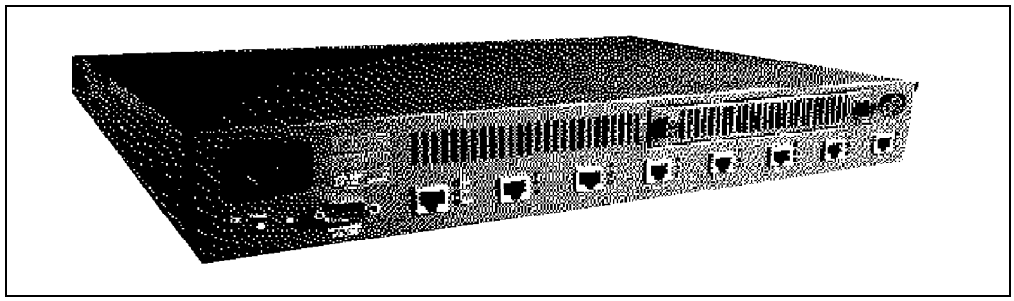


Figure 65. 8272 Nways Token-Ring LAN Switch

The new switch model delivers the following benefits:

- Allows you to build larger, more complex switch networks using a common set of switch products
- Supports the same functions and features available on the IBM 8272 Model 108
- Offers 16 fixed token-ring ports that support twisted pair media via RJ-45 connectors
- Offers two universal feature slots
- Provides up to 384 Mbps aggregate bandwidth

The IBM 8272 Nways Token-Ring LAN Switch Model 216 doubles the number of fixed token-ring ports as well as the number of universal feature slots over the existing Model 108.

This new switch model allows you to build larger and more complex switched networks using a common set of switch products. The IBM 8272 Model 216 will be supported by a new microcode release for the IBM 8272 which will provide the IBM 8272 Model 108 and the IBM 8272 Model 216 with a common set of supported functions.

Release 2 of the IBM 8272 Microcode is required to support both the IBM 8272 Model 108 and the new Model 216 as well as the 2-port Token-Ring Fiber Universal Feature Card. In addition to this hardware support, this release of the IBM 8272 microcode supports source-route switching.

Table 26. 8272: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8272	108	Nways Token-Ring LAN Switch
8272	216	Nways Token-Ring LAN Switch
	9196	4-Port TR UTP/STP UFC
	6985	2-Port TR Fiber UFC

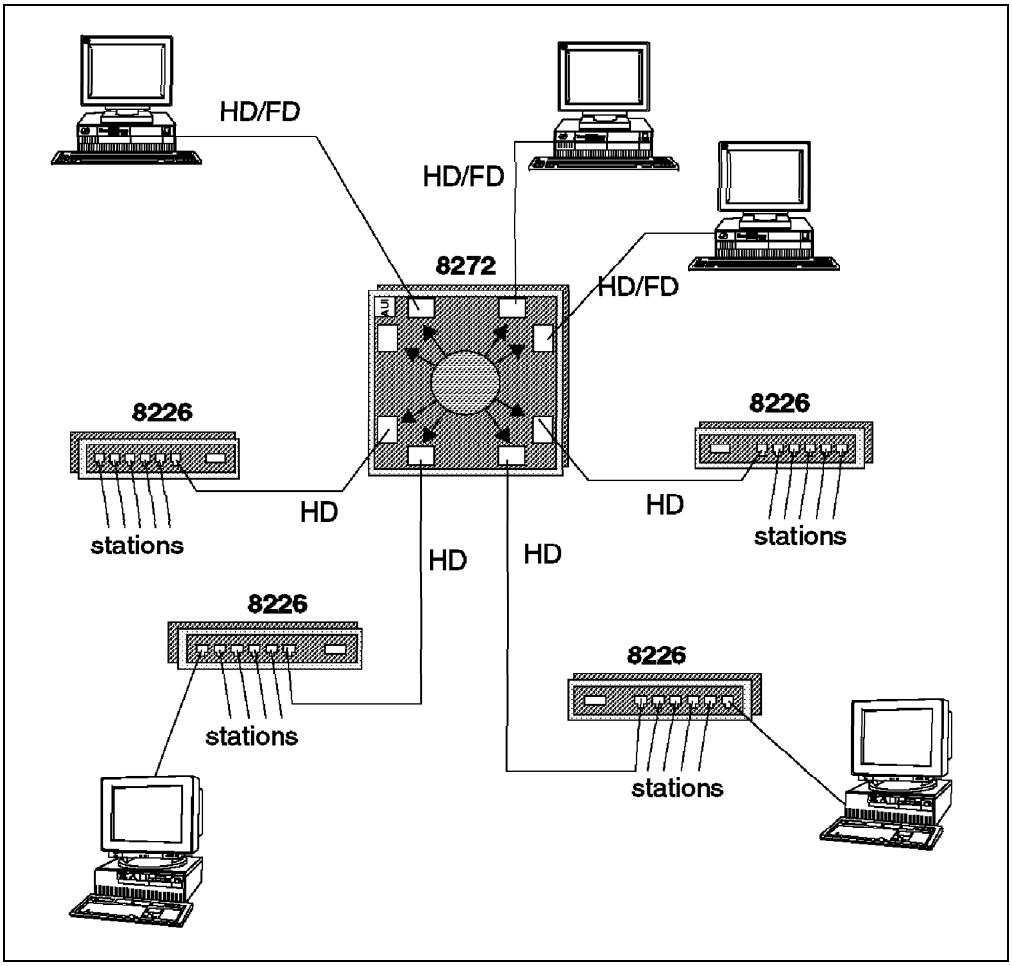


Figure 66. 8272 Nways Token-Ring LAN Switch: Interconnection

4.3.4 8285 Nways ATM Workgroup Switch

With the IBM 8285 Nways ATM Workgroup Switch, you can build your ATM network today with a switching technology designed for the future: the ATM25 physical interface.

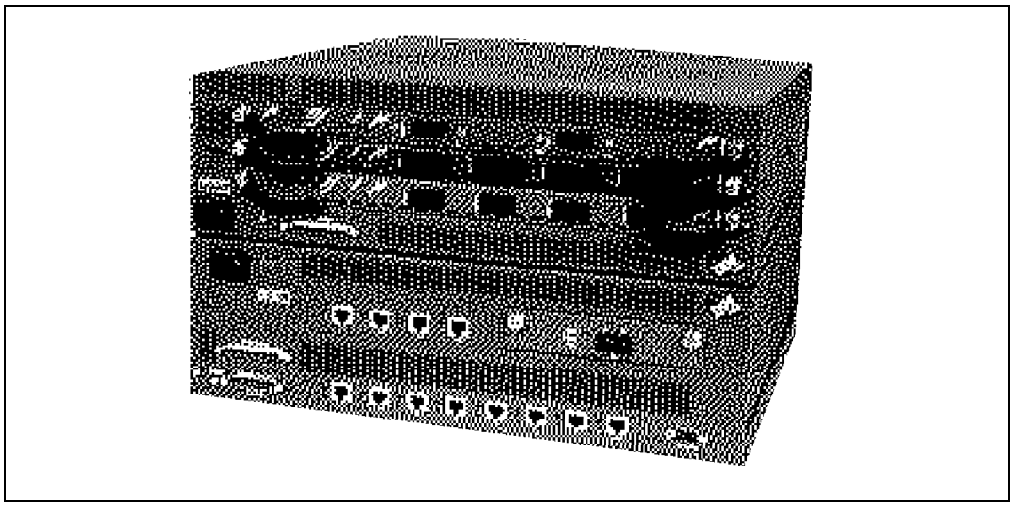


Figure 67. 8285 Nways ATM Workgroup Switch

This popular standard provides 25.6 Mbps of bidirectional ATM bandwidth.

The 8285 offers greater throughput than Ethernet or token-ring networks, and bandwidth on demand enables a new generation of applications such as desktop video conferencing, with guaranteed ATM Quality of Service.

The low cost of the 8285 and its equally low operating cost with copper wiring (including voice-grade wiring) provide a quick and affordable option for desktop ATM. This is ATM switching that is not restricted to LAN backbones or high-speed servers.

Through its imbedded ATM Forum LAN Emulation servers, the IBM 8285 accommodates base unit connectivity for up to 12 users. And with its rich management features and sophisticated routing algorithms, the 8285 easily integrates into large, complex networks containing hundreds of switches and thousands of users.

Network owners receive improved end-user productivity and a competitive edge for opening new business opportunities.

When the 8285 is combined with backbone ATM switches, such as the IBM 8260 Nways Multiprotocol Switching Hub, the cost of ownership is reduced through:

- Simplification of network design and planning
- Reduction of the number of different LAN technologies in the network
- Enablement of two true virtual LANs that are logically assigned to the workstations rather than to the physical port in the network

In summary, the IBM 8285 Nways ATM Workgroup Switch provides these major benefits:

- Low-cost ATM workgroup switch
- Expansion to 48 connections at the ATM25 interface, with multiple-feature, 155-Mbps ports
- High switching capacity using IBM's Switch-on-a-Chip switching matrix
- Full support of ATM Quality of Service
- Full ATM Forum standard compliance
- Rich in IBM extensions for switch-to-switch interfaces, fully compatible with the IBM 8260
- Integrated ATM Forum LAN Emulation servers
- Full set of network management and operations features
- Open for third-party development through the IBM ATM kit Development Program

Table 27. 8285: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8285	00B	Base Unit
8285	00P	Base Unit
	5500	155-Mbps I/O Card MMF
	5501	155-Mbps I/O Card SMF
	5502	Expansion Unit
	5012	12-Port 25-Mbps Concentration Module
	5004	4-Port 100-Mbps Fiber Concentration Module
	5002	2-Port 155-Mbps ATM Flex. Concentration Module
	8800	1-Port Fiber Multimode ATM Flex I/O Card
	8801	1-Port Fiber Monomode ATM Flex I/O Card
	8802	1-Port UTP/STP I/O Card
	5204	4-Port ATM LAN Bridge Module
	5102	ATM Carrier 1-Slot Module
	5202	ATM Carrier Universal 2-Slot Module
	3150	Universal Code Download Kit

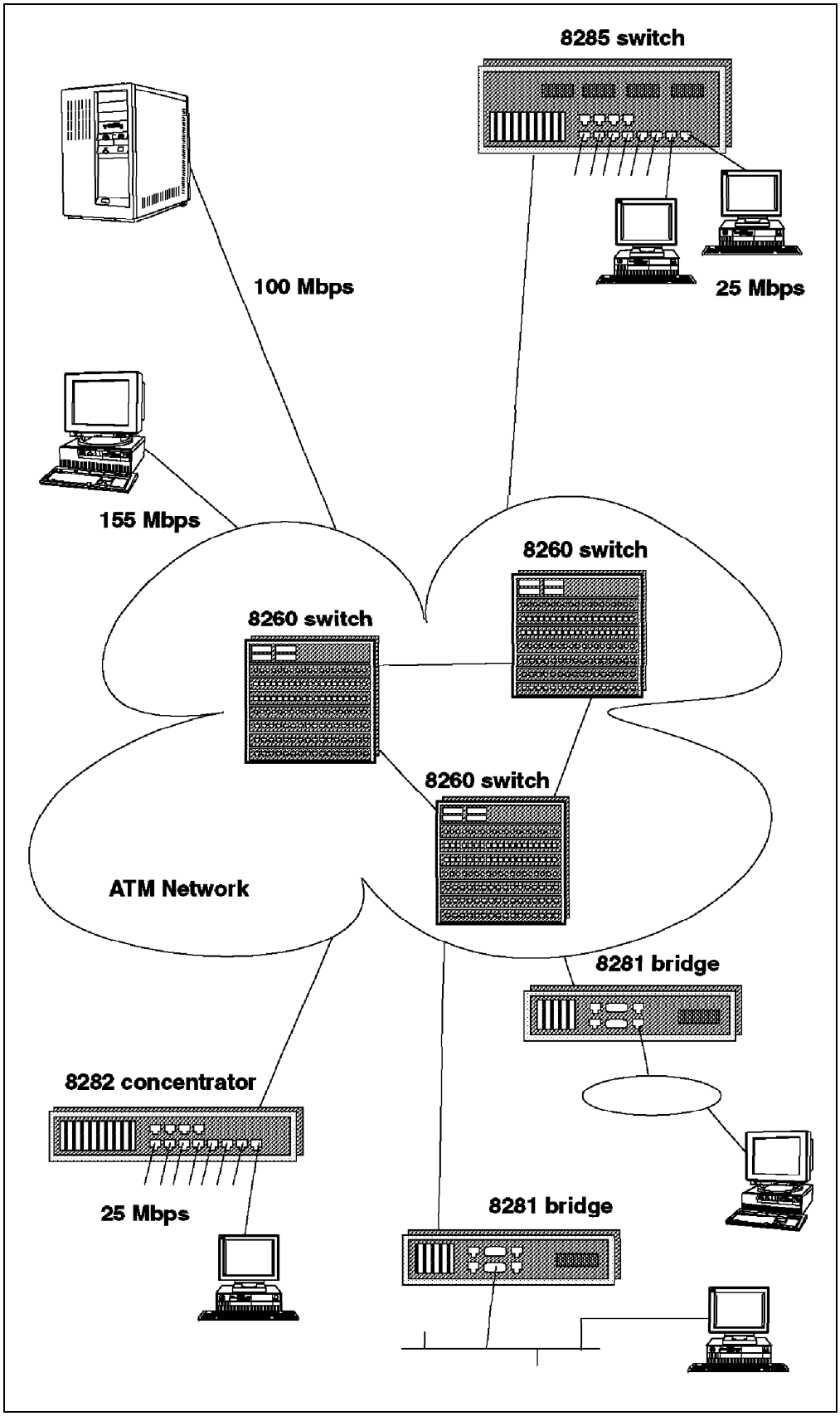


Figure 68. ATM Products Interconnection

4.3.5 7319 Fibre Channel Switch 16/1063

The Fibre Channel Switch 16/1063 is available on selected RS/6000 models and RS/6000 Scalable POWERparallel Systems. This channel switch provides:

- High-speed data transfers between supported RS/6000 system
- A base configuration with four ports, expandable to 16 ports per switch in one-port increments
- A link rate of 1063 Mbps per port
- Non-blocking connection of all 16 ports
- A 19-inch, rack-mountable configuration
- Fiber optic technology
- The adapter and its device drivers support the IP (Internet protocol), including TCP/IP, UDP (user datagram protocol), and raw sockets.

Table 28. 7319: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
7319	110	Fibre Channel Switch 16/1063
	6507	Rack-Mounting Kit for Machine for 7319
	1902	Optics Daughter Card, 1-Port 1063 Mbps

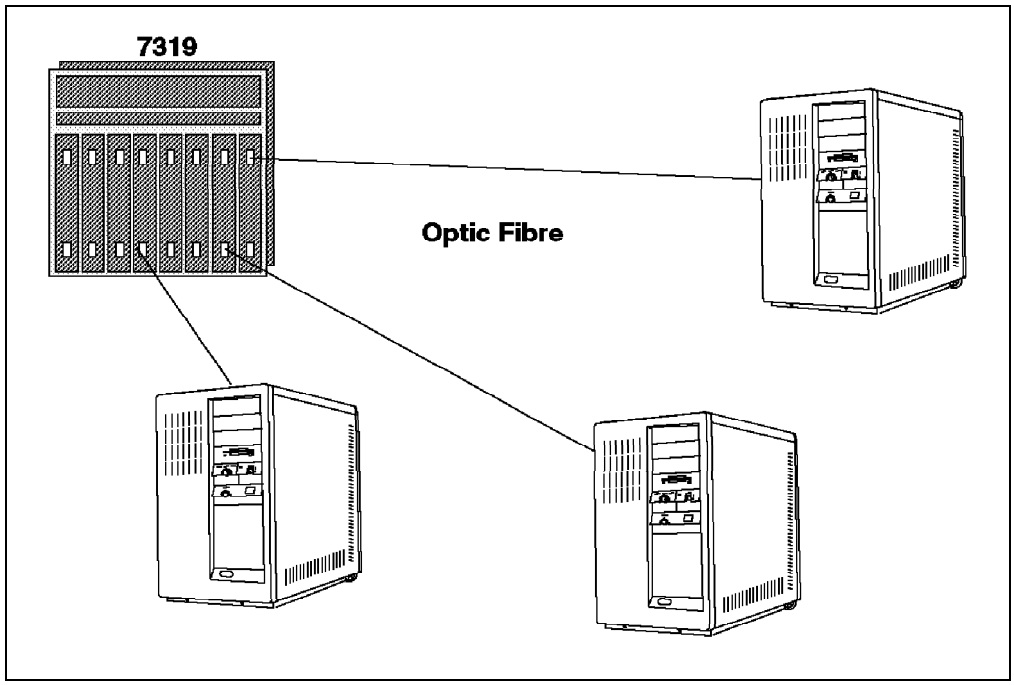


Figure 69. 7319 Fibre Channel Switch 16/1063

4.4 Remote LAN-Access Servers

This section describes remote LAN-access servers.

4.4.1 8235 DIALs (Dial-In Access to LANs) Server

The IBM 8235 is designed for remote access.

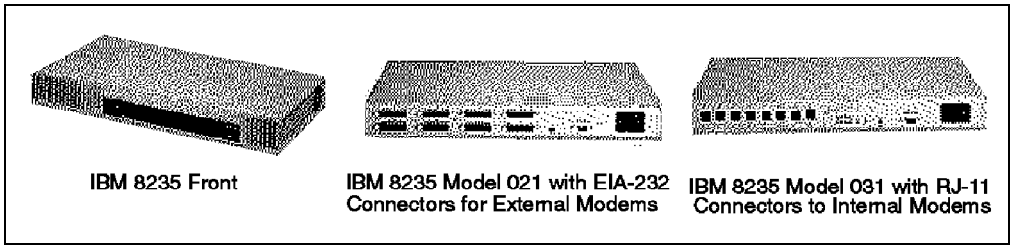


Figure 70. 8235 DIALs Server

- IBM's 8-port 8235 DIALs server is the office-end of remote access—an inexpensive, high performance, multiprotocol, multiport, multifunction, remote networking server for token-ring and Ethernet networks. The 8235 is a compact, stand-alone device that fits easily on a desktop or stacks in a wiring closet. The 8-port 8235 supports dial-in from remote sites, dial-out to offsite services, and LAN-to-LAN dial-up connections in a single device. The 8235 has reliable, solid-state components with nothing to wear out or break.
- The 8235 combines remote access, dial-up routing and modem pooling in a single device that is simpler and costs less than multiple devices. Users can transfer files, print documents, send faxes, access the Internet, e-mail, and access client/server applications and databases without having to learn new commands or complicated procedures.
- The 8235 comes with IBM DIALs client software for OS/2, DOS and Windows. The 8235 is compatible with Windows 95, SLIP, and most Point-to-Point Protocol (PPP) dial clients. You can make as many copies of the client software as you need for remote users to connect to your 8235. An authorized user simply calls an 8235 using conventional, cellular, or ISDN telephone lines and connects to the office network.

Ethernet and Token-Ring Support

- The 8-port 8235 directly attaches to either an Ethernet or token-ring LAN. It makes its users and the network operating system think the users are directly attached to the LAN, even though they are attached via remote lines. The IBM 8235 is a dedicated multiport, multiprotocol, remote-access hardware server. This server supports remote PC users dialing in to applications the same way users access applications from workstations directly attached to a token-ring or Ethernet LAN.

Multiuser, Multiprotocol, Multifunction

- With routing and bridging support for multiple protocols (that is, NetBIOS for LAN servers, IPX for NetWare, 802.2 LLC for 3270 and 5250, IP for TCP/IP applications, X.25, and AppleTalk on Ethernet with ARA 2.0 clients), a user can remotely access a variety of applications. And the 8235 supports dial-up LAN-to-LAN routing and dial-out modem/line pooling. All of the 8235's eight ports can operate simultaneously. Special filtering and compression techniques reduce the amount of network traffic. PPP and support for

transmission speeds up to 115.2 Kbps also contribute to optimum remote access performance.

- DOS, Windows, OS/2, Apple Macintosh, Windows 95, Windows NT 3.5, and UNIX clients are supported. Point-to-Point protocol (PPP) clients are supported, as well as selected Serial Line Internet Protocol (SLIP) clients. Now more of your remote users can be covered with a single product.
- Terminal Server support is provided by a shell command, allowing dumb terminals to connect to a host with the Telnet protocol. This extends the supported remote access platforms to earlier generation terminals.

Pick Your Modems: External, Integrated, or a Combination

- IBM 8235 models 021 and 022 come with high-speed serial attachments for external modems or digital services. The 8235 Model 021 supports token ring, and Model 022 supports Ethernet. These functions are also available as hub modules for IBM's 8250 and 8260 Multiprotocol Intelligent Hubs. As hub modules, they benefit from 8250 and 8260 fault tolerance, self-healing, and remote management.
- The 8235 Models 031 and 032 include slots for eight internal V.34 modems or high-speed serial cards. If internal modems are used, no external modems are required. Everything fits into the compact rack-mountable unit that contains the dial-in server function.
- The modular design of the integrated modems allows these new models to be field upgraded with new modem technology as it's developed. Integration of the modems into the DIALS servers eliminates bulky EIA-232 wiring between modems and servers and eliminates the power cords associated with stand-alone modems.
- Costs for the installation of stand-alone external modems, wiring closet rack space, modem trays, EIA-232 cables, power drops, and associated labor costs for installation can be dramatically reduced. If you want a combination of internal and external modems, or you want to connect to digital services like Switched 56 or ISDN, you can also mix high-speed serial cards and modems. Buy what you need, when you need it, and change it as your needs change. That's flexibility!

Protect Your Network With Multitiered Security

- The IBM 8235 gives you a variety of convenient security options that can help assure that your network is safe, secure, and available only to those users you authorize.
- The Challenge Handshake Authentication Protocol (CHAP) and PAP support for PPP connections is supported for dial-in and LAN-to-LAN connections. So are dial-back with SecurID, Security Dynamics ACE Server backup, API for TTY-based authentication, and user-defined dial-in banners.

Outstanding Remote Networking Management

- Managing the 8235 can be accomplished from a simple network management protocol (SNMP) manager or from a Windows-based workstation that has access to the LAN, locally or remotely. You can also manage the 8235 from a command shell by using Telnet or by using an ASCII terminal as a management console.
- The IBM 8235 DIALs includes Windows software that lets you configure, monitor, and upgrade any number of 8235 units from a single, local or remote workstation. You have the option of either IP or IPX for management.
- You can also manage your 8235s by using a Simple Network Management Protocol (SNMP) manager. You can keep an activity log that records each

incoming call from beginning to end, as well as any error conditions that exist. The activity log can be easily exported to another application for more detailed analysis. The management software also provides complete status information on all 8235s on your network.

A Uniquely Flexible Product, Perfectly Suited to Today's Mobile Users

- The 8235 family of products from IBM will meet your remote networking needs. Whether you have users who occasionally work at home, travelers who need up-to-the-minute access to mail, a full telecommuting program, or clients, customers, or suppliers who need access to your network, IBM has computers, modems, and 8235 DIALs servers for you. IBM can also provide education, consulting, and services to help you decide what approach is best for you and then help you build and operate it.

Table 29. 8235: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8235	021	Token-Ring with Release 4.0 Software
8235	031	Token-Ring IMM with Release 4.0 Software
	4580	Single ISDN S/T Adapter
8235	051	2-Port DIALs Servers for LAN Remote Access Token-Ring Model
8235	022	Ethernet with Release 4.0 Software
8235	032	Ethernet IMM with Release 4.0 Software
	4580	Single ISDN S/T Adapter
8235	052	2-Port DIALs Servers for LAN Remote Access Ethernet Model

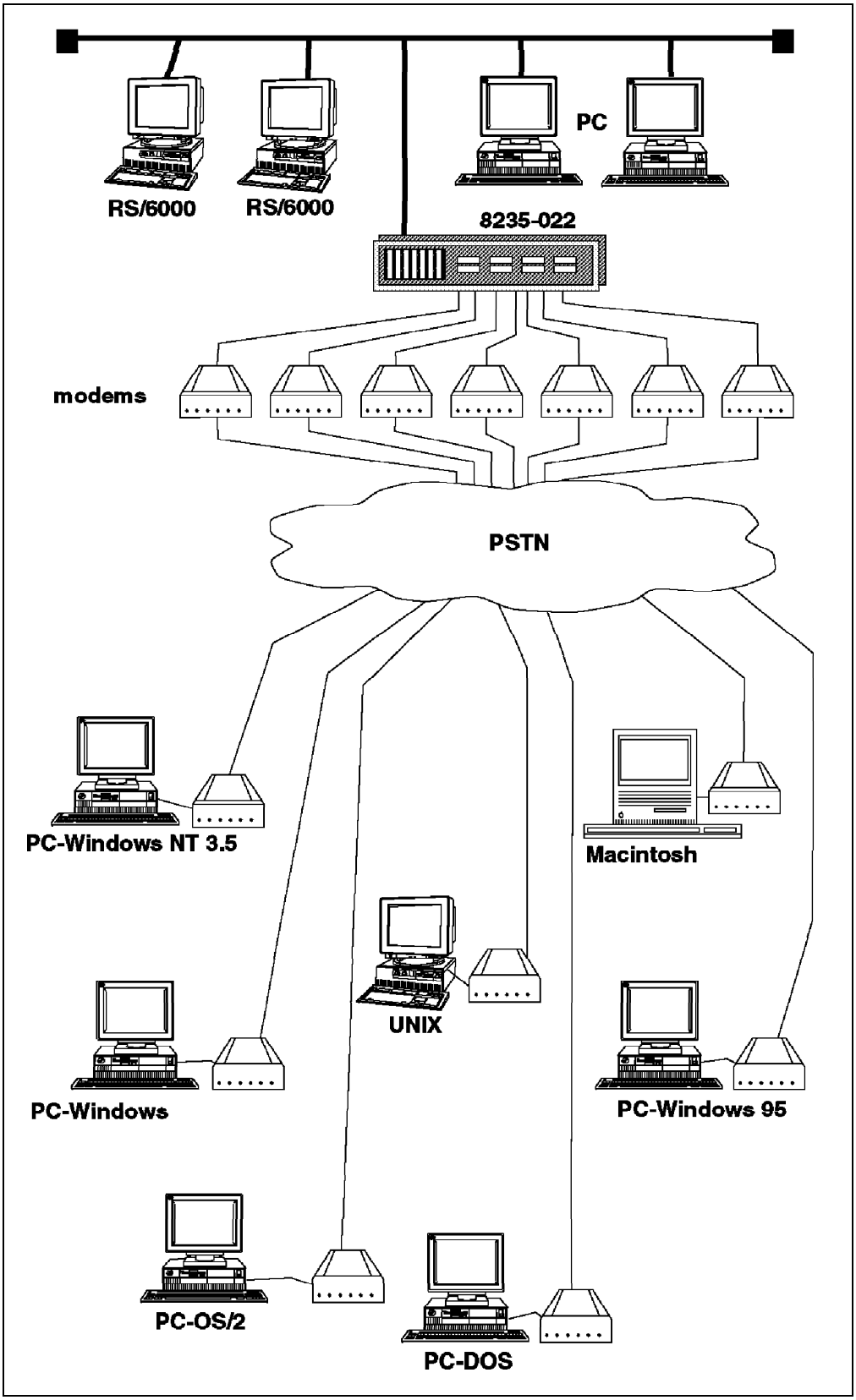


Figure 71. 8235 DIALs Server: Example of Configuration

4.5 Serial Communications Network Servers

This section discusses serial communication network servers.

4.5.1 7318 Serial Communications Network Server

The 7318 Model P10 and S20 attach asynchronous devices and parallel printers to an Ethernet that is attached to the RS/6000 and/or other systems.

The Model P10 provides serial and parallel ports for one or more RS/6000 systems using standard Ethernet LAN wiring and popular Ethernet protocols. The Model P10 serial ports support single-port burst speeds up to a rate of 115.2 thousand bits per second (Kbps), with all 16 ports expected to run at speeds over 100 Kbps (output) and 76 Kbps (input), and the parallel ports support a burst data rate of up to 100 KBps. Both are configured like native serial and parallel ports on the RS/6000. With this and other unique features, the Model P10 makes the Ethernet network transparent to users and their applications.

The IBM 7318 Model S20 provides all the functions of the P10 for asynchronous and parallel port attachment to the RS/6000 and in addition, offers connection to other IBM systems and non-IBM systems using standard Ethernet wiring, TCP/IP protocols, and 3270 terminal emulation. The IBM 7318 Model S20 also supports SNMP network management and Kerberos V.5 network security encryption applications. In addition, the 7318 Model S20 provides remote dial-in users running serial line networking protocols, SLIP, CSLIP, or PPP the same TCP/IP functionality as a user locally attached to the Ethernet network.

- The 7318 Model P10 and S20 provide the user with all the connectivity advantages of a network-attached device, including attachment to multiple RS/6000 systems, with all the dynamic configurability and functionality of a native serial and parallel port.
- The 7318 Model P10 and S20 provide high-performance serial and parallel port connectivity without requiring a separate asynchronous adapter.
- The 7318 Model S20 provides serial and parallel port connectivity to other systems in addition to RS/6000 systems, using industry-standard TCP/IP protocols and 3270 terminal emulation.
- The 7318 Model S20 provides remote dial-in users running serial line protocols, SLIP, CSLIP, or PPP, the same TCP/IP functionality as a user locally attached to the Ethernet network.
- The Network Accelerator adapters improve RS/6000 system performance by off-loading networking protocol overhead from the system processor, which results in an increase in the number of supportable users or in faster applications processing.
- The Network Accelerator adapters, in conjunction with the 7318 Model S20, provide for attachment of up to 2048 asynchronous devices to an RS/6000 per Micro Channel adapter slot.

Table 30. 7318: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
7318	P10	7318 Serial Communications Network Server Model P10
7318	S20	7318 Serial Communications Network Server Model S20
	3100	PC Parallel Printer Cable
	7900	Wall-Mount Brackets
	7901	RJ45 to RJ45 Cable
	7902	Extended RS-232D Modem Control Cable
	7903	Modem Adapter (RJ45 to DB25)
	7904	Terminal Adapter (RJ45 to DB25)
	7905	PC DB9 Adapter (RJ45 to DB9)
	7906	RJ45 to Mini DIN Adapter
	7907	RJ45 to MMJ Cable
	7908	Rack-Mount Brackets
	7909	Daisy Chain Cable/Wrap Plugs

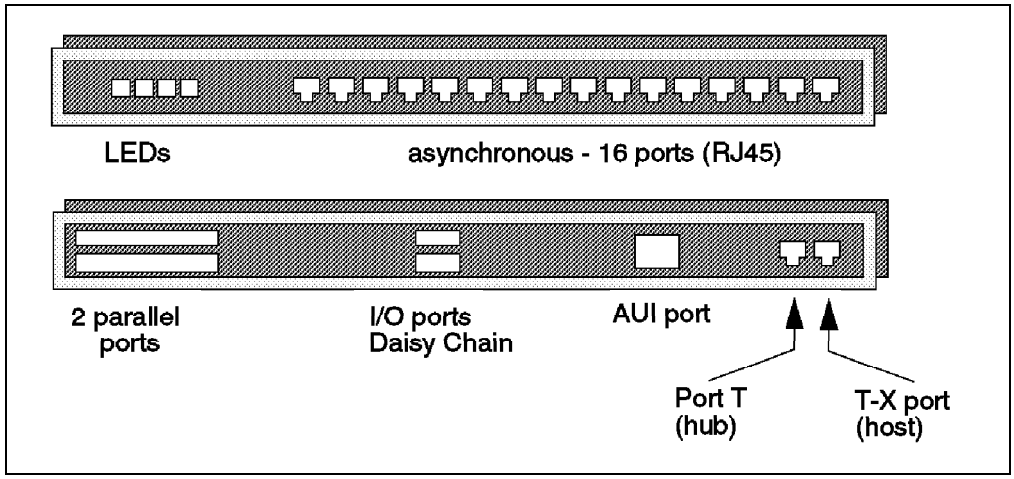


Figure 72. 7318 Serial Communications Network Server: Front and Rear Views

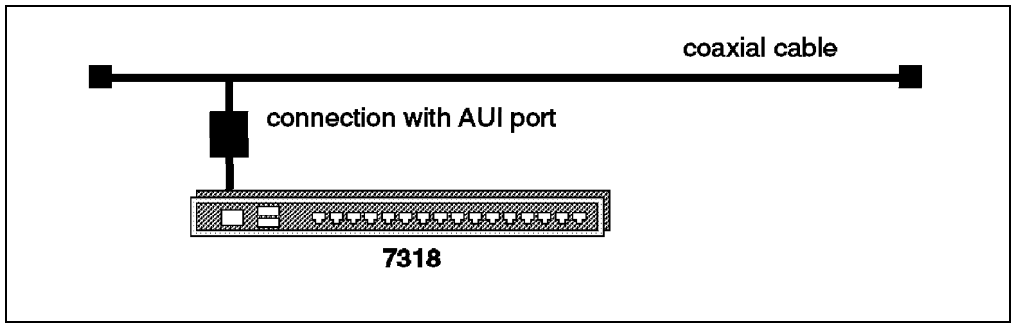


Figure 73. 7318 Serial Communications Network Server: Using AUI Port

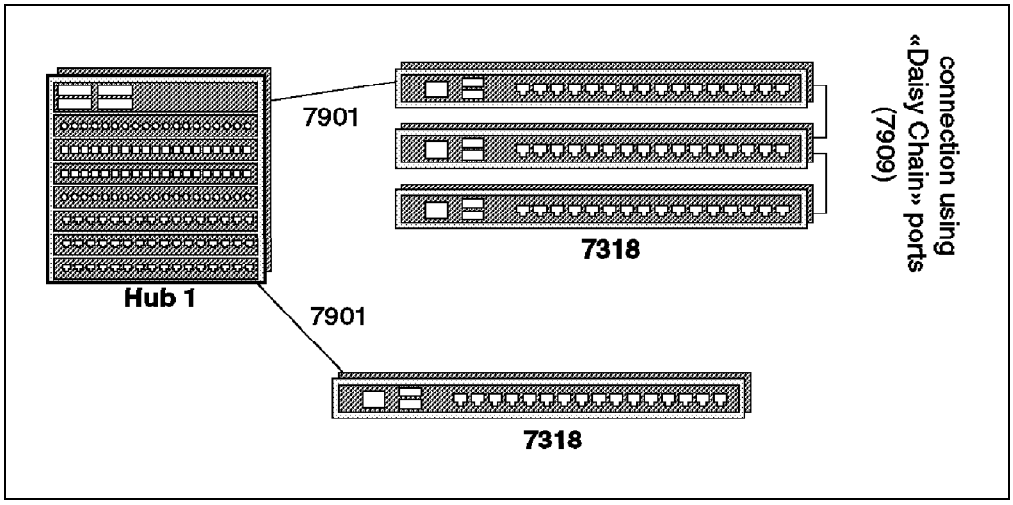


Figure 74. 7318 Serial Communications Network Server: Using Daisy Chain Port

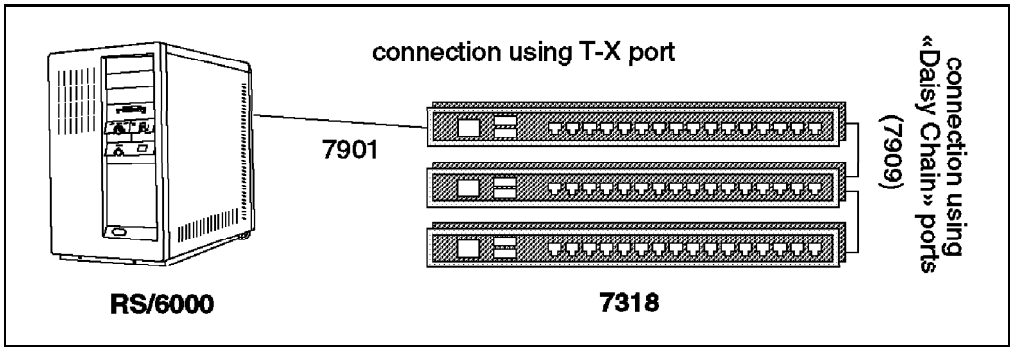


Figure 75. 7318 Serial Communications Network Server: Direct Connection

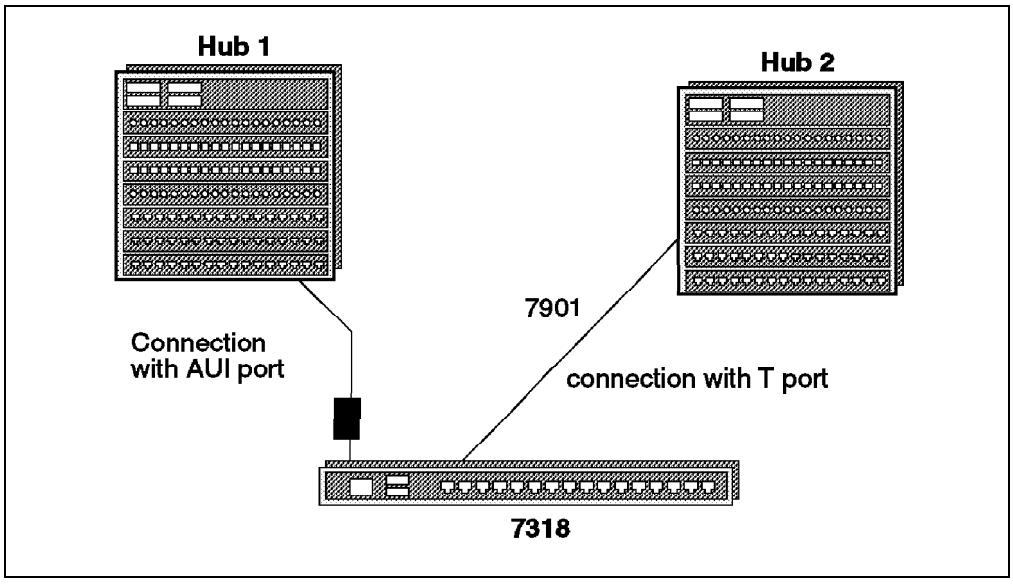


Figure 76. 7318 Serial Communications Network Server: Safe Configuration

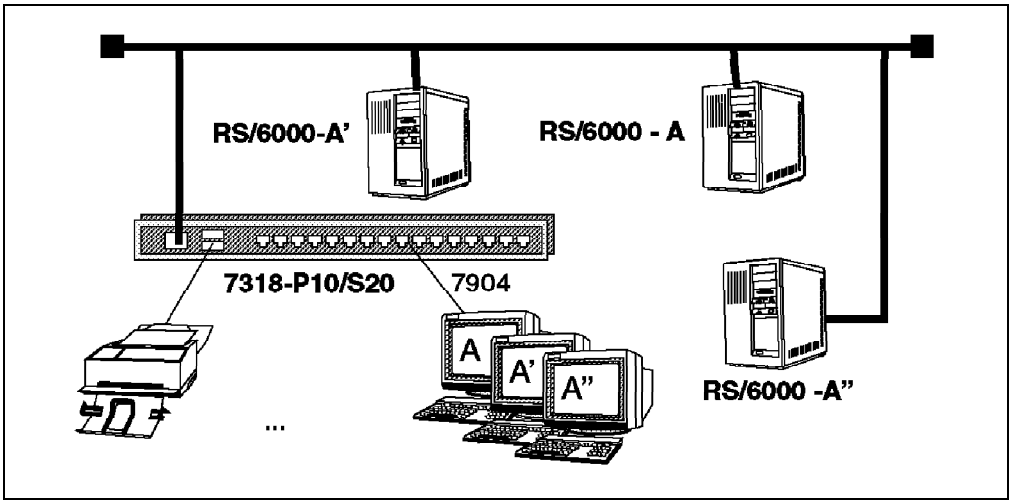


Figure 77. 7318 Serial Communications Network Server: Virtual Sessions

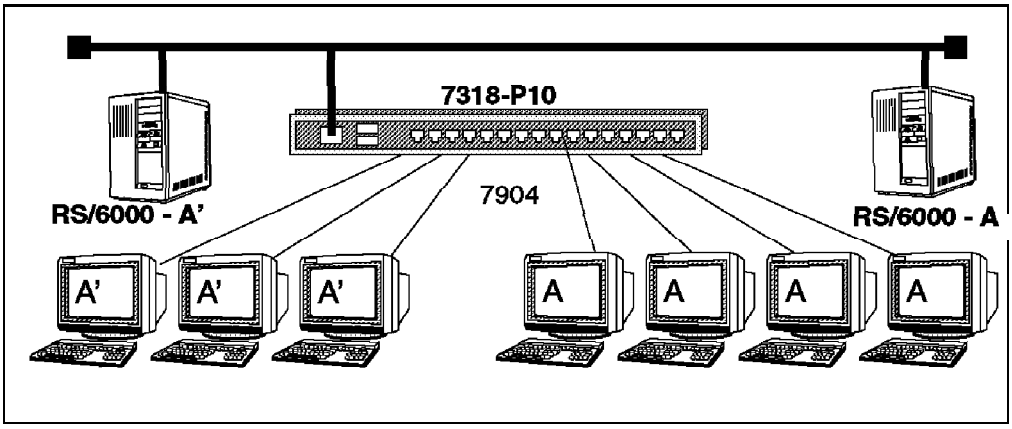


Figure 78. 7318 Serial Communications Network Server: Two Groups of Terminals

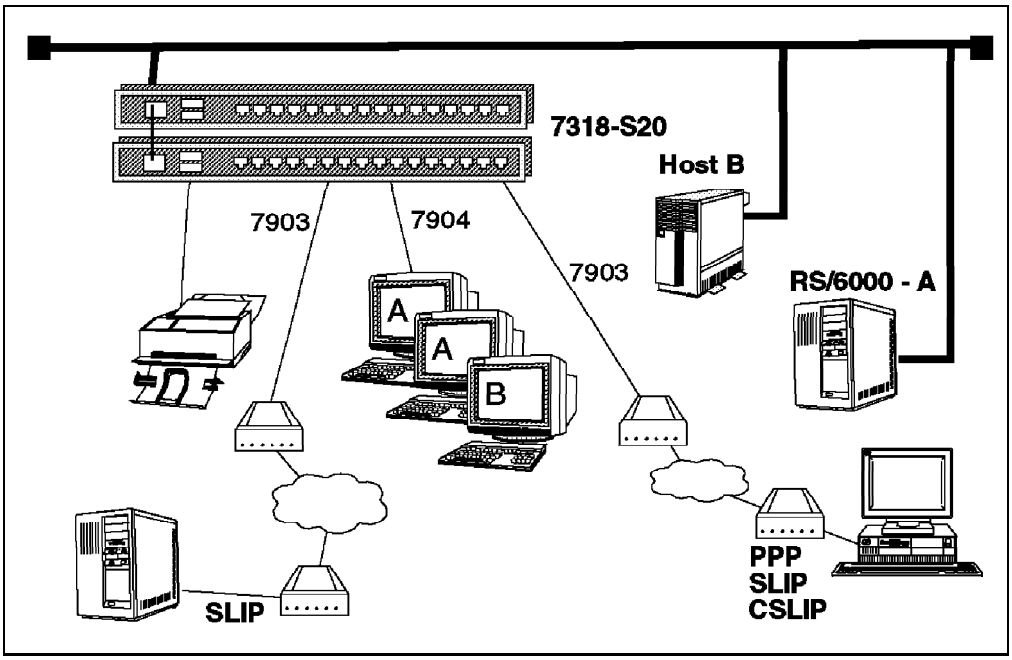


Figure 79. 7318 Serial Communications Network Server: Remote Connection

4.6 LAN Connection for Printers and Plotters

This section discusses LAN connections for printers and plotters.

4.6.1 MarkNet LAN Printer Attachment Node

The MarkNet LAN Printer Attachment Node is a product that provides direct Local Area Network connectivity for IBM PC parallel printers or EIA-232-C serial printers or plotters.

Table 31. MarkNet: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
MarkNet	001	Token-Ring, IEEE 802.5
MarkNet	002	Ethernet 10BaseT, IEEE 802.3
MarkNet	003	Ethernet 10Base2/5, IEEE 802.3

MarkNet LAN Printer Attachment Node consists of a network printer adapter and a software utility that resides on a LAN print server. The adapter contains one serial and one parallel port that can be used simultaneously to support two printers / plotters. This product is available as a Lexmark's product. IBM's previous name was: 4033-LAN Connection for Printers and Plotters.

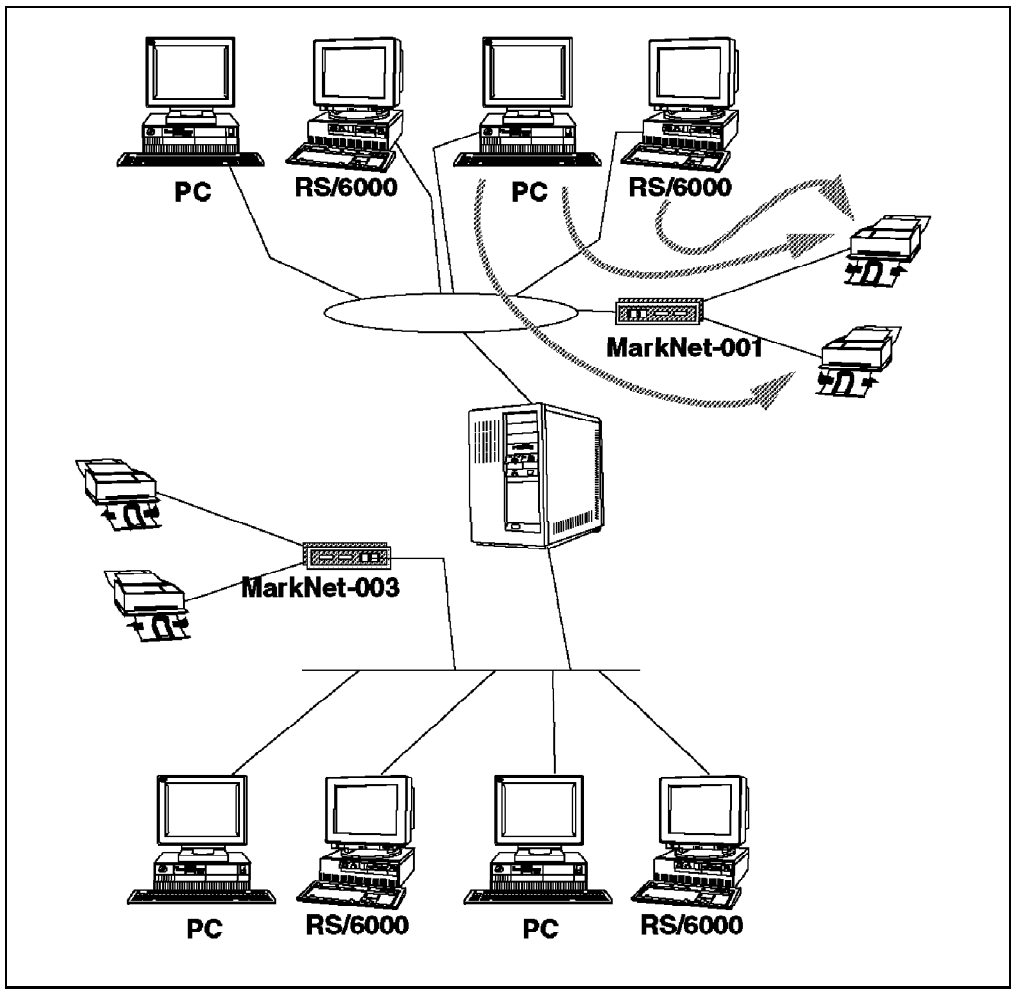


Figure 80. MarkNet LAN Printer Attachment Node

4.7 Bridges

This section discusses a variety of bridges.

4.7.1 8281 Nways ATM LAN Bridge

The 8281 Nways ATM LAN Bridge provides the link between traditional LANs, such as Ethernet and token-ring, and an ATM network.

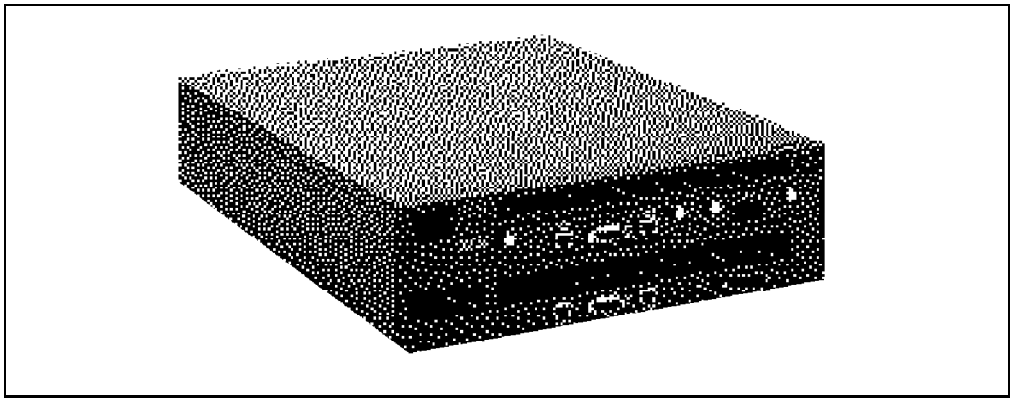


Figure 81. 8281 Nways ATM LAN Bridge

Designed for very-high-traffic applications, with extensive filtering on LAN and ATM interfaces provided to block unnecessary traffic coming from the attached LANs, the 8281 gives network managers the ability to phase ATM into their networks in an orderly fashion.

Current applications operate unaltered, with current LAN infrastructure in workstation adapters, LAN wiring, and LAN concentrators and hubs continuing to function without modification.

Network servers can be connected directly to the ATM network, freeing them from the constraint of traditional LAN attachment. Power users can be connected with 25-Mbps ATM, and it all interoperates.

The 8281 provides local bridging between LAN ports, and bridging from LAN ports to ATM using the LAN Emulation protocol.

It fully participates in source routing, allowing it to be used in complex token-ring networks that include source-route bridges. It also participates in the 802.1 spanning tree for Ethernet-bridged networks.

It has the capability of being configured to run in full-duplex operations over LAN interfaces, therefore increasing the bandwidth when connected to IBM 8271 and 8272 LAN switches. ATM is optional; so users can start getting the benefits of the bridge's multiport feature, reserving the advantages of ATM for the future.

A version of the 8281 is available as an integrated module in the 8260, providing direct connectivity to the ATM backplane. It also benefits from the redundancy and advanced management features of the 8260.

Table 32. 8281: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8281	001	Nways ATM LAN Bridge
	6800	2-Port LAN Adapter
	6812	100 MBPS ATM Adapter

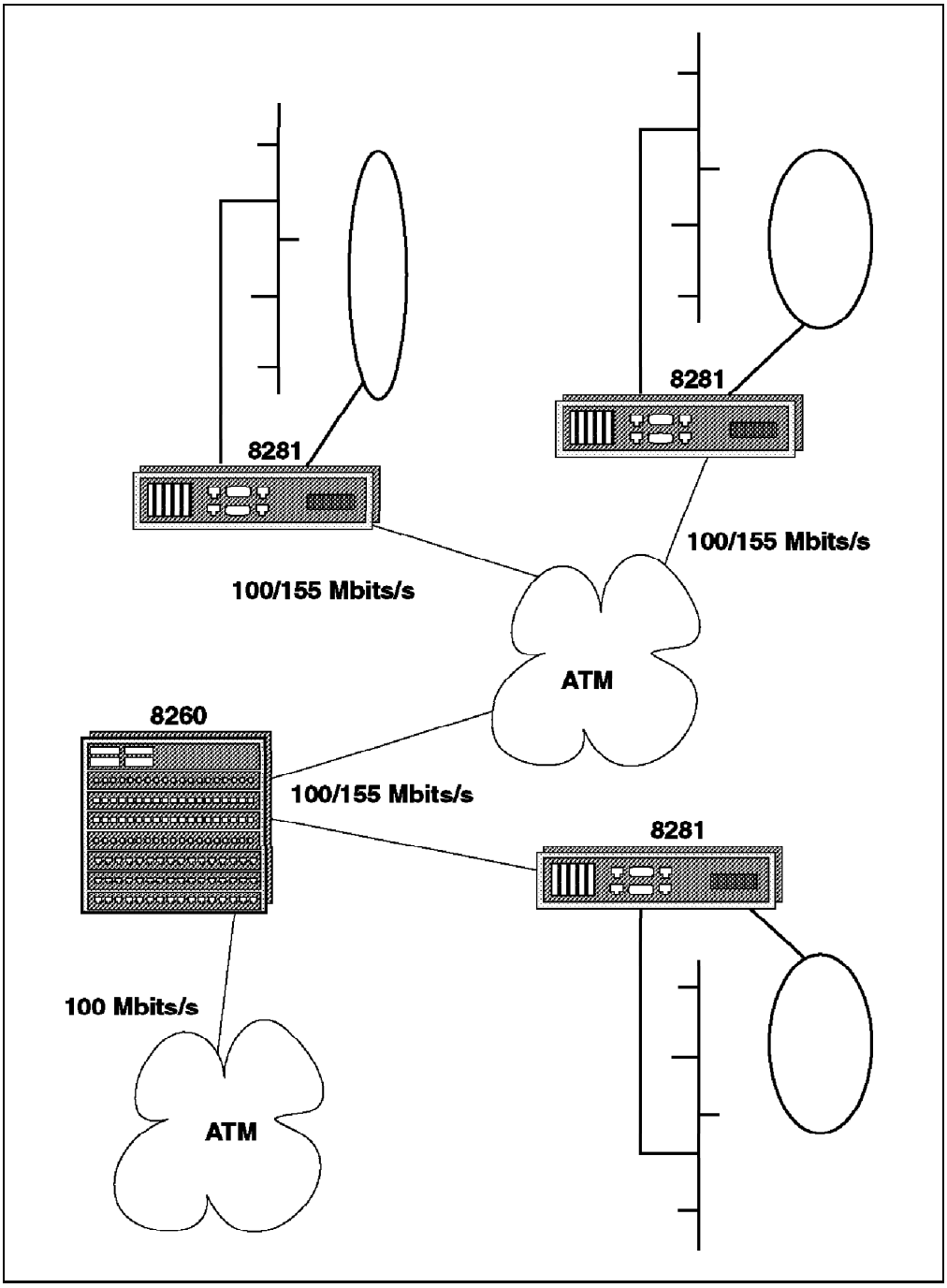


Figure 82. 8281s and 8260 Interconnected

4.7.2 8229 Bridge

The IBM 8229 Bridge is a functional enhancement and replacement for the IBM 8209, at an improved price/performance.

The 8229 is a modular, rack-mountable plug-and-play hardware bridge, supporting a maximum of two attachment modules. Three 8229 models are available:

- Model 001 provides a connection between two local token-ring segments.

- Model 002 provides a connection between a local token-ring segment and a local Ethernet segment.
- Model 003 provides a connection between a local token-ring segment and a remote token-ring segment via a wide area network (WAN) at up to T1/E1 speeds.

Enhancements to the IBM 8229 Bridge include:

- Performance improvement to media speed
- Addition of a WAN bridge, allowing a local token-ring to be connected to a remote token-ring
- Enhanced management
- Management via IBM LAN Network Manager (LNM) or a simple network management protocol (SNMP) manager, such as AIX NetView/6000
- Flash memory for code download
- RS-232 port for out-of-band code download
- Packaging changes
- Rack mountable
- All cable connections accessible from the front of the rack
- All feature modules loadable from the front of the rack

The IBM 8229 Bridge is shipped without I/O cards; customers need to order one or more cards.

Table 33. 8229: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
8229	001	8229 Bridge with dual port TR module and LNM enabled
8229	002	8229 Bridge with TR and ENET modules and LNM enabled
8229	003	8229 Bridge with TR and WAN modules and LNM enabled
	4762	Single-Port Token-Ring Module
	4763	Dual-Port Token-Ring Module
	4764	Ethernet Module
	4765	WAN Module

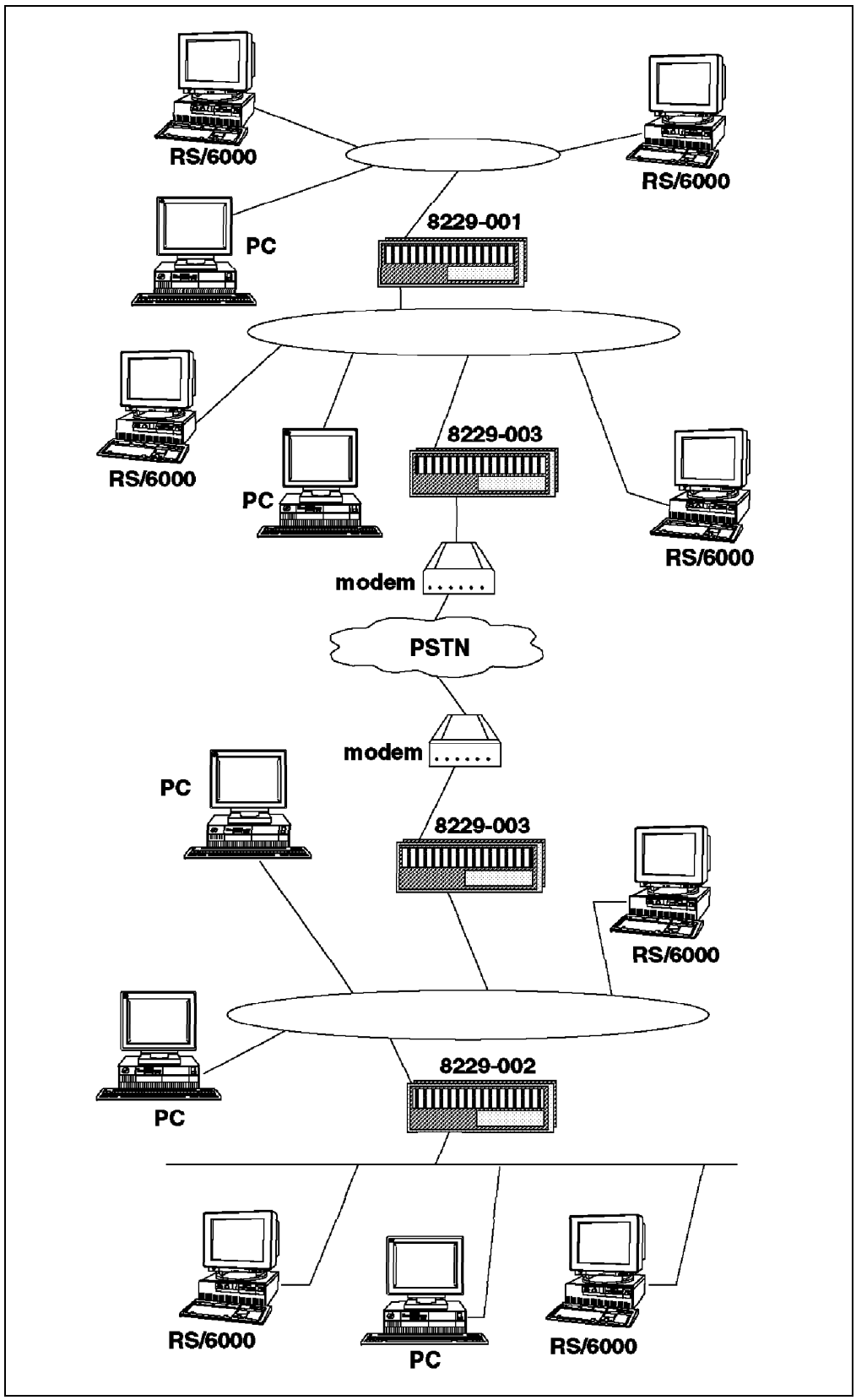


Figure 83. 8229 Bridge: Using Three Bridges

4.8 Routers

This section discusses a variety of network routers.

4.8.1 2210 Nways Multiprotocol Router

Build end-to-end multiprotocol networks with 2210 Nways Multiprotocol Router.

- Link your remote offices and regional and central host sites into a cohesive multiprotocol network using all IBM 2210 Nways Multiprotocol Routers or in combination with IBM 6611 Network Processors.
- The 2210 family of routers provides an extensive range of connectivity, protocol, and price granularity that can be tailored to fit your network design. Low-end solutions include the 2210 Models 12T and 12E, which offer one LAN and two WAN serial ports, while models 127 and 128 each provide an ISDN BRI port in addition to LAN/WAN connections.
- The new higher-end 2210 models—14T, 24T, 24E, and 24M—can double the connectivity and performance of low-end models with up to two LANs and four serial ports.

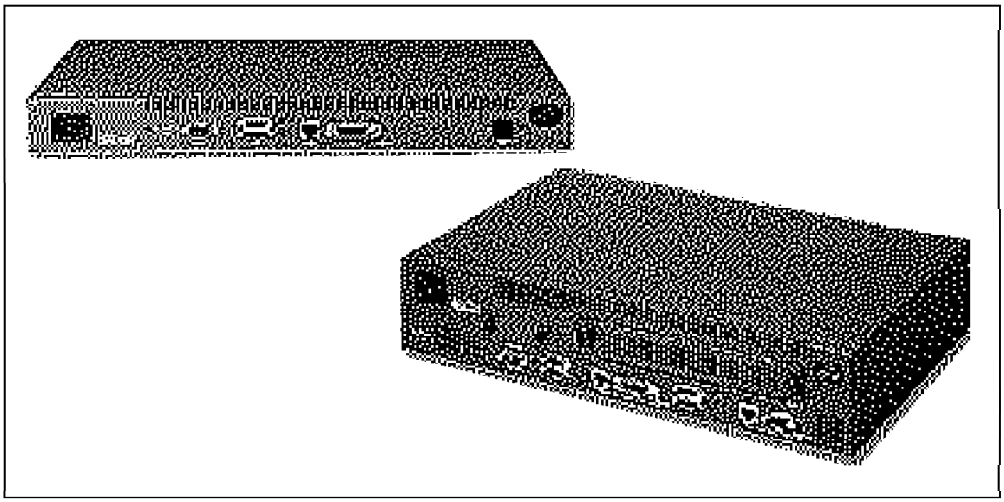


Figure 84. 2210 Nways Multiprotocol Router: Models 128 and 24M

Multiple options in a single box:

- The 2210 Nways routers come equipped with 4 MB of flash memory and 4 MB of DRAM. All models have upgradable DRAM to either 8 or 16 Mb. The higher-end models provide field upgradable flash to 8 Mb.
- All models also contain a service port supporting asynchronous communication for configuration and maintenance. Higher-end models have an optional second service port, which can also include an integrated 14.4 Kbps modem. Once you order, you can have your IP addresses and some other parameters preconfigured on your 2210 by sending a request through electronic mail. Both a menu-driven graphical configuration program and a command-line editor are provided to help you tailor your configuration image.
- In addition, the 2210's EasyStart function allows the remote router to solicit its configuration file from a server typically located at the customer's central site, using BootP client/server protocols.

Many protocols, many solutions:

- The 2210 family of routers can simultaneously transport SNA, NetBIOS, and SDLC (PU 2.0, 2.1), route TCP/IP, IPX, AppleTalk, DECnet, and Banyan VINES, and bridge whatever is left. SNA can be transported directly between a 2210 to a host-attached 3745/3746 controller or to an AS/400 by using boundary access node (BAN) support. SNA can also be transported among routers through TCP/IP by using Data Link Switching (DLSw).
- The versatile 2210s also support a variety of serial Interfaces including EIA RS232/V.24, V.35, V.36/RS449, X.21, V.25 bis, ISDN BRI, and data link controls, such as frame-relay, SDLC, PPP, and X.25. All models support the industry's open network management standard, SNMP. Management of the system can be accomplished by using SNMP managers such as IBM's SystemView for AIX and HP OpenView, with application support provided by IBM's Campus Manager LAN for AIX products.

Table 34. 2210: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
Low-end		
2210	12T	1 Token-Ring, 2 Multiple Interface Serial Ports
2210	12E	1 Ethernet, 2 Multiple Interface Serial Ports
2210	127	1 Token-Ring, 2 Multiple Interface Serial Ports, 1 ISDN BRI Port
2210	128	1 Ethernet, 2 Multiple Interface Serial Ports, 1 ISDN BRI port
Higher-end (includes open adapter slot for future connectivity enhancements)		
2210	14T	1 Token-Ring, 4 Multiple Interface Serial Ports
2210	24E	2 Ethernet, 4 Multiple Interface Serial Ports
2210	24T	2 Token-Rings, 4 Multiple Interface Serial Ports
2210	24M	1 Ethernet, 1 Token-Ring, 4 Multiple Interface Serial Ports

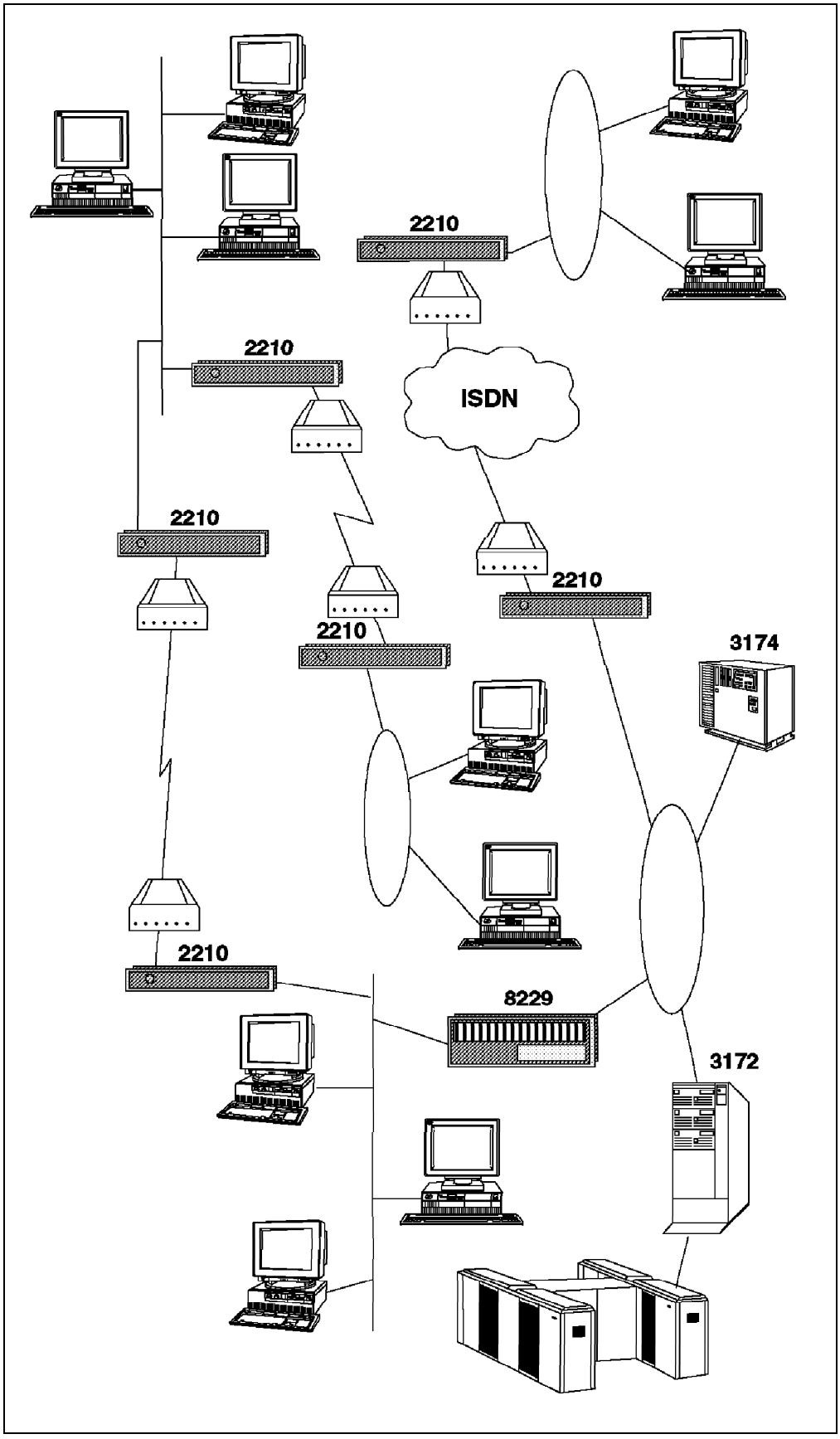


Figure 85. 2210 Nways Multiprotocol Router

4.8.2 6611 Network Processor

The IBM 6611 Network Processor is IBM's first multiprotocol, multiport router and bridge product. The hardware platform for IBM 6611 Network Processors is based on IBM's proven RISC technology. Software support for all IBM 6611 Network Processors is provided by the IBM Multiprotocol Network Program.

The IBM 6611 Network Processors, by enabling the consolidation of multiple protocols on a physical link, can reduce a customer's networking expenses.

The basic functions of the IBM 6611 Network Processors include the ability to route a wide variety of LAN protocols as well as the ability to transport SNA and NetBIOS traffic in a bridged or routed environment.

The IBM 6611 Network Processor can also act as a gateway for remote SDLC devices such as the IBM 3174 Establishment Controller. The SNMP network management agent is included in the IBM Multiprotocol Network Program. The 6611 can be managed directly by the IBM AIX Router and Bridge Manager/6000 running on the AIX NetView/6000 platform. The IBM 6611 can also be managed by other network managers that meet open networking standards for SNMP.

- Systems Management—The IBM 6611 Network Processors can reduce systems management expenses for networking facilities by enabling the consolidation of multiple networking protocols on a physical link.
- End-User Productivity—The IBM 6611 Network Processors address customer requirements for a cost-effective means of implementing new end-user applications that improve end-user productivity through LAN technologies and protocols and distributed computing models, such as client-server computing.
- Investment Protection—The IBM 6611 Network Processors, with their ability to handle a wide variety of LAN-based protocols as well as SNA, enable customers to protect the significant investment they have made in application development, personnel training, and computing and networking hardware.
- Growth Enablement—Application growth is no longer constrained by the expense of implementing and maintaining multiple physical networks to support the wide variety of LAN protocols underlying the rich array of LAN-based personal computer and workstation applications.
- Business Solutions—The IBM 6611 Network Processors, with their ability to handle a wide variety of LAN protocols, enable business solutions to be developed to meet unique end-user requirements with minimal consideration of, and constraint imposed by, the underlying networking protocols.

Table 35. 2210: Machine Type, Model, Feature Number, and Description

Machine Type	Model / Feature Number	Description
6611	120	Network processor: low-priced entry ten predefined fixed configuration options
6611	125	Network processor: low-end two adapter features
6611	145	Network processor: mid-range four adapter features
6611	175	Network processor: high-end seven adapter features

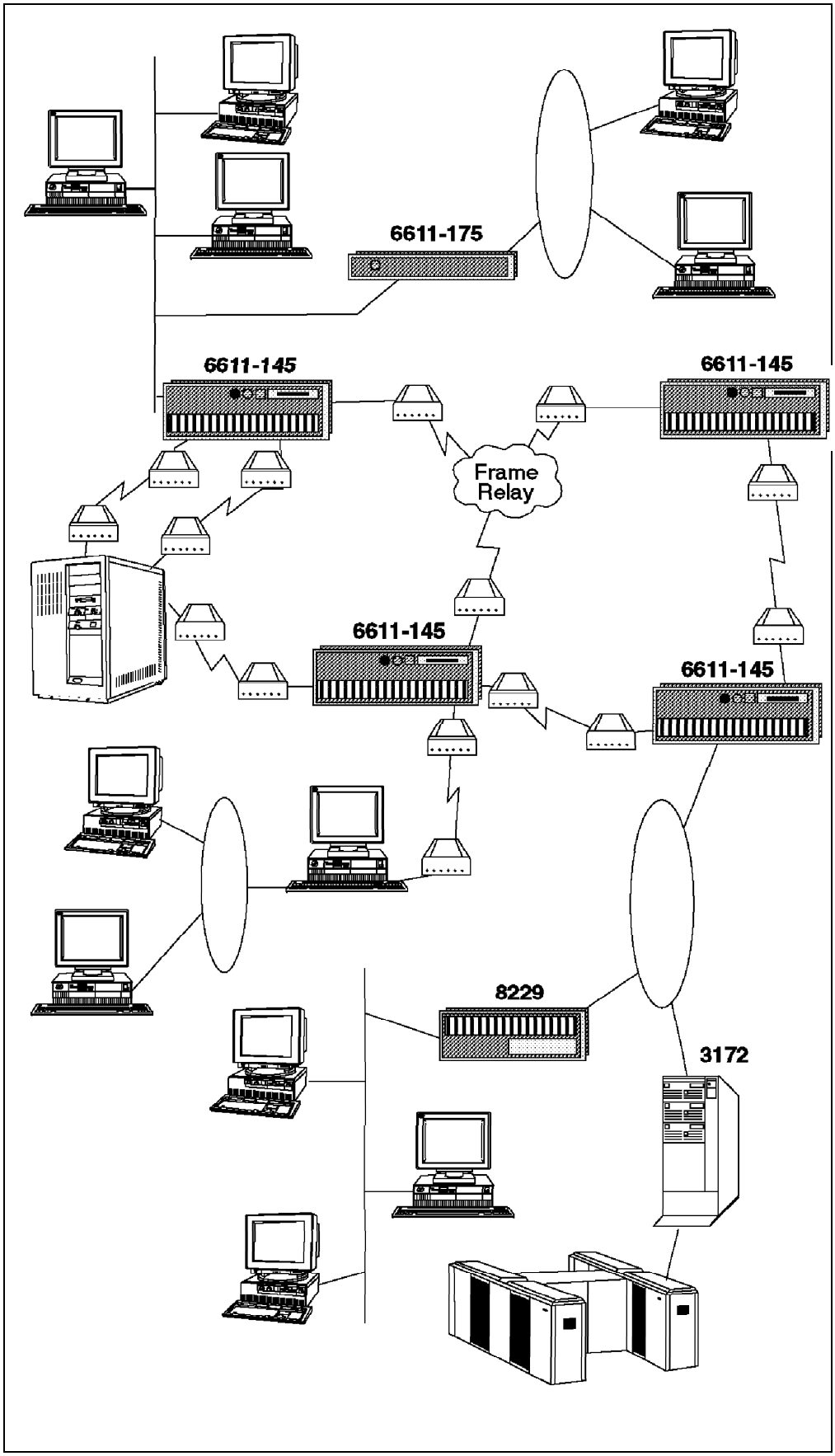


Figure 86. 6611 Network Processor

Chapter 5. RS/6000 Communication Adapters Offering

This chapter describes all the IBM, and a few nonIBM, adapters provided on the RS/6000 platform. At the beginning of this chapter, tables list the technical characteristics of these adapters.

The Internet can help you

You can find more information on the WWW at this address:

`http://www.austin.ibm.com`

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

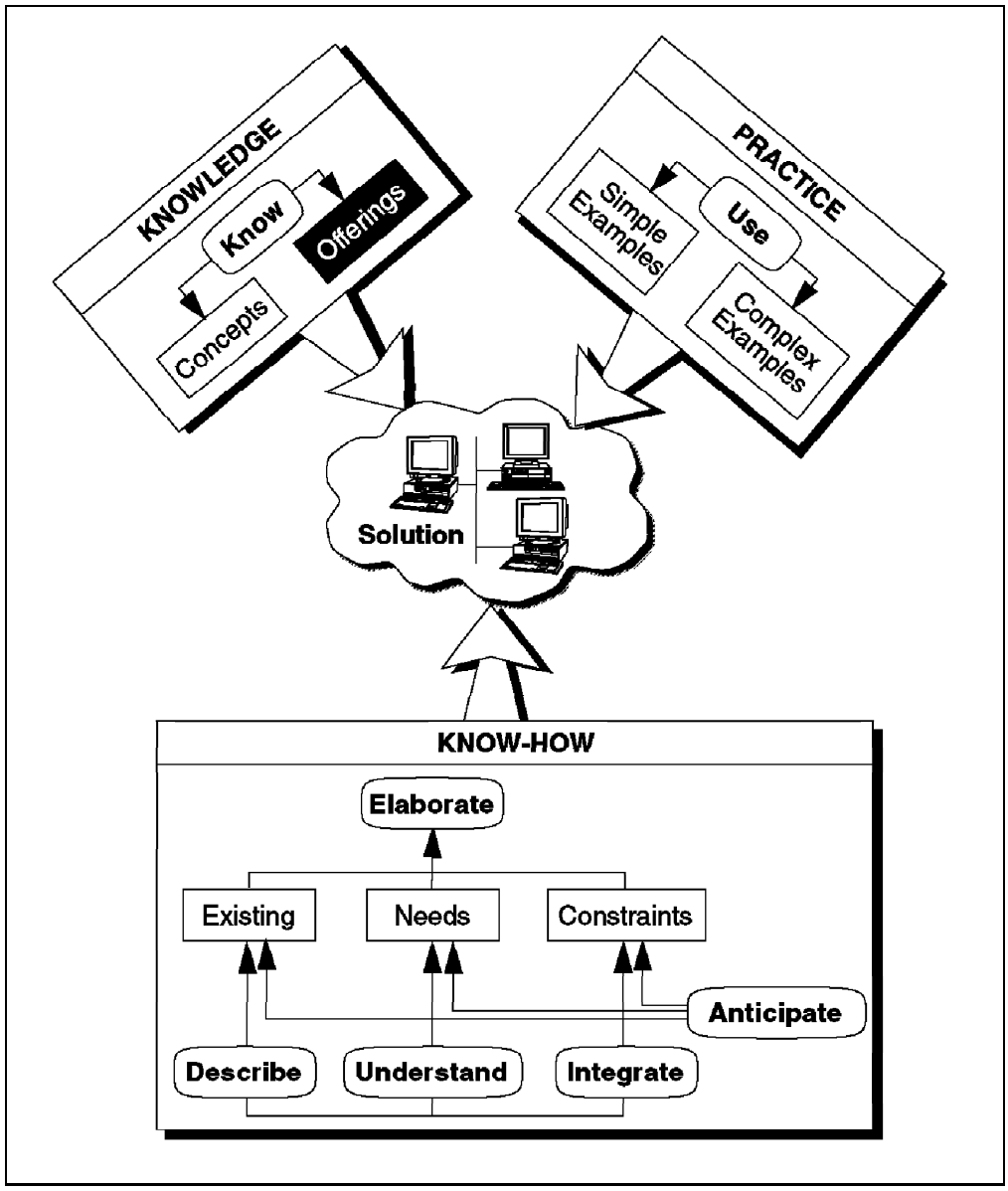


Figure 87. Position of Chapter 5 in Solution Design

5.1 Overview

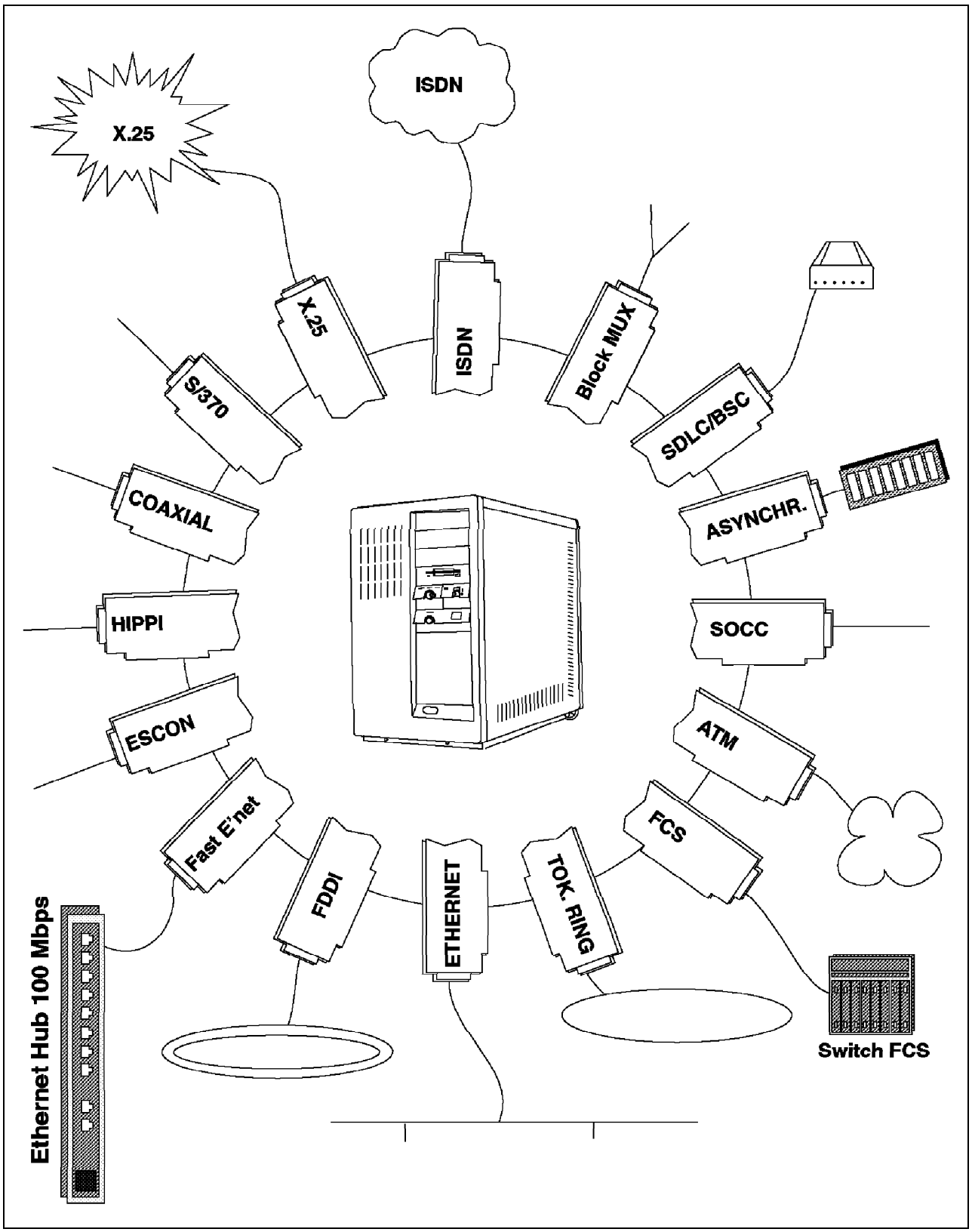


Figure 88. Overview of RS/6000 Adapters

Table 36. Asynchronous Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	# Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
8-port Async Adapter	2930	MCA	1	8	Yes	Yes	V24/EIA232D
8-port Async Adapter	2931 8207(2)	ISA	1	8	Yes	Yes	V24/EIA232D
16-port Async Adapter	2955 2956	MCA	1	16	Yes	Yes	V24/EIA232D
64-port Async Adapter	6400	MCA	1	64	Yes	Yes	V24/EIA232D
128-port Async Adapter	8128 8127	MCA	1	128	Yes	Yes	V24/EIA232D
128-port Async Adapter	2933	ISA	1	128	Yes	Yes	V24/EIA232D
8-port Async Adapter	2940	MCA	1	8	Yes	Yes	V24/EIA422A
8-port Async Adapter	2932	ISA	1	8	Yes	Yes	V24/EIA232D V24/EIA422A
16-port Async Adapter	2957	MCA	1	16	Yes	Yes	V24/EIA422A

Table 37. Token-Ring Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	# Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
Token-Ring High-Perf.	2970 9970	MCA	1	1	Yes	Yes	D-Shell
Token-Ring LANstreamer	2972	MCA	1	1	Yes	Yes	RJ45
Token-Ring (short)	2971 2973 8209 (2)	ISA	1	1	Yes	Yes	D-Shell RJ45
Token-Ring LANstreamer	2979	PCI	1	1	Yes	Yes	RJ45
Token-Ring - 3COM	8246	PCI	1	1	Yes	Yes	RJ45
Token-Ring Credit Card	7092	PCM CIA	1	1	No	No	D-Shell
Token-Ring	8042 8043 8044	PCM CIA	1	1	Yes	No	D-Shell

Note

- (2) Only available for the 43P/43S Models

Table 38. FDDI Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	# Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
FDDI - Single-Ring	2720	MCA	1	1	Yes	No	FDDI opt. interf.
FDDI - Dual-Ring	2722	MCA	1	1	Yes	No	FDDI opt. interf.
FDDI - Single-Ring	2724	MCA	1	1	Yes	Yes	FDDI opt. interf.
FDDI - Dual-Ring	2723	MCA	1	1	Yes	Yes	FDDI opt. interf.
FDDI - Single-Ring	2725	MCA	1	1	Yes	Yes	FDDI cop. inter.
FDDI - Dual-Ring	2726	MCA	1	1	Yes	Yes	FDDI cop. inter.

Table 39. X.25 Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	# Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
X.25 Interface Co-Processor/2	2960	MCA	1	1	Yes	Yes	V24/EIA232D, X21, V35
X.25 Interface Co-Processor/2	2961 2962 8211 (2)	ISA	1	1	Yes	Yes	V24/EIA232D, X21, V35
ARTIC: PortMaster 1 Mo	7006	MCA	1	6/8	Yes	Yes	V24/EIA232D, X21, V35
ARTIC: PortMaster 2 Mo	7008	MCA	1	6/8	Yes	Yes	V24/EIA232D, X21, V35
ARTIC 960:1 Mo	2921	MCA	1	6/8	Yes	Yes	V24/EIA232D, X21, V35, V36
ARTIC 960: 2 Mo	2924	MCA	1	6/8	Yes	Yes	V24/EIA232D, X21, V35, V36
ARTIC 960: 8 Mo	2928	MCA	1	6/8	Yes	Yes	V24/EIA232D, X21, V35, V36

Note

- (2): Only available for the 43P/43S Models

Table 40. Ethernet Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
Ethernet	2980 9980	MCA	1	1	Yes	Yes	10 Base 5 10 Base 2
Ethernet (integrated)	4221 9000	MCA	1	1	Yes	Yes	10 Base 5 10 Base 2
Ethernet (integrated)	4222 9001	MCA	1	1	Yes	Yes	10 Base T
Ethernet	2992	MCA	1	1	Yes	Yes	10 Base 5 10 Base T
Ethernet	2993	MCA	1	1	Yes	Yes	10 Base 2
Ethernet	2987	PCI	1	1	Yes	Yes	10 Base 5 10 Base T
Ethernet	2985	PCI	1	1	Yes	Yes	10 Base 2 10 Base T
Ethernet 10/100 OEM	8242	PCI	1	1	Yes	Yes	10 Base T
Ethernet (short)	2981 2982 8210 (2)	ISA	1	1	Yes	Yes	10 Base 5 10 Base 2 10 Base T
Ethernet OEM	8241	ISA	1	1	Yes	Yes	10 Base 5 10 Base 2
Ethernet OEM	8241	ISA	1	1	Yes	Yes	10 Base 2 10 Base T
Ethernet	std	PCM CIA	1	1	No	No	10 Base 5
Ethernet	8022 8023 8024	PCM CIA	1	1	Yes	Yes	10 Base 2
Ethernet	8032 8033 8034	PCM CIA	1	1	Yes	Yes	10 Base T
Network Accelerator Terminal/256 sessions	2402 2406	MCA	1	1	No(1)	Yes	10 Base 5
Network Accelerator Terminal/2048 session	2403 2407	MCA	1	1	No(1)	Yes	10 Base 5

Notes

- (1): Support is provided starting from AIX V.4.1.5.
- (2): Only available for the 43P/43S Models.

Table 41. Synchronous Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
1-port Multiprotocol	2959	MCA	1	1	Yes	Yes	V24/EIA232D
4-port Multiprotocol	2700	MCA	1	4	Yes	Yes	V24/EIA232D, X21, V35
4-port Multiprotocol	2701	ISA	1	4	Yes	Yes	V24/EIA232D, X21, V35

Table 42. Host Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
3270 Connection WW	2990	MCA	1	1	Yes	Yes	Coaxial interf.
3270 Connection USA	2991	MCA	1	1	Yes	Yes	Coaxial interf.
S/370 Channel Emul.	2759	MCA	1	1	Yes	No	S/370 interf.
S/390 ESCON Ctr Unit	2756	MCA	2	1	Yes	Yes	ESCON interf.
S/390 ESCON Emul.	2754	MCA	1	1	Yes	No	ESCON interf.
Block Multiplex. Chan.	2755	MCA	1	1	Yes	Yes	BMPX interface

Table 43. Fibre Channel Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
Fiber Channel/266	1906	MCA	1	1	No	No	FCS Interface
Fiber Channel/1063	1904+ 1902	MCA	1	1	Yes	Yes	FCS Interface

Table 44. ATM Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
Turboways 100 ATM	2984	MCA	1	1	Yes	Yes	ATM interface
Turboways 155 ATM	2989	MCA	1	1	Yes	Yes	ATM interface

Table 45. HIPPI Adapter Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
HIPPI Channel	2735	MCA	5	1	Yes	Yes	HIPPI interface

Table 46. SOCC Adapter Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
SOCC	2860	MCA	1	2	No	No	SOCC interface

Table 47. Twinax Adapters Abstract

	Feature code (initial order or MES)	MCA /ISA PCI/PCMCIA	#Slots required	#Ports available	Supported on AIX 4.1	Supported on AIX 4.2	Interface(s) available
DCI (Development Concepts Inc.) - Phone: (215) 443-9652 - Fax: (215) 674-0607							

5.2 Asynchronous Adapters

5.2.1 Asynchronous EIA-232 - Standard Ports - Uniprocessor

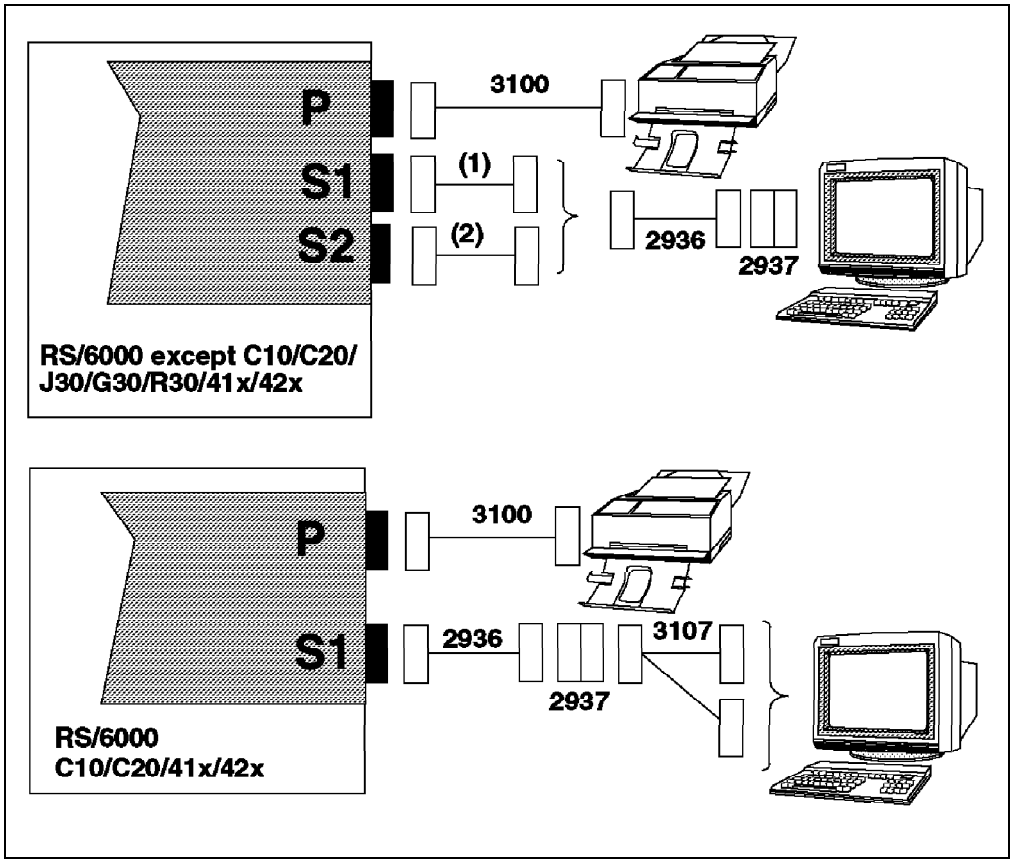


Figure 89. Asynchronous EIA-232 - Standard Ports on Uniprocessor

Table 48. Asynchronous Standard Ports: Features and Cables

Feature	Description	Length	
		m	ft
S1/S2	**2 Standard serial ports**		
3100	PC parallel printer cable	3	10
(1)	Serial port jumper cable (two provided with each system models 32x, 52x, 53x, and 550)	0.09	0.33
(2)	Serial port jumper cable (two provided with each system models 930 and 950)	3	10
3107	Serial port jumper cable feature that makes the second serial port available from a single serial port connector on the back (C10/C20/41x/42x)	0.17	0.57
2936	Asynchronous Cable EIA-232/V.24	3	10
2937	Printer/Terminal Interposer - EIA-232	0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)	3	10

5.2.2 Asynchronous EIA-232 - Standard Ports - Multiprocessors

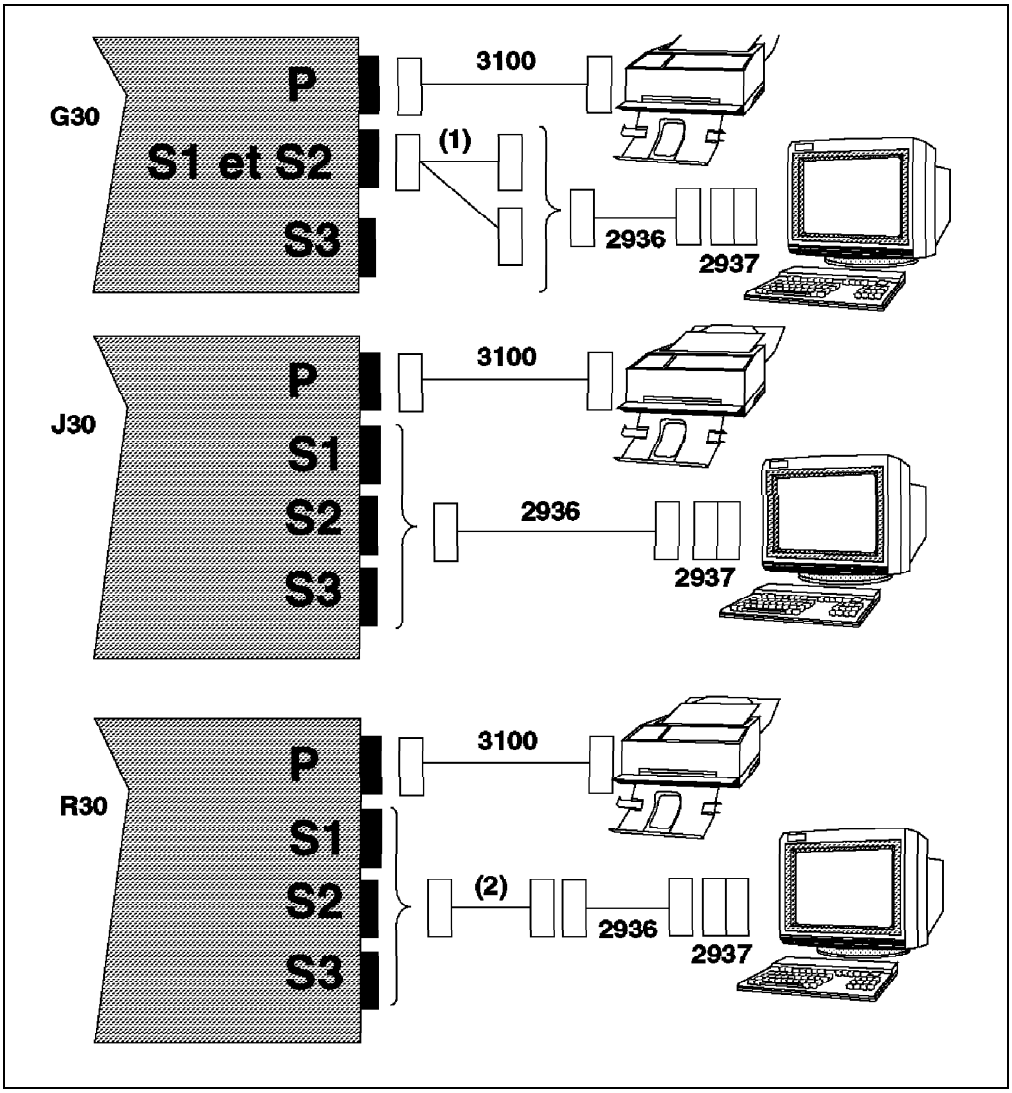


Figure 90. Asynchronous EIA-232 - Standard Ports on Multiprocessors

Table 49. Asynchronous Standard Ports: Features and Cables

Feature	Description	Length	
		m	ft
3100	PC parallel printer cable	3	10
(1)	Serial port jumper cable feature that makes the second serial port available from a single serial port connector on the back of the system unit (supplied with the system unit).	0.17	0.57
(2)	Serial port jumper that converts from a 9-pin D-Shell connector to a 25-pin D-Shell (supplied with the system unit).		
2936	Asynchronous Cable EIA-232/V.24	3	10
2937	Printer/Terminal Interposer - EIA-232	0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)	3	10

5.2.3 2930 - 8-Port Asynchronous Adapter - EIA-232 - MCA

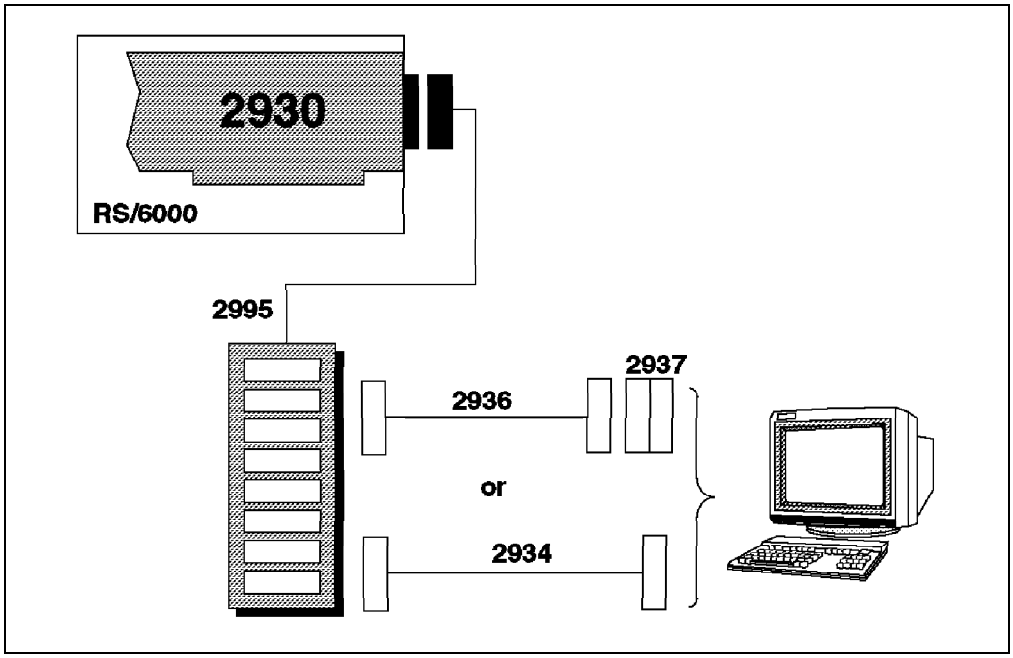


Figure 91. 2930 - 8-Port Asynchronous Adapter - EIA-232 - MCA

Table 50. 2930: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2930	**8-Port Asynchronous Adapter - EIA-232**	**MCA**		
2995	Multiport Interface Cable		3	10
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10

Information

- Supported on AIX V4.1 and AIX V4.2.

5.2.4 2931 - 8-Port Asynchronous Adapter - EIA-232 - ISA

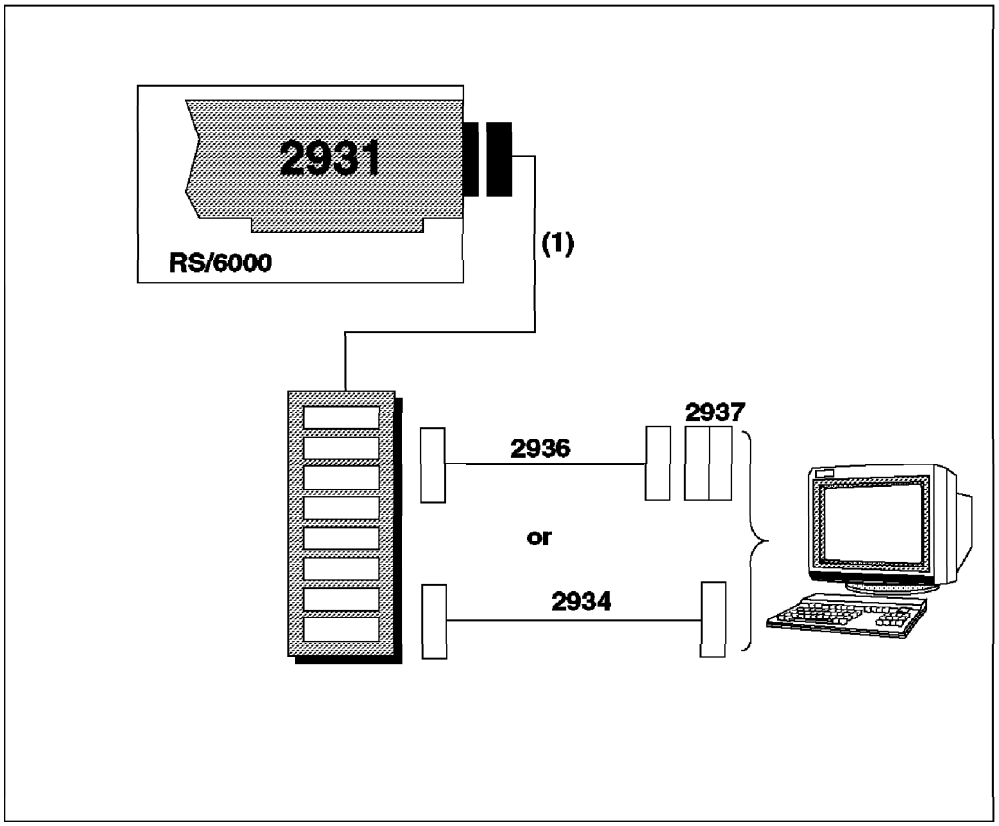


Figure 92. 2931 - 8-Port Asynchronous Adapter - EIA-232 - ISA

Table 51. 2931: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2931	**8-Port Asynchronous Adapter - EIA-232**	**ISA**		
(1)	Multiport Interface Cable (shipped with the adapter)		3	10
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10

Information

- This adapter provides the same function and interface as the MCA version (2930).

5.2.5 2955 - 16-Port Asynchronous Adapter - EIA-232 - MCA

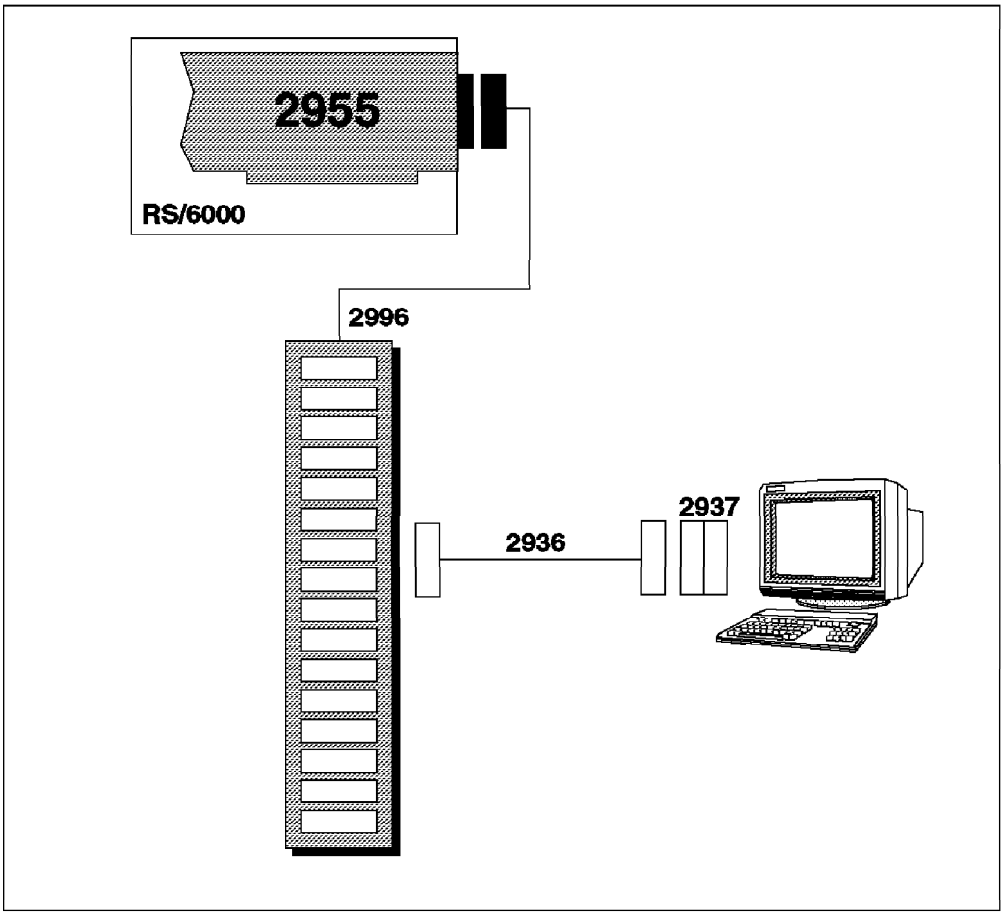


Figure 93. 2955 - 16-Port Asynchronous Adapter - EIA-232 - MCA

Table 52. 2955: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2955	**16-Port Asynchronous Adapter - EIA-232**	**MCA**		
2956	**option 16-Port Asynch. Adapter (25S, C10)**	**MCA**		
2996	16-Port Interface Cable - EIA-232		3	10
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10

Information

- Supported on AIX V4.1 and AIX V4.2.

5.2.6 6400 - 64-Port Asynchronous Controller - MCA

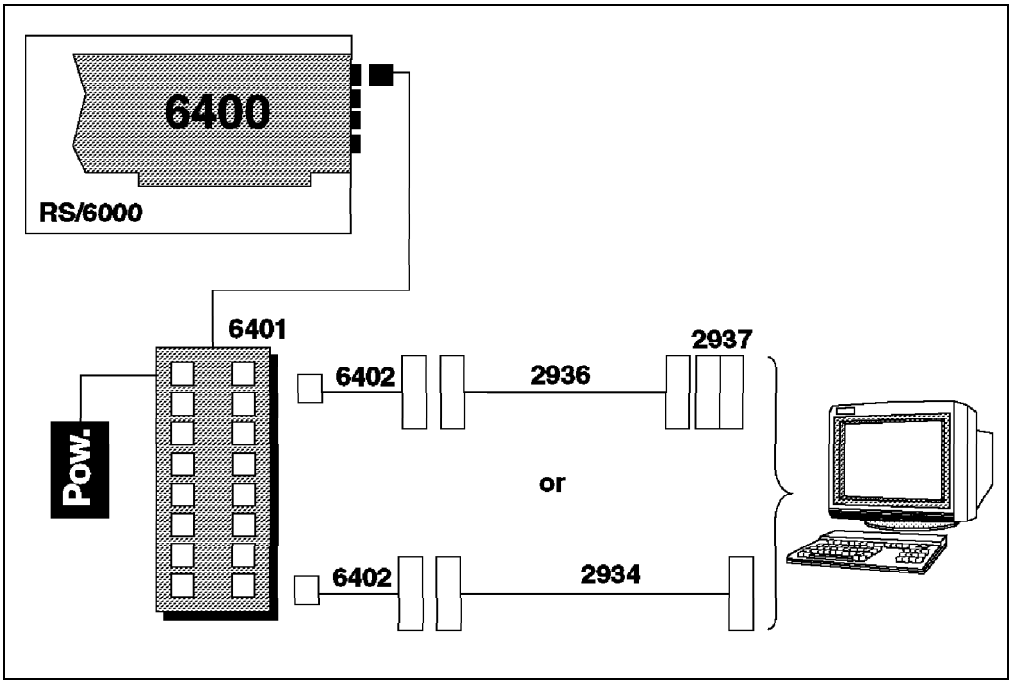


Figure 94. 6400 - 64-Port Asynchronous Controller - MCA

Table 53. 6400: Features and Cables

Feature	Description	Bus	Length	
			m	ft
6400	**64-Port Async Controller**	**MCA**		
6401	16-Port Async Concentrator Remote Async Node EIA-232		7.6	25
6402	RJ-45 to DB-25 Converter Cable		0.45	1.5
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10

Information

- The above features are withdrawn.
- Not supported on SMP.
- Supported on AIX V4.1 and AIX V4.2.

5.2.7 8128 - 128-Port Asynchronous Controller -MCA

Table 54. 8128: Features and Cables

Feature	Description	Bus	Length	
			m	ft
8128	**128-Port Asynchronous Controller**	**MCA**		
8127	**Option 128-Port Asynchronous Controller (25S, C10)**			
8131	128-Port Asynchronous Controller Cable, 8 wire		4.57	15
8132	128-Port Asynchronous Controller Cable, 8 wire		0.23	9 in.
8133	RJ-45 to DB-25 Converter Cable (four provided with each order)		0.61	2
8134	Remote Asynchronous Node 16-Port EIA-232 (worldwide)		-	-
8130	Remote Asynchronous Node 16-Port EIA-232 (USA)		-	-
8136	Rack-Mountable, Remote Asynchronous Node 16-Port EIA-232 (worldwide)		-	-
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10
(1)	128-Port Asynchronous Controller Cable, 4-wire			
(2)	128-Port Asynchronous Controller EIA-232 Modem cable, system			
(3)	128-Port Asynchronous Controller EIA-232 Modem cable, device			
(4)	128-Port Asynchronous Controller EIA-422 Modem cable, system			
(5)	128-Port Asynchronous Controller EIA-422 Modem cable, device			
(6)	Controller line terminator (includes with controller)			
8135	64-Port to 128-Port Pin-Out Converter			

Information

- Only **one pair** of synchronous modems is allowed per controller line.
- Attention, when you use remote connection, the speed of the whole chain is the speed of the remote line.
- The 128-Port Asynchronous Controller supports **up to four** Remote Asynchronous Nodes on each controller line.

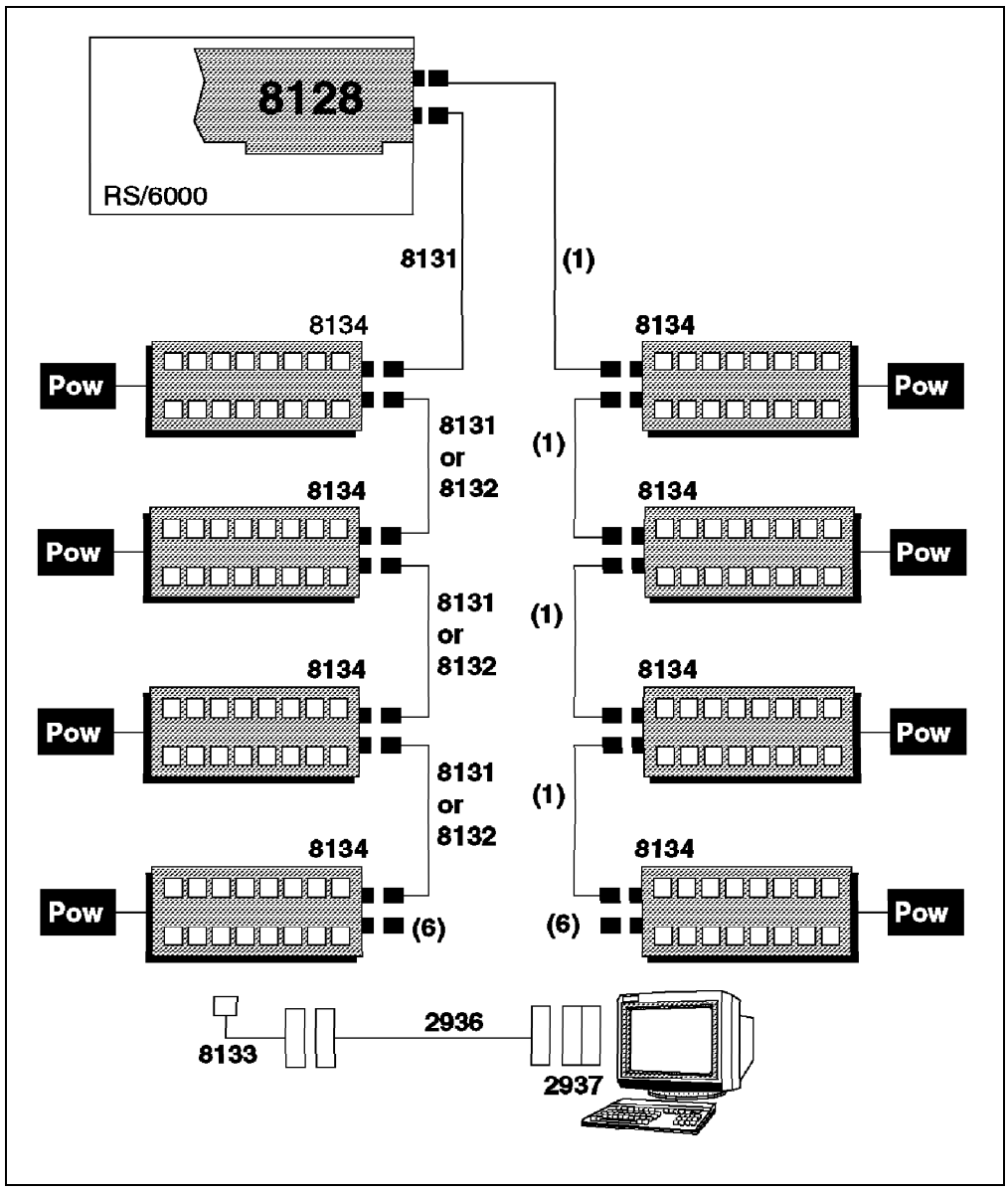


Figure 95. 8128 - 128-Port Asynchronous Controller - MCA: Local Configuration

Information

- Remote Asynchronous Nodes are used in local as simple concentrators.
- This configuration is interesting when asynchronous cabling is already installed.
- The price ratio (# of terminals / cabling cost) is very interesting, especially if you make your own cables.
- You can plug multiplexers onto the Remote Asynchronous Node.

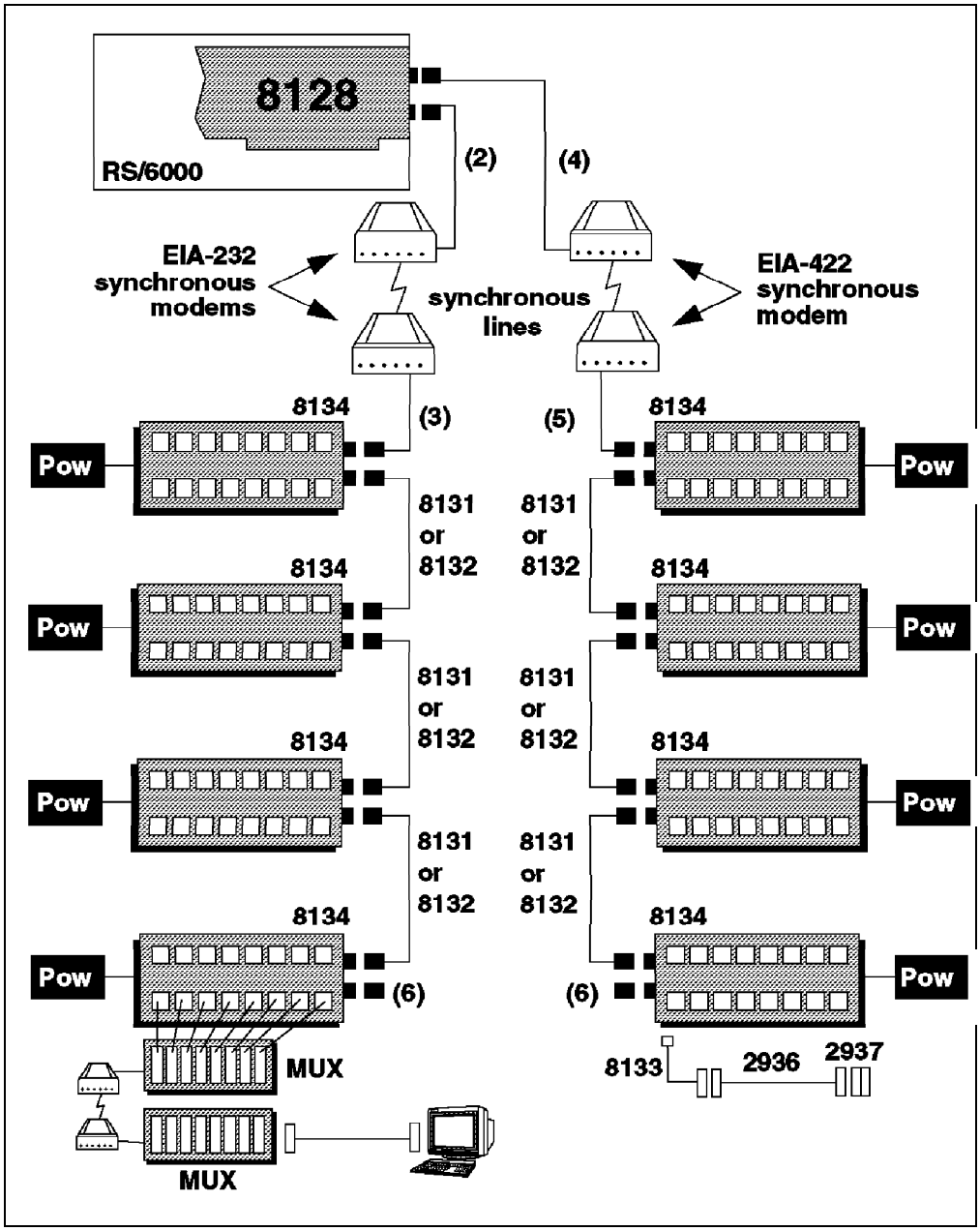


Figure 96. 8128 - 128-Port Asynchronous Controller - MCA: Remote Configuration

Information

- Remote Asynchronous Node are used as multiplexers.
- Only **one pair** of synchronous modems is allowed per controller line, but you can plug multiplexers on the Remote Asynchronous Node and address others remote sites.
- This configuration is not very safe because if the first modem on the line or the first RAN is out of use, all terminals on this line are stopped!
- With high-speed lines (>19.2 Kbps), it's necessary to add an interface convertor onto each line between the adapter and modem.

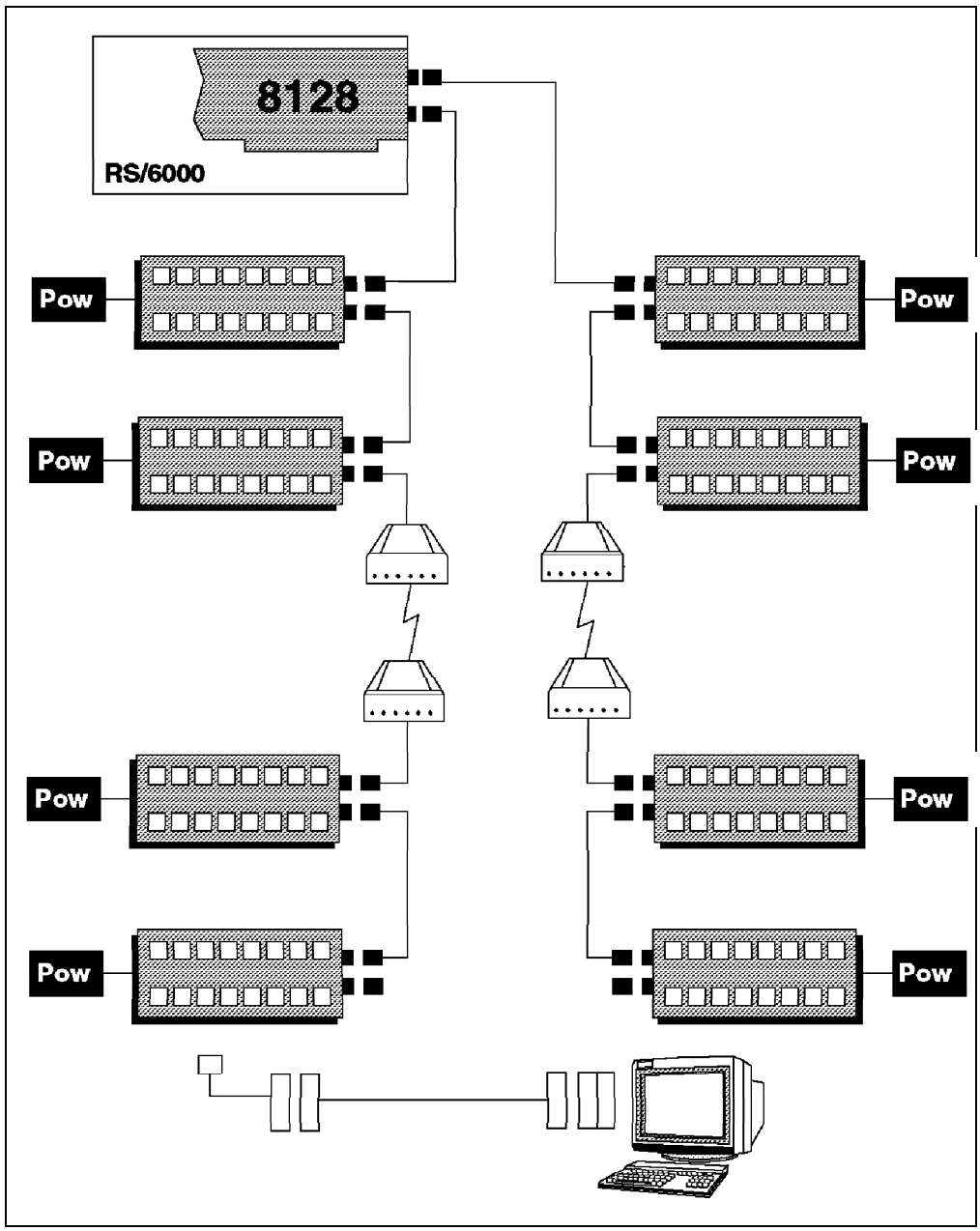


Figure 97. 8128 - 128-Port Asynchronous Controller - MCA: Mixed Configuration

Information

- Attention, when you use a remote connection, the speed of whole chain is the speed of the remote line. So this configuration is possible, but not recommended!

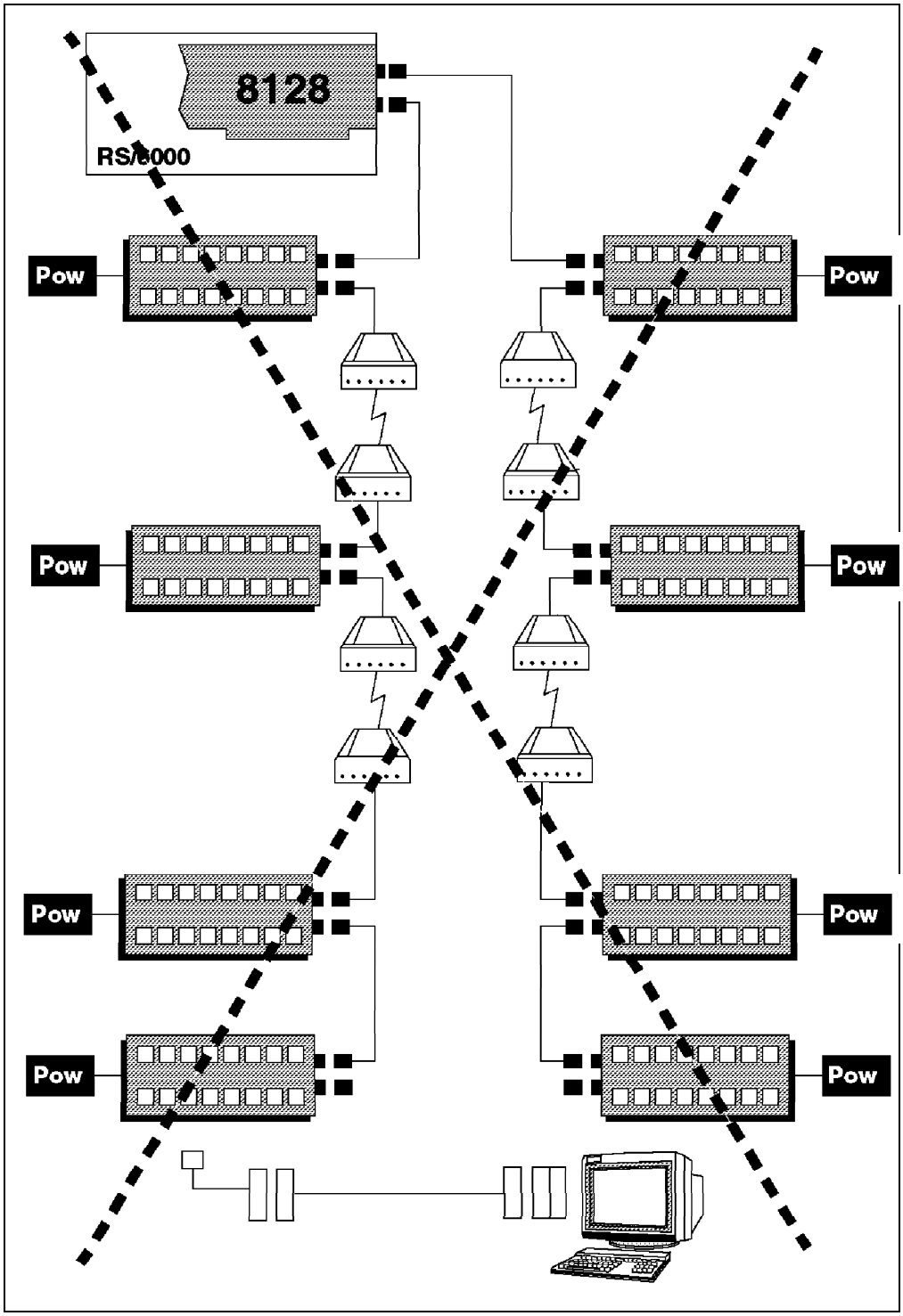


Figure 98. 8128 - 128-Port Asynchronous Controller - MCA: Configuration Prohibited!

Information

- Only **one pair** of synchronous modems is allowed per controller line.

  So, this configuration is **strictly prohibited** (not supported, even if it sometimes works).

5.2.8 2933 - 128-Port Asynchronous Controller-ISA

Table 55. 2933: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2933	**128-Port Asynchronous Controller**	**ISA**		
8131	128-Port Asynchronous Controller Cable, 8-wire		4.57	15
8132	128-Port Asynchronous Controller Cable, 8-wire		0.23	9 in.
8133	RJ-45 to DB-25 Converter Cable (four provided with each order)		0.61	2
8134	Remote Asynchronous Node 16-Port EIA-232 (worldwide)		-	-
8130	Remote Asynchronous Node 16-Port EIA-232 (USA)		-	-
8136	Rack Mountable Remote Asynchronous Node 16-Port EIA-232 (worldwide)		-	-
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10
(1)	128-Port Asynchronous Controller Cable, 4-wire			
(2)	128-Port Asynchronous Controller EIA-232 Modem cable, system			
(3)	128-Port Asynchronous Controller EIA-232 Modem cable, device			
(4)	128-Port Asynchronous Controller EIA-422 Modem cable, system			
(5)	128-Port Asynchronous Controller EIA-422 Modem cable, device			
(6)	Controller line terminator (includes with controller)			
8135	64-Port to 128-Port Pin-Out Converter			

Information

- This adapter provides the same function and interface as the MCA version (8128).

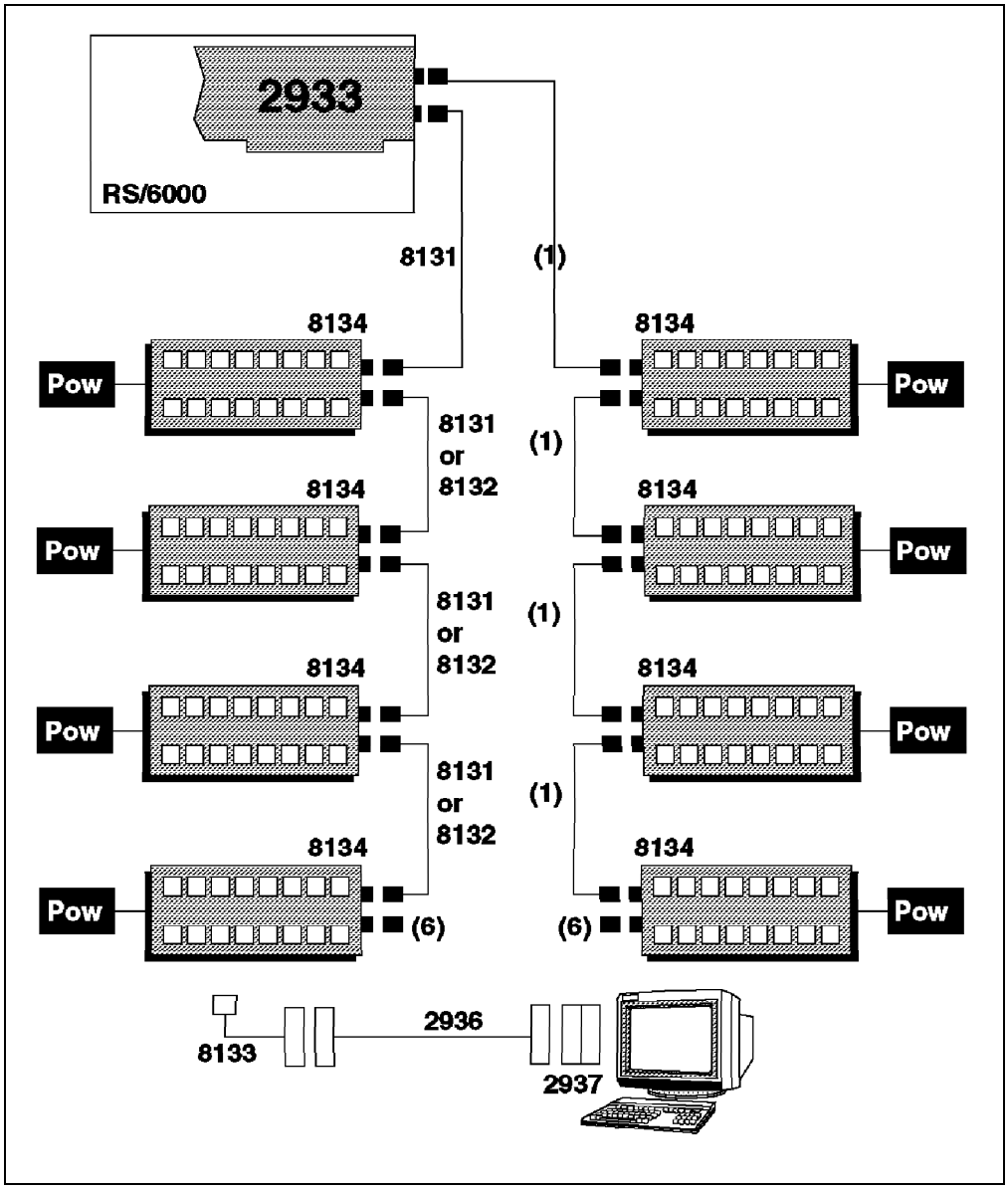


Figure 99. 2933 - 128-Port Asynchronous Controller ISA: Local Configuration

Information

- Only **one pair** of synchronous modems is allowed per controller line.
- Attention, when you use a remote connection, the speed of whole chain is the speed of the remote line.
- The 128-Port Asynchronous Controller supports **up to four** Remote Asynchronous Nodes on each controller line.

5.2.9 2940 - 8-Port Asynchronous Adapter - EIA-422A - MCA

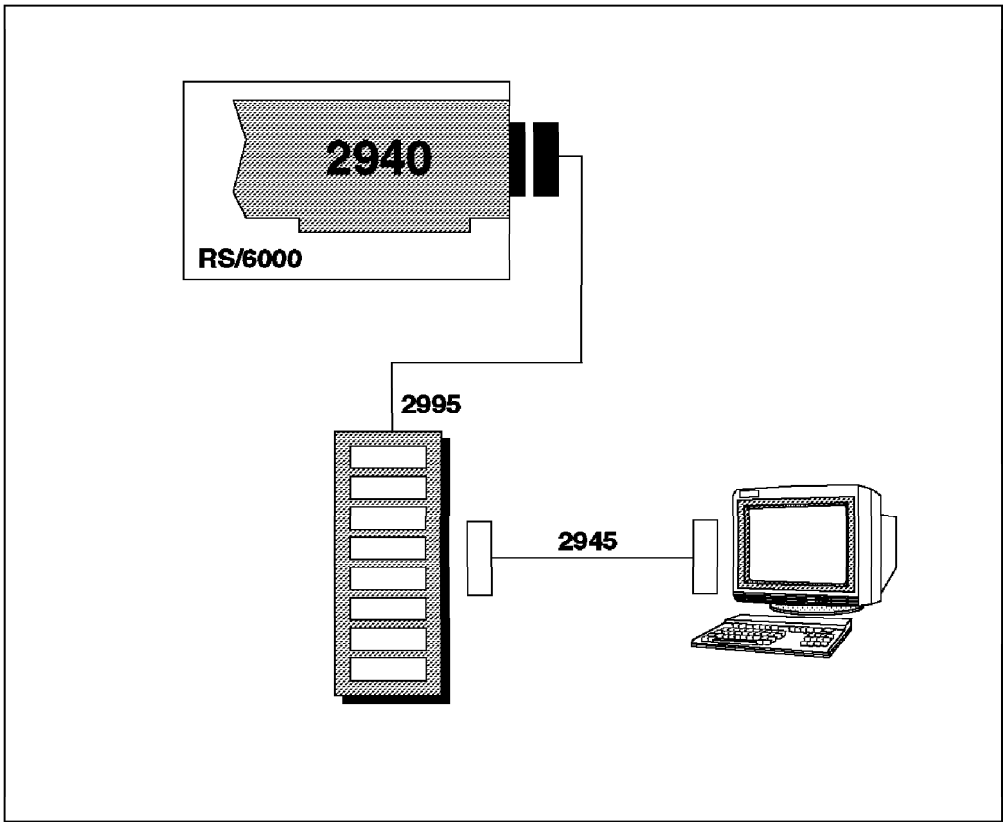


Figure 100. 2940 - 8-Port Asynchronous Adapter - EIA-422A - MCA

Table 56. 2940: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2940	**8-Port Asynchronous Adapter - EIA-422A**	**MCA**		
2995	Multiport Interface Cable		3	10
2945	Terminal Cable - EIA-422A		20	65.5

Information

- With the EIA-422A standard, you can use a longer connection.

5.2.10 2932 - 8-Port Asynchronous Adapter - EIA-232/EIA-422 - ISA

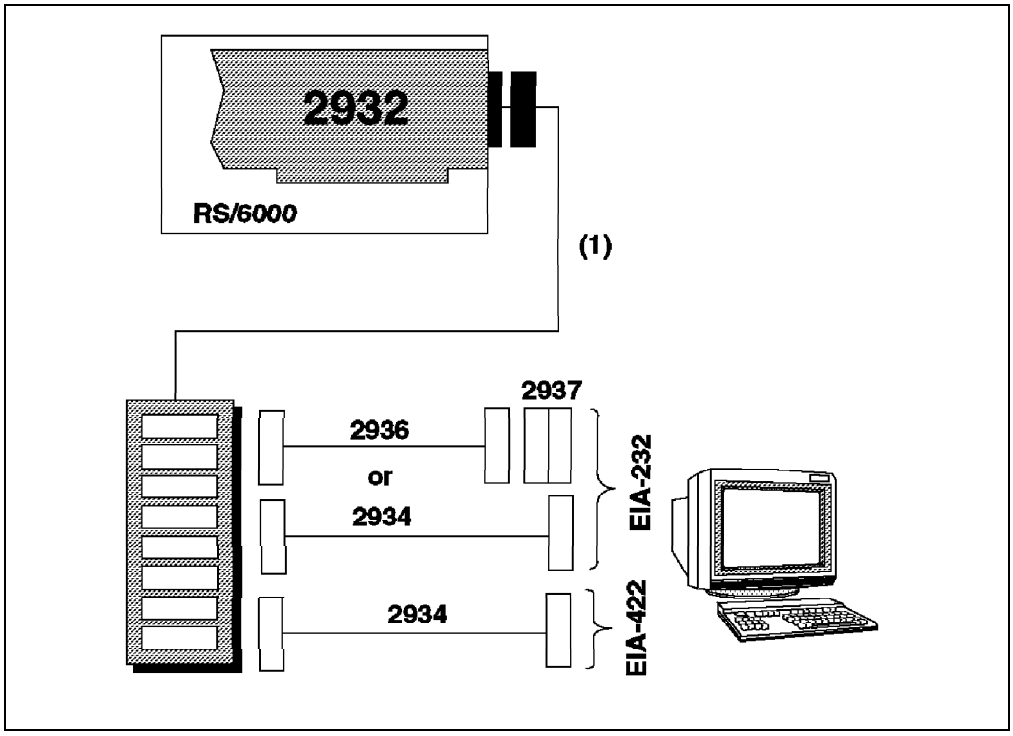


Figure 101. 2932 - 8-Port Asynchronous Adapter - EIA-232 - ISA

Table 57. 2932: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2931	**8-Port asynchronous adapter -EIA232/EIA422**	**ISA**		
(1)	Multiport Interface Cable (shipped with the adapter)		3	10
2936	Asynchronous Cable EIA-232/V.24		3	10
2937	Printer/Terminal Interposer - EIA-232		0.02	0.06
2934	Asynchronous Terminal/Printer Cable EIA-232 (=2936+2937)		3	10
2945	Terminal Cable EIA-422		20	65.5

Information

- This adapter is interesting because you can mix EIA-232 and EIA-422 connections. Use it for short and long lines.

5.2.11 2957 - 16-Port Asynchronous Adapter - EIA-422A - MCA

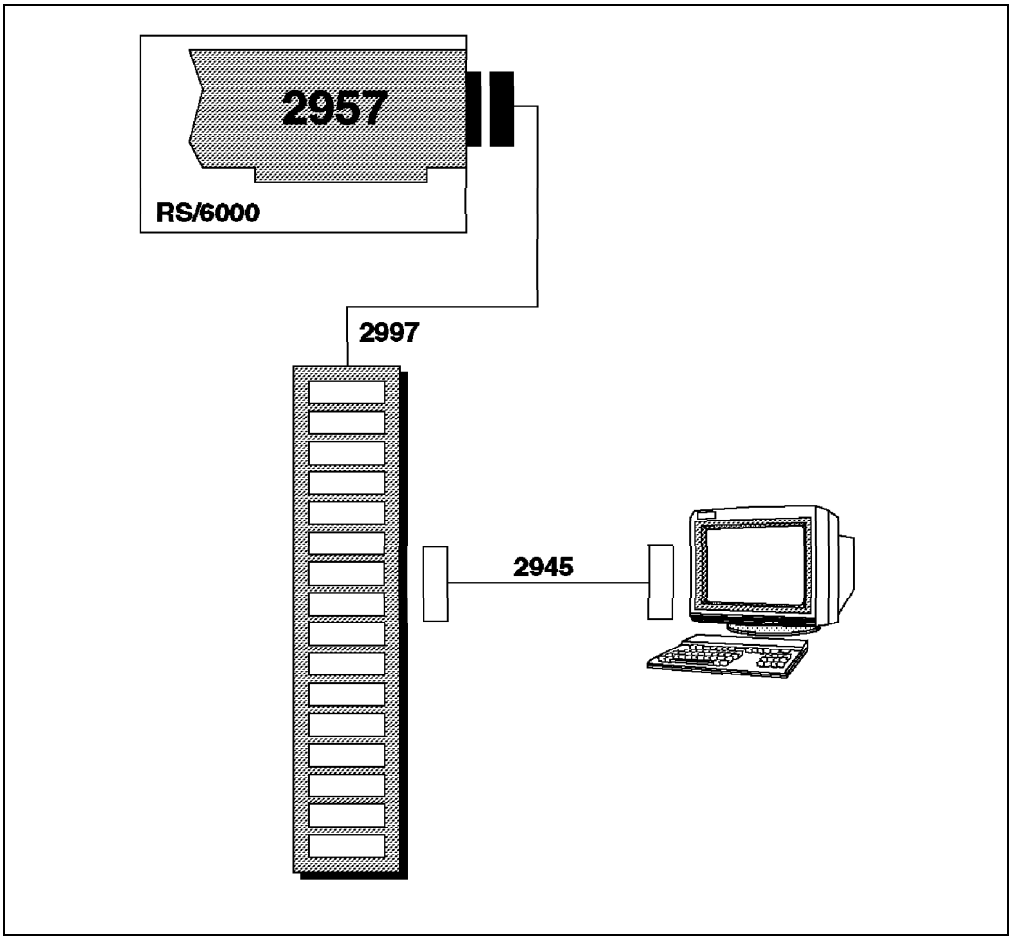


Figure 102. 2957 - 16-Port Asynchronous Adapter EIA-422 - MCA

Table 58. 2957: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2957	**16-Port Asynchronous Adapter - EIA-422A**	**MCA**		
2997	16-Port Interface Cable - EIA-422A		3	10
2945	Terminal cable EIA-422		20	65.5

Information

- Supported on AIX V4.1 and AIX V4.2.

5.3 Token-Ring Adapters

This section discusses a variety of token-ring adapters.

5.3.1 2970/9970 - Token-Ring High-Performance Adapter - MCA

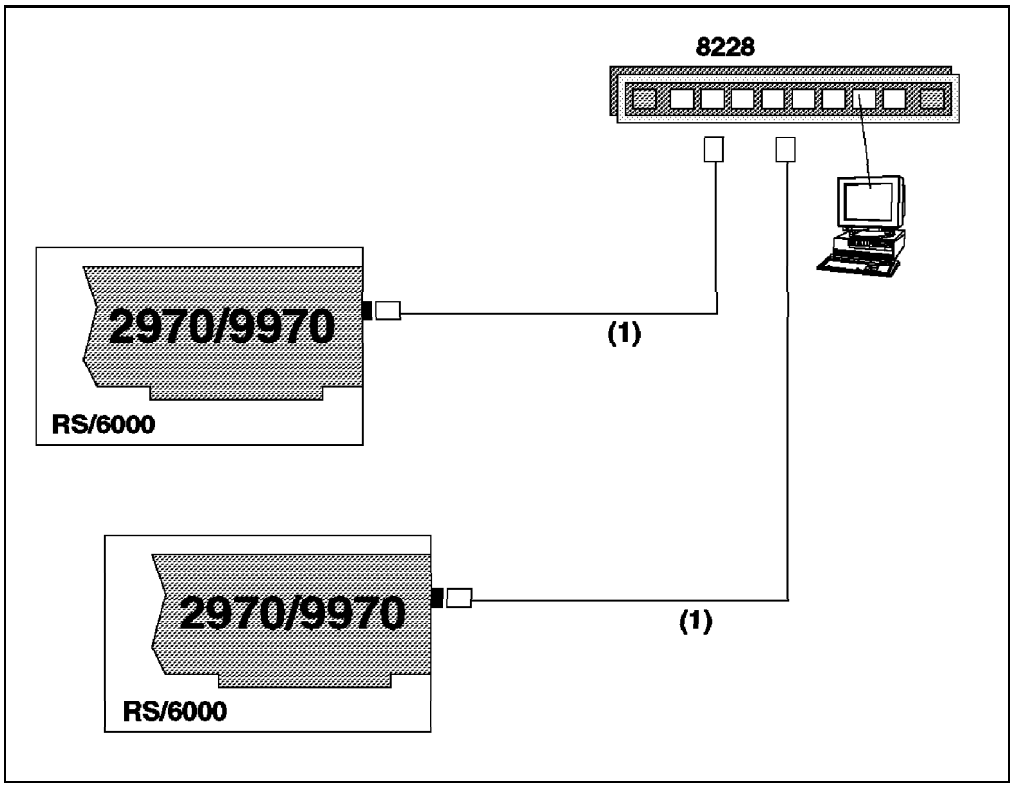


Figure 103. 2970 - Token-Ring High-Performance Adapter - MCA

Table 59. 2970: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2970	**Token-Ring HIgh-Performance Network Adapter**	**MCA**		
9970	**Token-Ring HIgh-Performance Network Adapter (option Model C10)**	**MCA**		
(1)	Token-Ring LAN cable (shipped with the adapter)		3	10

Information

- This adapter uses a D-Shell connection, an IBM Cabling System for example.

5.3.2 2972 - Auto Token-Ring LANstreamer 32 MC Adapter - MCA

The IBM Auto Token-Ring LANstreamer MC 32 is a high-performance token-ring adapter designed to operate with any RS/6000 that supports the Micro Channel bus interface. This adapter is particularly well suited for servers and high-end workstations running I/O-intensive applications on the network.

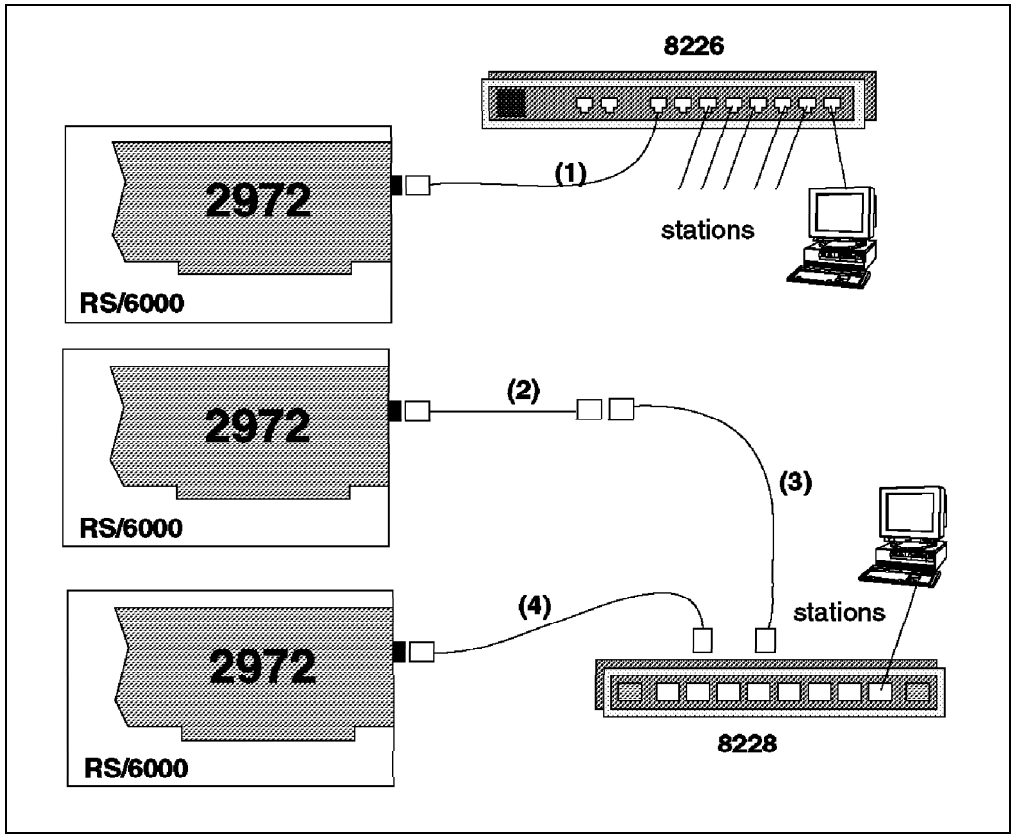


Figure 104. 2972 - Auto Token-Ring LANstreamer 32 MC Adapter - MCA

Table 60. 2972: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2972	**Auto Token-Ring LANstreamer 32 MC Adapter**	**MCA**		
(1)	Token-Ring Unshielded Twisted Pair Cable (customer provided)			
(2)	Conversion cable (shipped with the adapter). (P/N: 60G1066) Converts from a 9-pin D-Shell connector to an RJ-45 connector		0.25	0.8
(3)	IBM Cabling System to 9-pin D-Shell Token-Ring Shielded Twisted Pair (P/N: 6339098)			
(4)	RJ-45 to IBM Cabling System cable (P/N:60G1063)		2.4	8

Information

- Supported on AIX V4.1 and AIX V4.2.

5.3.3 2971/2973/8209 - 16-Bit Token-Ring Adapter - ISA

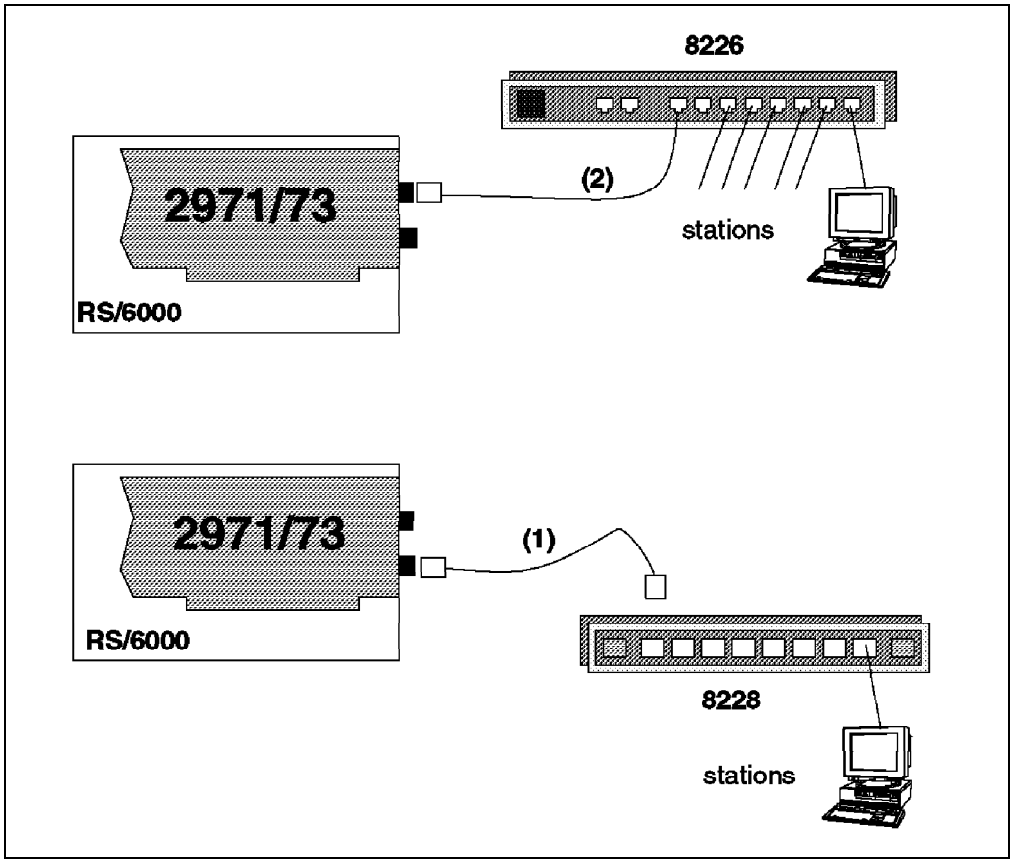


Figure 105. 2971/2973/8209 - 16-Bit Token-Ring Adapter - ISA

Table 61. 2971/2973: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2971	**16-Bit Token Ring Adapter**	**ISA**		
2973	**16-Bit Token Ring Adapter (Model 40x)**	**ISA**		
8209	**16-Bit Token Ring Adapter (Model 43x- MES)**	**ISA**		
(1)	Token-Ring cable RJ45 connection (shipped with the adapter)		3	10
(2)	Token-Ring cable ICS connection (shipped with the adapter)		3	10

Information

- Supported on AIX V4.1 and AIX V4.2.

5.3.4 2979 - Auto Token-Ring LANstreamer Adapter - PCI

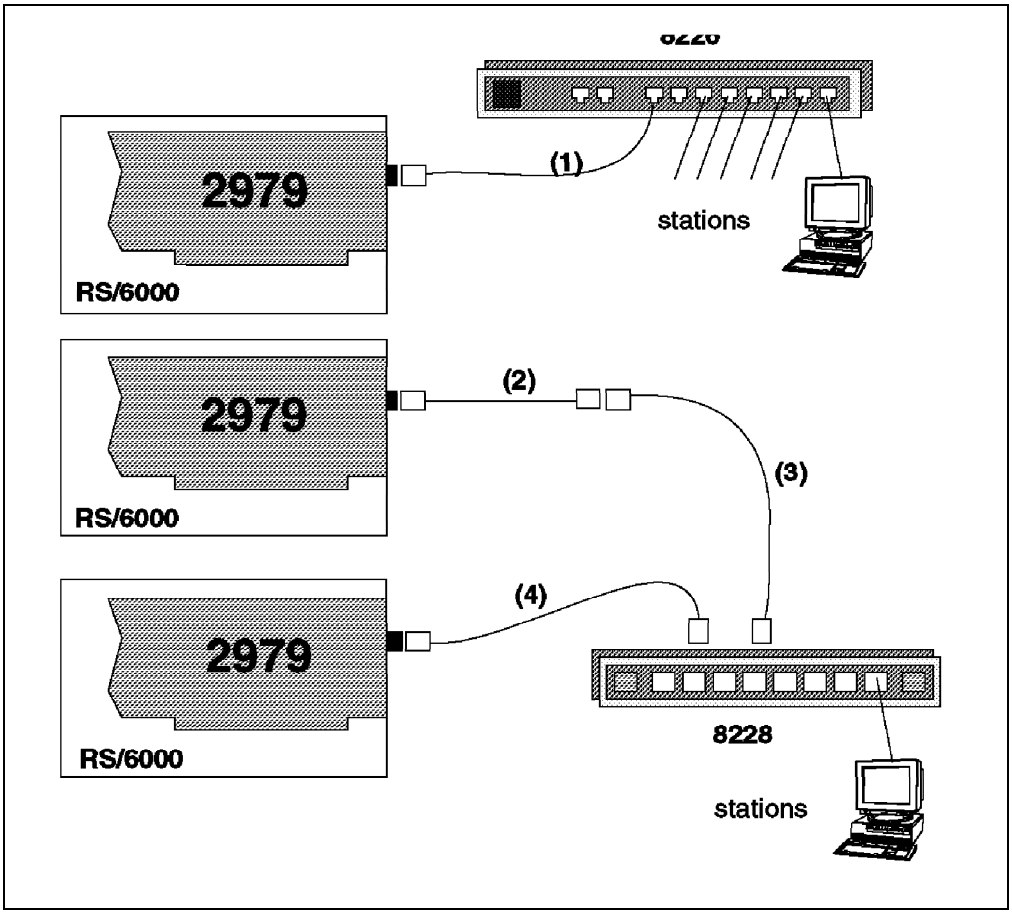


Figure 106. 2972 - Auto Token-Ring LANstreamer 32 MC Adapter - PCI

Table 62. 2972: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2972	**Auto Token-Ring LANstreamer 32 MC Adapter**	**PCI**		
(1)	Token-Ring Unshielded Twisted Pair Cable (customer-provided)			
(2)	Conversion cable (shipped with the adapter) (P/N: 60G1066) Converts from a 9-pin D-Shell connector to an RJ-45 connector.		0.25	0.8
(3)	IBM Cabling System to 9-pin D-Shell Token-Ring Shielded Twisted Pair (P/N: 6339098)			
(4)	RJ-45 to IBM Cabling System Cable (P/N:60G1063)		2.4	8

Information

- This adapter provides the same function and interface as the MCA version (2972).

5.3.5 8246 - Olicom Token-Ring Adapter - PCI

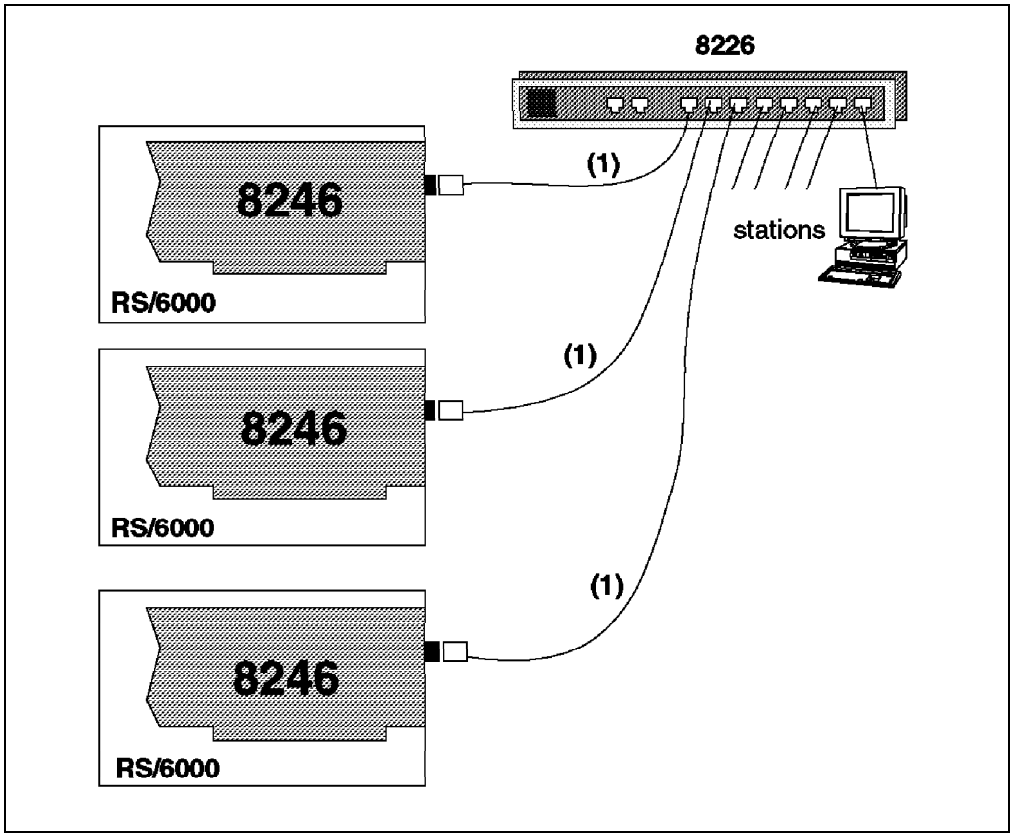


Figure 107. 8246 - Olicom Token-Ring Adapter - PCI

Table 63. 8246: Features and Cables

Feature	Description	Bus	Length	
			m	ft
8246	**Olicom Token-Ring**	**PCI**		
(1)	Token-Ring Cable (customer provided)		-	-

Information

- IBM is now offering a wider selection of independent hardware vendor options in support of the RS/6000 machine types 7020 and 7248.

5.3.6 7092 - Token-Ring 16/4 Credit-Card Adapter - PCMCIA

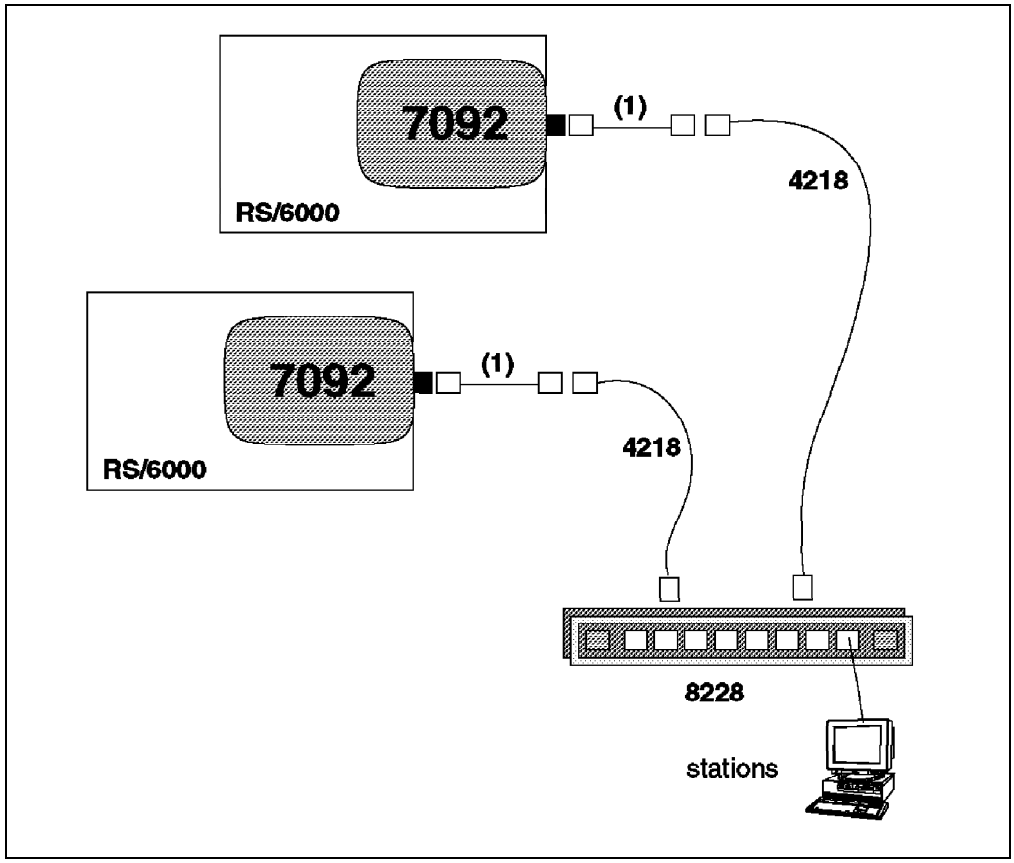


Figure 108. 7092 - Token-Ring 16/4 Credit-Card Adapter - PCMCIA

Table 64. 7092: Features and Cables

Feature	Description	Bus	Length	
			m	ft
7092	**Token-Ring 16/4 Credit Card Adapter (N40)**	**PCMCIA**		
(1)	Conversion cable (shipped with the adapter). Converts from a 9-pin D-Shell connector to an RJ-45 connector.		0.25	0.8
4218	Token-Ring Cable		3	10

Information

- The above features are withdrawn.

5.3.7 8042/8043/8044 - Token-Ring Adapter - PCMCIA

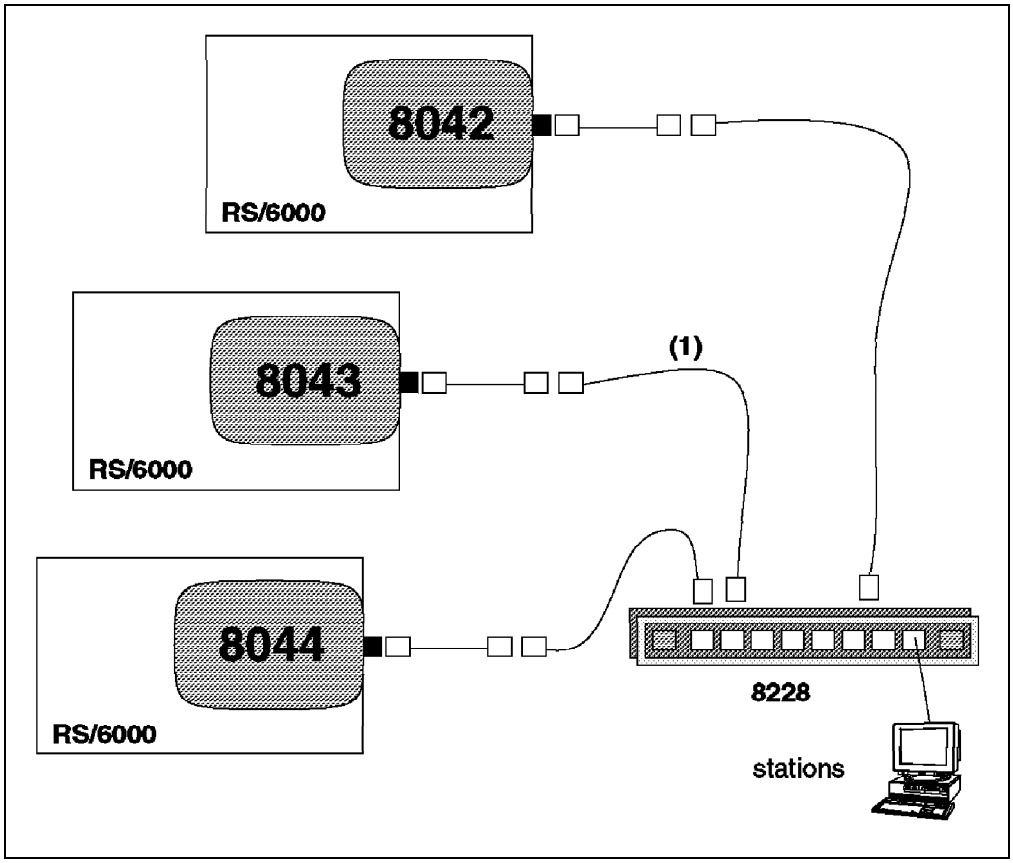


Figure 109. 8042/8043/7044 - Token-Ring Adapter - PCMCIA

Table 65. 7092: Features and Cables

Feature	Description	Bus	Length	
			m	ft
8042	**Token-Ring PCMCIA Adapter (English)**	**PCMCIA**		
8043	**Token-Ring PCMCIA Adapter (German)**	**PCMCIA**		
8044	**Token-Ring PCMCIA Adapter (Spanish)**	**PCMCIA**		
(1)	Token-Ring Cable			

Information

- Supported on AIX V4.1 and AIX V4.2.

5.4 FDDI Adapters

5.4.1 2725/2726 - FDDI-STP Single-Ring/Dual-Ring Adapters - MCA

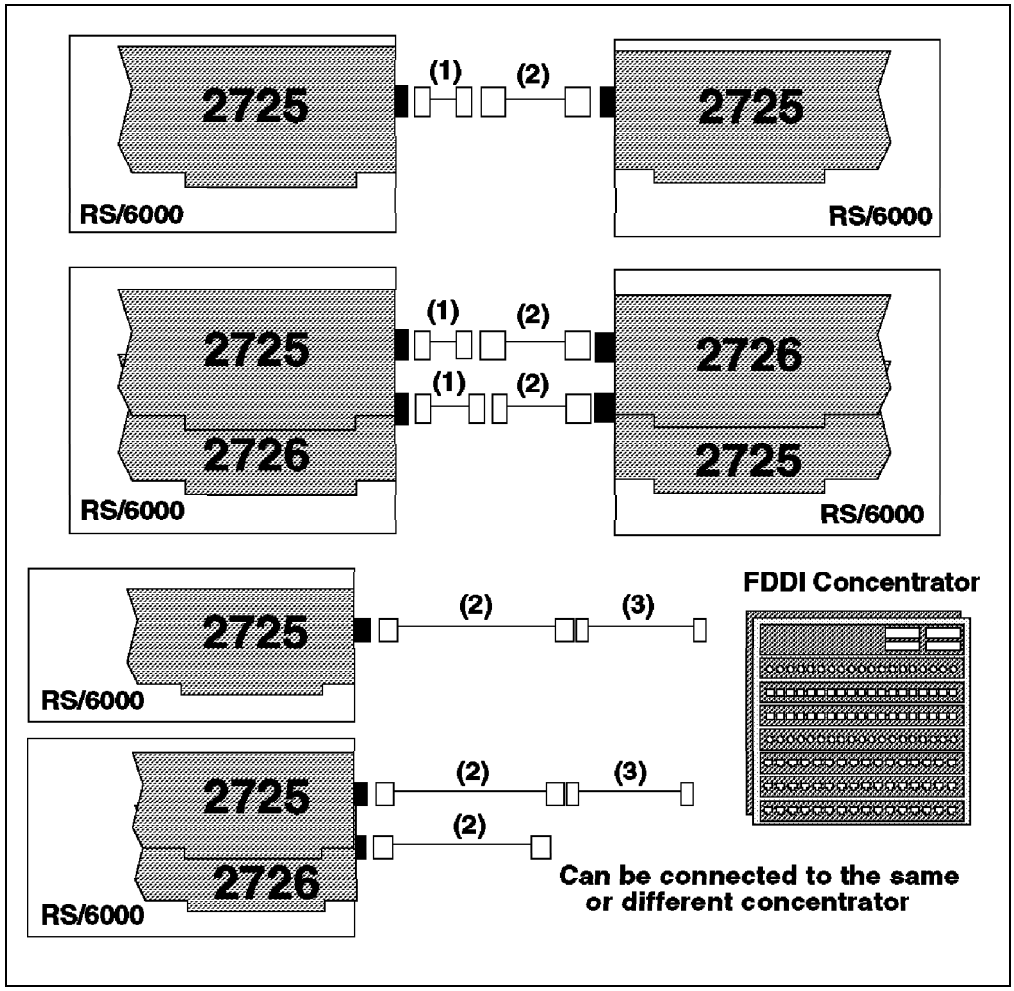


Figure 110. 2725/2726 - FDDI-STP Single-Ring/Dual-Ring Adapters - MCA

Table 66. 2725/2726: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2725	**FDDI - STP Single-Ring Adapter**	**MCA**		
2726	**FDDI - STP Dual-Ring Upgrade**	**MCA**		
(1)	FDDI Copper Adapter Reversing Cable (P/N: 33G2762)		3	10
(2)	FDDI Copper Adapter Cable (P/N: 33G2761)		3	10
(3)	FDDI Copper Adapter Cable (P/N: 33G2760))		3	10

Information

- For installation of FDDI systems, please refer to the IBM *FDDI Introduction and Planning Guide, GA27-3892.*

5.4.2 2720/2722 - FDDI-Fiber Single-Ring/Dual-Ring Adapters - MCA

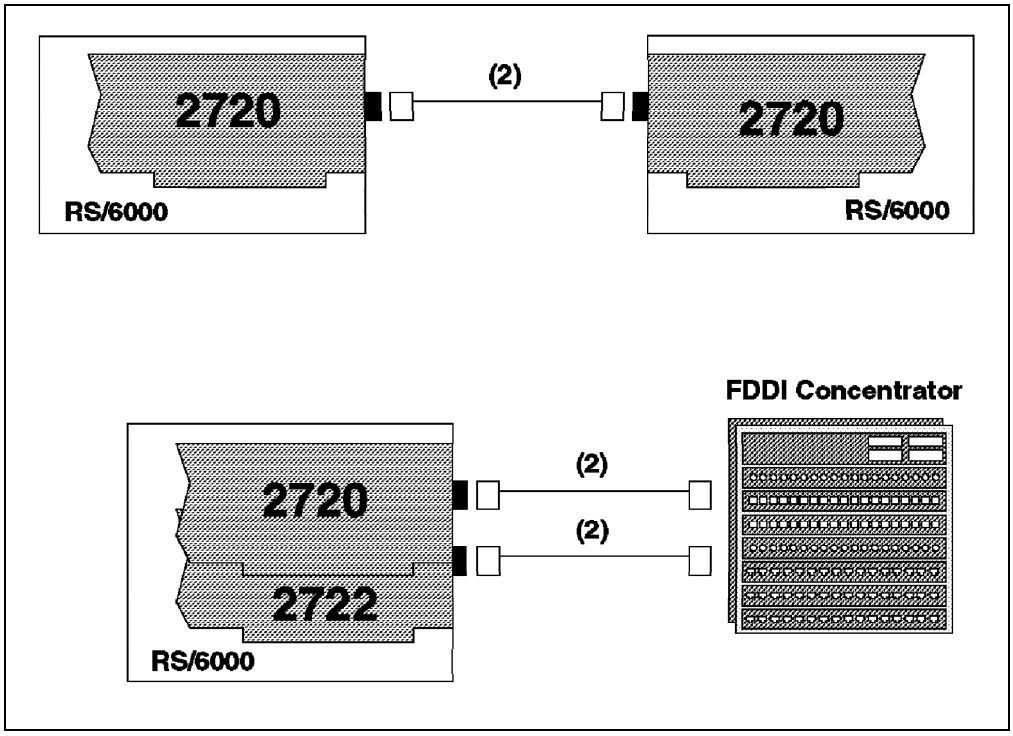


Figure 111. 2720/2722 - FDDI-Fiber Single-Ring/Dual-Ring Adapters - MCA

Table 67. 2720-2722: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2720	**FDDI-Fiber Single-Ring Adapter**	**MCA**		
2722	**FDDI-Fiber Dual-Ring Upgrade**	**MCA**		
(2)	Fiber Cable Connection (P/N: 92F8977)		4	13
(2)	Fiber Cable Connection (P/N: 92F8978)		6	20
(2)	Fiber Cable Connection (P/N: 92F8979)		15	50
(2)	Fiber Cable Connection (P/N: 92F8980)		30	100

Information

- For installation of FDDI systems, please refer to the IBM *FDDI Introduction and Planning Guide,* GA27-3892.
- For additional information concerning FDDI optical systems, please refer to the IBM *FDDI Optical Fiber Planning and Installation Guide,* GA27-3943.
- The above features are withdrawn.

5.4.3 2724/2723 - FDDI-Fiber Single-Ring/Dual-Ring Adapters - MCA

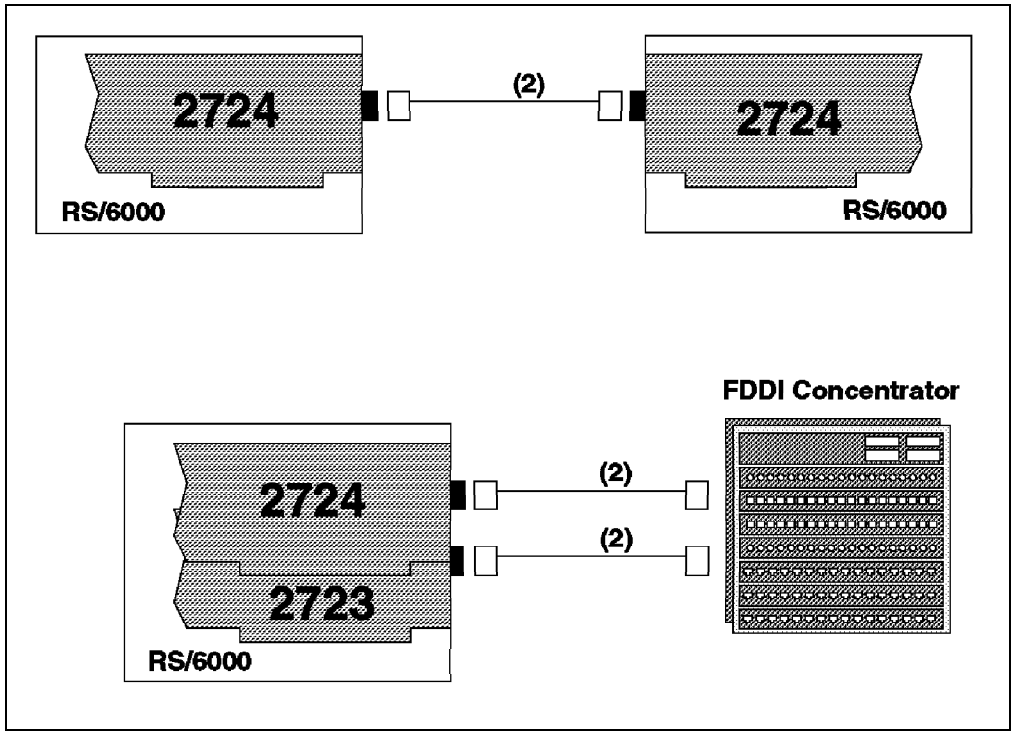


Figure 112. 2724/2723 - FDDI-Fiber Single-Ring/Dual-Ring Adapters - MCA

Table 68. 2724-2723: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2724	**FDDI-Fiber Single-Ring Adapter**	**MCA**		
2723	**FDDI-Fiber Dual-Ring Upgrade**	**MCA**		
(2)	Fiber Cable Connection (P/N: 92F8977)		4	13
(2)	Fiber Cable Connection (P/N: 92F8978)		6	20
(2)	Fiber Cable Connection (P/N: 92F8979)		15	50
(2)	Fiber Cable Connection (P/N: 92F8980)		30	100

Information

- For installation of FDDI systems, refer to the IBM *FDDI Introduction and Planning Guide,* GA27-3892.
- For additional information concerning FDDI optical systems, refer to the IBM *FDDI Optical Fiber Planning and Installation Guide,* GA27-3943.

5.5 Ethernet Adapters

5.5.1 MCA Ethernet Adapters

Table 69. MCA Ethernet Adapters: Features and Cables

Type/ Model & Version	Initial order or MES or OEM	10Base 5		10Base 2		10Base T	
		#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external
All models	Initial order or MES	#2980	adapter	#2980	adapter	#2980 + #4224	adapter+ external transcv.
All models running AIX 4.1.4 except SMP models	Initial order or MES	#2992	adapter	#2993	adapter	#2992	adapter
7030-3xT7012-34X 7012-35X 7012-36X 7012-37X 7012-38X 7012-39X 7013-55L	Initial order	#9000 (std)	adapter	#9000 (std)	adapter	#9001 (option)	adapter
	MES	#4221	adapter (replace #9000, #9001 or #4222)	#4221	adapter (replace #9000, #9001 or #4222)	#4222	adapter (replace #9000, #9001 or #4221)
7008-M2X7011-22X7011-23X	Initial order	#std	integrated	#std + #4223	integr.+ ext.trans.	#standard + #4224	integr.+ ext.trans.
7011-25X7006-41X7006-42X	Initial order	#std	integrated	#std + #4223	integr.+ ext.trans.	#standard + #conv. std	adapter+ external transcv.
7009-C10	Initial order	#9980 (option)	adapter	#9980 (option)	adapter	#9980+ #4224	adapter+ external transcv.
7009-C20	Initial order	#2992	adapter	#2993	adapter	#2992	adapter

Information

- You can use AUI connections with a 10Base2 (BNC) Transceiver to connect any RS/6000 to a 10Base2 (BNC) Network (for example, #4222).
- You can use AUI connections with a 10BaseT Transceiver to connect any RS/6000 to a 10BaseT Network (for example, #4224 or #7087).

5.5.2 PCI Ethernet Adapters

Table 70. PCI Ethernet Adapters: Features and Cables

Type/ Model & Version	Initial order or MES or OEM	10Base 5		10Base 2		10Base T	
		#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external
7248-43P	Initial order	#2987	adapter	#2985	adapter	#2987 or #2985	adapter
	Initial order (3COM)					#RRR-2450 / 8242	adapter (10/100 Mbps)
	MES	#2987	adapter	#2985	adapter	#2987 or #2985	adapter
7025-F307024-E30 7024-E20	Initial order	#2987	adapter	#2985	adapter	#2987 or #2985	adapter
	MES	#2987	adapter	#2985	adapter	#2987 or #2985	adapter
7020-40x	Initial order (3COM)					#RRR-2450 / 8242	adapter (10/100 Mbps)

Information

- You can use AUI connections with a 10Base2 (BNC) Transceiver to connect any RS/6000 to a 10Base2 (BNC) Network (for example, #4222).
- You can use AUI connections with a 10BaseT Transceiver to connect any RS/6000 to a 10BaseT Network (for example, #4224 or #7087).

5.5.3 ISA Ethernet Adapters

Table 71. ISA Ethernet Adapters: Features and Cables

Type/ Model & Version	Initial order or MES or OEM	10Base 5		10Base 2		10Base T	
		#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external
7248-43P	Initial order	#2981	adapter	#2981	adapter	#standard or #2981	integrated or adapter
	Initial order (3COM)	#RRR-2450 / 8241	adapter	#RRR-2450 / 8241	adapter	#RRR-2450 / 8240	adapter
	MES	#8210	adapter	#8210	adapter	#standard or #8210	integrated or adapter
7020-40x	Initial order	#2981	adapter	#2981	adapter	#2981	adapter
	Initial order (3COM)	#RRR-2450 / 8241	adapter	#RRR-2450 / 8241	adapter	#RRR-2450 / 8240	adapter
	MES	#2982	adapter	#2982	adapter	#2982	adapter

Information

- You can use AUI connections with a 10Base2 (BNC) Transceiver to connect any RS/6000 to a 10Base2 (BNC) Network (for example, #4222).
- You can use AUI connections with a 10BaseT Transceiver to connect any RS/6000 to a 10BaseT Network (for example, #4224 or #7087).
- 2981 is chosen between token-ring, X.25 and Ethernet adapters.

5.5.4 PCMCIA Ethernet Adapters

Table 72. PCMCIA Ethernet Adapters: Features and Cables

Type/ Model & Version	Initial order or MES or OEM	10Base 5		10Base 2		10Base T	
		#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external	#feature standard or optional	adapter, integrated, or external
7247-82x7249-85x	Initial order or MES			#8022 or #8023 or #8024	adapter	#8032 or #8033 or #8034	adapter
7007-N40	Initial order	#std.	integrated	#std + #7087	integr.+ ext.trans.	#std + #7088	integr.+ ext.trans.
	MES			#std + #7087	integr.+ ext.trans.	#std + #7088	integr.+ ext.trans.

Information

- You can use AUI connections with a 10Base2 (BNC) Transceiver to connect any RS/6000 to a 10Base2 (BNC) Network.
- You can use AUI connections with a 10BaseT Transceiver to connect any RS/6000 to a 10BaseT Network.
- #8222, #8223 and #8224 are the same adapters. It's a country option.

5.5.5 Ethernet Connectivity - 10Base5 Connections

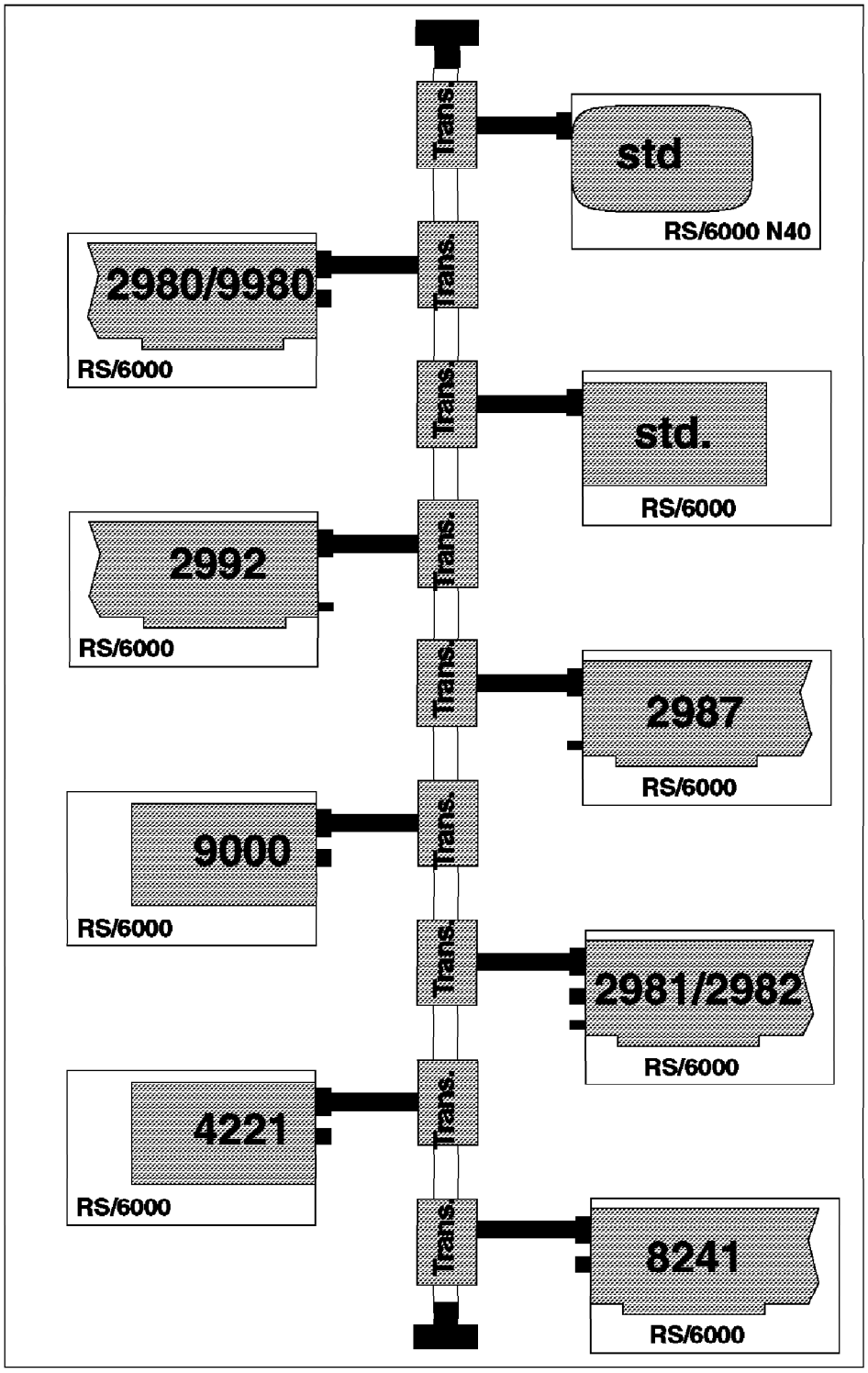


Figure 113. Ethernet Connectivity: 10Base5 Connections

5.5.6 Ethernet Connectivity - 10Base2 Connections

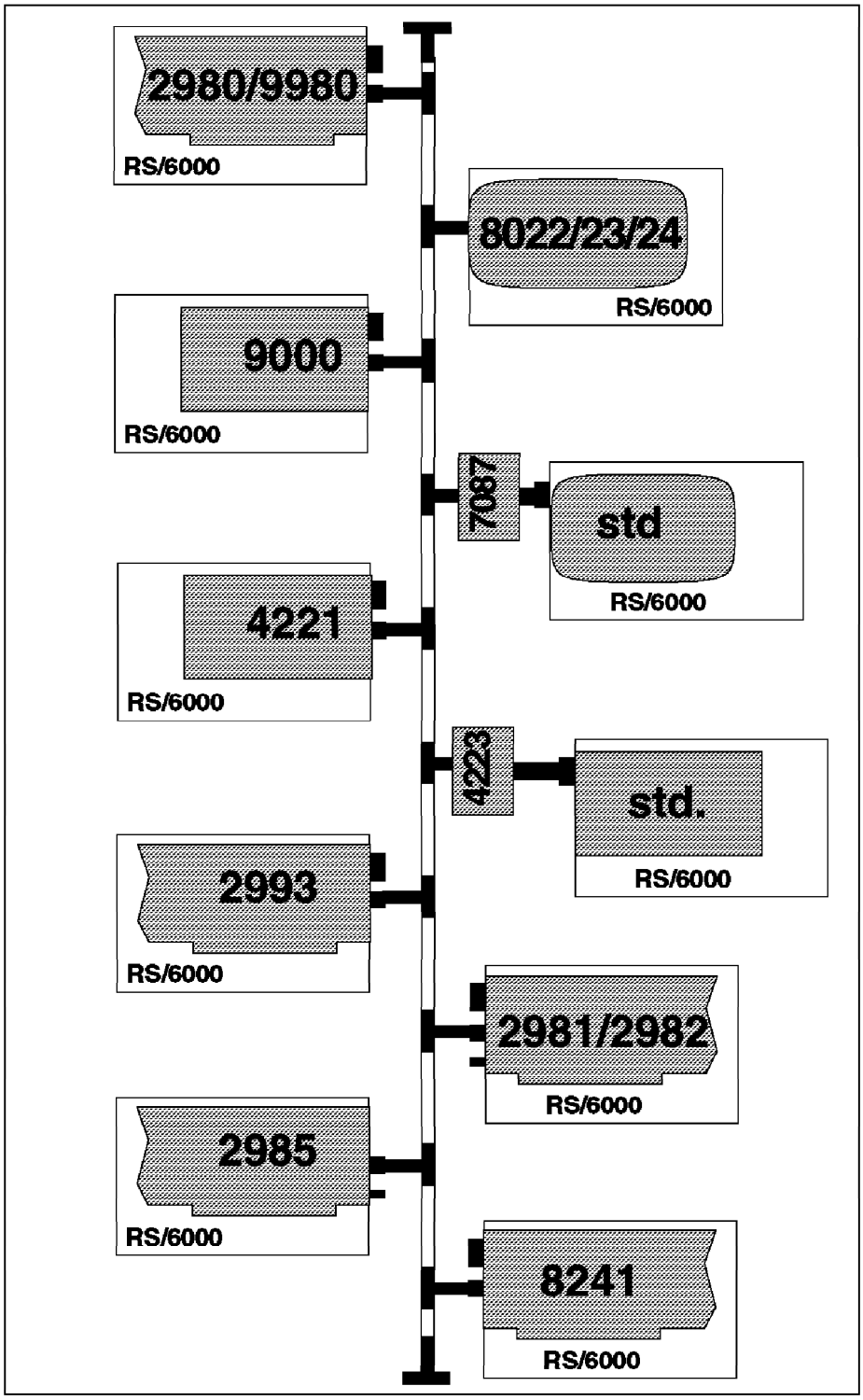


Figure 114. Ethernet Connectivity: 10Base2 Connections

5.5.7 Ethernet Connectivity - 10BaseT Connections

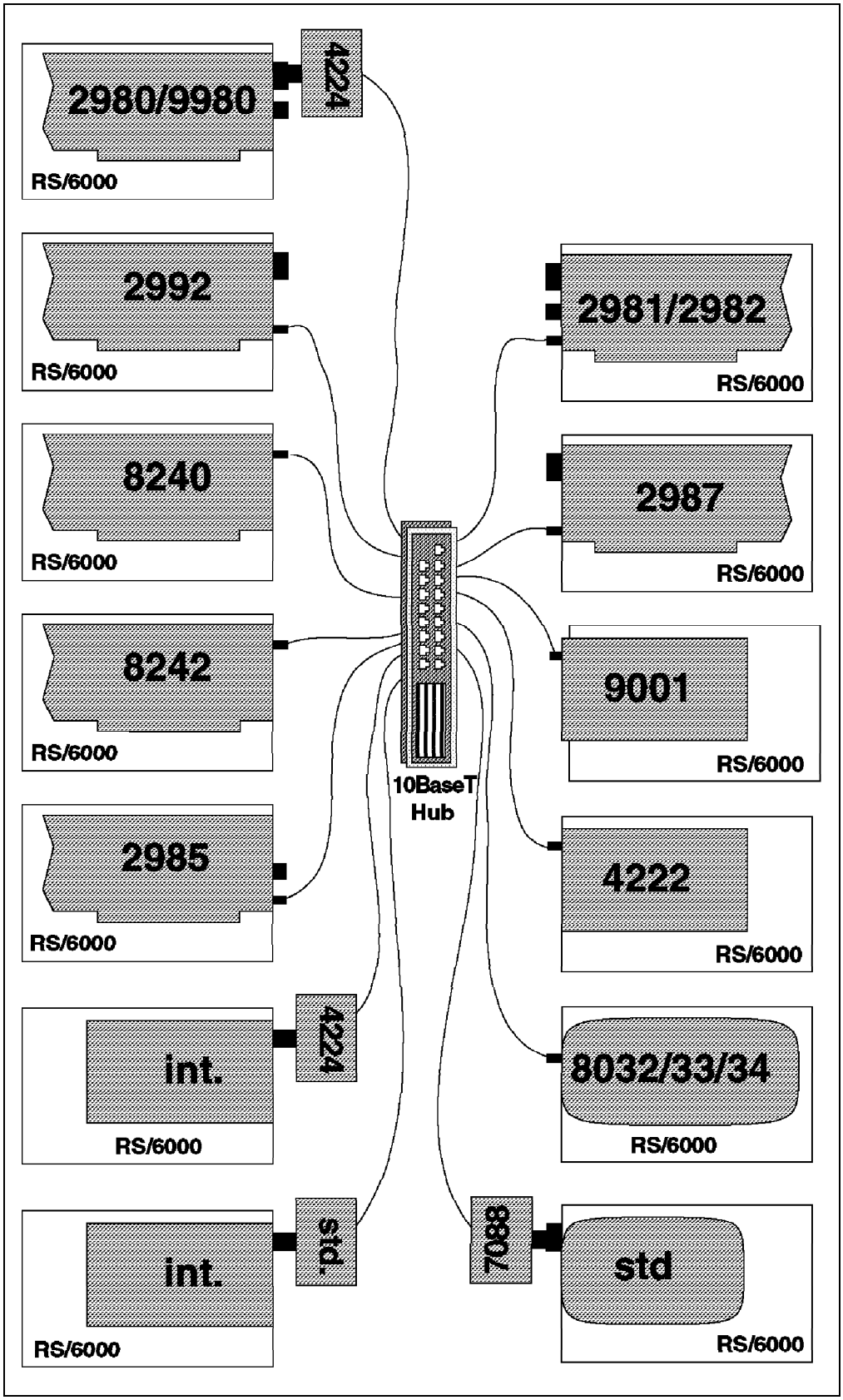


Figure 115. Ethernet Connectivity: 10BaseT Connections

5.5.8 2402/2403 - Network Terminal Accelerator Adapters - MCA

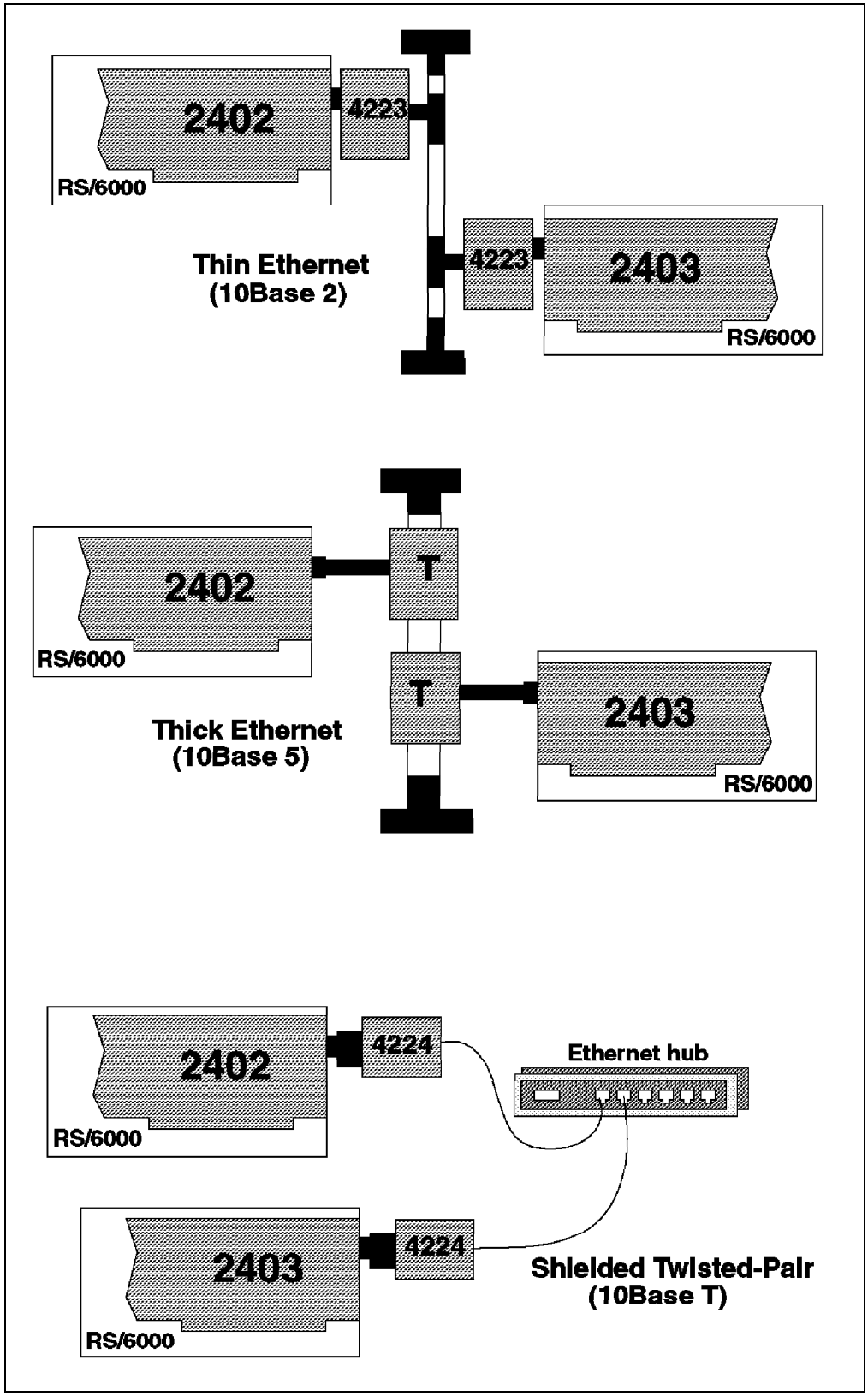


Figure 116. 2402/2403 - Network Terminal Accelerator Adapters - MCA

Table 73. 2402/2403: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2402	**Network Terminal Accelerator Adapters/ 256 sessions**	**MCA**		
2403	**Network Terminal Accelerator Adapters/ 2048 sessions**	**MCA**		
2406	**Network Terminal Accelerator Adapters/ 256 sessions (option C10)**	**MCA**		
2407	**Network Terminal Accelerator Adapters/ 2048 sessions (option C10)**	**MCA**		
4223	Ethernet 10Base2 Transceiver		-	-
4224	Ethernet 10Base-T Transceiver		-	-

Information

- Only supported on AIX version 4.2
- Will be supported on AIX Version 4.1.5

Highlights

- Frees processor resources and speeds application processing
- Allows a significant increase in the number of users supported by the system
- Supports up to 256 or 2048 login sessions (feature code 2402 or 2403, respectively)
- Capable of attaching up to 2048 asynchronous devices to a single RS/6000 Micro Channel slot, when used with the 7318 Serial Communications Network Server Model S20
- Supports standard Ethernet applications

Customer solutions

- The IBM Network Terminal Accelerator is a high-performance Ethernet adapter that can significantly increase the performance of your RS/6000.

  This boost to system performance is achieved by off-loading network protocol processing associated with telnet and rlogin sessions from the RS/6000 CPU.

  All users logging into the system over Ethernet with telnet and rlogin gain the benefits of the adapter, whether logging in from PCs, other workstations, or terminal servers such as the 7318 Server Model S20.
- The Network Terminal Accelerator is the ideal way to connect large numbers of users to the RS/6000, while utilizing a minimum of Micro Channel Adapter slots.

  The Network Terminal Accelerator-2048 can support up to 2048 login sessions concurrently and utilizes only one adapter slot. This capability gives your system the ability to handle a growing network of users.
- When users log in to the RS/6000 using the Accelerator, not only is TELNETD or RLOGIND protocol processing eliminated from the system CPU, but the TCP/IP and physical layer protocols are also off-loaded. The Accelerator provides even better system CPU efficiency than current IBM multiport asynchronous features, while providing the connectivity of Ethernet.

- The Network Terminal Accelerator accepts two IP network addresses. The first IP address invokes the high-performance telnet and rlogin functions of the adapter. The second address handles protocols other than TELNETD and RLOGIND, eliminating the need for a second Ethernet card in the system. The Accelerator also supports the Simple Network Management Protocol (SNMP), so that all network components may be managed from a central location.
- The Network Terminal Accelerator can expand the capabilities of RS/6000 systems serving users over Ethernet. Whether the system is being used to process transactions or to compile software, the Accelerator focuses the power of the RS/6000 CPU on the application.
- As shown in the following diagram, the Network Terminal Accelerator is an ideal solution for attaching users to a RS/6000. Users can log in from terminals attached to terminal servers or from any system supporting telnet and rlogin sessions.

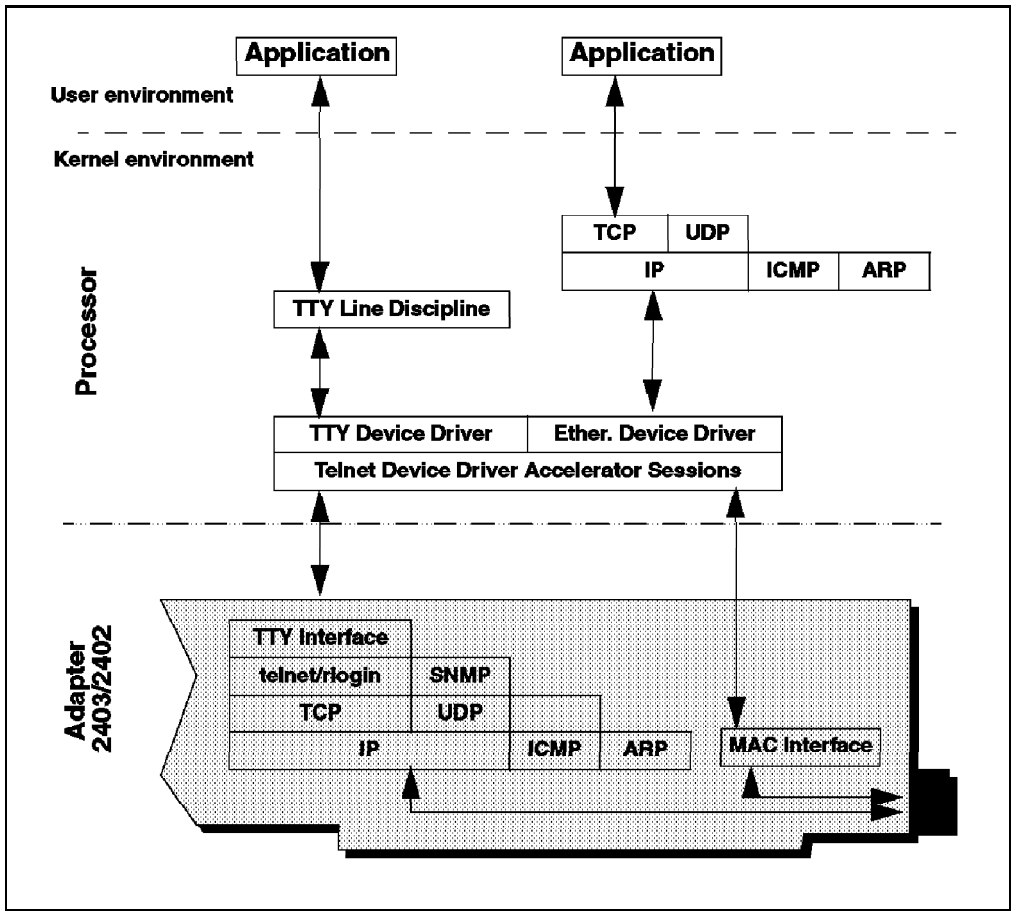


Figure 117. 2402/2403 - Network Terminal Accelerator Adapters: Implementation

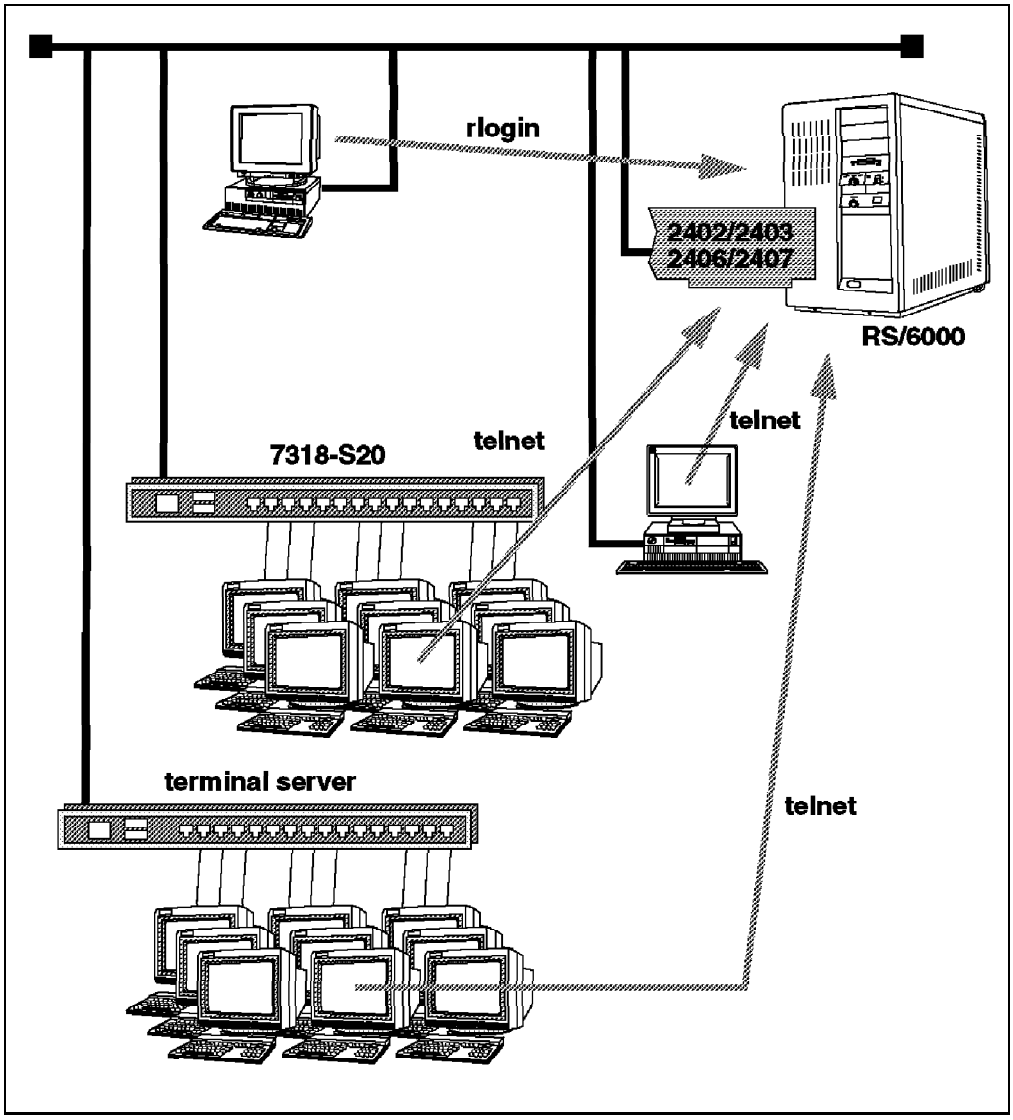


Figure 118. 2402/2403 - Network Terminal Accelerator Adapters: Using with 7318-S20

Table 74. 2402/2403 - Network Terminal Accelerator Adapters: Benchmarks

	Customer bench.		TPC-C		RAMP-C	
	C10		C10		530	
	CPU Idle time	# of users	# of transac-tions/min	# of users	# of transac-tions/min	# of users
Ethernet Standard Adapter	5% tpm	150	215	200	10700	40
Network Terminal Accelerator	15% tpm	200	316	280	22400	90

5.6 X.25 Adapters

5.6.1 2960 - X.25 Interface Co-Processor/2 - MCA

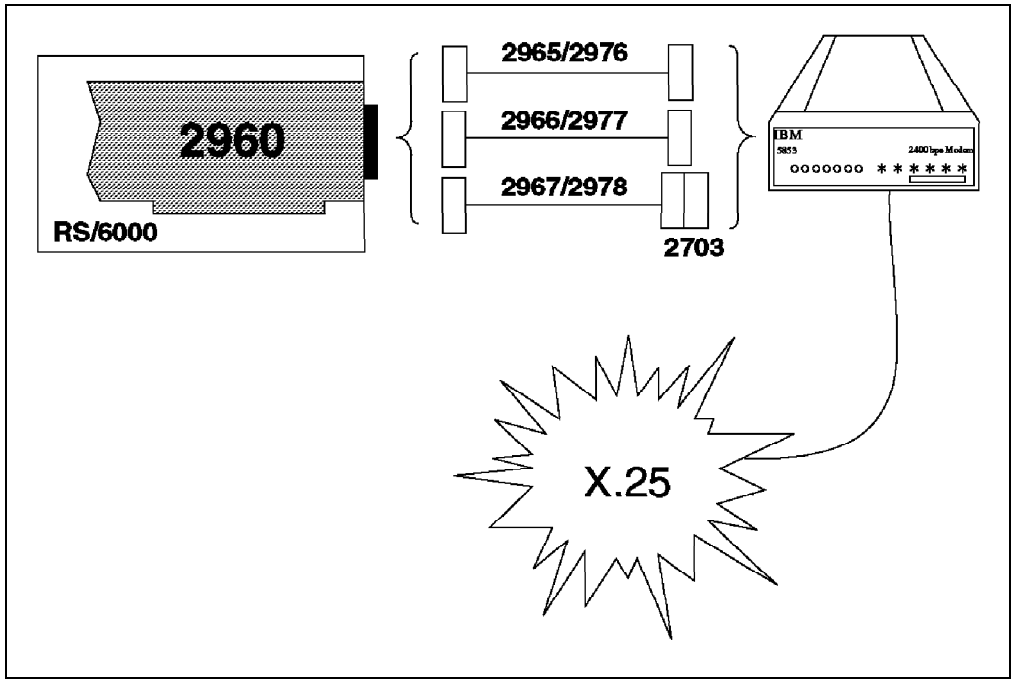


Figure 119. 2960 - X.25 Interface Co-Processor/2 - MCA

Table 75. 2960: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2960	**X.25 Interface Co-Processor/2**	**MCA**		
2965	X.25 Attachment Cable X.21		3	10
2966	X.25 Attachment Cable V.24		3	10
2967	X.25 Attachment Cable V.35		3	10
2976	X.25 Attachment Cable X.21		6	20
2977	X.25 Attachment Cable V.24		6	20
2978	X.25 Attachment Cable V.35		6	20
2703	V.35 Cable (France)		-	-

Information

- The X.25 adapter requires the AIXLink X.25 (5696-926) LPP, ordered separately.
- This adapter is the low-entry model. If you need more virtual circuits or more switching speed, choose the Portmaster adapter.

5.6.2 2961 - X.25 Interface Co-processor Adapter - ISA

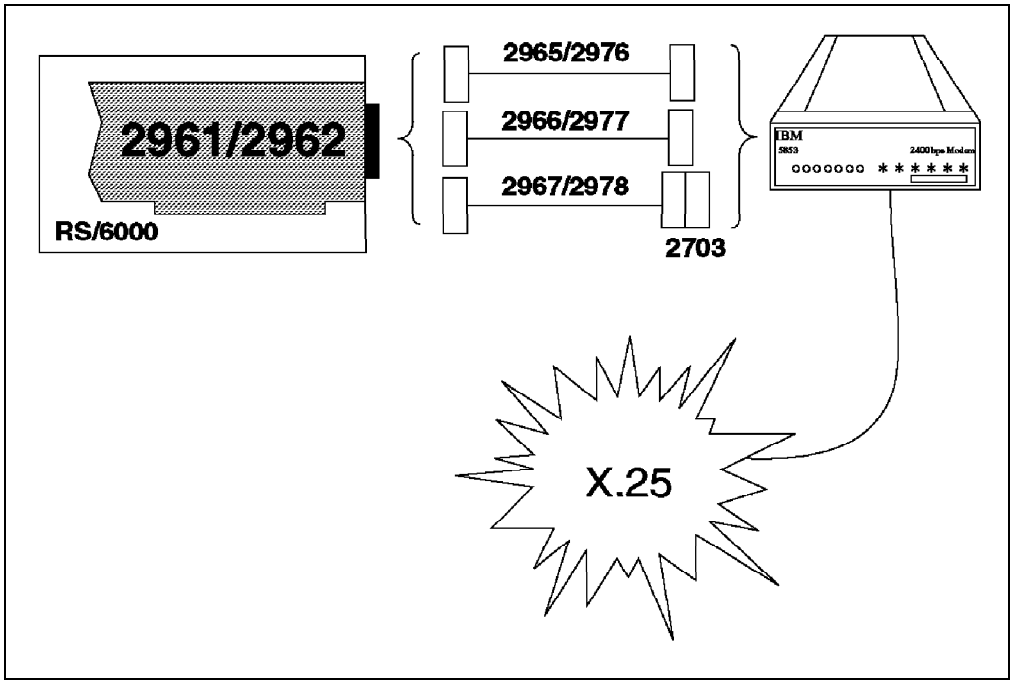


Figure 120. 2961 - X.25 Interface Co-processor Adapter - ISA

Table 76. 2961: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2961	**X.25 Interface Co-processor Adapter**	**ISA**		
2962	**X.25 Adapter (option for the 40P Model)**	**ISA**		
8211	**X.25 Adapter (option for the 43x Model)**	**ISA**		
2965	X.25 Attachment Cable X.21		3	10
2966	X.25 Attachment Cable V.24		3	10
2967	X.25 Attachment Cable V.35		3	10
2976	X.25 Attachment Cable X.21		6	20
2977	X.25 Attachment Cable V.24		6	20
2978	X.25 Attachment Cable V.35		6	20
2703	V.35 Cable (France)		-	-

Information

- This adapter provides the same function and interface as the MCA version (2960).
- This X.25 adapter requires the AIXLink X.25 (5696-926) LPP, ordered separately.

5.6.3 7006/7008 - Portmaster Adapter/A - MCA

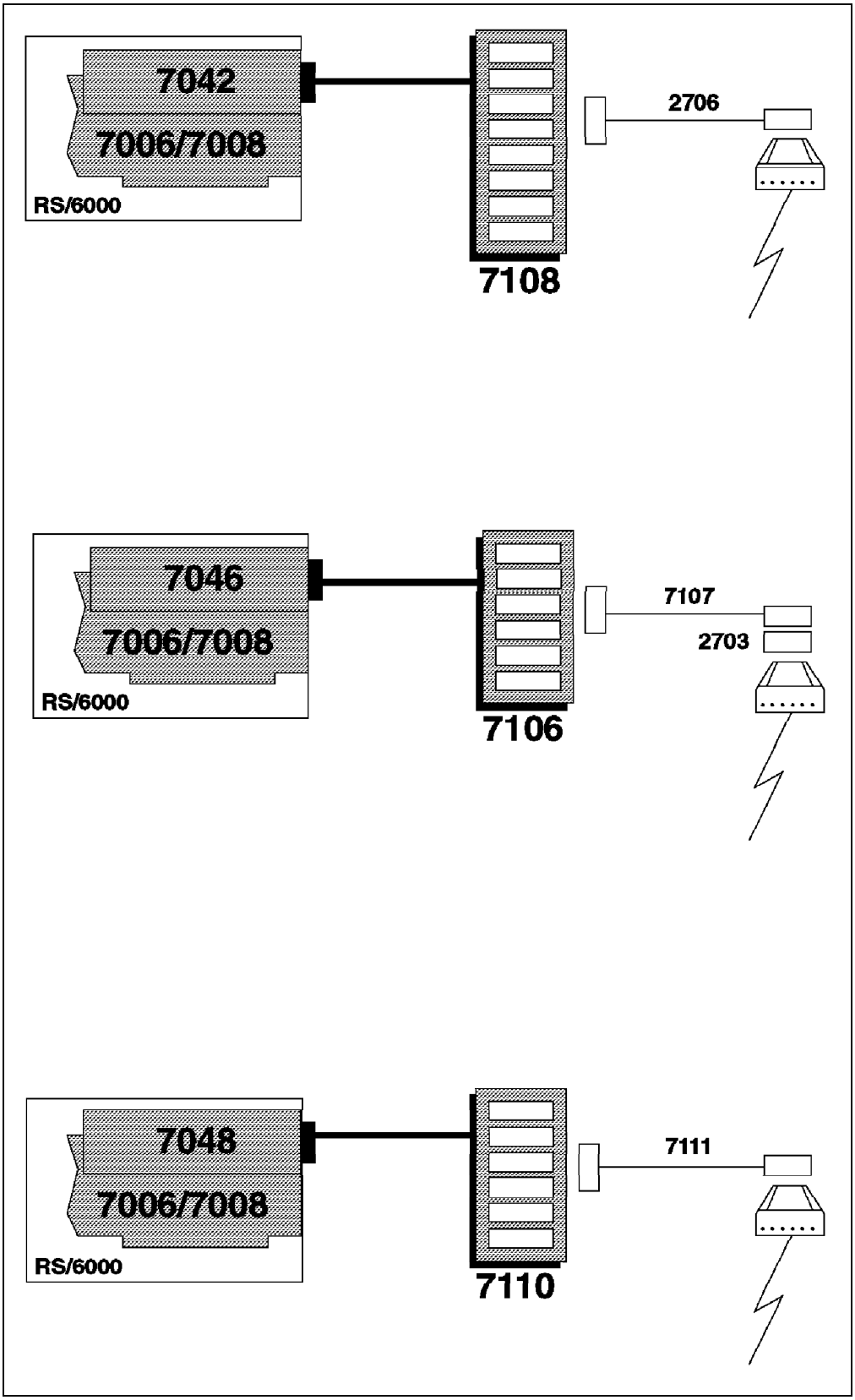


Figure 121. 7006/7008: Portmaster Adapter/A - MCA

Table 77. 7006/7008: Features and Cables

Feature	Description	Bus	Length	
			m	ft
7006	**Realtime Interface Co-Processor: Portmaster 1 Mo**	**MCA**		
7008	**Realtime Interface Co-Processor: Portmaster 2 Mo**	**MCA**		
7042	Realtime Interface Co-Processor: 8-Port V.24 Interface Board/A		-	-
7046	IBM Realtime Interface Co-Processor: 6-Port V.35 Interface Board/A		-	-
7048	IBM Realtime Interface Co-Processor: 6-Port X.21 Interface Board/A		-	-
7106	Realtime Interface Co-Processor: 6-Port V.35 Cable		1.2	4
7107	Realtime Interface Co-Processor: V.35 Network Cable		2	6.5
2703	V.35 Cable (France)		-	-
7108	Realtime Interface Co-Processor: 8-Port Cable V.24		1.2	4
7110	Realtime Interface Co-Processor: 6-Port X.21 Cable		1.2	4
7111	Realtime Interface Co-Processor: X.21 Network Cable		2	6.5

Information

- To use these adapters with the X.25 protocol, don't forget to order the AIXLink X.25 (5696-926) LPP.
- This adapter is more efficient than the 2960 adapter.

5.6.4 5306/6590 - ARTIC Multiport II Adapter 1 MB - ISA

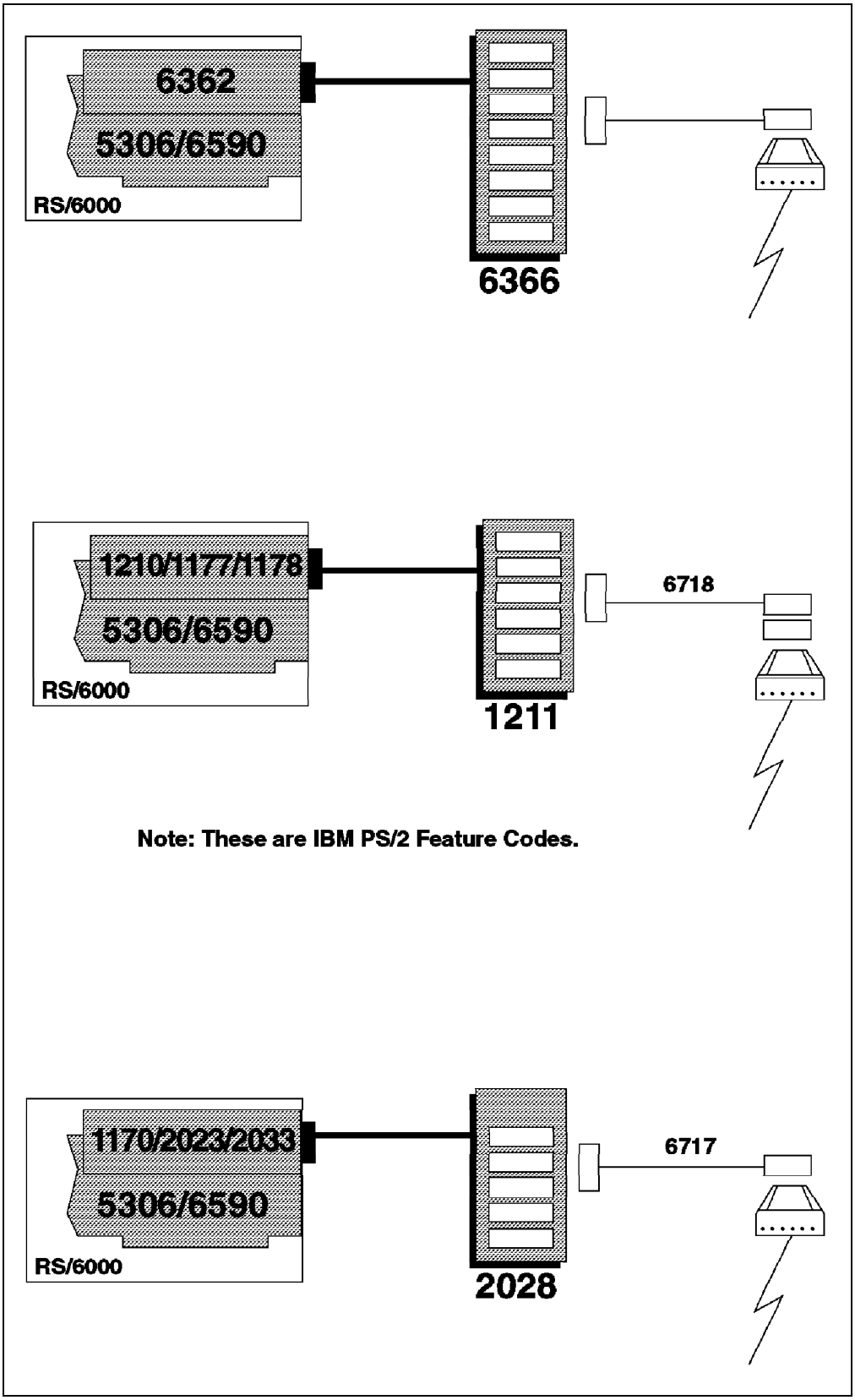


Figure 122. 5306/6590: ARTIC Multiport 2 Adapter - ISA

Table 78. 5306/9590: Features and Cables

Feature	Description	Bus	Length	
			m	ft
5306	**RIC Multiport II Adapter - 1 MB (EMEA)**	**ISA**		
6590	**RIC Multiport II Adapter - 1 MB (USA)**	**ISA**		
6362	8-Port V.24 Interface Board/A		-	-
1210	6-Port V.35 Interface Board/A - US English		-	-
1177	6-Port V.35 Interface Board/A - Spanish			
1178	6-Port V.35 Interface Board/A - French			
1170	6-Port X.21 Interface Board/A - US English			
2023	6-Port X.21 Interface Board/A - Spanish			
2033	6-Port X.21 Interface Board/A - French			
6366	Realtime Interface Co-Processor Portmaster V.24 Cable			
6717	Realtime Interface Co-Processor X.21 Cable			
6718	Realtime Interface Co-Processor V.35 Cable			
1211	Realtime Interface Co-Processor 6-Port V.35 Cable			
2028	Realtime Interface Co-Processor 6-Port X.21 Cable			

Information

- To use these adapters with the X.25 protocol, don't forget to order the AIXLink X.25 (5696-926) LPP (Version 1.1.3 or later).
- This adapter is more efficient than the 2960 adapter.
- You will not find these features in CFRS6000, but this adapter is supported with AIXLink X.25.

5.6.5 2929/2935/2938 - ARTIC960 Adapters - MCA

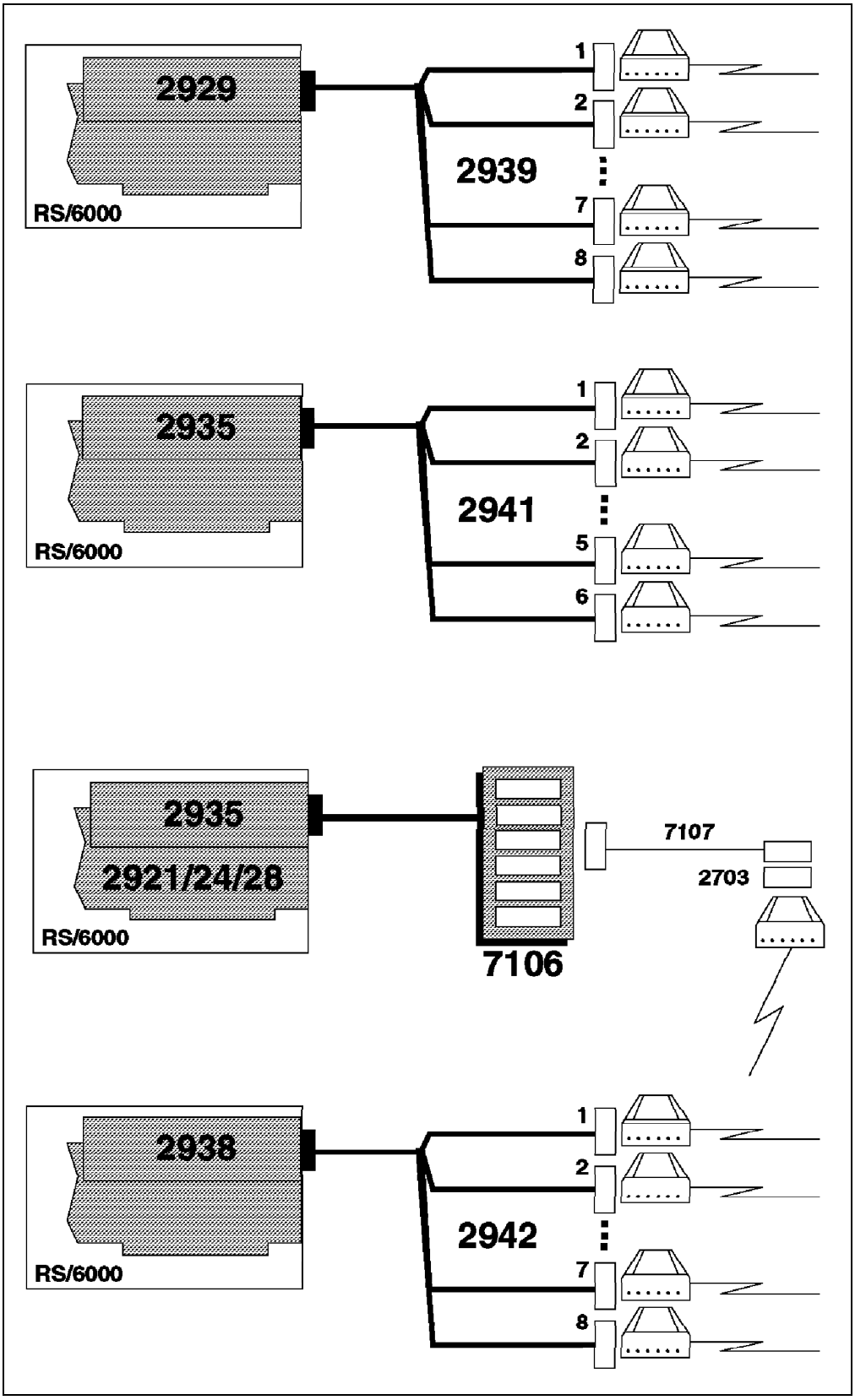


Figure 123. 7006/7008: Portmaster 1/2 Mo Adapter - MCA

Table 79. 7006/7008: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2929	**ARTIC960 Co-Processor 8-Port V.24**	**MCA**		
2935	**ARTIC960 Co-Processor 6-Port V.36/V.35**	**MCA**		
2935	**ARTIC960 Co-Processor 8-Port X.21**	**MCA**		
2939	ARTIC960 8-port EIA-232 Cable		6	20
7106	Realtime Interface Co-Processor: 6-Port V.35 Cable		1.2	4
7107	Realtime Interface Co-Processor: V.35 Network Cable		2	6.5
2941	ARTIC960 6-port V.36 Cable		3	10
2942	ARTIC960 6-port X.21 Cable		6	20
2703	V.35 Cable (France)		-	-

Information

- To use these adapters with the X.25 protocol, don't forget to order the AIXLink X.25 (5696-926) LPP, Version 1.1.3 or later.
- This adapter is more efficient than the 2960 adapter.

5.7 Synchronous Adapters

5.7.1 2959 - 1-Port Multiprotocol Communications Adapter - MCA

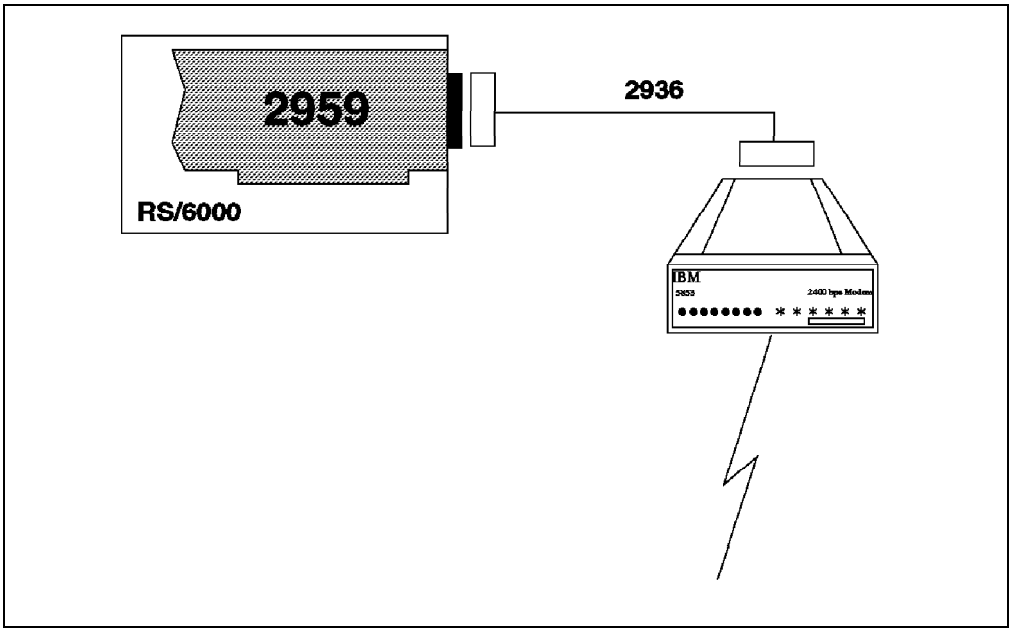


Figure 124. 2959 - 1-Port Multiprotocol Communications Adapter - MCA

Table 80. 2959: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2959	**1-Port Multiprotocol Communications Adapter**	**MCA**		
2936	Asynchronous Cable EIA-232/V.24		3	10

Information

- This adapter provides SDLC connection for an SNA network.
- This adapter does not support BSC connection.

5.7.2 2700 - 4-port Multiprotcol Communications Controller - MCA

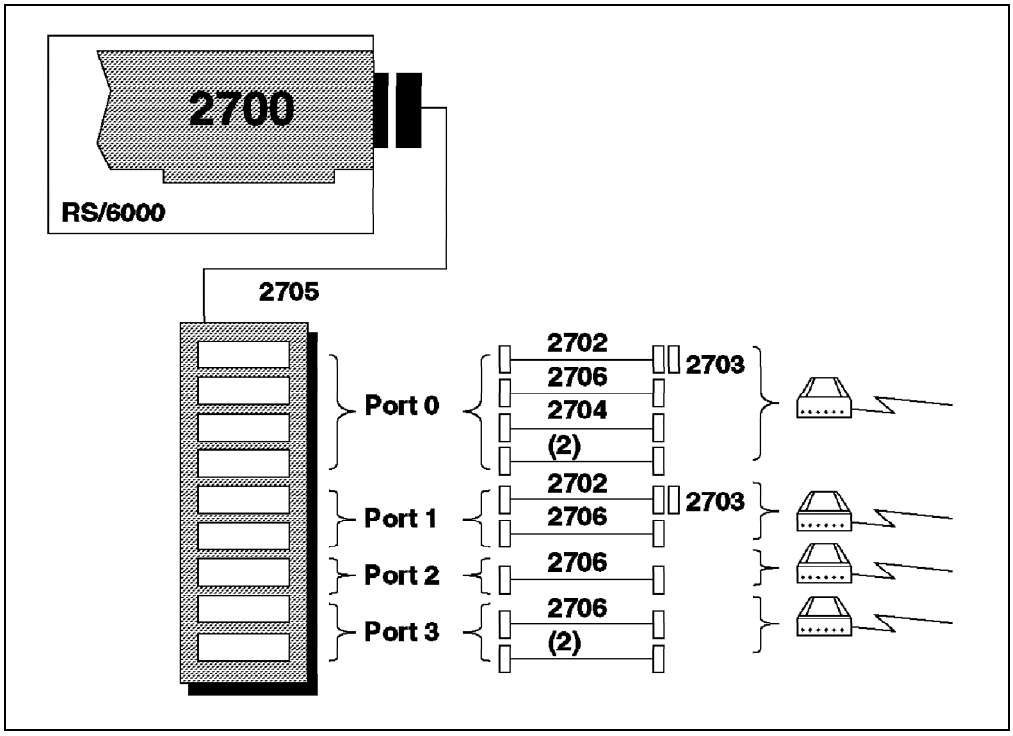


Figure 125. 2700 - 4-port Multiprotcol Communications Controller - MCA

Table 81. 2700: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2700	**4-port Multiprotcol Communications Controller**	**MCA**		
2705	4-Port Multiprotocol Interface Cable		3	10
2702	Multiprotocol Attachment Cable - V.35		2	6.5
2703	V.35 Pin Adapter (France only)		-	-
2704	Multiprotocol Attachment Cable - X.21		3	10
2706	Multiprotocol Modem Attachment Cable - EIA-232/V.24		3	10
(2)	EIA-422 Cable			

Information

- This adapter provides SDLC connection for an SNA network.
- This adapter provides BSC connection on AIX V4.1 and AIX V4.2.

5.7.3 2701 - 4-Port Multiprotcol Communications Controller - ISA

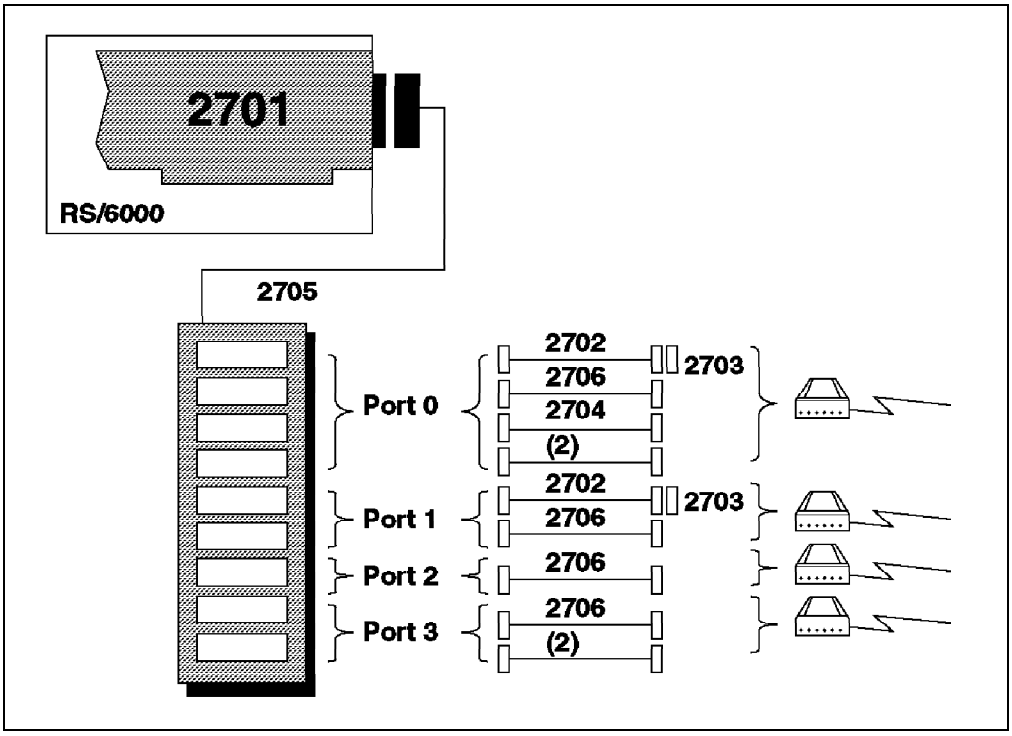


Figure 126. 2701 - 4-Port Multiprotcol Communications Controller - ISA

Table 82. 2700: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2700	**4-port Multiprotcol Communications Controller**	**ISA**		
2705	4-Port Multiprotocol Interface Cable		3	10
2702	Multiprotocol Attachment Cable - V.35		2	6.5
2703	V.35 Pin Adapter (France only)		-	-
2704	Multiprotocol Attachment Cable - X.21		3	10
2706	Multiprotocol Modem Attachment Cable - EIA-232/V.24		3	10
(2)	EIA-422 Cable			

Information

- This adapter provides SDLC connection for an SNA network.
- This adapter provides BSC connection on AIX V4.2.

5.8 Host Connections Adapters

5.8.1 2990 - 3270 Connection Adapter - MCA

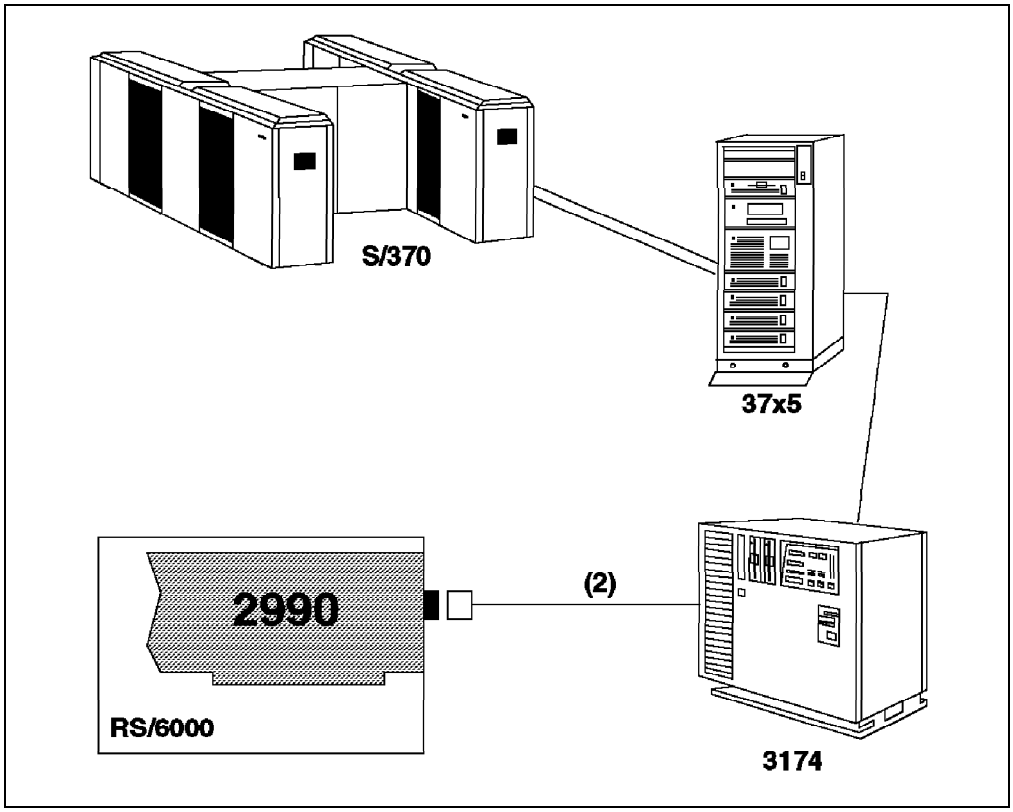


Figure 127. 2990 - 3270 Connection Adapter - MCA

Table 83. 2990: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2990	**3270 Connection Adapter**	**MCA**		
(2)	coaxial cable (P/N: 6245998)			

Information

- This adapter is only available for use in the United States.
- This adapter is not very interesting. We think it's preferable to use a LAN adapter with a "real" protocol, not just a 3270 emulation.
- This 3270 connection adapter requires the 3270 Host Connection Program for AIX V2.1 (5765-398) LPP, ordered separately.

5.8.2 2991 - 3270 Connection Adapter - MCA

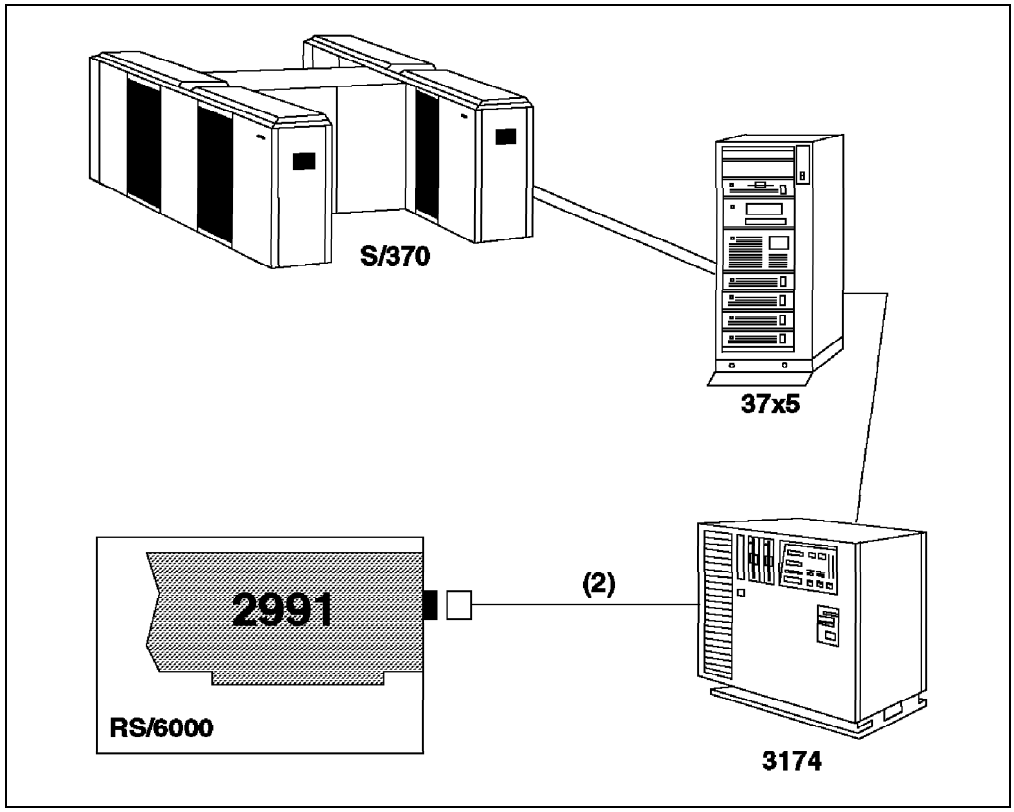


Figure 128. 2991 - 3270 Connection Adapter - MCA

Table 84. 2990: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2991	**3270 Connection Adapter**	**MCA**		
(2)	Coaxial Cable (P/N: 6245998)			

Information

- This adapter is available for all countries except the United States.
- This adapter is not very interesting. We think it's preferable to use a LAN adapter with a "real" protocol, not just a 3270 emulation.
- This 3270 connection adapter requires the 3270 Host Connection Program for AIX V2.1 (5765-398) LPP, ordered separately.

5.8.3 2759 - System/370 Channel Emulator/A - MCA

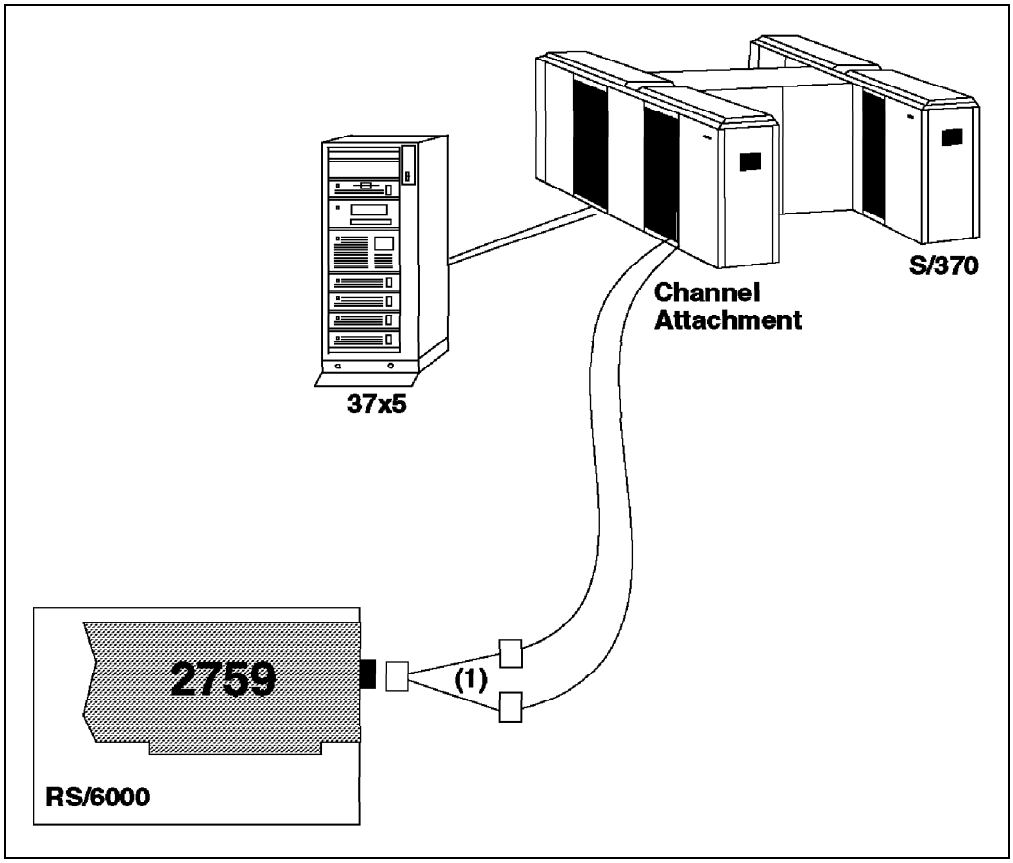


Figure 129. 2759 - System/370 Channel Emulator/A - MCA

Table 85. 2759: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2759	**System/370 Channel Emulator/A**	**MCA**		
(1)	System/370 Channel Emulator/A Cable (P/N: 68F7209)		3	10

Information

- Please refer to the *System/360 System/370, 4300, 9370 and ES9000 Processors Input/Output Equipment Installation Manual - Physical Planning*, GC22-7064, for details and restrictions regarding channel cabling.
- This adapter in only supported in TCP/IP environment.
- This adapter is only supported with AIX Version 4.1.
- PRPQ #5799-QDA, IBM Parallel Channel Tape Attachment/6000, or IBM AIX Print Service Facility for AIX Version 2.1 (5765-505).

5.8.4 2756 - System/390 ESCON Control-Unit Adapter - MCA

The ESCON Channel Adapter provides ESCON Channel attachment of an RS/6000 to an System/390 system with an ESCON Channel.

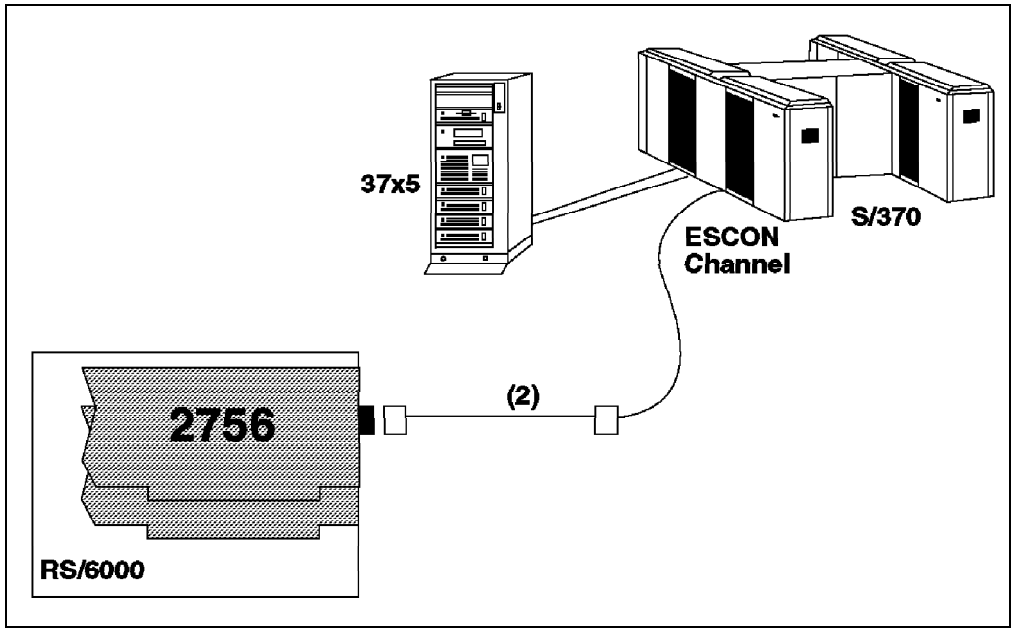


Figure 130. 2756 - System/390 Escon Control Unit Adapter - MCA

Table 86. 2756: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2756	**System/390 Escon Control Unit Adapter**	**MCA**		
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5412)		3.7	12
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5413)		6.1	20
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5414)		12.1	40
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5415)		21.3	70
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5416)		30.4	100
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5417)		61	200
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5418)		122	400

Information

- Refer to the *Enterprise System Connection Adapter User's Guide and Service Information*, SC23-2474, for more details.
- This adapter requires two MCA slots.
- When this System/390 ESCON Control Unit adapter is used in an SNA environment, it requires SNA Channel Attachment (5765-652, option: 0705).
- This System/390 ESCON Control Unit adapter requires ESCON Channel Connectivity for AIX Version 1.1 (5765-603) LPP ordered separately.

5.8.5 2754 - System/390 ESCON Channel Emulator Adapter - MCA

The S/390 ESCON Channel Emulator Adapter allows attachment of S/390 tapes to an RS/6000.

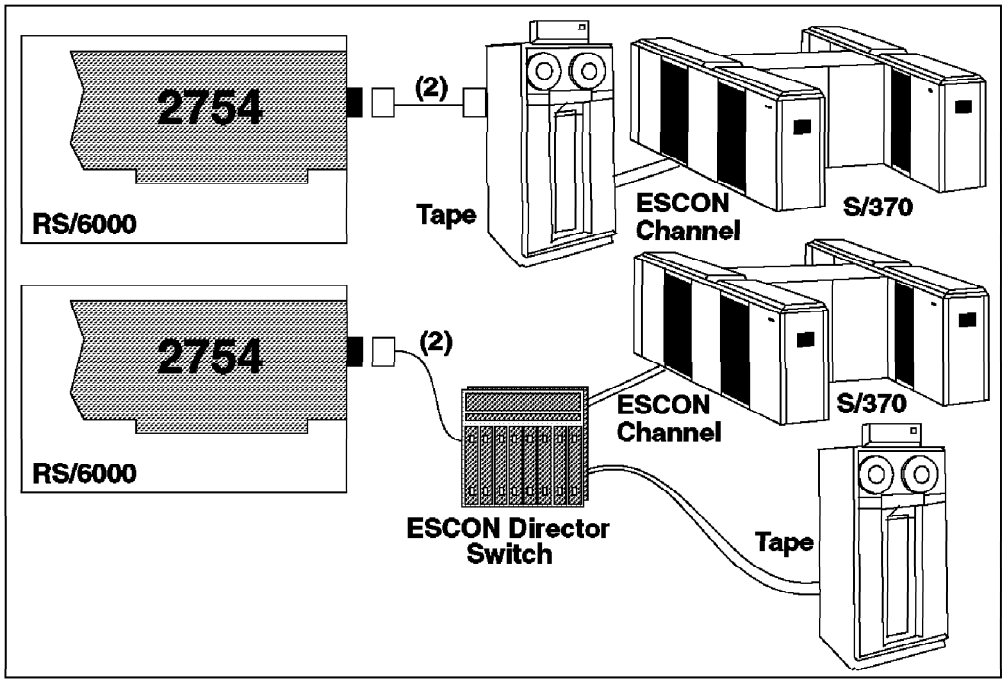


Figure 131. 2754 - System/390 Escon Channel Emulator - MCA

Table 87. 2754: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2754	**System/390 Escon Channel Emulator**	**MCA**		
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5412)		3.7	12
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5413)		6.1	20
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5414)		12.1	40
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5415)		21.3	70
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5416)		30.4	100
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5417)		61	200
(2)	System/390 ESCON Channel Jumper Cable (P/N:74F5418)		122	400

Information

- Refer to the *Planning for Enterprise System Connection Links,* order number GA23-0367, for more details.
- When this System/390 Escon Control Unit adapter is used in SNA environment, it requires SNA Channel Attachment (5765-652, option: 0705).
- This System/390 Escon Channel Emulation adapter requires device driver orderable using RPQ#8A1016.
- This adapter is supported only with AIX version 4.1.

5.8.6 2755 - Block Multiplexer Channel Adapter - MCA

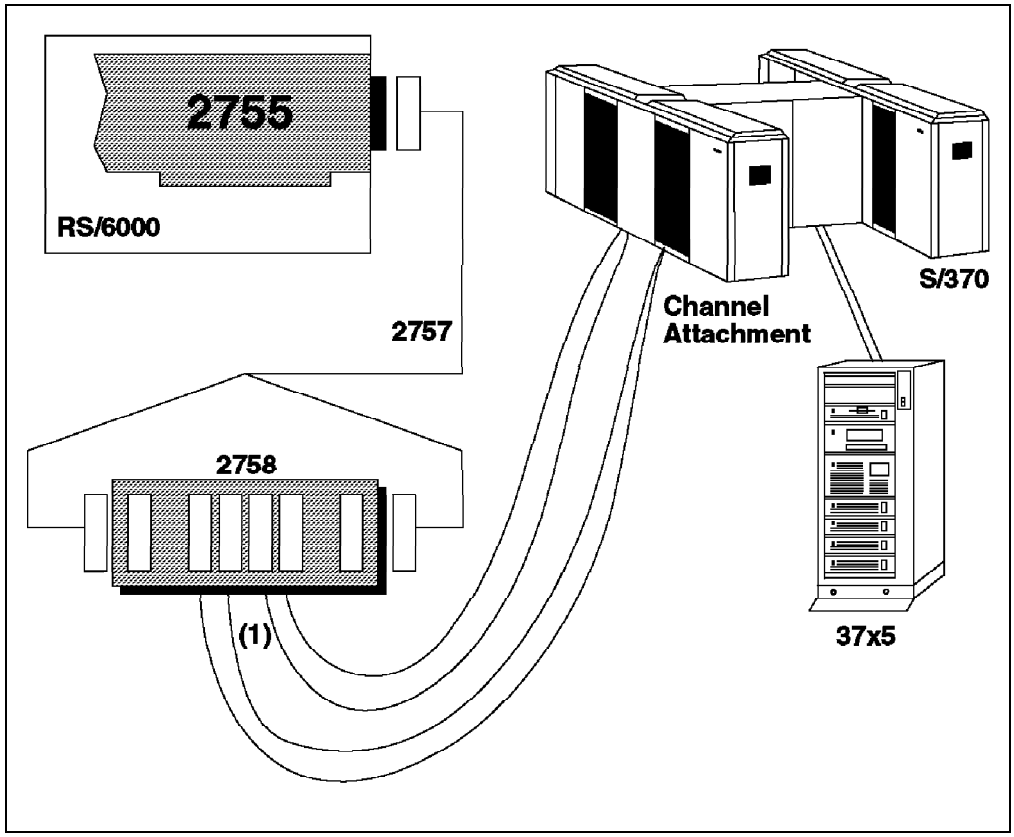


Figure 132. 2755 - Block Multiplexer Channel Adapter - MCA

Table 88. 2755: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2755	**Block Multiplexer Channel Adapter**	**MCA**		
2757	Block Multiplexer Channel Adapter Cable		1.8	6
2758	Block Multiplexer Channel Cable Assembly		-	-
(1)	Block Multiplexer Channel Cables			

Information

- Please refer to the *System/360 System/370, 4300, 9370, and ES9000 Processors Input/Output Equipment Installation Manual - Physical Planning*, GC22-7064, for details and restrictions regarding channel cabling.
- This Block Multiplexer Channel adapter requires the Block Multiplexer Channel Connectivity V1.1 (5765-604) LPP, ordered separately.

5.9 Fibre Channel Adapters

5.9.1 1904/1902 - Fibre Channel Adapter/1063 - MCA

The Fibre Channel Switch 16/1063 is an ANSI fibre channel standard compliant, high-performance serial optical fabric supporting a link rate of 1063 Mbps.

It utilizes high-speed data paths and a low latency control method to enable high-speed data transfers between RS/6000 and RS/6000 SP systems equipped with Fibre Channel Adapter/1063s.

The Fibre Channel Adapter/1063 is an MCA Adapter designed to attach to selected RS/6000 systems. The Fibre Channel Adapter/1063 supports link rates of 1063 Mbps.

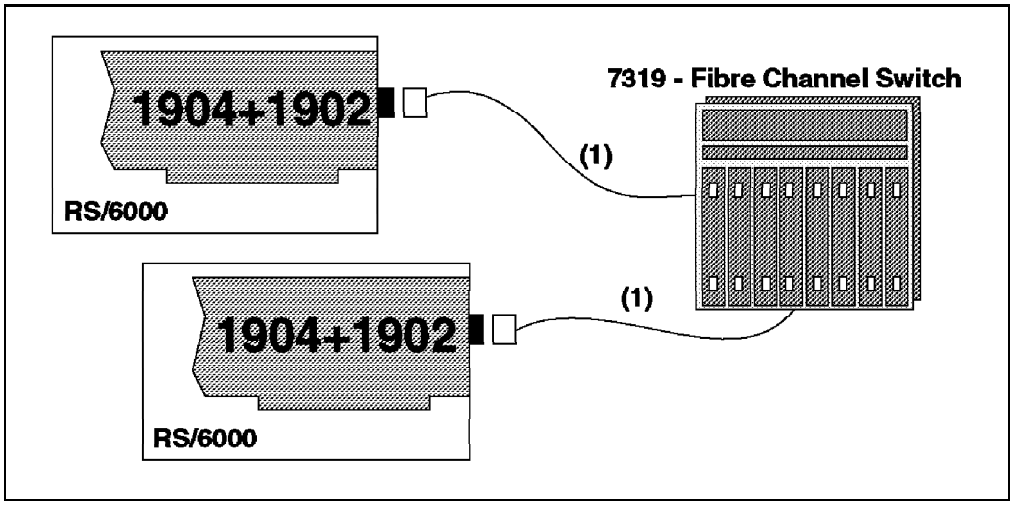


Figure 133. 1904/1902 - Fibre Channel Adapter/1063 - MCA

Table 89. 1904/1902: Features and Cables

Feature	Description	Bus	Length	
			m	ft
1904	**Fibre Channel Adapter/1063**	**MCA**		
1902	**Optics Daughter Card, 1-Port/1063**	**MCA**		
(1)	Fiber Optic Cable (US P/N:54G3384 / Others P/N: 54G3385)		7	22
(1)	Fiber Optic Cable (US P/N:54G3384 / Others P/N: 54G3386)		13	42
(1)	Fiber Optic Cable (US P/N:54G3384 / Others P/N: 54G3387)		22	72
(1)	Fiber Optic Cable (US P/N:54G3384 / Others P/N: 54G3388)		31	101
(1)	Fiber Optic Cable (US P/N:54G3384 / Others P/N: 54G3389)		46	150

Information

- Feature 1904 is the base adapter; feature 1902 is an optical transceiver daughter card that attaches to the base adapter (FC1904). One FC 1902 must be ordered for each FC 1904 base adapter ordered.
- The adapter and its device drivers support the Internet Protocol, including TCP/IP, UDP, and raw sockets.

5.9.2 1906 - Fibre Channel Adapter/266 - MCA

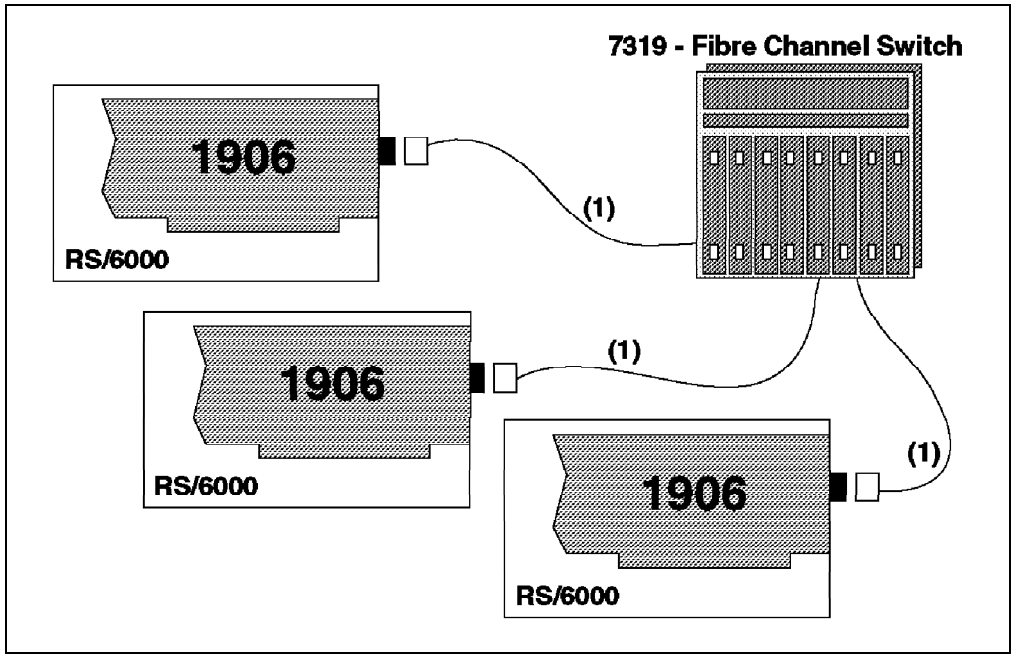


Figure 134. 1906 - Fibre Channel Adapter/266 - MCA

Table 90. 1904/1902: Features and Cables

Feature	Description	Bus	Length	
			m	ft
1906	**Fibre Channel Adapter/266**	**MCA**		
(1)	Fiber Optic Cable (P/N: 19G6772)		4	13
(1)	Fiber Optic Cable (P/N: 19G6773)		6	20
(1)	Fiber Optic Cable (P/N: 19G6774)		10	33
(1)	Fiber Optic Cable (P/N: 19G6775)		20	66
(1)	Fiber Optic Cable (P/N: 19G6776)		40	131
(1)	Fiber Optic Cable (P/N: 19G6777)		60	197
(1)	Fiber Optic Cable (P/N: 19G6778)		80	262
(1)	Fiber Optic Cable (P/N: 19G6779)		100	328

Information

- This adapter is only supported in a TCP/IP environment.
- Point-to-point connection and switch connections.
- ARP server support in addition to normal IP communication, when attached to the IBM Fibre Channel Switch.
- The above features are withdrawn.

5.10 ATM Adapters

5.10.1 2984 - Turboways 100 ATM Adapter - MCA

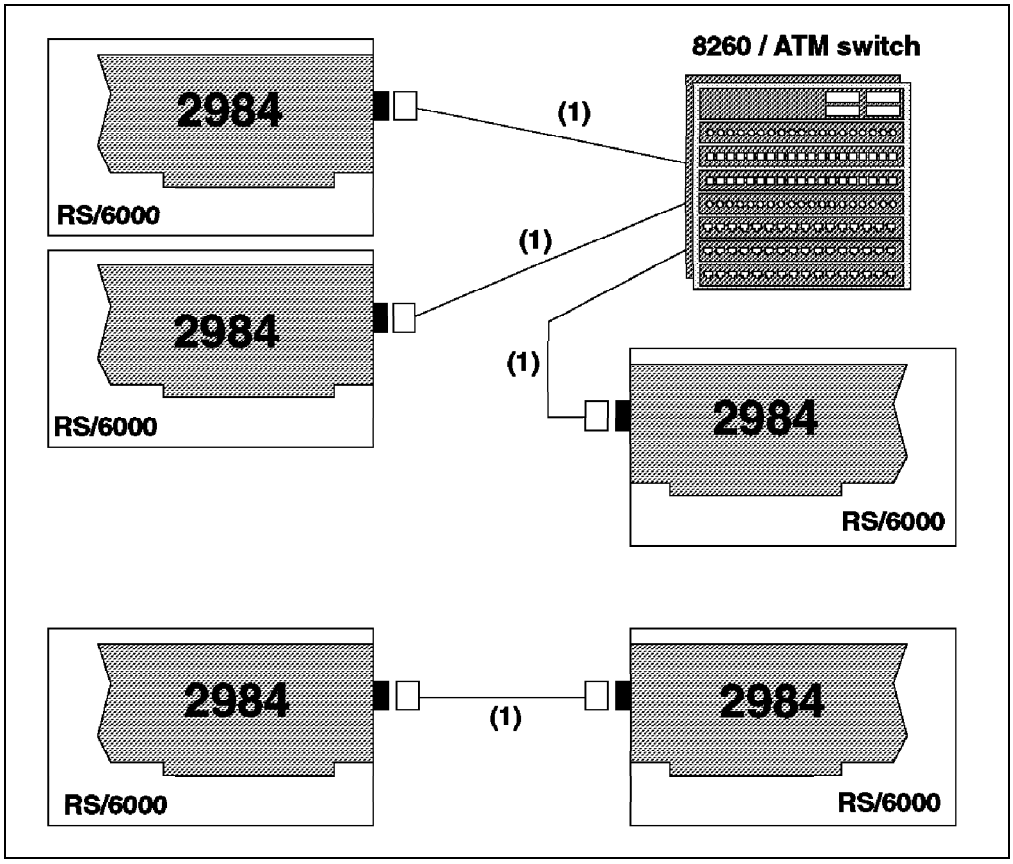


Figure 135. 2984 - Turboways 100 ATM Adapter - MCA

Table 91. 2984: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2984	**Turboways 100 ATM Adapter**	**MCA**		
(1)	Fiber optic cable - P/N: 19G6706		2	6.6
(1)	Fiber optic cable - P/N: 19G4864		4	13
(1)	Fiber optic cable - P/N: 19G4865		6	20
(1)	Fiber optic cable - P/N: 19G4866		10	33
(1)	Fiber optic cable - P/N: 19G4867		20	66
(1)	Fiber optic cable - P/N: 19G4868		40	131

Information

- This adapter is only supported in TCP/IP environment.

5.10.2 2989 - Turboways 155 ATM Adapter - MCA

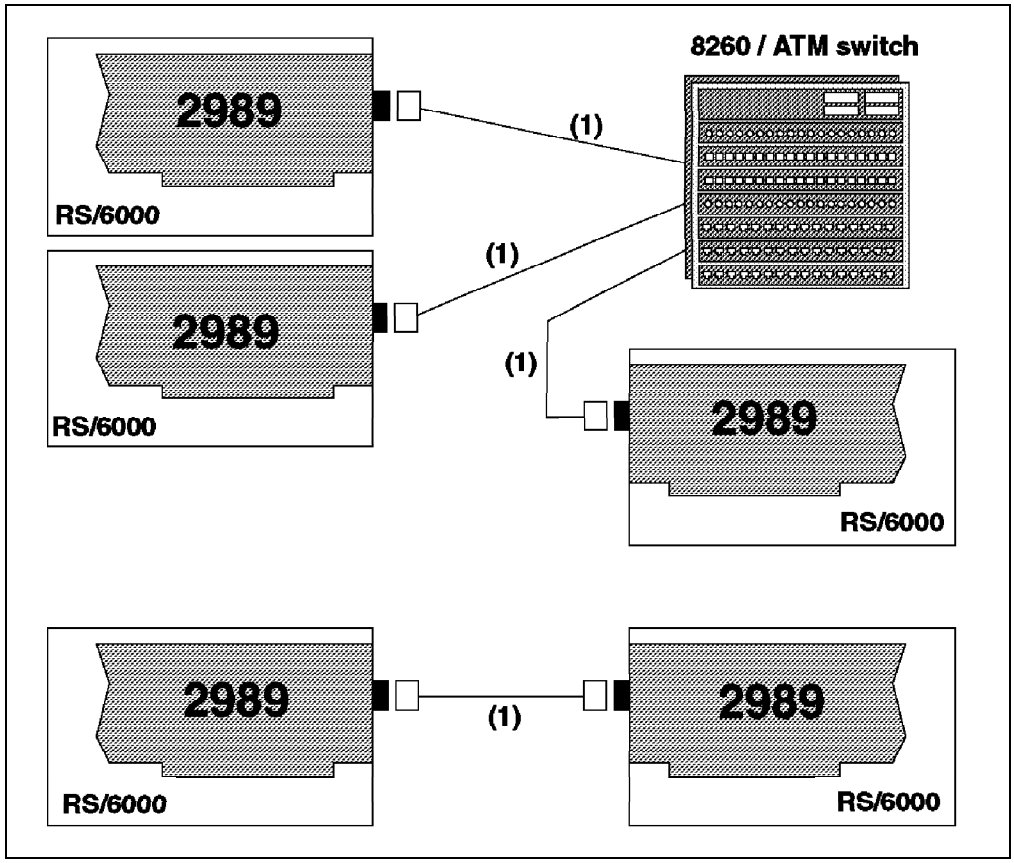


Figure 136. 2989 - Turboways 100 ATM Adapter - MCA

Table 92. 2989: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2989	**Turboways 155 ATM Adapter**	**MCA**		
(1)	Fiber Optic Cable - P/N: 19G6706		2	6.6
(1)	Fiber Optic Cable - P/N: 19G4864		4	13
(1)	Fiber Optic Cable - P/N: 19G4865		6	20
(1)	Fiber Optic Cable - P/N: 19G4866		10	33
(1)	Fiber Optic Cable - P/N: 19G4867		20	66
(1)	Fiber Optic Cable - P/N: 19G4868		40	131

Information

- This adapter is only supported in TCP/IP environment.

5.11 High-Speed Adapters

5.11.1 2860 - Serial Optical Channel Converter - MCA

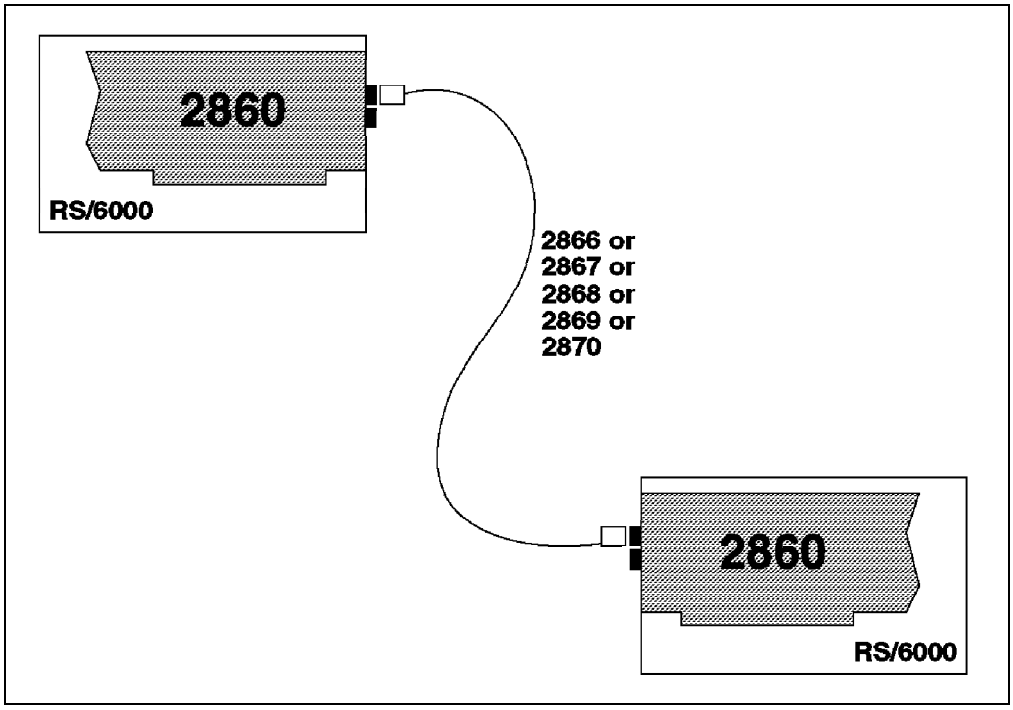


Figure 137. 2860 - Serial Optical Channel Converter - MCA

Table 93. 2860: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2860	**Serial Optical Channel Converter**	**MCA**		
2866	Optical Channel Converter Cable		6	20
2867	Optical Channel Converter Cable		10	33
2868	Optical Channel Converter Cable		20	65.5
2869	Optical Channel Converter Cable		60	197
2870	Optical Channel Converter Cable		100	328

Information

- This adapter is supported only in a TCP/IP environment.
- The above features are withdrawn. Use instead ATM or Fibre Channel adapters.

5.11.2 2735 - High-Performance Parallel Interface - MCA

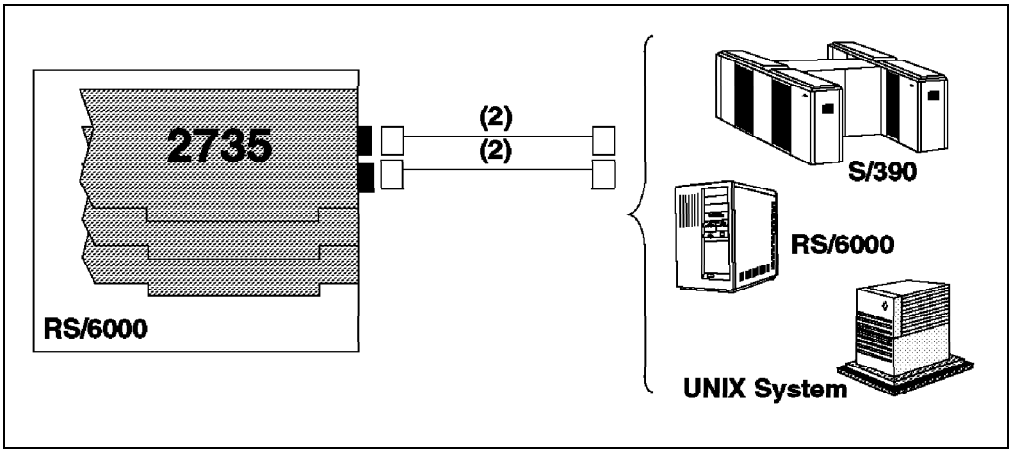


Figure 138. 2735 - High-Performance Parallel Interface - MCA

Table 94. 2735: Features and Cables

Feature	Description	Bus	Length	
			m	ft
2735	**High-Performance Parallel Interface**	**MCA**		
(2)	HIPPI Cable (customer supplied)			

Information

- This HIPPI adapter requires THE High-Performance Parallel Interface 4.1 (5765-551) LPP, ordered separately.

  Support for SMP systems will be provided by using RPQ #8A1017.
- When used in conjunction with RS/6000 High-Performance Parallel Interface (HIPPI)Micro Channel Adapter set (#2735), it enables an RS/6000 system, to provide gigabit speed connectivity to a variety of supercomputer, storage, and communication equipment.
- This channel allows the RS/6000 to be connected to other RS/6000 systems and to the IBM 9570 Disk Array Subsystem, other vendor supercomputers, HIPPI fiber optic extenders, HIPPI switches, disk arrays, and tape subsystems. The RS/6000 HIPPI channel is fully compliant with American National Standards Institute (ANSI) standards. The RS/6000 systems, by supporting the industry-standard HIPPI channel together with TCP/IP, HIPPI Framing Protocol, UDP, and IPI-3 (Intelligent Peripheral Interface) master and slave upper-level protocols, offers one of the industry's highest performance and most complete solutions for high-speed and large data transfer requirements. HIPPI/6000 contains six functional device drivers:
  - HIPPI Framing Protocol
  - IPI-3 master transport services driver
  - IPI-3 slave transport services driver
  - HIPPI LE layer driver for use with TCP/IP, UDP, and NFS
  - HIPPI adapter driver.
- This adapter requires three MCA slots.

5.12 OEM Adapter Offerings for the RS/6000

This section cannot be exhaustive. But, sometimes, you need a nonIBM adapter to achieve your communication solution.

The Internet can help you

You can find more information on the WWW at this address:

`http://info6000.austin.ibm.com/products/oemhw/`

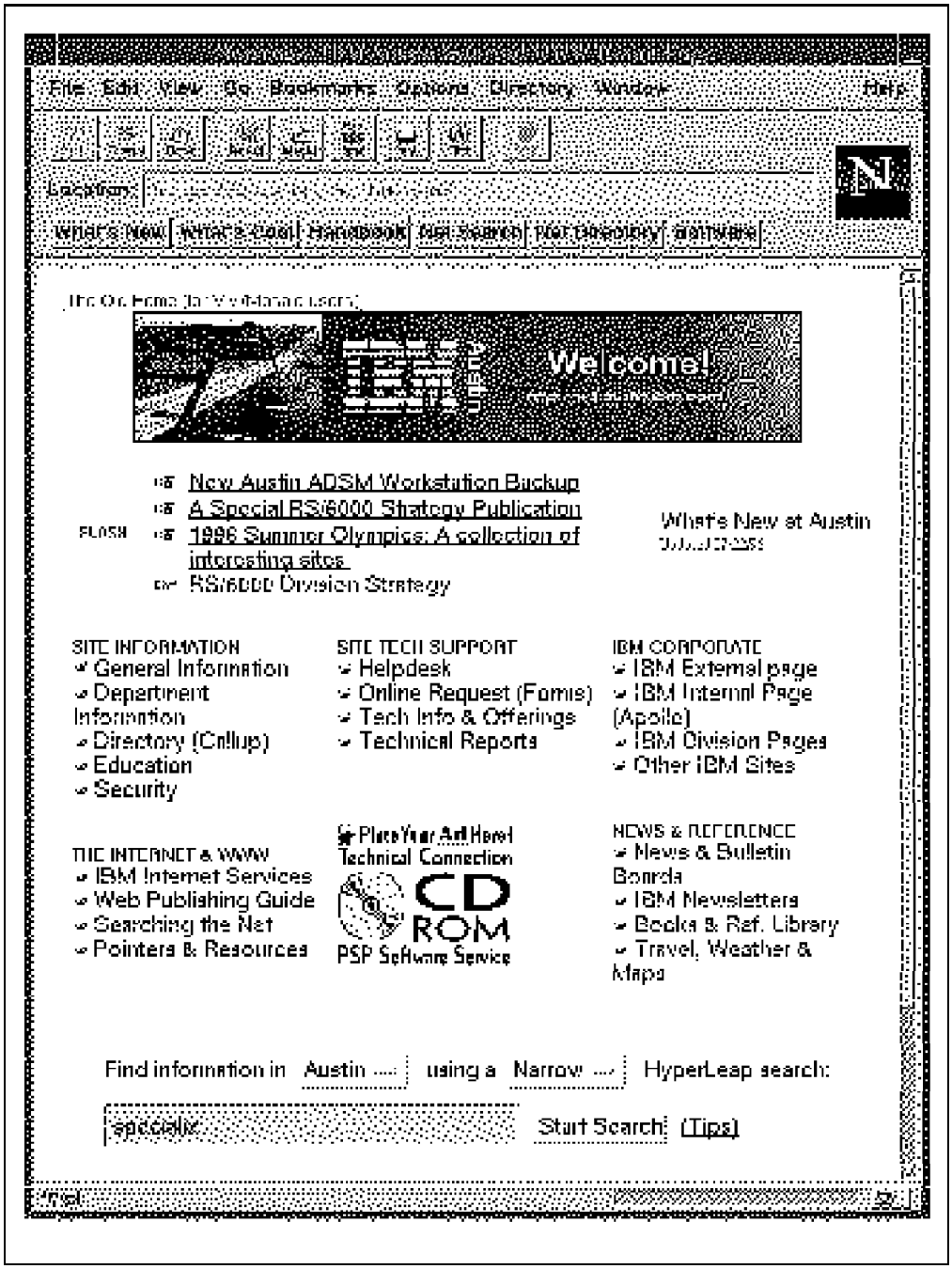


Figure 139. http://w3.austin.ibm.com/

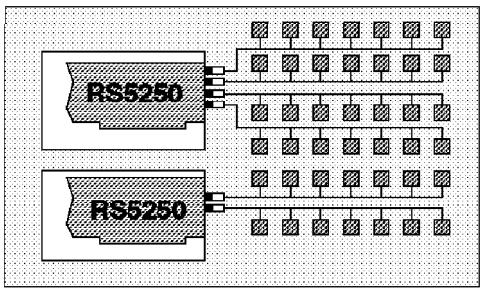
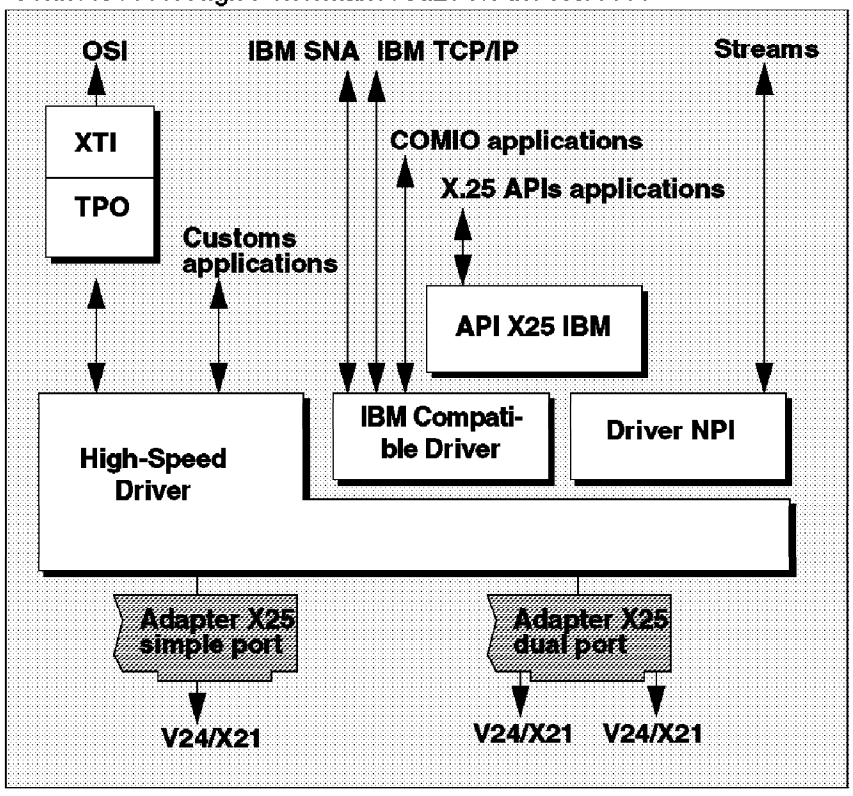
You will find on the WWW many OEM products, especially a lot of sections concerning communications, such as:

- AS/400 and S/3X Connection
- ATM
- Channel (Mainframe Connection)
- Ethernet
- FAX
- FDDI Connection
- Fibre Channel
- Frame Relay
- HDLC
- ISDN
- RJE terminal emulation
- SDLC
- Serial Ports
- Telephone
- Terminal Servers (LAN-attached)
- Terminal Servers (serial multi-ports)
- Token-Ring
- T1 Line
- WAN
- Wireless
- X.25, X.28, X.29, X.3, X.121

Not an IBM product

Remember: these products are not IBM products. So, IBM does not provide any support on these adapters.

Table 95. A Few OEM Products

Product - Functions	Contact
- MULTIPORT: Range of Serial I/O Products - JETSTREAM: Range of TCP/IP Terminal Servers & Communications Servers - NPS: Network Printer Server - HIGHWAY: Range of ISDN Terminal Adapters - ROADSTER: Range of ISDN PC Cards	- USA SPECIALIX phone: 1.408.378.7919 fax: 1.408.378.0786 mail: info@specialix.com http://www.specialix.com/ - EUROPE SPECIALIX phone: 33.01.34.63.06.70 fax: 33.01.34.65.38.60 mail: infofr@specialix.co.uk
- DCI twinax controllers allow the twinax attachment of 5250 terminals and printers to the RS/6000, and come with software that provides IBM 3151 emulation. Controllers are available with support for 14 or 28 twinax devices per card.  	- USA DCI (Development Concepts Inc.) phone: 1.215.443.9652 fax: 1.215..674.0607
- Syncard X.25/ISDN : WAN access: ISDN B channels (2x64 Kbps) and ISDN D channel X.25, X.25 or LL access, Supported applications: TCP/IP, PPP, SNA,..., Buses: ISA, MCA, PCI - Connect 6000: HIgh-Performance X.25 for the RS/6000  	- FRANCE SYNAPTEL phone: 33.01.30.67.17.00 fax: 33.01.34.65.39.13 mail: market@synaptel.fr http://www.synaptel.fr/

Chapter 6. AIX V4 Communication Software Offerings

This chapter describes the AIX for RS/6000 Version 4.1 and Version 4.2 operating systems and RS/6000 software offerings concerning communications and connectivity.

This chapter can be used as a reference for the RS/6000 software products required to develop communication solutions.

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

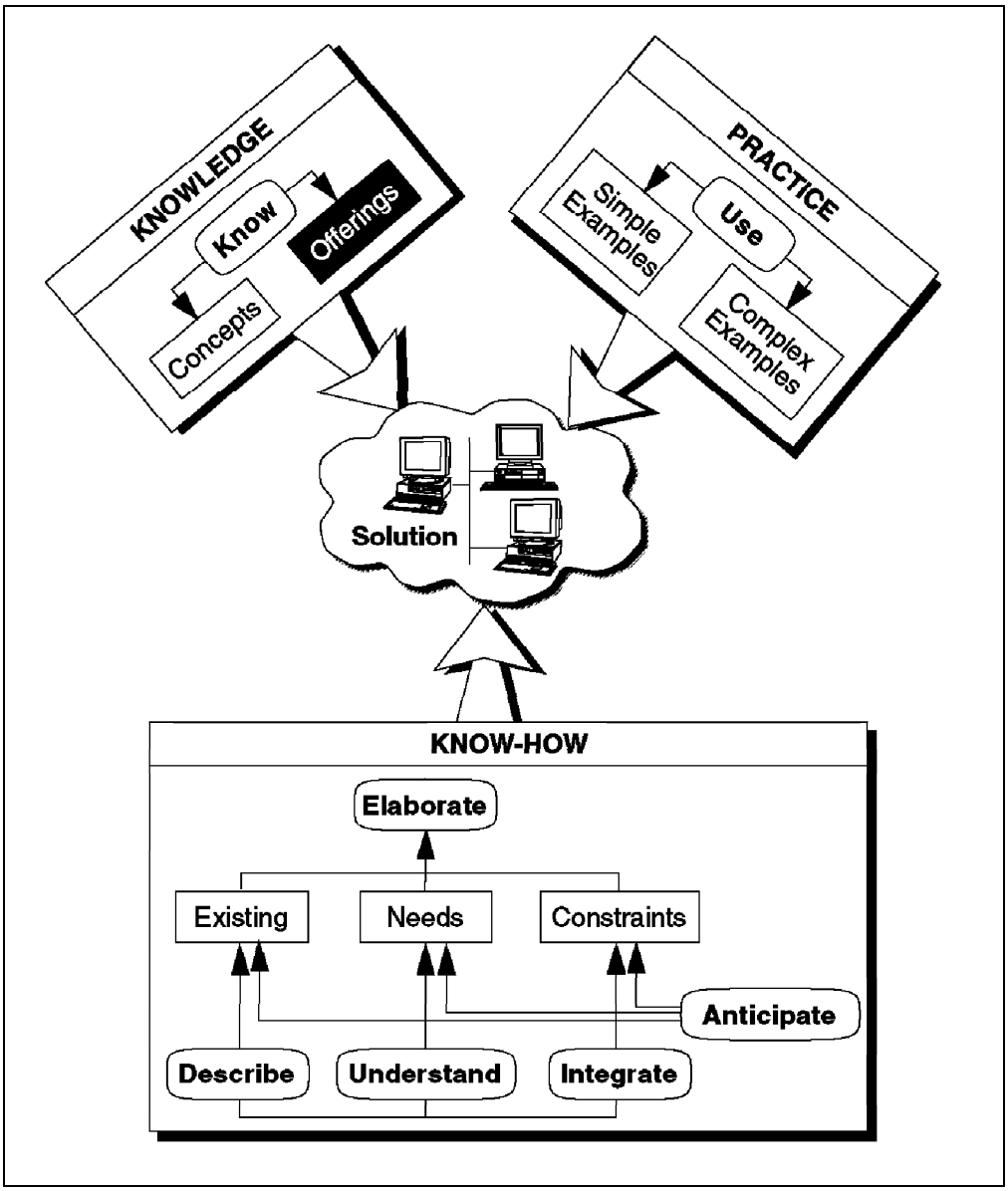


Figure 140. Position of Chapter 6 in Solution Design

6.1 AIX V4.1 and AIX V4.2 for the RS/6000: Licensed Program and Options

This section describes the integrated and optional features of IBM AIX for RS/6000 operating systems Version 4.1 (5765-393) and version 4.2 (5765-655). Differences in features, functionality, or support between Version 4.1 and Version 4.2 will be pointed out.

AIX Version 4.1 and Version 4.2 are offered as packages and options. AIX packages provide the base, orderable functions and services required for an operating environment. Options are provided to extend specific AIX packages (for example, AIX Connections, described below in this section).

6.1.1 Communications Facilities

IBM AIX for RS/6000 provides the following communications facilities:

- **Transmission Control Protocol/Internet Protocol (TCP/IP)** facilities, including end-user commands, network security support, and an application programming interface. TCP/IP can communicate on an Ethernet Version 2, IEEE 802.3, token-ring LAN, X.25 wide area network (WAN), asynchronous connection (using Serial Line Internet Protocol and Point-to-Point Protocol), Serial Optical Channel, or a Fiber Channel. TCP/IP can also communicate through an S/370, S/390 Block Multiplexer Channel connection, ESCON connection, or a Fiber Distributed Data Interface (FDDI) LAN (by separately orderable device drivers). Simple Network Management Protocol (SNMP) Agent support is included with TCP/IP, as with SNMP Management Information Base. The SNMP agent supports the sending of SNMP trap information to a designated SNMP manager. AIX for RS/6000 TCP/IP implementation is based on 4.3 BSD-Reno and includes the following:

  - Adherence to Internet protocols as described in *X/OPEN Guide to Internet Protocol Suites*.
  - Support for Internet Engineering Task Force Requests for Change (RFC) 1105, 1122, 1123, 1155, 1157, and 1158. AIX's PPP implementation adheres to Internet Engineering Task Force (IETF) Request for Comments (RFCs) 1661, 1332, and 1662.

- **Dynamic Host Configuration Protocol (DHCP)** support. With the addition of the DHCP function, AIX allows much of the initial installation and physical movement of TCP/IP hosts to be handled automatically.

  This significantly reduces the system administrator's time, allows individual workstations to be up and running faster, and prevents errors that could occur because of manual updates to the network information.

  The IP addresses are dynamically assigned rather than being tied by administrative action to a single host name. This allows a particular hostname to move from subnetwork to subnetwork, acquire the proper IP address, and initiate the table updates in the name servers that allow it to function.

  Dynamic Host Configuration Protocol is an IETF approved standard.

  This implementation adheres to IETF RFCs 1533, 1534, 1541, and 1542.

- **Point-to-Point Protocol (PPP)** support. Point-to-Point Protocol (PPP) is an IETF- defined protocol for both synchronous and asynchronous connectivity.

It has become popular for asynchronous TCP/IP access of servers. With this release, AIX is providing TCP/IP connectivity over PPP used with RISC/6000 asynchronous connections.

This connectivity is very popular for applications that access the Internet. AIX's PPP implementation adheres to IETF Request for Comments (RFCs) 1661, 1332, and 1662. It is a streams-based kernel implementation, in contrast to the daemon implementation of some commercially available packages. The kernel implementation prevents the performance overhead of having part of the protocol in application space. It was designed to provide a robust TCP/IP server attachment.

- **Network File System (NFS)** support compatible with Open Network Computing (ONC)/NFS Version 4.0 developed by Sun Microsystems, Inc. NFS includes Network Information Service (NIS) support, Network Local Manager, remote-mapped files support, the Remote Procedure Call (RPC) API, and eXternal Data Representation (XDR).
- **Network Computing System (NCS)** support, which provides transparent access capabilities for end users, developers, and applications.
- **Portable STREAMS Environment (PSE)**, which is a flexible I/O subsystem well-suited for protocol-based intersystem and intrasystem communication. PSE includes end-user commands, the Transport Layer Interface (TLI) library, the loadable STREAMS environment and application programming interface, drivers for communication through the Internet protocols (TCP and UDP), UNIX-domain protocols, and an Ethernet-based Data Link Provider Interface (DLPI). PSE is upwardly compatible with OSF/1.0 and is compatible with the AT&T Base System V Release 4 STREAMS environment.
- Support for AT&T Base System V Release 4-compatible streams.
- **DOS Server**, which allows users and applications on appropriately attached IBM PCs and PS/2s running the IBM AIX Access for DOS Users licensed program to access file and printers and to run AIX programs on the RS/6000 host. DOS Server can communicate on an IEEE 802.3, token-ring LAN, or asynchronous connection.
- **Basic Network Utilities (BNU/UUCP)**, which provides for remote system polling, remote system login, remote command execution, job queueing, and file transfer between AIX for RS/6000 and other UNIX systems with BNU facilities installed. BNU can use TCP/IP to communicate on an Ethernet Version 2, IEEE 802.3, or token-ring LAN; an X.25 WAN; an asynchronous connection, or a Serial Optical Channel. BNU can also use TCP/IP to communicate through an S/370, S/390 Block Multiplexer Channel connection, ESCON connection, or a Fiber Distributed Data Interface (FDDI) LAN.
- **Mail Facilities**, including the 4.3 BSD-Reno Sendmail application and the Rand Corporation Messaging Handler (MH) application, which allows users to generate, process, send, and receive messages across a network. Mail facilities use TCP/IP to communicate on an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, X.25 WAN, an asynchronous connection, or a Serial Optical Channel. Mail facilities can also use TCP/IP to communicate through an S/370, S/390 Block Multiplexer Channel connection, ESCON connection, or a Fiber Distributed Data Interface (FDDI) LAN.
- **Asynchronous Terminal Emulation (ATE)** provides asynchronous communications support.
- **X-station Manager**, supporting multiple X-station connections.

The following functions have been added to AIX 4.2 to support IETF (Internet Engineering Task Force) standards. This improves the functionality and the interoperability of the AIX operating system in network environments.

- **Point to Point Protocol (PPP)** has been enhanced to include PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol) to provide authentication of remote users. It conforms to RFC 1334, the PPP authentication.
- **Network Time Protocol (NTP)** provides the mechanisms to synchronize time and coordinate time distribution in large Internet networks. It conforms to RFC 1305 Network Time Protocol (Version 3).
- The **Sendmail program** has been updated to Version 8.7 BSD (Berkeley Software Distribution). It conforms to: RFC 1651, SMTP (Simple Mail Transfer Protocol) Service Extensions, RFC 1652, SMTP Service Extension for 8-bit MIMEtransport (MIME Multipurpose Internet Mail Extensions), RFC1653, and the SMTP Service Extension for Message Size Declaration.

6.1.2 AIX Connections

IBM AIX Connections is new function designed to increase affinity with PC desktop systems. It provides the infrastructure to do file and print serving with familiar, industry-leading technologies. AIX Connections is offered both as an integrated AIX Connections Version 4.1 package as well as an AIX Connections Version 4.1 option for existing AIX Version 4.1 Client and Server packages. AIX Connections Version 4.1 function provides:

- Broad interoperability between AIX and PC desktop.
- AIX Connections file and print services are compatible with OS/2 (IBM's LAN Server), Microsoft's LAN Manager, Novell's NetWare, and Apple's Filing Protocol (AFP).
- A low-cost, entry-level server using the PowerPC technology.
- IPX/SPX, TCP/IP, NetBIOS, RFC 1001/1002, and AppleTalk protocol support.
- Embedded gateway support for NetWare, Server Message Block (SMB) and DCE-DFS file systems, that provides peer-to-peer capability.
- Double Byte Character Set (DBCS) enablement includes Japanese, Korean and Traditional Chinese support.

AIX Connections provides file and print services for connecting many of today's popular client workstations, such as OS/2, AIX Version 4.1, Windows for Workgroups, Windows 95, Windows NT clients, Macintosh, and NetWare clients. It also allows the RS/6000, to function as a network server for a variety of networking client systems.

AIX Connections includes the ability for AIX to act as a client to a Novell NetWare Server, a LAN Manager from Microsoft, or a LAN Server from IBM. This allows for maximum interoperability with these environments. For example, the ability to print to any printer (PC or server on the network) is possible through this client software. AIX Connections also provides peer-to-peer services through a set of embedded gateway functions for the servers and workstations mentioned above.

6.1.3 Communication Hardware Support

The following tables summarize communication adapters support in AIX V4.1 and AIX V4.2. They also point to required software and device drivers and to TCP/IP and SNA protocol support.

Table 96. Asynchronous Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
8-port Async Adapter	2930	MCA	Yes	Yes	X	-	-
8-port Async Adapter	2931 8207	ISA	Yes	Yes	X	-	-
16-port Async Adapter	2955 2956	MCA	Yes	Yes	X	-	-
64-port Async Adapter	6400	MCA	Yes	Yes	X	-	-
128-port Async Adapter	8128 8127	MCA	Yes	Yes	X	-	-
128-port Async Adapter	2933	ISA	Yes	Yes	X	-	-
8-port Async Adapter	2940	MCA	Yes	Yes	X	-	-
8-port Async Adapter	2932	ISA	Yes	Yes	X	-	-
16-port Async Adapter	2957	MCA	Yes	Yes	X	-	-

Table 97. Token-Ring Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
Token-Ring High-Perf.	2970 9970	MCA	Yes	Yes	X	X	-
Token-Ring LANstreamer	2972	MCA	Yes	Yes	X	X	-
Token-Ring (short)	2971 2973 8209	ISA	Yes	Yes	X	X	-
Token-Ring LANstreamer	2979	PCI	Yes	Yes	X	X	-
Token-Ring - 3COM	8246	PCI	Yes	Yes	X	X	-
Token-Ring Credit Card	7092	PCM CIA	No	No	X	X	-
Token-Ring	8042 8043 8044	PCM CIA	Yes	Yes	X	X	-

Table 98. FDDI Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
FDDI - Single-Ring	2720	MCA	Yes	No	X	X	-
FDDI - Dual-Ring	2722	MCA	Yes	No	X	X	-
FDDI - Single-Ring	2724	MCA	Yes	Yes	X	X	-
FDDI - Dual-Ring	2723	MCA	Yes	Yes	X	X	-
FDDI - Single-Ring	2725	MCA	Yes	Yes	X	X	-
FDDI - Dual-Ring	2726	MCA	Yes	Yes	X	X	-

Table 99. Ethernet Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
Ethernet	2980 9980	MCA	Yes	Yes	X	X	-
Ethernet (integrated)	4221 9000	integr.	Yes	Yes	X	X	-
Ethernet (integrated)	4222 9001	integr.	Yes	Yes	X	X	-
Ethernet	2992	MCA	Yes	Yes	X	X	-
Ethernet	2993	MCA	Yes	Yes	X	X	-
Ethernet	2987	PCI	Yes	Yes	X	X	-
Ethernet	2985	PCI	Yes	Yes	X	X	-
Ethernet 10/100 OEM	8242	PCI	Yes	Yes	X	X	-
Ethernet (short)	2981 2982 8210	ISA	Yes	Yes	X	X	-
Ethernet OEM	8241	ISA	Yes	Yes	X	X	-
Ethernet	8022 8023 8024 8032 8033 8034	PCM CIA	Yes	Yes	X	X	-

Table 100. Network Term. Accel. Adapters and Serial Com. Network Servers Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
Network Accelerator Terminal/256 sessions	2402 2406	MCA	No(1)	Yes	X	X	-
Network Accelerator Terminal/2048 sessions	2403 2407	MCA	No(1)	Yes	X	X	-
Serial Communications Network Server 7318	Mod. P10	Eth.	Yes	Yes	X	-	-
Serial Communications Network Server 7318	Mod. S20	Eth.	Yes	Yes	X	-	-

Notes

- (1) Support is provided starting from AIX V.4.1.5.
- Support for Serial Communications Network Server (Machine type 7318, models P10 and S20) is provided in AIX V.4.1 and AIX V4.2, no additional drivers and software required. (In AIX V.3.2 it was supported by a separate program, Asynchronous Terminal Server-Accelerator (5765-268).)

Table 101. X.25 Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
X.25 Interface Co-Processor/2	2960	MCA	Yes	Yes	X	X	AIXLink X.25 (5696-926)
X.25 Interface Co-Processor/2	2961, 2962 8211	ISA	Yes	Yes	X	X	AIXLink X.25 (5696-926)
ARTIC: PortMaster 1 Mo	7006	MCA	Yes	Yes	X	X	AIXLink X.25 (5696-926)
ARTIC: PortMaster 2 Mo	7008	MCA	Yes	Yes	X	X	AIXLink X.25 (5696-926)
ARTIC 960:1 Mo	2921	MCA	Yes	Yes	X	X	AIXLink X.25 1.1.3 (5696-926)
ARTIC 960: 2 Mo	2924	MCA	Yes	Yes	X	X	AIXLink X.25 1.1.3 (5696-926)
ARTIC 960: 8 Mo	2928	MCA	Yes	Yes	X	X	AIXLink X.25 1.1.3 (5696-926)

Table 102. Synchronous Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
1-port Multiprotocol	2959	MCA	Yes	Yes	-	X	-
4-port Multiprotocol	2700	MCA	Yes	Yes	-	X	-
4-port Multiprotocol	2701	ISA	Yes	Yes	-	X	-

Table 103. Host Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
3270 Connection (WorldWide/USA)	2990 2991	MCA	Yes	Yes	-	-	3270 HCON v.2.1 (5765-398)
S/370 Channel Emul.	2759	MCA	Yes	No	X	-	PRPQ 5799-QDA, or AIX Print Service Facility (5765-505)
S/390 ESCON Ctr Unit	2756	MCA	Yes	Yes	X	X	ESCON Channel Connectivity for AIX V1.1. (5765-603)
S/390 ESCON Emul.	2754	MCA	Yes	No	X	X	Order device driver PRPQ#8A1016
Block Multiplex. Chan.	2755	MCA	Yes	Yes	X	X	BMPX Connectivity for AIX V1.1. (5765-604)

Table 104. Fibre Channel Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
Fiber Channel/266	1906	MCA	No	No	X	-	-
Fiber Channel/1063	1904+ 1902	MCA	Yes	Yes	X	-	-

Table 105. ATM Adapters Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
Turboways 100 ATM	2984	MCA	Yes	Yes	X	-	-
Turboways 155 ATM	2989	MCA	Yes	Yes	X	-	-

Table 106. HIPPI Adapter Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
HIPPI Adapter	2735	MCA	Yes	Yes	X	-	HIPPI Driver Group (5765-551)

Table 107. SOCC Adapter Support

	Feature code	MCA /ISA PCI/PCMCIA	Supported on AIX V.4.1	Supported on AIX V.4.2	TCP/IP support, (by AIX itself)	SNA support, (by SNA Server)	Additional software required
SOCC	2860	MCA	No	No	X	-	-

6.1.3.1 ESCON Channel Connectivity for AIX V1.1

These channel connectivity licensed programs are intended to extend the networking/connectivity capabilities to host systems over the ESCON channels. Support is included for SNA and TCP/IP protocols and for the Client Input Output/Sockets (CLIO/S) licensed program (5648-129 V2.1).

ESCON Channel Connectivity for AIX Version 1.1 requires the following:

- TCP/IP Environments: AIX Version 4.1.2 or later
- SNA Environments: SNA Server for AIX Version 3.1 (5765-582) (or Communications Server for AIX, Version 4) and the SNA Channel Attachment feature (feature #0705)

ESCON Channel Connectivity for AIX V1.1 is compatible with Client Input Output/Sockets (CLIO/S) 5648-129 with PTF# 74395.

ESCON Channel Connectivity for AIX V1.1 requires ESCON Control Unit Adapter (#2756) plus ESCON fiber-optic cabling and connectors, and ESCON optional cooling fan is required for a type 7013 RS/6000.

Table 108. ESCON Channel Connectivity for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
ESCON Channel Connectivity for AIX	1.1	5765-603	Yes	Yes	Yes	Yes

6.1.3.2 Block Multiplexer Channel Connectivity for AIX V1.1

These channel connectivity licensed programs are intended to extend the networking/connectivity capabilities to host systems over the Block Multiplexer channels. Support is included for SNA and TCP/IP protocols and for the Client Input Output/Sockets (CLIO/S) licensed program (5648-129 V2.1).

Block Multiplexer Channel Connectivity for AIX Version 1.1 requires the following:

- TCP/IP Environments: AIX Version 4.1.2 or later
- SNA Environments: SNA Server for AIX Version 3.1 (5765-582) (or Communications Server for AIX, Version 4) and SNA Channel Attachment Feature (feature #0705)

Block Multiplexer Channel Connectivity for AIX V1.1 is compatible with Client Input Output/Sockets (CLIO/S) 5648-129 with PTF #74395.

Block Multiplexer Channel Connectivity for AIX V1.1 requires the Block Multiplexer Channel Adapter (#2756) plus a Block Multiplexer Adapter Cable, Block Multiplexer Interface Assembly, and a BUS and TAG cable of appropriate length.

Table 109. Block Multiplexer Channel Connectivity for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
Block Multiplexer Channel Connectivity for AIX	1.1	5765-604	Yes	Yes	Yes	Yes

6.1.3.3 High Performance Parallel Interface Driver Group V4.1

When used in conjunction with the RS/6000 High Performance Parallel Interface (HIPPI) Micro Channel Adapter set (FC #2735), this group of drivers enables a RISC System/6000 system to provide gigabit-speed connectivity to a variety of supercomputer, storage, and communication equipment. This channel allows the RS/6000 to be connected to other RS/6000 systems, the IBM 9570 Disk Array Subsystem, other vendor supercomputers, HIPPI fiber-optic extenders, HIPPI switches, disk arrays, and tape subsystems. The RS/6000 HIPPI channel is fully compliant with ANSI standards. The RS/6000 systems, by supporting the industry standard HIPPI channel together with TCP/IP, HIPPI Framing Protocol, UDP, and IPI-3 (Intelligent Peripheral Interface) master and slave upper level protocols, offers one of the industry's highest performance and most complete solutions for high-speed and large data transfer requirements. The High Performance Parallel Interface Driver Group contains six functional device drivers:

- IBM 9570 Disk Array Subsystem device driver. The IBM 9570 Disk Array Subsystem driver is used to do raw block-based read/writes to the IBM 9570 Disk Array or compatible IPI-3-based HIPPI attached disk.

- HIPPI Framing Protocol. The HIPPI Framing Protocol provides the function necessary to allow user applications to send and receive packets over a HIPPI Channel. This protocol conforms to the specification defined by the standard High Performance Parallel Interface Framing Protocol, ANSI X3.210-92, also known as HIPPI-FP.
- IPI-3 master transport services driver. The IPI-3 master driver provides the necessary communication services for either kernel mode or application level programs for implementing communications with IPI-3 slave mode devices via the HIPPI channel. The IPI-3 master driver supports first- and third-party IPI-3 transfers involving servers, clients and HIPPI devices.
- IPI-3 slave transport services driver. The IPI-3 slave driver supports kernel mode and application-level interfaces and can be used by programs to emulate IPI-3 slave mode devices. In addition, this driver, used in conjunction with the IPI-3 master driver previously mentioned, can be used for high-speed intersystem communications between IPI-3 master hosts and IPI-3 slave hosts. The IPI-3 slave driver supports first- and third-party IPI-transfers involving servers, clients, and HIPPI devices.
- HIPPI LE (802.2 Link Encapsulation) layer driver for use with TCP/IP, UDP, and NFS. The HIPPI Link Encapsulation network interface driver provides IEEE 802.2 functionality, as defined by the ANSI HIPPI-LE specification, and allows the use of the full range of AIX Version 4.1 for RS/6000 Internet Protocol services (including TCP/IP, UDP, and NFS) over a HIPPI network.
- HIPPI adapter driver. The HIPPI adapter driver manages low-level communication across the Micro Channel between the host system and the HIPPI adapter.

Table 110. High Performance Parallel Interface Driver Group

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
High Performance Parallel Interface Driver Group	4.1	5765-551	Yes	Yes	Yes	3Q96

6.2 X.25 Environment for the RS/6000

6.2.1 AIXLink/X.25 V1.1

IBM AIXLink/X.25 Version 1.1 complies with the CCITT 1988 X.25 recommendations as well as with the earlier 1980 and 1984 recommendations.

In addition, AIXLink/X.25 Version 1.1 provides X.3, X.28, and X.29 Packet Assembler/Disassembler (PAD) support attachment of asynchronous terminals. There are few highlights:

- Supports CCITT 1980/1984/1988 recommendations (run-time selectable)
- Full-terminal and host-Packet Assembler/Disassembler (PAD) support (X.3, X.28, X.29)
- Supports Transmission Control Protocol/Internet Protocol (TCP/IP) higher-layer protocols
- Dedicated or switched (X.32, V.25 bis) network access

- Automatic or user-defined point-to-point Data Terminal Equipment/Data Circuit-Terminating Equipment (DTE/DCE) configuration
- Flexible adapter support
- Up to 512 virtual circuits per line
- Extensive line trace and statistics facilities
- Simple Network Management Protocol (SNMP) proxy agent and Management Information Base (MIB) support for X.25 and LAP-B statistics
- New streams-based application program interfaces (APIs) to packet and frame layers
- Preserves application program interface (API) compatibility with the X.25 support included with AIX Version 3 for RS/6000 for existing application migration

Hardware Consideration

Supported communications adapters:

- IBM X.25 Interface Co-Processor/2 (#2960)
- IBM X.25 Interface Co-Processor Adapter (#2961)
- IBM Realtime Interface Co-Processor (ARTIC) Portmaster Adapter/A (#7006/7008)

Table 111. AIXLink/X.25

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
AIXLink/X.25	1.1	5696-926	Yes	Yes	Yes	Yes

6.3 SNA Environment for the RS/6000

The IBM Communications Server for AIX is a UNIX application platform that extends SNA communications to AIX networks by acting as an enterprise server and a connectivity platform between AIX and SNA networks in peer-to-peer environments and traditional, hierarchical subarea networks. The server supports SNA and TC/IP network interoperability and includes an integrated gateway function for SNA and TCP/IP clients. It provides:

- Integrated, powerful enterprise gateway function that allows multiple, downstream clients to go through a single communication server to one or more hosts. The enterprise gateway can concentrate thousands of sessions into the host by using only one physical connection.
- Multiprotocol support with integrated AnyNet functions, specifically, APPC over TCP/IP and Sockets over SNA.
- Full implementation of APPN, both end -node and network-node.
- Support for direct, high-speed, channel connection from an RS/6000 workstation to an IBM host. Support includes the ESCON and Block Multiplexer channel environments.
- Support for a broad range of LAN and WAN protocols including SDLC, X.25, Ethernet, token-ring, and FDDI.

- Extensive set of application programming interfaces (APIs), ranging from platform to device level, such as LUs 0, 1, 2, 3 and 6.2 (APPC and CPI-C).
- Support for the uniprocessor (UP) and symmetric multiprocessing (SMP) hardware system environments.

Communications Server for AIX, Version 4 includes all the robust, function rich characteristics of the existing SNA Server for AIX Version 3.1 product along with the following enhancements:

- 3270 Host Connection emulation capability—single session. The total 3270 Host Connection Program is shipped as an integrated part of the media for the Communications Server but authorization is limited to a single user, and it can be installed only on one machine.
- AnyNet APPC over TCP/IP Gateway. The AnyNet: APPC over TCP/IP gateway for AIX connects Internet Protocol (IP) networks and SNA networks to enable communications between SNA applications. In conjunction with the AnyNet product that runs on OS/2, MVS, OS/400, or AIX, networks can run SNA applications in IP-attached workstations or hosts and communicate seamlessly into native SNA environments. End users with SNA applications can now access and communicate with other SNA APPC applications worldwide across IP networks.
- API enhancement - APPC Non-Blocking. The API enhancement provides an APPC programming interface with calls that return in a timely basis, allowing a transaction program (TP) author more flexibility in writing TPs.

Hardware Consideration

One or more of the following network communication adapters are required (for more detail description and a list of supported adapters, please see Chapter 5):

- IBM Token-Ring High Performance Network Adapter (for example, #2970, #2972), or ISA (Industry Standard Architecture) Token-Ring Adapter.
- Ethernet High-Performance LAN Adapter (for example, #2980), ISA Ethernet Adapter, or the Integrated Ethernet Adapter.
- Single-port, Multiprotocol Adapter/A (#2959)
- 4-Port Multiprotocol Communications Controller (#2700, #2701)
- X.25 Interface Co-Processor/2 (#2960, #2961) or Artic Portmaster Adapter/A (#7006, #7008)
- IBM Fiber Distributed Data Interface (FDDI) Adapters (#2725, #2726, #2720, #2722, #2724, #2723)
- ESCON Channel Adapter (#2756). *It is necessary to order an SNA Channel Attachment option (5765-652, option 0705) to use with this adapter*.
- Block Multiplexer Channel Adapter (#2755). *It is necessary to order an SNA Channel Attachment option (5765-652, option 0705) to use with this adapter.*

Communications Server for AIX Version 4 is compatible with ESCON Channel Connectivity for AIX Version 1.1 (5765-603), and Block Multiplexer Channel Connectivity for AIX Version 1.1 (5765-604).

Table 112. Communications Server for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
Communications Server for AIX	4.0	5765-652	Yes	Yes	Yes	Yes
option: SNA Channel Attachment	4.0	option: #0705	Yes	Yes	Yes	Yes

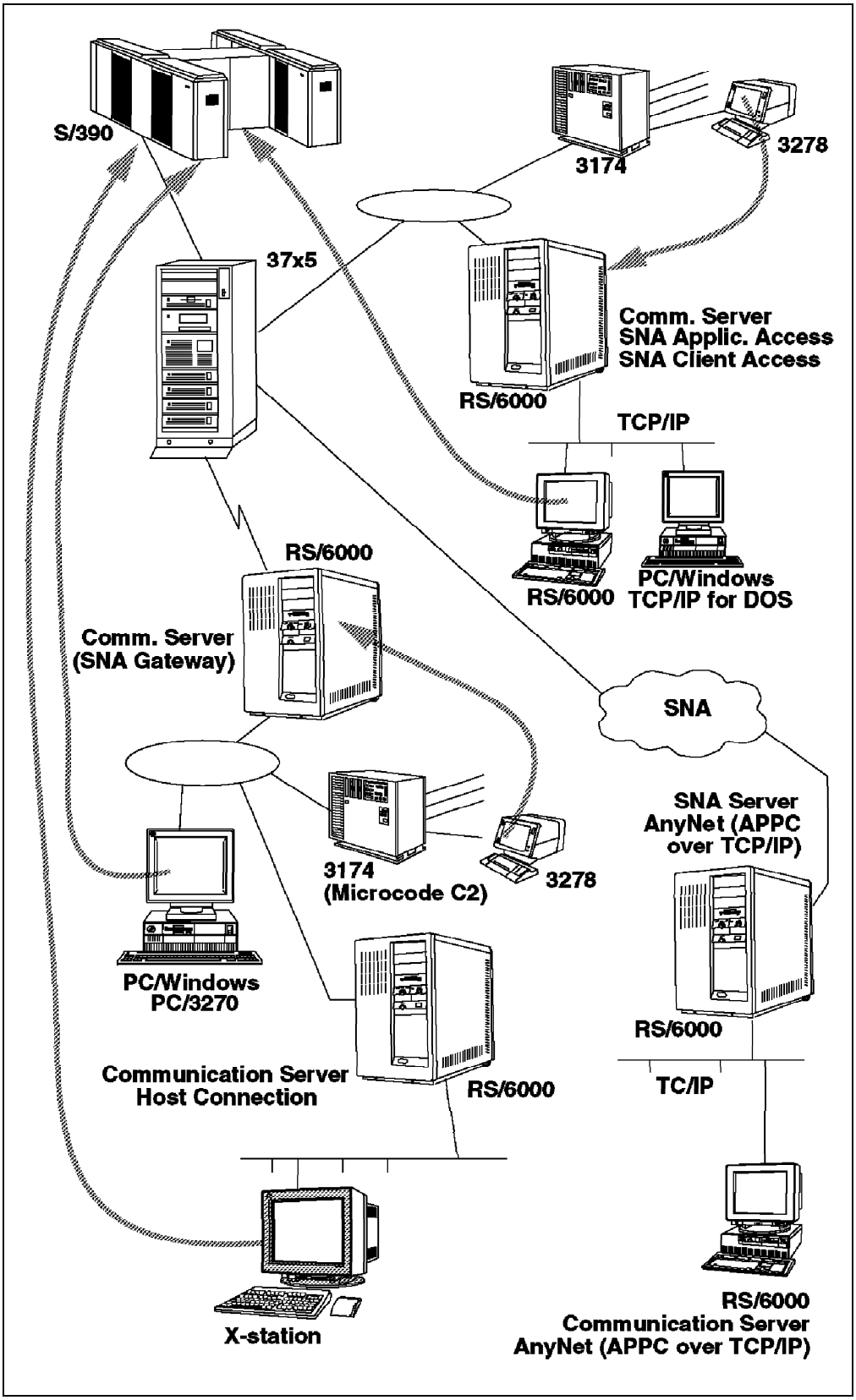


Figure 141. SNA Environment Connectivity Examples

6.3.1 SNA Application Access for AIX V1.2

With IBM SNA Application Access, SNA 3270 devices and emulators located anywhere on an SNA network can access various types of applications residing on the RS/6000 platform. Application types that can be accessed are 3270-based, VT100, AIX ASCII, and Telnet 3270.

Examples of such AIX applications are CICS/6000 and DB2/6000. Through its primary LU support, SNA Application Access allows installed SNA devices, such as 3174s, to connect directly to the RS/6000 and SP2s. It also provides Automatic Print Spooler support to allow direct printing to SNA-attached printers located anywhere in the SNA network.

The AIX Version 4.1 support includes both the UP and SMP hardware system environments. SNA Application Access supports the following types of connectivity:

- IBM Token-Ring
- Synchronous Data Link Control (SDLC)
- Ethernet/802.3, includes both subarea (cross domain) and downstream PU2.0 (local-domain) connections.

When combined with Communications Server for AIX, SNA Application Access provides the SNA communications capabilities of a host system and a communication controller and positions the AIX system as an SNA applications server.

Hardware Consideration

One or more of the following network communication adapters are required (for more detail description and list of supported adapters see Chapter 5):

- IBM Token-Ring High Performance Network Adapter (#2970 or #2972), or ISA Token-Ring Adapter
- Ethernet High-Performance LAN Adapter (#2980), ISA Ethernet Adapter, or the Integrated Ethernet Adapter
- Single-port, Multiprotocol Adapter/A (#2959)
- 4-Port Multiprotocol Communications Controller (#2700, #2701)

Table 113. SNA Application Access for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
SNA Application Access for AIX	1.2	5696-943	Yes	Yes	Yes	Yes

6.3.2 SNA Client Access for AIX V1.2

IBM SNA Client Access for AIX gives users of programmable workstations or personal computers that are attached to TCP/IP networks access to SNA networks. This allows TCP/IP network users to take advantage of the host system applications existing in SNA networks. These client workstations will be able to perform SNA 3270/5250 functions, Telnet 3270/5250 functions, and LU 6.2 functions. SNA Client Access for AIX runs on SNA Server for AIX (Communications Server for AIX) with the RS/6000 platform. SNA Client Access

functions as a TCP/IP Telnet server, providing a consistent platform for SNA network access to client applications running anywhere in the TCP/IP network.

SNA Client Access for AIX Version 1.2 includes the following key features:

- Extends 3270 Telnet support to include TN3270E, providing 3270 terminal and printer emulation to TCP/IP users (enabling locally attached printer support)
- Enables load-balancing gateways for optimizing load conditions and maintaining operation during server failures
- Provides response-time measurement, from the application to the TN3270E client, using NetView Performance Monitor with the SNA Definite Response Mode
- Dedicated LUs for TN3270 clients
- Support for the uniprocessor (UP) and symmetric multiprocessing (SMP) hardware-system environments
- Exploits all the connectivity and performance capabilities of the SNA Server for AIX product

Hardware Consideration

One or more of the following network communication adapters are required (for more detail description and list of supported adapters see Chapter 5):

- IBM Token-Ring High Performance Network Adapter (#2970 or #2972), or ISA Token-Ring Adapter
- Ethernet High-Performance LAN Adapter (#2980), ISA Ethernet Adapter, or the Integrated Ethernet Adapter
- Single-port, Multiprotocol Adapter/A (#2959)
- 4-Port Multiprotocol Communications Controller (#2700, #2701)

Table 114. SNA Client Access for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
SNA Client Access for AIX	1.2.1	5696-944	Yes	Yes	Yes	Yes

6.4 S/390 Connectivity for the RS/6000

6.4.1 3270 Host Connection Program for AIX V2.1

IBM 3270 Host Connection Program for AIX allows access to RS/6000 customers who have applications that are 3270 character-mapped, non-graphic, execute on a System/370 or System/390 host, and are connected to the RS/6000 over an SNA or TCP/IP network.

The connection can be communicating to a 3174/3274, 5088/6098, 3172/8232, or 3725/3745 control unit. Key features of this program are:

- 3278/79 display emulation support using ASCII terminals, graphical displays and X-stations

- Connectivity to System/370 or System/390 hosts via coax, local area and wide area networks (see list of available options below)
- Concurrent access to multiple hosts and/or multiple host sessions
- Extensive international language support for both single-byte and multibyte character sets, including multiple concurrent sessions in different national languages
- IBM 3286/87 printer emulation on most printers supported by AIX Version 4
- Host file transfer support
- Industry Standard HLLAPI (High-Level Language Application Programming Interface) support, using C, FORTRAN, and COBOL languages

One of the following operating systems are required in the System/370 or System/390 host system: VM, MVS, or VSE.

HCON requires one of the following programs to be installed on the host to support file transfer:

- IBM Host-Support File Transfer Program (IND$FILE) for Virtual Machine/Conversational Monitor System (VM/CMS) (5664-281).
- CICS/VS 3270 PC File Transfer Program (5798-DQH) is required for CICS/VSE, CICS/MVS, and CICS/ESA. For VSE/SP and VSE/ESA, no prerequisite programs are needed. All required programs are part of the base VSE operating system.
- IBM Host-Support File Transfer Program (IND$FILE) for Multiple Virtual Systems/Time Sharing Option (MVS/TSO) (5775-311).

At least one of the following programs must be installed on the host to support file transfer for files that consist of Single Byte Character Set (SBCS) or Double Byte Character Set (DBCS) text:

- VM/CMS File Transfer Program Version 1.1 or Version 2.1 or later version
- File Transfer Program Version 1.1 or later version
- MVS/TSO File Transfer Program Version 2.1 or later version
- CICS (MVS/VSE) File Transfer Program Version 1.1 or Version 2.1

Connection options from the RS/6000 can be (for more detail description and list of supported adapters, please see Chapter 5):

- Coaxial attachment (3270 connection adapter)
- Wide area network communication using SDLC or X.25
- Local area network using the IBM Token-Ring protocol and IEEE 802.3
- Channel attachment with TCP/IP using the Block Multiplexor Channel or ESCON Channel adapter

Hardware Consideration

One or more of the following communication adapters are required for connection to the host system (for more detail description and list of supported adapters see Chapter 5):

- The IBM 3270 connection adapter (#2990 or #2991) for DFT coax attachment to an IBM 3174/3274 control unit or equivalent (SNA and non-SNA mode are supported)
- TCP/IP attachment using TELNET 3270: a supported Ethernet or token-ring adapter, a supported X.25 adapter if using TCP/IP over X.25, a Fiber Distributed Data Interface (FDDI) adapter, or a Serial Optical Channel-Converted adapter
- IBM Token-Ring High Performance Network Adapter (for example, #2970, #2972) or ISA Token-Ring Adapter.
- Ethernet High-Performance LAN Adapter (for example, #2980), ISA Ethernet Adapter, or the Integrated Ethernet Adapter
- Single-port, Multiprotocol Adapter/A (#2959)
- 4-Port Multiprotocol Communications Controller (#2700, #2701)
- X.25 Interface Co-Processor/2 (#2960, #2961) or Artic Portmaster Adapter/A (#7006, #7008)
- IBM Fiber Distributed Data Interface (FDDI) Adapters (#2725, #2726, #2720, #2722, #2724, #2723)
- ESCON Channel Adapter (#2756). It is necessary to order an SNA Channel Attachment option (5765-652, option 0705) to use with this adapter.
- Block Multiplexer Channel Adapter (#2755). It is necessary to order an SNA Channel Attachment option (5765-652, option 0705) to use with this adapter.

Table 115. 3270 Host Connection Program for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
3270 Host Connection Program for AIX	2.1	5765-398	Yes	Yes	Yes	Yes

6.4.2 3270 Emulator for the X-Window System V1.2

IBM 3270 Emulator for the X-Window System (x3270) is an enhanced 3270 emulator that provides workstation access to 3270 applications on IBM System/370 and System/390 mainframes running under VM or MVS operating systems in networks using the Transmission Control Protocol/Internet Protocol (TCP/IP).

The x3270 operates in X-Window System environments using the OSF/Motif graphical user interface (GUI). Existing x3270 functional support includes:

- Support for GDDM graphics.
- Support for the APL2 character set.
- National Language Support: All messages and tables are externalized, allowing translations to be performed by users.
- Interactive graphical keyboard remapping: x3270 keyboard mappings may be customized by use of the dynamic keyboard remapper. The remapper allows keyboard and mouse mappings to be dynamically modified from an active x3270 session by using a graphical interface.

- Dynamic font selection (in both graphics and non-graphics mode): Four graphics sizes and unlimited non-graphics sizes are dynamically available.
- xHLLAPI support: x3270 HLLAPI support provides a library of functions that facilitate the writing of applications that drive a host session.
- Attention key emulation: A key may be defined to emulate the attention key function for those host TCP/IP systems that have attention key capability (this applies to MVS systems).
- Light pen emulation: The mouse may now be used to emulate the light pen.

Note

This software product is not supported on AIX V4.2.

Hardware Consideration

To connect to the host system an adapter is required that allows connection to a TCP/IP LAN (for example, Ethernet, token-ring). Network TCP/IP support must be provided on the host system to which the workstation is connected:

- For VM/XA systems, use IBM TCP/IP Version 2 Release 1 or later (5735-FAL).
- For MVS/ESA systems, use IBM TCP/IP Version 2 Release 1 or later (5735-HAL).

Table 116. 3270 Emulator for the X-Window System

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
3270 Emulator for the X-Window System	1.2	5765-011	Yes	No	Yes	Yes

6.4.3 Client Input Output/Sockets V2 for AIX

IBM Client Input Output/Sockets is a data-transfer protocol that consists of a set of programs and Application Programming Interfaces (APIs) that provide high-speed file and data transfer and access to tape devices on a network of RISC System/6000 and IBM 9076 Scalable POWERparallel Systems and MVS/ESA systems.

IBM Client Input Output/Sockets makes it easier to distribute work and data across such a network and reduces CPU use, compared to TCP/IP data transfers. It runs on both MVS/ESA and AIX platforms and is bi-directional.

With Client Input Output/Sockets, you can quickly move files and data between your AIX and MVS/ESA systems or from AIX to AIX system. The sockets interface provides a standards-based interface to the communication functions of IBM Client Input Output/Sockets. The Client Input Output/Sockets File Transfer Program (FTP) provides high-speed file transfer using an interface consistent with Transmission Control Protocol's (TCP/IP) FTP command.

The Client Input Output/Sockets Cross-System Pipe Link (CLPLINK) function connects an AIX named pipe or an MVS batch pipe to remote data. This allows applications to transparently access remote disk or tape files. In addition, AIX named pipes and MVS batch pipes can be used together to allow an application

running on one system to read the output of an application running on another system without that output being written to an intermediate file.

Client Input Output/Sockets automatically transfers data across the fastest technology available in your network of AIX and MVS systems. Client Input Output/Sockets can also perform data conversion between IEEE and IBM System/390 formats, allowing AIX-based and MVS-based applications to share the same data files.

Client Input Output/Sockets provides both a BSD Sockets-like API and a TCP/IP FTP-like command interface. Client Input Output/Sockets provides these functions:

- Fast transfer of data by using a file transfer command, a sockets interface, a communication manager programming interface (CMI), a distributed processing programming interface (DPI), and a Cross-System Pipe Link (CLPLINK).
- A tape server that can be accessed by using UNIX commands and programs and the Client Input Output/Sockets tape programming interface.

Client Input Output/Sockets can be used to:

- Quickly move data between your MVS/ESA system and your AIX system
- Transfer very large files
- Access a tape drive on MVS/ESA from your AIX/6000 system through an API or UNIX tape pseudo-device-driver interface
- Start servers on AIX/6000 and MVS/ESA systems in your network to create a parallel processing environment
- Provide transparent access to remote data and applications (via CLPLINK)

To run IBM Client Input Output/Sockets on MVS/ESA, you need the following products:

- IBM MVS/ESA SP-JES2 Version 4.2 SP or higher (5695-047) or MVS/ESA SP-JES3 Version 4.2 or higher (5695-048)
- IBM TCP/IP Version 2.2.1 or higher (program number 5735-HAL)
- IBM C/370 Run Time Library Version 2.1 or higher (program number 5688-188)
- IBM PL/I Library Version 2.3 or higher (program number 5688-911) or the IBM SAA AD/CYCLE Language Environment/370 (program number 5668-198)
- IBM Batch Pipes/MVS program product (program number 5655-065) is required if the IBM Client Input Output/Sockets Cross-System Pipe Link (CLPLINK) is going to be used

Note

This software product is not currently supported on AIX V4.2. Support is planned for the next release of AIX V4.2.

Hardware Consideration

Client Input Output/Sockets transfers data in two ways:

- ES/9000 running MVS/ESA to RS/6000 (or IBM 9076 Scalable POWERparallel Systems) running Block Multiplexer Channel Adapter (BLKMUX) or the ESCON interface adapter.
- Workstation-to-workstation using the Serial Optical Channel (SOCC) interface or TCP/IP. The TCP/IP connection can use any hardware supported by TCP/IP, including Fiber Distributed Data Interface(FDDI), FCS, Ethernet, and token-ring.

Note

You can use IBM Client Input Output/Sockets without BLKMUX or ESCON; performance is limited to the date transfer rate of TCP/IP.

Table 117. Client Input Output/Sockets

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
Client Input Output/Sockets	2	5648-129	Yes	1Q97	Yes	Yes

6.5 AS/400 Connectivity for the RS/6000

6.5.1 Connection Program/400 for UNIX Environments V3.1

IBM Connection Program/400 provides common AS/400 system access capability across a heterogeneous network of RS/6000 and other supported UNIX workstations (Sun SPARCstation and Hewlett-Packard 9000 Series 700). Here are the key features and functions of this program:

- *5250 emulation* (x5250 and e5250)
  Existing functions include dynamic font selection, keystroke record/playback, cut and paste, enhanced user interface 5250 data stream support, color customization, screen print control, xButtons, mouse support, command line options, keyboard customization, and text assist. This function supported in SNA and TCP/IP networks.
- *File Transfer* using SQL-like commands
  This function is supported in SNA network only. In a TCP/IP environment, the file transfer function is supported by TCP/IP protocol itself (TFTP, FTP, and RCP applications).

  Remote Printer support
  It allows print AS/400 SCS printed output on any workstation attached printer in the network. Users can print where it is most convenient and printers can be shared between UNIX users and applications and between AS/400 users and applications. This function is supported in SNA and TCP/IP networks.
- *Remote Command Execution* from AS/400 system to control multiple workstations from a single AS/400 system
  This function is supported in SNA network only. In a TCP/IP environment, the remote command execution function is supported by the TCP/IP protocol itself (REXEC, RSH applications).
- *Database and Application access*
  It opens up AS/400 database and application access to RS/6000, SUN and HP workstations. Remote access to the AS/400 system data can easily be

achieved using SQL APIs. This function is supported in SNA and TCP/IP networks.

- *National Language support*

Connection Program/400 supports the two communication protocol suites:

- TCP/IP over token-ring, Ethernet, X.25 (for communications between the AS/400 system and RS/6000, Sun SPARCstation, and HP 9000 Series 7000 workstations). The following software is required from the AS/400 side: Operating System/400 Version 2 Release 2 (5738-SS1) and later and TCP/IP Connectivity Utilities/400 Version 2 Release 2 (5738-TC1).
- SNA (including APPC LU6.2) over token-ring, Ethernet, X.25, or SDLC (for communications between the AS/400 system and the RS/6000). Communication Server for AIX (or SNA Server for AIX) is required to run in an SNA environment. The following software is required from the AS/400 side: Operating System/400 Version 2 Release 2 (5738-SS1) and later and PC Support/400 for Version 2 Release 2 (5738-PC1).

Hardware Consideration

Connection Program/400 requires one of the following adapters on the RS/6000:

- Any LAN adapter that allows you to connect to a TCP/IP LAN (for example, Ethernet, Token-Ring and so forth)
- X.25 Interface Co-Processor/2 (#2960, #2961) or Artic Portmaster Adapter/A (#7006, #7008)
- Single-port, Multiprotocol Adapter/A (#2959) (for SNA network only)
- 4-Port Multiprotocol Communications Controller (#2700, #2701) (for SNA network only)

6.5.2 Connection Program/400 for UNIX Environments V3.6

This AS/400 Licensed Program for OS/400 Version 3 Release 6 was created to support the latest AS/400 Advanced Series systems based on PowerPC technology. It has the same functionality as described above for the Connection Program/400 for UNIX Environments Version 3.1 (5798-RZB).

Table 118. Connection Program/400 for UNIX Environments

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
Connection Program/400 for UNIX Environments	3.1	5798-RZB	Yes	Yes	Yes	Not tested
Connection Program/400 for UNIX Environments	3.6	5798-TBE	Yes	Yes	Yes	Not tested

Note

These products are not supported in CFRS6000 for AIX Version 4.

6.6 PC LAN Environment for RS/6000

6.6.1 NetBIOS and IPX/SPX Support for AIX V2.1

IBM NetBIOS and IPX/SPX Support for AIX, Version 2.1 (NetBIOS and IPX/SPX 2.1) enables the AIX Version 4 operating system to interoperate in PC-based environments.

This product includes NetBIOS (NETBEUI), IPX/SPX, and RFC 1001/1002 communications protocol support. These industry-standard protocols provide a complete set of communication protocols for AIX Version 4 and continue to fulfill the IBM commitment to the Open Blueprint.

Here are some key features that enhance the AIX Operating System:

- Support for industry-standard RFC 1001/1002, NetBIOS and IPX Local Area Network Protocols. RFC 1001/1002 allows NetBIOS applications to communicate using TCP/IP.
- Interoperability with Novell NetWare and LAN Manager/LAN Server Network operating system products.
- Enhanced connectivity for clients running DOS, Windows, or OS/2.
- Ability to run NetBIOS applications in conjunction with the TCP/IP protocol
- Runs with AIX Version 4 DLPI drivers, which support token-ring and Ethernet
- Support for industry-standard application program interfaces, such as the Network Control Block (NCB) and Streams TLI.

Hardware Consideration

NetBIOS and IPX/SPX Support for AIX requires one of the following adapters on the RS/6000:

- An Ethernet or token-ring adapter plus appropriate cables for attachment to a token-ring or Ethernet (please see Chapter 5 for a detailed description of the adapters offered for the RS/6000).

Table 119. NetBIOS and IPX/SPX Support for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
NetBIOS and IPX/SPX Support for AIX	2.1	5765-550	Yes	Yes	Yes	Yes

6.6.2 NetWare for AIX V3.11B

IBM NetWare for AIX, Version 3.11B allows RS/6000 workstations with AIX Version 4.1 and Version 4.2 to act as servers for products running Novell's NetWare on Local Area Networks (NetWare LANs). Based on Novell NetWare for UNIX Version 3.11B, IBM NetWare Version 3.11B brings the resources and applications of the full-function, multipurpose AIX operating system to PC LAN users. Here are the key features and functions of this program:

- Allows a single RISC System/6000 to perform a dual role as an AIX network system and a Novell NetWare server.

- *File and Print Sharing among DOS, OS/2, Windows, and AIX users*. It is transparent to existing NetWare clients. NetWare Version 3.11B is compatible with other implementations of Novell's Intel-based NetWare products such as Novell's Intel-based NetWare 3.12 or Novell's Intel-based NetWare 2.2. OS/2 user can manipulate long file names with Extended Attributes (the same as with local files). In addition, NFS files can be shared by AIX, DOS, OS/2, and Windows users. The personal computer and AIX users can share the same print queues and system printers.
- *Support for IPX/SPX protocols in AIX*.
- *Personal Computer access to AIX applications* via Novell Virtual Terminal (NVT2). NVT2 capability works with off-the-shelf personal computer terminal emulation software to provide login and access to the AIX operating system. With NVT2, DOS and DOS/Windows users gain access to the many AIX multiuser applications available in this environment.
- *Application Programming Interface*. NetWare Version 3.11B provides support for NetWare application programming interfaces (APIs) such as Sequenced Packet Exchange (SPX), Internet Packet Exchange (IPX), and NetWare.

Product Positioning

IBM NetWare for AIX Version 3.11B should be marketed to customers who desire access to AIX from PC workstations and for customers who desire a Novell NetWare server running on a UNIX operating system. It cannot serve as substituter for existing Novell's Intel-based NetWare servers.

Hardware Consideration

NetWare for AIX, Version 3.11B requires one of the following adapters on the RS/6000:

- An Ethernet, token-ring, or FDDI Adapter plus appropriate cables for attachment to a token-ring, Ethernet, or FDDI Local Area Network (LAN) (please see Chapter 5 for a detailed description of the adapters offered for the RS/6000).

Table 120. NetWare for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
NetWare for AIX	311B	5697-021	Yes	Yes	Yes	Yes

6.7 OSI Environment for the RS/6000

6.7.1 Open Systems Standard Communications V3.0

Open Systems Standard Communications (OSSC) is a family of OSI networking products for the AIX platforms offered by the IBM Government Sector/Houston. It is available today to meet the requirements of open systems and the various profiles used to specify conformance. The family consists of a broad array of OSI products that have been fully integrated with AIX. The members of the family deliver capabilities including basic connectivity, application-level interoperability, and OSI migration. OSSC provides the following features:

- XTI XPG4 compliant
- 1988 X.400: X.400 AAPI, GAPI, XDS, and XOM
- 1988 X.500 Directory Services; XDS, XOM
- Fully integrated X.400/X.500 support capability
- FTAM w/ ERRPM, VT applications
- HP Openmail support, Nexor Motif-based graphical User Agents for MHS and DS, BSW Gateway support
- Multiple Transport Provider Capability - All OSSC OSI applications can be concurrently used with TP4/CLNP over 802.3, 802.5, FDDI and X.25; RFC 1006 (TP0 over TCP/IP); TP0 over X.25; TP2 over X.25; and TP4 over X.25
- X.25 LPP and Arctic Portmaster for WAN support

Contact

Send Purchase Order to: Retix/Telegenics
Product code: MH-88AIX
2401 Colorado Avenue
Santa Monica, CA 90404-3563
USA

Attention: Mr. Stuart Kelly/OSSC

The Internet can help you

You can find more information on the WWW at this address:

`http://www.azlan.co.uk/retix.html`

Table 121. Open Systems Standard Communications

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
Open Systems Standard Communications	3.0	Retix MH-88AIX	Yes	Yes	Yes	Not tested

6.7.2 OSI Network Support for AIX V4

The IBM OSI Network Support for AIX is an RS/6000 software which provides an OSI transport service over X.25 network in conjunction with the X/OpenTransport Interface (XTI) library. The IBM OSI Network Support for AIX is a generic term to design both the OSI communication stack and the associated Simple Directory Service (SDS) library.

The OSI Reference model defines seven layers. The OSI Network Support for AIX implements:

- Layer 4: the transport layer that ensures a connection-oriented, end-to end data transfer across the network
- Sublayers 3c and 3bn of the network layer: the Connection-Oriented Network Layer (CONL) that handles routing information and subnetwork dependent convergencies functions

The IBM OSI Network Support for AIX transport layer implementation supports the classes 0, 2, and 4 and complies with ISO 8072, and ISO 8073 standards.

The IBM OSI Network Support for AIX complies with ISO 8348, ISO 8648 and ISO 8878 standards for the Connection-Oriented Network Layer (CONL) implementation.

The IBM OSI Network Support for AIX supports the Connection Oriented Network Service (CONS) over X.25/84 and X.25/88.

The SDS library provides functions that convert logical application names into OSI addresses and vice versa.

Hardware Consideration

The IBM OSI Network Support for AIX requires one of the following adapters on the RS/6000:

- X.25 Interface Co-Processor/2 (#2960, #2961)
- Artic Portmaster Adapter/A (#7006, #7008)

Table 122. OSI Network Support for AIX

Product	Ver.	Feature	Support			
			4.1	4.2	UP	SMP
OSI Network Support for AIX	4.0	5797-BCW	Yes	Yes	Yes	Yes

6.8 Summary

This last section of Chapter 6 summarizes the communication software products described above by providing the functions of the application layer (for example, emulation, file sharing, printer sharing, mail and so forth). If a designated function is provided, the protocol name or interface name is specified at the meeting point of the function-column and the product-row.

Table 123. Functions of All Communication Products on AIX V4

Product or combination		Emulation	File Transfer	File Sharing	Sharing	Remote Command	APIs	Mail	Security	Graphics (X-Window)	Name and Directory	Network Management
Product	**Feature**											
TCP/IP	part of AIX BOS	over 100 Term. types	FTP TFTP RCP	NFS	LPR/ LPD	rexec rsh	Sockets	SMTP	Ker-beros	Yes	DNS	SMTP MIB II
ATE/BNU	part of AIX BOS	vt100	UUCP			Yes	Yes					
Communication Server (SNA Server/Gateway)	5765-652	3270 single session	APPC applic. suite			APPC applic. suite	CPI-C APPC		Yes		APPC applic. suite	SNA/ MS
SNA Application Access	5696-943	server for 3270			Yes							
SNA Client Access	5696-944	telnet server										
CP/400 over SNA	5798-RZB +5765-652	5250 (block)	Yes		Yes	Yes	(SQL-like)					
CP/400 over TCP/IP	5798-RZB	5250 (block)			Yes		(SQL-like)					
3270 HCON	5765-398	3270	fxfer		3286/87 emul.		HLL-API					
3270 Emulator for X-Window	5765-011	3270					xHLL-API					
Client Input Output/Sockets	5648-129		Yes				Sockets CMI DPI					
Open System Standard Communications	Retics catalog	Virtual Term.	FTAM				AAPI GAPI	X.400 MHS			X.500	CMIP
AIX Connections	Optional package			SMB NCP AFP	SMB NCP Apple							
NetWare for AIX	5697-021	NVT2		NCP	NCP		Net-Ware		Yes			

Table 124. AIX Communication Products Summary

Envt.	Product	Ver.	Feature	Support			
				4.1	4.2	UP	SMP
Base Operating System	AIX with TCP/IP (FTP, Telnet, RCP, RSH, PING,...), DHCP, PPP, NFS, NCS, DOS Server, BNU/UUCP, Mail Facilities, ATE, X-Station Manager, AIX Connections and Asynch. Term. Server-Accel.	4.1	5765-393	Yes	-	Yes	Yes
	AIX with: TCP/IP (FTP, Telnet, RCP, RSH, PING,...), DHCP, PPP (with PAP), NTP, Sendmail program, NFS, NCS, DOS Server, BNU/UUCP, Mail Facilities, ATE, X-Station Manager, AIX Connections and Asynch. Term. Server-Accelerator	4.2	5765-655	-	Yes	Yes	Yes
Base Oper. Syst. HW support	ESCON Channel Connectivity for AIX	1.1	5765-603	Yes	Yes	Yes	Yes
	Block Multiplexer Channel Connectivity for AIX	1.1	5765-604	Yes	Yes	Yes	Yes
	High Performance Parallel Interface Driver Group	4.1	5765-551	Yes	Yes	Yes	3Q96
SNA	Communications Server for AIX option: SNA Channel Attach.	4.0	5765-652 option: #0705	Yes	Yes	Yes	Yes
	SNA Application Access for AIX	1.2.1	5696-943	Yes	Yes	Yes	Yes
	SNA Client Access for AIX	1.2.1	5696-944	Yes	Yes	Yes	Yes
X.25	AIXLink/X.25	1.1	5696-926	Yes	Yes	Yes	Yes
S/390	3270 Host Connection Program for AIX	2.1	5765-398	Yes	Yes	Yes	Yes
	3270 Emulator for the X-Window System	1.2	5765-011	Yes	No	Yes	Yes
	Client Input Output/Sockets	2	5648-129	Yes	1Q97	Yes	Yes
PC	NetBIOS and IPX/SPX Support for AIX	2.1	5765-550	Yes	Yes	Yes	Yes
	NetWare for AIX	3.11B	5697-021	Yes	Yes	Yes	Yes
AS/400	Connection Program/400 for UNIX Environments	3.1	5798-RZB	Yes	Yes	Yes	Not tested
	Connection Program/400 for UNIX Environments	3.6	5798-TBE	Yes	Yes	Yes	Not tested
OSI	Open Systems Standard Communications	3.0	Retix MH-88AIX	Yes	Yes	Yes	Not tested
	OSI Network Support for AIX	4.0	5797-BCW	Yes	Yes	Yes	Yes

6.9 OEM Software Offerings for AIX V4

This section cannot be exhaustive. But, sometimes, you need a nonIBM adapter to achieve your communication solution.

The Internet can help you

You can find more information on the WWW at this address:

`http://info6000.austin.ibm.com/products/oemhw/`

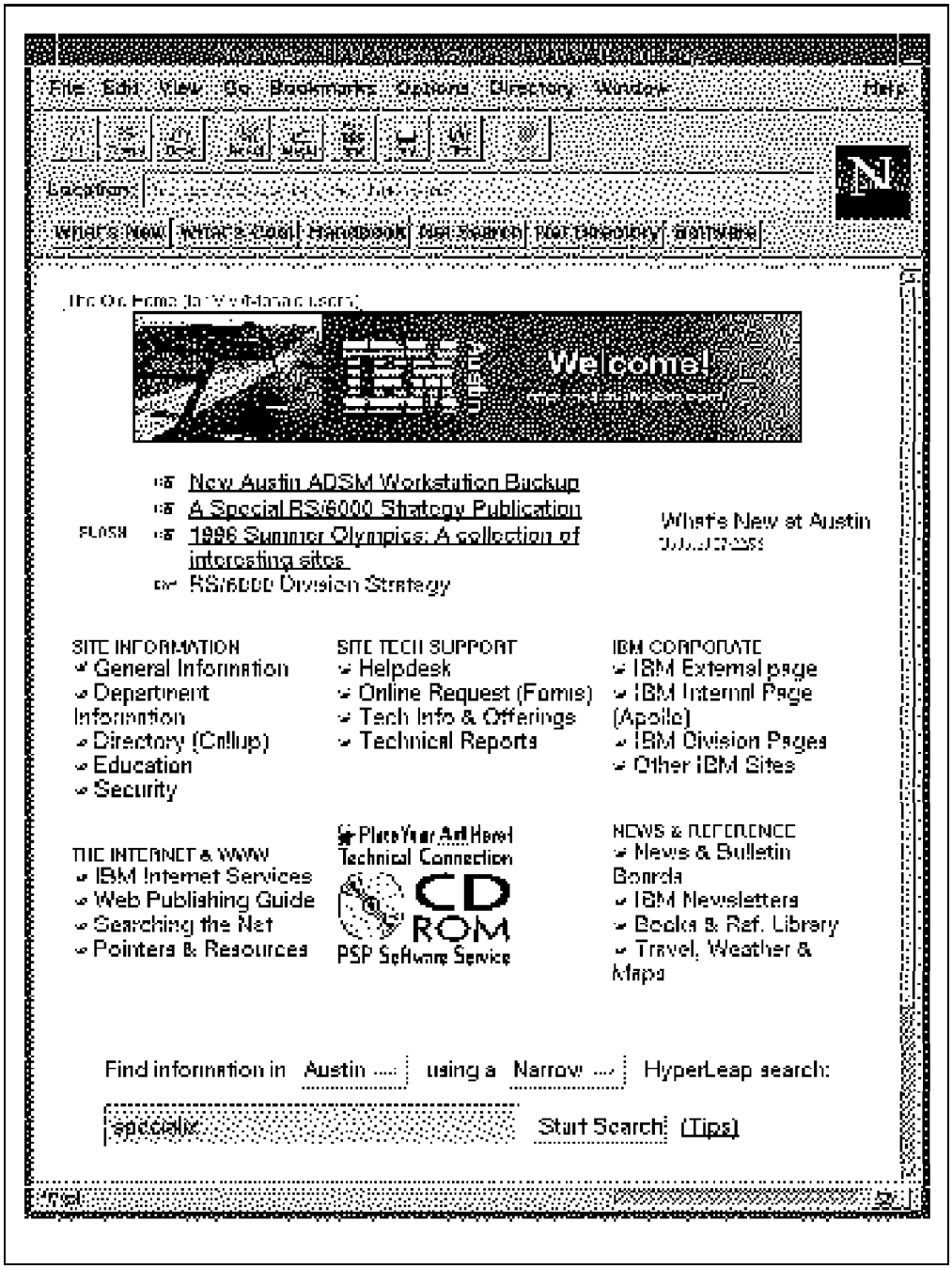


Figure 142. http://w3.austin.ibm.com/

Not an IBM product

Remember, these products are not IBM products. So, IBM does not provide any support on these adapters.

Table 125. OEM Software Offering for AIX V4

Environment	Product	Functions	Contact
- DEC VMS (DECnet, LAT)	- TSSnet for AIX	- File transfer services - Task-to-Task Interface - Virtual Terminal Support - Shared print services - Bidirectional mail gateway between UNIX and VMS mail systems - Network Management Utilities	- USA THURSBY SOFTWARE SYSTEM phone: 1-817-478-5070 fax: 1-817-561-2313 mail:sales@thursby.com - FRANCE LOGIX phone:33.01.40.87.97.87 fax: 33.01.40.87.97.98
	- Kinet for AIX	- File transfer - Remote printing - Emulation	- USA Ki NETWORKS phone: 1-410-290-0355 fax: 1-410-290-0397 mail: sales@ki.com
- Bull DSAP/DSAS	-	- OSI layers and DSAP/DSAS applications	- One IBM marketing representative
- Macintosh	- Ethershare	- Transform RS/6000 as an full AppleShare Server	- http://www.helios.de/
- BSC	- BSX for AIX V4 (#2700: AIX V4.1/4.2) (#2701: AIX V4.2)	- APIs and samples	- IBM France F. Bouillot phone: 33.01.49.05.74.51 mail: fbouillot@vnet.ibm.com
- PC	- TotalNET Advanced Server	- PC-to-UNIX connectivity solutions for sharing files, printers, and applications among DOS/Windows, OS/2, NetWare, Macintosh, and UNIX computers.	- USA SYNTAX phone: 1-206-838-2626 fax: 1-206-838-9836 - FRANCE AID phone: 33.01.40.92.73.33
- Unisys terminal emulation	- The ES1000 adapter comes with software to support a variety of Unisys-based terminal emulation. Both synchronous and asynchronous protocol support is provided using a V.24/RS-232 interface. The product supports Unisys multiplexer latching and long-drive features and the CL PEP and LinkUp families of terminal emulation packages.		- USA Computer Logics Limited phone: 1-216-349-8600 fax: 1-216-349-8620

Table 126. OEM Software Offering for AIX V4 (continued)

Environment	Product	Functions	Contact
- X.25	- SXPAD is an intelligent PAD software that offers more extras in the field of telecommunication optimization, printer management, security, and comfort beyond the basic PAD functions. The SXPAD software package allows: - remote connections from terminals to AIX application servers through X.25 networks - connection of two AIX systems through the X.25 network - management of remote printers through a standard AIX spooler, the same way as local printers - the establishment of screen sessions towards remote AIX servers and file transfers - administration of remote users and hardware peripherals - addition of resources (printers or terminals) - easy follow-up of disarrangements of the network - a control of the attribution of users or groups on the applications - the use, at the request of users, of AIX login, shells, or applications - SXPAD is also distributed by IBM France.		- FRANCE/ SYNCHRONIX phone: 33.01.64.46.26.26 fax: 33.01.64.64.46.69.67 mail: pierre@synx.com http://www.synx.com
- All networks	- ECOPAD reduceS up to 10 times the volume of data transmitted over a network - ECOPAD optimizes transactional outgoing and incoming data flow from the IBM server and remote workstations by suppressing the insignificant information, analyzing differences between screens, delocalizing the screens (in the local memory, coding and compressing), and by managing the field mode allowing a local echo. - The ECOPAD consists entirely of software The whole system uses standard IBM connections and requires no extra hardware and no alteration on the existing setup. - ECOPAD streamlines the use of transactional application, no matter what type of program (management, office, maintenance,...), type of network or type of protocol used (TCP/IP, X.25, frame-relay, ATM, PPP, ISDN, PSTN, leased lines, cellular phone, Intranet,...)		
- Multisession	- SX-M-VIEW	- Run up to 10 simultaneous applications with PC DOS to a UNIX Server	
- S/36	- OPEN RS/36	- Migration and emulation - File transfer - Connection of S/36 units	- FRANCE/ LOGIDIF phone: 33.01.48.97.55.55
	- UNIBOL/36	- Interactive migration - Dynamic access	- FRANCE/ LOGIX phone:33.01.40.87.97.87 fax: 33.01.40.87.97.98

Table 127. OEM software offering for AIX V4 (continued)

Environment	Product	Functions	Contact
- Heterogeneous	- MEDIATRANSFER: Automated File Transfer Software for PC and UNIX Platforms - MEDIATRANSFER provides a transparent, automated, secure file transfer capability between remote computers across phone lines, ISDN, mobile phones, the Internet, etc., with asynchronous ETP (Extended Transport Protocol used by telephone networks worldwide), X.25, or TCP/IP. - MEDIATRANSFER allows communication from branch offices, store point-of-sale (POS) systems, hotel rooms, cars, customer or supplier sites, the home, ... just about anywhere. The product is so transparent and reliable that most users don t even know they are using it. Once the scheduler has been set-up, all the remote user needs to do is remember to leave his PC (or UNIX machine) switched on and plugged into the network or phone jack; MEDIATRANSFER does the rest. - Telelogos first developed TEL96++ for MS-DOS and UNIX (AIX, HP-UX and SCO). At the beginning of 1996, they released MEDIATRANSFER, which is the a TEL96++ compatible product with a GUI for Windows 3.1, 95 and NT platforms and a full Windows communications driver. Each product comprises a Client version (one communication only) and a Server version (from 2 to 64 simultaneous communications). MEDIATRANSFER Server can initiate (dial out) and receive (receive call) communications from any other MEDIATRANSFER-equipped computer.		- FRANCE/ TELELOGOS phone: 33.02.41.48.11.1 fax: 33.02.41.48.28.36

Chapter 7. Hardware and Software Offerings for Other Systems

This chapter briefly describes the hardware and software products available on other platforms that allow the RS/6000 to connect with them. It covers the connectivity of the S/390 and AS/400 and various PCs.

Information

You can find more information and detailed descriptions on this subject in the *IBM Connectivity Guide,* SG24-4169*.*

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

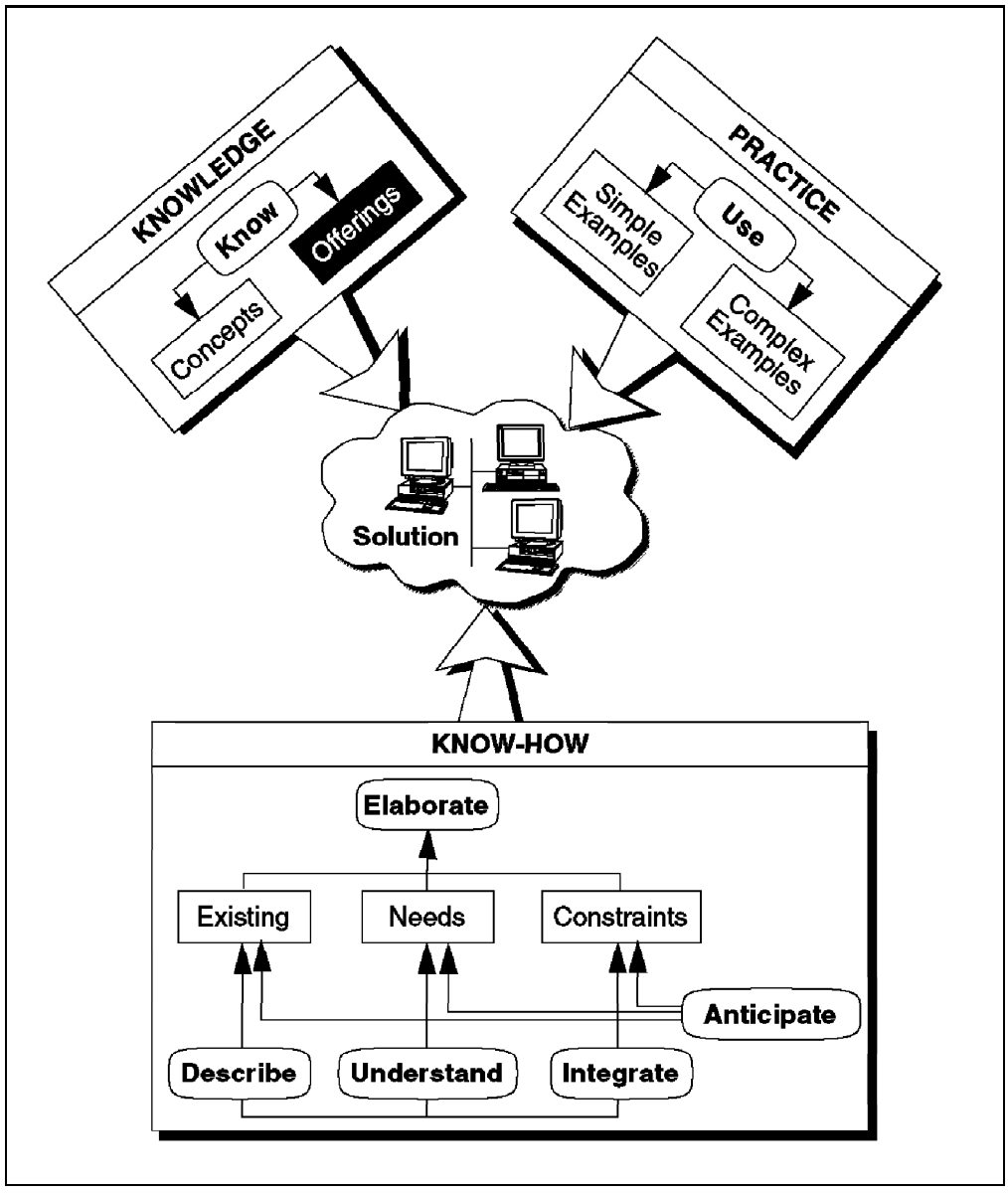


Figure 143. Position of Chapter 7 in Solution Design

7.1 PC DOS/Windows 3.1

7.1.1 Hardware Offerings

PCs running DOS/Windows 3.1 provide support for the most common adapters:

- Ethernet V2 / IEEE 802.3 (TCP/IP and SNA)
- IBM Token-Ring (TCP/IP and SNA)
- X.25 (TCP/IP and SNA)
- SDLC (SNA only)
- Asynchronous (TCP/IP)
- ISDN (TCP/IP and SNA)
- ATM (TCP/IP and SNA)
- FDDI (TCP/IP and SNA)

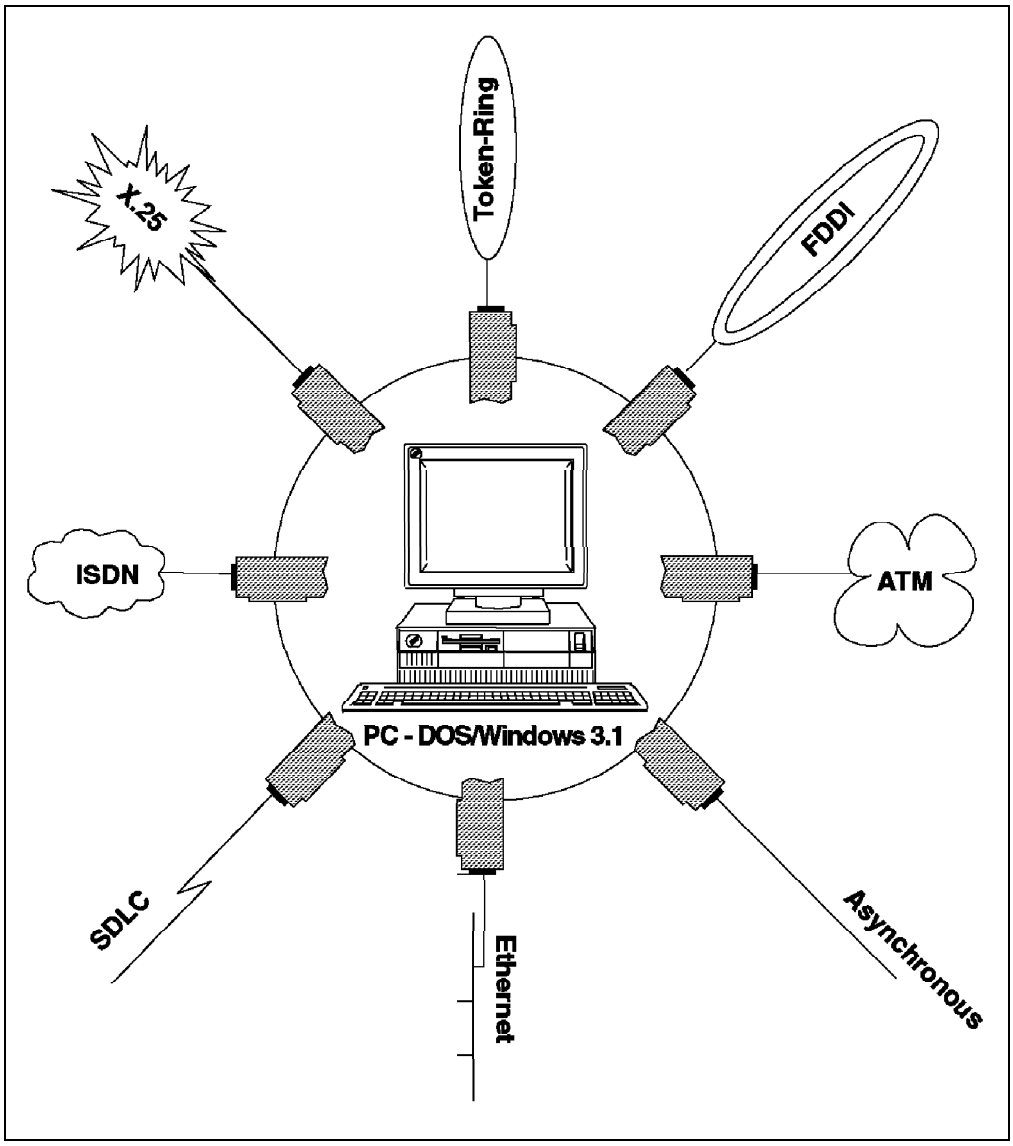


Figure 144. PC - DOS/Windows 3.1 Capabilities

7.1.2 Software Offerings

This section describes the software offerings for the PC in the DOS or DOS/Windows environment. These products have to be installed on the PC to communicate with the RS/6000.

Table 128. PC - DOS/Windows 3.1: IBM Software Offerings

Feature	Product
87G7-184	TCP/IP V2.1 for DOS option: NFS Kit (87G7-185) option: NetBIOS (87G7-186) option: Programmer's ToolKit (87G7-187)
20H1-709	AnyNet APPC over TCP/IP for Windows
39H3-778	Personal Communications AS/400 and 3270 V4.0 for Windows
39H0-478	Personal Communications AS/400 V4.1 for Windows

- **Personal Communications AS/400 & 3270 V4.1 for Windows**
  Personal Communications AS/400 for Windows

  Personal Communications AS/400 & 3270 V4.1 for Windows provides 3270 emulation in the Microsoft Windows 3.1 or Microsoft Windows for Workgroups V3.11 environment. It will also run on a workstation with Microsoft Windows for Workgroups V3.11 and Microsoft's LAN manager, allowing the workstation to be used as a client to Microsoft's SNA Server for Windows NT using the FMI interface.

7.1.3 OEM Products

There is a *huge* amount of software for the PC DOS/Windows environment. It's impossible to be exhaustive, and that is not the objective of this section. You will find in this table a few products that are frequently used on a PC with DOS/Windows 3.1 connected to the RS/6000.

Table 129. PC - DOS/Windows OEM Products

Product	Functions	Contact
- TUN*TCP TUN*Plus TUN-Emul TUM-Mail	- TCP/IP applications Host Integration Terminal emulation world-wide communi-cation	- USA ESKER phone:1-800-88ESKER fax: 1-415-675-7775 mail: info@esker.com http://www.esker.com
- X-Vision	- X-Server on Windows	- USA DICKENS DATA SYSTEMS phone: 1-404-475-8860 fax: 1-404-442-7525 mail: sales@dickens.com http://www.dickens.com
- Exceed5 for Windows	- PC integration	- HUMMINGBIRD SALES phone: 1-416-496-2200 mail:sales@hummingbird.com

7.2 PC -- OS/2 or Warp

The aim of this section is to provide information for the reader not familiar with OS/2 or Warp. It's not a detailed presentation, so for greater depth on any particular subject, the reader should refer to the IBM's manuals.

7.2.1 Hardware Offerings

PCs running OS/2 or Warp provide support for the most common adapters:

- Ethernet V2 / IEEE 802.3 (TCP/IP and SNA)
- IBM Token-Ring (TCP/IP and SNA)
- X.25 (TCP/IP and SNA)
- SDLC (SNA only)
- Asynchronous (TCP/IP)
- ISDN (TCP/IP and SNA)
- ATM (TCP/IP and SNA)
- FDDI (TCP/IP and SNA)

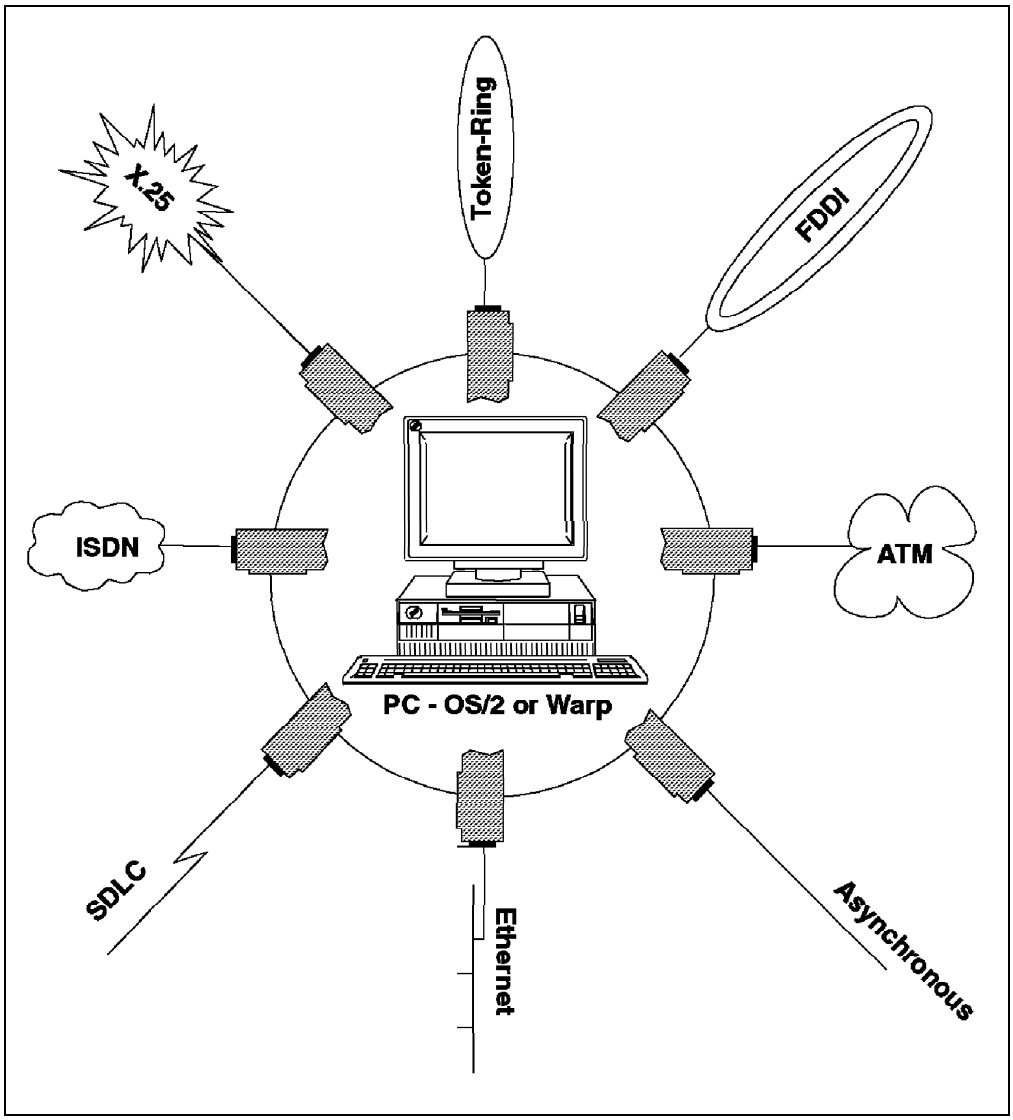


Figure 145. PC - OS/2 or Warp Capabilities

7.2.2 Software Offerings

This section provides information on connectivity with workstations running OS/2. The following products are the major IBM workstation operating systems and connectivity products available:

- **OS/2 Warp V3 and OS/2 Warp V3 with Win-OS2**

  Both operating systems are shipped with a bonus pack that includes IBM Internet Connection for OS/2. This provides easy access to the Internet and includes Mail and Gopher client facilities as well as TelnetPM, PMANT, and FTPM. In addition the following communication products can also be installed:

  - Communications Server for OS/2 Warp V4.0
  - Personal Communications AS/400 & 3270 V4.1 for OS/2
  - Personal Communications AS/400 V4.1 for OS/2
  - TCP/IP V2.0 for OS/2 (this is incompatible with IBM Internet Connection V3.0)

- **Warp Connect V3 and Warp Connect with Win-OS/2 V3**

  These products target small companies with a mid-range solution for connectivity. They provide a set of LAN products that include the following:

  - IBM Peer for OS/2 V1.1
  - OS/2 LAN Server 4.0 Requester
  - IBM LAN Distance Remote V2.2
  - IBM TCP/IP for OS/2 V3.0 (including Internet Connection for OS/2 features and IBM WebExplorer)
  - NetWare Client for OS/2 V2.11

  In addition, you could install the following:

  - IBM TCP/IP for OS/2 V2.0 kits
  - Communications Server for OS/2 Warp V4.0
  - Personal Communications AS/400 & 3270 V4.1 for OS/2
  - Personal Communications AS/400 V4.1 for OS/2

- **OS/2 Warp Server V4.0 and OS/2 Warp Server Advanced V4.0**

  OS/2 Warp Server V4.0 includes the following:

  - NetWare Client for OS/2
  - Remote Access Services for remote client support
  - TCP/IP and Dynamic IP

  In addition, you could install the following:

  - Communications Server for OS/2 Warp V4.0
  - Personal Communications AS/400 & 3270 V4.1 for OS/2
  - Personal Communications AS/400 V4.1 for OS/2

This table lists the software offerings in the PC environment for OS/2 or Warp. These products have to be installed on the PC to communicate with the RS/6000.

Table 130. PC - OS/2 or Warp: IBM Software Offerings

Feature	Product
65G1-220	TCP/IP V2.0 for OS/2 option: Extended Networking Kit (65G1-224) option: X-Window System Server Kit (65G1-228) option: X-Window System Client Kit (65G1-243) option: NFS Kit (65G1-255) option: Programmer's ToolKit (65G1-236) option: OSF/Motif Kit (71G9-486) option: DOS/Windows Kit (70G3-751) option: Domain Name Server Kit (76G8-086)
87G7-776	AnyNet /2 V2.0 option: AnyNet /2 NetBEUI over SNA (87G7-794) option: AnyNet/2 v2.0 Sockets over SNA Gateway (87G6-700) option: AnyNet/2 v2.0 SNA over TCP/IP Gateway (22H6-830) option: AnyNet/2 v2.0 IPX over SNA Gateway (22H6-736) option: AnyNet/2 v2.0 APPC over TCP/IP for Windows (20H1-709)
79G0-258	Communications Manager/2 V1.1
96F8-400	OS/2 LAN Server/Entry V3.0
96F8-414	OS/2 LAN Server/Advanced V3.0
96F8-455	OS/2 LAN Server for Macintosh V3.0
25H8-002	Warp Server V4.0
33H7-328	Communications Server for OS/2 Warp V4.0
25H8-030	Warp Server Advanced V4.0
28H0-081	LAN Server for Macintosh V1.01
10H9-800	Warp Connect V3.0 (TCP/IP V3.0 for OS/2 included)
39H3-929	Personal Communications AS/400 and 3270 V4.1 for OS/2
39H3-369	Personal Communications AS/400 V4.1 for OS/2
51H5-900	Personal Communications AS/400 for OS/2 Twinax Entry Level V4.1

- **Communications Server for OS/2 Warp V4.0**

  Communications Server for OS/2 Warp V4.0 is designed to provide communications services for most PC-based operating systems. When combined with the OS/2 Access feature, it provides the following support:

  - Multiprotocol gateway support
  - SNA Network support for dependent LUs
  - APPN network-node and end-node support
  - SNA gateway support allowing dependent LUs residing in workstations that are connected downstream of the gateway
  - Mobile computing capabilities provided by Remote Access Services using asynchronous, synchronous, ISDN, or X25 PAD dial connections.

- **Personal Communications AS/400 & 3270 V4.1 for OS/2**
  Personal Communications AS/400 for OS/2

  Personal Communications AS/400 & 3270 V4.1 for OS/2 provides TN3270 and both 3270 and 5250 emulation, whereas Personal Communications AS/400 for OS/2 only provides TN5250 and 5250 emulation. Both products contain the

OS/2 Access feature providing additional communication and programming support for:

- AnyNet Sockets over SNA
- AnyNet SNA over TCP/IP
- APPN end-node support, including HPR and DLUR

Personal Communications AS/400 & 3270 V4.1 for OS/2 also supports 3174 Peer Communication.

7.3 PC -- Windows 95

The aim of this section is to provide information for the reader who is not familiar with Windows 95. It's not a detailed presentation, so for greater depth on any particular subject, the reader should refer to the Microsoft manuals.

The Internet can help you

You can find more information on the WWW at this address:

`http://www.microsoft.com/windows`

Windows 95 includes full 32-bit, protected-mode versions of TCP/IP, IPX/SPX, and NetBEUI, and full Novell NetWare- and Windows NT-based clients.

Or with vendor-supplied additions, it supports Banyan VINES, DEC PATHWORKS, and SUN NFS.

Table 131. PC - Windows 95: IBM Software Offerings

Feature	Product
64H0-342	Personal Communications AS/400 and 3270 V4.1 for Windows 95
64H0-375	Personal Communications AS/400 V4.1 for Windows 95

- **Personal Communications AS/400 & 3270 V4.1 for Windows 95**
  Personal Communications AS/400 for Windows 95

  While both products provide 5250 emulation in the Windows 95 environment, Personal Communications AS/400 & 3270 V4.1 for Windows 95 also provides TN3270 and 3270 emulation in addition and Personal Communications AS/400 V4.1 for Windows 95 also provides TN5250emulation in addition.

  Both products contain the Windows access feature providing additional communication and programming support, which results in the combination of the Networking Services for Windows product and the AnyNet product.

7.4 PC -- Windows NT Workstation

The aim of this section is to provide information for the reader who is not familiar with Windows NT Workstation. It's not a detailed presentation; so for greater depth on any particular subject, the reader should refer to the Microsoft manuals.

The Internet can help you

You can find more information on the WWW at this address:

`http://www.microsoft.com/ntworkstation`

Windows NT Workstation includes:

- Support for 15 network protocols, including Client Services for NetWare, TCP/IP (including DHCP, WINS, PPP, and SLIP), NetBEUI, IPX/SPX, DCE RPC, and DLC
- Peer-to-peer and FTP server capabilities
- Client software for both Telnet and FTP services
- TCP/IP network utilities, including arp, finger, ftp, hostname, ipconfig, lpq, lpr, nbstat, netstat, ping, rcp, rexec, route, rsh, tftp, and tracert

7.5 PC -- Windows NT Server 4.0

The aim of this section is to provide information for the reader not familiar with Windows NT Server 4.0. It's not a detailed presentation, so for greater depth on any particular subject, the reader should refer to the Microsoft's manuals.

The Internet can help you

You can find more information on the WWW at this address:

`http://www.microsoft.com/ntserver`

Windows NT Server 4.0:

- Integrates seamlessly with your existing systems including NetWare, UNIX, and IBM mainframes.
- Works with the protocols you have, including TCP/IP, IPX/SPX, NetBEUI, DLC, HTTP, SNA, PPP, PPTP, and more.
- Works with the clients you have including MS-DOS, Windows, Windows for Workgroups, Windows 95, OS/2, Windows NT Workstation, UNIX, and Macintosh.
- Microsoft SNA Server makes it easy to connect PCs to IBM mainframe and AS/400 applications and data.

7.6 Macintosh

The aim of this section is to provide information for the reader who is not familiar with Macintosh. It's not a detailed presentation, so for greater depth on any particular subject, the reader should refer to the Apple's manuals.

The Internet can help you

You can find more information on the WWW at these addresses:

```
http://product.info.apple.com/productinfo/datasheets/ssindex.html
http://dev.info.apple.com/thirdparty/third_party.html
```

7.6.1 Hardware Offerings

7.6.1.1 Asynchronous
Every Macintosh comes with asynchronous capability.

7.6.1.2 LocalTalk
Every Macintosh comes with AppleTalk networking capability, including software and a LocalTalk networking port. A LocalTalk network costs little to install, is easy to maintain, and transmits information with high reliability at 230.4 Kbps.

7.6.1.3 Ethernet
Built-in Ethernet connectivity is provided through an Apple Ethernet port in the Macintosh Centris 650, most Macintosh Quadra computers, all Power Macintosh computers and Workgroup Servers, and several LaserWriter printers.

7.6.1.4 Token-Ring
Token-Ring networks often serve a mixture of personal computers, minicomputers, and mainframes. Software drivers and hardware for token-ring networks are available for Macintosh II, Macintosh Centris, Macintosh Quadra, and Power Macintosh computers, as well as for the Workgroup Servers.

7.6.1.5 WAN
X.25 and ISDN adapters are provided by others companies.

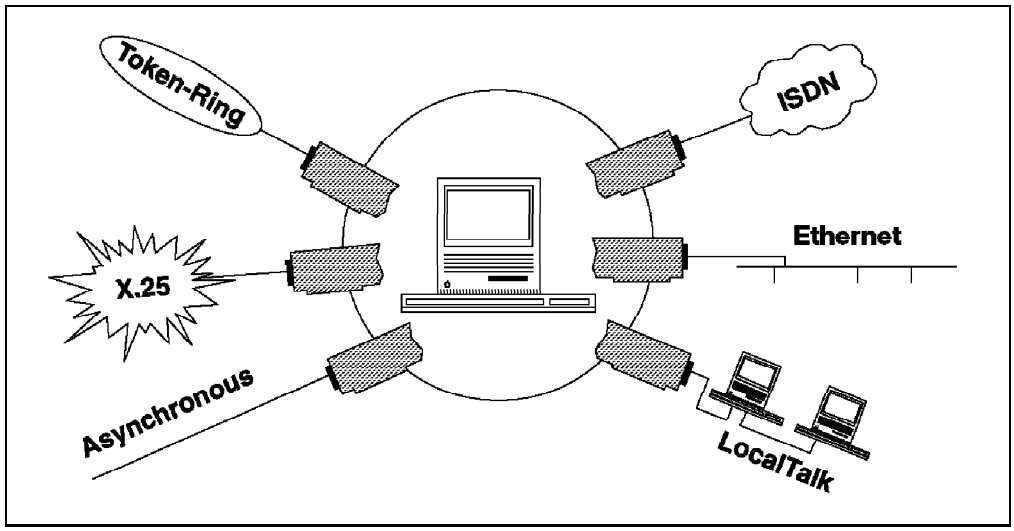


Figure 146. Macintosh Capabilities

7.6.2 Software Offerings
This section describes the software offerings for the Macintosh environment. These products have to be installed on the Macintosh to communicate with the RS/6000.

7.6.2.1 Common Protocols

Macintosh computers support TCP/IP, AppleTalk, DECnet, and IPX/SPX protocols.

7.6.2.2 Apple LocalTalk Bridge Software

This product enables you to extend the networking reach of your current system by bridging your LocalTalk network to Ethernet or token-ring networks. You can gain access to shared resources on the Ethernet or token-ring network, such as file servers, electronic mail, or mainframe systems, while maintaining a seamless connection to LocalTalk-based systems and LaserWriter printers.

7.6.2.3 Other Software

Mac Terminal can be used to emulate asynchronous terminals on the Macintosh. You can find other products, such as eXodus, that provide a complete connectivity package for accessing X-Window applications on UNIX.

Table 132. OEM Macintosh Products

Product	Functions	Contact
- MacTCP: TCP/IP Connection for Macintosh	- Domain name resolver - SNMP - FTP - Telnet - NFS - Support for LocalTalk, Ethernet, Token-Ring.	- Apple Computer, Inc. phone: 1-408-996-1010 fax: 1-408-974-9974 mail:AppleForever@apple.com
- MacTerminal	- Asynchronous emulation for Macintosh	
- TCP/IP Administration for Macintosh	- MacSNMP Admin (SNMP configuration) software	
- X.25, ISDN adapters	- WAN adapters	
- eXodus for Macintosh, v6.0	- A complete connectivity package for accessing X-Window applications on UNIX	- White Pine Software, Inc. Phone: 1-603-886-9050 Fax: 1.603.886.9051 mail: info@wpine.com
- TOTALMac	- Mac-to-UNIX connectivity solutions for sharing files, printers, and applications	- USA / SYNTAX, Inc. phone: 1-206-838-2626 fax: 1-206-838-9836 - FRANCE / AID phone: 33.01.40.92.73.33
- GatorBoxes connect a single Ethernet network to a single LocalTalk network. GatorStars add LocalTalk routing between 24 LocalTalk ports and a single Ethernet network. Each LocalTalk port could be a separate LocalTalk network.		- USA / CAYMAN SYS phone: 1-617-494-1999 fax: 1-617-494-9270 mail: sales@cayman.com http://www.cayman.com/

7.7 System/370 or System/390

7.7.1 Hardware Offerings

7.7.1.1 Gateways

The following products are channel-attached controllers that provide some level of gateway function to an MVS or VM mainframe host.

In this section, a gateway is used to mean a device that handles interconnection and the transfer of data between entities in layers 4 through 7 of the Systems Network Architecture (SNA) according to Open Systems Interconnection (OSI) reference model.

- **3745 Communication Controller (NCP), 3746-900 and 3746-950**

  The 3745 offers a variety of LAN-to-channel options, providing connectivity for both SNA and IP through traditional networks. The 3745 can act as a local gateway (channel-attached) or as a remote gateway (remote linked). As a gateway, the 3745 performs the function of routing data through the network rather than relying on an attached mainframe. This capability is provided for SNA, TCP/IP, frame relay, X.25, and X.21.

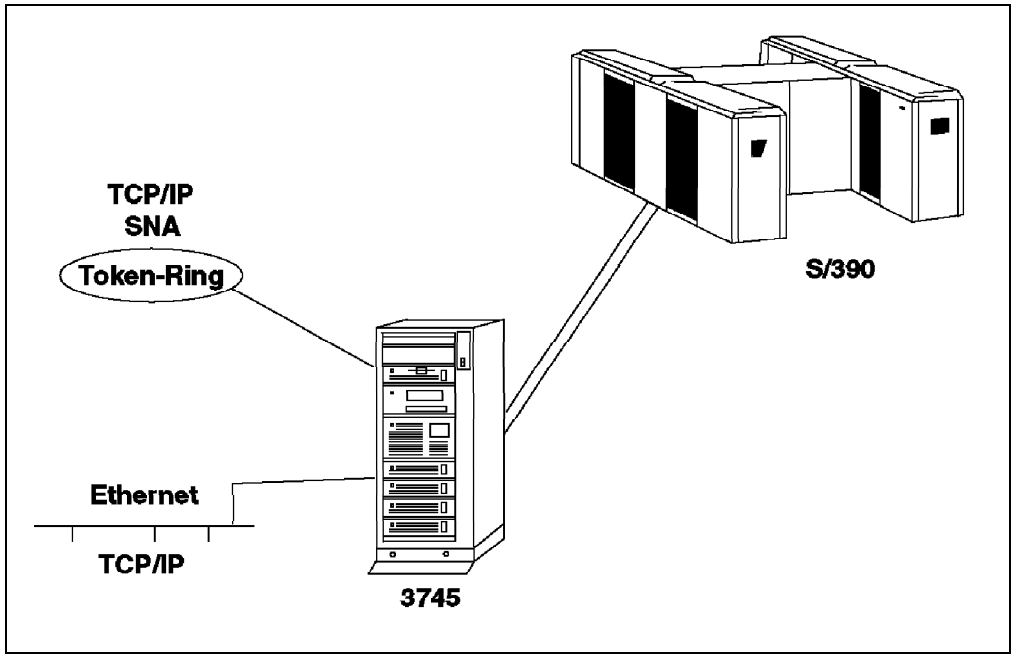


Figure 147. 3745 Local Gateway

- The 3745 can act as a remote gateway for SNA and TCP/IP from token-ring LANs and for TCP/IP from Ethernet LANs to an S/390 by transporting data over the network using the following protocols:
  - SDLC (SNA only)
  - X.25 (SNA and TCP/IP)
  - Frame Relay (SNA and TCP/IP)
  - Token-Ring (SNA and TCP/IP)
  - Ethernet (TCP/IP only)

- The 3746-900 under NCP control can act as a remote gateway for SNA on token-ring LANs to an S/390 by transporting data over the network using the following protocols:
  - SDLC (SNA)
  - X.25 (SNA)
  - Frame Relay (SNA)
  - Token-Ring (SNA)
- The 3746-900 in a stand-alone mode and the 3746-950 can act as a remote gateway for SNA on token-ring LANs to an S/390 by transporting data over the network using the following protocols:
  - SDLC (SNA)
  - Token-Ring (SNA)

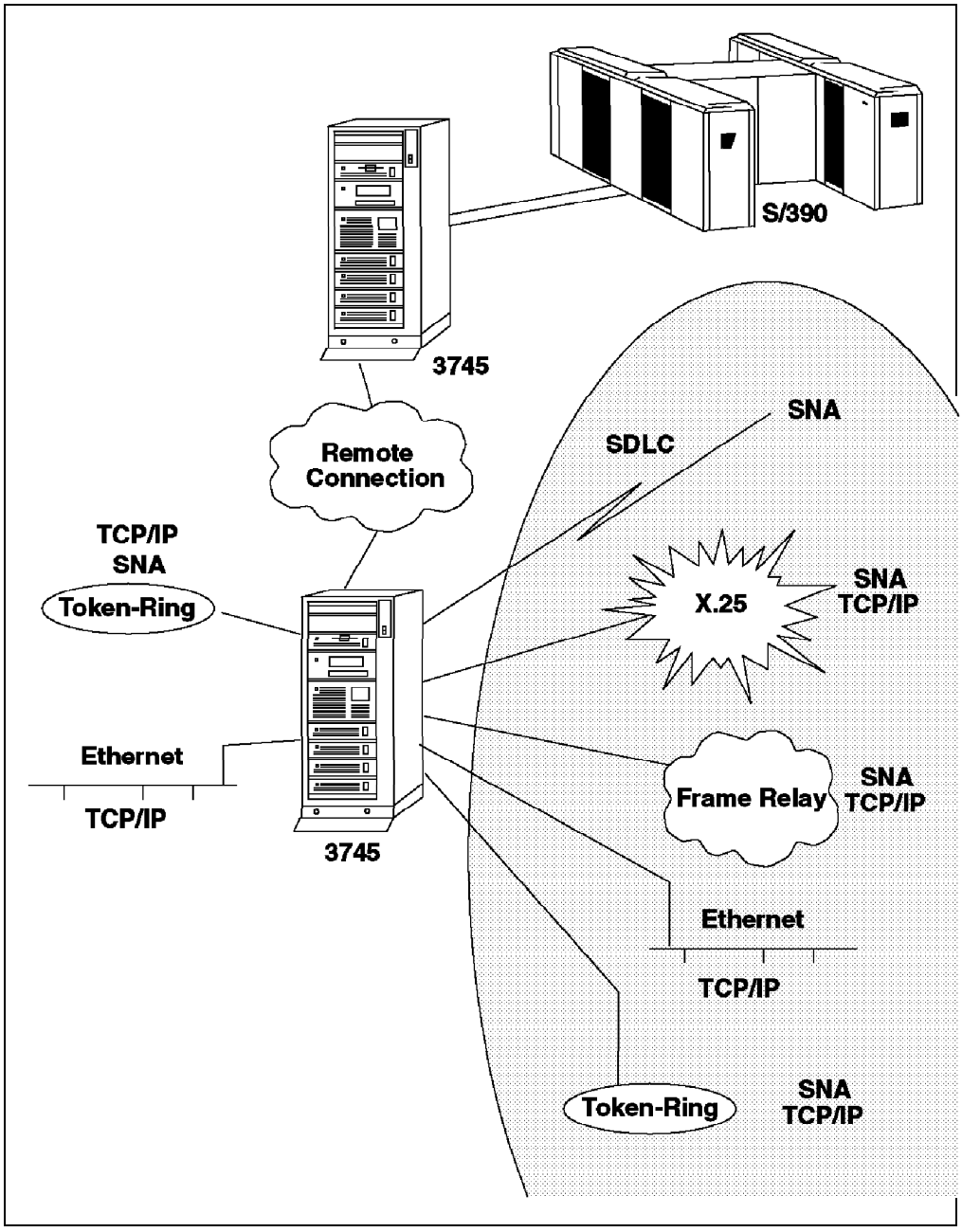


Figure 148. 3745 Remote Gateway

- **3172 Interconnect Controller**

  The IBM 3172 Model 3 Interconnect Controller is a communications processor that functions as a high-speed, channel-attached host gateway. The 3172 interfaces with multiple types of LANs and WANs to host processors via parallel or ESCON Channel attachment. It has options to accommodate a wide variety of protocols (SNA, TCP/IP, IPX, NetBIOS,...), topologies, and environments, including FDDI, Frame Relay, leased point-to-point, and multipoint communications and dial access.

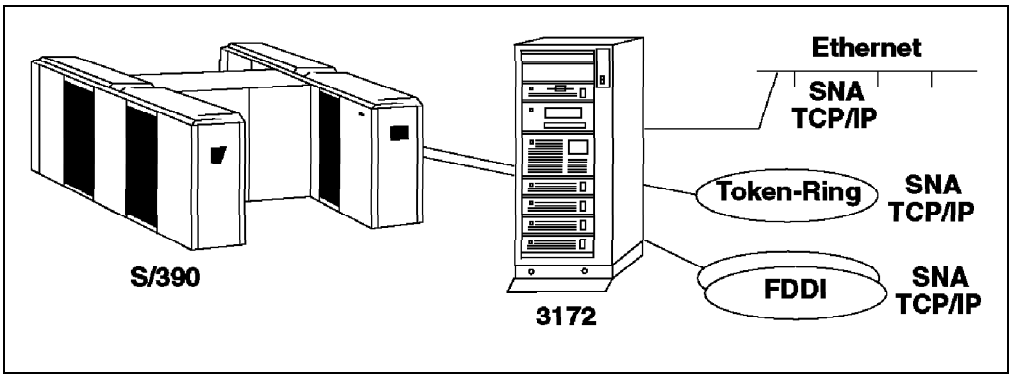


Figure 149. 3172 Local Gateway

The 3172 Model 3, depending on the configuration, can function either as LAN-to-host gateway or a WAN-to-host gateway.

- As a LAN-to-host gateway, the 3172 supports FDDI, token-ring, or Ethernet connections.

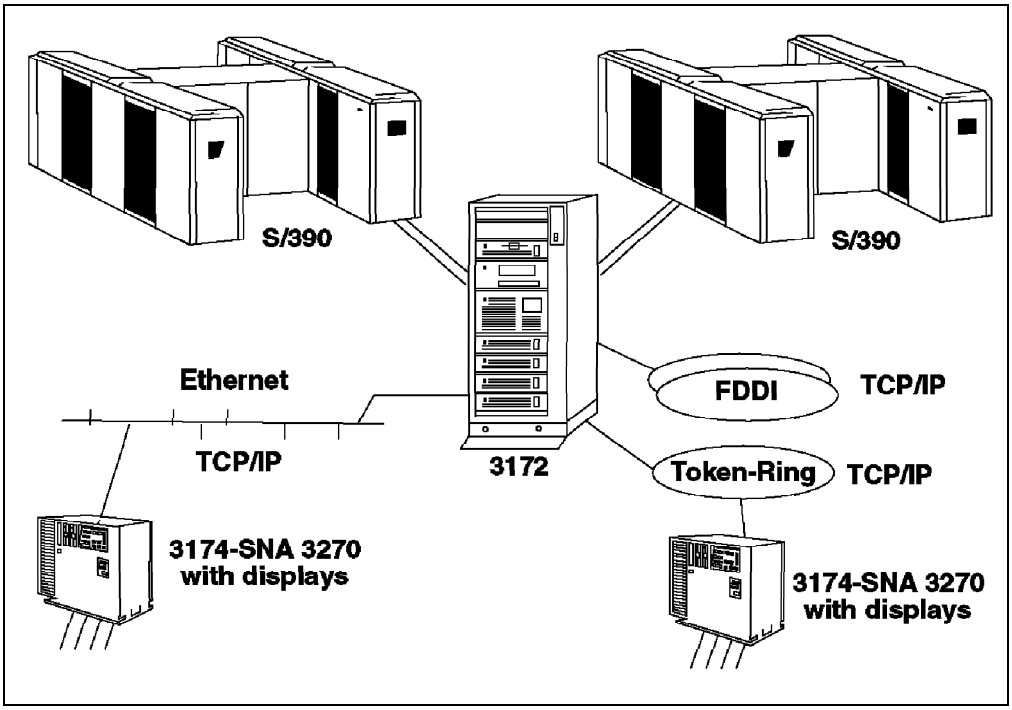


Figure 150. 3172 LAN-to-host Gateway Functions

- The WAN-to-host support includes X.21, V.35, RS-232, or RS-442/449 link attachment for SNA/SDLC point-to-point or multipoint links as well as Frame Relay capabilities.

- **3174 Establishment Controller**

The 3174-xxL models can act as a local gateway for SNA Traffic on token-ring LANs to the host by sending data over the channel, or if a Concurrent Communication Adapter (CCA) is installed, by sending data over an SDLC or X.25 adapter.

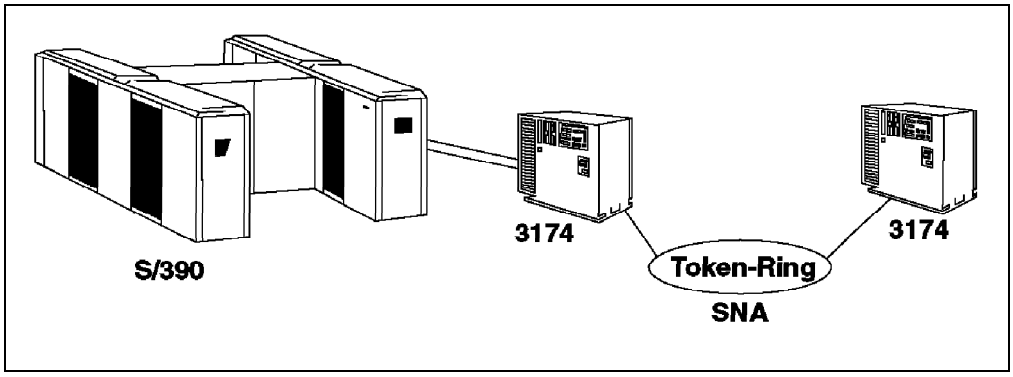


Figure 151. 3174 Local Gateway

The 3174-xxR models can act as a remote gateway for SNA and TCP/IP on token-ring and Ethernet LANs to aN S/390 host. The 3174 can have one LAN adapter, either token-ring or Ethernet. TCP/IP traffic coming in from the LAN can only be transported upstream by using frame relay. SNA traffic coming in from the LAN can be transported upstream with the following:

- SDLC
- X.25
- Frame Relay

The 3174 can also act as an ISDN gateway with the ISDN adapter.

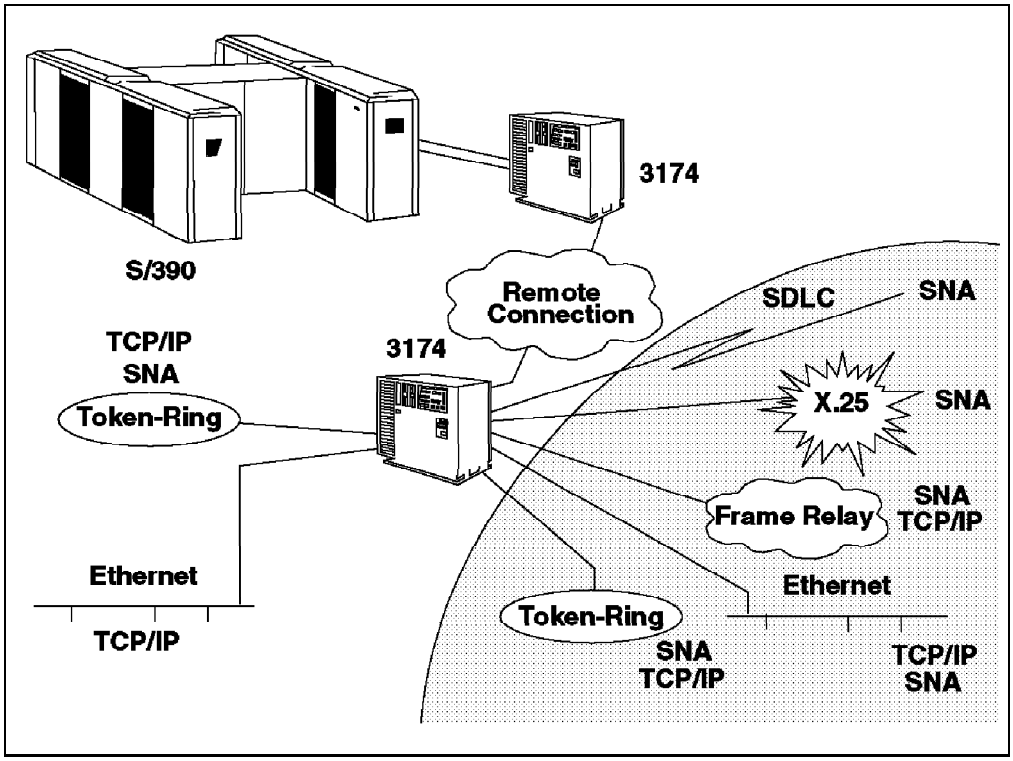


Figure 152. 3174 Remote Gateway

The IBM 3174 family of establishment controllers provides a wide range of establishment gateways options. Two of them deserve to be included here.

- 3174 TCP/IP and C3 Base Implementation (PRPQ 8Q0935)

  This PRPQ provides a TCP/IP Telnet client function for the IBM 3174 controller. The 3270 devices attached to an IBM 3174 communicate directly with TCP/IP servers via the 3174's interface to a token-ring. The TCP/IP server may be attached directly to the token-ring, or it may exist anywhere in the network reachable via the token-ring, or any bridges or routers.

  Coax-attached displays operating in CUT mode are supported as VT100, VT220, IBM3101 or DG210 devices and *can access full-screen* (24x80) *Telnet applications.*

  Note: When accessing TCP/IP on an IBM S/390 host (TCP/IP for MVS or VM), only line-by-line mode is supported.

  The following displays can be used to access TCP/IP applications:
  - Coax-attached (CUT) dependent displays
  - Intelligent workstations operating in CUT mode
  - DFT-E displays operating in ASCII host session mode
  - ASCII displays

  The following are the supported TCP/IP protocols:
  - IP
  - ICMP
  - ARP (resolver client only)
  - TCP
  - UDP
  - Telnet (client only)
  - PING
  - DNS (stub resolver)
  - SNMP (MIB-I agent only)

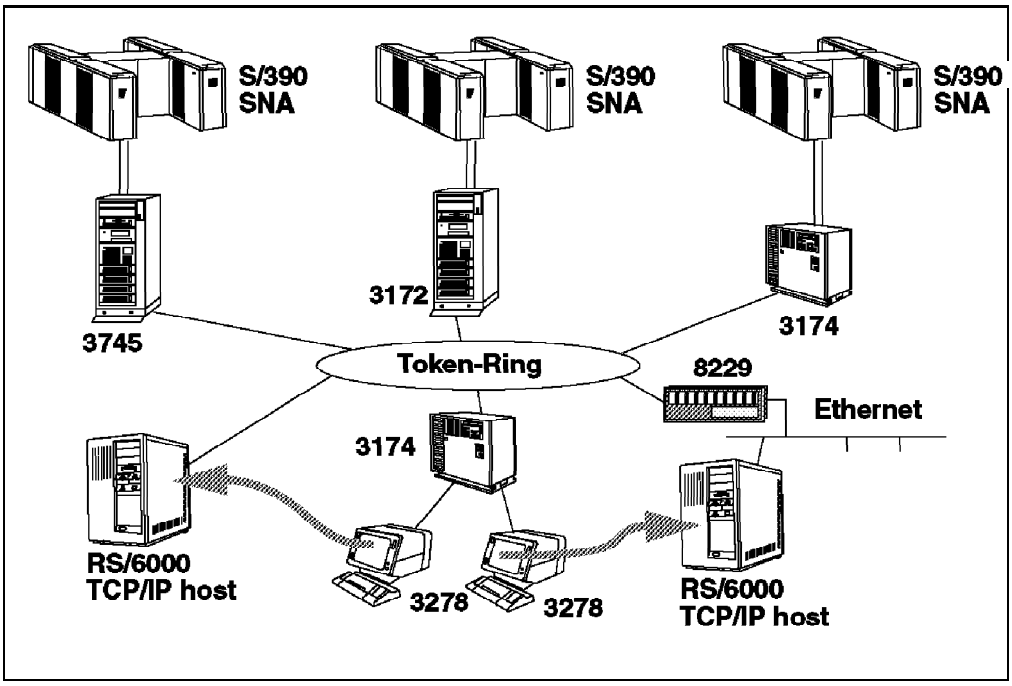


Figure 153. 3174 TCP/IP Capabilities implementation

- 3174 Ethernet and TCP/IP Enhancements (PRP Q8Q1041)

  Three IBM 3174 Models (14R, 24R, and 64R) support Ethernet IEEE 802.3 and Ethernet DIX Version 2 connections. The newer models include an Ethernet adapter in the base machine. An Ethernet adapter is available for existing 3174 models. Configuration Support-C Release 4.0 is required for the 3174 Models 14R, 24R, and 64R, and the Ethernet adapter.

  Attached dependent terminals (both CUT and ASCII) may access SNA and TCP/IP hosts via an Ethernet LAN. These terminals, attached to one of these controllers, can access upstream Ethernet LAN-attached hosts in a manner similar to the token-ring DSPU configurations.

  Using the Ethernet adapter feature, the 3174 controller can be configured as an Ethernet gateway to SNA hosts. Devices attached downstream from the 3174 on an Ethernet LAN can access SNA hosts upstream from the 3174 Ethernet gateway. Existing MLT support makes it possible for each dependent terminal to have up to five sessions.

  PRPQ Q8Q1041 TCP/IP Enhancements provides TCP/IP TN3270 support, TCP/IP host printer and SNMP MIB-II support.
  - TN3270 support makes it possible for client terminals to use TCP/IP protocol for mainframe access to 3270 applications in full-screen mode.
  - TCP/IP printer support allows printers attached to a 3174 to accept and print jobs from TCP/IP hosts.
  - SNMP MIB-II support enhances the level of network management offered by the 3174.

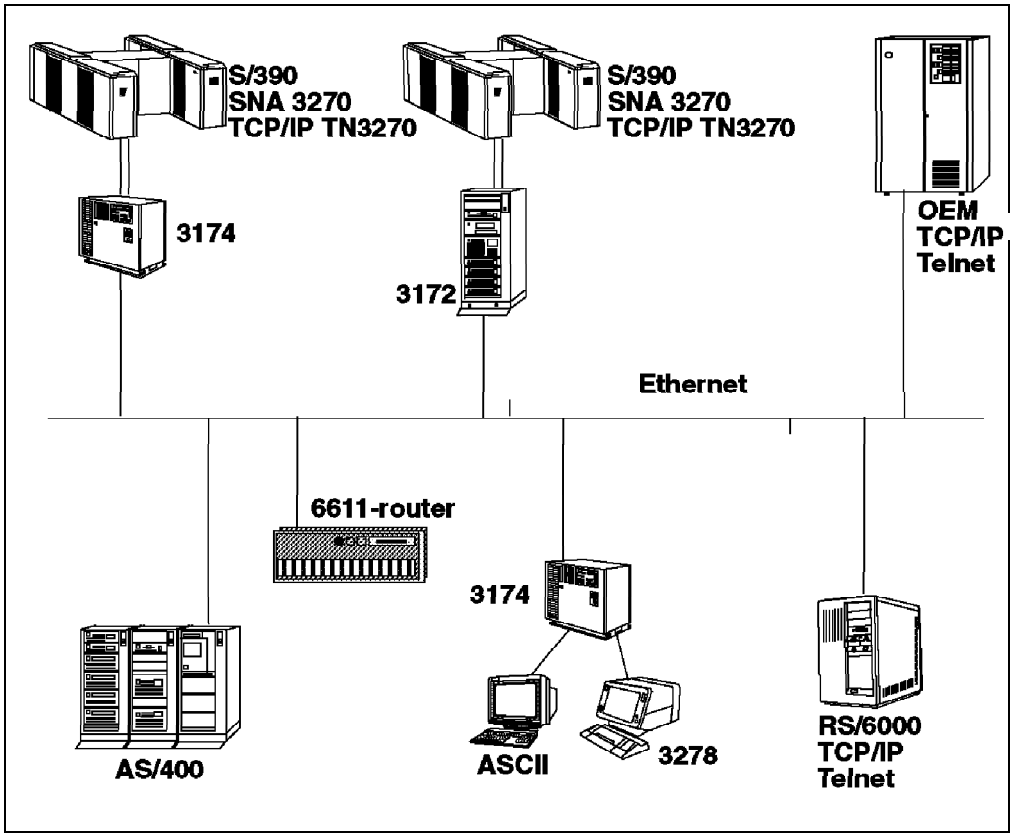


Figure 154. 3174 TCP/IP on Ethernet

- **Open System Adapter (OSA)**

  The OSA 1 provides token-ring, Ethernet and FDDI interfaces on the S/390 and ES/9000. OSA supports SNA, APPN, TCP/IP and IPX protocols.

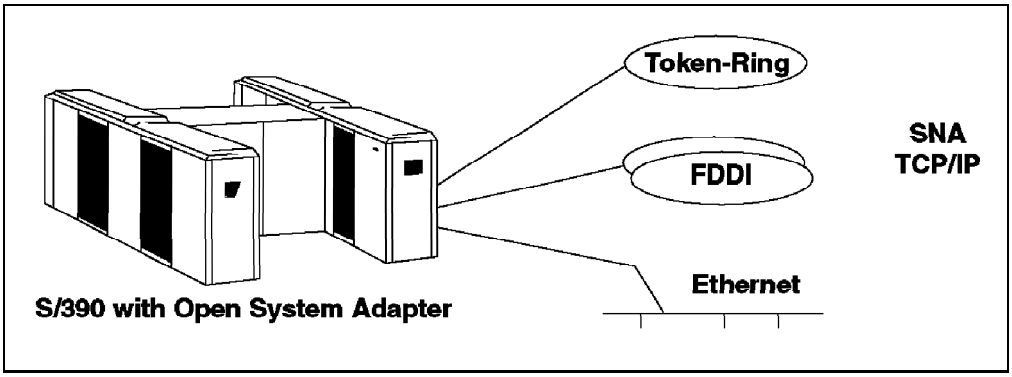


Figure 155. Local Gateway Communication - OSA

- **RISC System/6000**

  The RS/6000 can be used as a TCP/IP and SNA gateway. AIX SNA Server/6000 and Gateway/6000 software provide the SNA gateway capability.

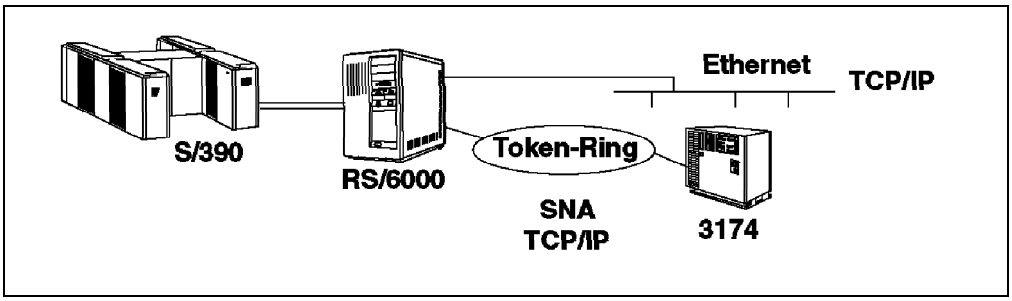


Figure 156. RS/6000 as a Local Gateway

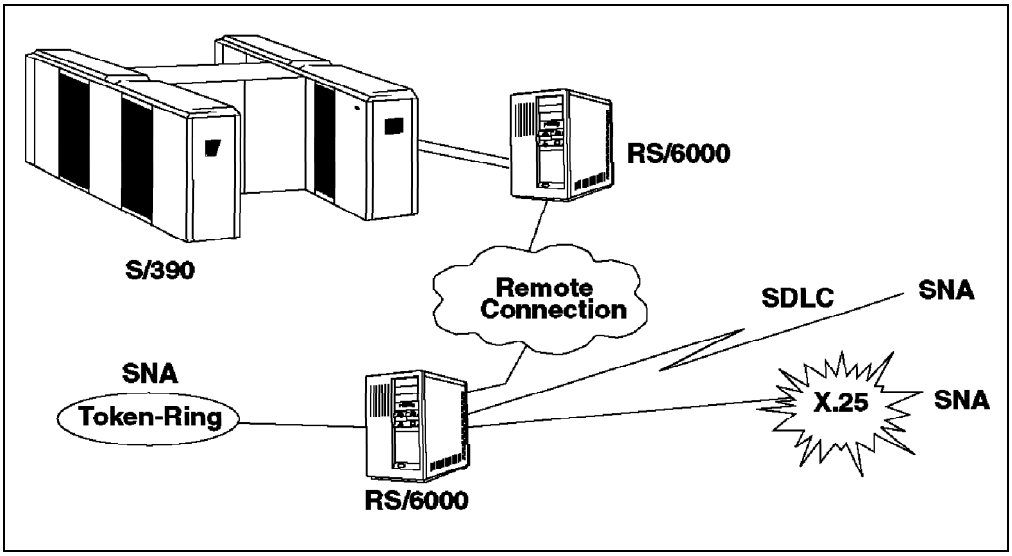


Figure 157. RS/6000 as a Remote Gateway

- **PC**

A PC gateway is a LAN-attached PC running specialized software that provides services for other devices attached to the LAN to access the host. It requires hardware connections for upstream communications with the hosts network and downstream communications with the other LAN-attached devices. The IBM PS/2 and PC families, together with the IBM communications software for the PC, prove a wide range of gateway options.

A PC gateway can be connected to the SNA host on its upstream side in a number of different ways, as shown in figure below.

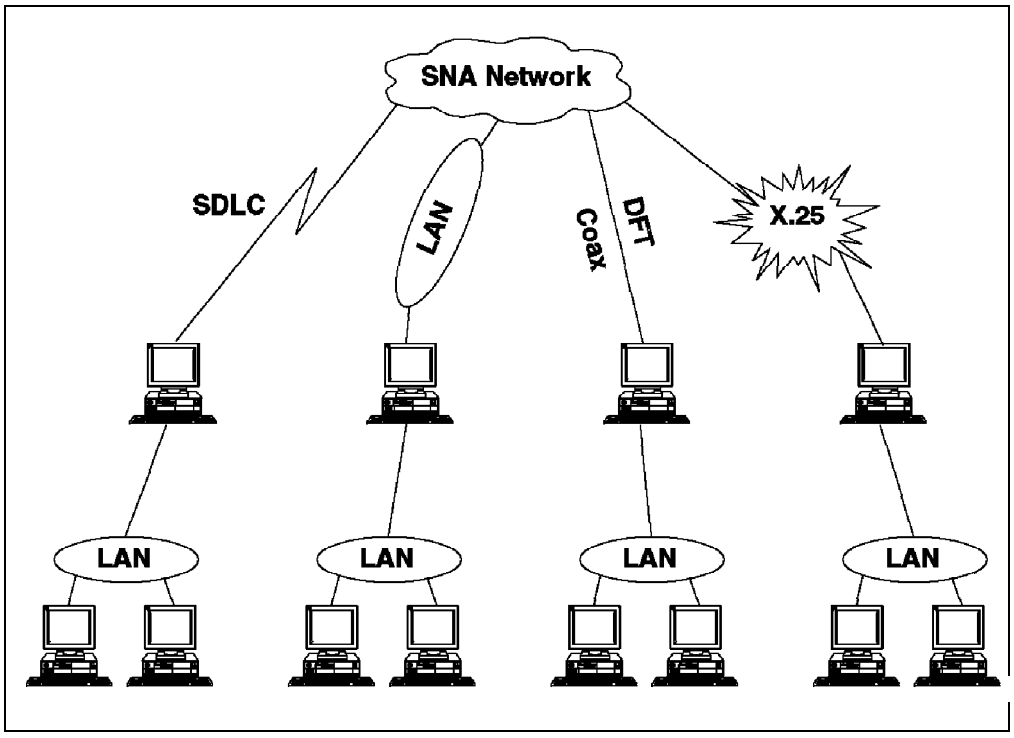


Figure 158. Upstream Communications Protocols to SNA Network

The following are four common approaches to upstream communications:

- Through a leased or switched telephone line using synchronous data link control (SDLC) protocols
- Via a public or private X.25 network
- Through a coaxial line using the distributed function terminal (DFT) support of another device
- Via an SNA backbone LAN/WAN using the facilities of the LAN-attached communications controller

The following two commonly used PC communications packages are discussed, outlining their downstream LAN attachments anD upstream communications protocols:

- IBM Personal Communications AS/400 and 3270 V4.1 for OS/2
- IBM Communications Server for OS/2 Warp

• **AS/400**

The AS/400 cannot be used as an SNA gateway for PU 2.0 devices; however, the AS/400 can be configured as an APPN network node and supports LU 6.2 sessions. TCP/IP and OSI are supported.

7.7.1.2 ES/9000 Integrated Communication Adapter

The integrated I/O controller bus and attached I/O controller provide, besides the standard channels, a second type of connection path between the ES/9000 rack-mounted processor and various I/O devices.

I/O controllers are logic cards that act as a control units and directly attach I/O devices without separate control units. I/O controllers, plus the devices they control, are called I/O subsystems.

I/O controllers available on the ES/9000 rack-mounted system are the following:

- S/370 Block Multiplexer Channel
- DASD/Tape Subsystem Controller
- Workstation Subsystem Controller
- Communication Controller:
  - Telecommunications Subsystem Controller
  - X.25 TCP/IP Communication Subsystem Controller
  - ASCII Subsystem Controller
  - Token-Ring Subsystem Controller
  - Ethernet Subsystem Controller

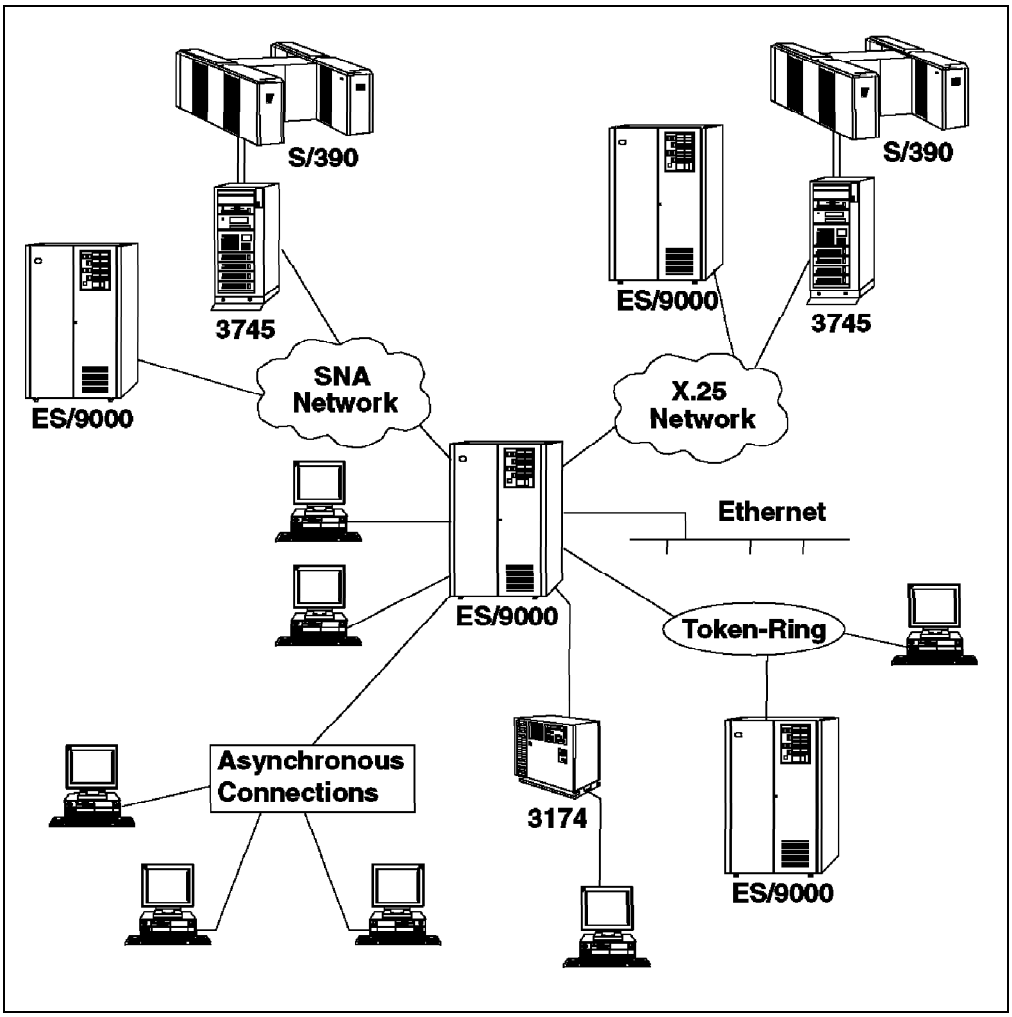


Figure 159. ES/9000 Integrated Communication Adapter

This figure is one example of configuring communications capabilities in an S/390 environment.

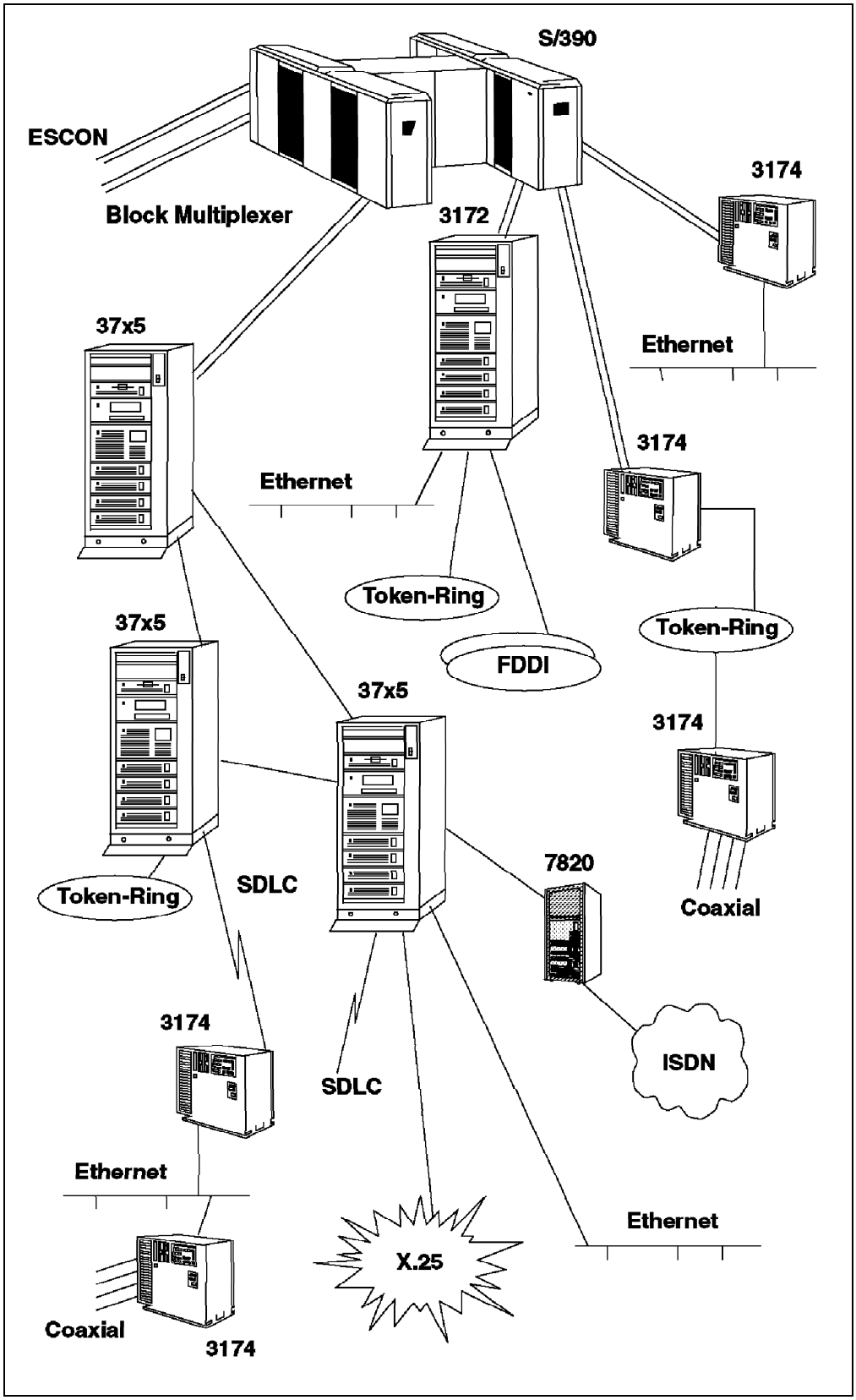


Figure 160. S/390: Example Configuration

7.7.2 Software Offerings

This table lists the software offerings in the S/370 or S/390 environment for MVS or VM. These products have to be installed on the host.

Table 133. S/370 or S/390 Software Offerings

Feature	Product
5655-068	MVS/ESA JES2 5.2.2 OpenEdition
5655-069	MVS/ESA JES3 5.2.2 OpenEdition
5654-030	VM/ESA V2 R1
5695-168	Networking Queuing System/MVS V1 R1
5695-117	ACF/VTAM V4.3 for MVS option: ACF/VTAM 4.3 for MVS AnyNet feature
5654-010	ACF/VTAM V4.2 for VM
5665-311	3270-PC File Transfer Program for MVS
5664-281	3270-PC File Transfer Program for VM
5798-DQH	CICS/VS 3270-PC File Transfer Program
5648-039	LAN File Services/ESA
5684-142	LAN Resource Extension and Services/VM
5995-123	LAN Resource Extension and Services/MVS
5684-061	Open System Message Exchange for VM
5685-070	Open System Message Exchange for MVS
5735-FAL	TCP/IP V2.3 for VM option: TCP/IP application programs option: TCP/IP V2.3 for VM NFS feature
5655-HAL	TCP/IP V3.1 for MVS: option: TCP/IP application program option: DFSMS Network File System Feature V1.3 (5995-DF1)
5648-063	ACF/NCP V7R4
5688-035	NCP Packet Switching Interface (NPSI) V3.8
5621-425	3172 Interconnect Controller Program
5696-865	SNA Communications Program
5697-196	3172 IP Channel Communications Program V1
5685-014	OSI/CS for MVS - X400
5685-046	OSI/FS for MVS - FTAM
5684-013	OSI/CS for VM - X400
5684-038	OSI/FS for VM - FTAM

7.8 AS/400

7.8.1 Hardware offerings

The Advanced Systems and Advanced Servers support the following communications controllers and adapters.

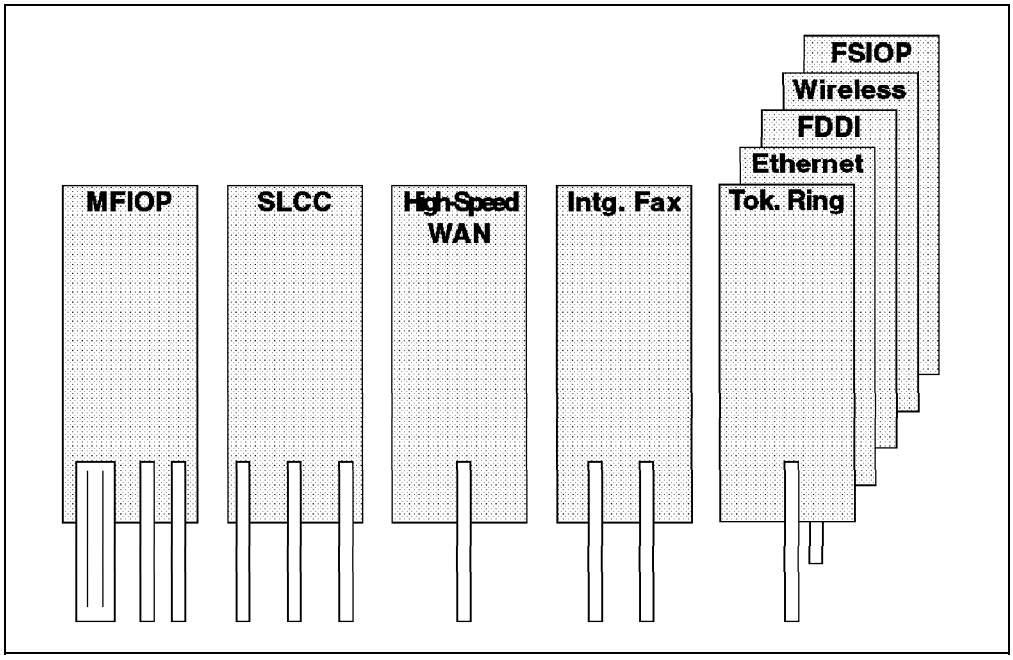


Figure 161. Adapters Supported on the AS/400

- The MFIOP (Multi-Function I/O Processor) is a standard feature on the AS/400. It can be used to support either disk, taped, diskette or workstation controller attachments. It also supports two communications lines. The first communications line is supplied as a standard via a V.24 supplied adapter.

  A second adapter can be ordered for the second line, which cab be either V.24, V.35, X.21, or a LocalTalk workstation adapter. LAN adapters are also supported.
- The SLLC (Six-Line Communications Controller) is an optional feature that can support up to six communication lines via three adapter slots. These adapters can be a mixture of one- and two-line V.24 adapters slots, one- and two-line X.21 adapters, online V.35 adapters, an ISDN Basic Rate Interface adapter, or a LocalTalk workstation adapter.
- The FSIOP (File Server I/O Processor) is an optional feature that connects to the AS/400 to provide high-performance file servings to PCs. The FSIOP can run Novell NetWare or IBM LAN Server. Integration Services for FSIOP is a feature of OS/400 that provides the OS/2 Warp operating system for the FSIOP.This feature allows the FSIOP to be used as a token-ring or Ethernet adapter. Network Extensions, OS/400 Integration for Novell NetWare, and Novell NetWare 4.1 can be used with Integration Services for FSIOP to provide Novell NetWare support on the AS/400. The licensed program LAN Server/400 provides IBM LAN Server for the FSIOP.
- **Remote 5x94 Controllers**

Remote controllers are supported for the remote attachment of workstations and printers. This includes the 5394 remote workstation controller and the 5494 remote workstation controller.

- The 5394 provides a WAN (SDLC or X.25) link to the AS/400 and supports twinax-attached 5250 devices.
- The 5494 supports either a WAN (SDLC, X.25, or Frame Relay) or a LAN link to the AS/400. The single 5494 LAN adapter (token-ring or Ethernet) can either be used for the AS/400 connection or for LAN attached 5250 devices. 5250 devices can also be twinax-attached to the 5494. The 5494 is an APPN Low-Entry Network) node.

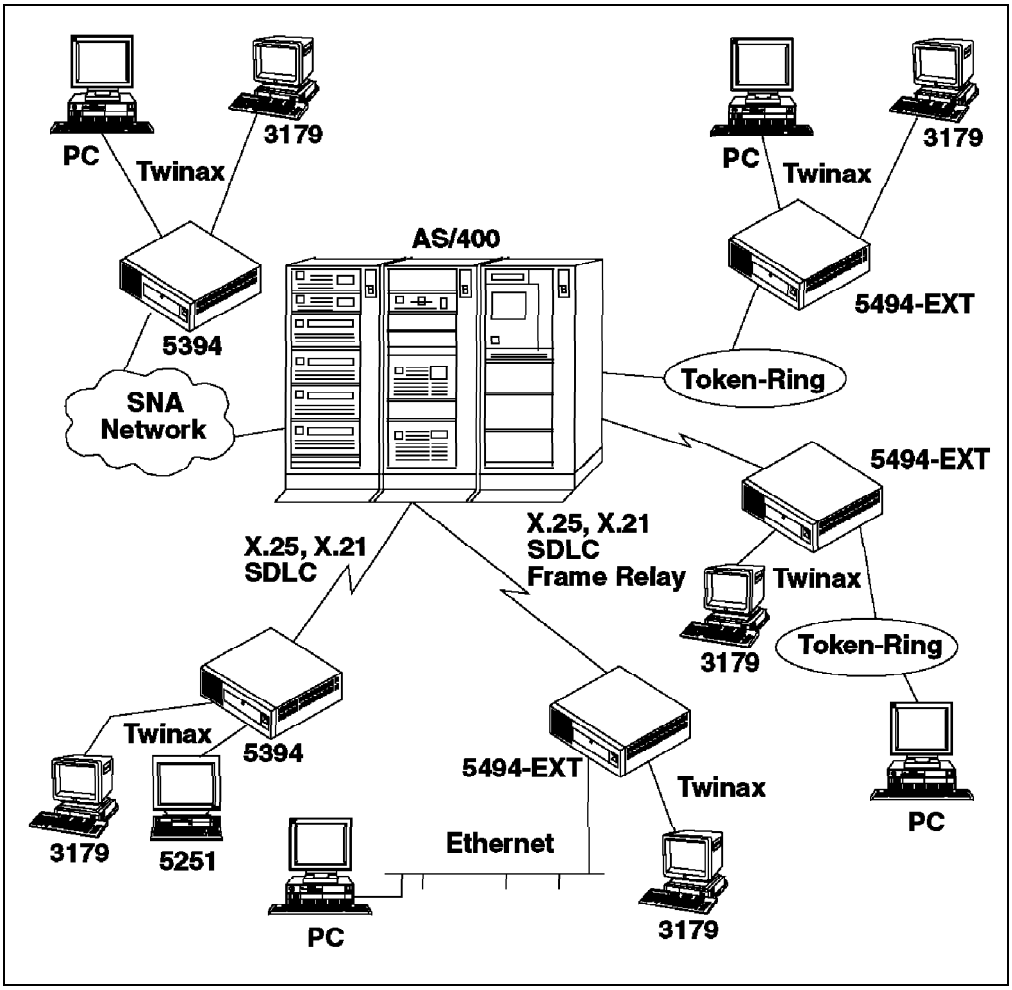


Figure 162. 5394 and 5494 Remote Control Units

- **AS/400 LAN Features**

  The following are the LAN adapters available on the AS/400:
  - Ethernet/IEEE 802.3 Network Adapter
  - Fiber Distributed Data Interface Adapter
  - 16/4 Mbps Token-Ring Network Adapter/HP
  - 16/4 Mbps Token-Ring Network Adapter/A
  - I/O Attachment Processor
  - Shielded Twisted-Pair Distributed Data Interface Adapter
  - AS/400 Wireless LAN Adapter

7.8.2 Software Offerings

The AS/400, although traditionally a node found in APPN networks and a T2.1 node in SNA subarea networks, also supports TCP/IP, IPX/SPX, and OSI networking protocols.

- **SNA and TCP/IP are part of the base support provided by OS/400.**

  The AS/400 is primarily an APPC host. APPC is the communications method of using the SNA LU Session Type 6.2 protocol. APPN, which the AS/400 also supports, allows data communications to route data between two or more APPC hosts that are not directly attached in a network.

  The following is a brief overview of the TCP/IP applications supported:
  - Telnet: client and server
  - File Transfer Protocol (FTP): client and server
  - LPR/LPD (Line Print Requester/Line Printer Daemon): client and server
  - SMTP (Simple Mail Transport Protocol): send and receive
  - SNMP (Simple Network Management Protocol): MIB II
  - FSS/400 (File Server Support/400): NFS server
- **IPX/SPX is available as a feature.**

  Native IPX supports now available on the AS/400. This allows the AS/400 to transparently route IPX. IPX packets can be transported from one IPX network into another, either LAN to LAN or LAN to WAN, via the AS/400. The AS/400 implements RIP and NLSP for routing in an IPX network. Applications can be written to IPX sockets. IPX is also added to AnyNet/400, which will allow AS/400 users to transport native APPC application data over an IPX backbone.

  NetWare application server support is available via the FSIOP (File Server I/O Protocol)—that is, Novell Netware 4.1 can be installed on the FSIOP.
- **OSI is a separately licensed program product.** The AS/400 supports the following OSI standards:
  - X.400
  - FTAM
  - X.500
  - Network Management
- **NetBIOS is also supported** as part of the LAN Server/400 licensed program product.
- **Connection Program/400 provides connectivity for UNIX environments.**

  Connectivity from an AS/400 to a RS/600 is provided by the IBM Connection Program/400 for UNIX Environments. This product also allows the AS/400 to connect to other UNIX vendors such as Sun SPARCstation and HP 900 Series 700. It provides 5250 emulation, file transfer, remote command, remote database access via SQL APIs, national language support, and remote printer support.

  IBM Connection Program/400 is supported on the SUN and HP workstation over TCP/IP and on the RS/6000 over TCP/IP and SNA. TCP/IP is supported over token-ring, Ethernet, or X.25. The 5250 SNA is supported over token-ring, Ethernet, X.25, or SDLC.

  For more information about this product, please refer to chapter 6.

This table lists the software offerings in the AS/400 environment for OS/400. These products have to be installed on the AS/400.

Table 134. S/370 or S/390 Software Offerings

Feature	Product
5763-SS1	OS/400 V3.1
5763-SS1	OS/400 V3.6
5798-TAA	TCP/IP File Server Support/400 V3.1
5798-TAZ	TCP/IP File Server Support/400 V3.6
5763-XA1	Client Access/400 V3.1
5798-RZB	Connection Program/400 for UNIX Environments (for OS/400 V3.1)
5798-TBE	Connection Program/400 for UNIX Environments (for OS/400 V3.6)
11H1-303	5250 Emulation for Windows V1.1
5738-OS1	OSI Communications Subsystem/400 - base OSI
5738-MS1	OSI Message Services/400 - X400
5738-FS1	OSI File Services/400 - FTAM

Chapter 8. Methodology for Designing a Communication Solution

This chapter presents a methodology to help you in the elaboration of a communication solution. This method is certainly not perfect and not complete, but we hope it will help you.

This method is based on:

- Questions that you have to ask (and probably, get answered)
- Lists of items
- Figures to help you summarize different ideas

But, by this time, the application must have been chosen. The functional needs must be decided beforehand, and this is not the purpose of this methodology.

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

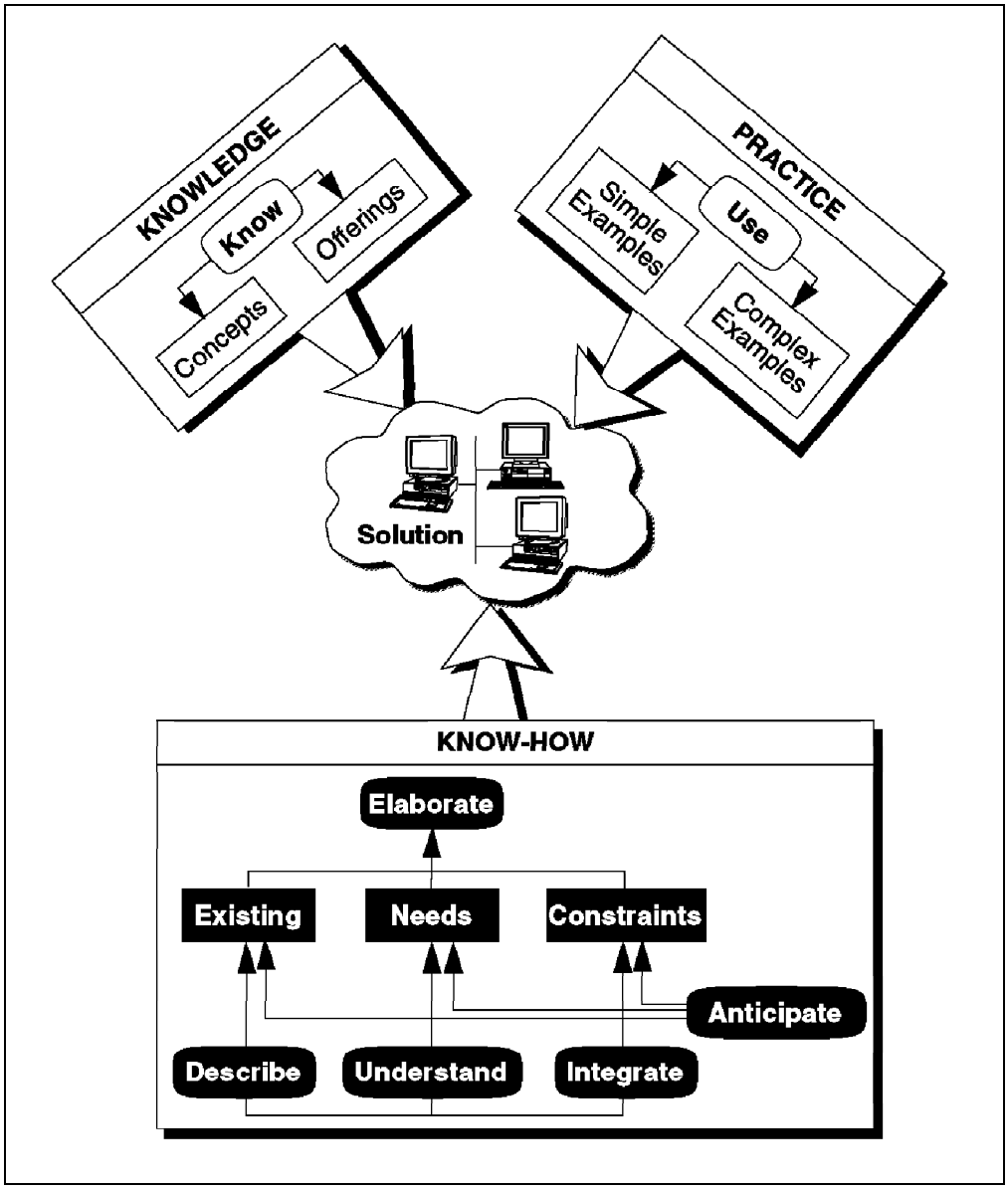


Figure 163. Position of Chapter 8 in Solution Design

8.1 Listing the Existing Environment

As a first step, it's necessary to know the environment where the solution is to be installed.

- With these items, you can list all physical and logical components in the solution environment. You need to know them before choosing different products.
  Example: You cannot install TCP/IP package on a PC with only 1 MB RAM.
- Knowledge of exploitation is also necessary.

  Example: You could use some people to transfer files manually rather than using a very expensive solution.
- The figure shown below is very useful for writing down what you need.

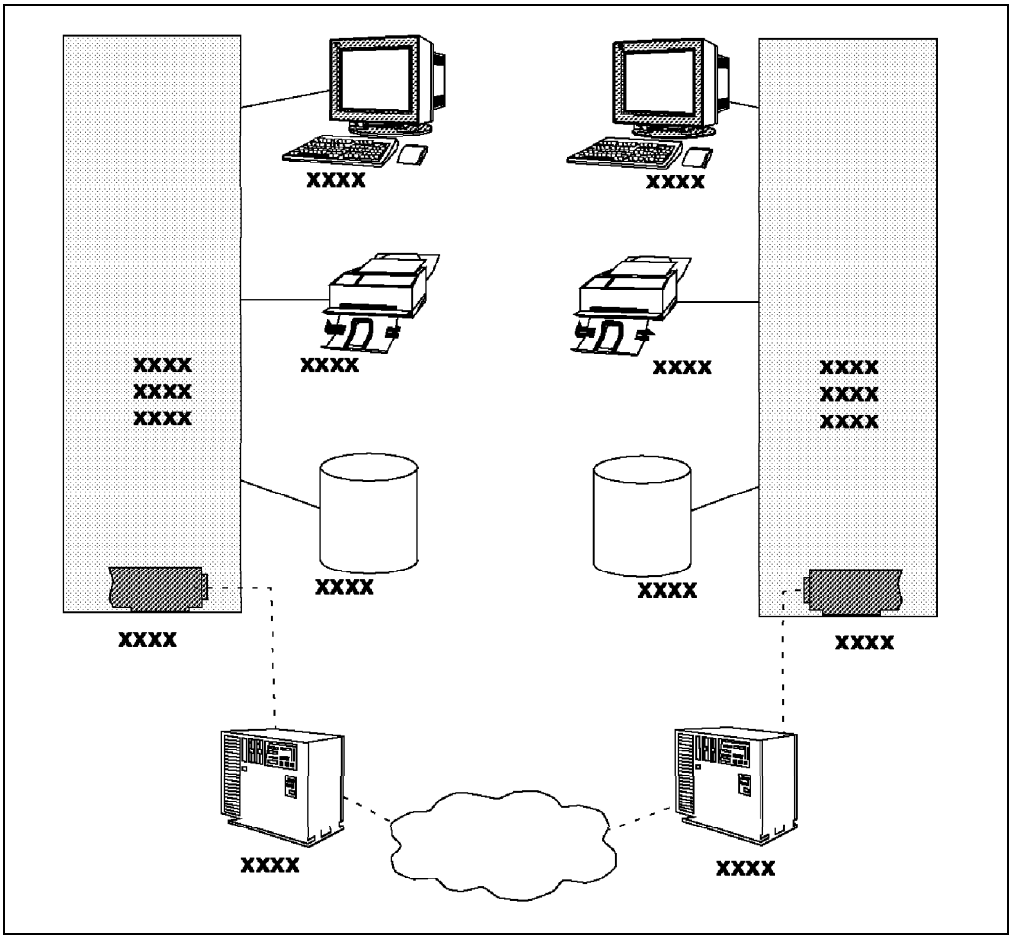


Figure 164. Generic Figure Used to Evaluate Important Elements

- **Physical Components**
  - Host system:
    - Processor type: Intel, Power PC, Mips,...
    - Disk types and capacity: SCSI-1, SCSI-2, SSA,...
    - Memory: capacity, type,...
  - Terminal:
    - Character: vt100, 5250, 3270, DKU,...
    - Graphic: X-Window, Windows, Presentation Manager, Mac,...
    - Media connection: RS-232, RS-422, Twenties, coaxial, Ethernet, Token-Ring, FDDI,.
    - Mode: synchronous or asynchronous,...
  - Printers: laser, serial, parallel or connected directly to the network
  - Communication adapters: number, speed, interfaces
  - Networks:
    - protocols: IPX/SPX, TCP/IP, SNA, DSA, LAT,...
    - wide area network: type, speeds, leased or switched,....
    - local area network: type, speed, connectors,...
  - Subnetwork connectivity:
    - Hubs/switches: number of ports, interfaces
    - modems: bought or leased, speed

    - Bridge: local/distant, between which networks, what bridging protocol is used
    - Router: single/multi-protocol, number of slots, # of plugs, what routing protocol is used
    - Controller: local/distant

- **Logical Components**
  - Host system:
    - Main function: server, gateway, storage,...
    - Operating system: type, version,...
    - Graphic extensions: Windows, X-Window,...
    - OLTP/RDBMS extensions: version, based on which protocol,...
    - Communications extensions: protocols, services, drivers, versions, implementation,...
    - Application: character/graphic, ordinal or client/server
    - Data: where, index,...
    - Files: sequential, access via an extension,...
  - Terminal:
    - Principal function: office applications,...
    - Secondary function: access to a management application,...
    - How does it work: on one display, with different displays,...
  - Communication adapters:
    - Single/multi-protocols, availability of drivers for this new version or this new model,...
  - Networks: mono/multi-protocols, mixed,...
  - Subnetwork connectivity: manageable, filtering, version of micro-code,...
- **Exploitation**
  - Procedure: automatic, semi-automatic, manual,...
  - People: responsibility, availability, number, qualification,...
  - Location: computer room, one or more sites,...

8.2 Integrating Constraints

After listing the existing environment, you can integrate constraints. If you must keep some components (hardware, software,...), you have to check them.

Items listed below will help you to elaborate a better solution. This list is not exclusive, and you can add more items.
Example: You cannot install two more terminals if the line speed is too slow.

- **Recovery**
  - Hardware:
    - Computer, terminal, display, printer, cabling and plugs, networks lines and network equipment
  - Software:
    - Migration or re-compilation, binary or source
    - File and data: size, type (ASCII/EBCDIC)
- **What is the strategy?**
  - Add software on a computer

- Add a component on old equipment
- Choice of one protocol for the backbone
- Choice of one operating system
- Choice of one way to manage equipment
- Cheap/secure/available

- **Automation**
  - With or without operator
  - Ease of starting or to using
  - Skills of people
  - Failure/backup

- **Lines**
  - Quantity of data to transfer
  - Reliability of the means of transmission
  - Length between every room, every place
  - Minimum/maximum speed
  - Frequency of utilization: one time per year or ten times per day

- **Terminals/Workstations**
  - Number to connect
  - Different protocols on the same adapter

- **Network Component**
  - number of slots
  - version

- **availability on the market**
  - products (HW/SW)
  - system engineer
  - users (for the tests)

8.3 Listing Needs

Functional needs have to be known before thinking about communication solution. In fact, in this section, we only talk about communications needs between systems. Most of the time, with a discussion about applications, printing, files, and data, you can describe a communication solution.

With the questions listed below, draw arrows on the generic figure to translate communication needs into information flows.

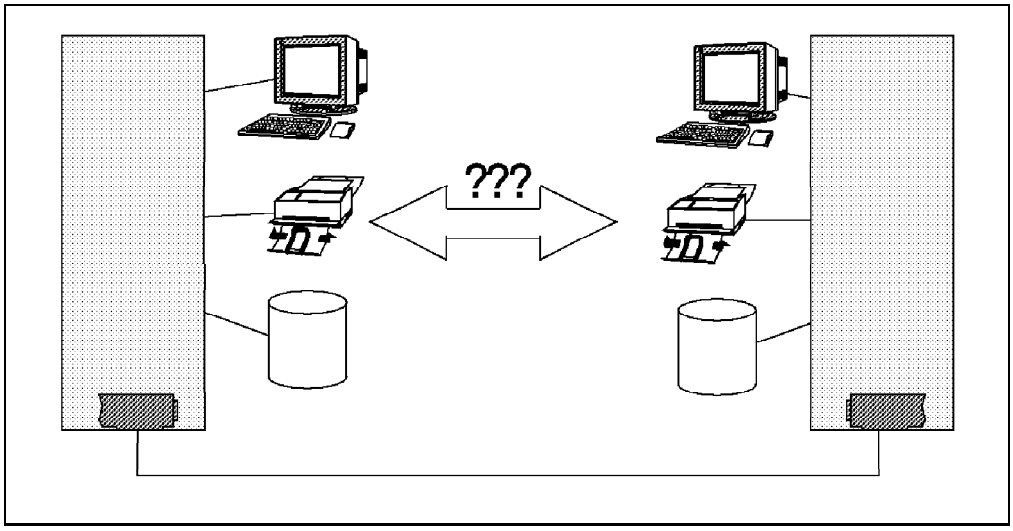


Figure 165. Generic Figure to Summarize Needs (Model to be Completed)

- **Application**
  - Where is the application you need to use located?
  - Which type?
    - Character: vt100, 3270, 5250
    - Graphic: Windows, X-Window
  - Where do you have to use it from?
  - In which type (character or graphic)?
  - How do you have to start it?
- **Printing**
  - Where is the printing application?
  - Where do you have to print?
  - Where do you have to print from?
  - How do you have to print?
- **Files**
  - Where are files to transfer?
  - Toward which disk do you have to transfer them?
  - How do you have to transfer them?
- **Data**
  - Where is the data to use?
  - Where do you have to use it from?
  - How do you have to use it?

This is a simple, generic figure to indicate the communication needs existing between two computers.

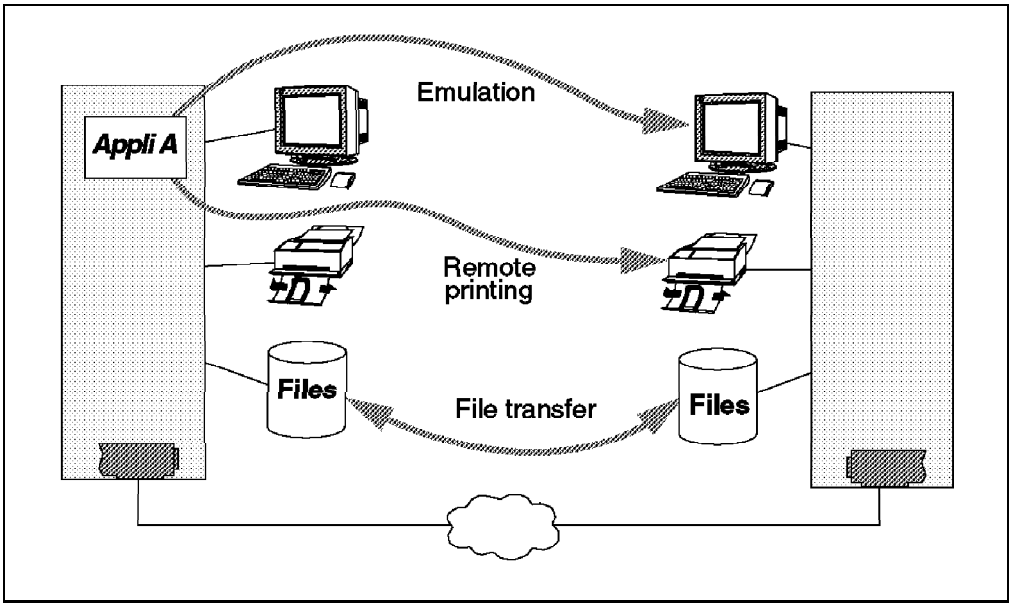


Figure 166. Example of Communication Needs between Two Systems

8.4 Back to the Future!

A knowledge of the following points is necessary in order to elaborate a communication solution:

- General concepts
- Hardware and software offerings
- Existing constraints and needs

But such a solution without a projection into the future could generate a very expensive solution that is not flexible or upgradable!

The items listed below can help you to anticipate a better solution or, perhaps, the best solution!

- **Increase**
  - Number of workstations, size of files, size of databases, number of locations to connect
  - Speed of communications networks
- **Costs**
  - Increase speed network or install a new system?
  - Licence: price per number of users or fixed price?
  - Installation of a new system: linear or exponential increase?
- **Evolution easiness**
  - Cabling (extension, new technology)
  - For a new system: can we duplicate previous choice?
  - Integration of a new company: integration easiness?
  - Integration of a new system (router, bridge, computer)
  - Communication architecture and products will have to change if hardware architecture changes?
- **Durability**

- Software and hardware
- Companies

Chapter 9. Single-Platform Communication Solutions

We call “Single Platform Solutions” a communication solution between only two platforms, in this case between one RS/6000 and one other platform.

This chapter contains very little text. Its purpose is to provide informational tables and graphics that outline a broad spectrum of single-platform communication solutions. In order to determine the location of a specific table and graphical depiction for a particular product or environment, please consult the Table of Contents, Table List, or Figure List in this redbook. The next chapter contains more complex examples.

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

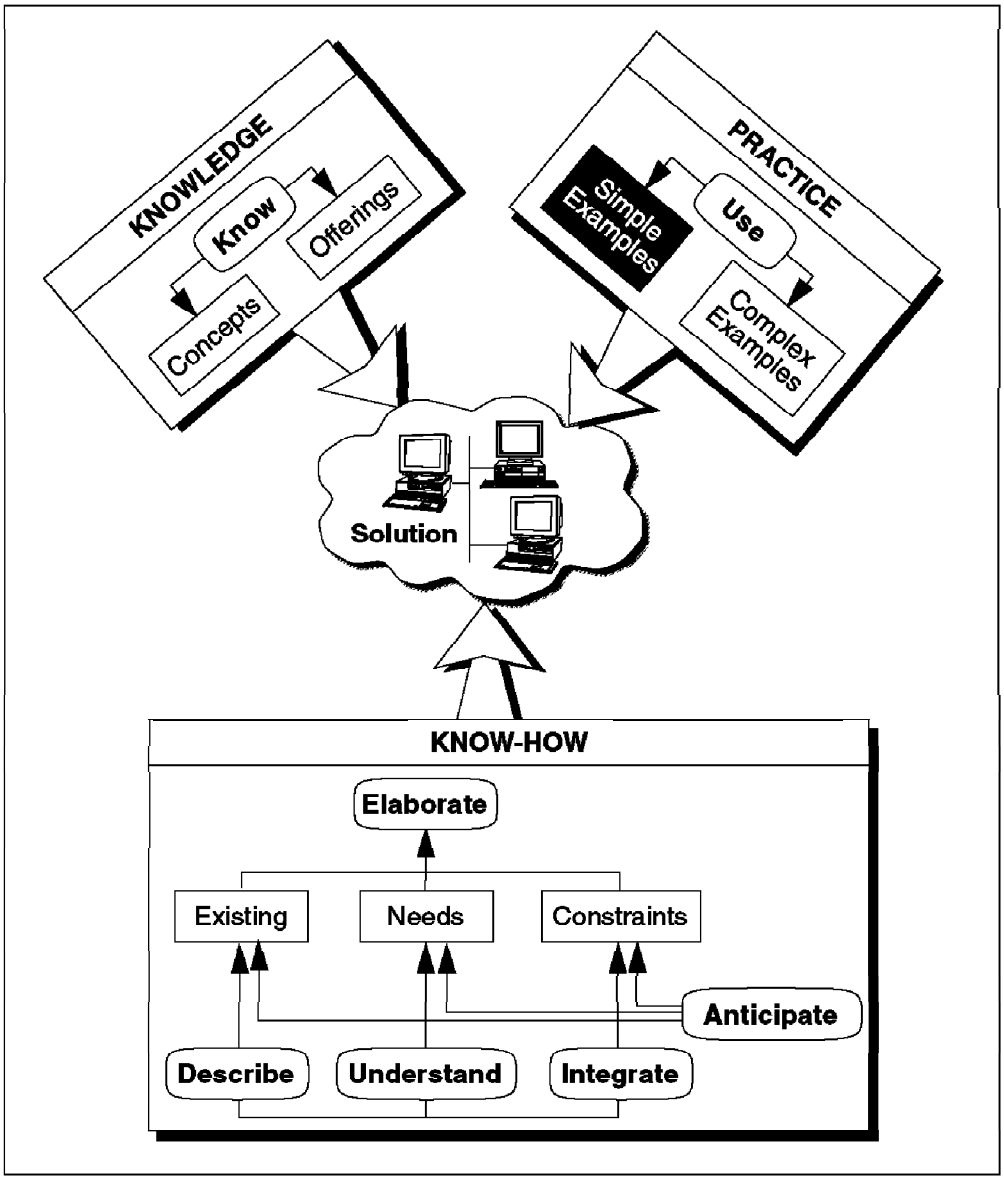


Figure 167. Position of Chapter 9 in Solution Design

9.1 Introduction

Before reading this chapter, you should know how and where to find most of the information you need.

In Chapter 1, we defined the terminology used in communication solutions.

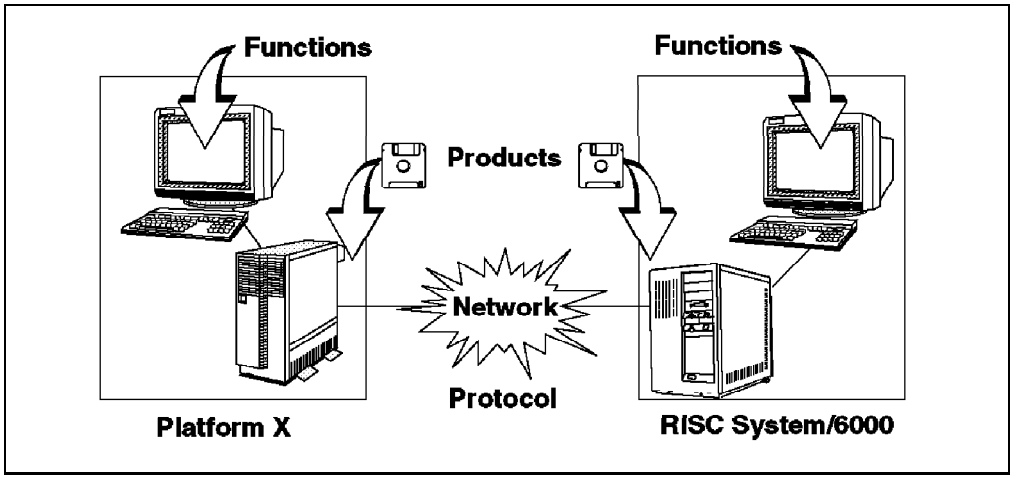


Figure 168. Terminology Used in Communication Solutions

When you are designing a solution and *Platform X* is connected to an RS/6000, you have to choose the right *Network*, *Protocol*, and *Products* to provide the desired *Functions*.

To make reading easier—and because paper has only two dimensions—we split this chapter this way:

- Each section (9.x) deals with one platform: RS/6000, UNIX, AS/400, S/390, PC, Asynchronous devices,....
- The first subsection (9.x.1) summarizes the capabilities of connection between Platform X and the RS/6000 with all protocols.
- The next subsection (9.x.y) deals with one protocol: TCP/IP, SNA, OSI,....
- The last subsection (9.x.y.z) deals with one network: token-ring, Ethernet, X.25, SDLC,....

Sometimes, in fact, you cannot choose a protocol because you must use the existing one, or you have to implement a certain product because somebody decided to use it everywhere....

The best way to decide upon a course of action would be to use a matrix in five dimensions, where the five dimensions would be: Platform, Network, Protocol, Products, and Functions. The intersection of the five dimensions would be the solution.

In each section of Chapter 9, you will see that:

- A *table*, like the following one, summarizes hardware features and software products to provide functions (C: client or S: server) between the platforms.

Table 135. RS/6000 and Platform X: Hardware, Software and Functions

		RS/6000	Platform X
Hardware		- Feature 1 - Feature 2 - ...	- Feature 3 - Feature 4 - ...
Software		- Software 1 - Software 2 - ...	- Software 3 - Software 4 - ...
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Function 1 (client/server) - Function 2 (/server) - ... - - - - - - - - -	- Function 3 (client/server) - Function 4 (client/) - ... - - - - - - - - -

- The table is followed by *remarks*, when necessary.
- A *logical view* of communication between the RS/6000 and Platform X follows.

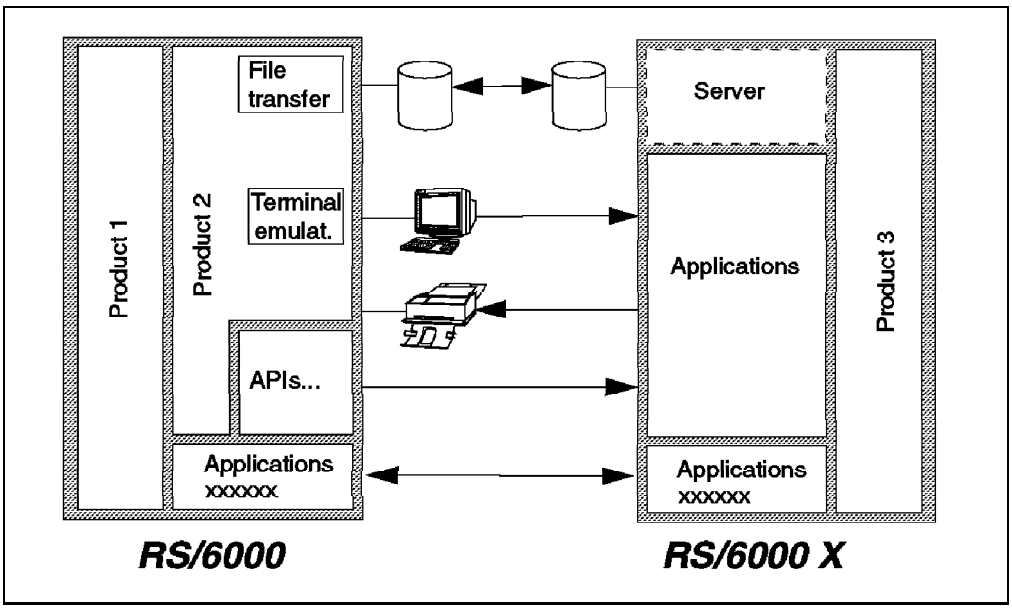


Figure 169. RS/6000 and Platform X - Protocol Y- Network Z: Logical View

- Then comes a *physical view* of the RS/6000 to Platform X connection.

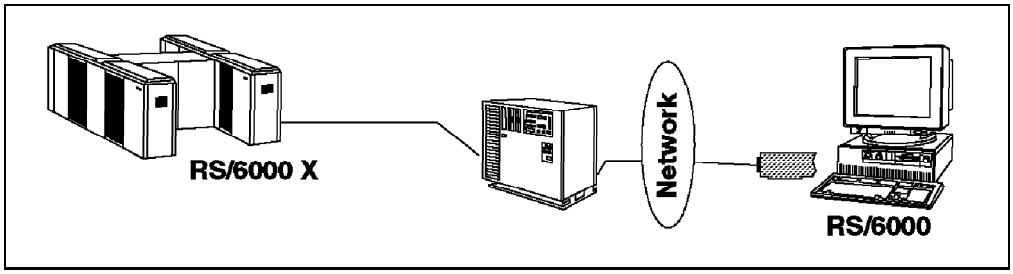


Figure 170. RS/6000 and Platform X - Protocol Y- Network Z: Physical View

9.2 RS/6000 and RS/6000

The investigation of single-platform connectivity begins here. Some of the things you should know about this type of connectivity are as follows:

- The common way to connect two RS/6000 together is to use TCP/IP (provided with AIX)!
- You can also use SNA (Communications Server for AIX), but it's not very convenient (no applications).
- Now, OSI is supported by OEM products.
- If you have no money to buy two Ethernet adapters, you may use an asynchronous connection!

9.2.1 Abstract

Table 136. RS/6000 and RS/6000 Communications Abstract

RS/6000 / RS/6000	TCP/IP	SNA	OSI	Asynchro-nous
Asynchronous	SLIP/PPP			
Token-Ring				
FDDI				
Ethernet				
X.25				
Synchronous				
Coaxial				
S/370 Channel				
ESCON				
BLKMUX				
Fibre Channel				
ATM				
HIPPI				
SOCC				
Twinax				

Remark

- Use SLIP/PPP when TCP/IP is used on an asynchronous line.

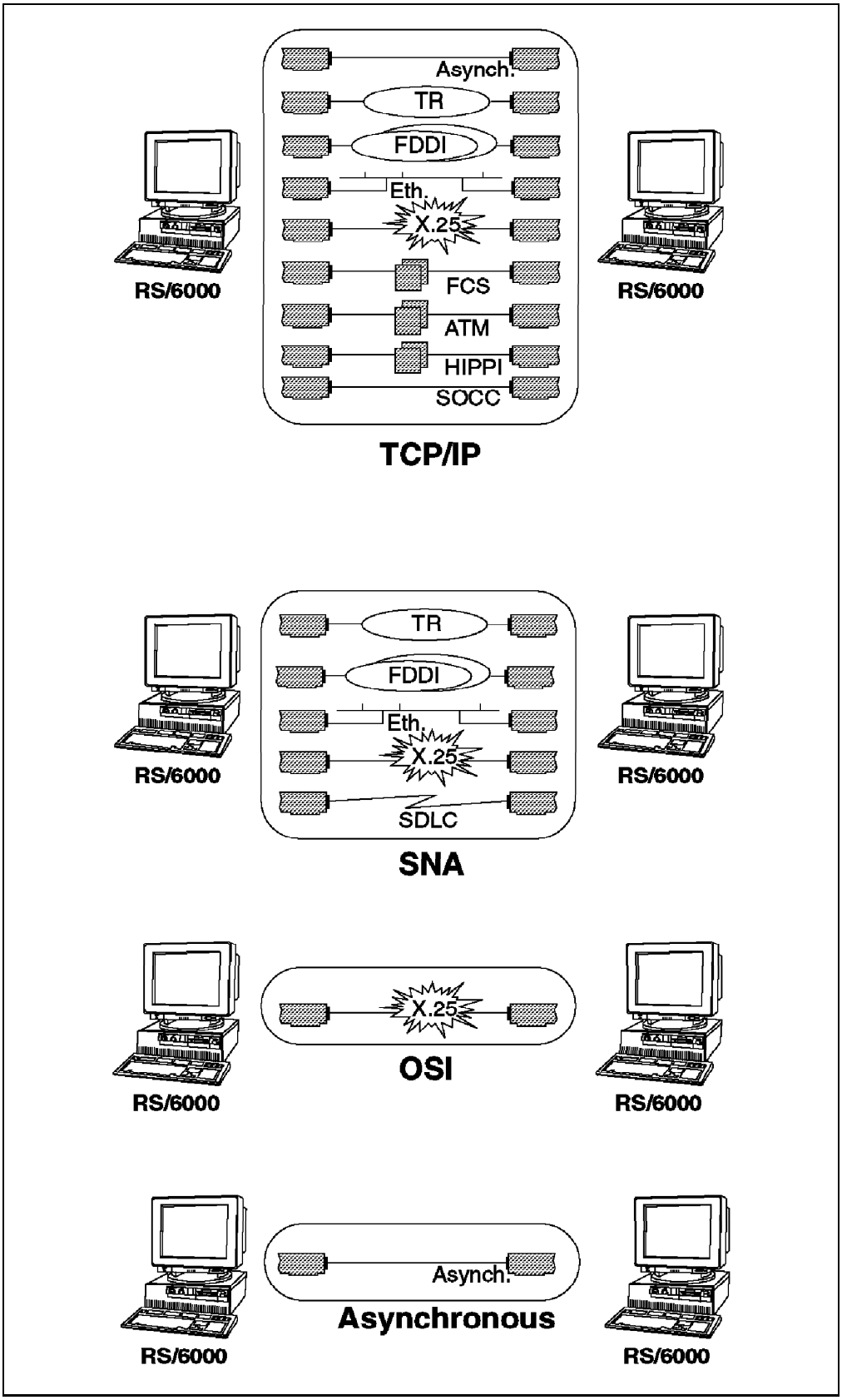


Figure 171. RS/6000 and RS/6000 Abstract

9.2.2 TCP/IP

9.2.2.1 Asynchronous Network

Table 137. RS/6000 and RS/6000 - TCP/IP - Asynchronous: Abstract

		RS/6000	RS/6000
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)
Software		- AIX V4 (TCP/IP, SLIP and PPP included)	- AIX V4 (TCP/IP, SLIP and PPP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Use PPP rather SLIP. It's faster and more economical in terms of packets.

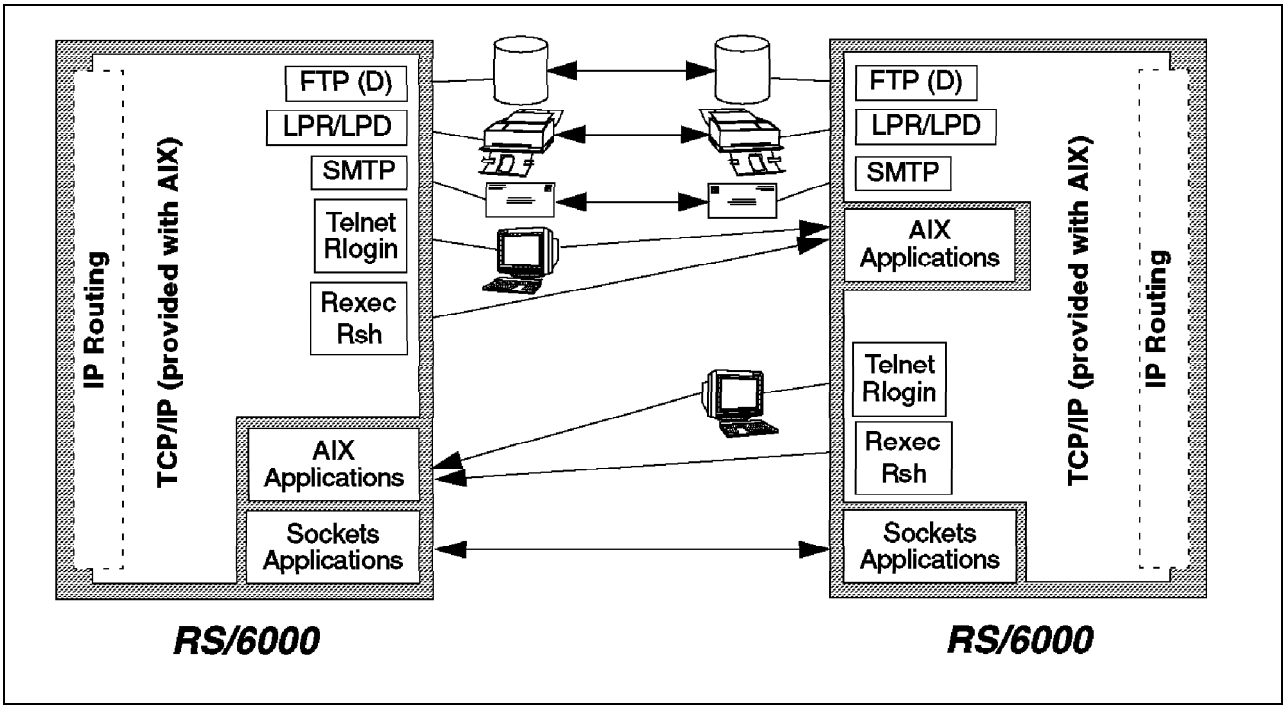


Figure 172. RS/6000 and RS/6000 - TCP/IP - Asynchronous: Logical View

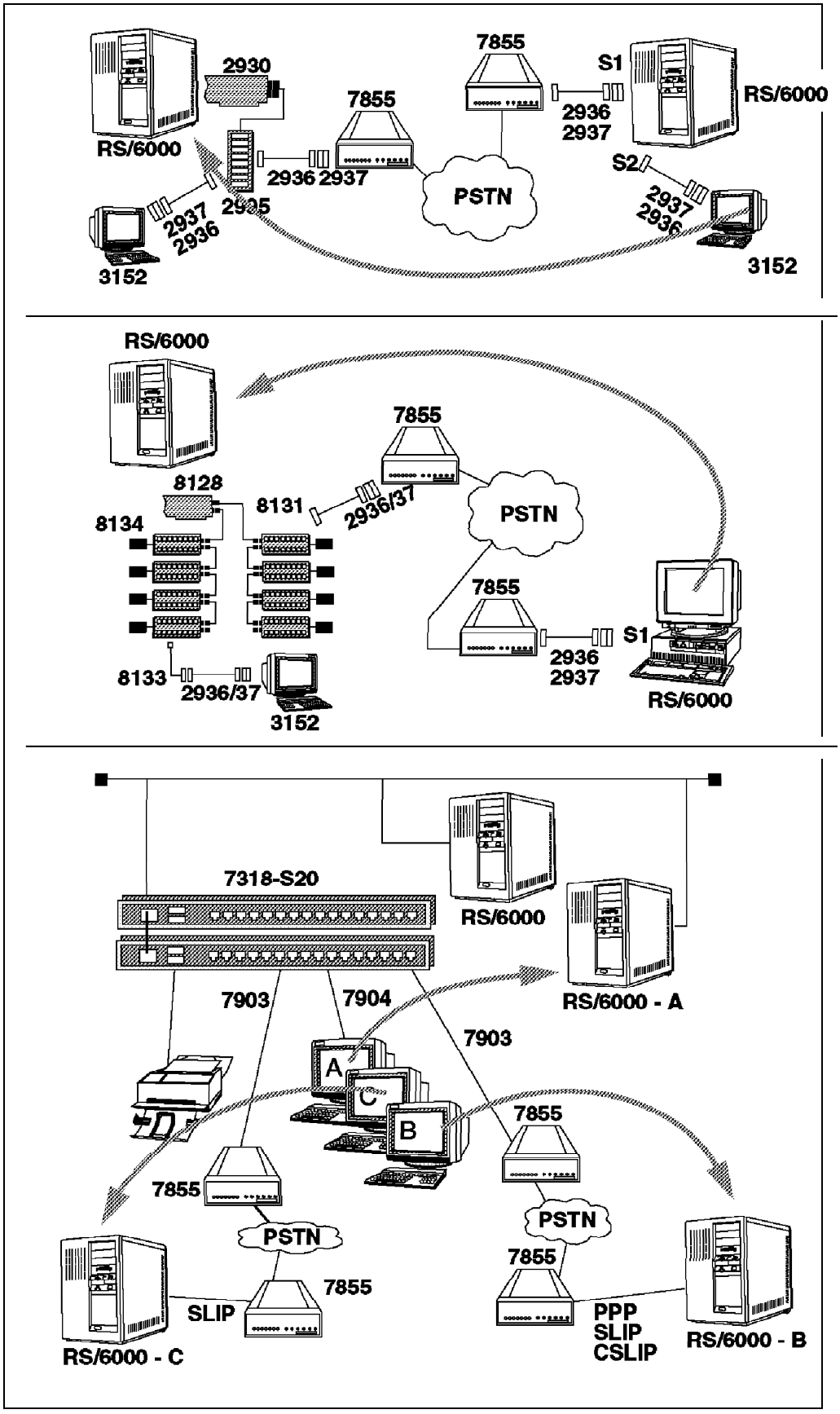


Figure 173. RS/6000 and RS/6000 - TCP/IP - Asynchronous: Physical View

9.2.2.2 Token-Ring Network

Table 138. RS/6000 and RS/6000 - TCP/IP - Token-Ring: Abstract

		RS/6000	RS/6000
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044
Software		- AIX V4 (TCP/IP included)	- AIX V4 (TCP/IP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- The most frequently used at IBM locations.

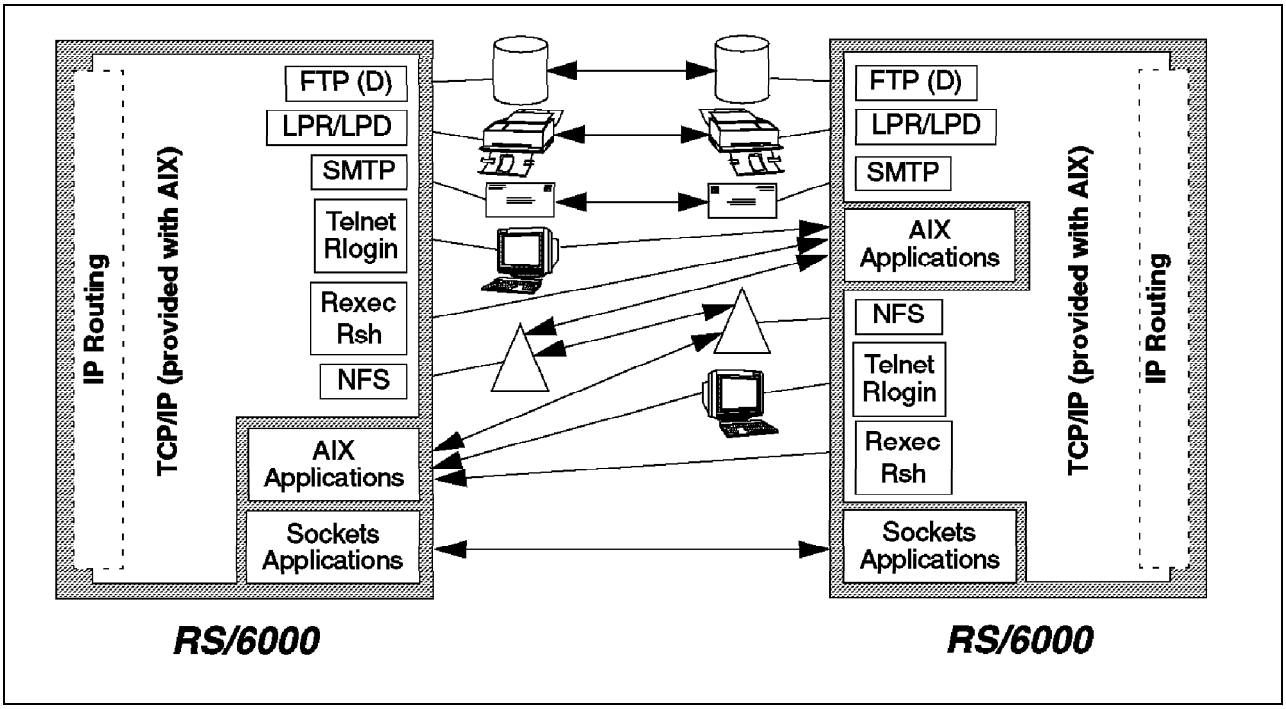


Figure 174. RS/6000 and RS/6000 - TCP/IP - Token-Ring: Logical View

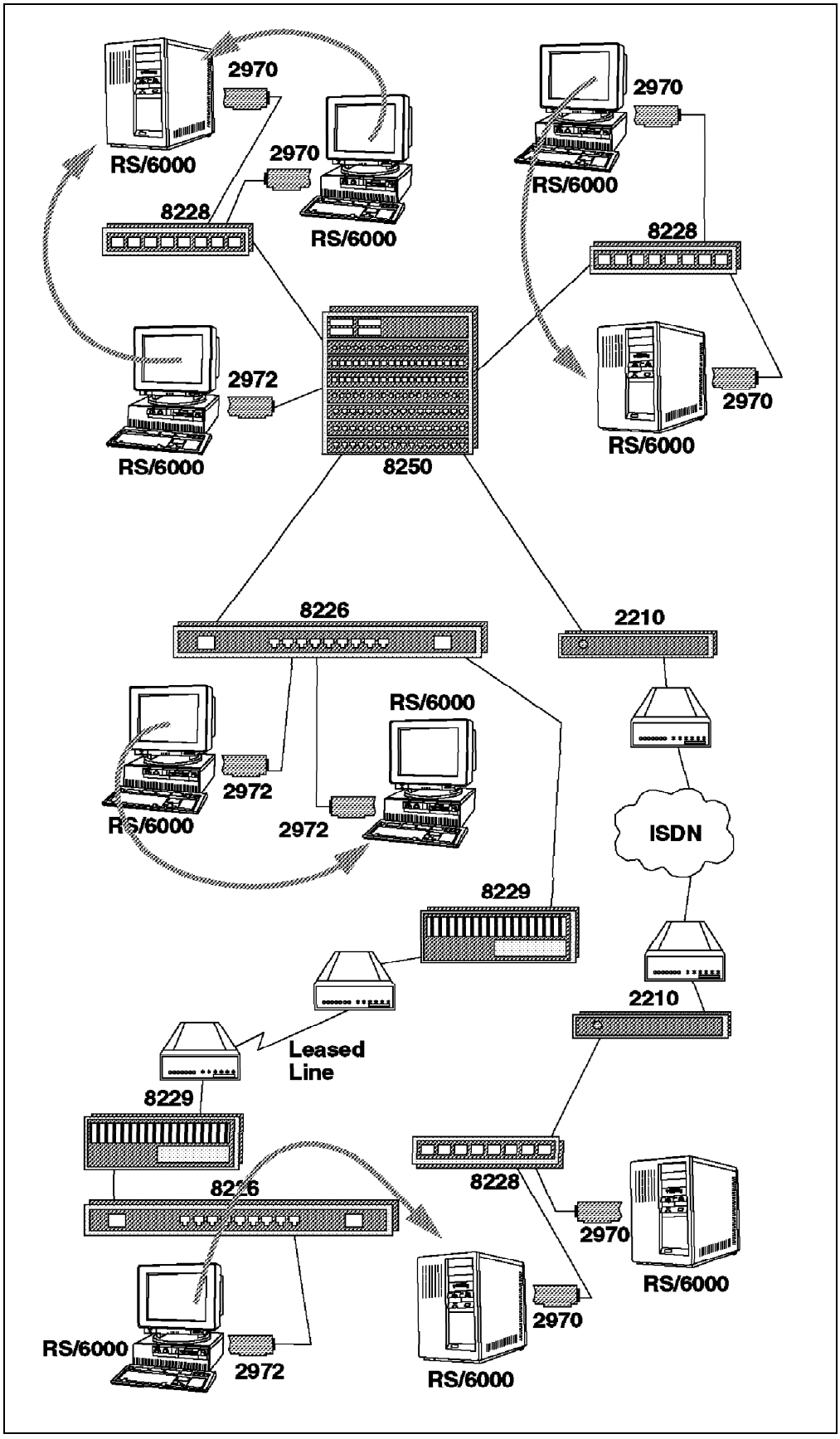


Figure 175. RS/6000 and RS/6000 - TCP/IP - Token-Ring: Physical View

9.2.2.3 FDDI Network

Table 139. RS/6000 and RS/6000 - TCP/IP - FDDI: Abstract

		RS/6000	RS/6000
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- 2725/2726 - 2720/2722 - 2724/2723
Software		- AIX V4 (TCP/IP included)	- AIX V4 (TCP/IP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- FDDI drivers are provided with AIX V4.1 or V4.2.

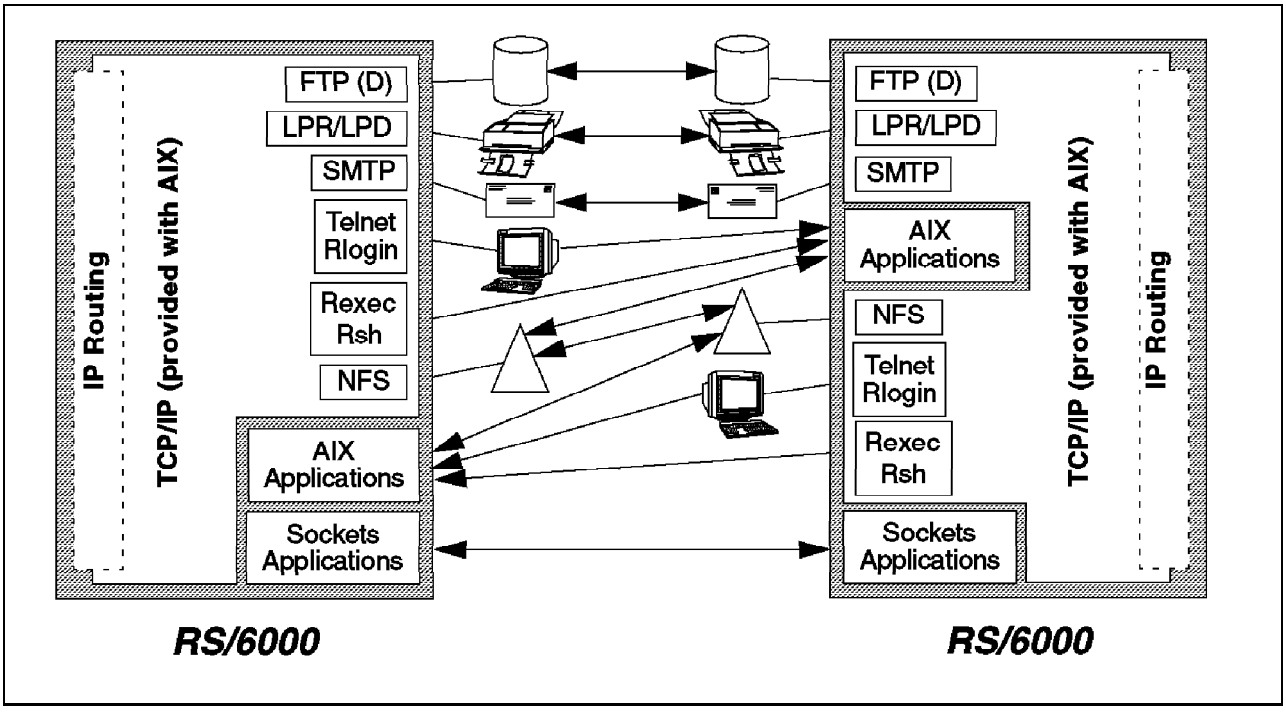


Figure 176. RS/6000 and RS/6000 - TCP/IP - FDDI: Logical View

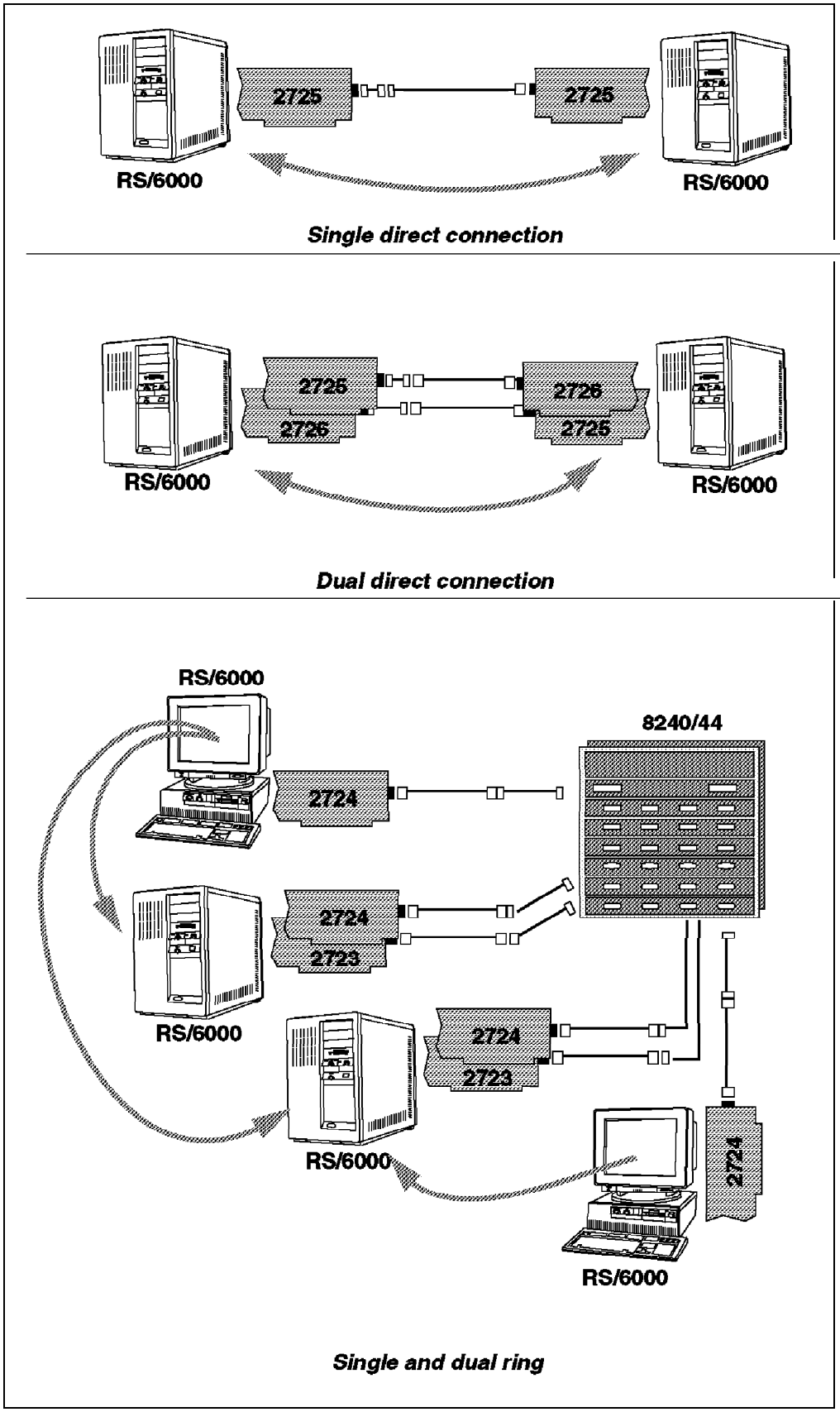


Figure 177. RS/6000 and RS/6000 - TCP/IP - FDDI: Physical View

9.2.2.4 Ethernet Network

Table 140. RS/6000 and RS/6000 - TCP/IP - Ethernet: abstract

		RS/6000	RS/6000
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)
Software		- AIX V4 (TCP/IP included)	- AIX V4 (TCP/IP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- The natural connection between two RS/6000s!

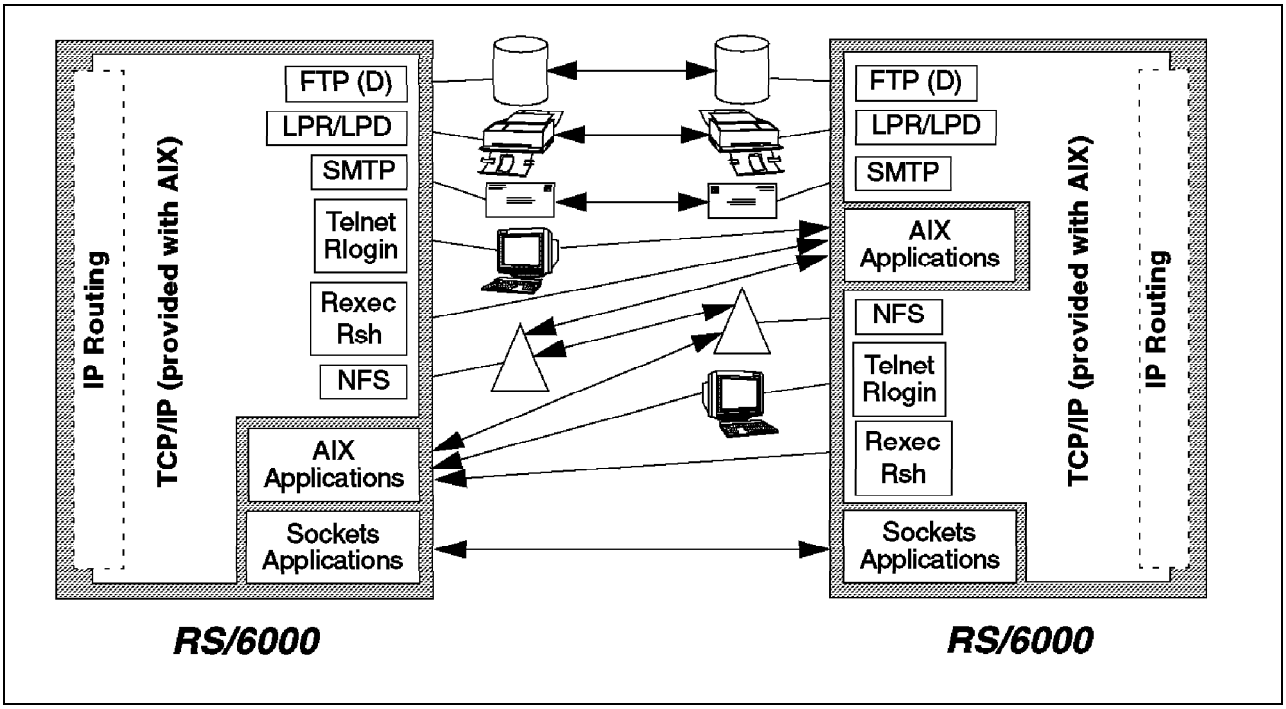


Figure 178. RS/6000 and RS/6000 - TCP/IP - Ethernet: Logical View

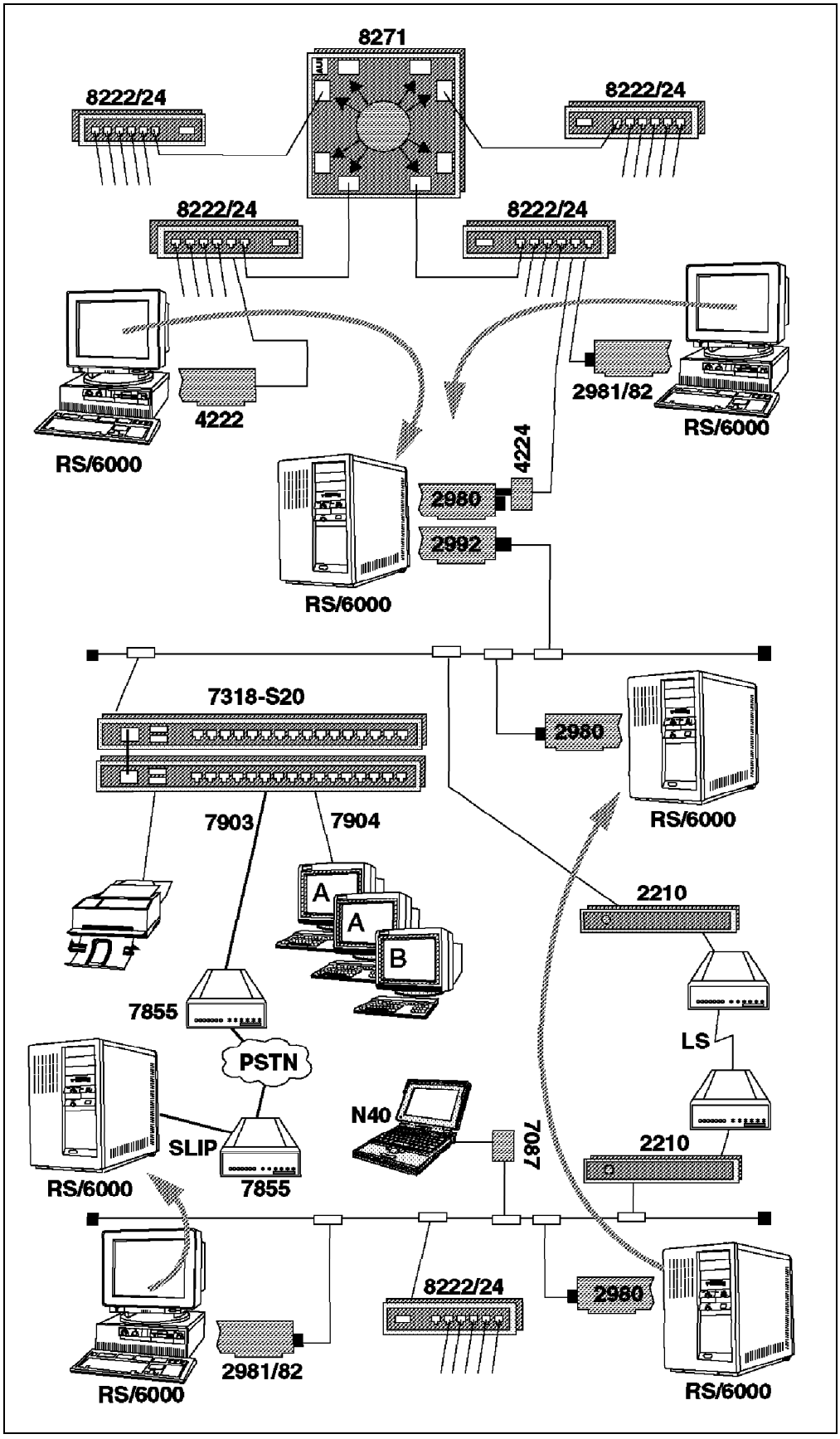


Figure 179. RS/6000 and RS/6000 - TCP/IP - Ethernet: Physical View

9.2.2.5 X.25 Network

Table 141. RS/6000 and RS/6000 - TCP/IP - X.25: Abstract

		RS/6000	RS/6000
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)
Software		- AIX V4 (TCP/IP included) - AIXLink/X.25 V1.1	- AIX V4 (TCP/IP included) - AIXLink/X.25 V1.1
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This configuration is not optimum for Telnet connections!
- In fact, X.25 packets transported on TCP/IP packets generate a lot of overflow. So, it's very nice to use some product (such as ECO-PAD) to compress this kind of communication. See the OEM software offerings for AIX V4 section to find out more information on this product.

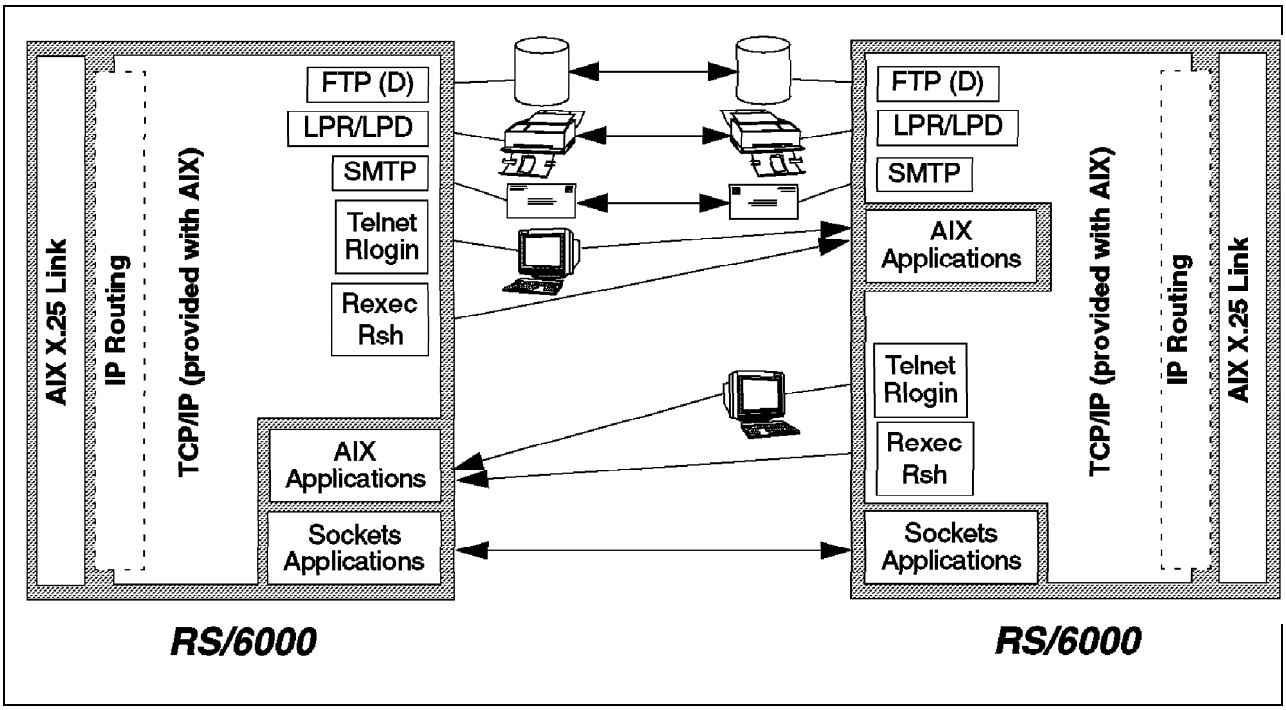


Figure 180. RS/6000 and RS/6000 - TCP/IP - X.25: Logical View

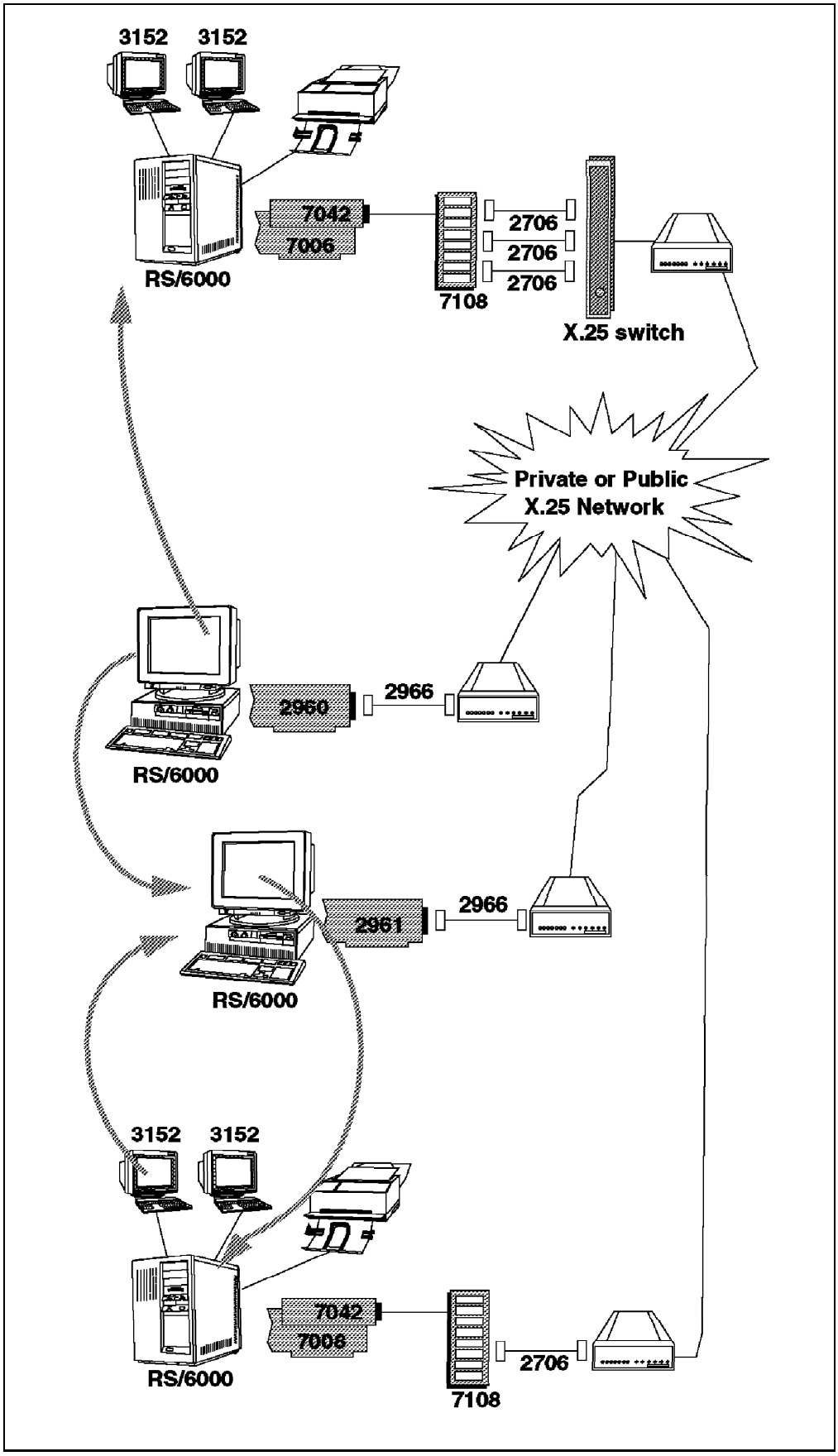


Figure 181. RS/6000 and RS/6000 - TCP/IP - X.25: Physical View

9.2.2.6 Fibre Channel Network

Table 142. RS/6000 and RS/6000 - TCP/IP - Fibre Channel: Abstract

		RS/6000	RS/6000
Hardware		- 1904 +1902 - 1906	- 1904 +1902 - 1906
Software		- AIX V4 (TCP/IP included)	- AIX V4 (TCP/IP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- You can use this connection instead of a Serial Optical Connection.
- This adapter supports a link rate of 1063 Mbps.

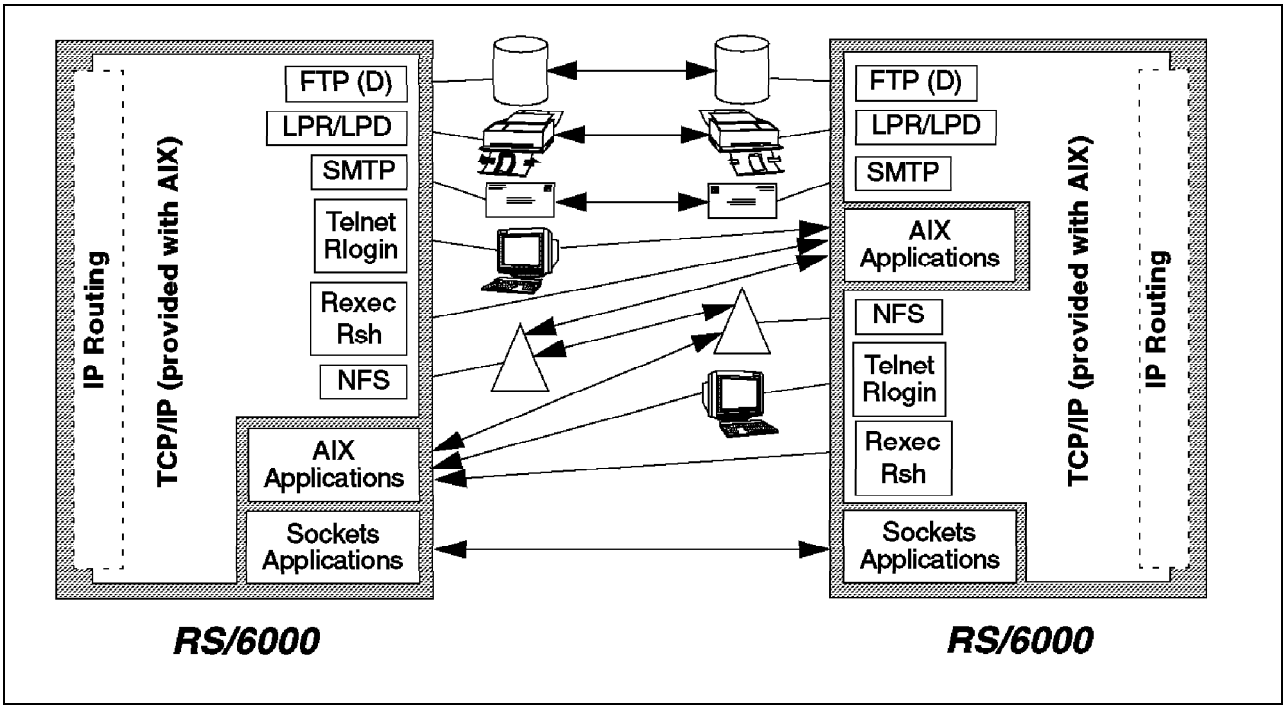


Figure 182. RS/6000 and RS/6000 - TCP/IP - Fibre Channel: Logical View

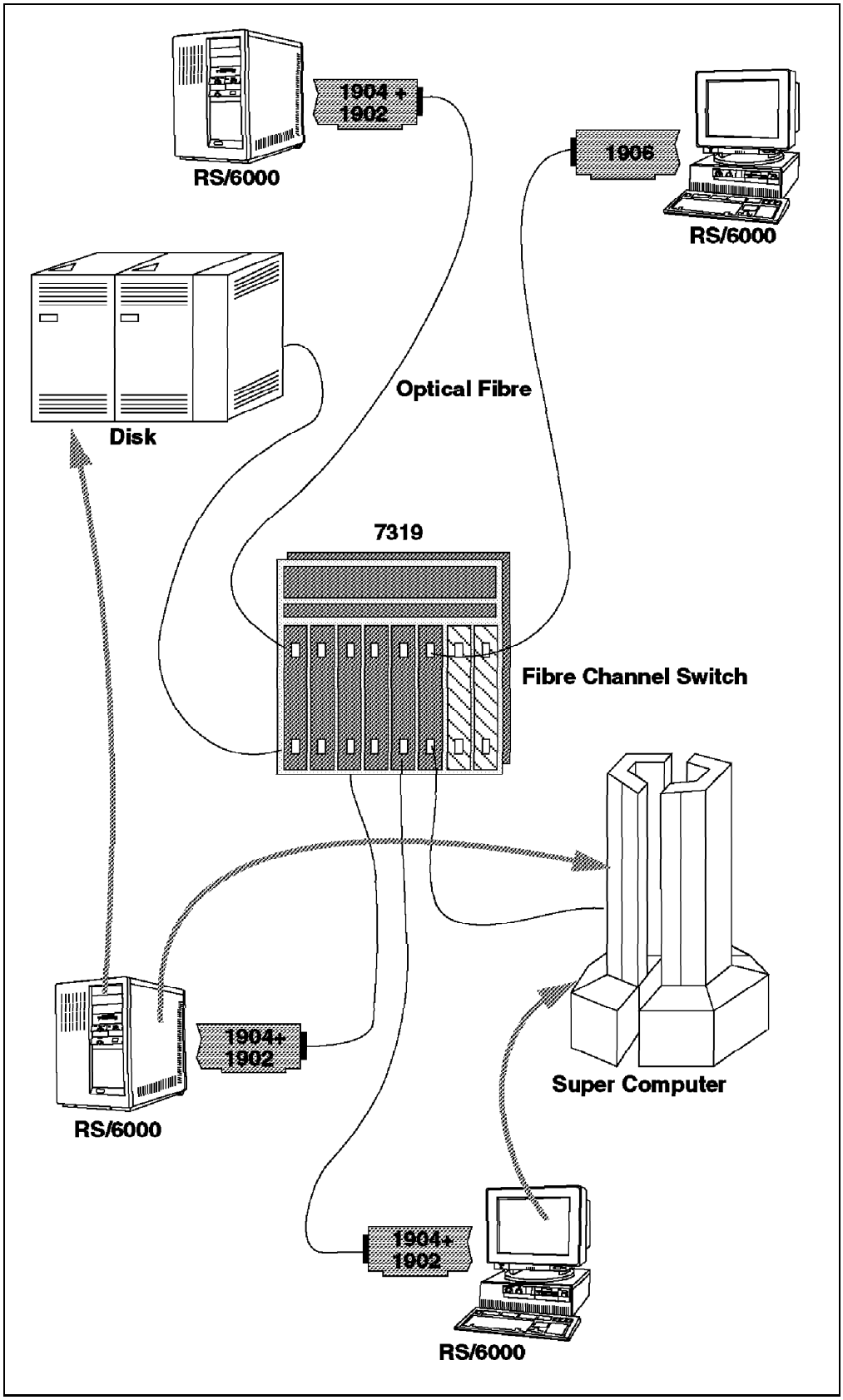


Figure 183. RS/6000 and RS/6000 - TCP/IP - Fibre Channel: Physical View

9.2.2.7 ATM Network

Table 143. RS/6000 and RS/6000 - TCP/IP - ATM: Abstract

		RS/6000	RS/6000
Hardware		- 2984 - 2989	- 2984 - 2989
Software		- AIX V4 (TCP/IP included)	- AIX V4 (TCP/IP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- ATM drivers are provided with AIX V4.1 or V4.2.
- You can use this connection instead of a Serial Optical Connection.

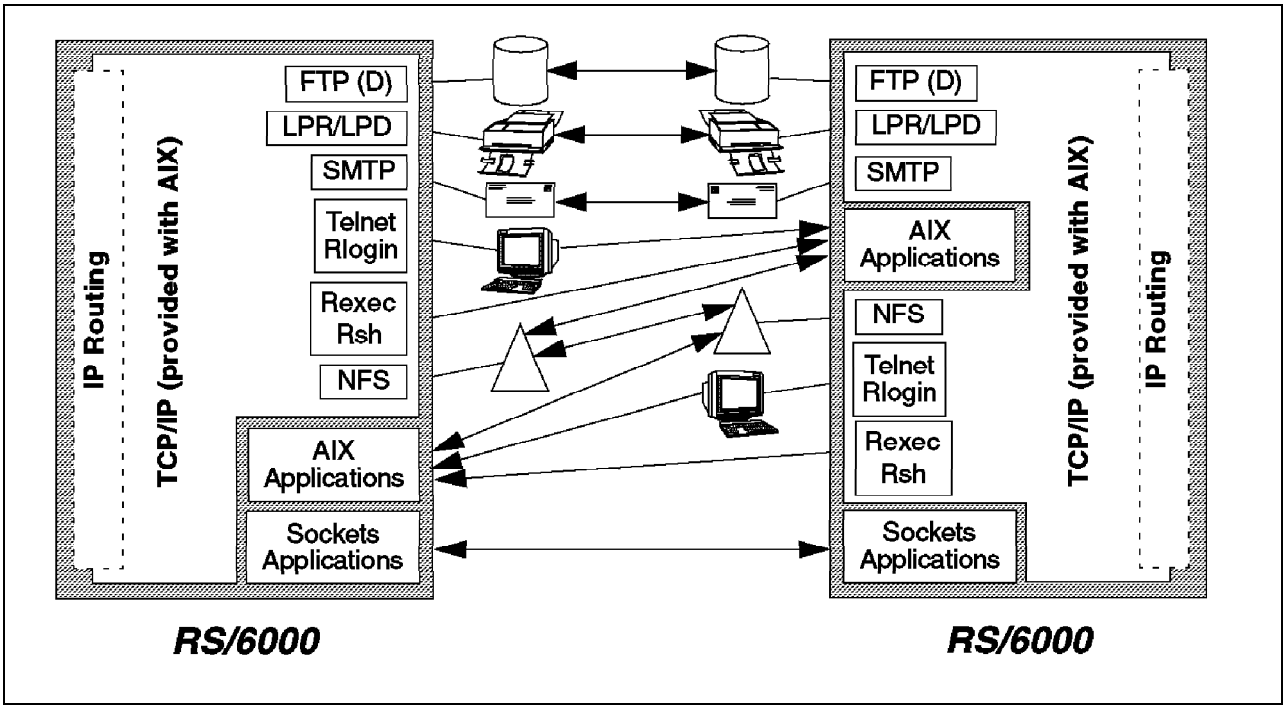


Figure 184. RS/6000 and RS/6000 - TCP/IP - ATM: Logical View

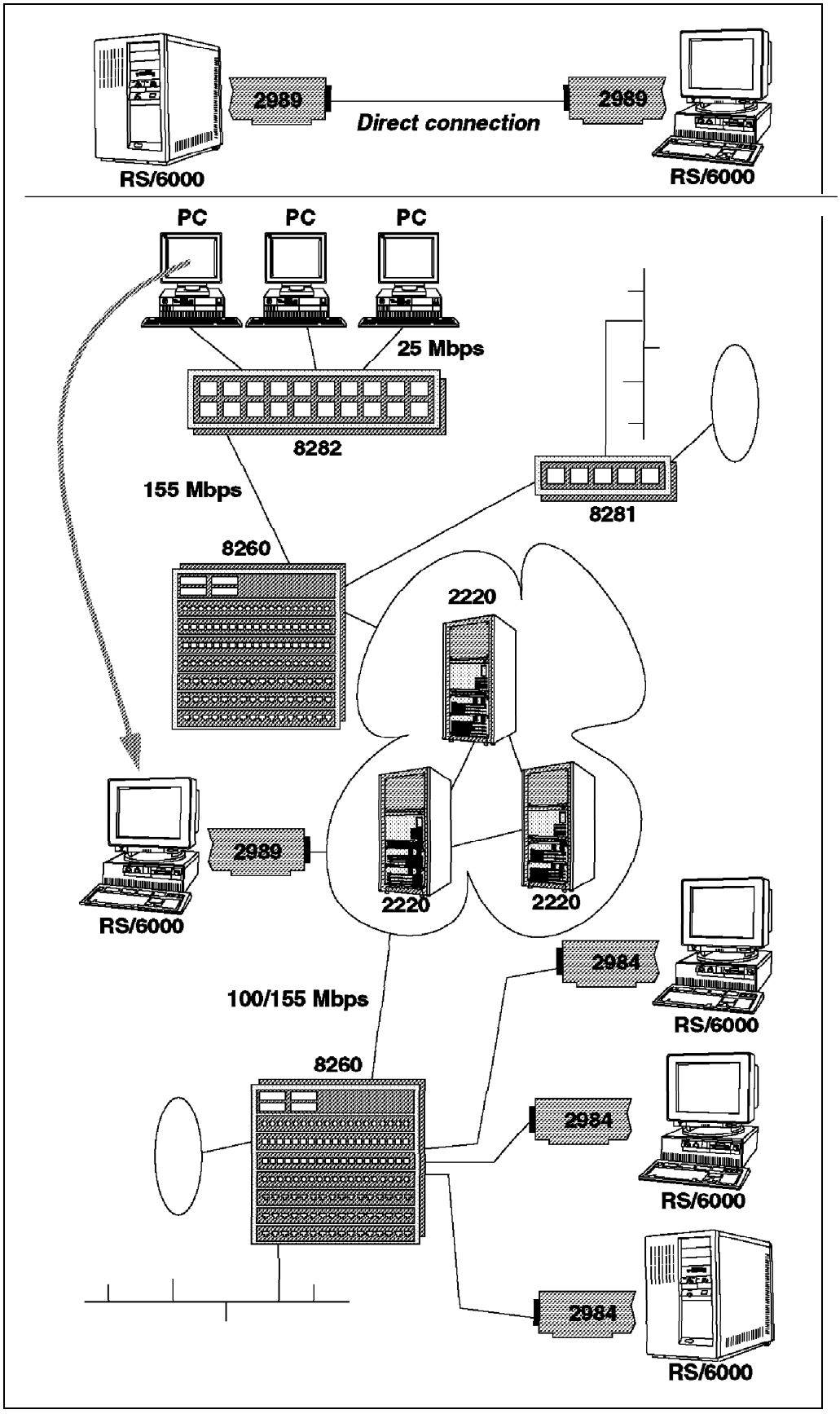


Figure 185. RS/6000 and RS/6000 - TCP/IP - ATM: Physical View

9.2.2.8 HIPPI Network

Table 144. RS/6000 and RS/6000 - TCP/IP - HIPPI: Abstract

		RS/6000	RS/6000
Hardware		- 2735	- 2735
Software		- AIX V4 (TCP/IP included) - HIPPI Interface 4.1	- AIX V4 (TCP/IP included) - HIPPI Interface 4.1
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This HIPPI adapter requires THE High Performance Parallel Interface 4.1 (5765-551) LPP, ordered separately.

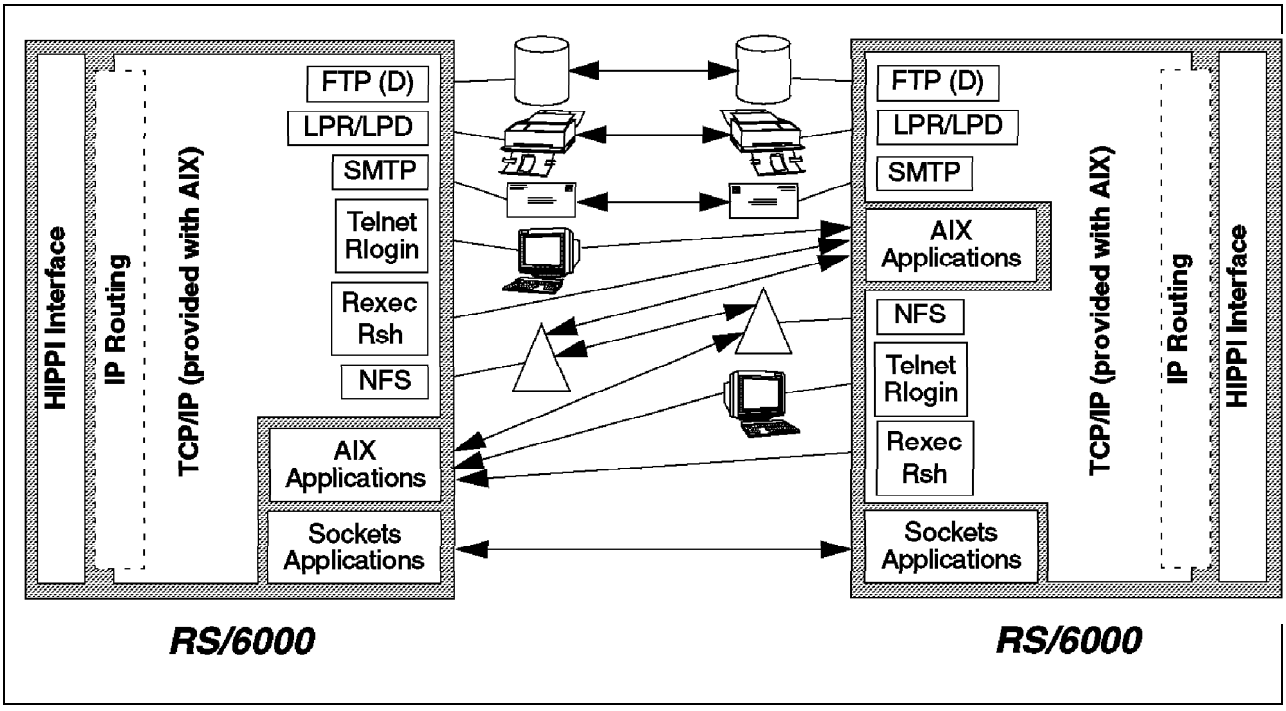


Figure 186. RS/6000 and RS/6000 - TCP/IP - HIPPI: Logical View

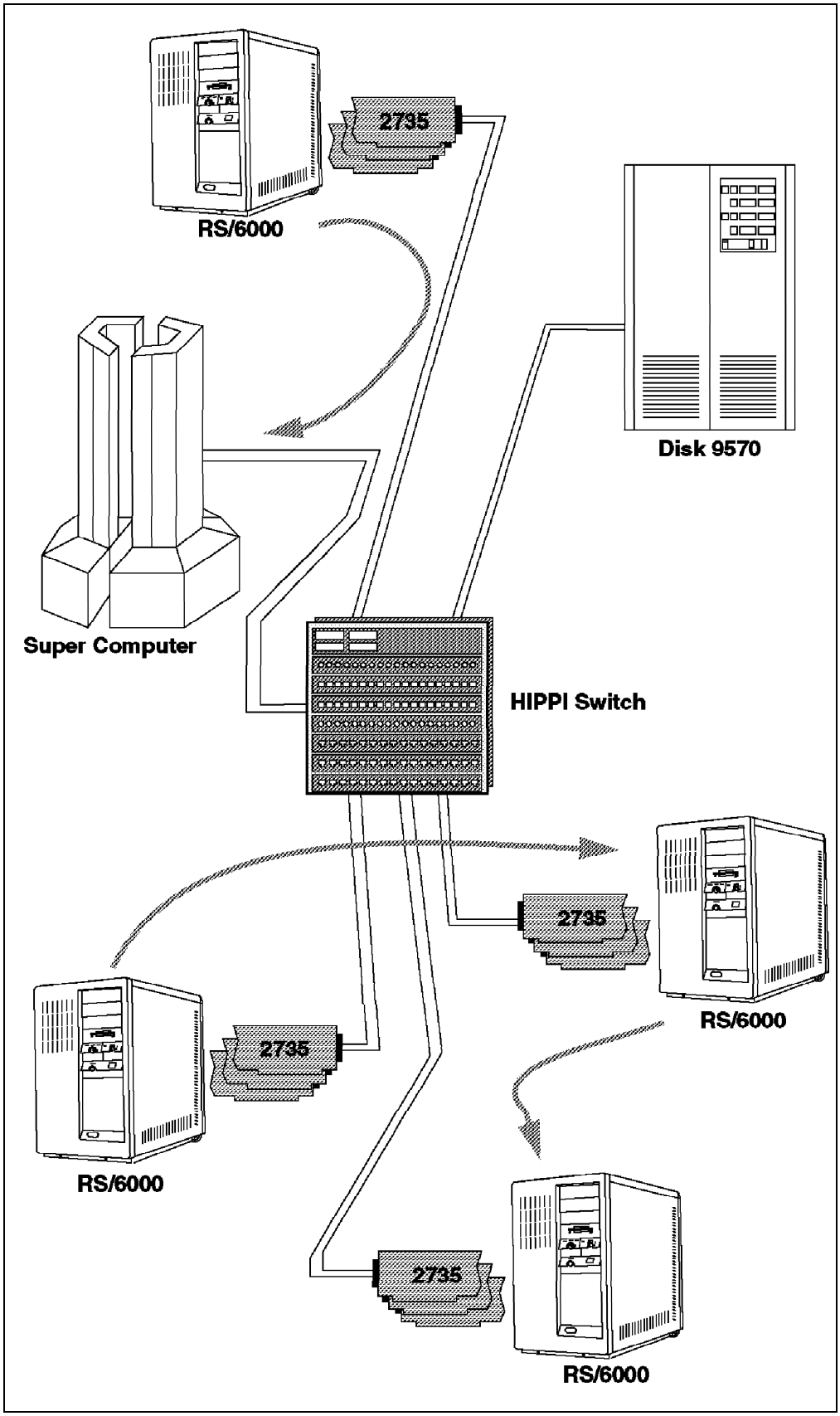


Figure 187. RS/6000 and RS/6000 - TCP/IP - HIPPI: Physical View

9.2.2.9 SOCC Network

Table 145. RS/6000 and RS/6000 - TCP/IP - SOCC: Abstract

		RS/6000	RS/6000
Hardware		- 2860	- 2860
Software		- AIX V4 (TCP/IP included)	- AIX V4 (TCP/IP included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),... - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S) - FTP (C/S), TFTP (C/S) - NFS (C/S) - LPR/LPD (C/S) - Rexec (C/S), Rcp (C/S), Rsh (C/S),..., - RPC (C/S), NCS (C/S), Sockets (C/S) - SMTP (C/S) - Kerberos (C/S) - X-Window (C/S) - Domain Name Server (R/S) - SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This adapter is withdrawn; use ATM or Fibre Channel adapters instead.

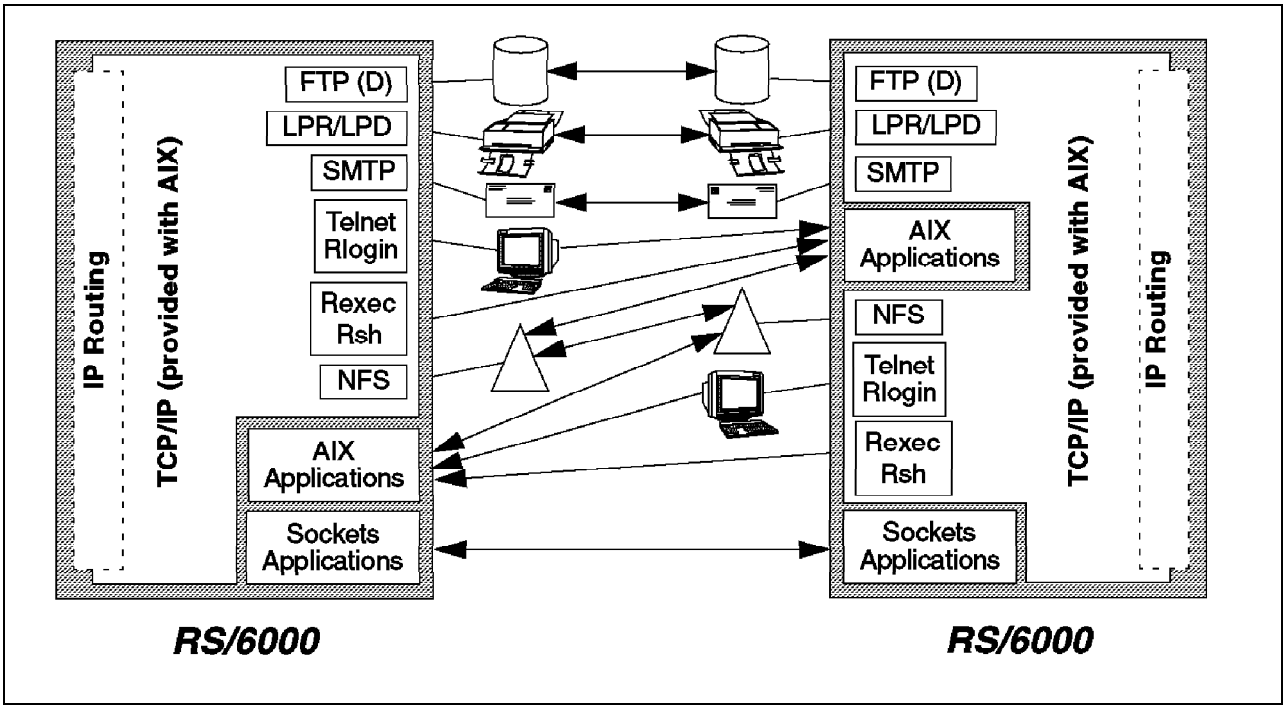


Figure 188. RS/6000 and RS/6000 - TCP/IP - SOCC: Logical View

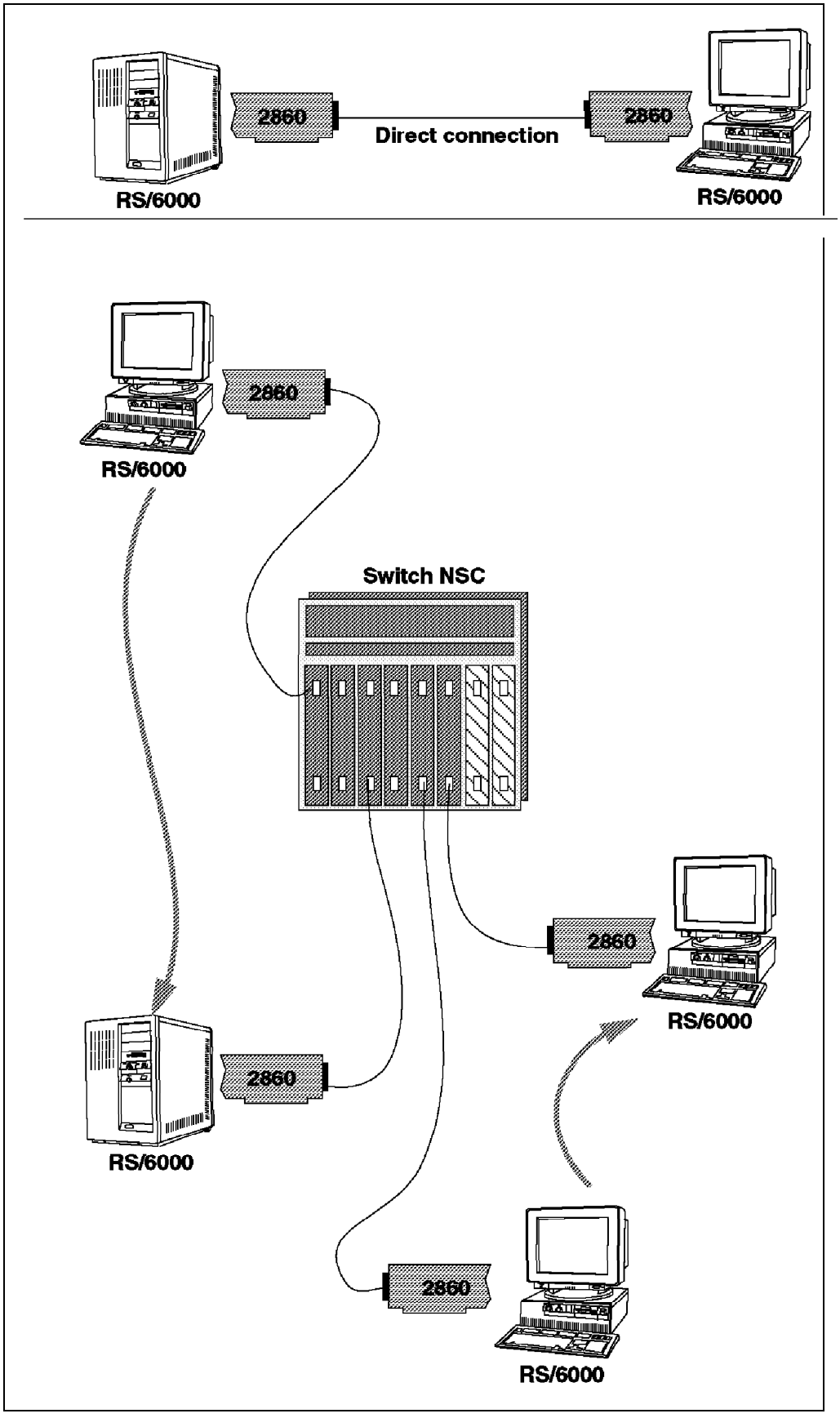


Figure 189. RS/6000 and RS/6000 - TCP/IP - SOCC: Physical View

9.2.3 SNA

9.2.3.1 Token-Ring Network

Table 146. RS/6000 and RS/6000 - SNA - Token-Ring: Abstract

		RS/6000	RS/6000
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for AIX V4.0 (AnyNet and Gateway included)
Functions	- emulation	-	-
	- file transfer	- APPC Applications Suite	- APPC Applications Suite
	- file sharing	-	-
	- print sharing	-	-
	- remote command	- APPC Applications Suite	- APPC Applications Suite
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used this way very often.

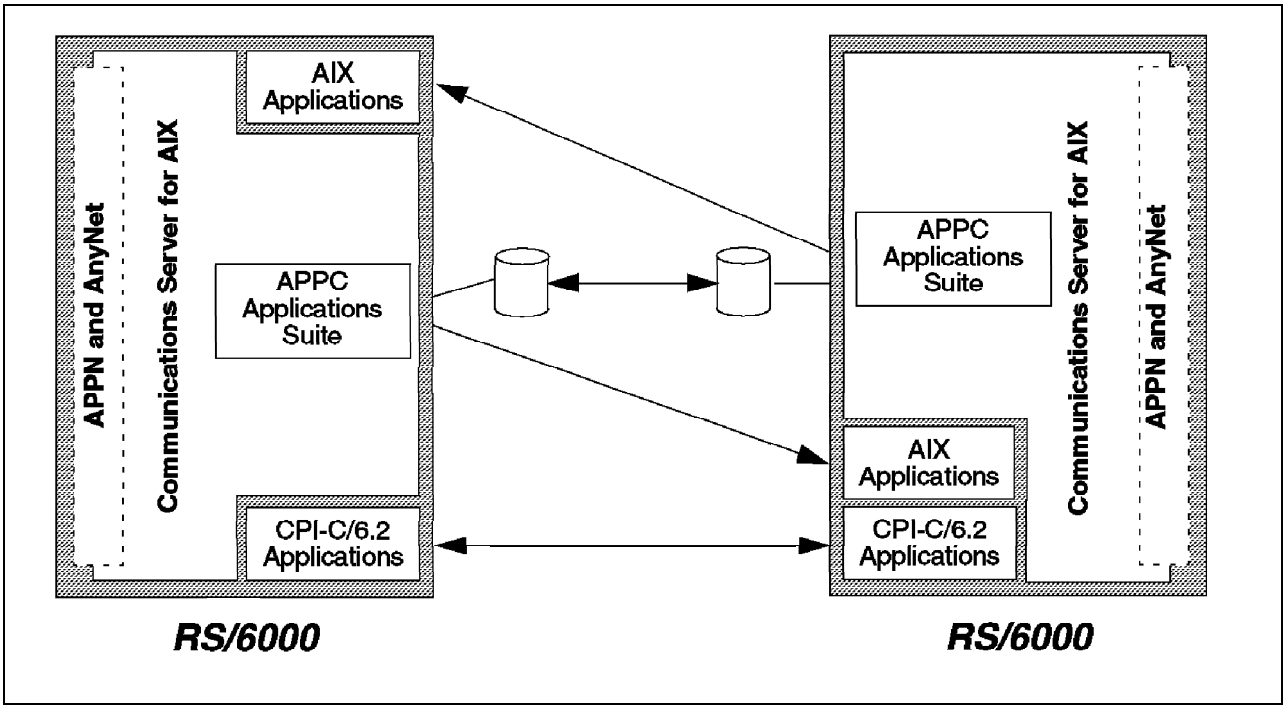


Figure 190. RS/6000 and RS/6000 - SNA - Token-Ring: Logical View

9.2.3.2 FDDI Network

Table 147. RS/6000 and RS/6000 - SNA - FDDI: Abstract

		RS/6000	RS/6000
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- 2725/2726 - 2720/2722 - 2724/2723
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for AIX V4.0 (AnyNet and Gateway included)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- - APPC Applications Suite - - - APPC Applications Suite - LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C) - - - - - APPN (EN, NN) and AnyNet	- - APPC Applications Suite - - - APPC Applications Suite - LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C) - - - - - APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used this way very often.

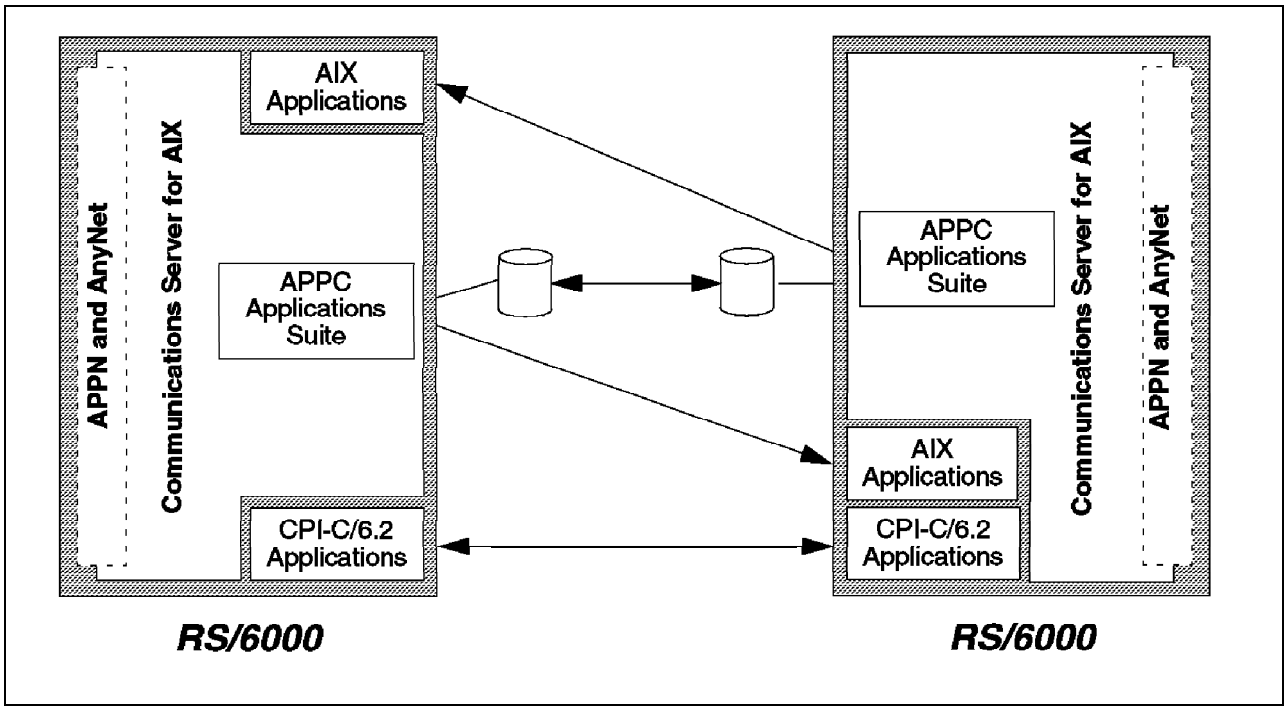


Figure 191. RS/6000 and RS/6000 - SNA - FDDI: Logical View

9.2.3.3 Ethernet Network

Table 148. RS/6000 and RS/6000 - SNA - Ethernet: Abstract

		RS/6000	RS/6000
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for AIX V4.0 (AnyNet and Gateway included)
Functions	- emulation	-	-
	- file transfer	- APPC Applications Suite	- APPC Applications Suite
	- file sharing	-	-
	- print sharing	-	-
	- remote command	- APPC Applications Suite	- APPC Applications Suite
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used this way very often.

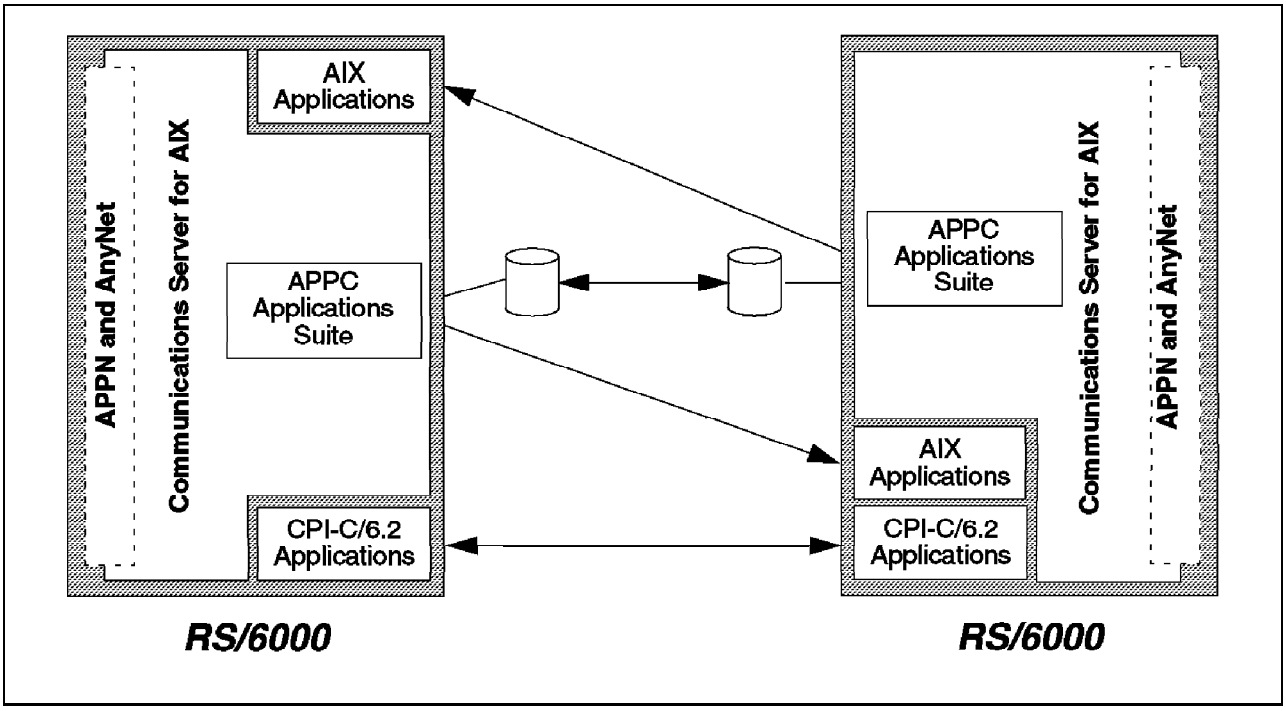


Figure 192. RS/6000 and RS/6000 - SNA - Ethernet: Logical View

9.2.3.4 X.25 Network

Table 149. RS/6000 and RS/6000 - SNA - X.25: Abstract

		RS/6000	RS/6000
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - AIXLink/X.25 V1.1	- Communications Server for AIX V4.0 (AnyNet and Gateway included) - AIXLink/X.25 V1.1
Functions	- emulation	-	-
	- file transfer	- APPC Applications Suite	- APPC Applications Suite
	- file sharing	-	-
	- print sharing	-	-
	- remote command	- APPC Applications Suite	- APPC Applications Suite
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used this way very often.

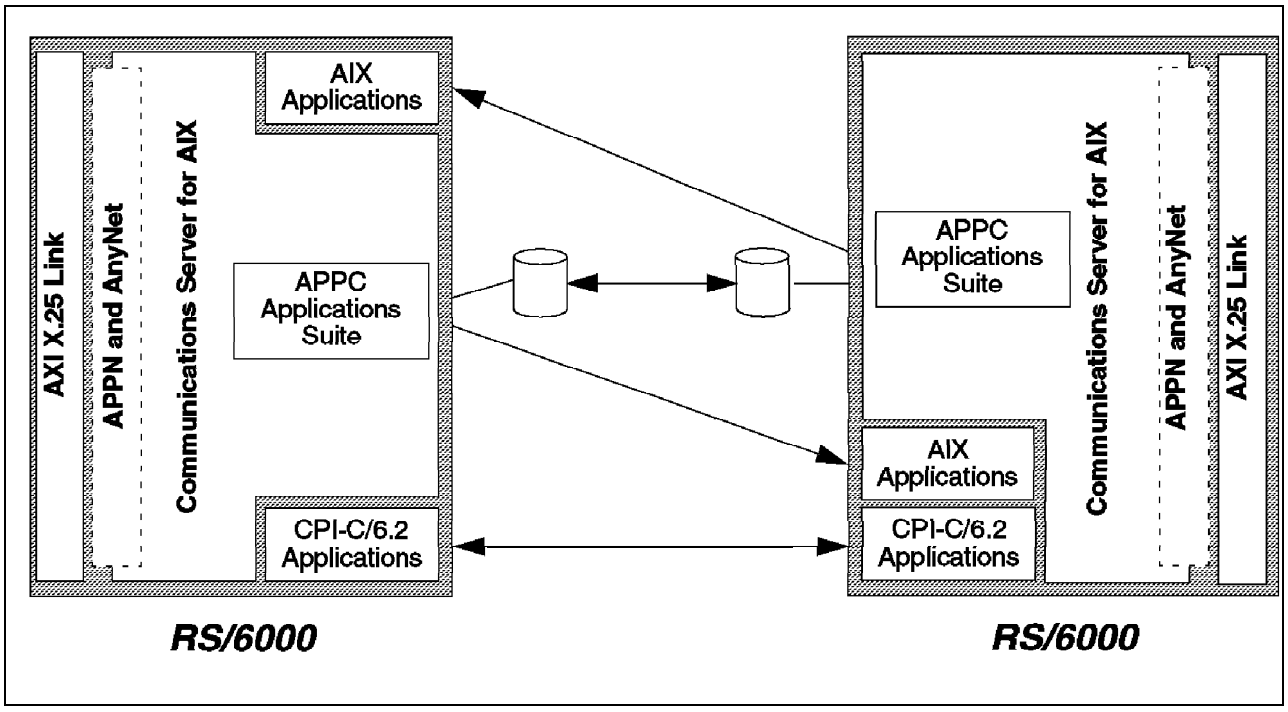


Figure 193. RS/6000 and RS/6000 - SNA - X.25: Logical View

9.2.3.5 Synchronous Network

Table 150. RS/6000 and RS/6000 - SNA - Synchronous: Abstract

		RS/6000	RS/6000
Hardware		- 2959 - 2700 (+2705) - 2701 (+2705)	- 2959 - 2700 (+2705) - 2701 (+2705)
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for AIX V4.0 (AnyNet and Gateway included)
Functions	- emulation	-	-
	- file transfer	- APPC Applications Suite	- APPC Applications Suite
	- file sharing	-	-
	- print sharing	-	-
	- remote command	- APPC Applications Suite	- APPC Applications Suite
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used this way very often.

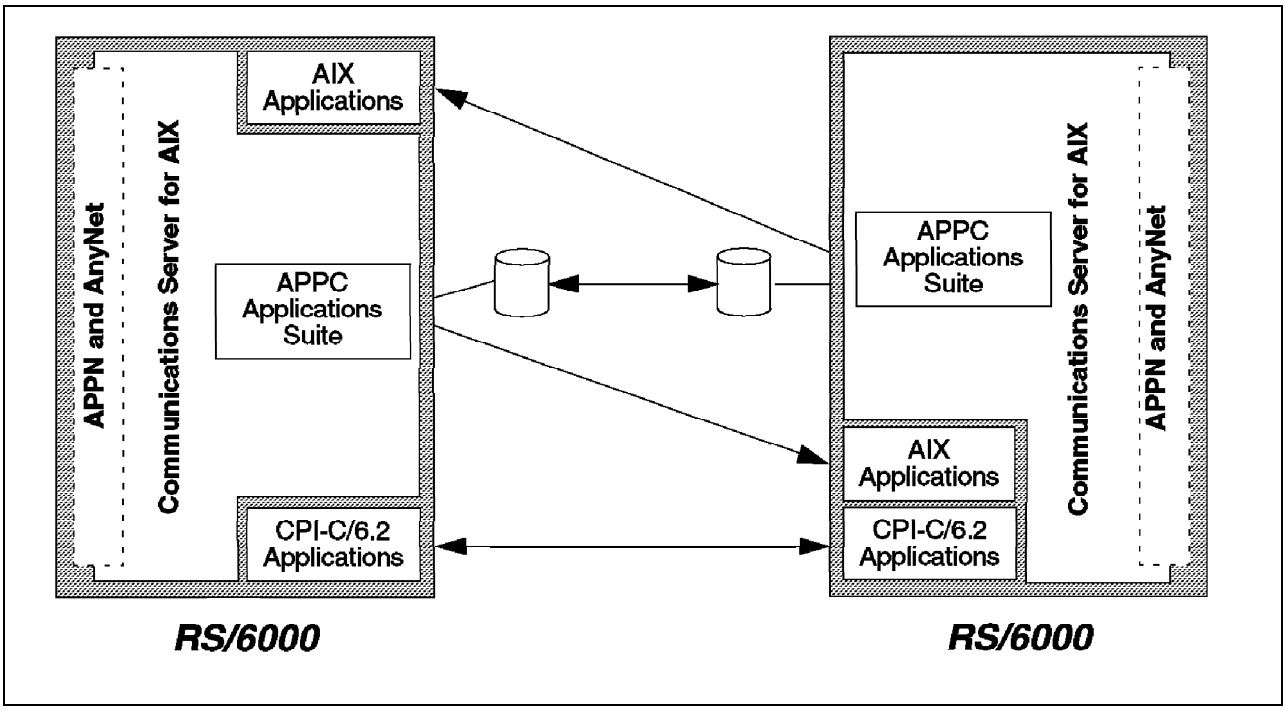


Figure 194. RS/6000 and RS/6000 - SNA - Synchronous: Logical View

9.2.4 OSI

9.2.4.1 X.25 Network

Table 151. RS/6000 and RS/6000 - OSI - X.25: Abstract

		RS/6000	RS/6000
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)
Software		- Open Systems Std Com. V3.0 - AIXLink/X.25 V1.1	- Open Systems Std Com. V3.0 - AIXLink/X.25 V1.1
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- Virtual Terminal - FTAM - - - - AAPI, GAPI - X.400, MHS - - - X.500 - CMIP	- Virtual Terminal - FTAM - - - - AAPI, GAPI - X.400, MHS - - - X.500 - CMIP

Remark

- These functions are provided by Open Systems Standard Communications V3.0. Other OSI products have more or less functions.
- Most of the time, OSI layers are used by telecommunication providers.

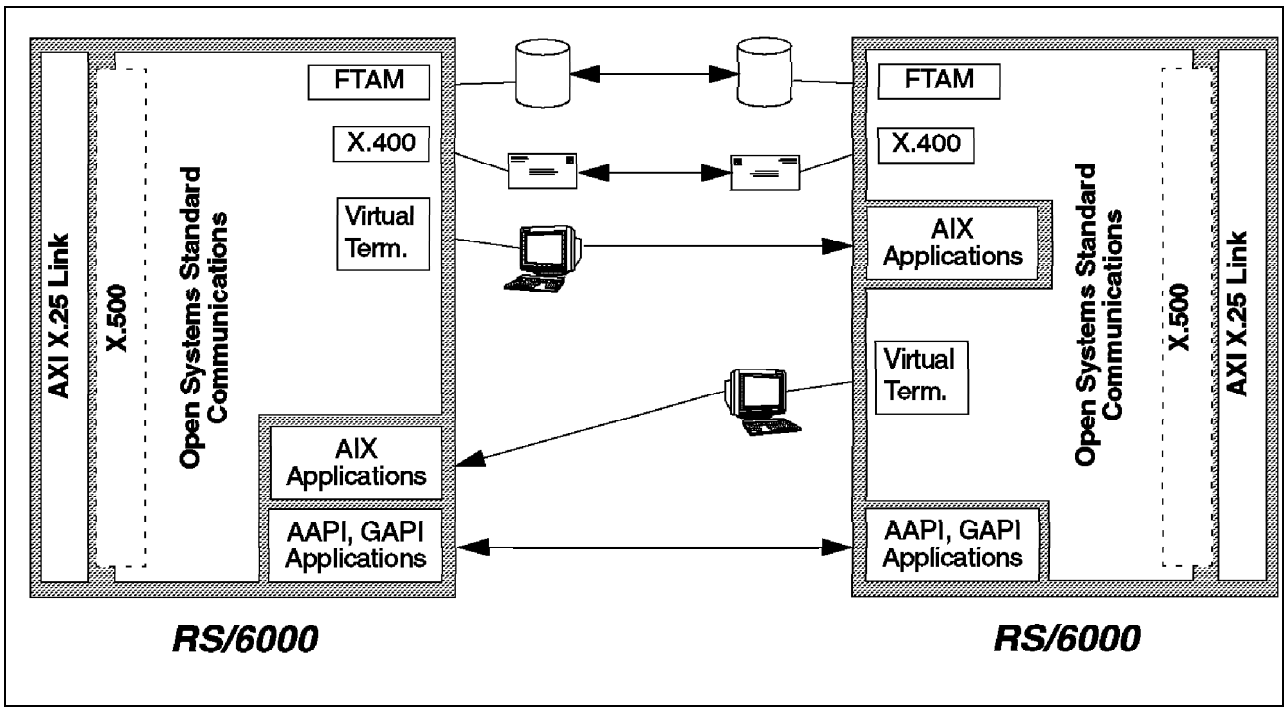


Figure 195. RS/6000 and RS/6000 - OSI - X.25: Logical View

9.2.5 Asynchronous

9.2.5.1 Asynchronous Network

Table 152. RS/6000 and RS/6000 - Asynch. - Asynch.: Abstract

		RS/6000	RS/6000
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)
Software		- ATE or BNU (included on AIX V4)	- ATE or BNU (included on AIX V4)
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- vt100 - UUCP - - - Yes - Yes - - - - -	- vt100 - UUCP - - - Yes - Yes - - - - -

Remark

- A long time ago, before TCP/IP and Ethernet were fully developed, a few people used these facilities, and it worked!

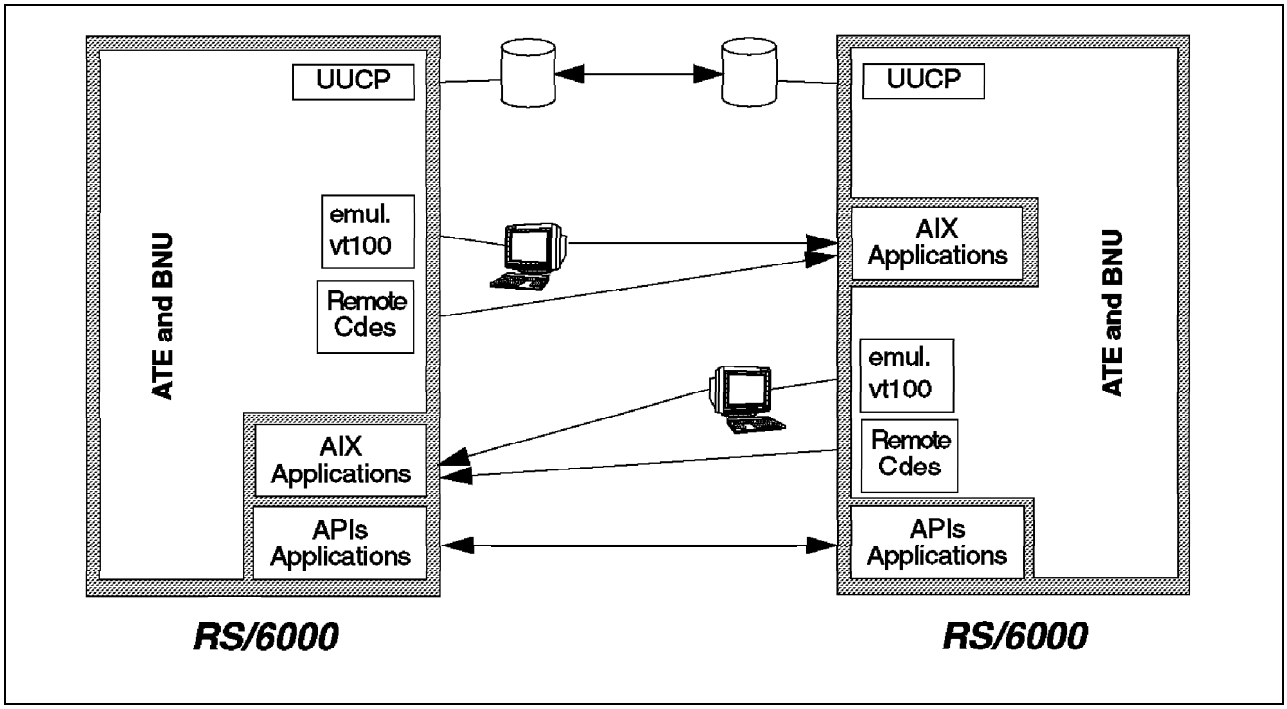


Figure 196. RS/6000 and RS/6000 - Asynchronous - Asynchronous: Logical View

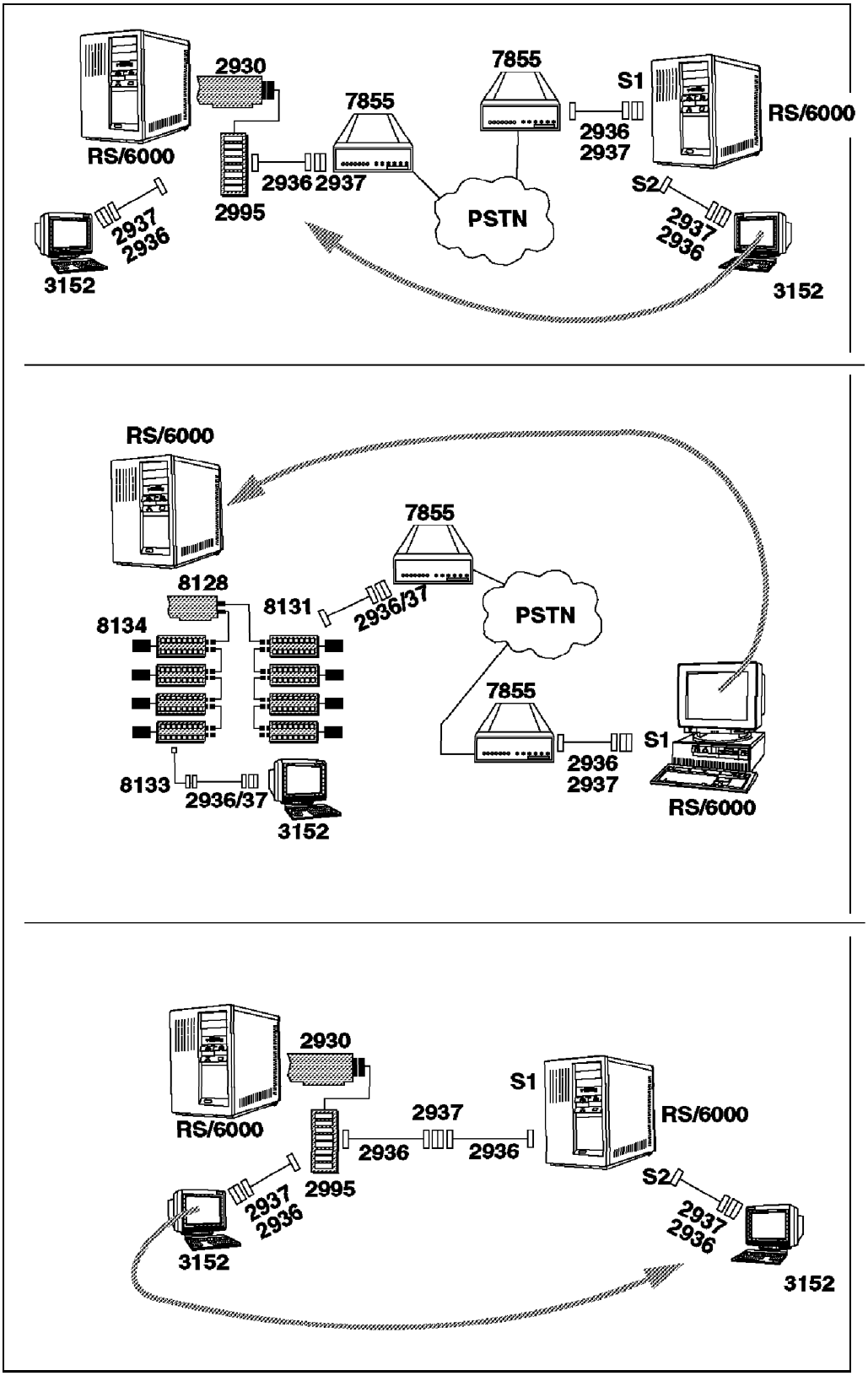


Figure 197. RS/6000 and RS/6000 - Asynchronous - Asynchronous: Physical View

9.3 RS/6000 and the UNIX Platform

The investigation of the RS/6000 and the UNIX platform begins here. Some of the things you should know about this type of connectivity are as follows:

- The common way to connect one RS/6000 with a UNIX platform is to use TCP/IP!
- Now, OSI is supported by OEM products.
- If you have no money to buy two Ethernet adapters, use an asynchronous connection!

9.3.1 Abstract

Table 153. RS/6000 and UNIX Platform Abstract

RS/6000 / UNIX Platform	TCP/IP	OSI	Asynchronous
Asynchronous	SLIP/PPP		
Token-Ring			
FDDI			
Ethernet			
X.25			
Synchronous			
Coaxial			
S/370 Channel			
ESCON			
BMPX			
Fibre Channel			
ATM			
HIPPI			
SOCC			
Twinax			

Remark

- Use SLIP/PPP when TCP/IP is used on an asynchronous line.

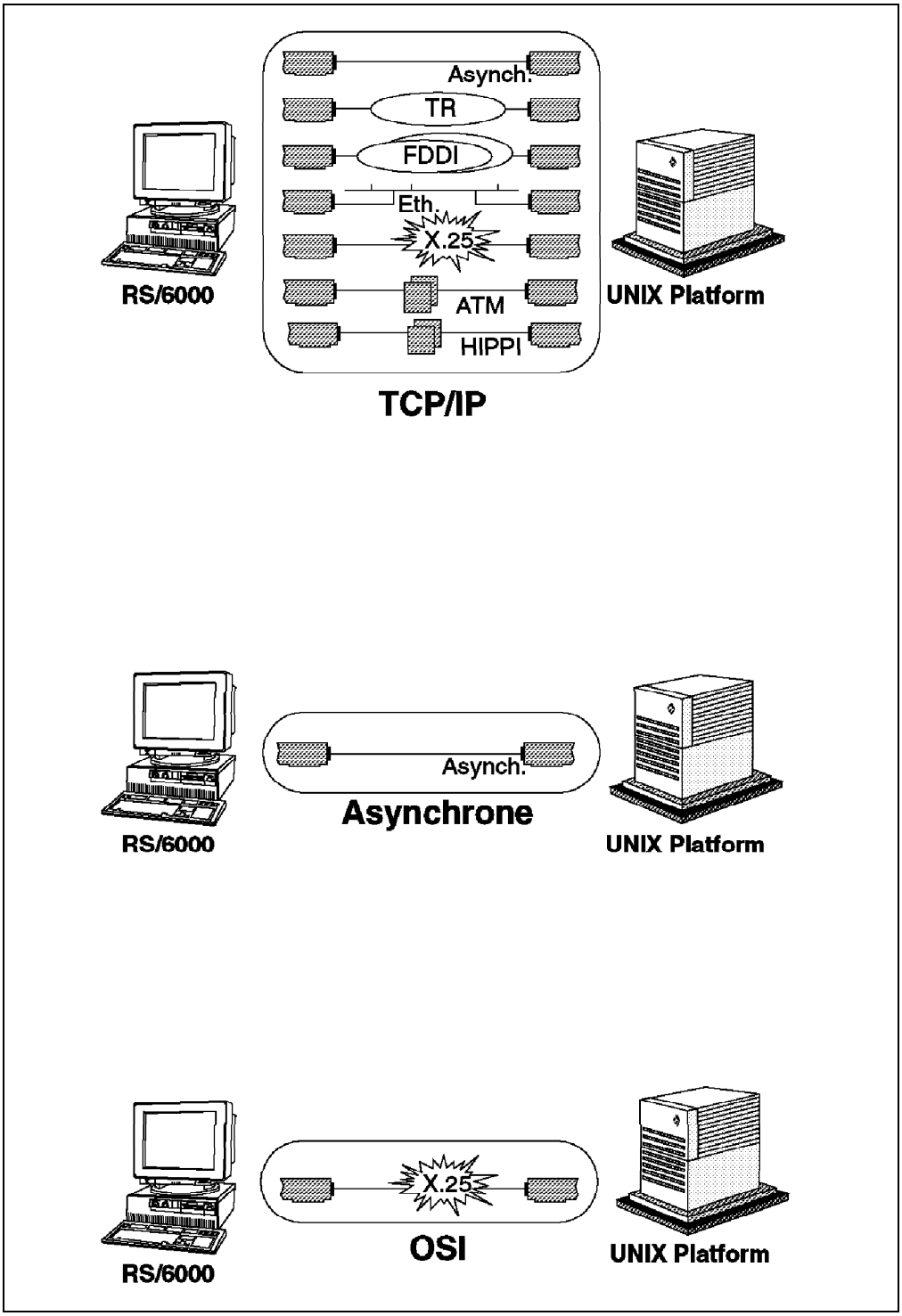


Figure 198. RS/6000 and UNIX Platform Abstract

9.3.2 TCP/IP

9.3.2.1 Asynchronous Network

Table 154. RS/6000 and UNIX Platform - TCP/IP - Asynchronous: Abstract

		RS/6000	UNIX Platform
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Asynchronous connection
Software		- AIX V4 (TCP/IP, SLIP and PPP included)	- TCP/IP (with SLIP and PPP, sometimes, it's not included)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Use PPP rather SLIP. It's faster and more economical in terms of packets.

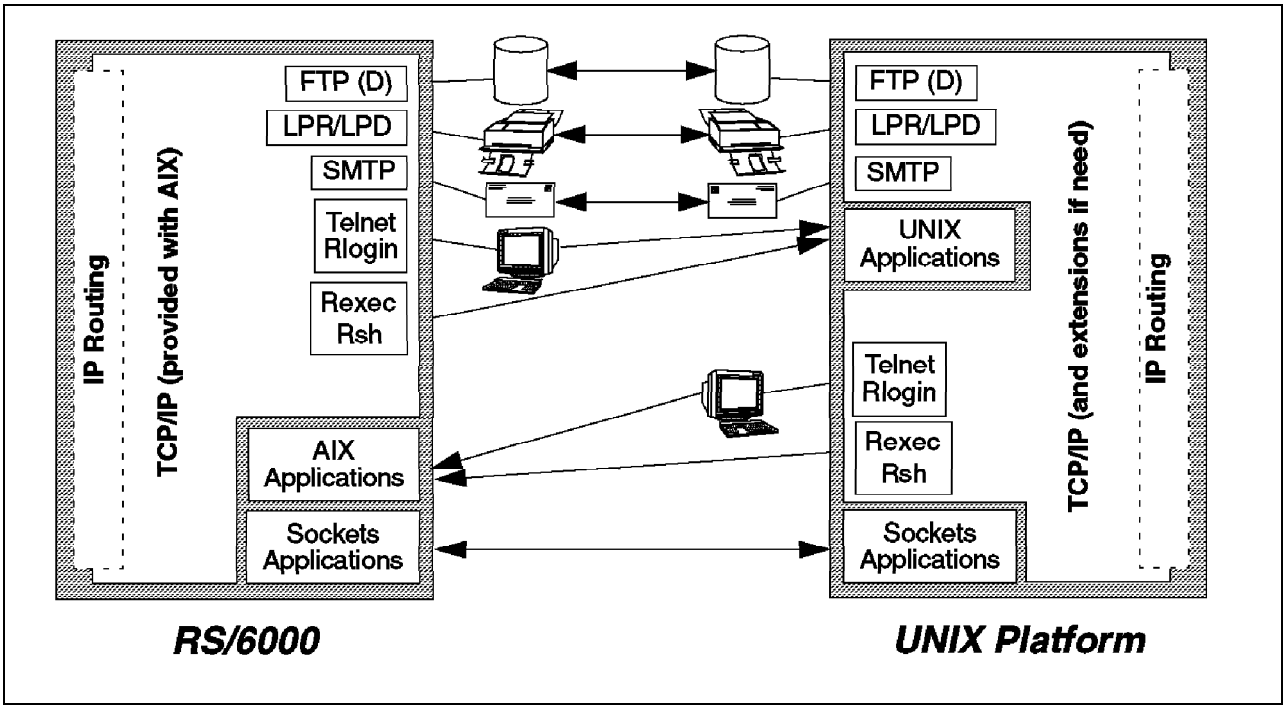


Figure 199. RS/6000 and UNIX Platform - TCP/IP - Asynchronous: Logical View

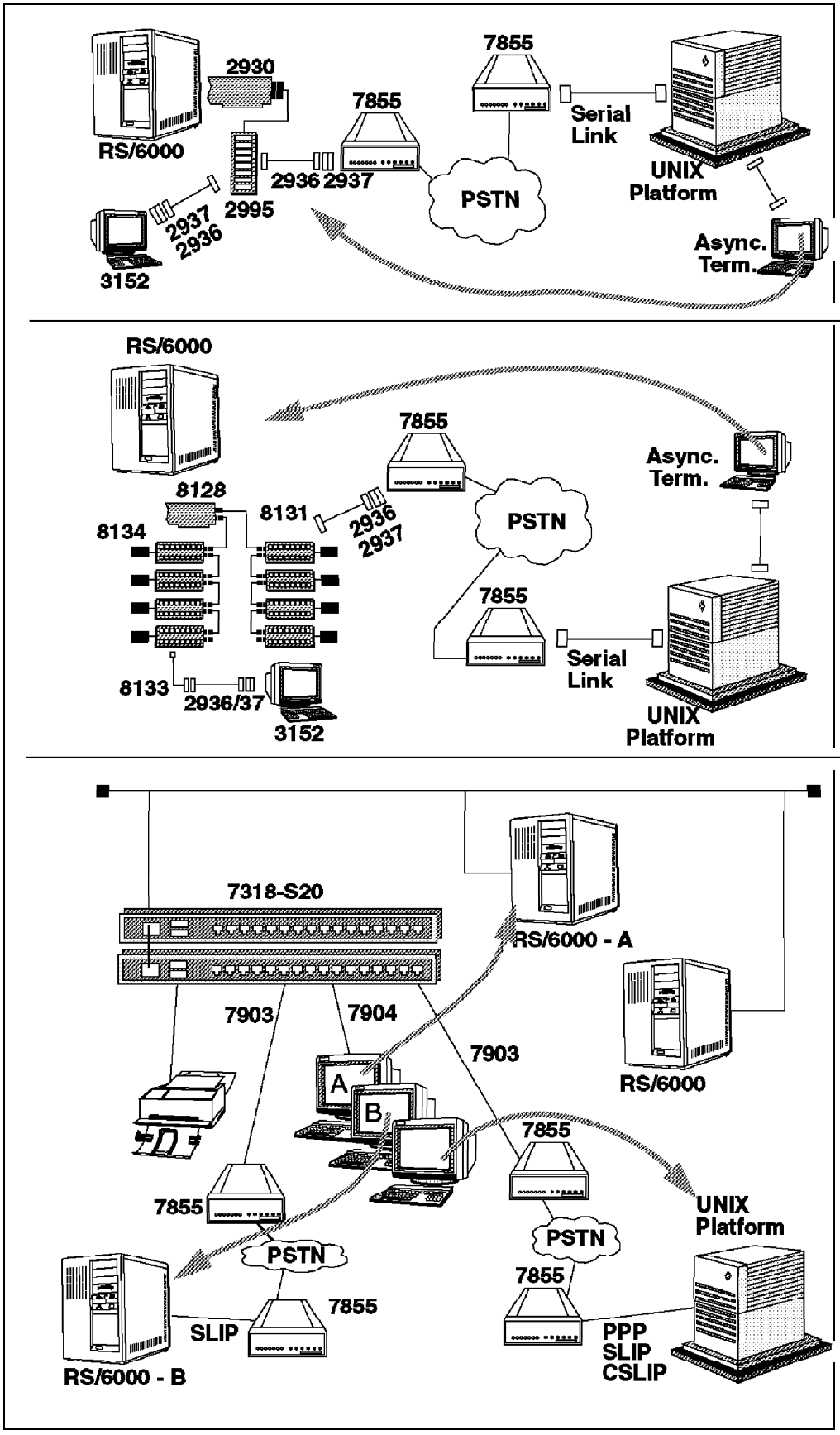


Figure 200. RS/6000 and UNIX Platform - TCP/IP - Asynchronous: Physical View

9.3.2.2 Token-Ring Network

Table 155. RS/6000 and UNIX Platform - TCP/IP - Token-Ring: Abstract

		RS/6000	UNIX Platform
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP (and all extensions if needed)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/S)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Only token-ring is supported on the UNIX platform.

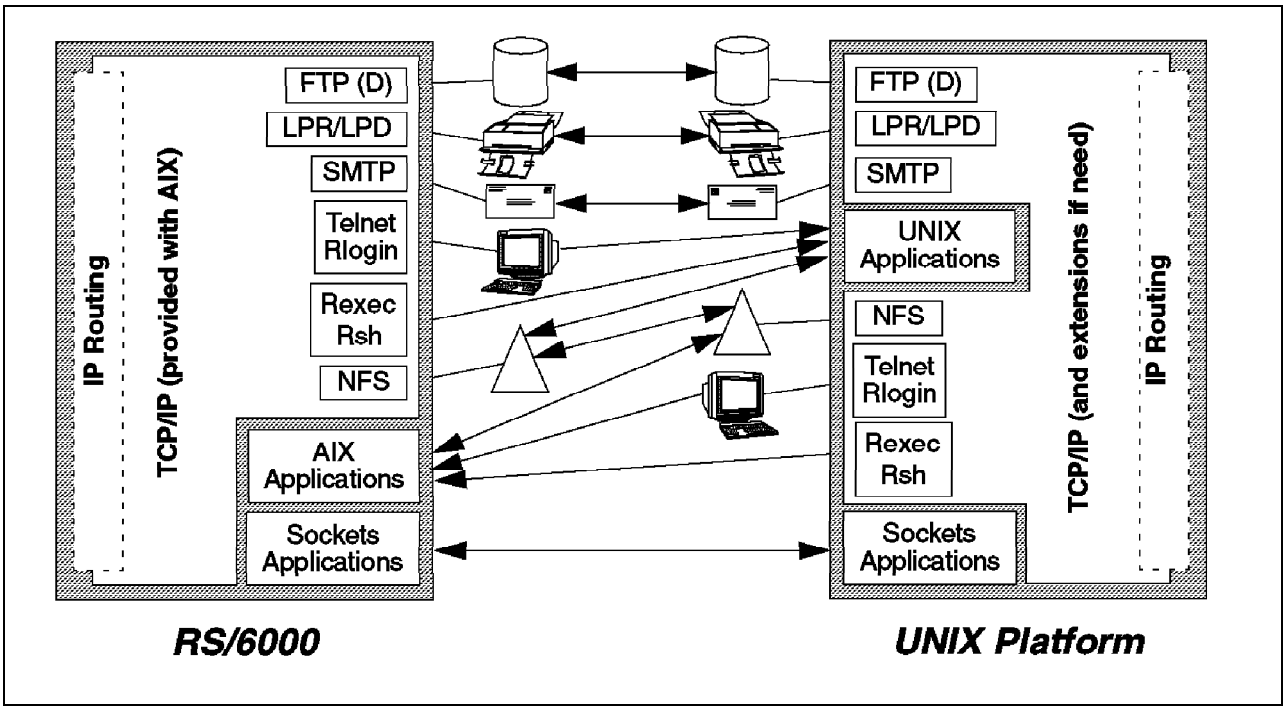


Figure 201. RS/6000 and UNIX Platform - TCP/IP - Token-Ring: Logical View

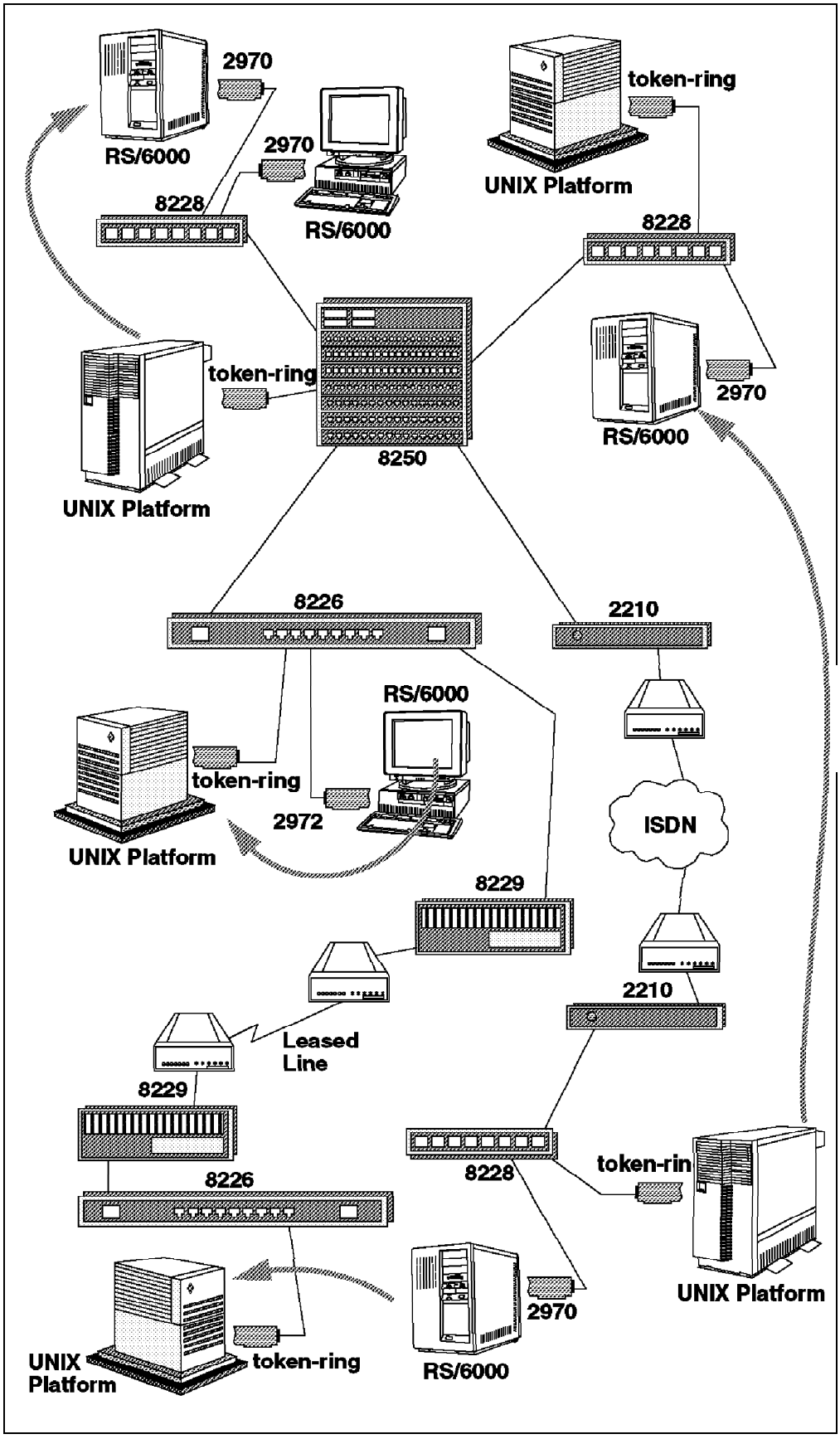


Figure 202. RS/6000 and UNIX Platform - TCP/IP - Token-Ring: Physical View

9.3.2.3 FDDI Network

Table 156. RS/6000 and UNIX Platform - TCP/IP - FDDI: Abstract

		RS/6000	UNIX Platform
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- FDDI adapter (Fibre or Copper) Sometimes, not supported...
Software		- AIX V4 (TCP/IP included)	- TCP/IP (and all extensions if needed), especially drivers
Functions	- **emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tnvt100 (C/S)
	- **file transfer**	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- **file sharing**	- NFS (C/S)	- NFS (C/S)
	- **print sharing**	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- **remote command**	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- **API**	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- **mail**	- SMTP (C/S)	- SMTP (C/S)
	- **security**	- Kerberos (C/S)	- Kerberos (C/S)
	- **graphic**	- X-Window (C/S)	- X-Window (C/S)
	- **name directory**	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- **network management**	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Use an FDDI connection, not an Ethernet 100 Mbps, to avoid collisions!

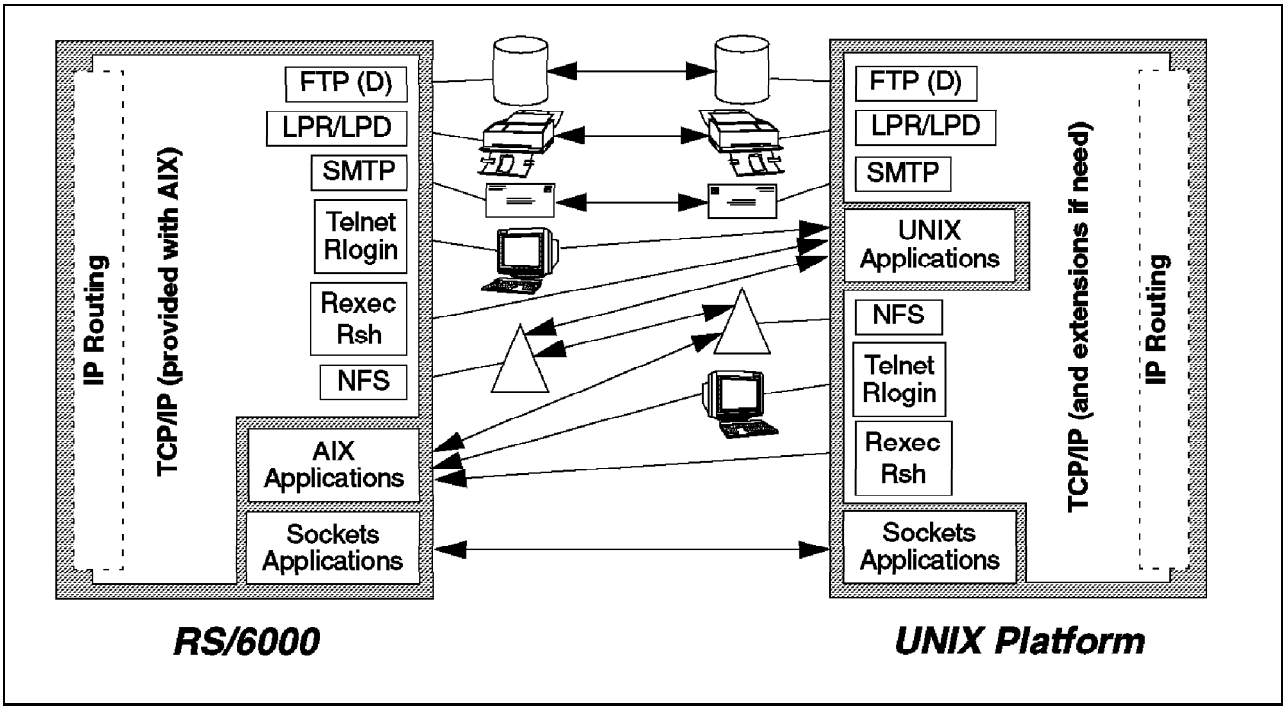


Figure 203. RS/6000 and UNIX Platform - TCP/IP - FDDI: Logical View

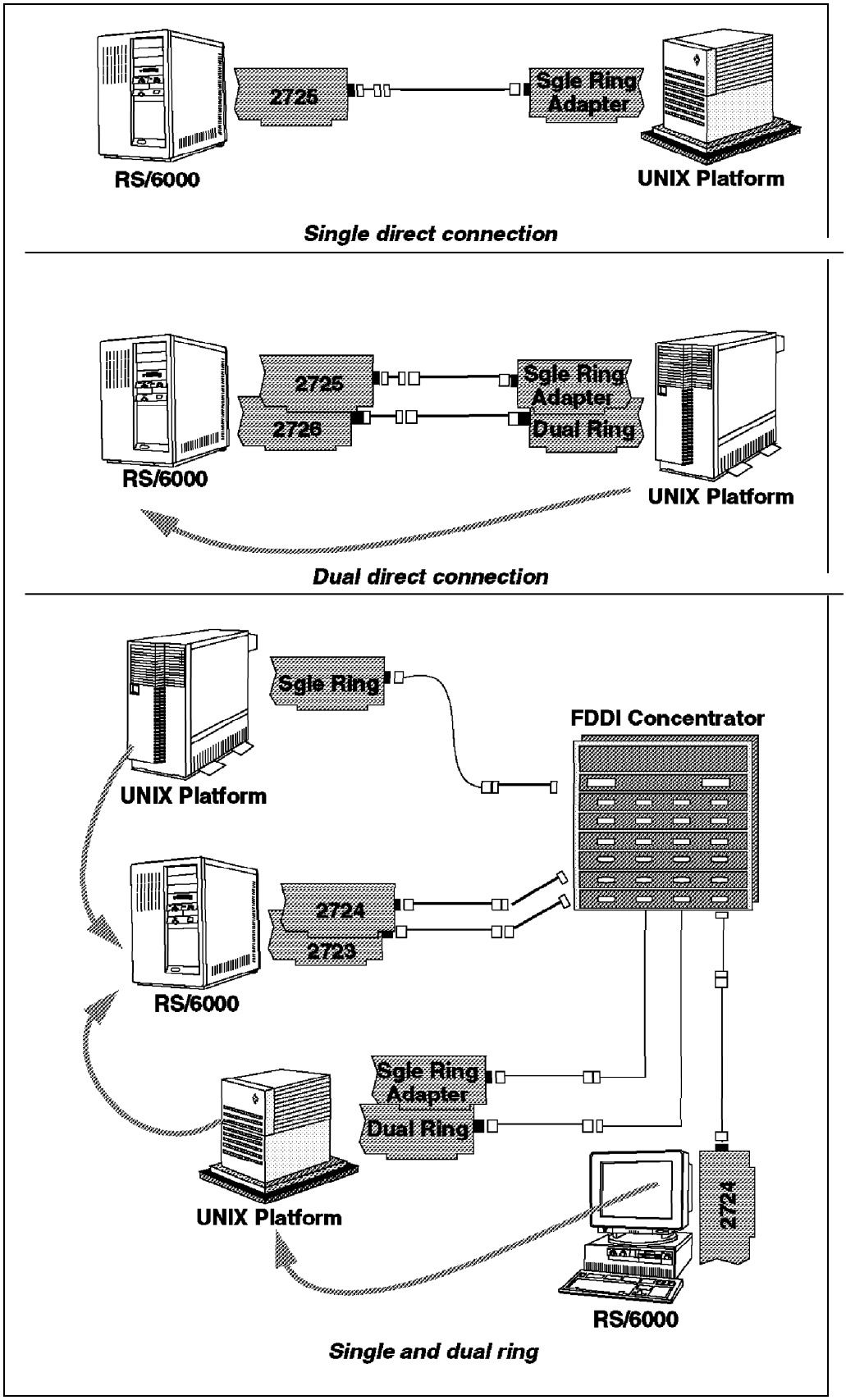


Figure 204. RS/6000 and UNIX Platform - TCP/IP - FDDI: Physical View

9.3.2.4 Ethernet Network

Table 157. RS/6000 and UNIX Platform - TCP/IP - Ethernet: Abstract

		RS/6000	UNIX Platform
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter (very often integrated)
Software		- AIX V4 (TCP/IP included)	- TCP/IP (and all extensions if needed)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/S)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- The most popular connection between two UNIX platforms!

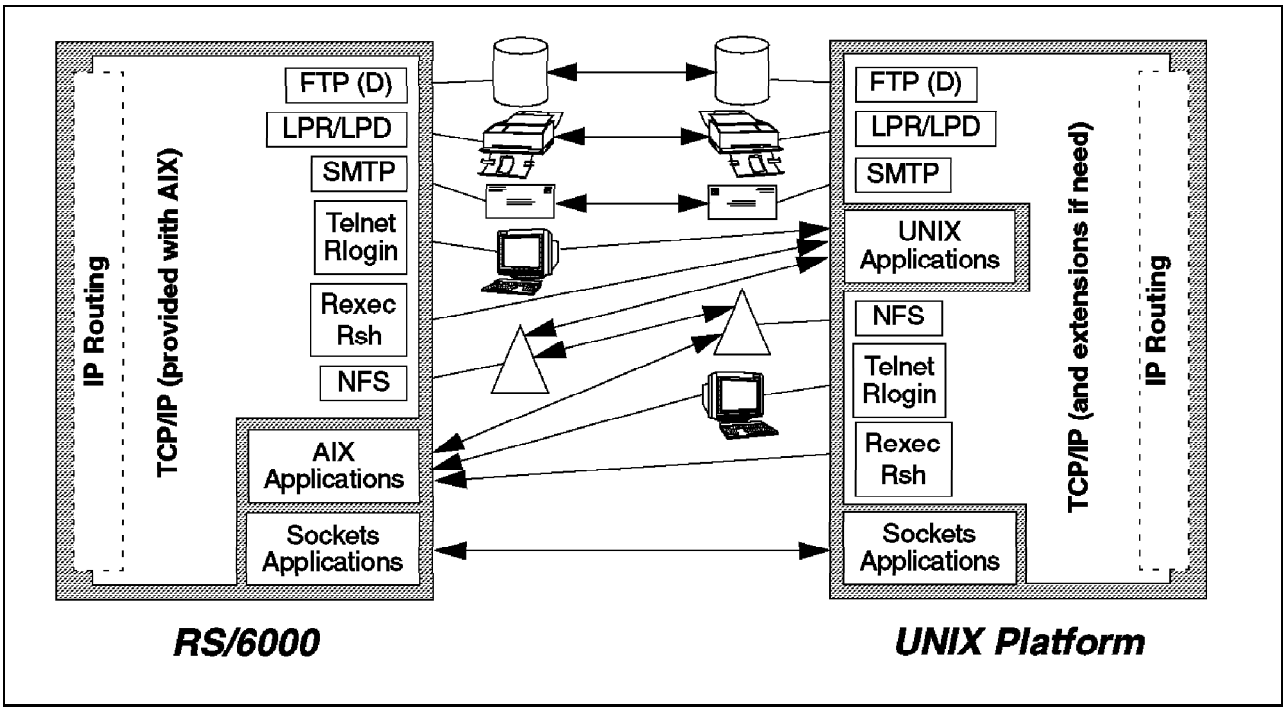


Figure 205. RS/6000 and UNIX Platform - TCP/IP - Ethernet: Logical View

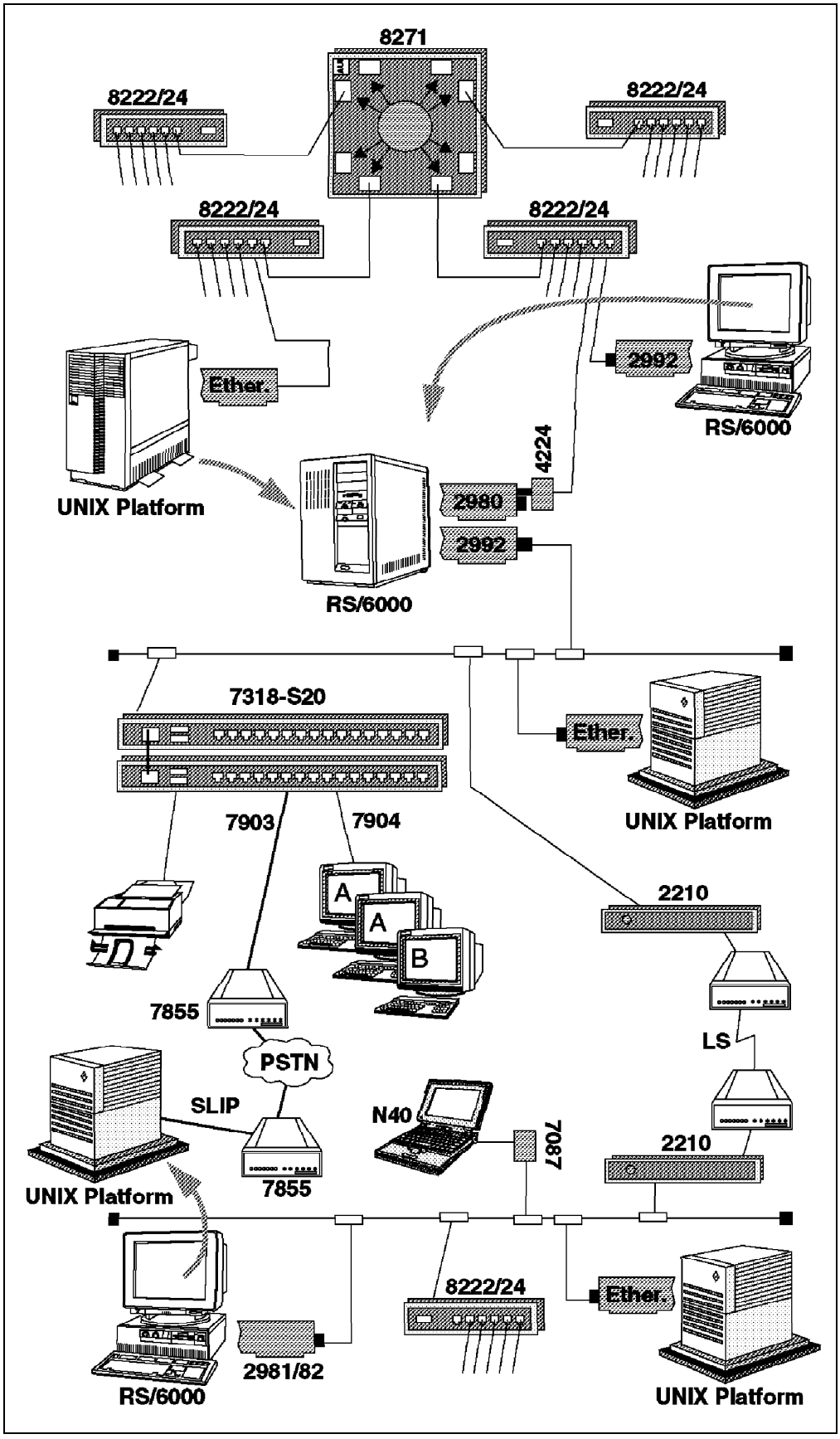


Figure 206. RS/6000 and UNIX Platform - TCP/IP - Ethernet: Physical View

9.3.2.5 X.25 Network

Table 158. RS/6000 and UNIX Platform - TCP/IP - X.25: Abstract

		RS/6000	UNIX Platform
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- AIX V4 (TCP/IP included) - AIXLink/X.25 V1.1	- TCP/IP (and all extensions if need)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This configuration is not optimum for Telnet connections!
- In fact, X.25 packets transported on TCP/IP packets generate a lot of overflow. So, it's better to use some product (such as ECO-PAD) to compress this kind of communication. See the OEM software offerings for AIX V4 section to find more information on this product.

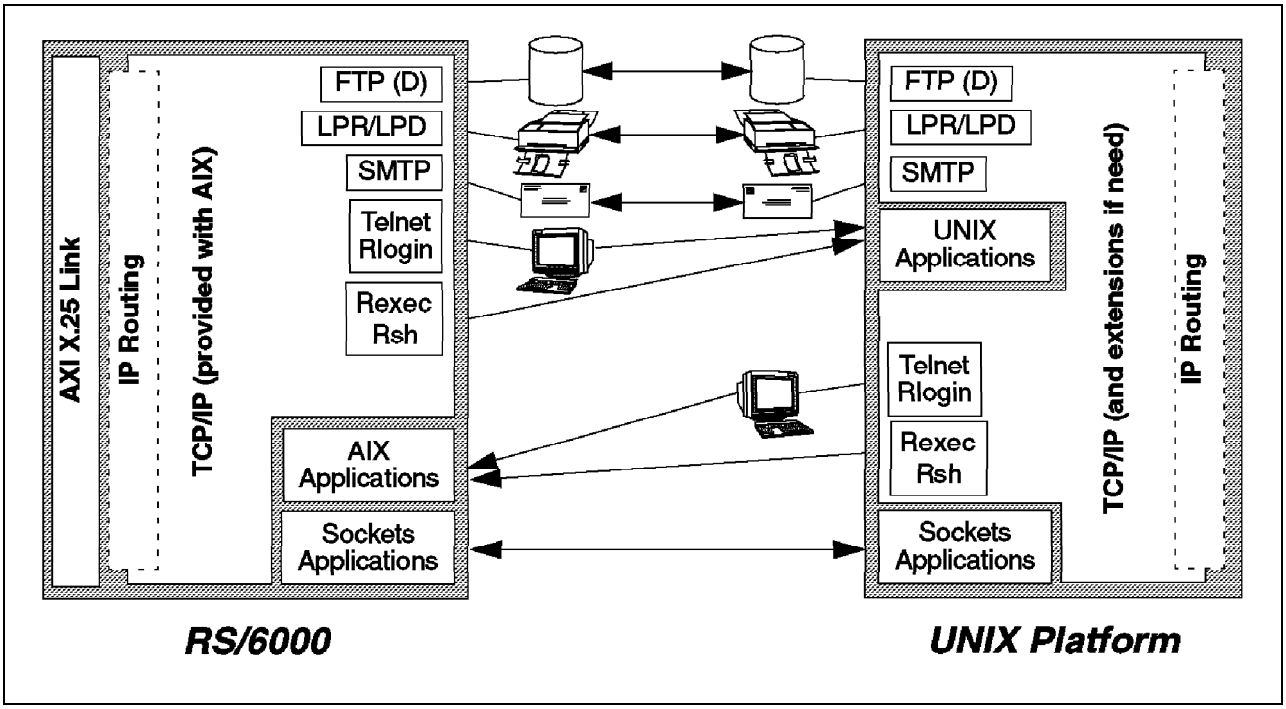


Figure 207. RS/6000 and UNIX Platform - TCP/IP - X.25: Logical View

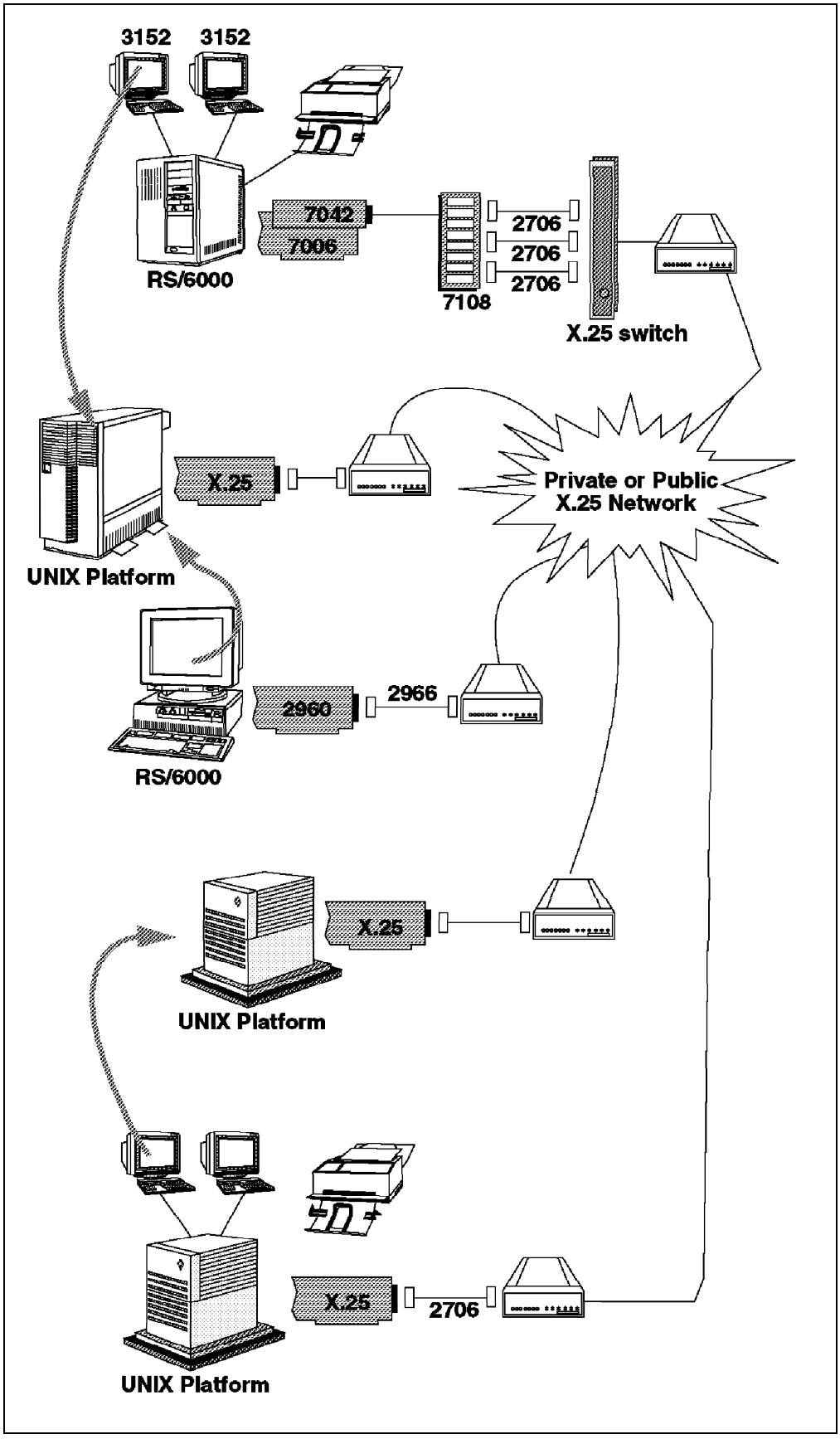


Figure 208. RS/6000 and UNIX Platform - TCP/IP - X.25: Physical View

9.3.2.6 ATM Network

Table 159. RS/6000 and UNIX Platform - TCP/IP - ATM: Abstract

		RS/6000	UNIX Platform
Hardware		- 2984 - 2989	- ATM adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP (and all extensions if needed)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/S)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- ATM drivers are provided with AIX V4.1 or V4.2.
- There are different speeds of ATM links (25, 100, 155,... Mbps).

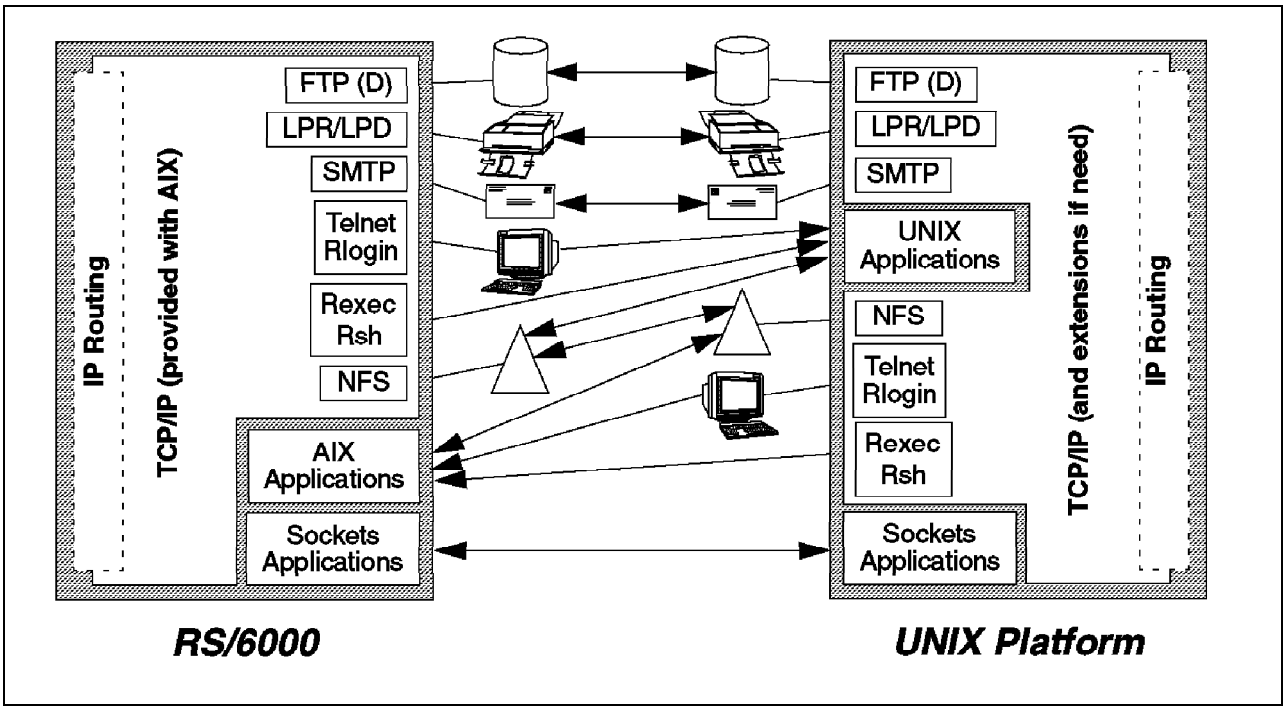


Figure 209. RS/6000 and UNIX Platform - TCP/IP - ATM: Logical View

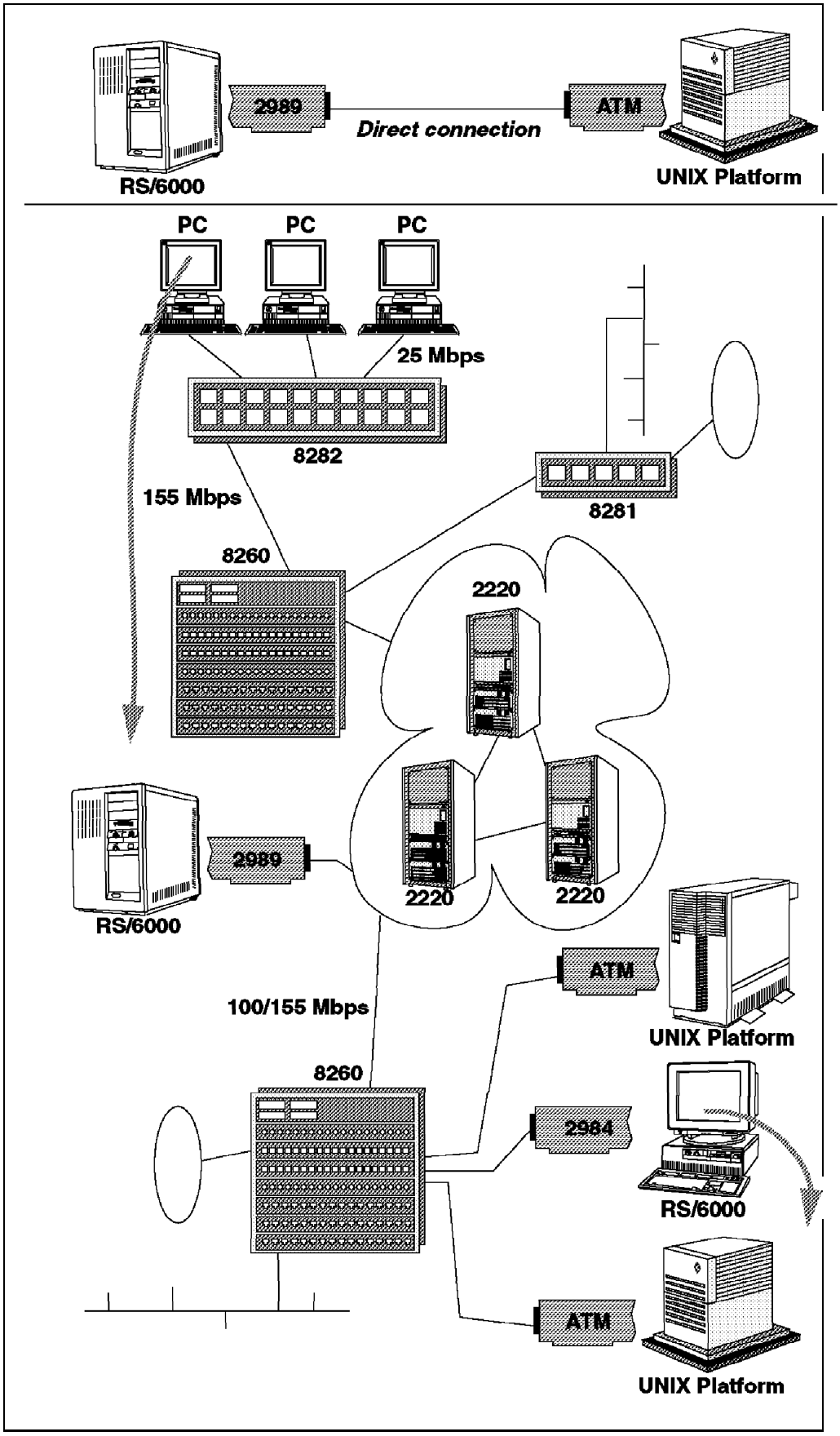


Figure 210. RS/6000 and UNIX Platform - TCP/IP - ATM: Physical View

9.3.2.7 HIPPI Network

Table 160. RS/6000 and UNIX Platform - TCP/IP - HIPPI: Abstract

		RS/6000	UNIX Platform
Hardware		- 2735	- HIPPI adapter
Software		- AIX V4 (TCP/IP included) - HIPPI Interface 4.1	- TCP/IP (and all extensions if need), especially drivers
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/S)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This HIPPI adapter requires the High Performance Parallel Interface 4.1 (5765-551) LPP, ordered separately.

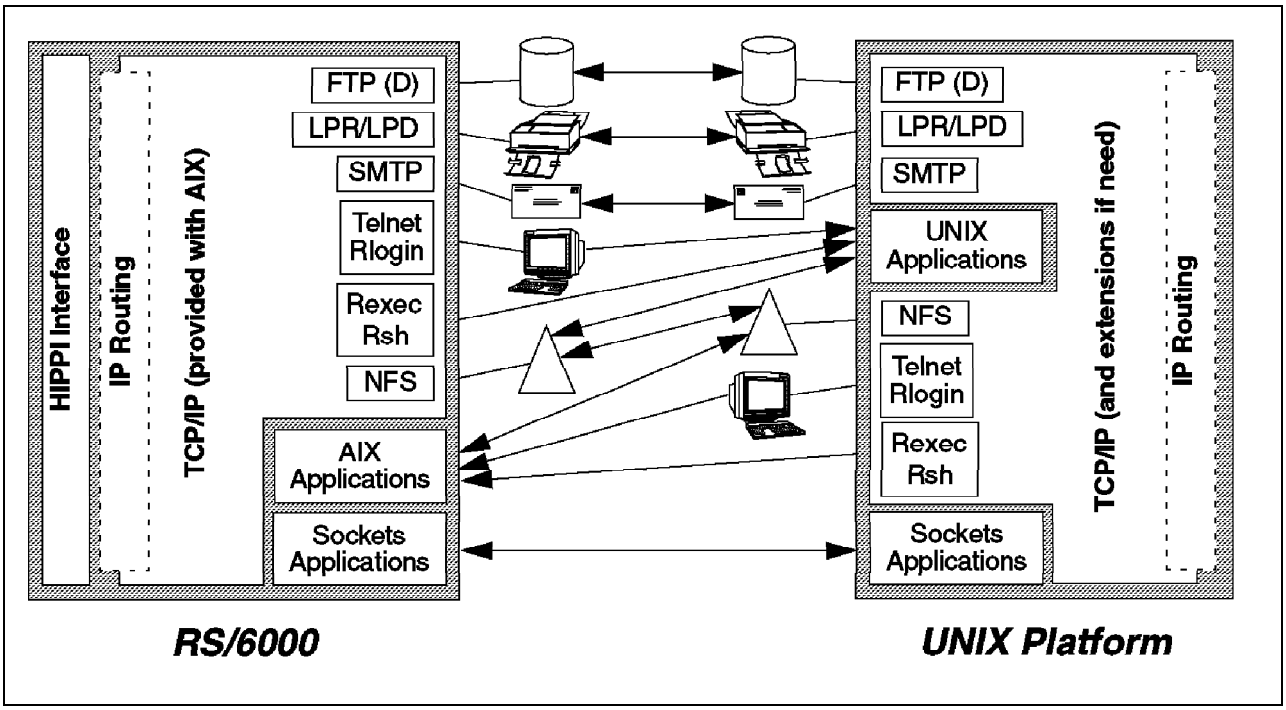


Figure 211. RS/6000 and UNIX Platform - TCP/IP - HIPPI: Logical View

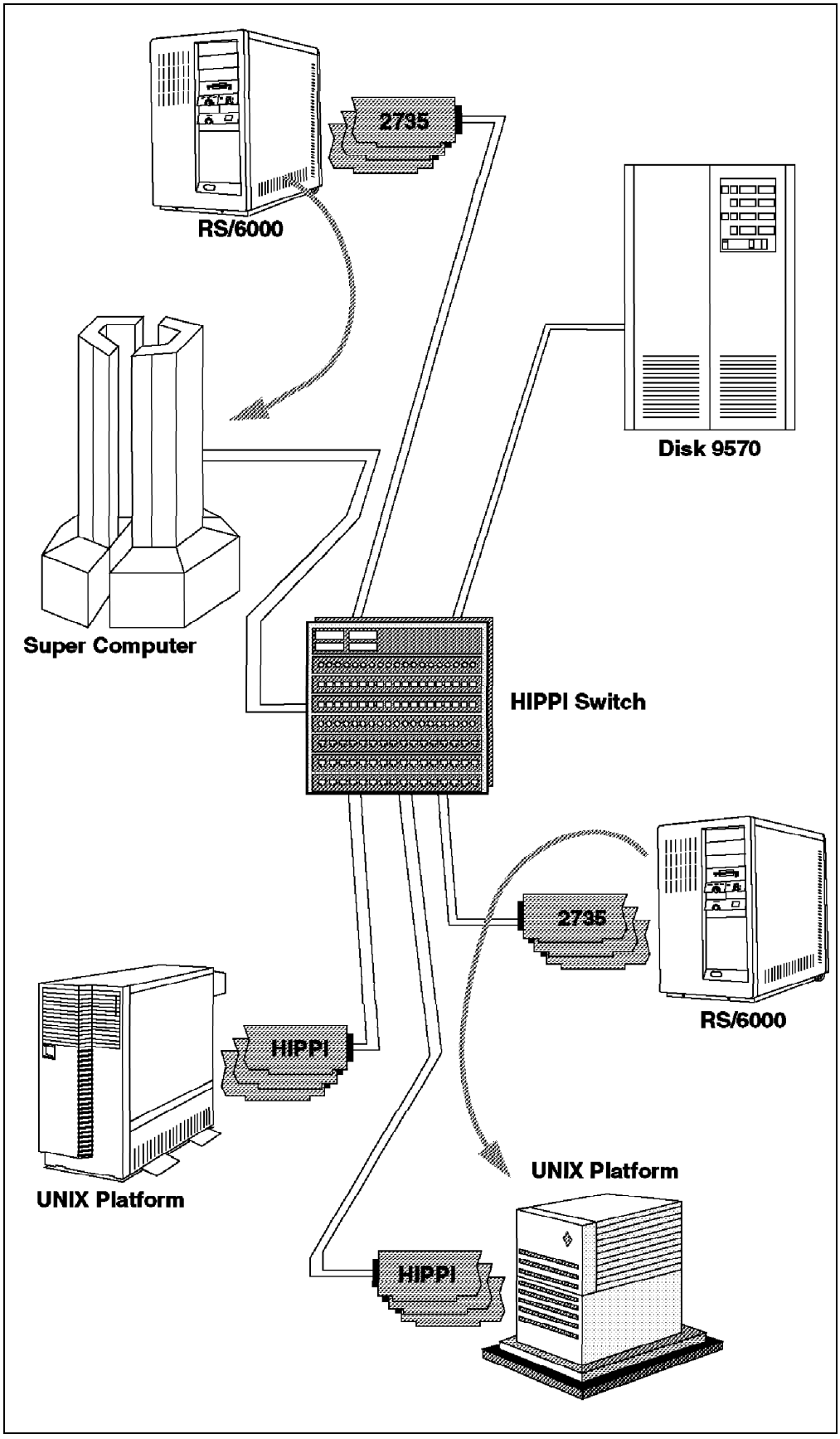


Figure 212. RS/6000 and UNIX Platform - TCP/IP - HIPPI: Physical View

9.3.3 OSI

9.3.3.1 X.25 Network

Table 161. RS/6000 and UNIX Platform - OSI - X.25: Abstract

		RS/6000	UNIX Platform
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- Open Systems Std Com. V3.0 - AIXLink/X.25 V1.1	- OSI Layers (and all extensions)
Functions	**- emulation**	- Virtual Terminal	- Virtual Terminal
	- file transfer	- FTAM	- FTAM
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- AAPI, GAPI	- AAPI, GAPI
	- mail	- X.400, MHS	- X.400, MHS
	- security	-	-
	- graphic	-	-
	- name directory	- X.500	- X.500
	- network management	- CMIP	- CMIP

Remark

- These functions are provided by Open Systems Standard Communications V3.0. Other OSI products have more or less functions.
- Most of the time, OSI layers are used by telecommunications providers.
- The functions on the UNIX platform are up to the OSI package.

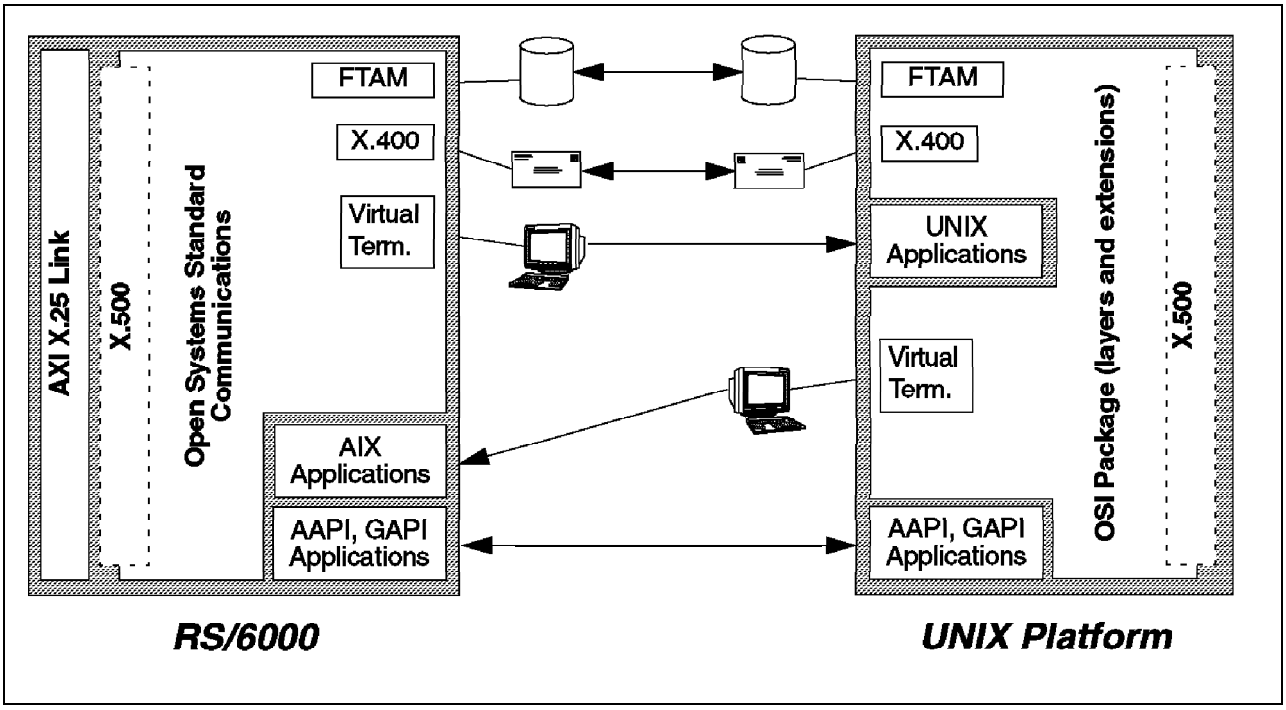


Figure 213. RS/6000 and UNIX Platform - OSI - X.25: Logical View

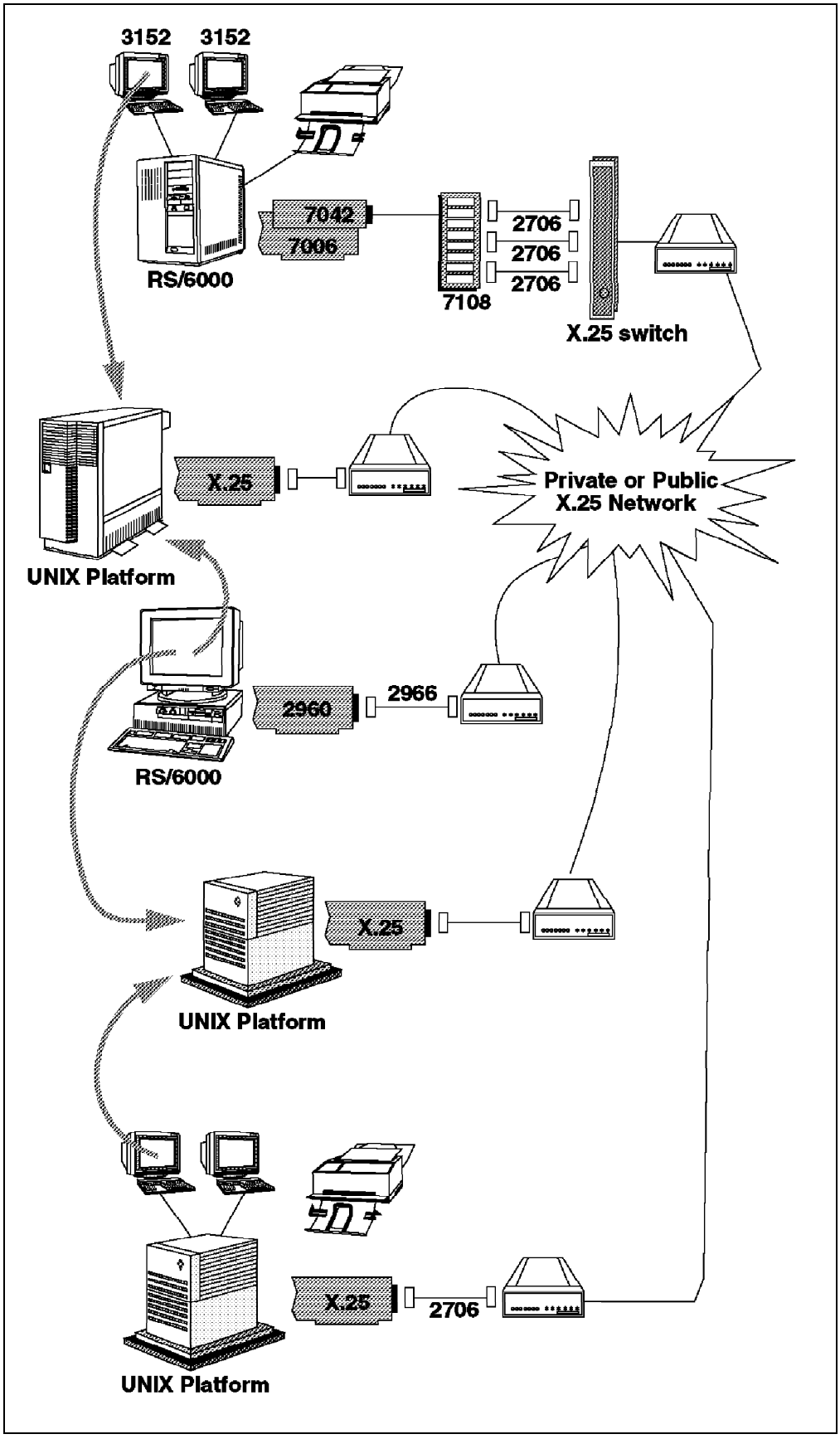


Figure 214. RS/6000 and UNIX Platform - OSI - X.25: Physical View

9.3.4 Asynchronous

9.3.4.1 Asynchronous Network

Table 162. RS/6000 and UNIX Platform - Asynchronous - Asynchronous: Abstract

		RS/6000	UNIX Platform
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Asynchronous adapter
Software		- ATE or BNU (included on AIX V4)	- ATE or BNU (included in all UNIX operating systems)
Functions	**- emulation**	- vt100	- vt100
	- file transfer	- UUCP	- UUCP
	- file sharing	-	-
	- print sharing	-	-
	- remote command	- Yes	- Yes
	- API	- Yes	- Yes
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- A long time ago, before TCP/IP and Ethernet were fully developed, a few people used these facilities, and it worked!

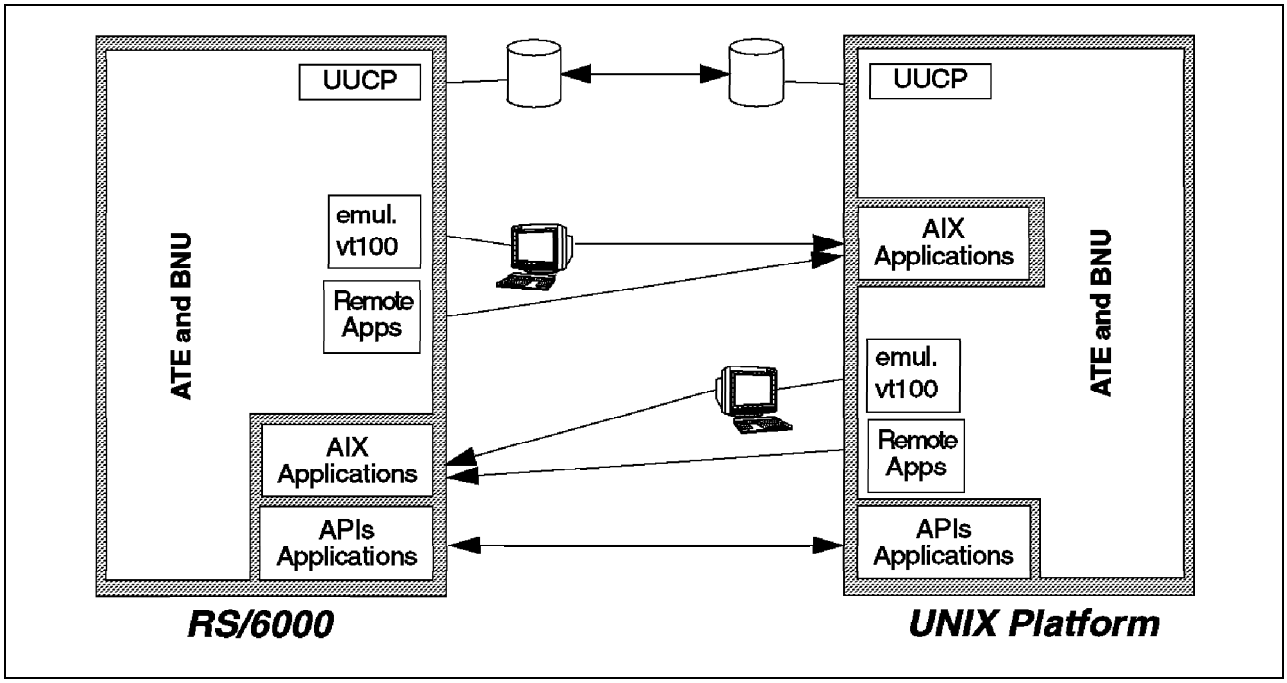


Figure 215. RS/6000 and UNIX Platform - AsynchronousAsynchronous: Logical View

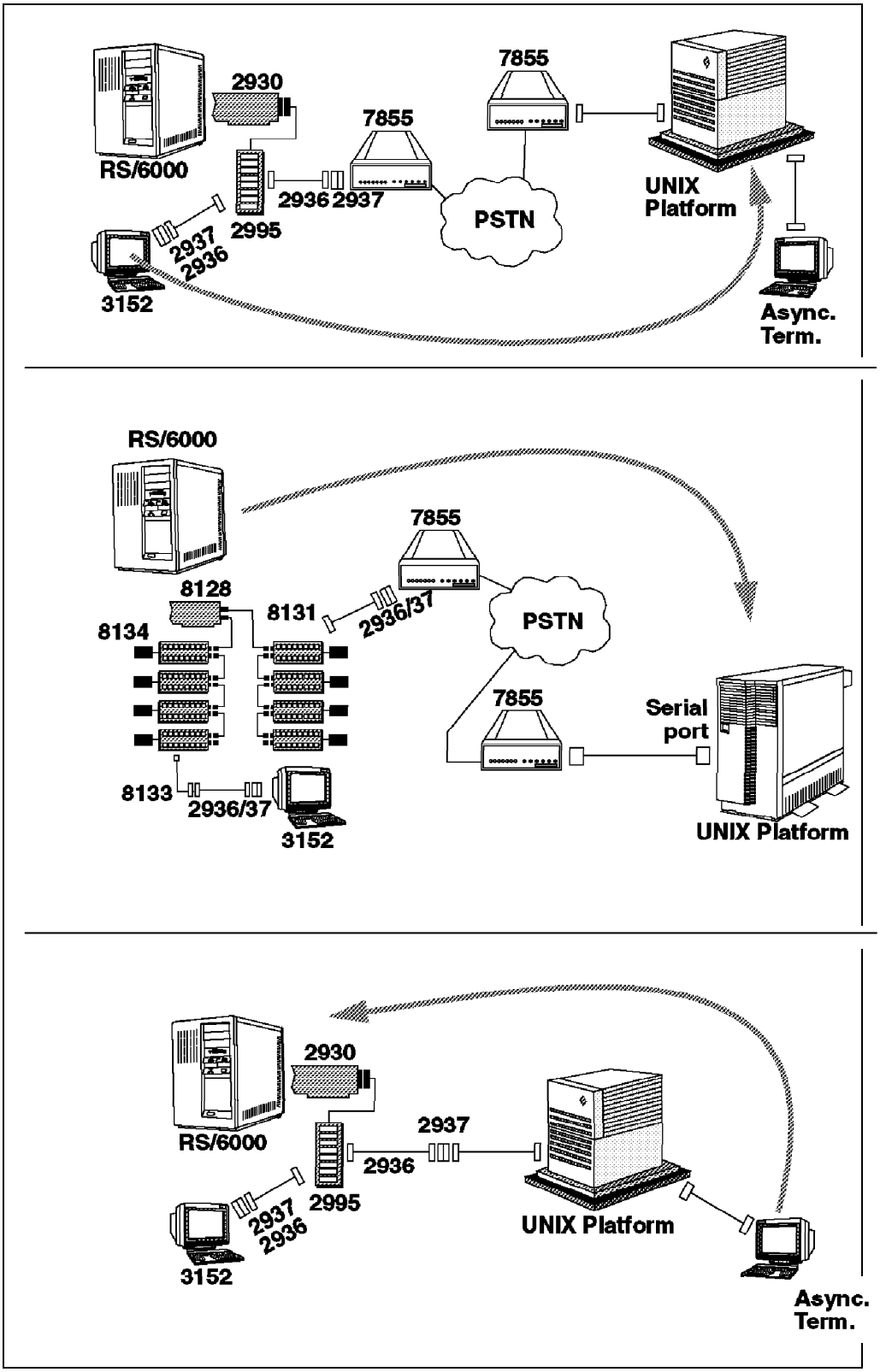


Figure 216. RS/6000 and UNIX Platform - Asynchronous-Asynchronous: Physical View

9.4 RS/6000 and the S/390

To connect an S/390 with a RS/6000, you can:

- Implement the UNIX native protocol (TCP/IP) on the S/390
- Implement the host native protocol (SNA) on the RS/6000

In the first case, you may use common TCP/IP applications, such as FTP, Telnet or Rexec. But, remember, the host platform uses synchronous mode, and the RS/6000 uses asynchronous mode. You can mix functions provided by TCP/IP implemented on the host and services provided by 3174 Establishment Controller microcode. Please refer to Chapter 7 for more information. To complete TCP/IP or SNA native functions, you may also add the Host Connection Program onto the RS/6000

You may also use the OSI protocol or a coaxial link.

9.4.1 Abstract

Table 163. RS/6000 and S/390 Abstractt

RS/6000 / S/390	TCP/IP	SNA	OSI	Coaxial
Asynchronous				
Token-Ring	HCON	HCON		
FDDI	HCON			
Ethernet	HCON	HCON		
X.25	HCON	HCON		
Synchronous		HCON		
Coaxial				HCON (CUT/DFT)
S/370 Channel	Tapes/Printers			
ESCON	HCON			
BLKMUX	HCON			
Fibre Channel				
ATM				
HIPPI				
SOCC				
Twinax				

Remark

- "HCON" means that Host Connection Program V2.1 is supported in this configuration.
- "Tapes/printers" means only tapes and printer attachments are supported by PRPQ #5799-QDA, IBM Parallel Channel Tape Attachment/6000 or IBM AIX Print Service Facility for AIX Version 2.1 (5765-505).

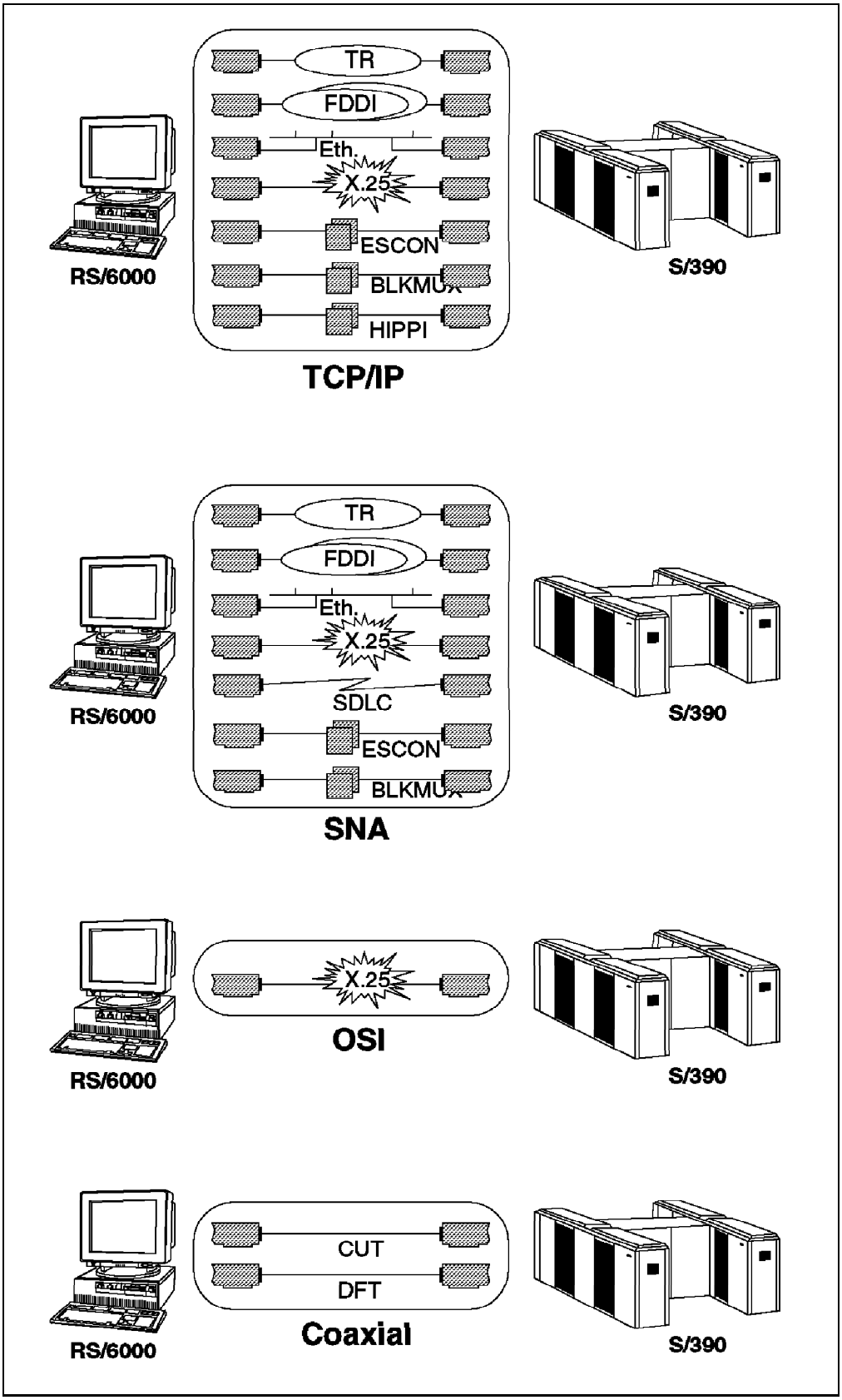


Figure 217. RS/6000 and S/390 Abstract

9.4.2 TCP/IP

9.4.2.1 Token-Ring Network

Table 164. RS/6000 and S/390 - TCP/IP - Token-Ring: Abstract

		RS/6000	S/390
Hardware		- 2970/9970 - 8246 - 2972 - 7092 - 2971/2973/8209 - 8042/8043/7044 - 2979	- 3172 controller - 3174 controller - 3745 controller - OSA adapter
Software		- AIX V4 (TCP/IP included) - Host Connection Program V2.1(1)	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: NFS feature(3) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2) option: IND$FILE(5) or CICS/VS File Tr.(5)
Functions	**- emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S), 3270 (C/)(1)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- file transfer	- FTP (C/S), TFTP (C/S), fxfer(1), (5)	- FTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (/S)(3)
	- print sharing	- LPR/LPD (C/S), 3286/87 emul.(1)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S), HLLAPI(1)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.
- (5) requires one of the following programs.

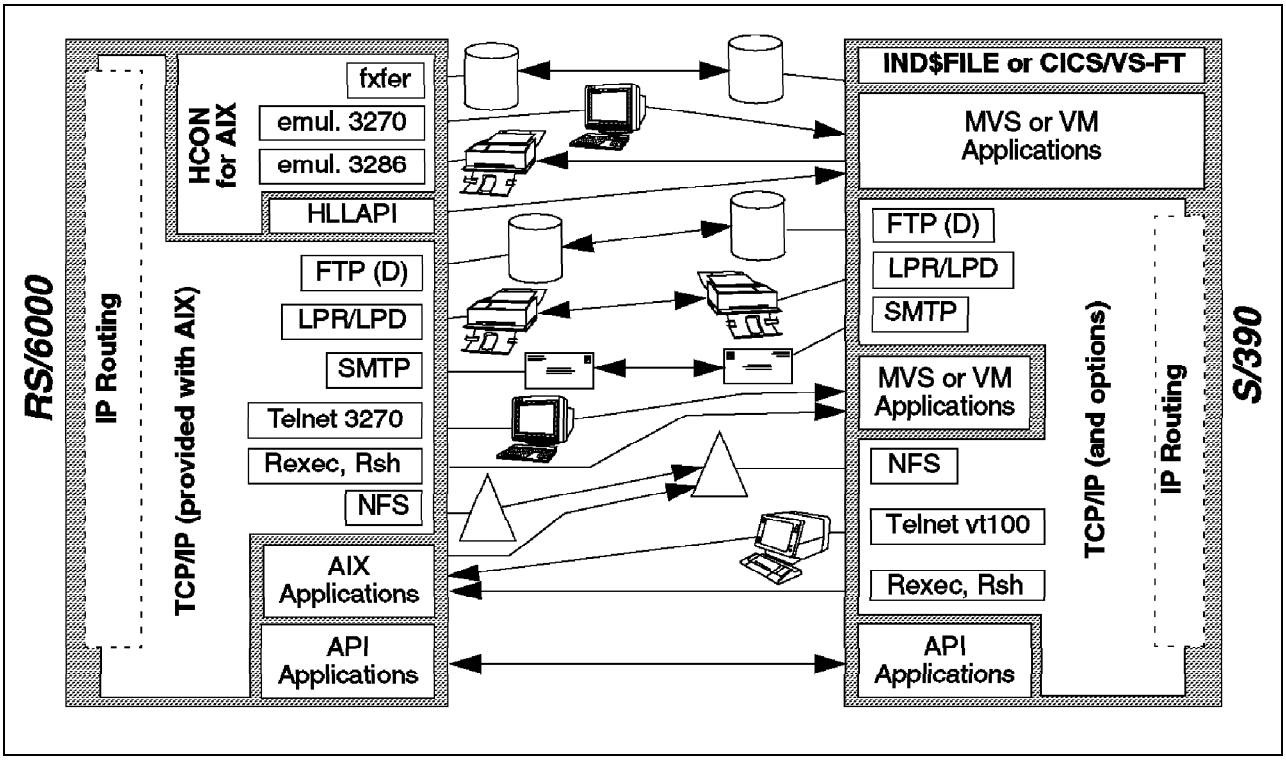


Figure 218. RS/6000 and S/390 - TCP/IP - Token-Ring: Logical View

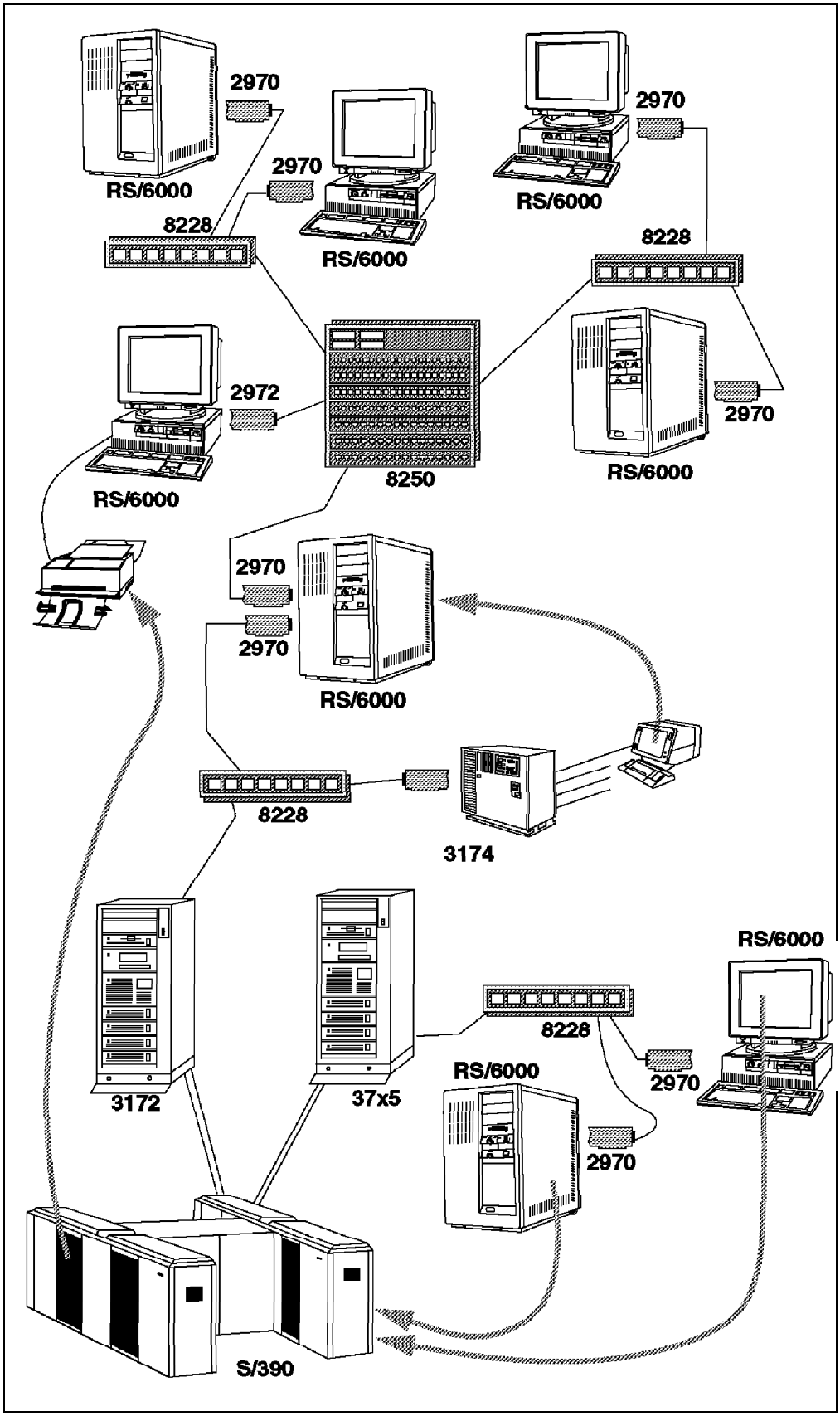


Figure 219. RS/6000 and S/390 - TCP/IP - Token-Ring: Physical View

9.4.2.2 FDDI Network

Table 165. RS/6000 and S/390 - TCP/IP - FDDI: Abstract

		RS/6000	S/390
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- 3172 controller - OSA adapter
Software		- AIX V4 (TCP/IP included) - Host Connection Program V2.1(1)	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: NFS feature(3) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2) option: IND$FILE(5) or CICS/VS File Tr.(5)
Functions	**- emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S), 3270 (C/)(1)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- file transfer	- FTP (C/S), TFTP (C/S), fxfer(1), (5)	- FTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (/S)(3)
	- print sharing	- LPR/LPD (C/S), 3286/87 emul.(1)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S), HLLAPI(1)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.
- (5) requires one of the following programs

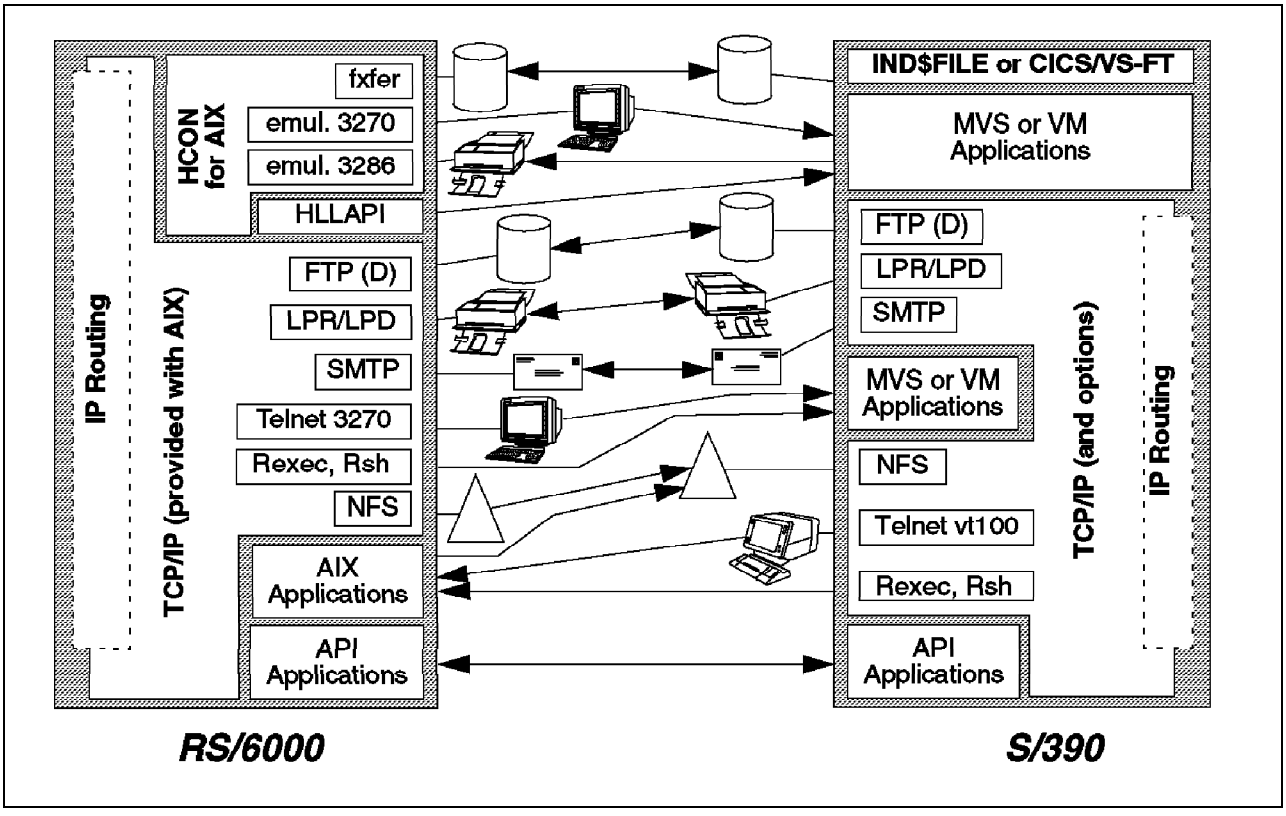


Figure 220. RS/6000 and S/390 - TCP/IP - FDDI: Logical View

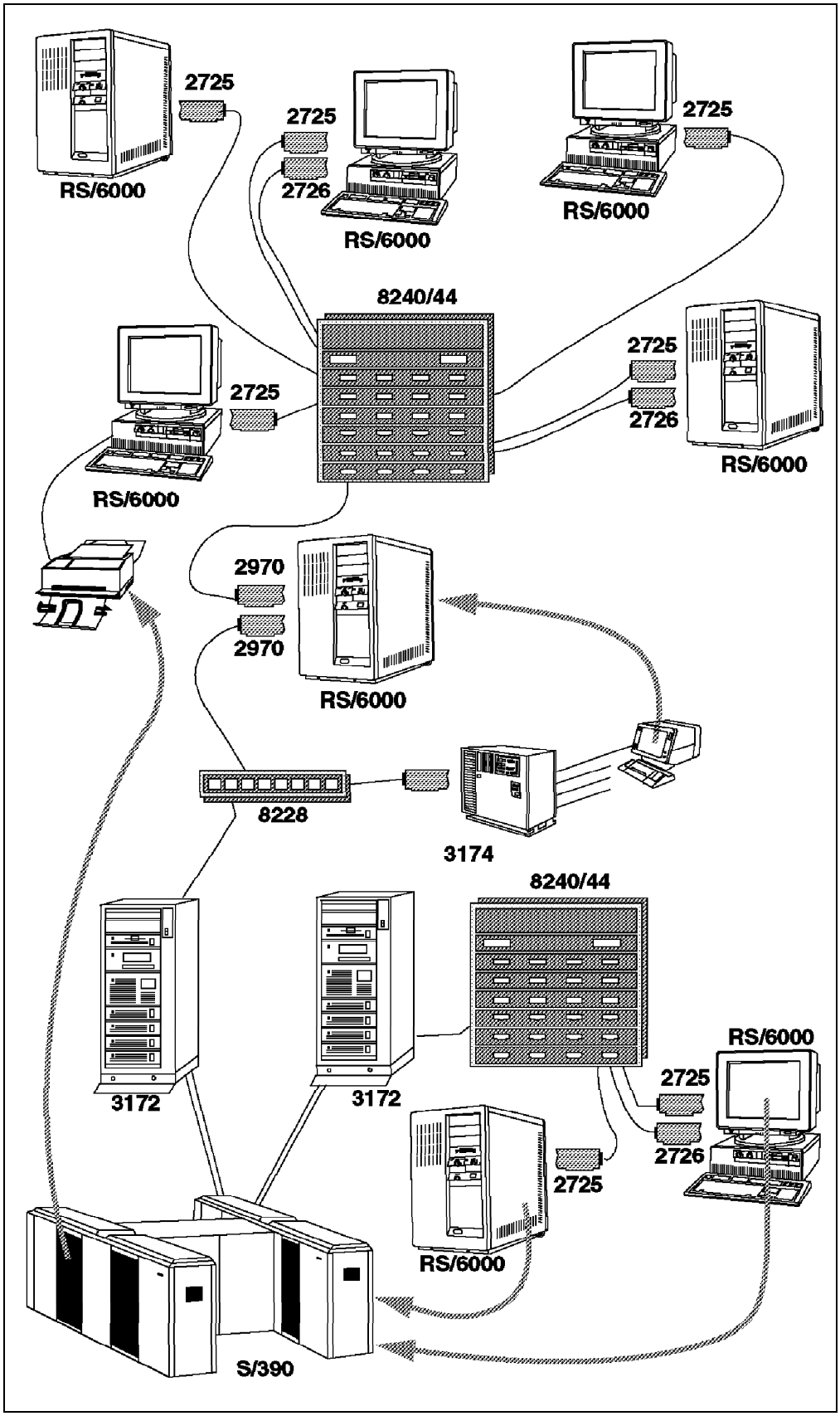


Figure 221. RS/6000 and S/390 - TCP/IP - FDDI: Physical View

9.4.2.3 Ethernet Network

Table 166. RS/6000 and S/390 - TCP/IP - Ethernet: Abstract

		RS/6000	S/390
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option:4222/4223)	- 3172 controller - 3174 controller - 3745 controller - OSA adapter
Software		- AIX V4 (TCP/IP included) - Host Connection Program V2.1(1)	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: NFS feature(3) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2) option: IND$FILE(5) or CICS/VS File Tr.(5)
Functions	**- emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S), 3270 (C/)(1)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- file transfer	- FTP (C/S), TFTP (C/S), fxfer(1), (5)	- FTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (/S)(3)
	- print sharing	- LPR/LPD (C/S), 3286/87 emul.(1)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S), HLLAPI(1)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4)are provided with this optional software.
- (5) requires one of the following programs.

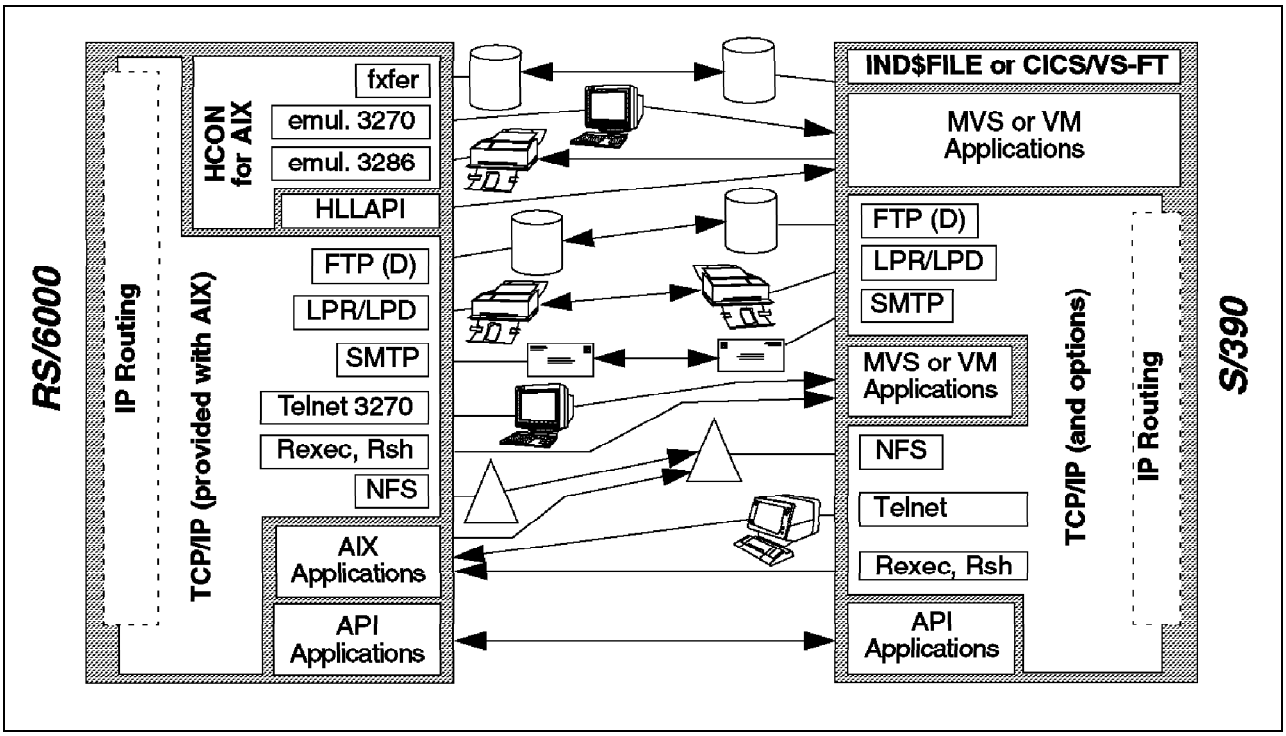


Figure 222. RS/6000 and S/390 - TCP/IP - Ethernet: Logical View

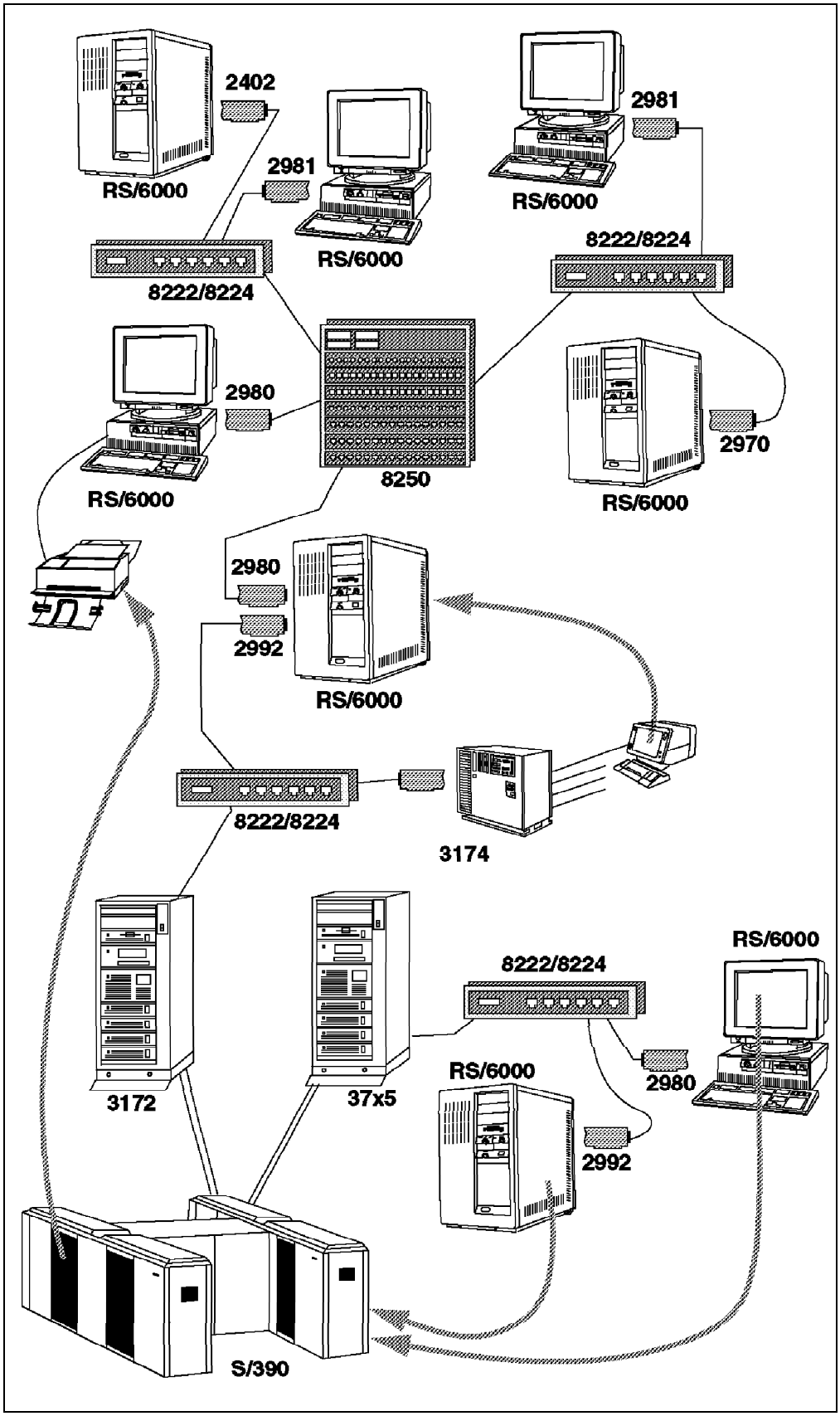


Figure 223. RS/6000 and S/390 - TCP/IP - Ethernet: Physical View

9.4.2.4 X.25 Network

Table 167. RS/6000 and S/390 - TCP/IP - X.25: Abstract

		RS/6000	S/390
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 3174 controller - 3745 controller
Software		- AIX V4 (TCP/IP included) - Host Connection Program V2.1(1) - AIXlink/X.25 V1.1	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2) option: IND$FILE(5) or CICS/VS File Tr.(5)
Functions	**- emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S), 3270 (C/)(1)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- file transfer	- FTP (C/S), TFTP (C/S), fxfer(1), (5)	- FTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S), 3286/87 emul.(1)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S), HLLAPI(1)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.
- (5) requires one of the following programs.

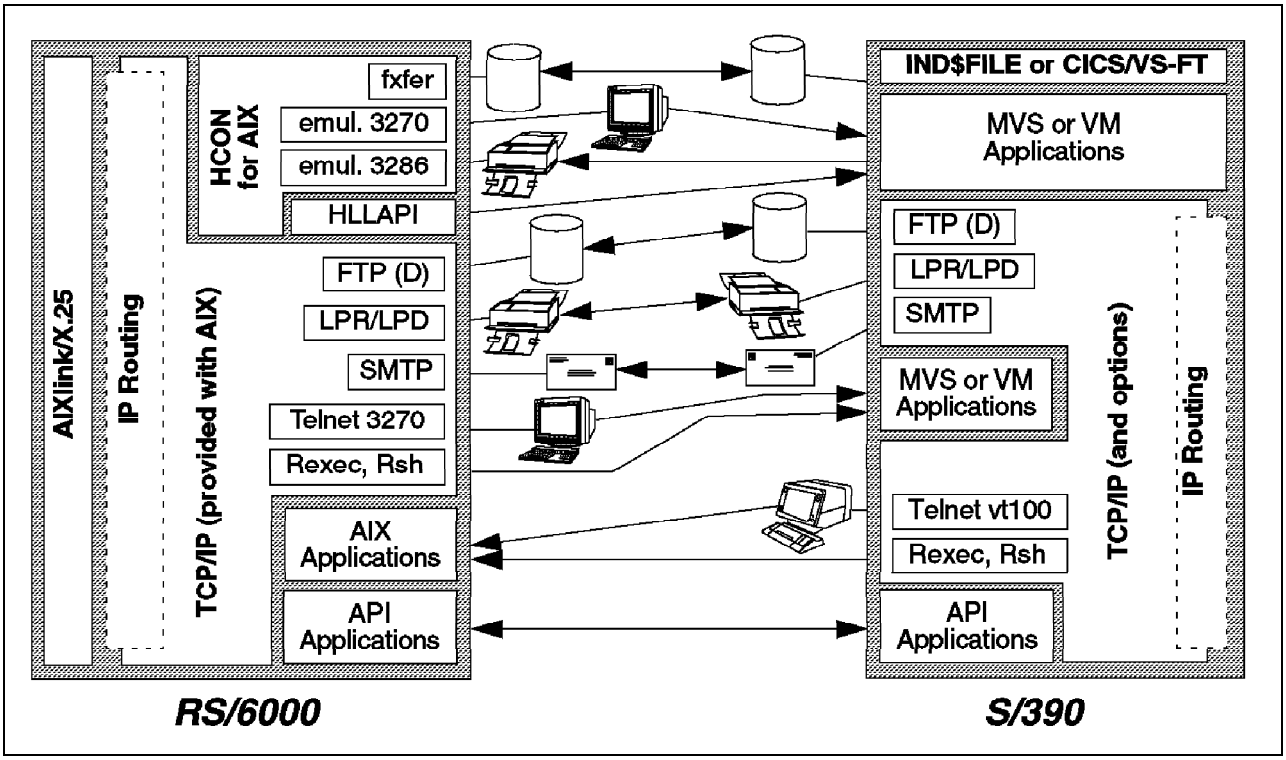


Figure 224. RS/6000 and S/390 - TCP/IP - X.25: Logical View

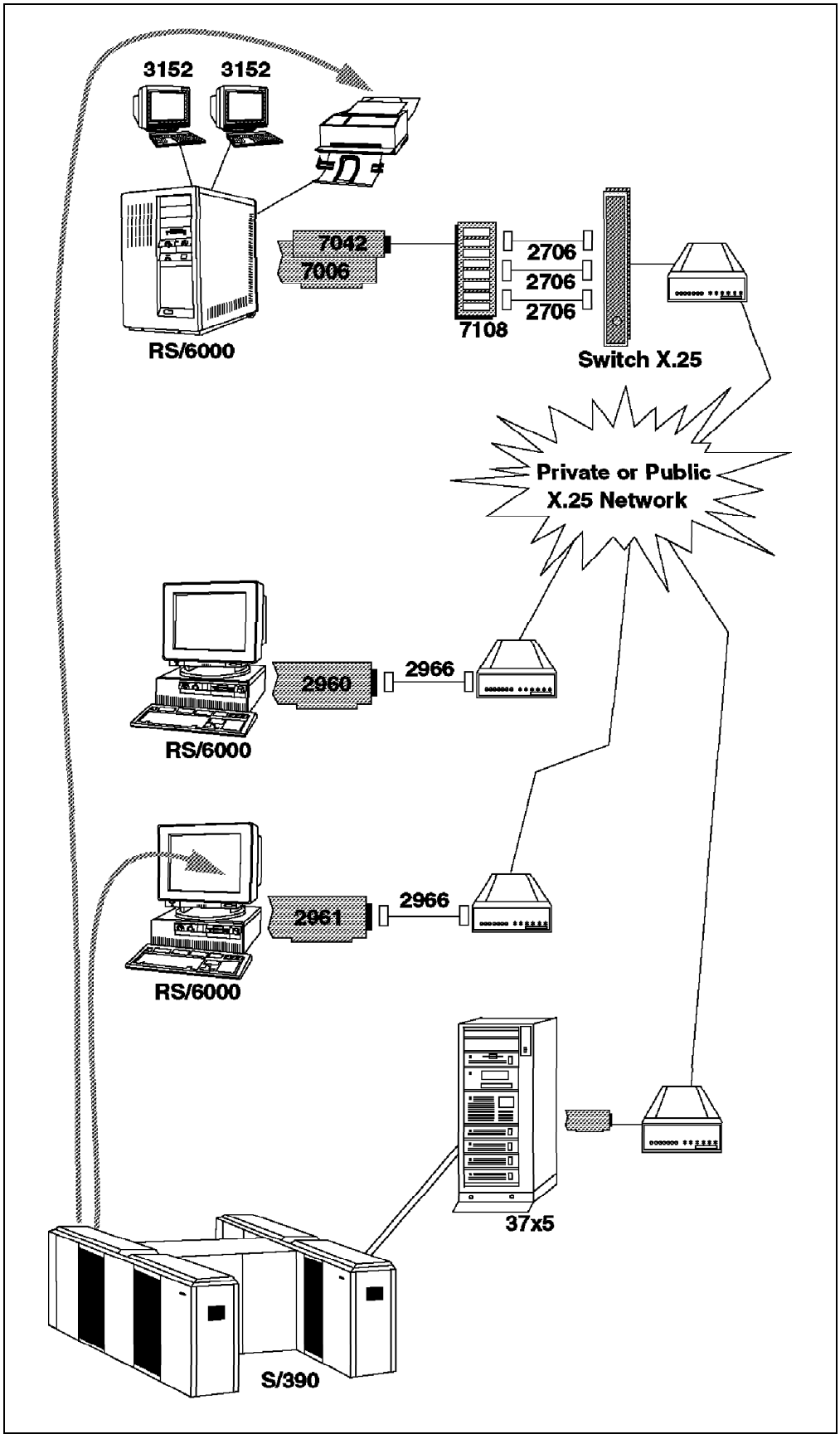


Figure 225. RS/6000 and S/390 - TCP/IP - X.25: Logical View

9.4.2.5 ESCON Network

Table 168. RS/6000 and S/390 - TCP/IP - ESCON: Abstract

		RS/6000	S/390
Hardware		- 2756 (+channel jumper cable) - 2754 (+channel jumper cable)	- Channel Connection
Software		- AIX V4 (TCP/IP included) - Host Connection Program V2.1(1) - ESCON Channel Connectivity V1.1	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: NFS feature(3) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2) option: IND$FILE(5) or CICS/VS File Tr.(5)
Functions	**- emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S), 3270 (C/)(1)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- file transfer	- FTP (C/S), TFTP (C/S), fxfer(1), (5)	- FTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (/S)(3)
	- print sharing	- LPR/LPD (C/S), 3286/87 emul.(1)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S), HLLAPI(1)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.
- (5) requires one of the following programs.

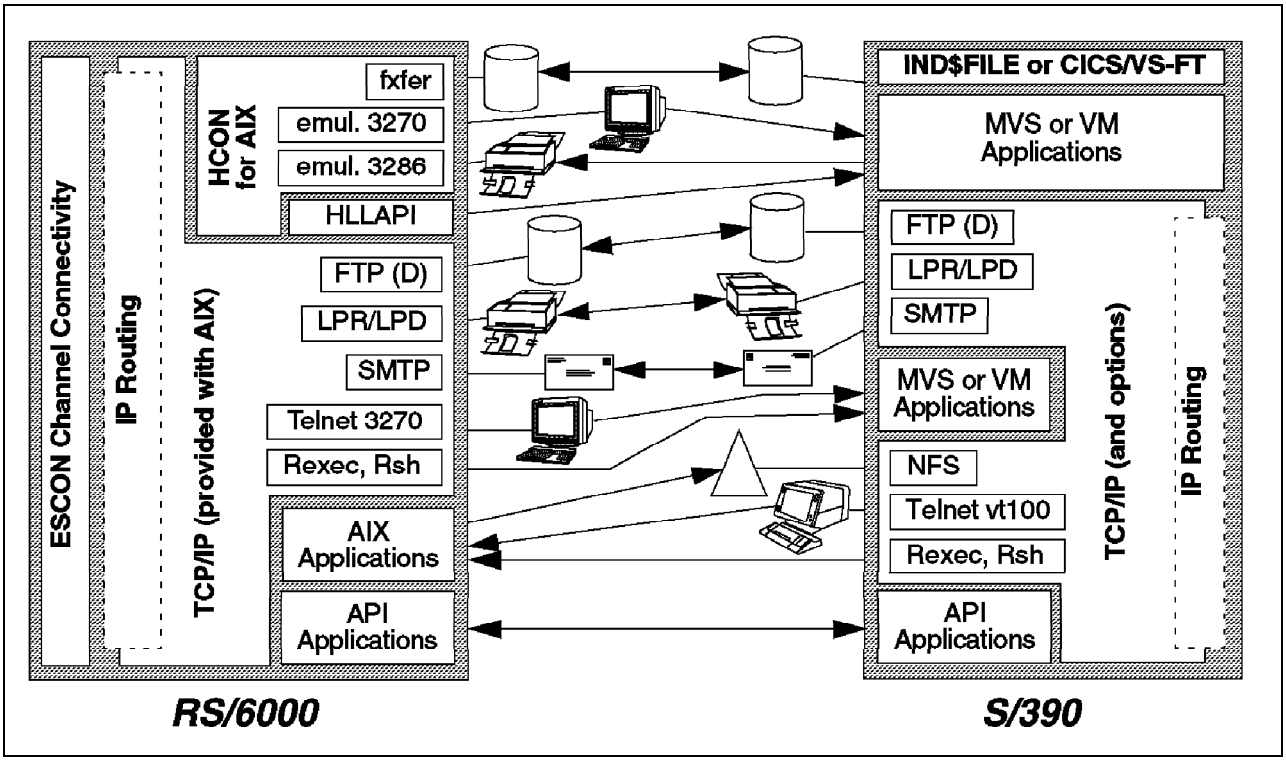


Figure 226. RS/6000 and S/390 - TCP/IP - ESCON: Logical View

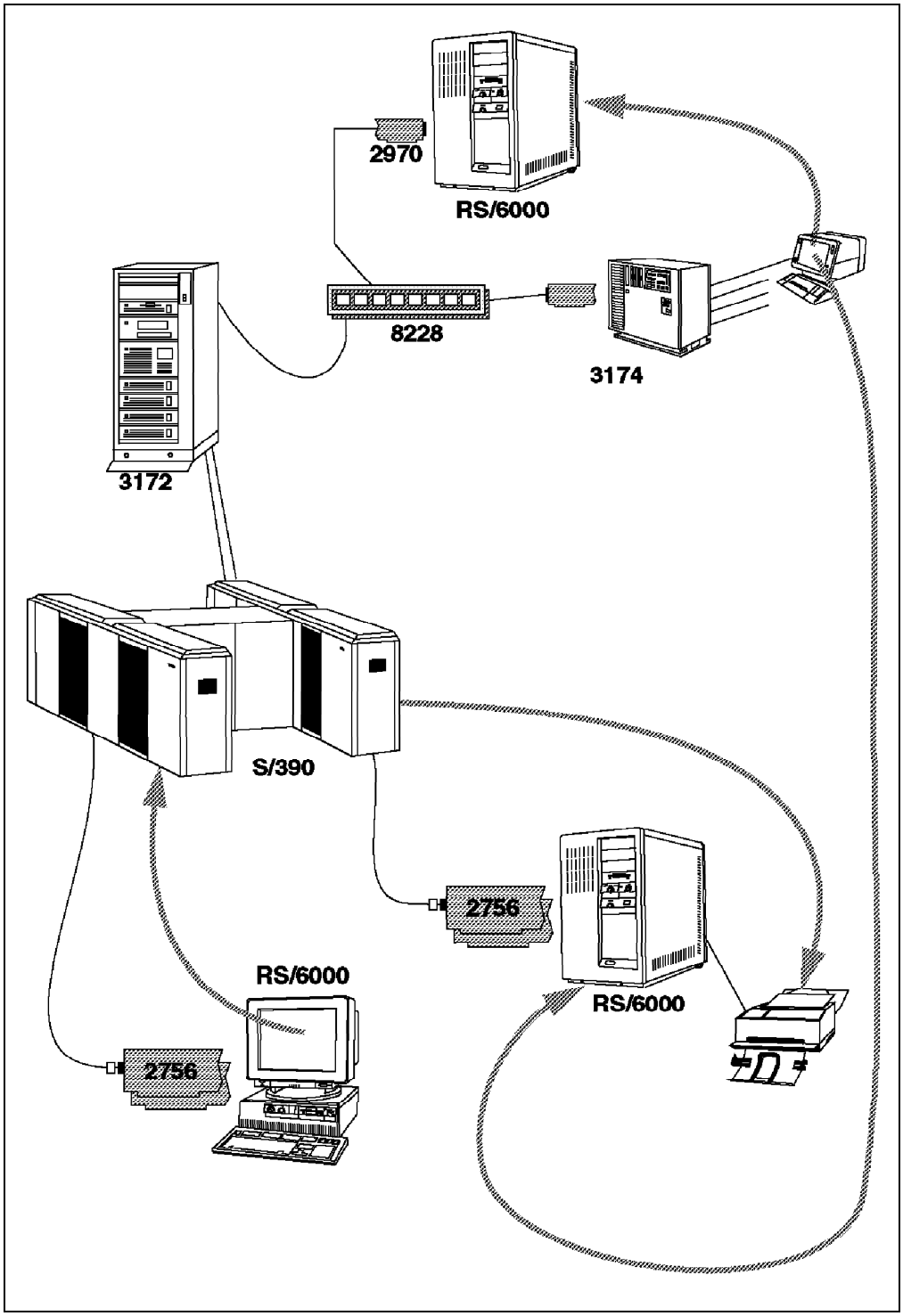


Figure 227. RS/6000 and S/390 - TCP/IP - ESCON: Physical View

9.4.2.6 BLKMUX Network

Table 169. RS/6000 and S/390 - TCP/IP - BLKMUX: Abstract

		RS/6000	S/390
Hardware		- 2756 (+channel jumper cable) - 2754 (+channel jumper cable)	- Channel Connection
Software		- AIX V4 (TCP/IP included) - Host Connection Program V2.1(1) - Block Multiplexer Channel Connectivity V1.1	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: NFS feature(3) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2) option: IND$FILE(5) or CICS/VS File Tr.(5)
Functions	**- emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S), 3270 (C/)(1)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- file transfer	- FTP (C/S), TFTP (C/S), fxfer(1), (5)	- FTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (/S)(3)
	- print sharing	- LPR/LPD (C/S), 3286/87 emul.(1)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S), HLLAPI(1)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.
- (5) requires one of the following programs.

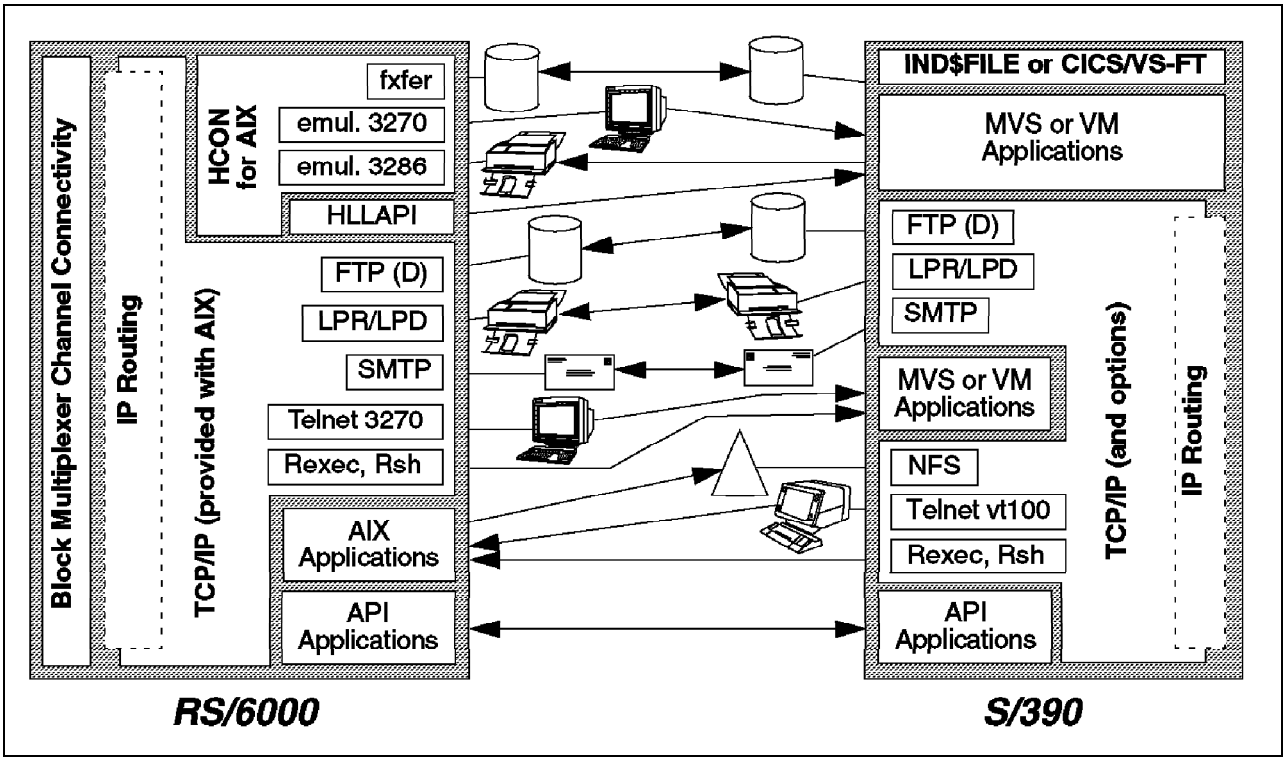


Figure 228. RS/6000 and S/390 - TCP/IP - BLKMUX: Logical View

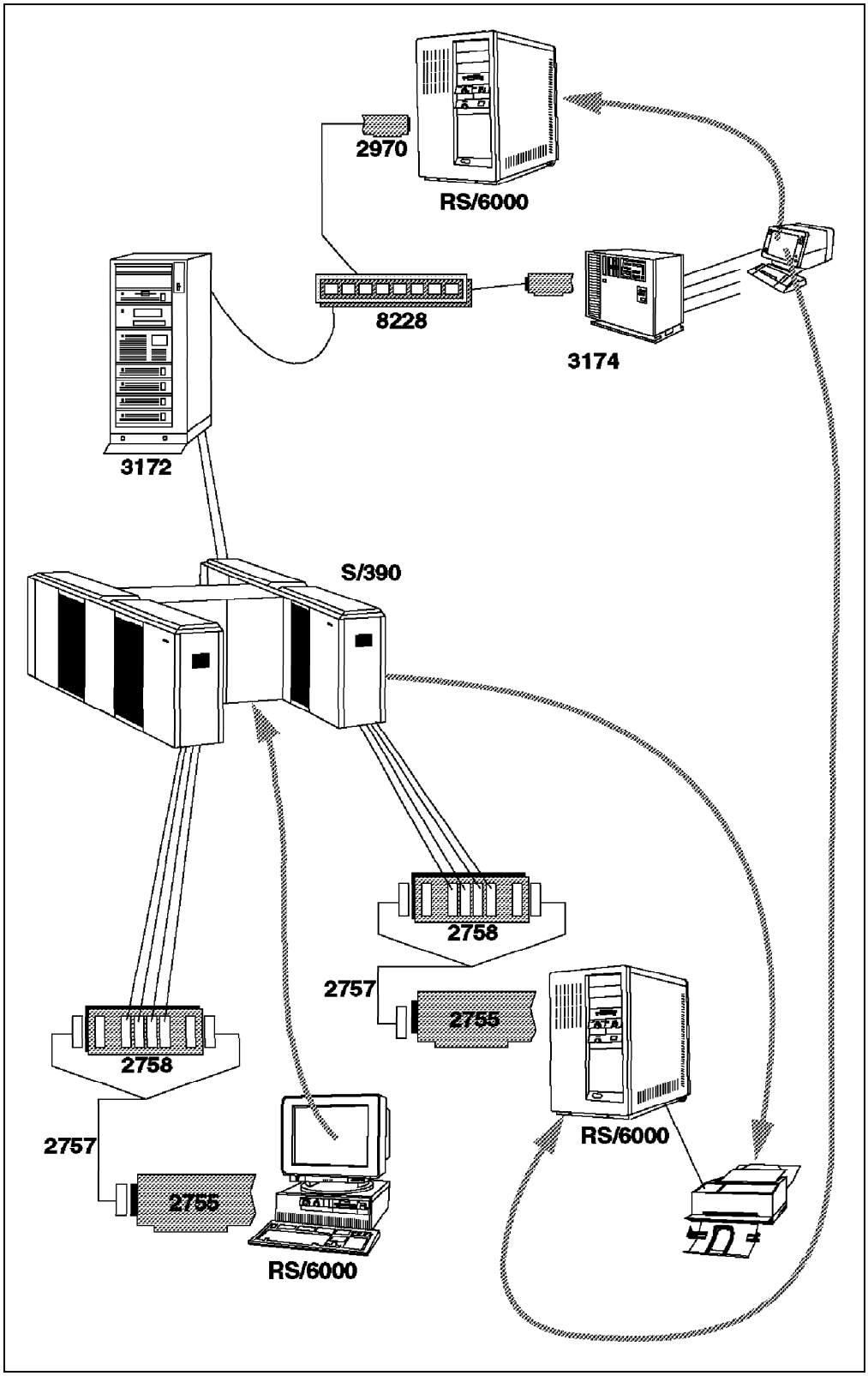


Figure 229. RS/6000 and S/390 - TCP/IP - BLKMUX: Physical View

9.4.2.7 HIPPI Network

Table 170. RS/6000 and S/390 - TCP/IP - HIPPI: Abstract

		RS/6000	S/390
Hardware		- 2756 (+channel jumper cable) - 2754 (+channel jumper cable)	- channel connection
Software		- AIX V4 (TCP/IP included) - High Performance Parallel Interface 4.1	- TCP/IP V3.1 for MVS (or V2.3 for VM) option: NFS feature(3) option: application programs(4) option: TCP/IP from Teubner & Assoc.(2)
Functions	- **emulation**	- tn (C/S), tn3270 (C/), tnvt100 (C/S)	- tn (C/S), tn3270 (C/S), tnvt100 (/S)(2)
	- **file transfer**	- FTP (C/S), TFTP (C/S)	- FTP (C/S)
	- **file sharing**	- NFS (C/S)	- NFS (/S)(3)
	- **print sharing**	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- **remote command**	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- **API**	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(4)
	- **mail**	- SMTP (C/S)	- SMTP (C/S)
	- **security**	- Kerberos (C/S)	- Kerberos (C/S)
	- **graphic**	- X-Window (C/S)	- X-Window (C/)
	- **name directory**	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- **network management**	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (3) and (4) are provided with this optional software.

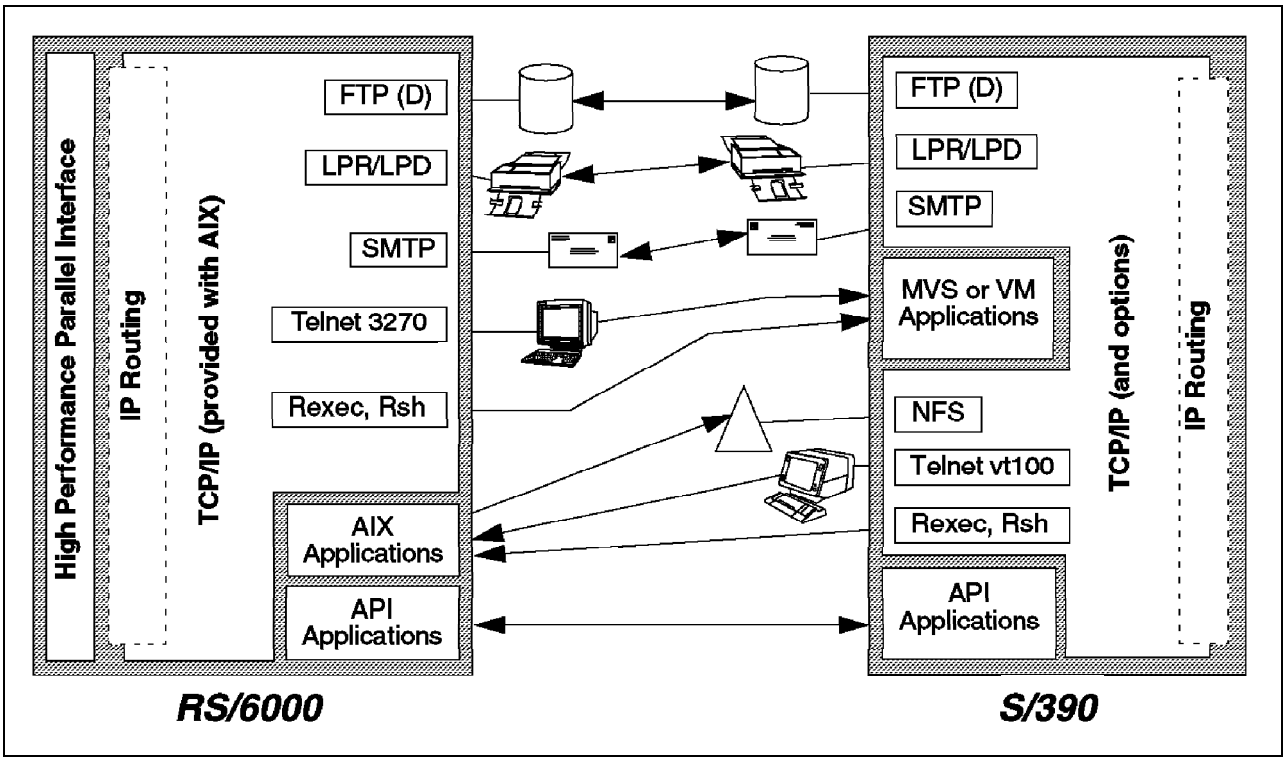


Figure 230. RS/6000 and S/390 - TCP/IP - HIPPI: Logical View

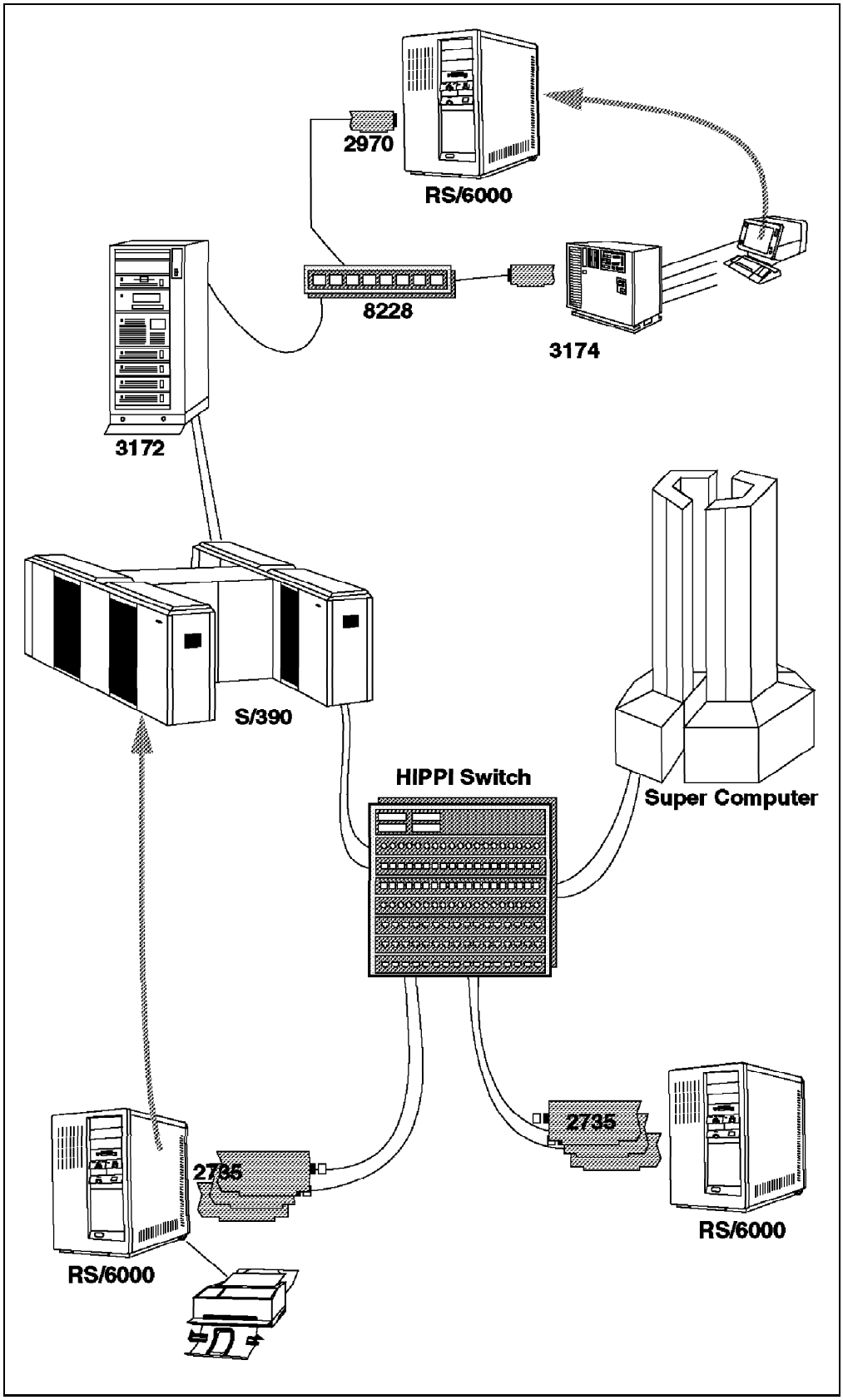


Figure 231. RS/6000 and S/390 - TCP/IP - HIPPI: Physical View

9.4.3 SNA

9.4.3.1 Token-Ring Network

Table 171. RS/6000 and S/390 - SNA - Token-Ring: Abstract

		RS/6000	S/390
Hardware		- 2970/9970 - 8246 - 2972 - 7092 - 2971/2973/8209 - 8042/8043/7044 - 2979	- 3172 controller - 3174 controller - 3745 controller - OSA adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Host Connection Program V2.1(1) - SNA Applications Access(4) - SNA Client Access(2)	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5)
Functions	**- emulation**	- tn3270 bloc(2), 3270 (C/)(1)	- Emulation thru AIX bloc applications(4)
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0,1,2,3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1), (2), and (4) are provided with this optional software.
- (5) requires one of the following programs.

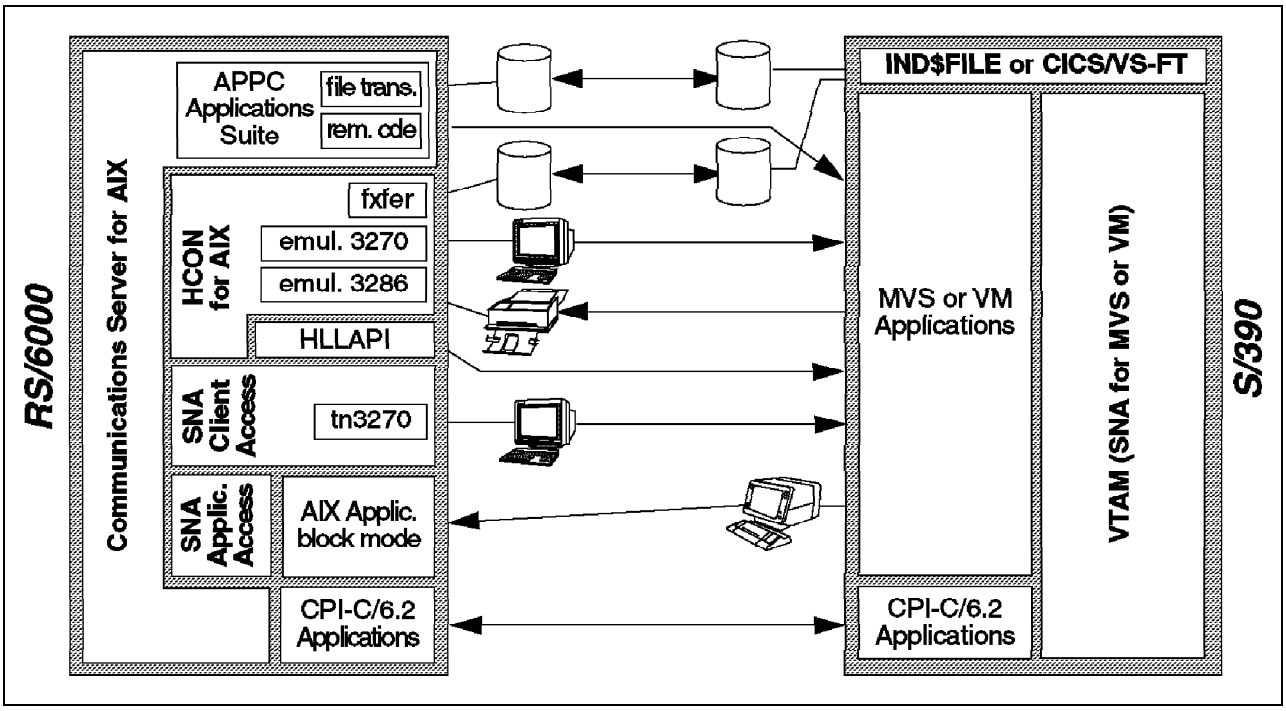


Figure 232. RS/6000 and S/390 - SNA - Token-Ring: Logical View

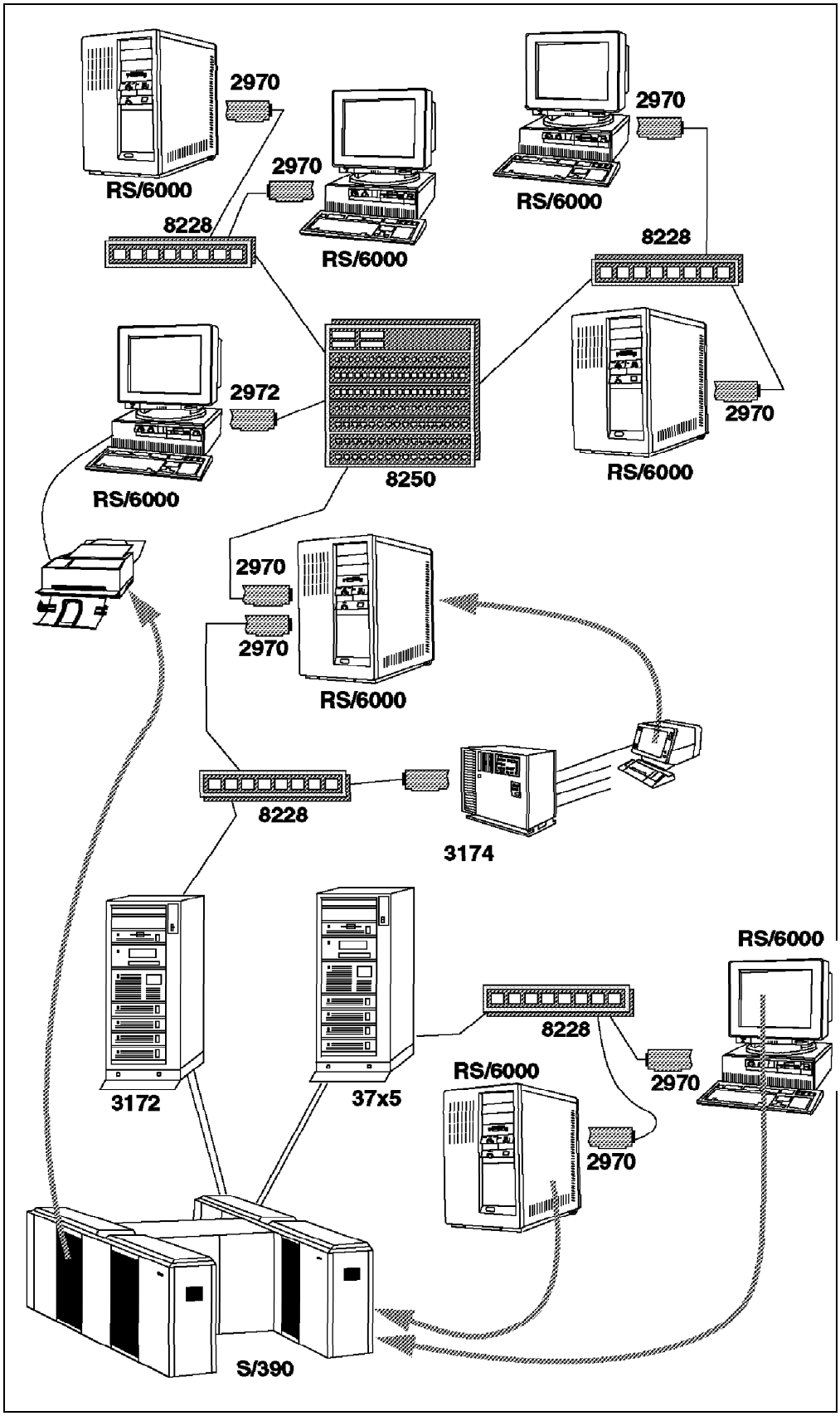


Figure 233. RS/6000 and S/390 - SNA - Token-Ring: Physical View

9.4.3.2 FDDI Network

Table 172. RS/6000 and S/390 - SNA - FDDI: Abstract

		RS/6000	S/390
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- 3172 controller - OSA adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Host Connection Program V2.1(1)	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5)
Functions	**- emulation**	- 3270 (C/)(1)	-
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1) is provided with this optional software.
- (5) requires one of the following programs.

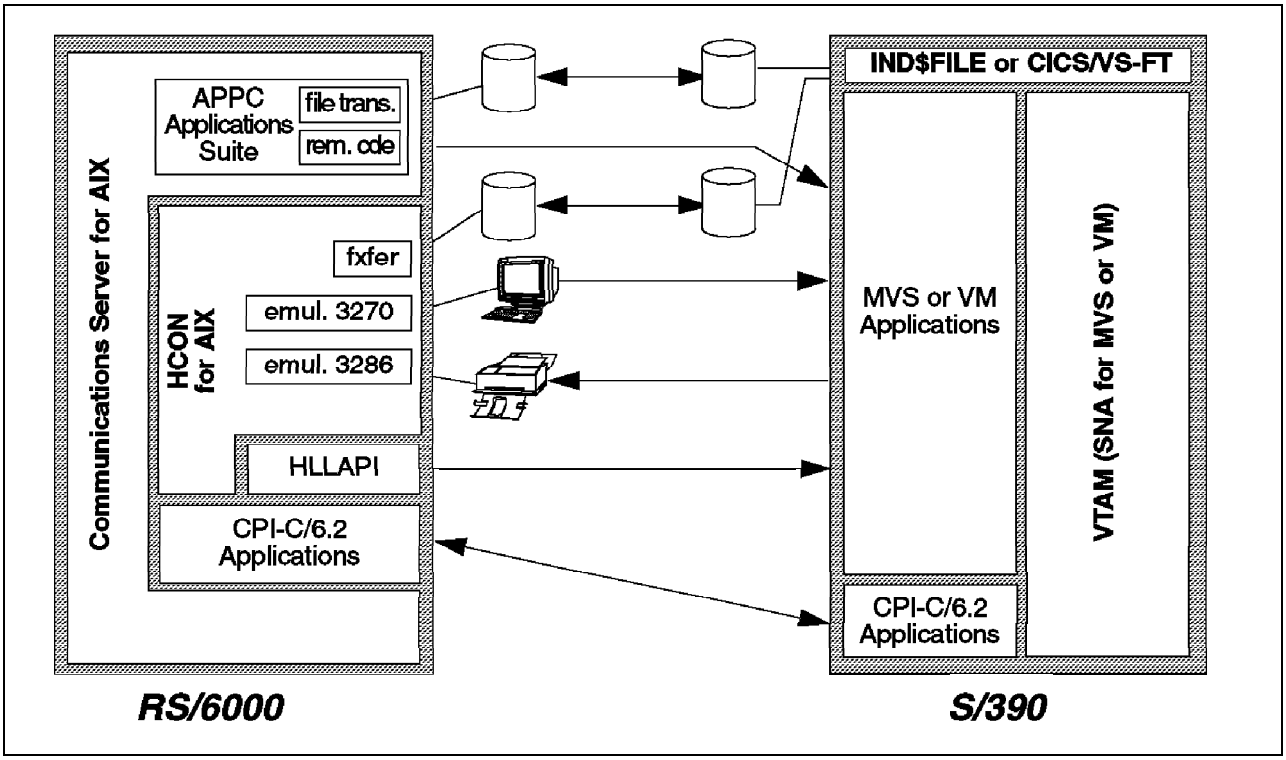


Figure 234. RS/6000 and S/390 - SNA - FDDI: Logical View

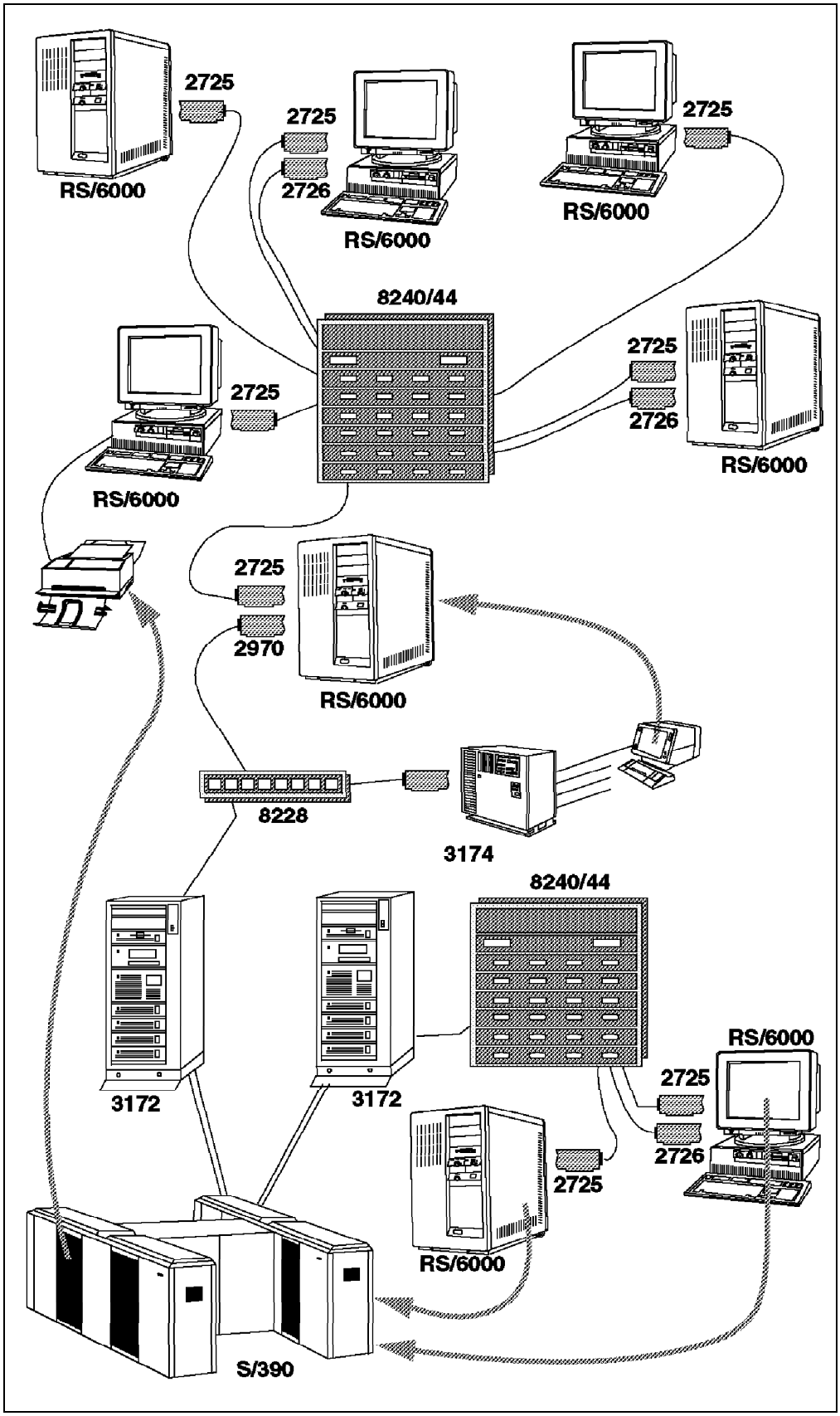


Figure 235. RS/6000 and S/390 - SNA - FDDI: Physical View

9.4.3.3 Ethernet Network

Table 173. RS/6000 and S/390 - SNA - Ethernet: Abstract

		RS/6000	S/390
Hardware		- Std ports - 8242 (100 Mbps) - 2980/9980 - 2981/2982/8210 - 4221/9000 - 8241 - 4222/9001 - 8022/8023/8024 - 2992 - 8032/8033/8034 - 2993 - 2402/2406 - 2987 - 2403/2407 - 2985 (option:4222/4223)	- 3172 controller - 3174 controller - 3745 controller - OSA adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Host Connection Program V2.1(1) - SNA Applications Access(4) - SNA Client Access(2)	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5)
Functions	**- emulation**	- tn3270 bloc(2), 3270 (C/)(1)	- Emulation thru AIX bloc applications(4)
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0,1,2,3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1), (2), and (4) are provided with this optional software.
- (5) requires one of the following programs.

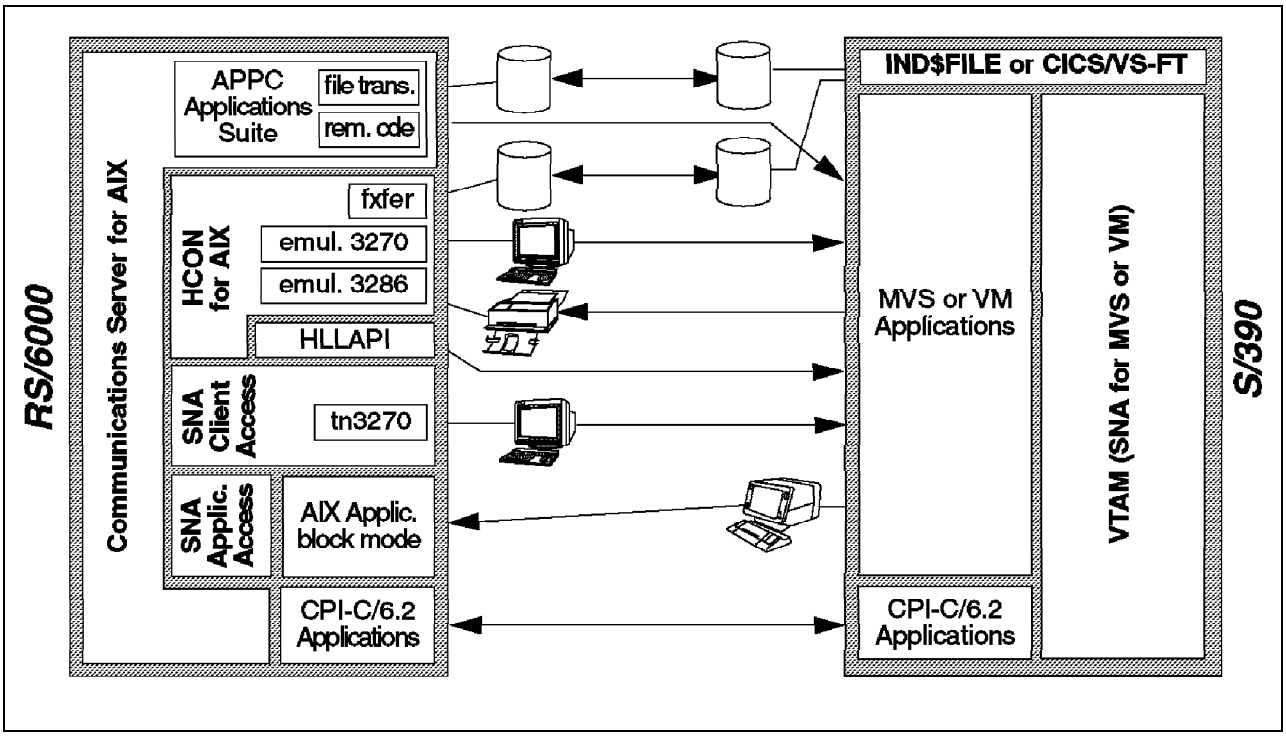


Figure 236. RS/6000 and S/390 - SNA - Ethernet: Logical View

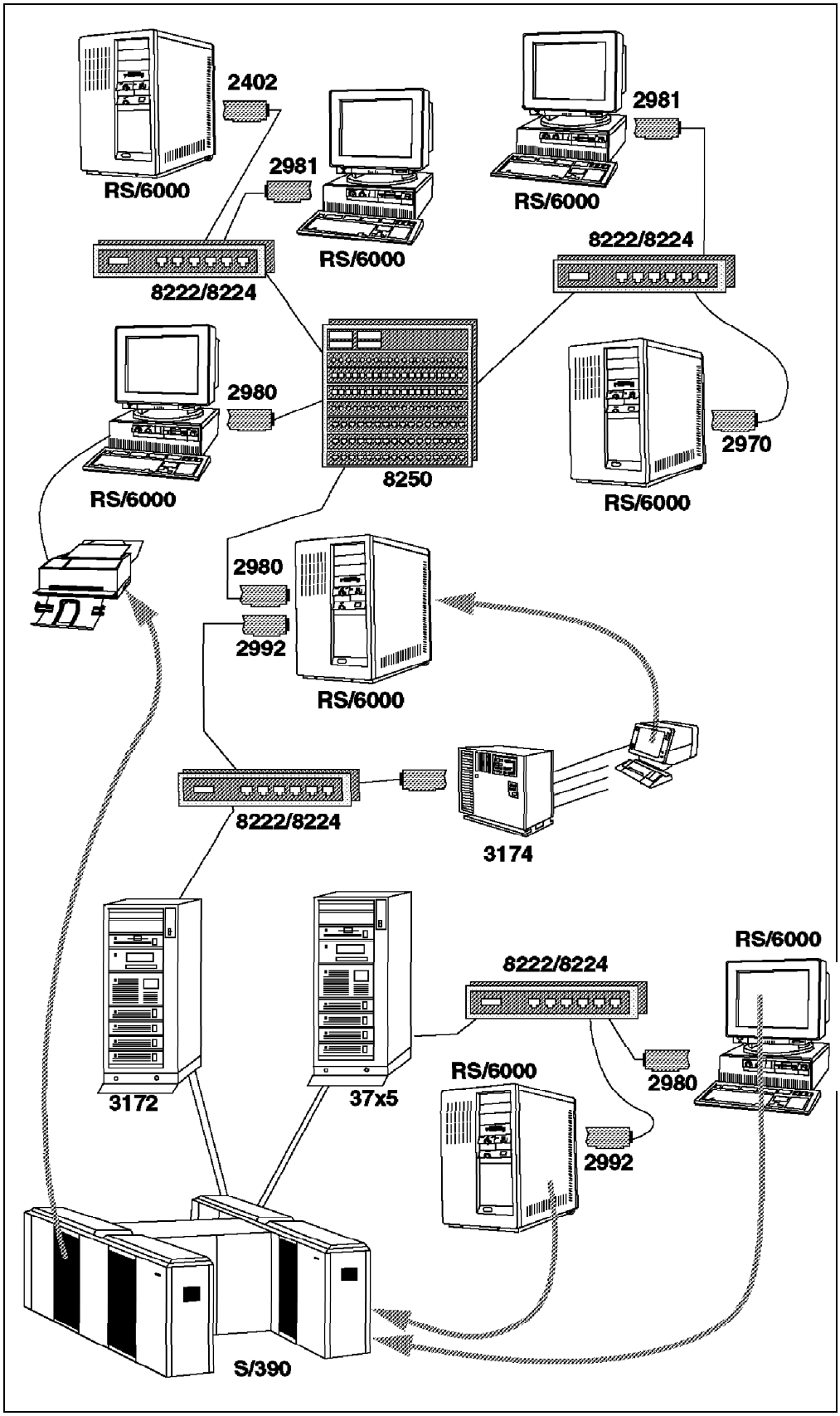


Figure 237. RS/6000 and S/390 - SNA - Ethernet: Physical View

9.4.3.4 X.25 Network

Table 174. RS/6000 and S/390 - SNA - X.25: Abstract

		RS/6000	S/390
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 3174 controller - 3745 controller
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Host Connection Program V2.1(1) - AIXlink/X.25 V1.1	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5) - X.25 NCP Packet Switching Interface V3.8
Functions	**- emulation**	- 3270 (C/)(1)	-
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1)is provided with this optional software.
- (5) requires one of the following programs.

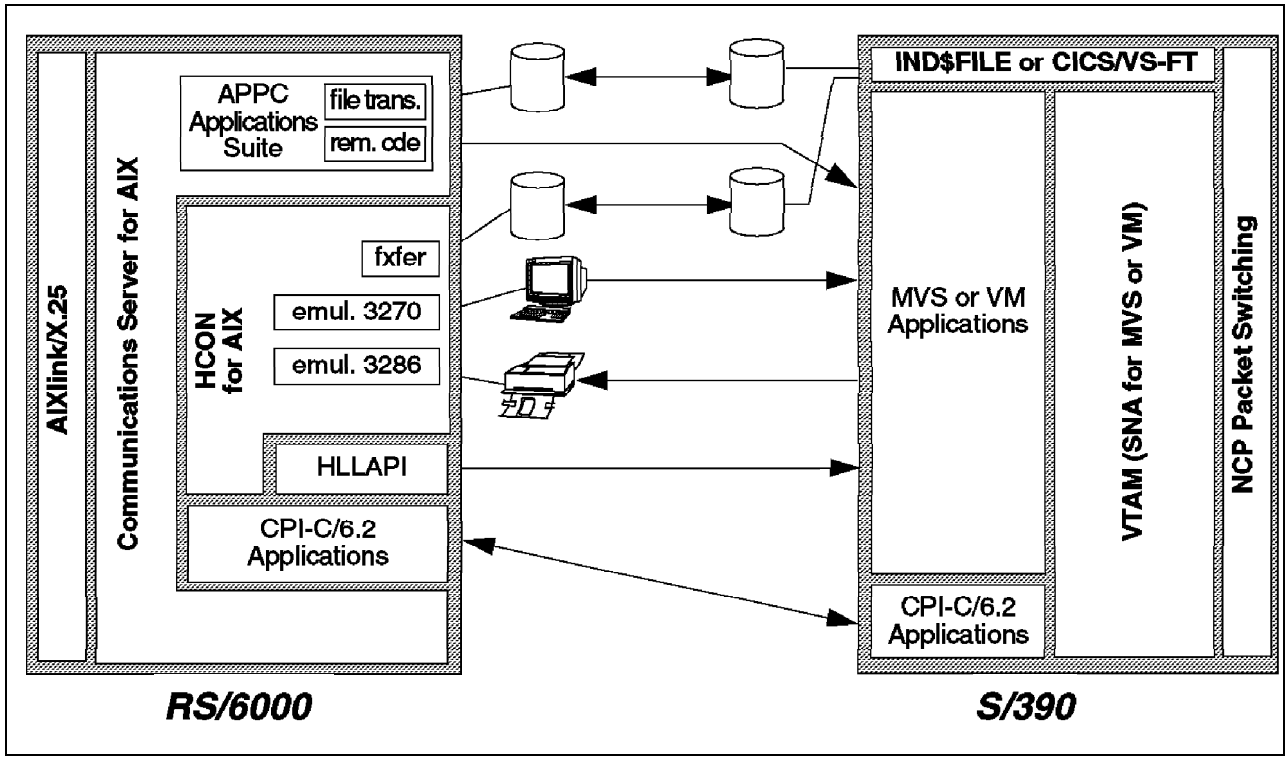


Figure 238. RS/6000 and S/390 - SNA - X.25: Logical View

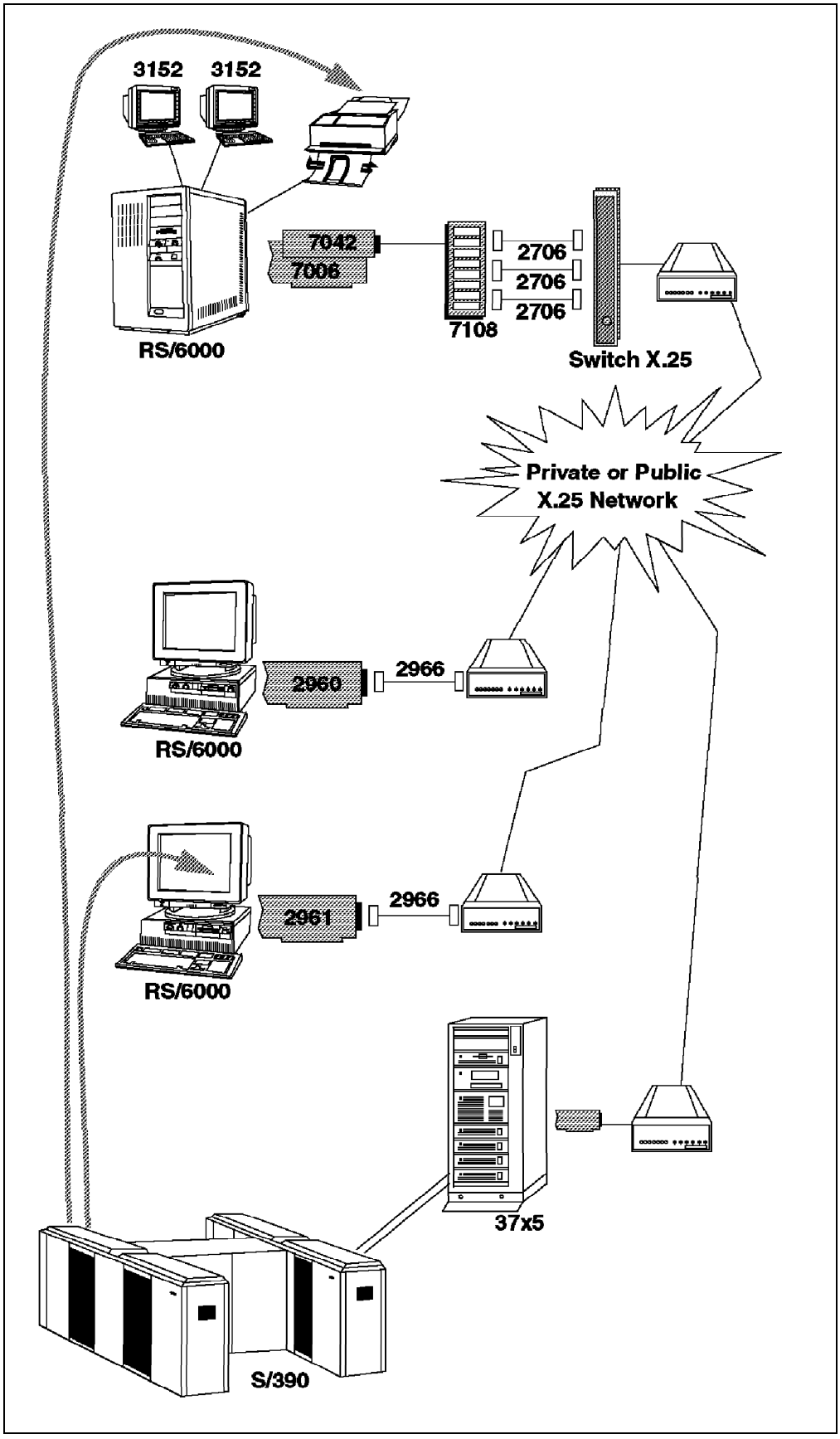


Figure 239. RS/6000 and S/390 - SNA - X.25: Logical View

9.4.3.5 Synchronous Network

Table 175. RS/6000 and S/390 - SNA - Synchronous: Abstract

		RS/6000	S/390
Hardware		- 2959 - 2700 (+2705) - 2701 (+2705)	- 3174 controller - 3745 controller
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Host Connection Program V2.1(1) - SNA Applications Access(4) - SNA Client Access(2)	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5) - NCP V7.4
Functions	**- emulation**	- tn3270 bloc(2), 3270 (C/)(1)	- Emulation thru AIX bloc applications(4)
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1), (2), and (4) are provided with this optional software.
- (5) requires one of the following programs.

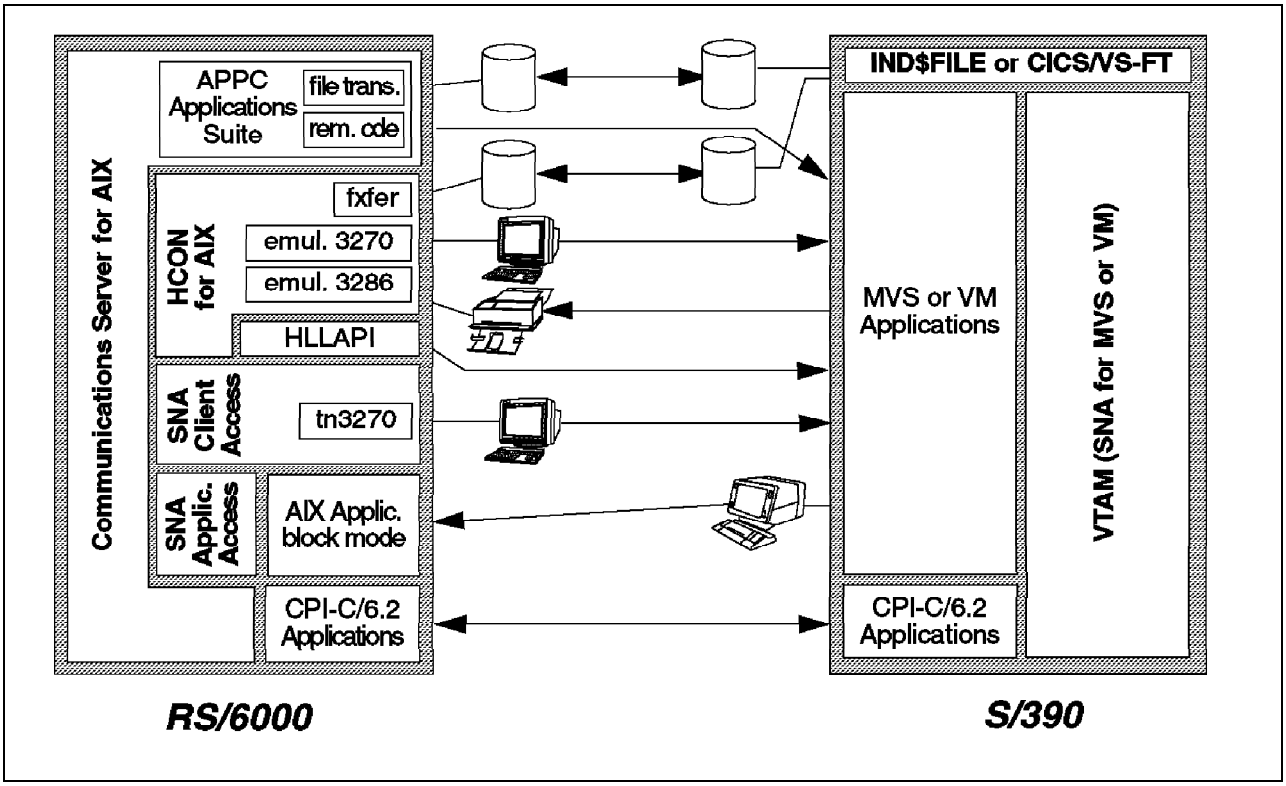


Figure 240. RS/6000 and S/390 - SNA - Synchronous: Logical View

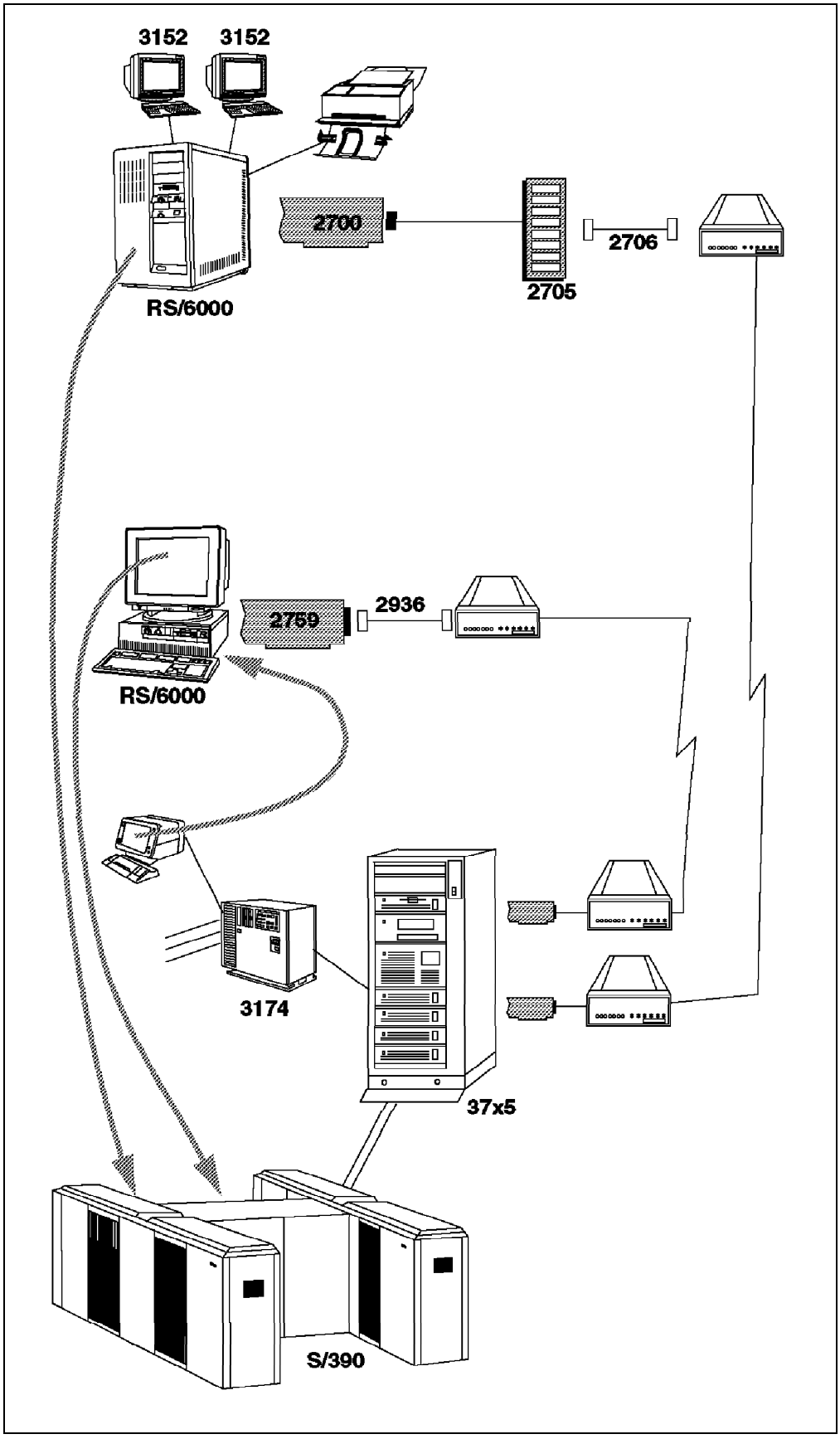


Figure 241. RS/6000 and S/390 - SNA - Synchronous: Physical View

9.4.3.6 ESCON Network

Table 176. RS/6000 and S/390 - SNA - ESCON: Abstract

		RS/6000	S/390
Hardware		- 2756 (+channel jumper cable) - 2754 (+channel jumper cable)	- Channel connection
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) option: SNA Channel Attachment - ESCON Channel Connectivity for AIX V1.1 - Host Connection Program V2.1(1)	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5)
Functions	- emulation	- 3270 (C/)(1)	-
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1) is provided with this optional software.
- (5) requires one of the following programs.

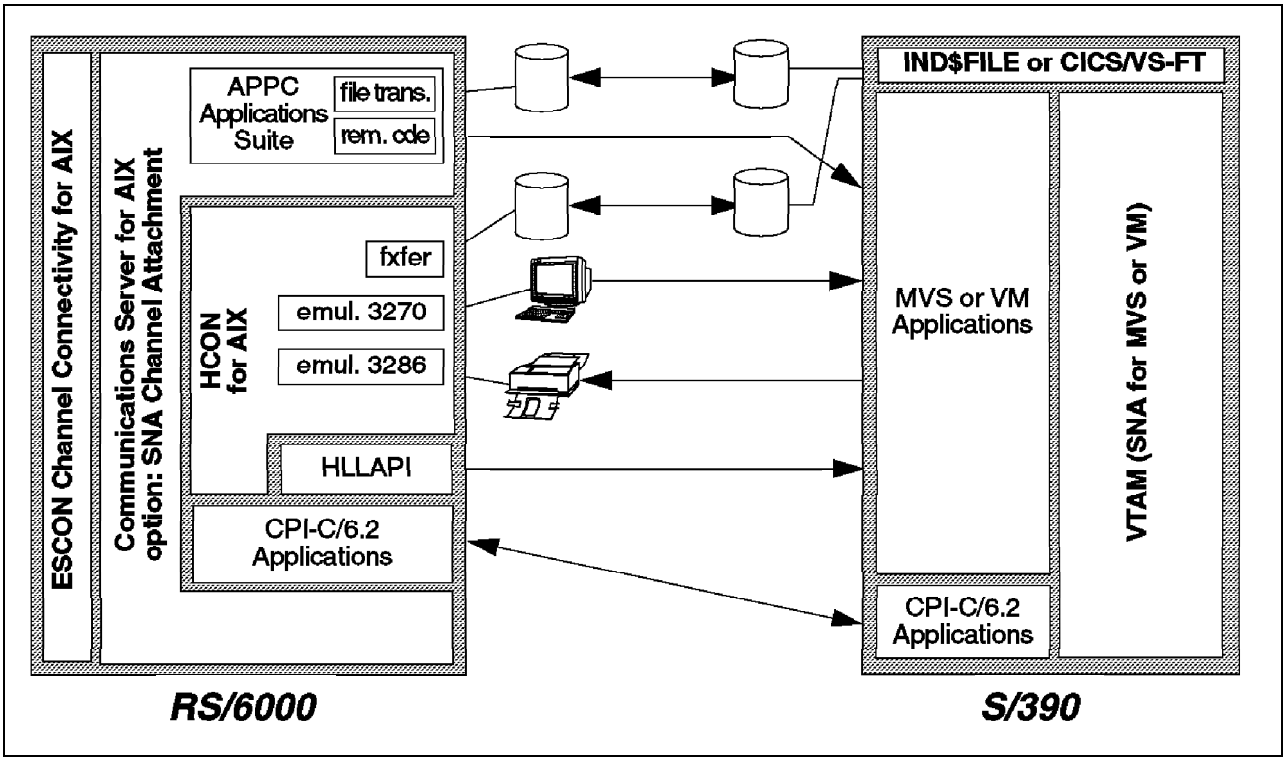


Figure 242. RS/6000 and S/390 - SNA - ESCON: Logical View

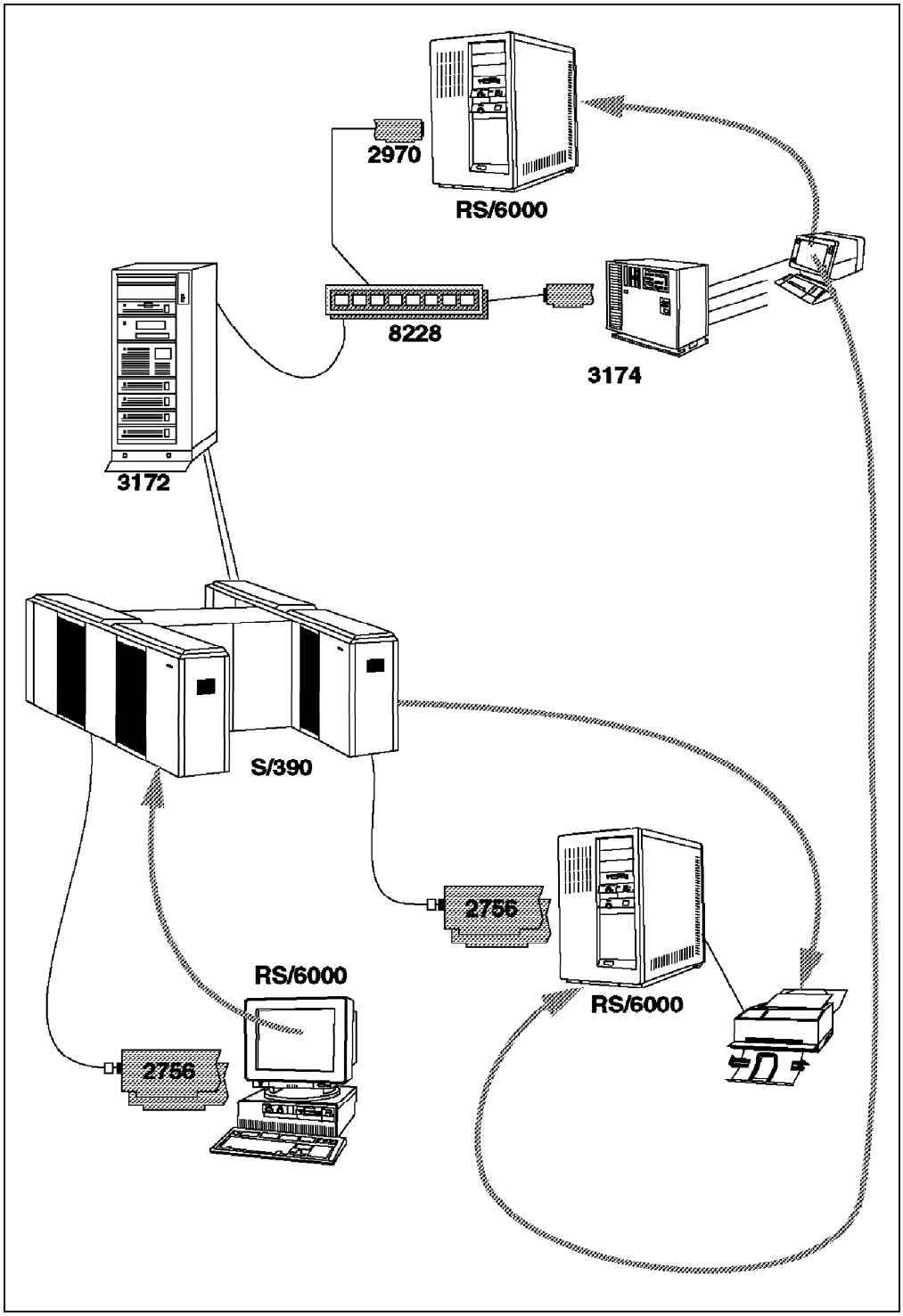


Figure 243. RS/6000 and S/390 - SNA - ESCON: Physical View

9.4.3.7 BLKMUX Network

Table 177. RS/6000 and S/390 - SNA - BLKMUX: Abstract

		RS/6000	S/390
Hardware		- 2755 (+2757 +2758)	- Channel Connection
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) option: SNA Channel Attachment - Block Multiplexer Channel Connectivity V1.1 - Host Connection Program V2.1(1)	- VTAM 4.3 for MVS (or V4.2 for VM) option: AnyNet feature option: IND$FILE(5) or CICS/VS File Tr. (5)
Functions	**- emulation**	- 3270 (C/)(1)	-
	- file transfer	- APPC Applications Suite, fxfer(1), (5)	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.(1)	-
	- remote command	- APPC Applications Suite	-
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), HLLAPI(1)	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	-

Remark

- (1) is provided with this optional software.
- (5) requires one of the following programs.

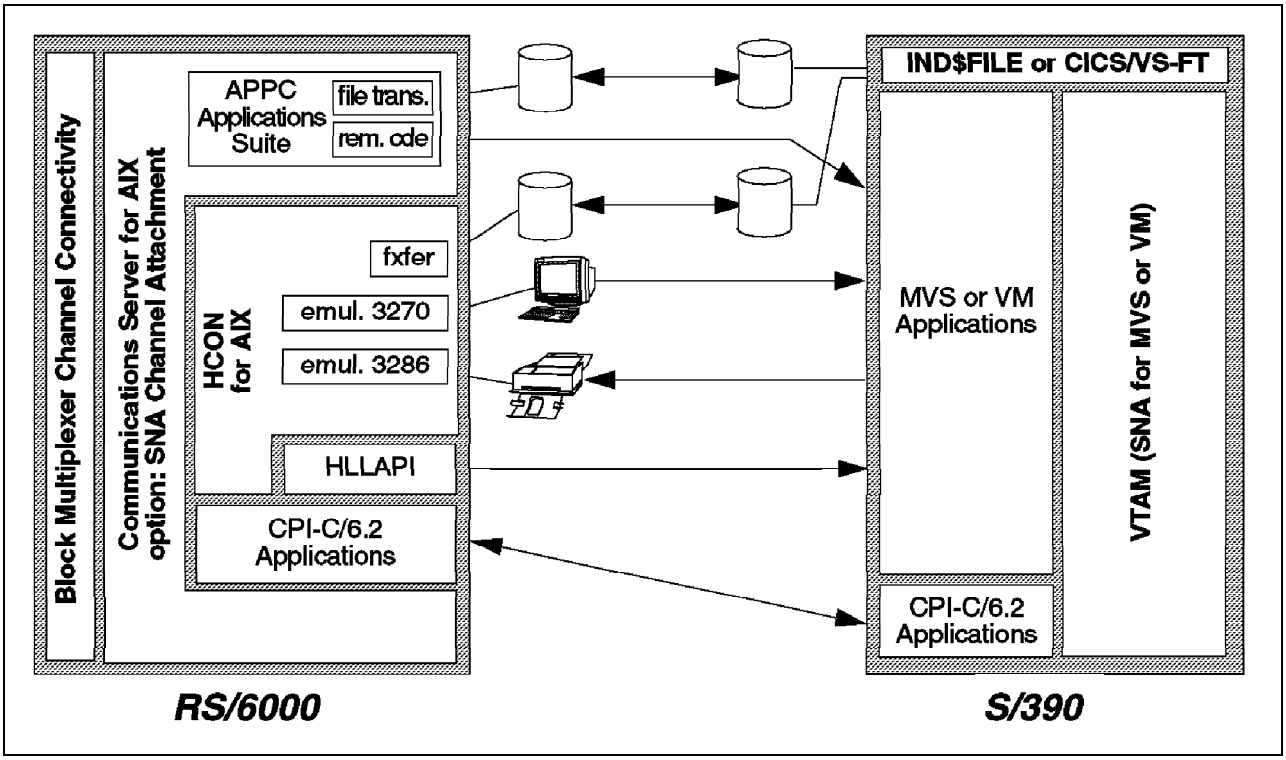


Figure 244. RS/6000 and S/390 - SNA - BLKMUX: Logical View

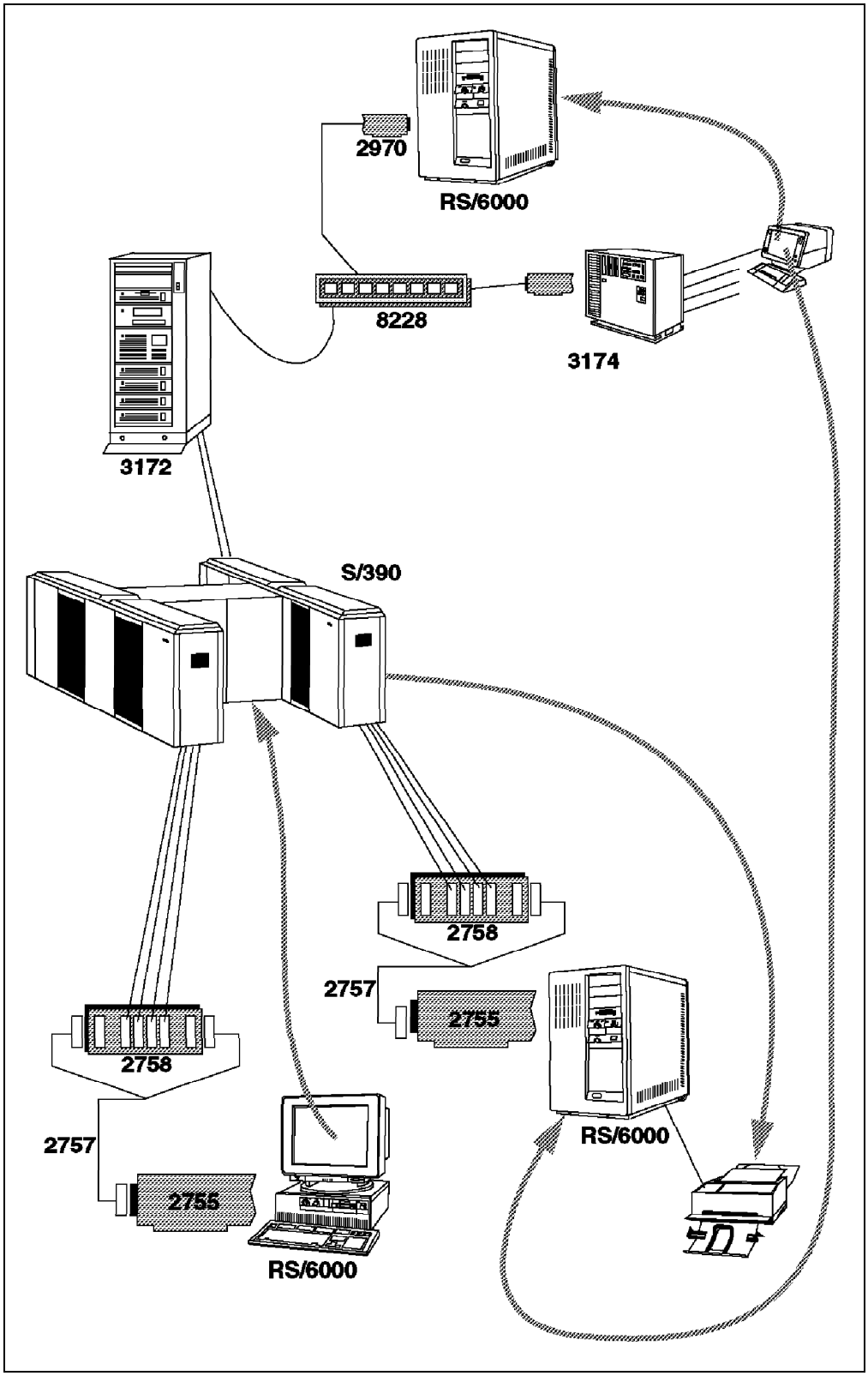


Figure 245. RS/6000 and S/390 - SNA - BLKMUX: Physical View

9.4.4 OSI

9.4.4.1 X.25 Network

Table 178. RS/6000 and S/390 - OSI - X.25: Abstract

		RS/6000	S/390
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 3174 controller - 3745 controller
Software		- Open Systems Std Com. V3.0 - AIXlink/X.25 V1.1	- OSI/CS for MVS or VM - X400 OSI/FS for MVS or VM - FTAM - X.25 NCP Packet Switching Interface V3.8
Functions	- emulation	-	-
	- file transfer	- FTAM	- FTAM
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	- X.400	- X.400
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- Not used very often.

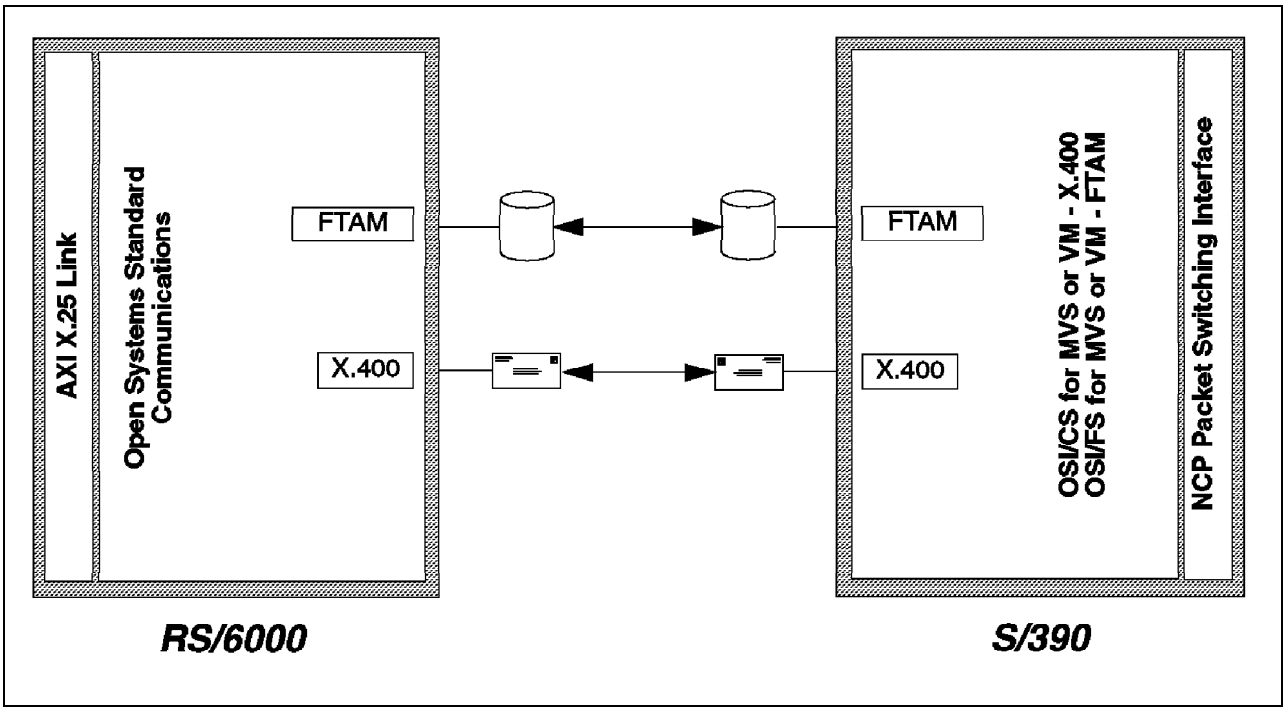


Figure 246. RS/6000 and S/390 - OSI - X.25: Logical View

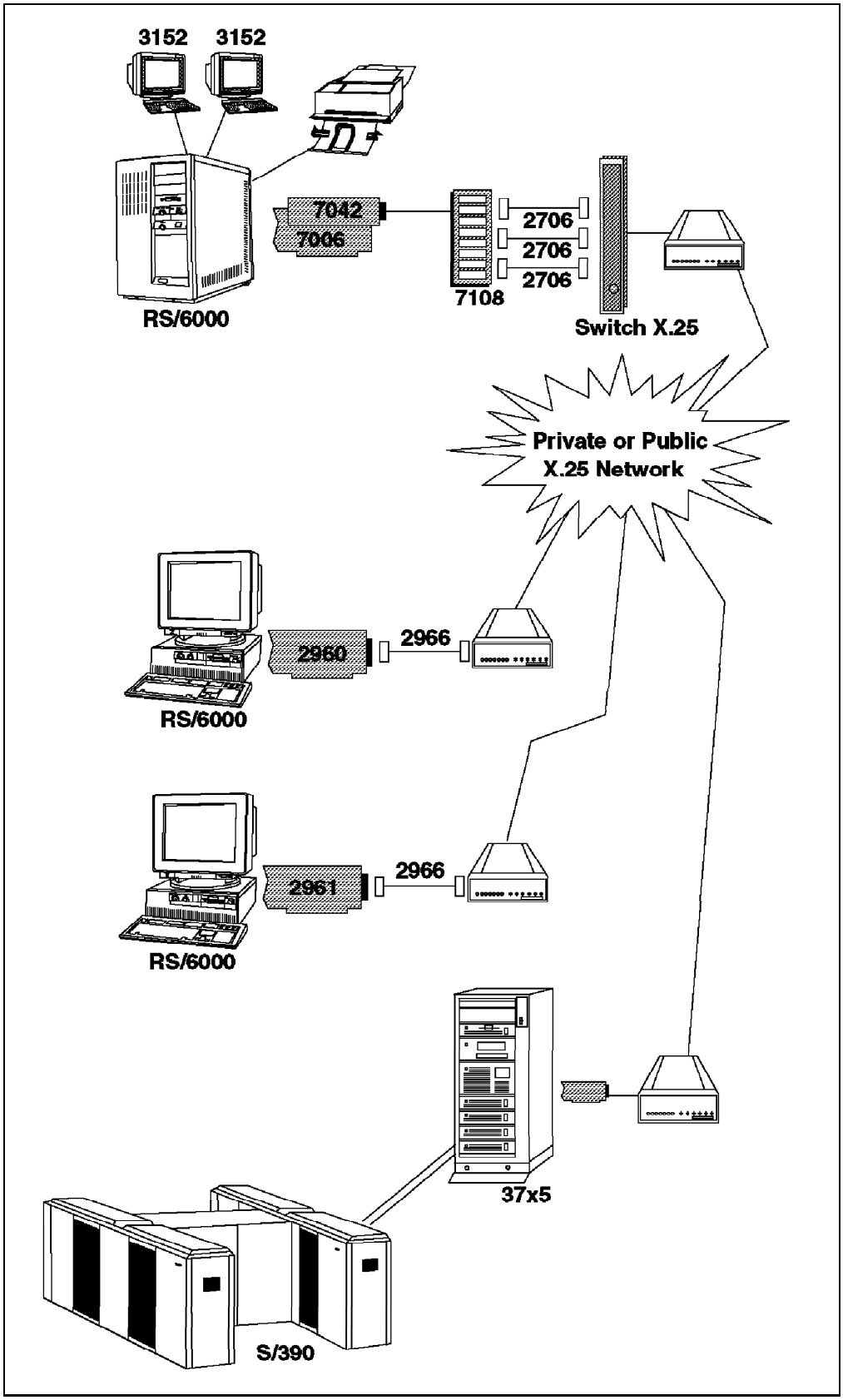


Figure 247. RS/6000 and S/390 - OSI - X.25: Logical View

9.4.5 Coaxial

9.4.5.1 DFT Mode

Table 179. RS/6000 and S/390 - Coaxial - DFT: Abstract

		RS/6000	S/390
Hardware		- 2990 - 2991 (USA only)	- 3174 controller
Software		- Host Connection Program V2.1	- IND$FILE[(5)] or CICS/VS File Tr. [(5)]
Functions	- emulation	- 3270 (C/)	-
	- file transfer	- fxfer[(5)]	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.	-
	- remote command	-	-
	- API	- HLLAPI	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (5) requires one of the following programs.
- If you can, choose a “real” communication solution instead (with SNA or TCP/IP and a LAN or WAN adapter).

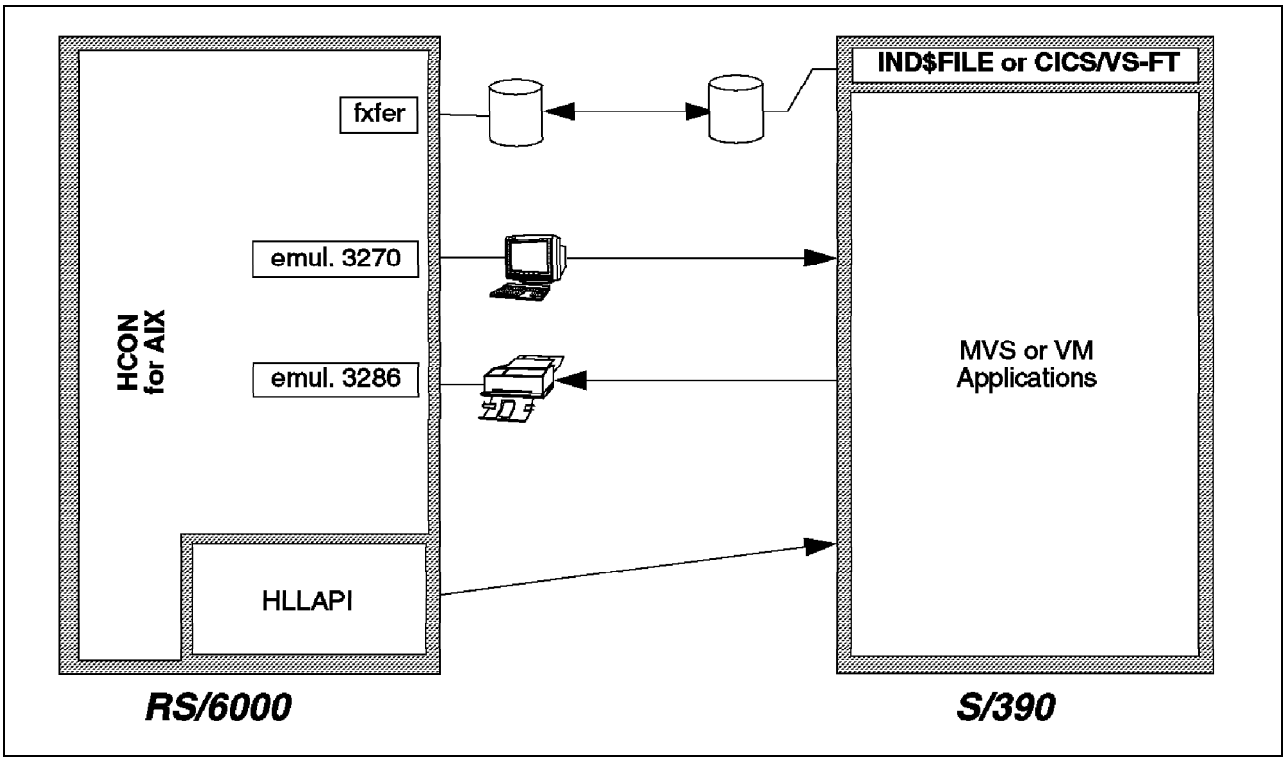


Figure 248. RS/6000 and S/390 - Coaxial - DFT: Logical View

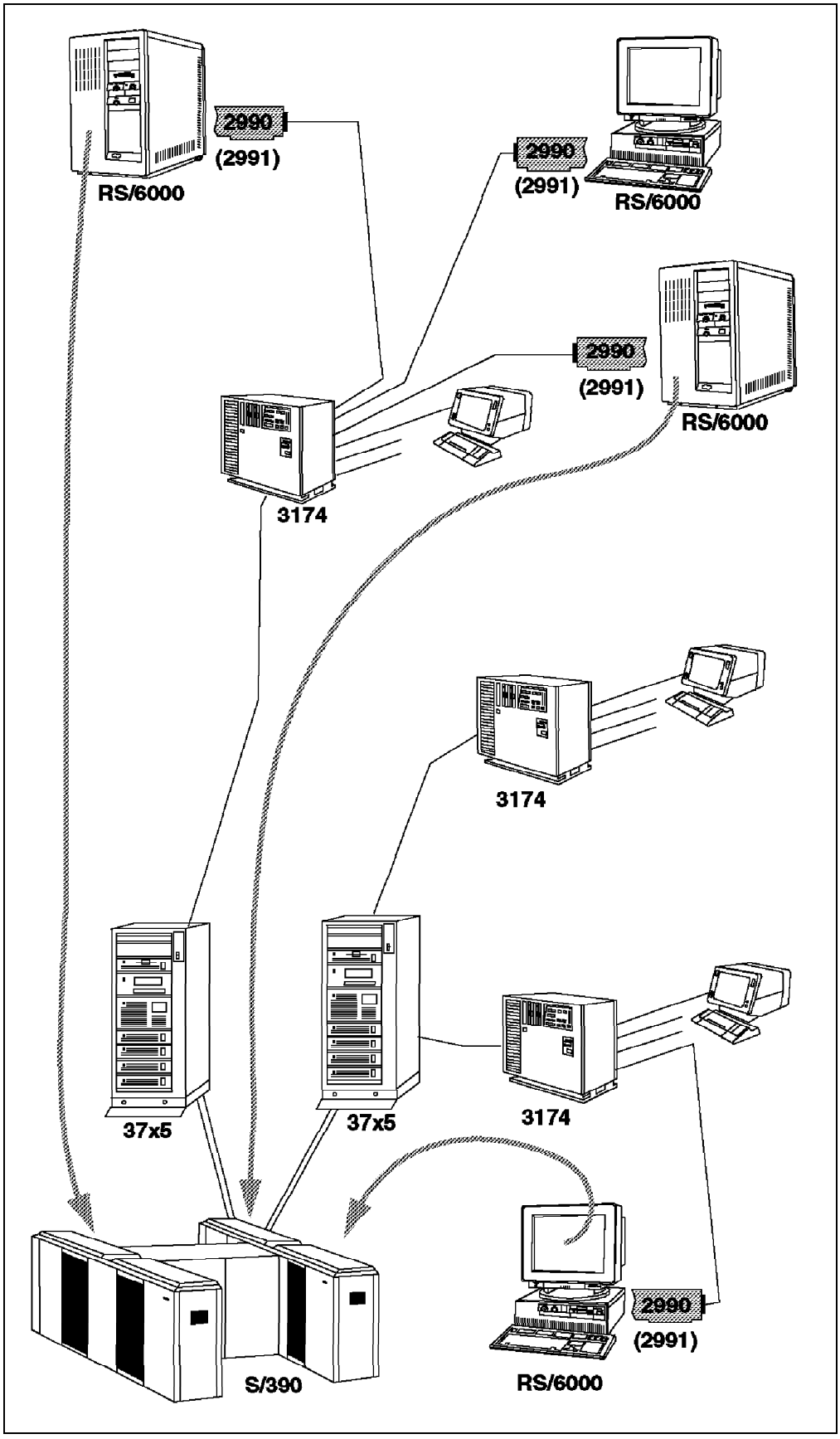


Figure 249. RS/6000 and S/390 - Coaxial - DFT: Physical View

9.4.5.2 CUT Mode

Table 180. RS/6000 and S/390 - Coaxial - CUT - Abstract

		RS/6000	S/390
Hardware		- 2990 - 2991 (USA only)	- 3174 controller
Software		- Host Connection Program V2.1	- IND$FILE[5] or CICS/VS File Tr. [5]
Functions	- emulation	- 3270 (C/)	-
	- file transfer	- fxfer[5]	-
	- file sharing	-	-
	- print sharing	- 3286/87 emul.	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (5) requires one of the following programs.
- If you can, choose a “real” communication solution instead (with SNA or TCP/IP and a LAN or WAN adapter).

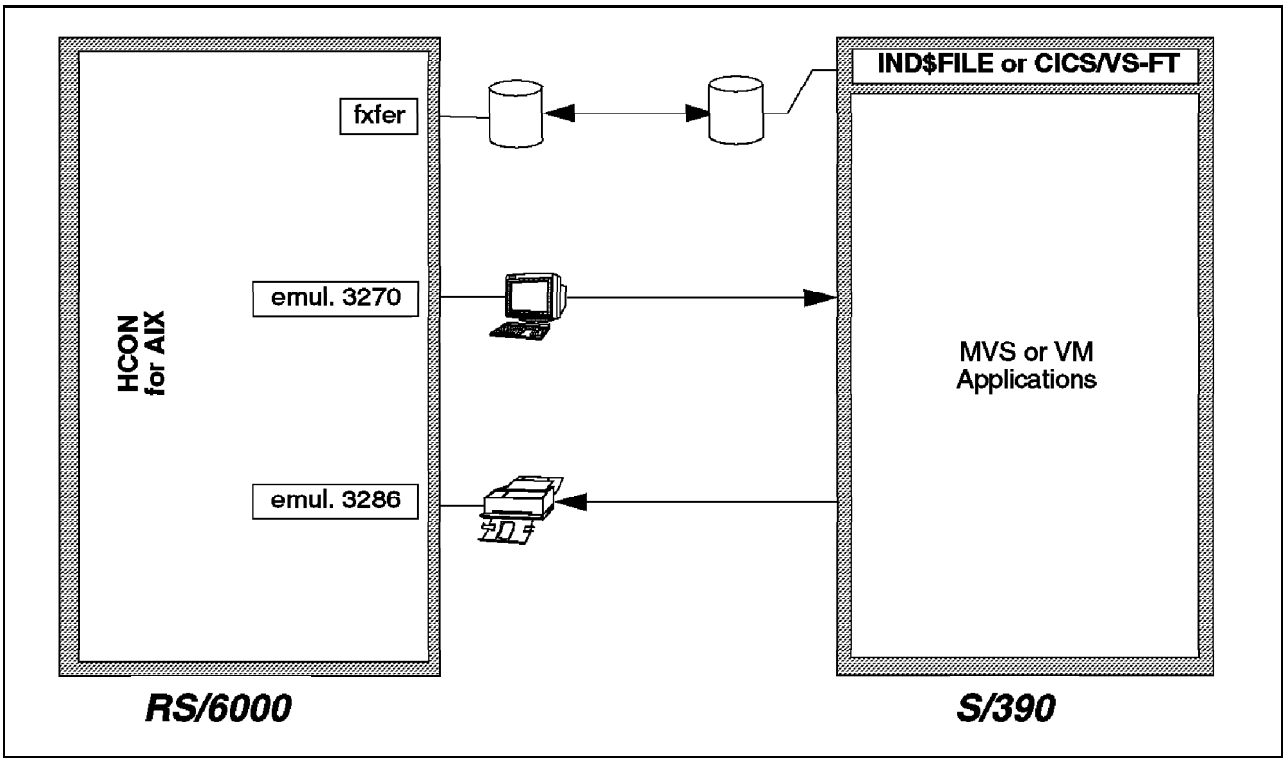


Figure 250. RS/6000 and S/390 - Coaxial - CUT: Logical View

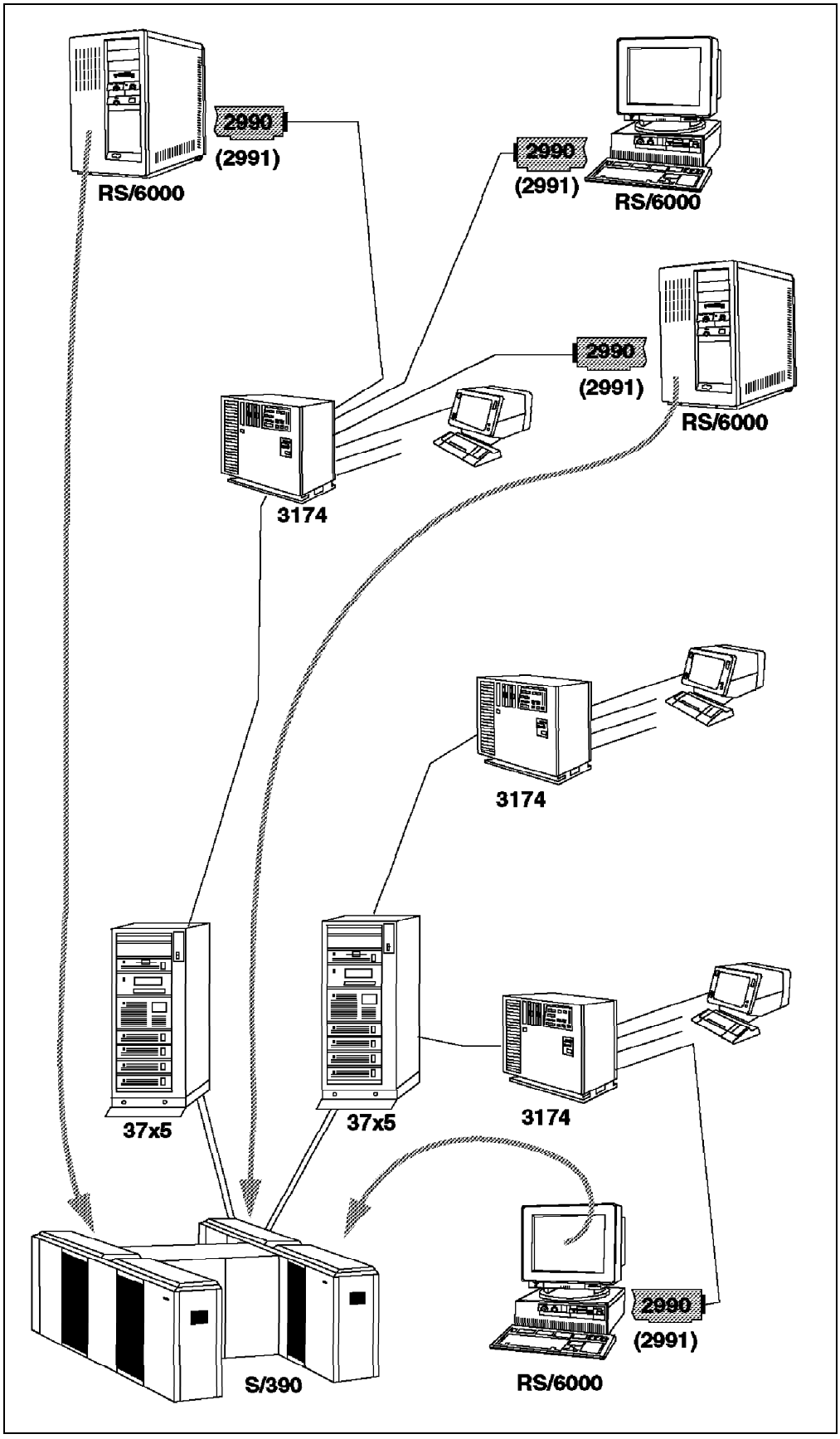


Figure 251. RS/6000 and S/390 - Coaxial - DFT: Physical View

9.5 RS/6000 and AS/400

To connect an AS/400 with an RS/6000, you can:

- Implement the AS/400 native protocol (SNA) on the RS/6000
- Use the UNIX native protocol (TCP/IP) on the AS/400 (now provided with OS/400).

In the first case, you may use common TCP/IP applications, such as FTP, Telnet, or Rexec. But remember, the AS/400 platform uses synchronous mode, and the RS/6000 uses asynchronous mode. To complete TCP/IP or SNA native functions, you may also add Connection Program /400 for UNIX (one module on each platform).

If you need to use AS/400 units (displays or printers), add a twinax adapter in the RS/6000. Please refer to Chapter 5 for more information.

You may also use an OSI protocol.

9.5.1 Abstract

Table 181. RS/6000 and AS/400 Abstract

RS/6000 / As/400	TCP/IP	SNA	OSI	Twinax
Asynchronous				
Token-Ring	CP/400	CP/400		
FDDI		CP/400		
Ethernet	CP/400	CP/400		
X.25	CP/400	CP/400		
Synchronous		CP/400		
Coaxial				
S/370 Channel				
ESCON				
BLKMUX				
Fibre Channel				
ATM				
HIPPI				
SOCC				
Twinax				AS/400 Units

Remark

- Connection Program/400 for UNIX Environments is supported in this configuration.

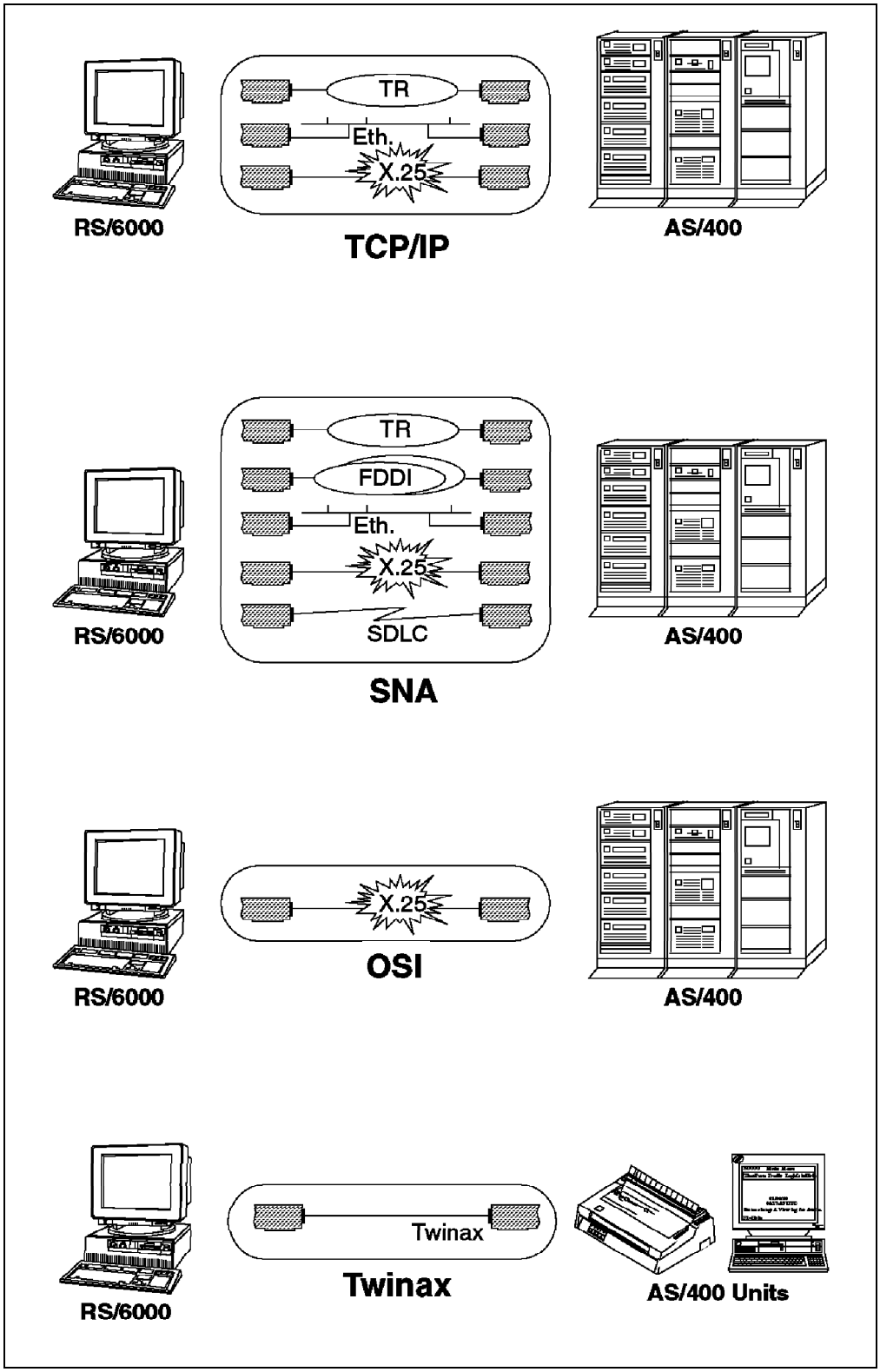


Figure 252. RS/6000 and AS/400 Abstract

9.5.2 TCP/IP

9.5.2.1 Token-Ring Network

Table 182. RS/6000 and AS/400 - TCP/IP - Token-Ring: Abstract

		RS/6000	AS/400
Hardware		- 2970/9970 - 8246 - 2972 - 7092 - 2971/2973/8209 - 8042/8043/7044 - 2979	- MFIOP adapter - 5494 controller - Token-ring adapter
Software		- AIX V4 (TCP/IP included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module)	- OS/400 V3.1 or 3.6 (TCP/IP included) option: TCP/IP File Server Support/400(5) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1 - DCE Base Services/400(4)
Functions	**- emulation**	- tn(C/S), tn3270(C/), tnvt100(C/S), 5250 block(1)	- tn(C/S), tn3270(C/S), tn5250(C/S), tnvt100(/S)
	- file transfer	- FTP (C/S)	- FTP (C/S)
	- file sharing	- NFS (C/S)(5)	- NFS (/S)(5)
	- print sharing	- LPR/LPD (C/S), 5250 remote printer(1)	- LPR/LPD (C/S), strunxwtr(1)
	- remote command	- Rexec (C/S)	- Rexec (/S), runrmtcmd, strunxcmd(1)
	- API	- RPC (C/S), SQL(1)	- RPC (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)(4)
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/)
	- network management	- SNMP (MIB II), Ping, Netstat	- SNMP (MIB II), Ping, Netstat

Remark

- (1) is provided with this optional software.
- (4) and (5) require one of the following programs.

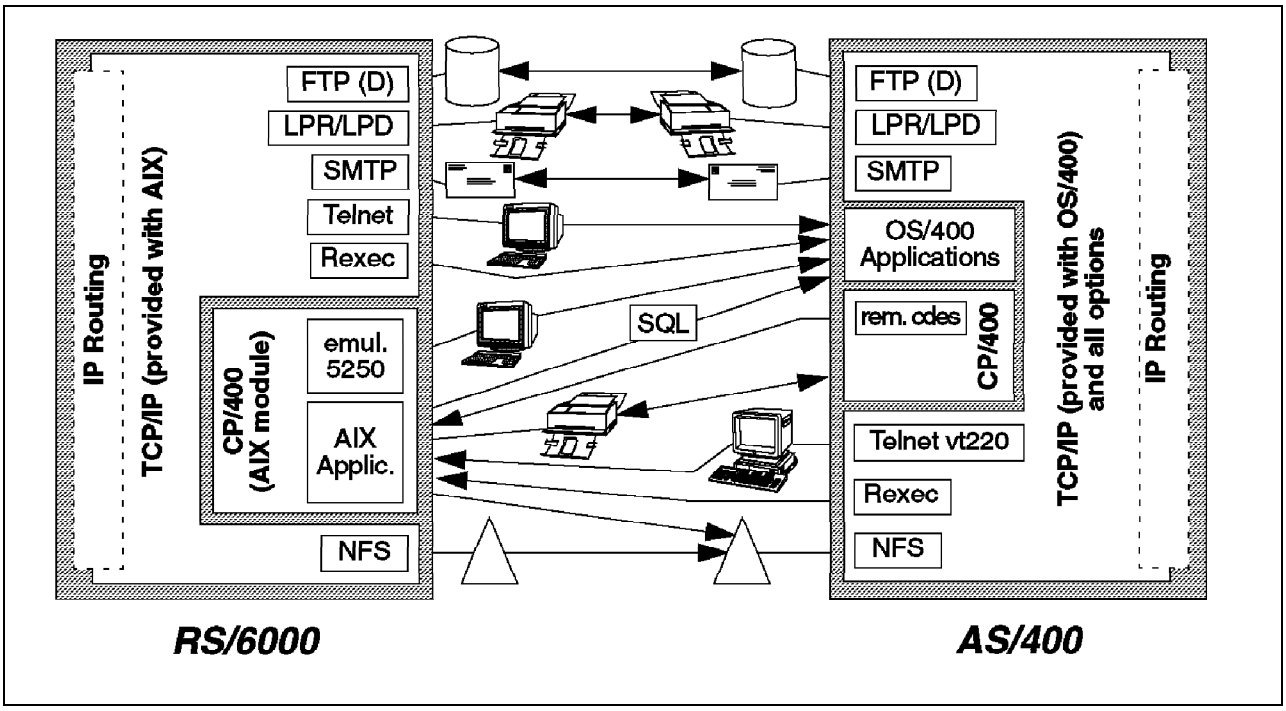


Figure 253. RS/6000 and AS/400 - TCP/IP - Token-Ring: Logical View

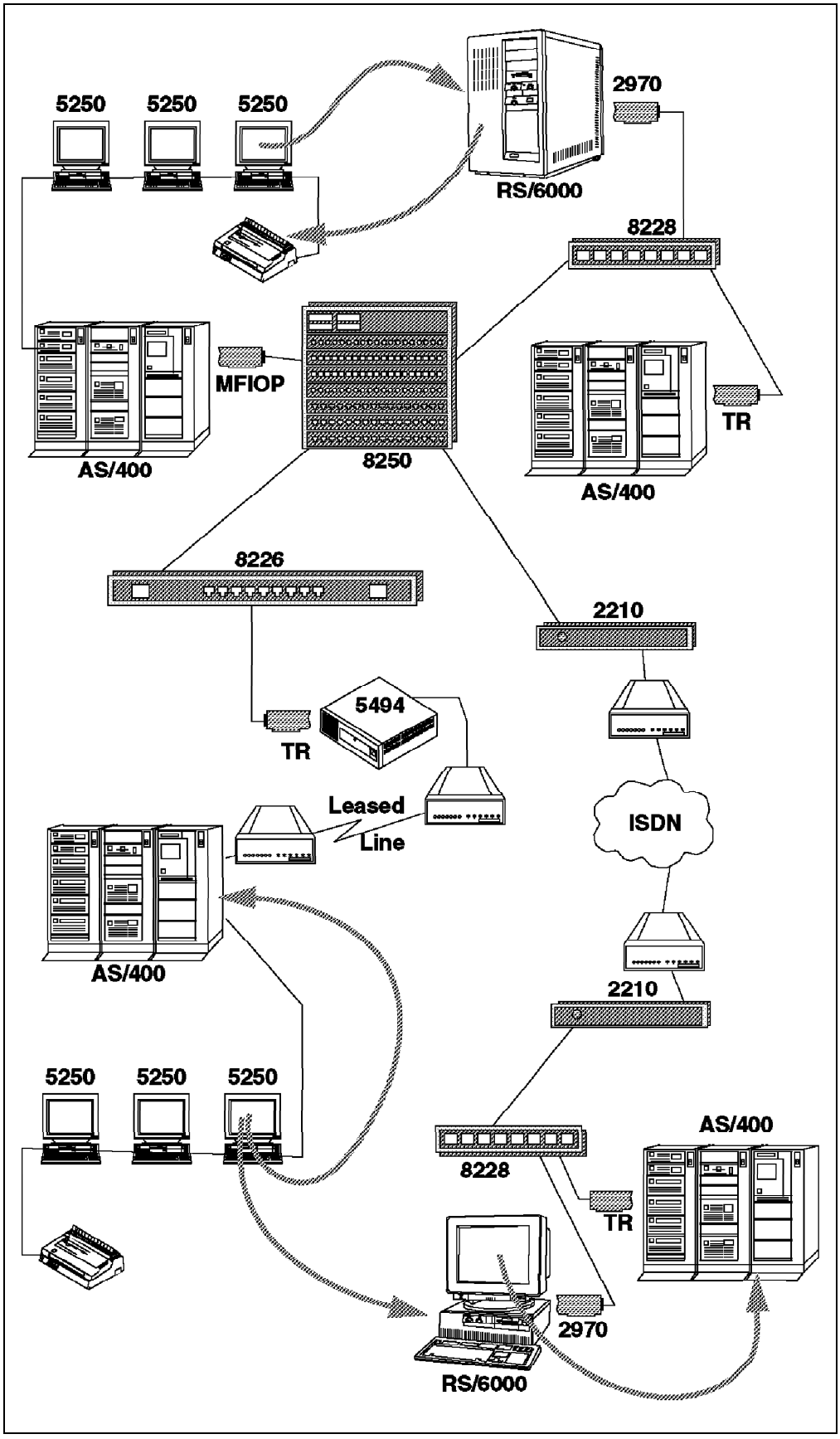


Figure 254. RS/6000 and AS/400 - TCP/IP - Token-Ring: Physical View

9.5.2.2 Ethernet Network

Table 183. RS/6000 and AS/400 - TCP/IP - Ethernet: Abstract

		RS/6000	AS/400
Hardware		- std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 3032/8033/8034 - 2402/2406, 2403/2407 (option transceivers: 4222/4223)	- MFIOP adapter - 5494 controller - Ethernet adapter
Software		- AIX V4 (TCP/IP included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module)	- OS/400 V3.1 or 3.6 (TCP/IP included) option: TCP/IP File Server Support/400(5) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1 - DCE Base Services/400(4)
Functions	**- emulation**	- tn(C/S), tn3270(C/), tnvt100(C/S), 5250 block(1)	- tn(C/S), tn3270(C/S), tn5250(C/S), tnvt100(/S)
	- file transfer	- FTP (C/S)	- FTP (C/S)
	- file sharing	- NFS (C/S)(5)	- NFS (/S)(5)
	- print sharing	- LPR/LPD (C/S), 5250 remote printer(1)	- LPR/LPD (C/S), strunxwtr(1)
	- remote command	- Rexec (C/S)	- Rexec (/S), runrmtcmd, strunxcmd(1)
	- API	- RPC (C/S), SQL(1)	- RPC (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)(4)
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/)
	- network management	- SNMP (MIB II), Ping, Netstat	- SNMP (MIB II), Ping, Netstat

Remark

- (1) is provided with this optional software.
- (4) and (5) require one of the following programs.

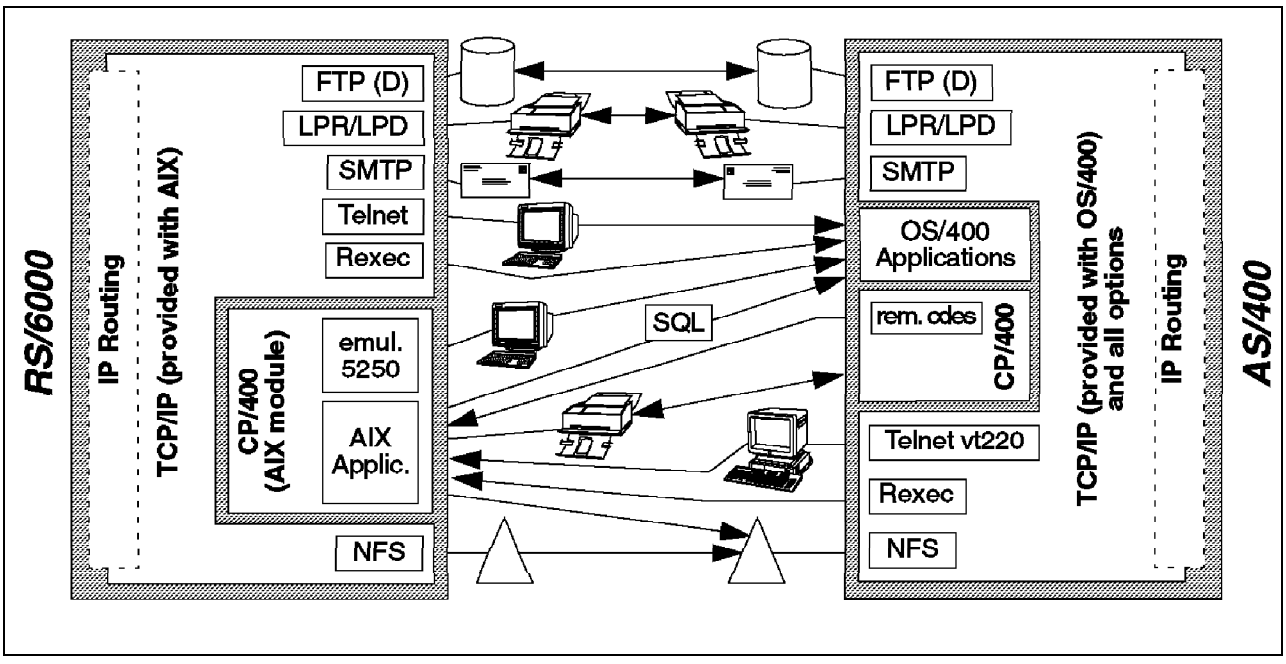


Figure 255. RS/6000 and AS/400 - TCP/IP - Ethernet: Logical View

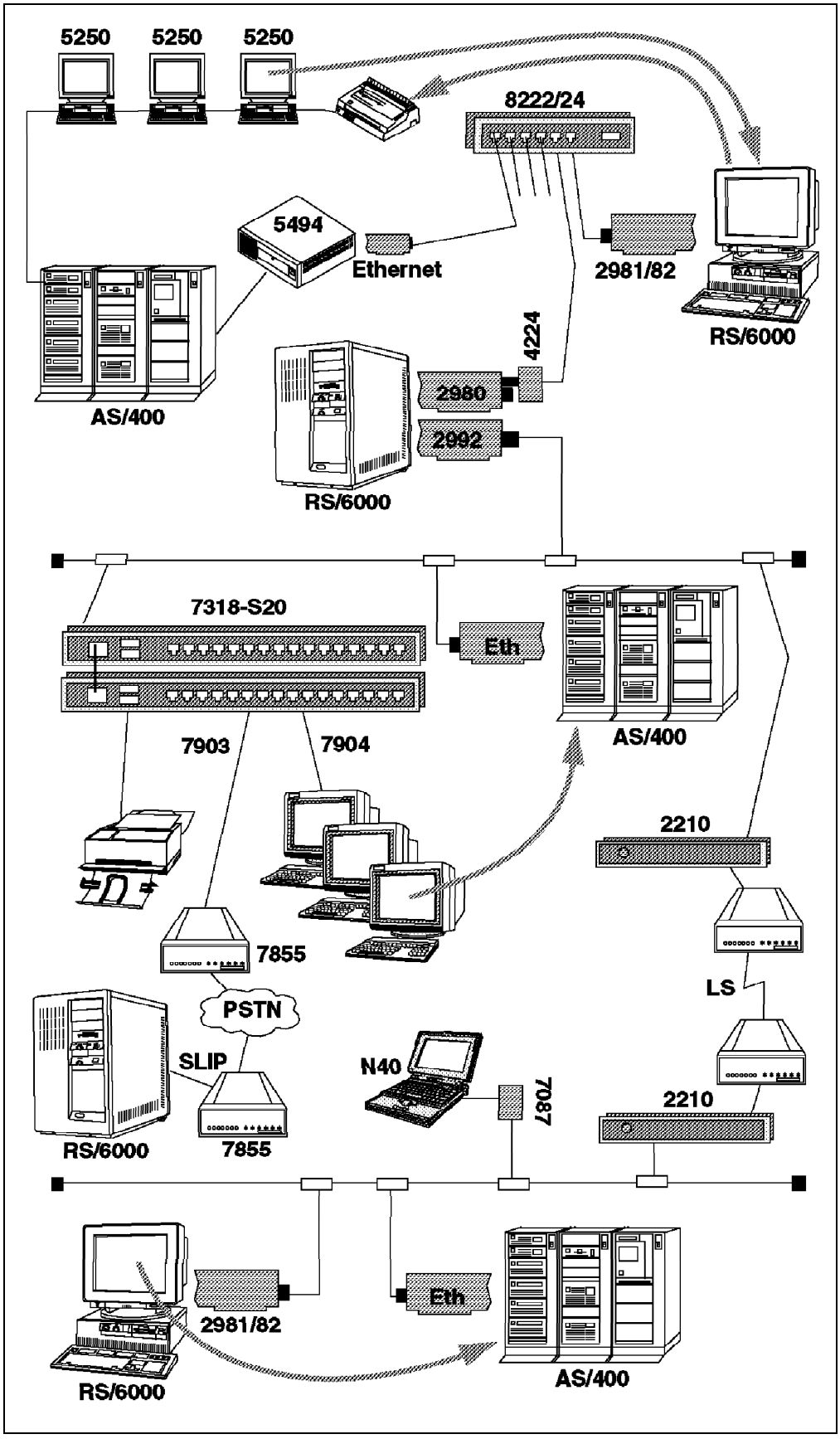


Figure 256. RS/6000 and AS/400 - TCP/IP - Ethernet: Physical View

9.5.2.3 X.25 Network

Table 184. RS/6000 and AS/400 - TCP/IP - X.25: Abstract

		RS/6000	AS/400
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 5494 controller - 5394 controller
Software		- AIX V4 (TCP/IP included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module) - AIXLink/X.25 V1.1	- OS/400 V3.1 or 3.6 (TCP/IP included) option: TCP/IP File Server Support/400(5) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1 - DCE Base Services/400(4)
Functions	**- emulation**	- tn(C/S), tn3270(C/), tnvt100(C/S), 5250 block(1)	- tn(C/S), tn3270(C/S), tn5250(C/S), tnvt100(/S)
	- file transfer	- FTP (C/S)	- FTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S), 5250 remote printer(1)	- LPR/LPD (C/S), strunxwtr(1)
	- remote command	- Rexec (C/S)	- Rexec (/S), runrmtcmd, strunxcmd(1)
	- API	- RPC (C/S), SQL(1)	- RPC (C/S)(4)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)(4)
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/)
	- network management	- SNMP (MIB II), Ping, Netstat	- SNMP (MIB II), Ping, Netstat

Remark

- (1) is provided with this optional software.
- (4) and (5) require one of the following programs.

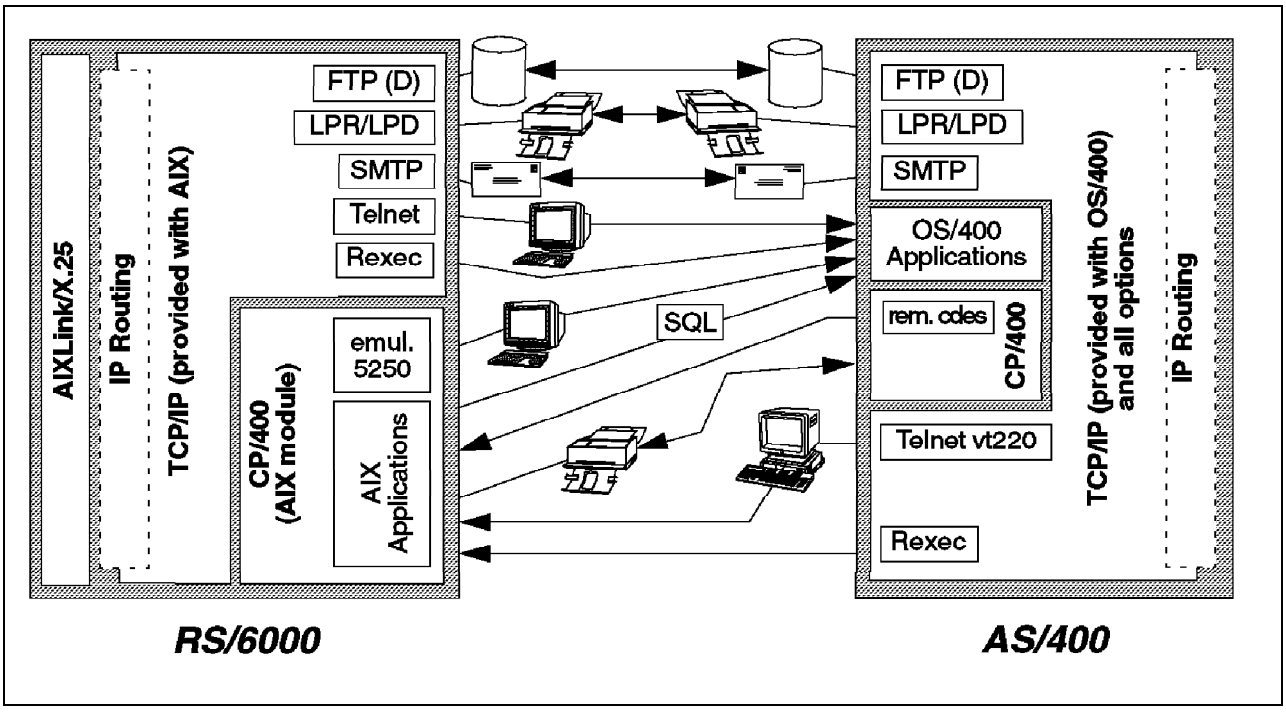


Figure 257. RS/6000 and AS/400 - TCP/IP - X.25: Logical View

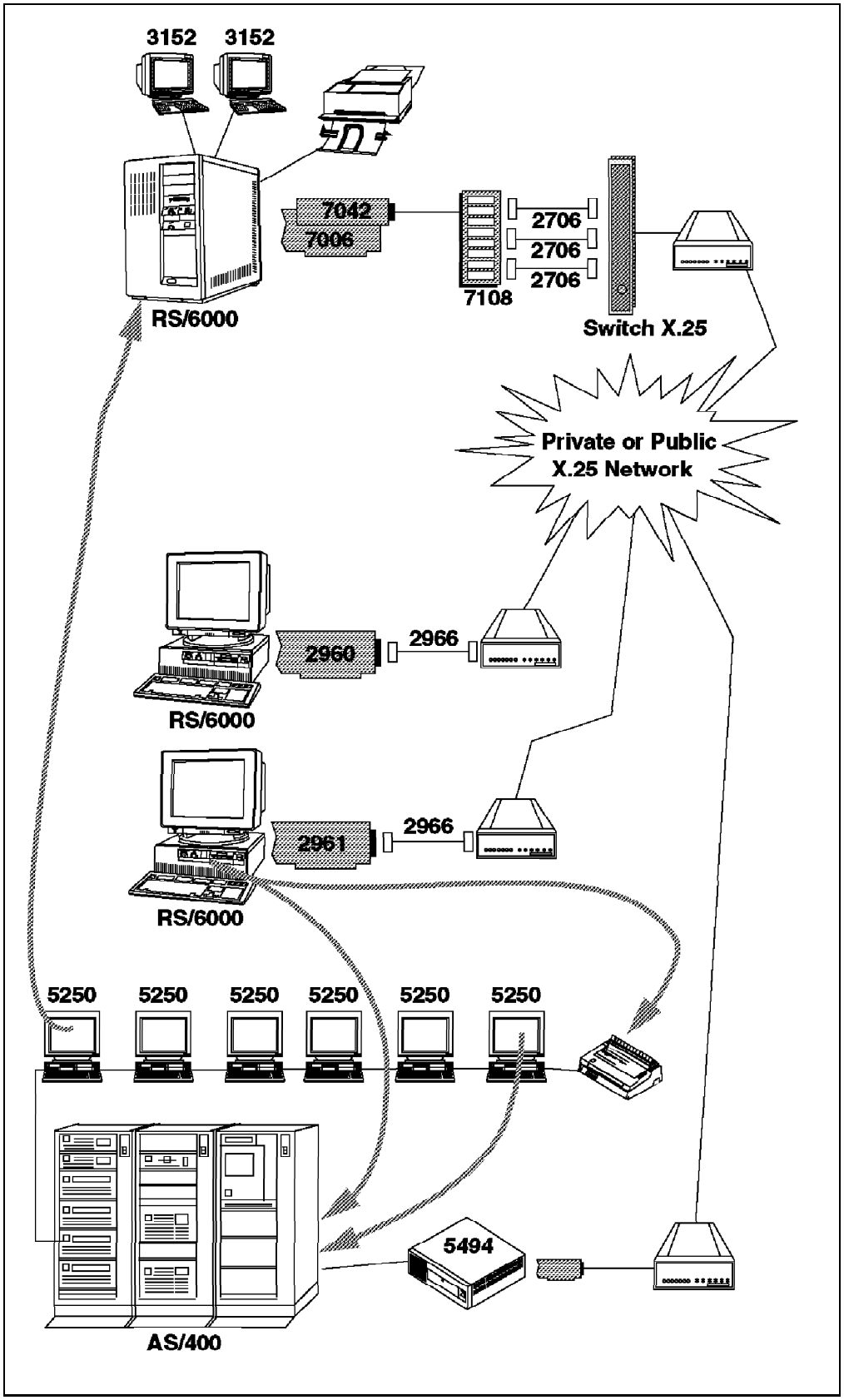


Figure 258. RS/6000 and AS/400 - TCP/IP - X.25: Logical View

9.5.3 SNA

9.5.3.1 Token-Ring Network

Table 185. RS/6000 and AS/400 - SNA - Token-Ring: Abstract

		RS/6000	AS/400
Hardware		- 2970/9970 - 8246 - 2972 - 7092 - 2971/2973/8209 - 8042/8043/7044 - 2979	- MFIOP adapter - 5494 controller - Token-ring adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module)	- OS/400 V3.1 or 3.6 (SNA included) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1
Functions	**- emulation**	- 5250 block(1)	-
	- file transfer	- xfer(1)	-
	- file sharing	-	-
	- print sharing	- 5250 remote printer(1)	- strunxwtr(1)
	- remote command	- Remote command(1)	- runrmtcmd, strunxcmd(1)
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), SQL(1)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1) is provided with this optional software.

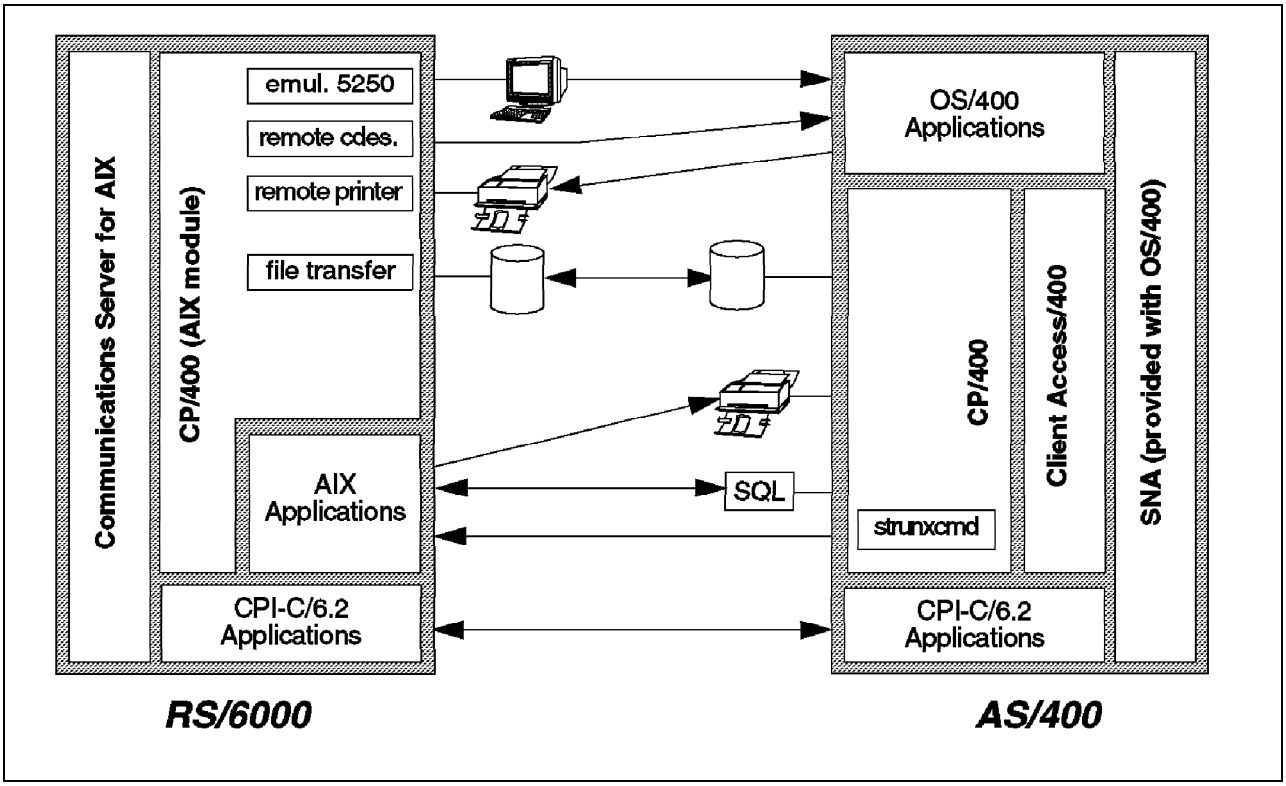


Figure 259. RS/6000 and AS/400 - SNA - Token-Ring: Logical View

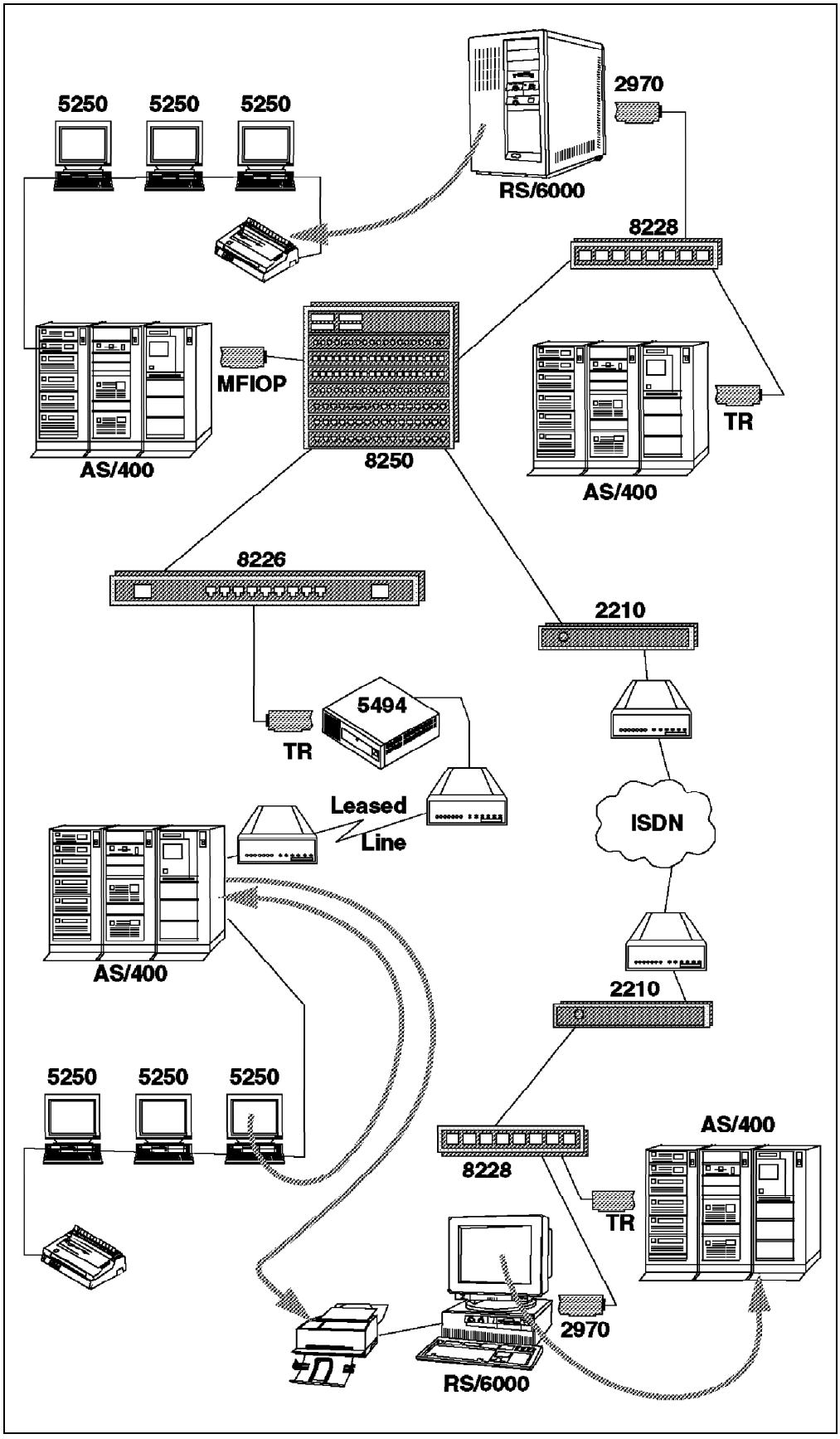


Figure 260. RS/6000 and AS/400 - SNA - Token-Ring: Physical View

9.5.3.2 FDDI Network

Table 186. RS/6000 and AS/400 - SNA - FDDI: Abstract

		RS/6000	AS/400
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- MFIOP adapter - FDDI adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module)	- OS/400 V3.1 or 3.6 (SNA included) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1
Functions	- **emulation** - **file transfer** - **file sharing** - **print sharing** - **remote command** - **API** - **mail** - **security** - **graphic** - **name directory** - **network management**	- 5250 block(1) - xfer(1) - - 5250 remote printer(1) - Remote command(1) - LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), SQL(1) - - - -	- - - - strunxwtr(1) - runrmtcmd, strunxcmd(1) - LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C) - - - - -

Remark

- (1) is provided with this optional software.

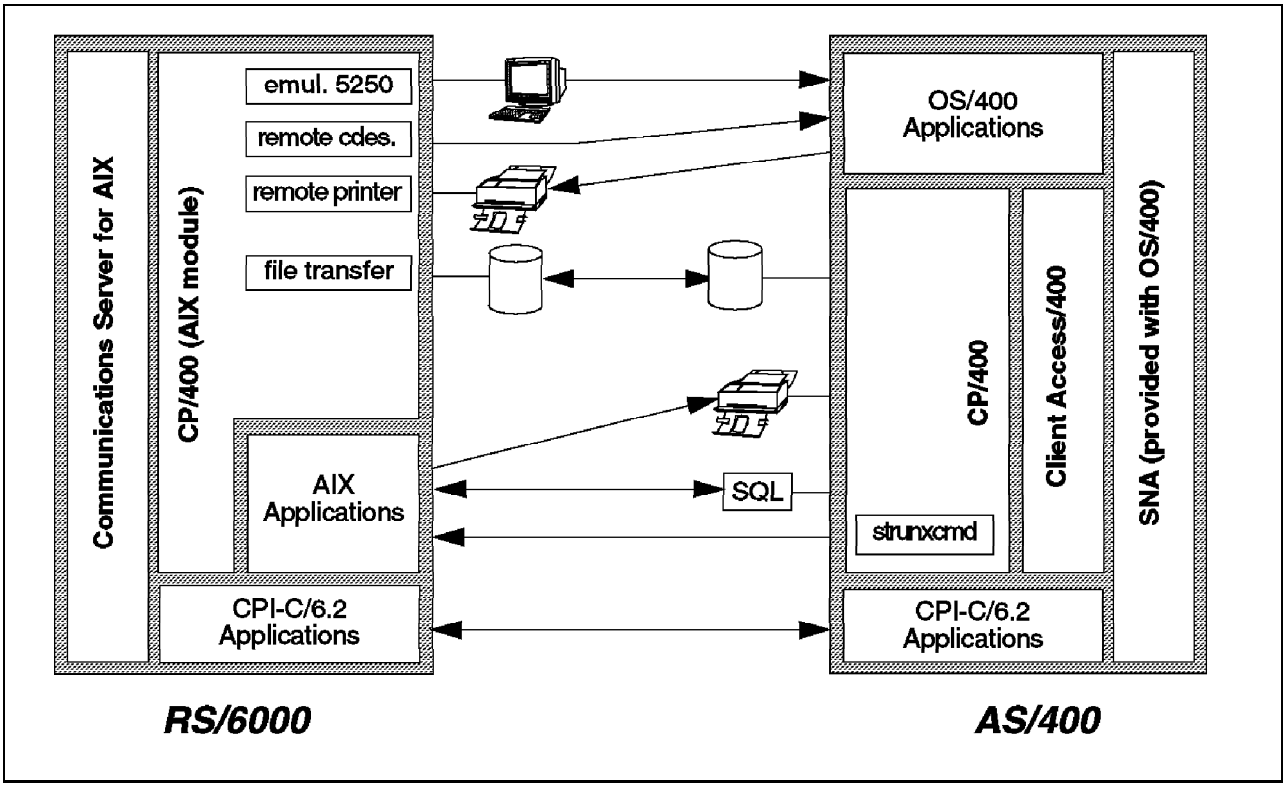


Figure 261. RS/6000 and AS/400 - SNA - FDDI: Logical View

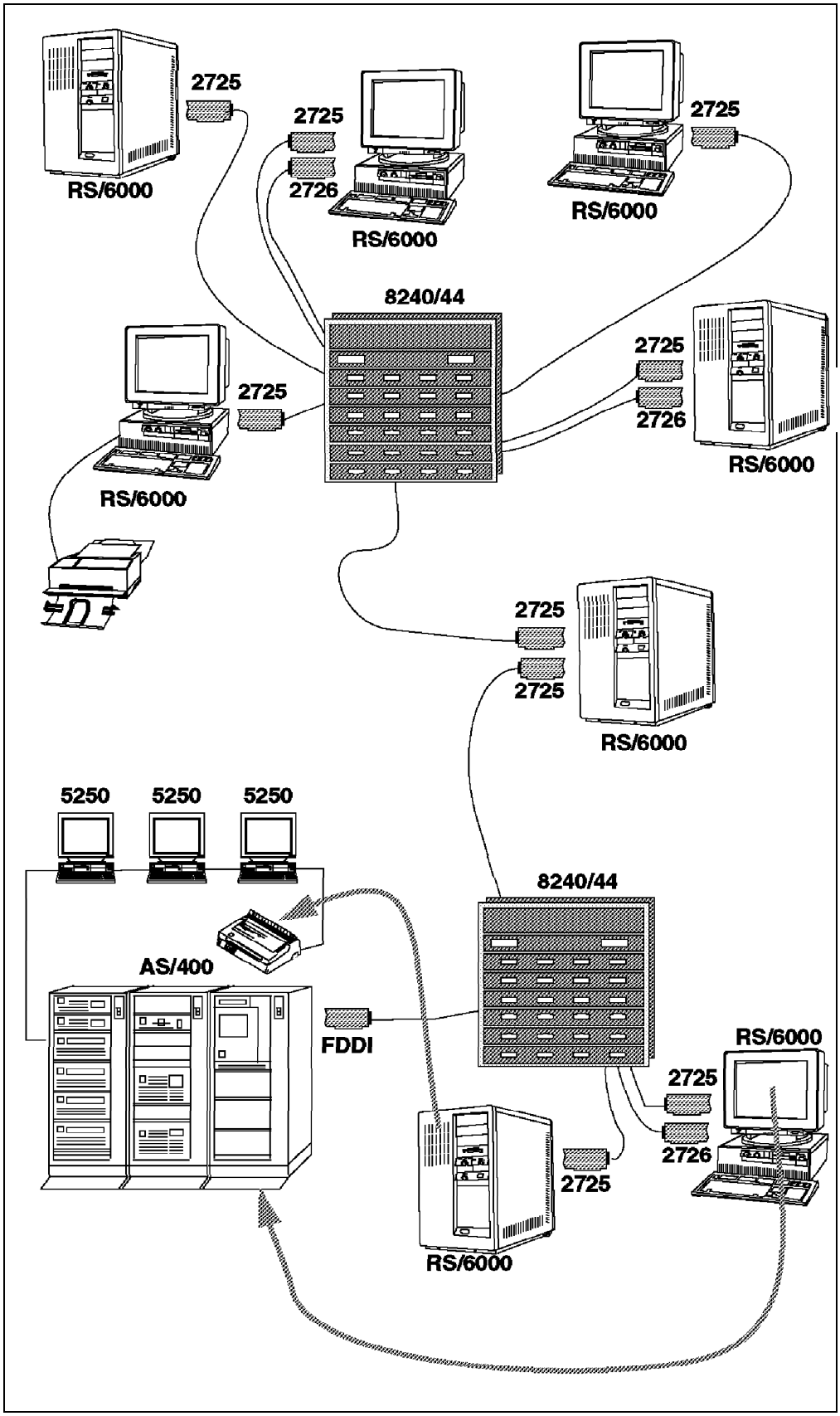


Figure 262. RS/6000 and AS/400 - SNA - FDDI: Physical View

9.5.3.3 Ethernet Network

Table 187. RS/6000 and AS/400 - SNA - Ethernet: Abstract

		RS/6000	AS/400
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 3032/8033/8034 - 2402/2406, 2403/2407 (option transceivers: 4222/4223)	- MFIOP adapter - 5494 controller - Token-ring adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module)	- OS/400 V3.1 or 3.6 (SNA included) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1
Functions	**- emulation**	- 5250 block(1)	-
	- file transfer	- xfer(1)	-
	- file sharing	-	-
	- print sharing	- 5250 remote printer(1)	- strunxwtr(1)
	- remote command	- Remote command(1)	- runrmtcmd, strunxcmd(1)
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), SQL(1)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1) is provided with this optional software.

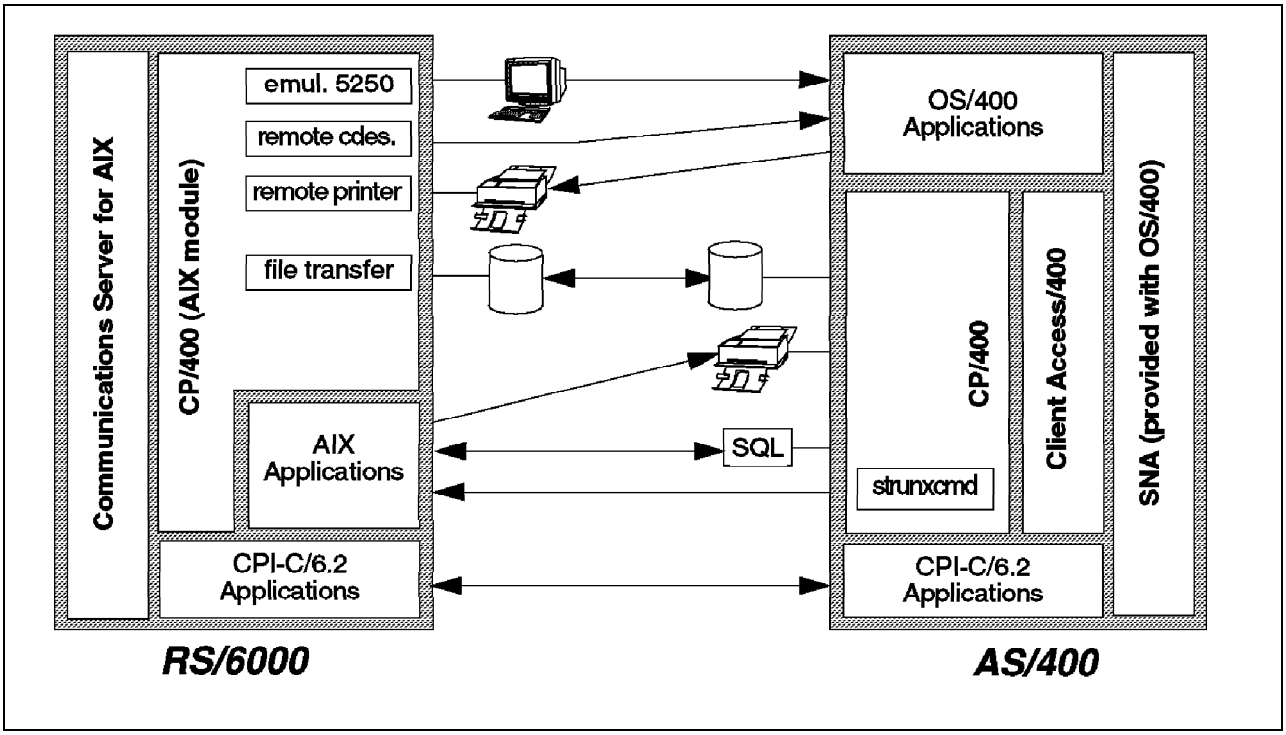


Figure 263. RS/6000 and AS/400 - SNA - Ethernet: Logical View

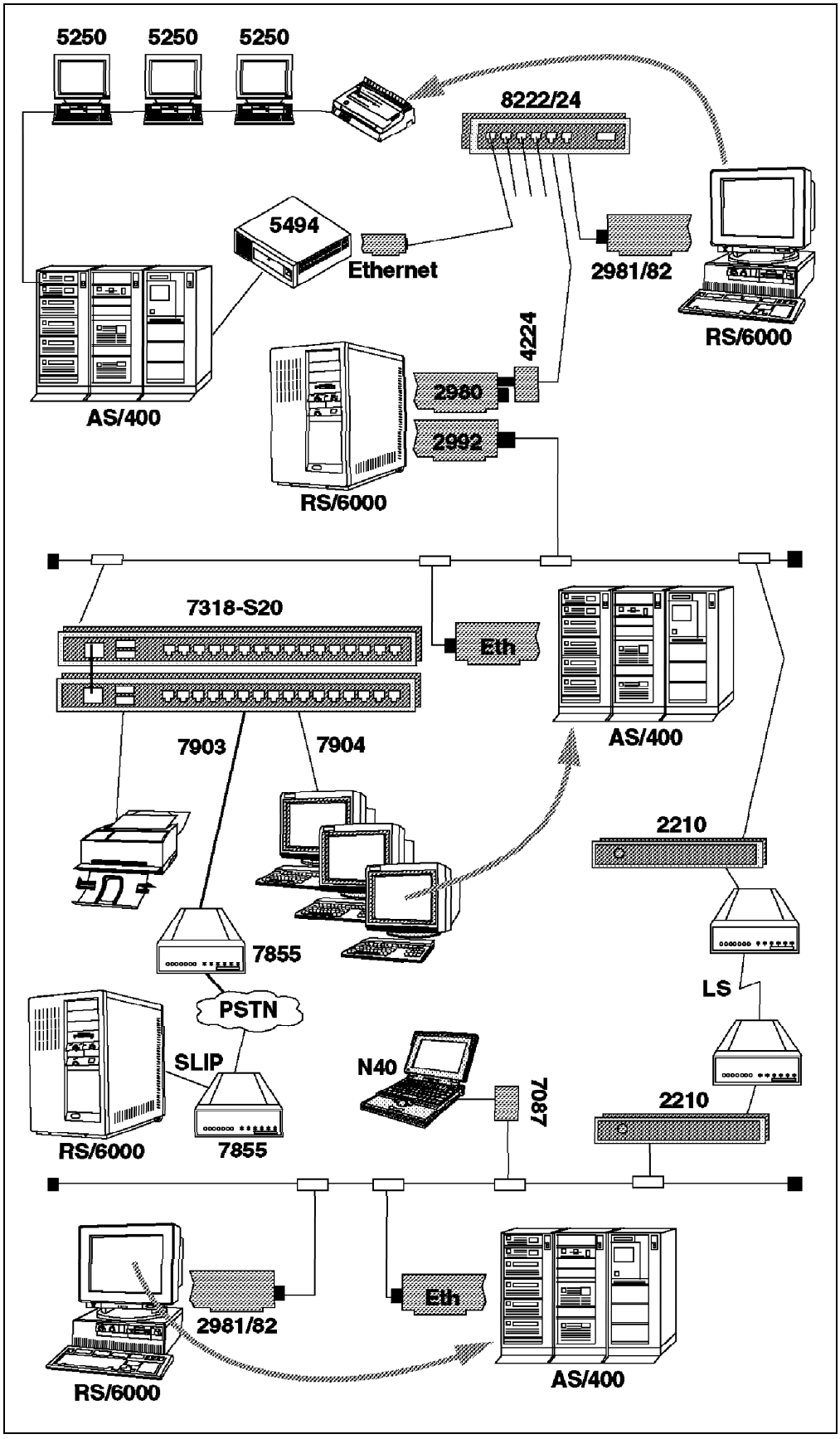


Figure 264. RS/6000 and AS/400 - SNA - Ethernet: Physical View

9.5.3.4 X.25 Network

Table 188. RS/6000 and AS/400 - SNA - X.25: Abstract

		RS/6000	AS/400
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 5494 controller - 5394 controller
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module) - AIXLink X.25 V1.1	- OS/400 V3.1 or 3.6 (SNA included) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1
Functions	**- emulation**	- 5250 block(1)	-
	- file transfer	- xfer(1)	-
	- file sharing	-	-
	- print sharing	- 5250 remote printer(1)	- strunxwtr(1)
	- remote command	- Remote command(1)	- runrmtcmd, strunxcmd(1)
	- API	- LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), SQL(1)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1) is provided with this optional software.

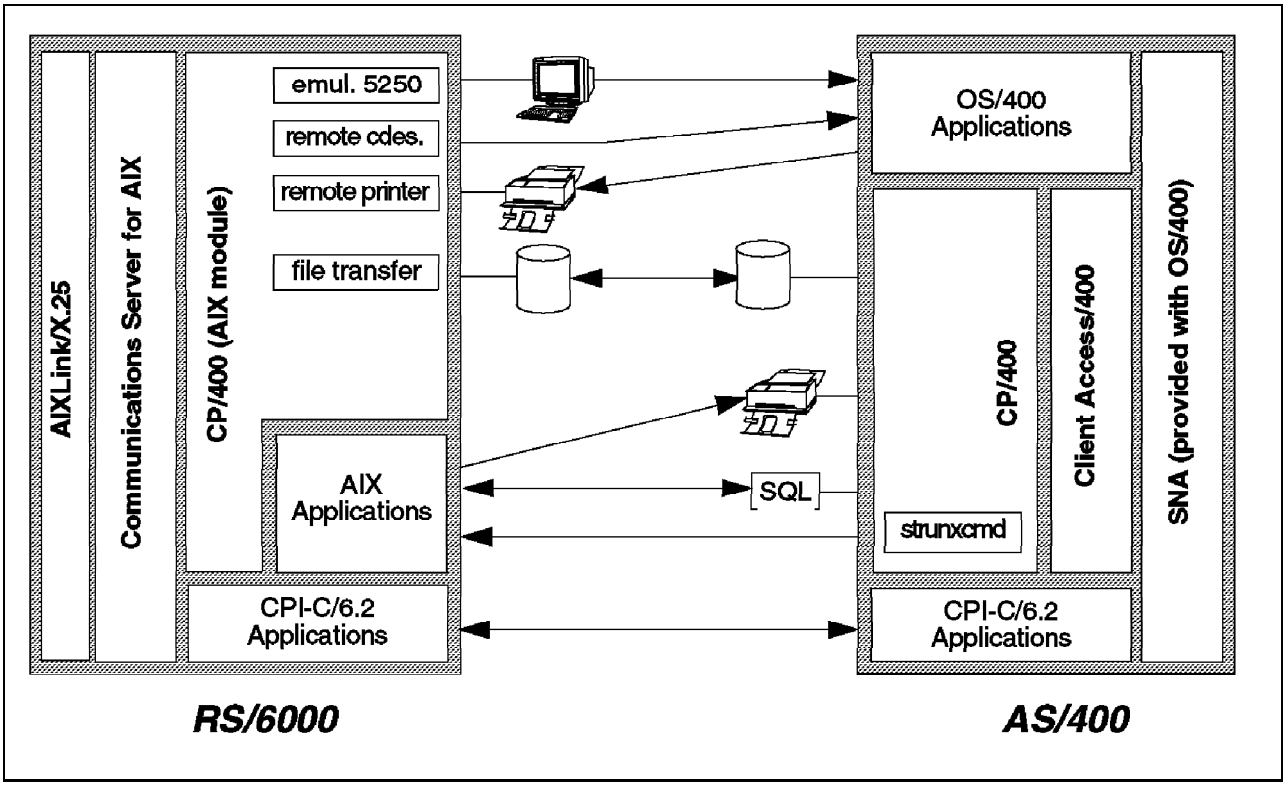


Figure 265. RS/6000 and AS/400 - SNA - X.25: Logical View

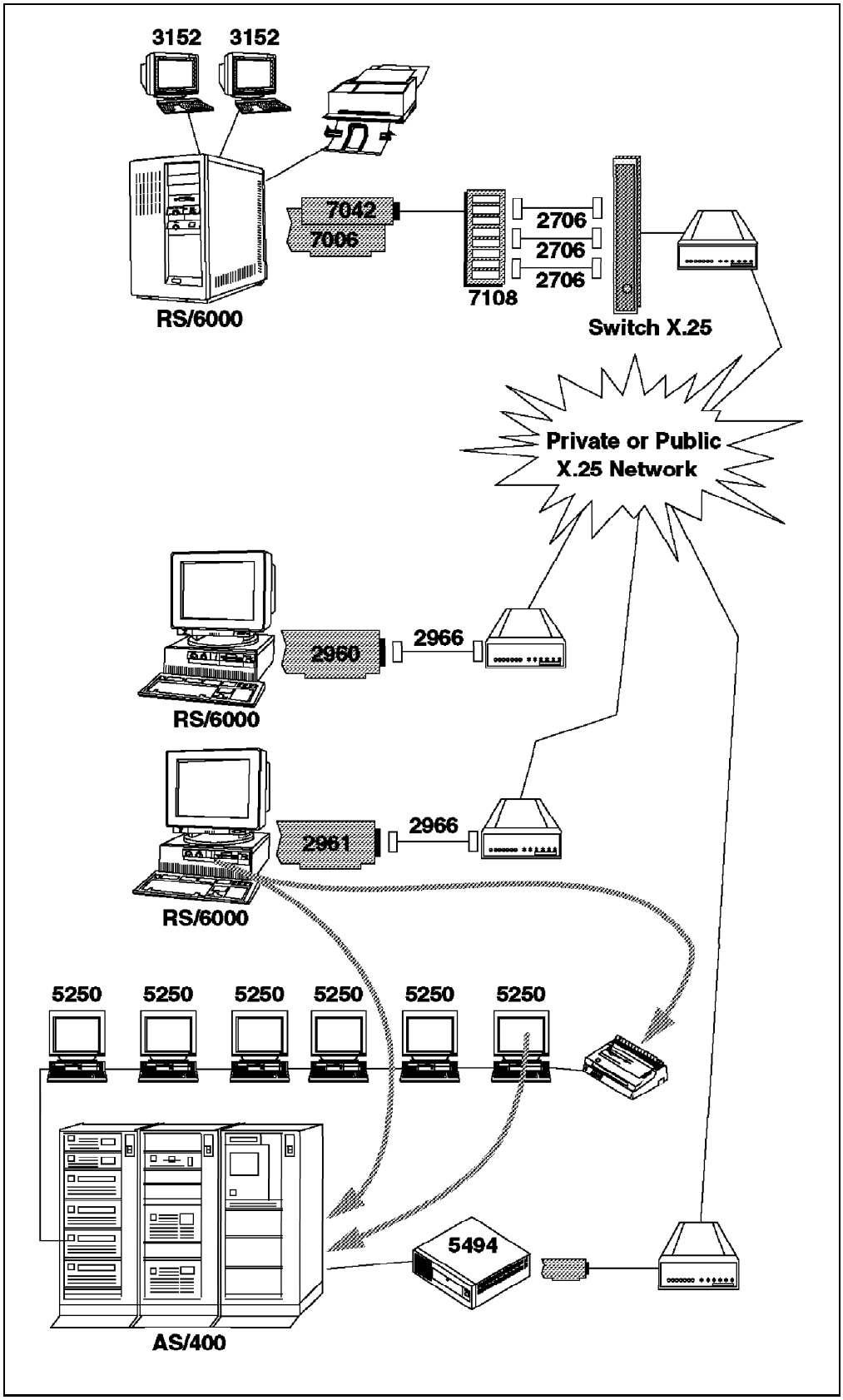


Figure 266. RS/6000 and AS/400 - SNA - X.25: Logical View

9.5.3.5 Synchronous Network

Table 189. RS/6000 and AS/400 - SNA - Synchronous: Abstract

		RS/6000	AS/400
Hardware		- 2970/9970 - 8246 - 2972 - 7092 - 2971/2973/8209 - 8042/8043/7044 - 2979	- MFIOP adapter - 5494 controller - 5394 controller
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - Connection Pgm/400 for UNIX V3.1(1) (AIX module)	- OS/400 V3.1 or 3.6 (SNA included) - Connection Pgm/400 for UNIX V3.1(1) - Client Access/400 V3.1
Functions	**- emulation** **- file transfer** **- file sharing** **- print sharing** **- remote command** **- API** **- mail** **- security** **- graphic** **- name directory** **- network management**	- 5250 block(1) - xfer(1) - - 5250 remote printer(1) - Remote command(1) - LUs 0, 1, 2, 3 & 6.2 (APPC & CPI-C), SQL(1) - - - - -	- - - - strunxwtr(1) - runrmtcmd, strunxcmd(1) - LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C) - - - - -

Remark

- (1) is provided with this optional software.

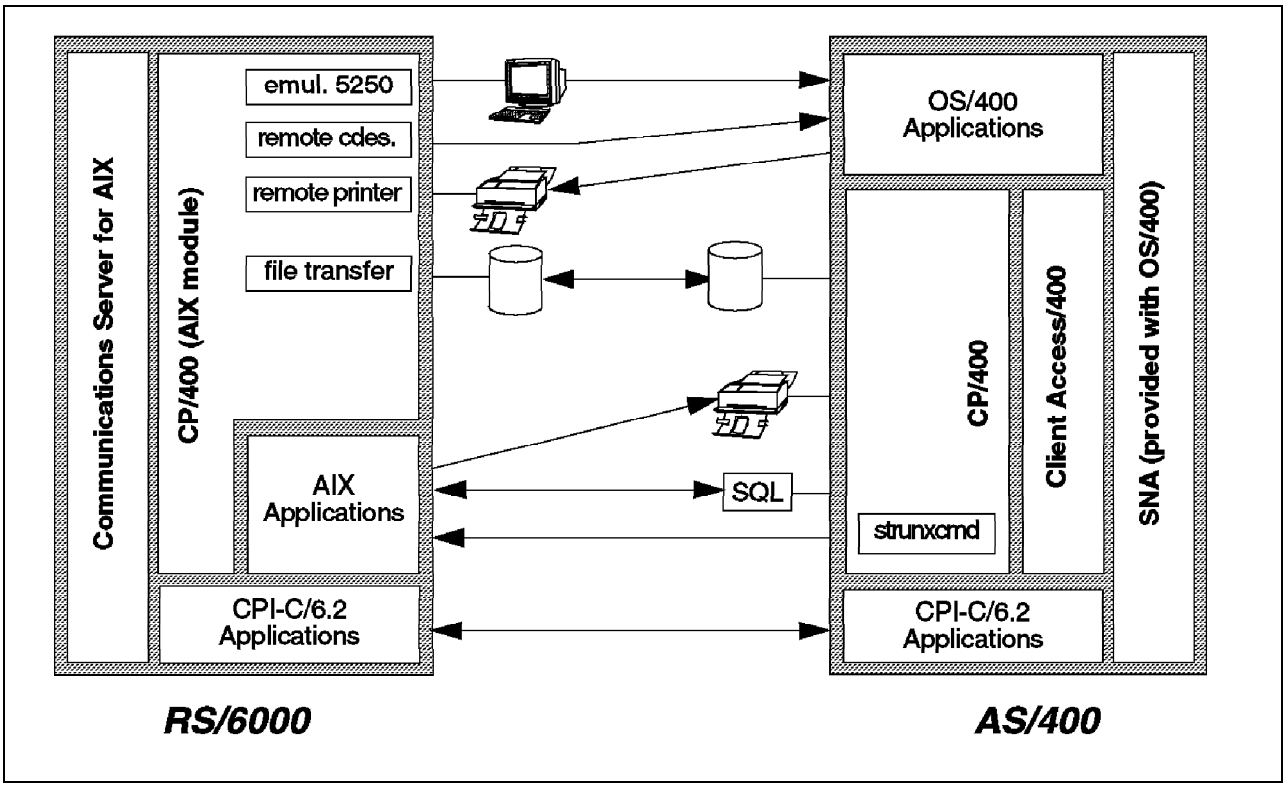


Figure 267. RS/6000 and AS/400 - SNA - Synchronous: Logical View

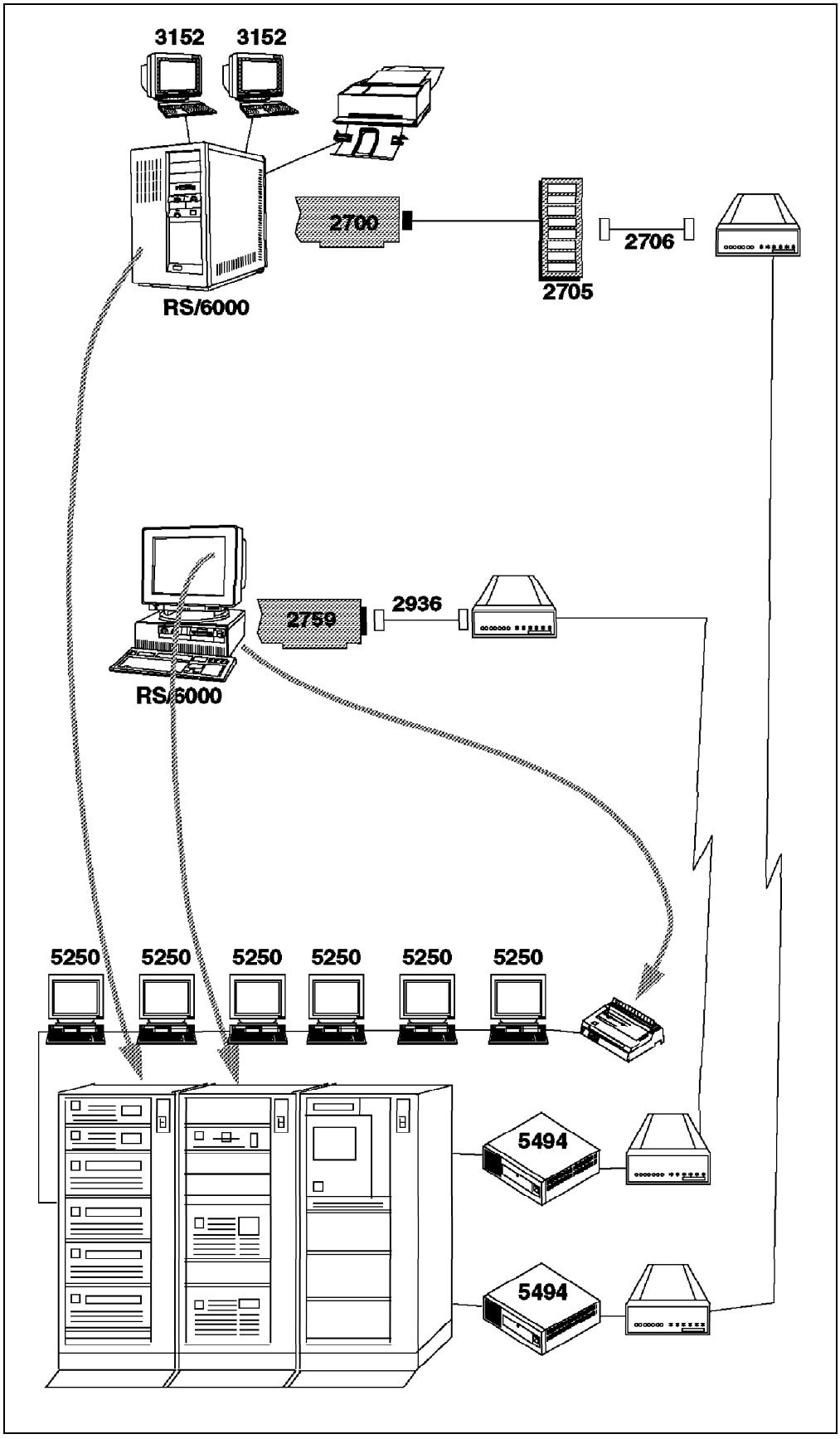


Figure 268. RS/6000 and AS/400 - SNA - Synchronous: Physical View

9.5.4 Twinax

Table 190. RS/6000 and AS/400 Units - Twinax: Abstract

		RS/6000	AS/400 Units (displays, printers)
Hardware		- DCI RS/5250	-
Software		- Software providing IBM 3151 emulation	-
Functions	**- emulation**	-	- Emulation 3151 displays
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	- Emulation 5254/5225 printers
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- DCI RS/5250 is not an IBM product.
- Please refer to Chapter 5 for more information.

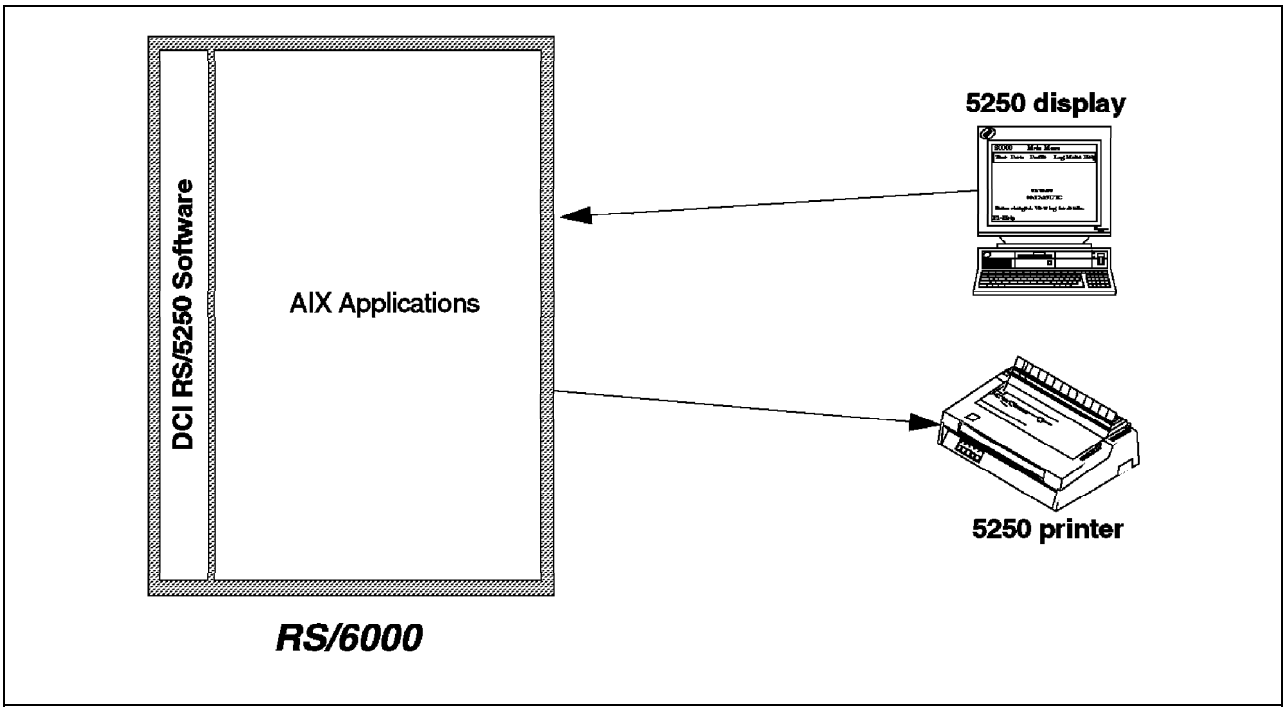


Figure 269. RS/6000 and AS/400 Units - Twinax: Logical View

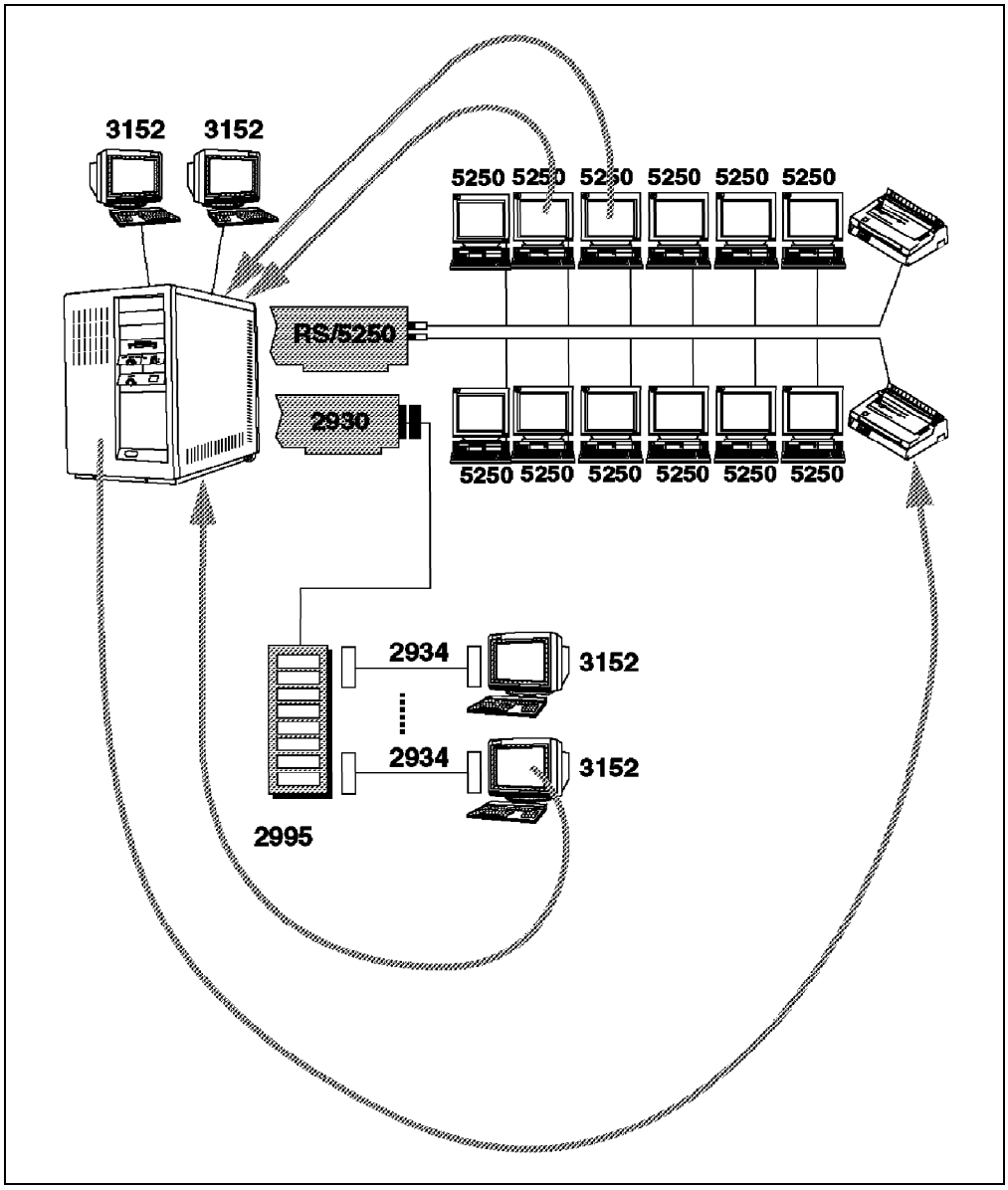


Figure 270. RS/6000 and AS/400 - Twinax: Physical View

9.5.5 OSI

9.5.5.1 X.25 Network

Table 191. RS/6000 and AS/400 - OSI - X.25: Abstract

		RS/6000	AS/400
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- 5494 controller - 5394 controller
Software		- Open Systems Std Com. V3.0 - AIXLink/X.25 V1.1	- OSICS/400 - OSIMS/400 - OSIFS/400
Functions	- emulation	-	-
	- file transfer	- FTAM	- FTAM
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	- X.400	- X.400
	- security	-	-
	- graphic	-	-
	- name directory	- X.500	- X.500
	- network management	- CMIP	- CMIP

Remark

- These functions are provided by Open Systems Standard Communications V3.0. Other OSI products have more or less functions.
- Most of the time, OSI layers are used by telecommunications providers.

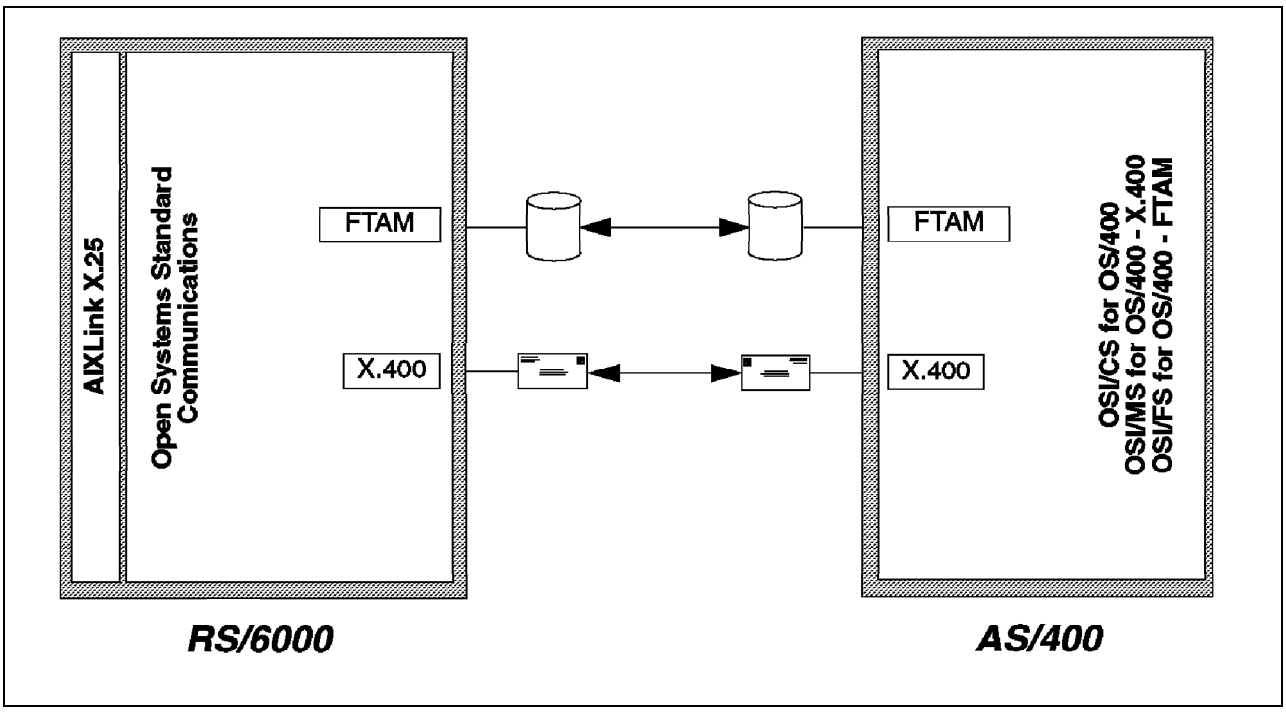


Figure 271. RS/6000 and AS/400 - OSI - X.25: Logical View

9.6 RS/6000 and the S/36

If you need to connect an S/36 to an RS/6000, you can use migration products; most of them provide emulation and file transfer. You can also simply connect S/36 units and use AIX applications.

Please refer to Chapter 6 for more information on S/36 integration products.

The Internet can help you

You can find more information on the WWW at this address:

`http://info6000.austin.ibm.com/products/oemhw/`

9.6.1 Abstract

Table 192. RS/6000 and S/36 Abstract

RS/6000 / S/36	Twinax	
Asynchronous		
Token-Ring		
FDDI		
Ethernet		
X.25		
Synchronous		
Coaxial		
S/370 Channel		
ESCON		
BLKMUX		
Fibre Channel		
ATM		
HIPPI		
SOCC		
Twinax		S/36 Units

Remark

- S/36 Units means displays or printers connected to S/36.

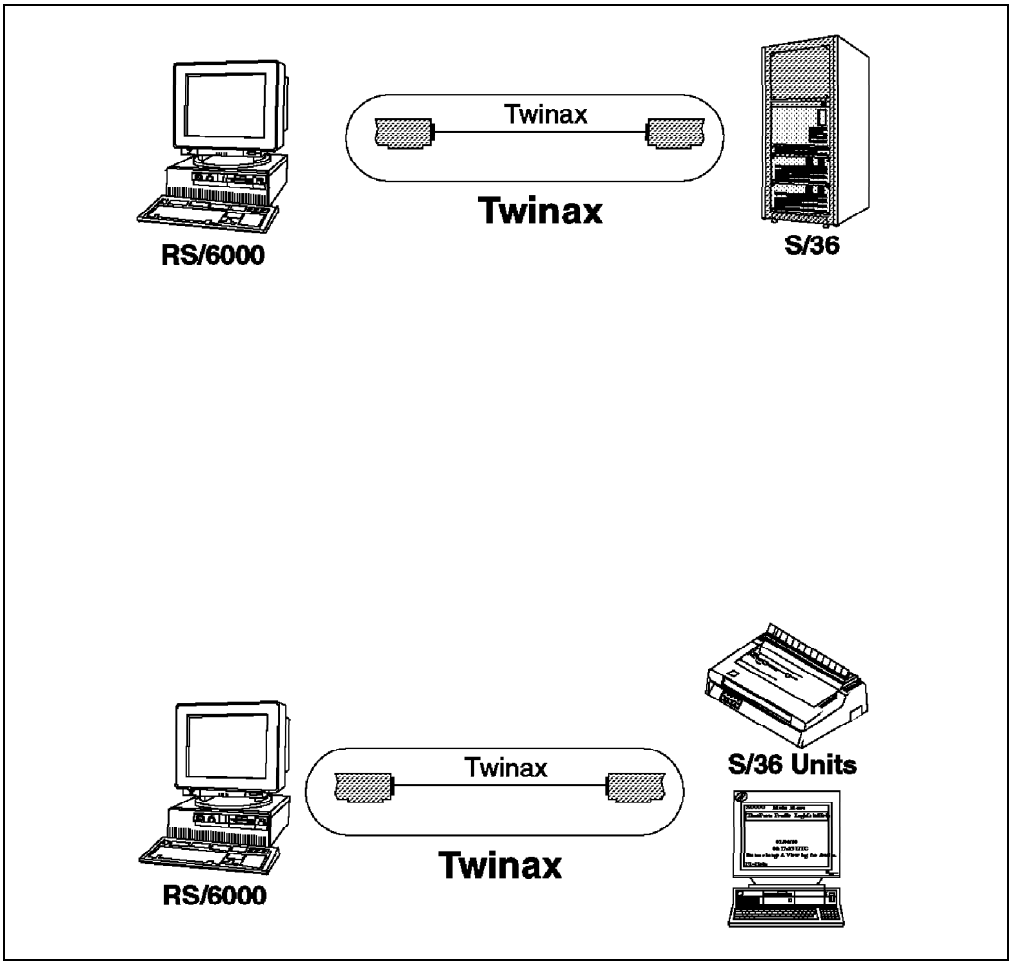


Figure 272. RS/6000 and S/36 Abstract

9.6.2 Twinax

Table 193. RS/6000 and S/36 - Twinax: Abstract

		RS/6000	S/36
Hardware		- Twinax adapter	-
Software		- OPEN RS/36(1)	-
Functions	**- emulation**	- Display emulation	-
	- file transfer	- File transfer	-
	- file sharing	-	-
	- print sharing	- Remote printing	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1) OPEN RS/36 is not an IBM product, but some other products provide the same functions. Please refer to Chapter 6 for more information.

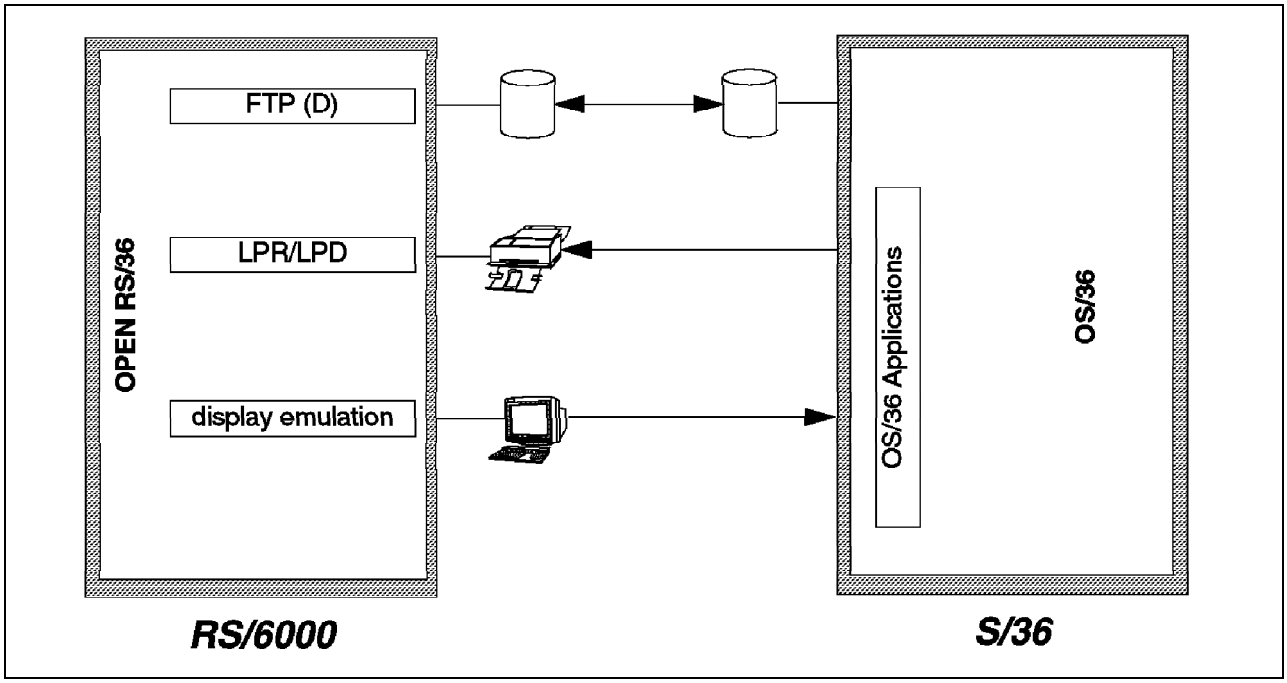


Figure 273. RS/6000 and S/36 - Twinax: Logical View

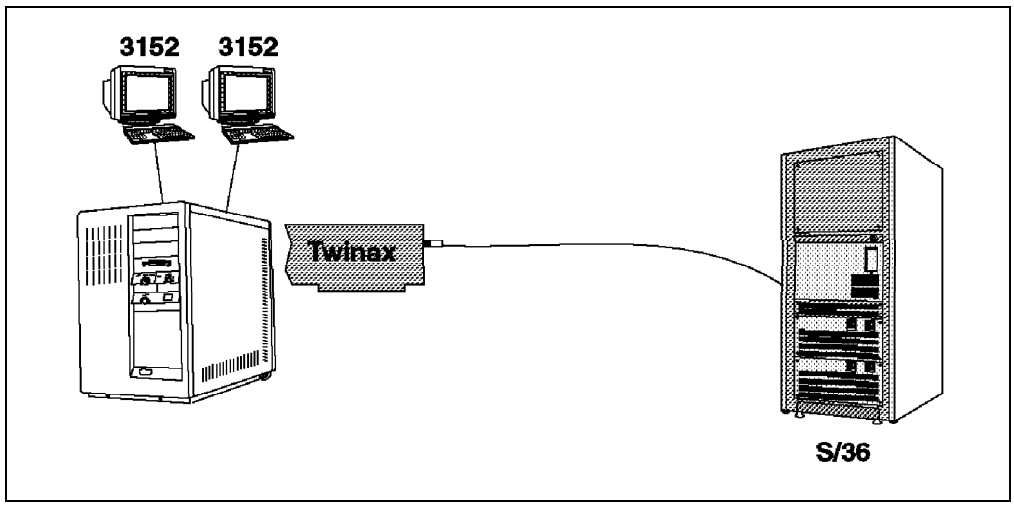


Figure 274. RS/6000 and S/36 - Twinax: Physical View

Table 194. RS/6000 and S/36 Units - Twinax: Abstract

		RS/6000	S/36
Hardware		- Twinax adapter	-
Software		- Communic8(1)	-
Functions	- emulation	-	- Emulation 3151 displays
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	- Emulation 5254/5225 printers
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1) Communic8 is not an IBM product, but some other products provide the same functions. Please refer to Chapter 6 for more information.

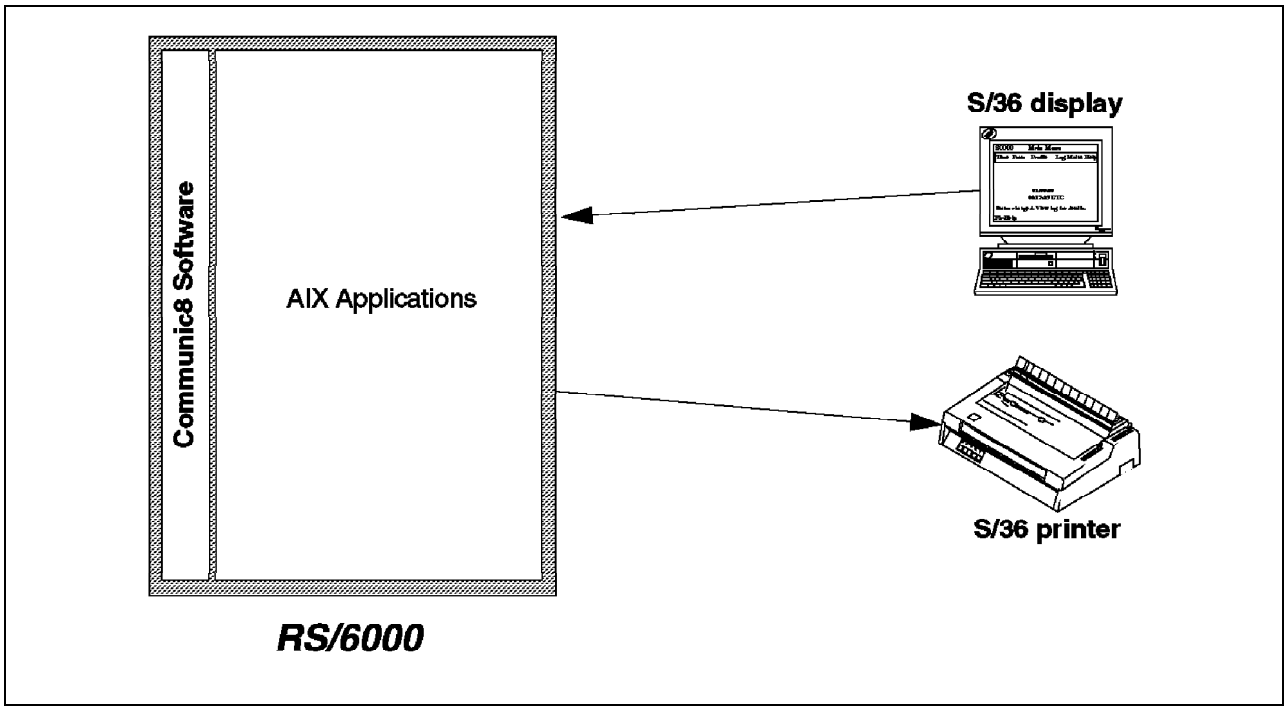


Figure 275. RS/6000 and S/36 Units - Twinax: Logical View

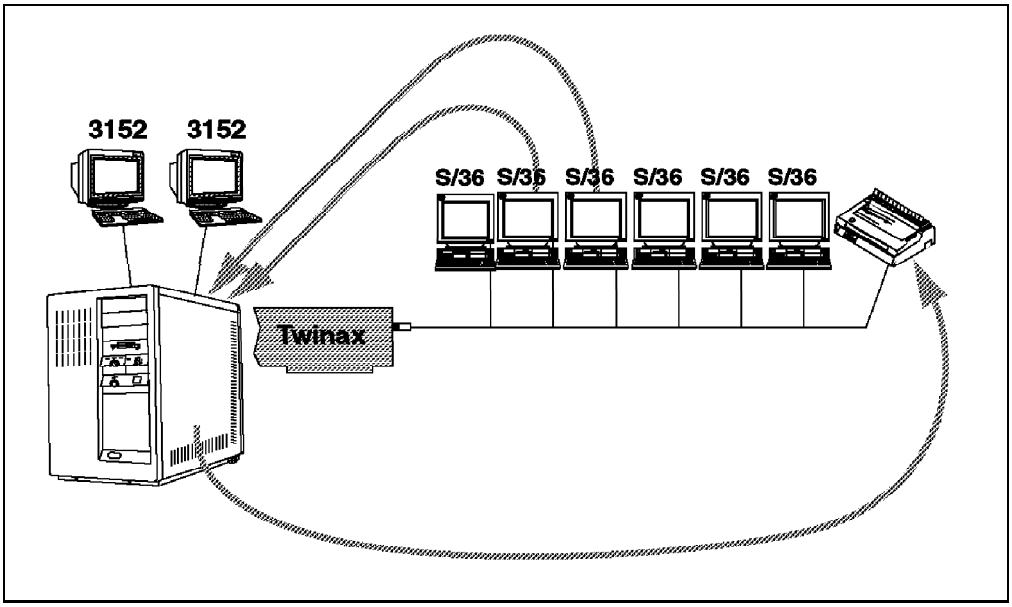


Figure 276. RS/6000 and S/36 Units - Twinax: Physical View

9.7 RS/6000 and PC-Windows

We could write an entire redbook on this topic. In fact, there are many products for connecting a PC-Windows environment to a UNIX system:

- You can integrate your PC-Windows as a TCP/IP workstation. Implement the TCP/IP protocol on the PC and use common functions, such as Telnet, FTP, or RCP. If you manage just few PCs, it's a very simple method.
- You can also implement PC native protocols (IPX/SPX, NetBIOS, NetBEUI) on the RS/6000, and transform it into a PC server. In fact, you can install a program on the RS/6000 such as AIX Connections. If you manage hundreds of PCs, you will prefer this method because you don't need to update all PCs with the new version of TCP/IP, just one platform (RS/6000). You will also use AIX facilities such as the Logical Volume Manager or System Management Interface Tool (SMIT).

Remark

In this chapter, the term *Windows* represents Windows 3.1 or Windows 95.

9.7.1 Abstract

Table 195. RS/6000 and PC-Windows Abstract

RS/6000 / PC-Windows	TCP/IP	SNA	NetBIOS	IPX/SPX	NetBEUI	Asyn-chronous
Asynchronous	SLIP/PPP					
Token-Ring	AIX Con. (1)		AIX Con. (1)	AIX Con. (1)	AIX Con. (1)	
FDDI						
Ethernet	AIX Con. (1)		AIX Con. (1)	AIX Con. (1)	AIX Con. (1)	
X.25						
Synchronous						
Coaxial						
S/370 Channel						
ESCON						
BMPX						
Fibre Channel						
ATM						
HIPPI						
SOCC						
Twinax						

Remark

- (1) AIX Connections is supported Ethernet and token-ring LANs.

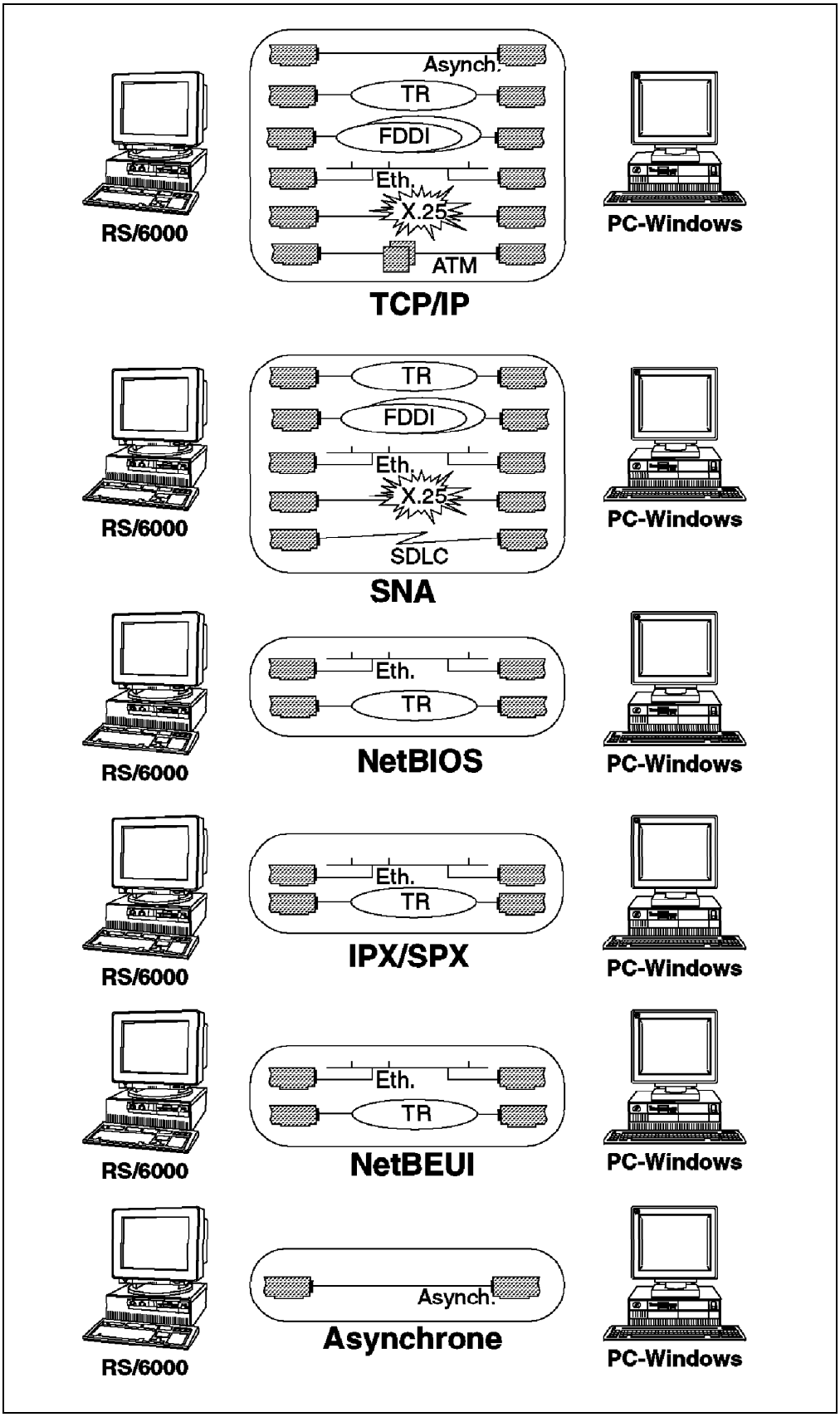


Figure 277. RS/6000 and PC-Windows Abstract

9.7.2 TCP/IP

9.7.2.1 Asynchronous Network

Table 196. RS/6000 and PC-Windows - TCP/IP - Asynchronous: Abstract

		RS/6000	PC-Windows
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceiv- ers: 4222/4223)	- Asynchronous adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP V2.1 for DOS option: Programmer's ToolKit(3)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Use PPP rather SLIP. It's faster and more economical in terms of packets.
- (3) is provided with this optional software.

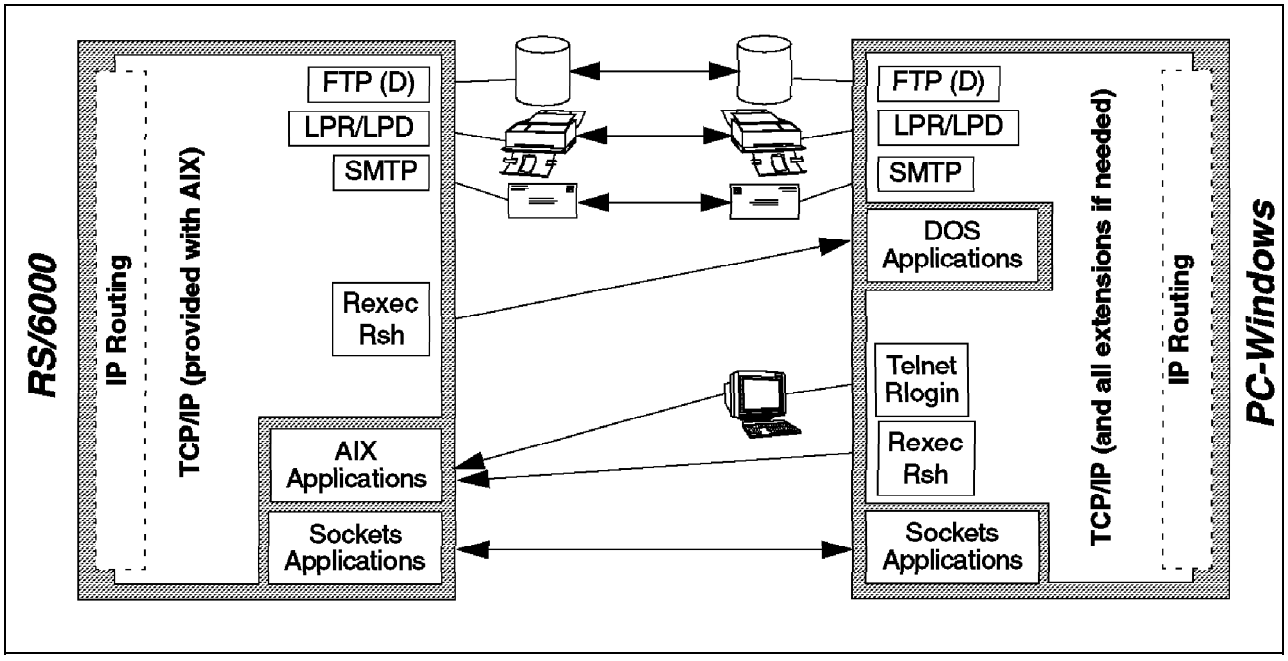


Figure 278. RS/6000 and PC-Windows - TCP/IP - Asynchronous: Logical View

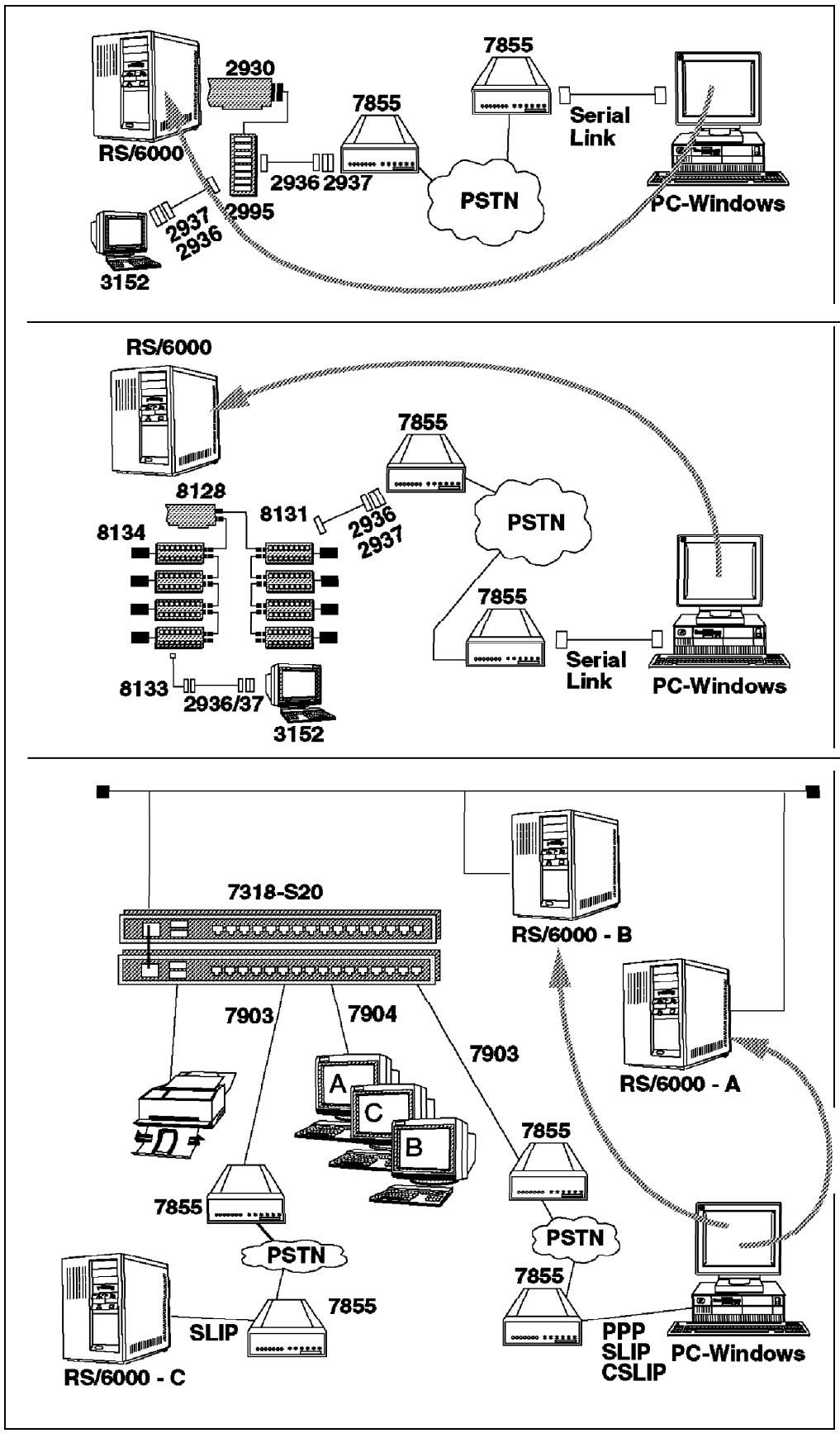


Figure 279. RS/6000 and PC-Windows - TCP/IP - Asynchronous: Physical View

9.7.2.2 Token-Ring Network

Table 197. RS/6000 and PC-Windows - TCP/IP - Token-Ring: Abstract

		RS/6000	PC-Windows
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP V2.1 for DOS option: NFS Kit(1) option: X-Vision(2) option: Programmer's ToolKit(3)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)(1)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	-	-
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), and (3) are provided with this optional software.
- (2) X-Vision is not an IBM product. Please see Chapter 7 for more information.

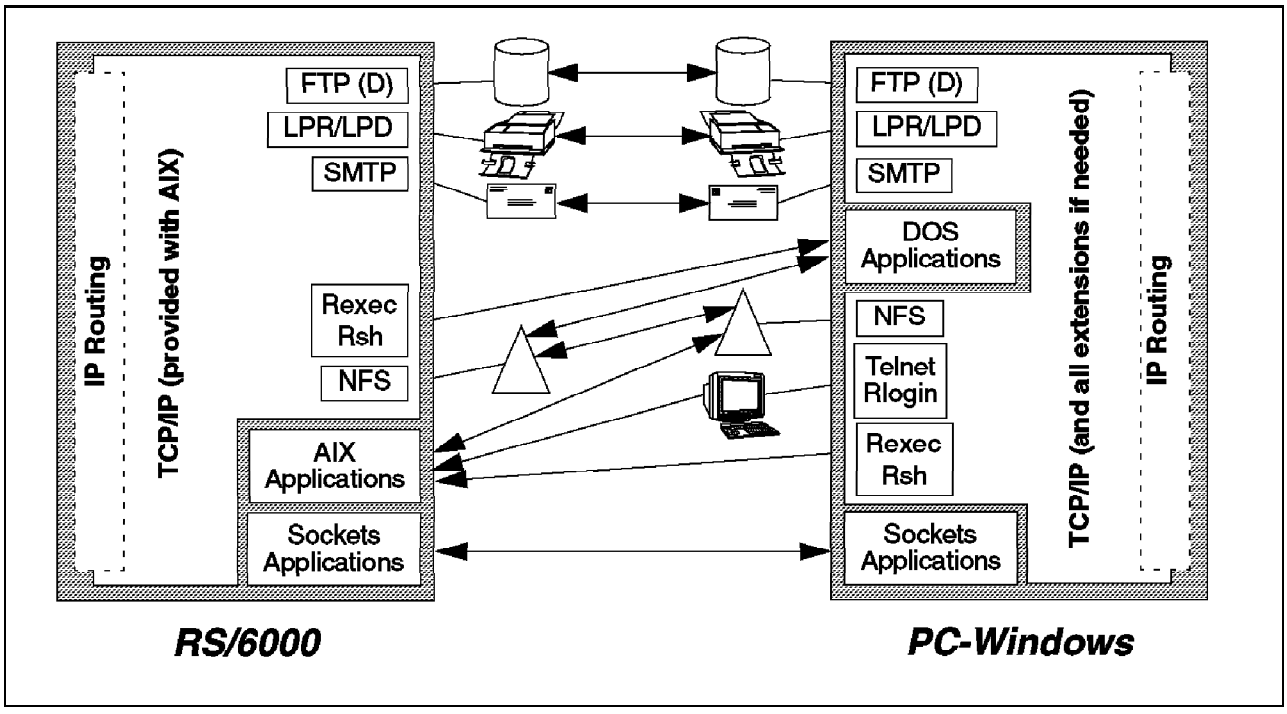


Figure 280. RS/6000 and PC-Windows - TCP/IP - Token-Ring: Logical View

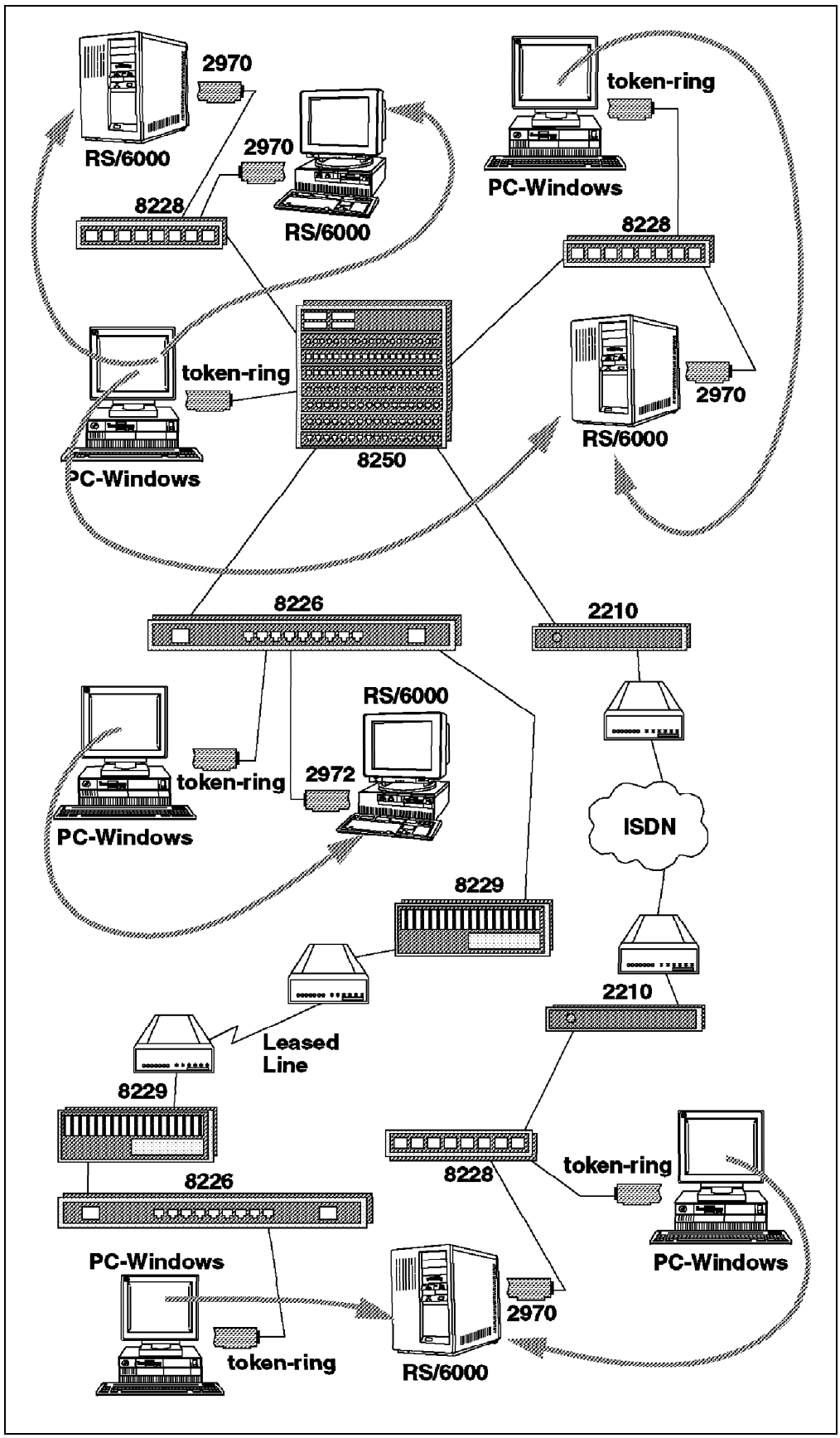


Figure 281. RS/6000 and PC-Windows - TCP/IP - Token-Ring: Physical View

9.7.2.3 FDDI Network

Table 198. RS/6000 and PC-Windows - TCP/IP - FDDI: Abstract

		RS/6000	PC-Windows
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- FDDI adapter (Fibre or Copper)
Software		- AIX V4 (TCP/IP included)	- TCP/IP V2.1 for DOS option: NFS Kit(1) option: X-Vision(2) option: Programmer's ToolKit(3)
Functions	- **emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- **file transfer**	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- **file sharing**	- NFS (C/S)	- NFS (C/S)(1)
	- **print sharing**	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- **remote command**	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- **API**	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- **mail**	- SMTP (C/S)	- SMTP (C/S)
	- **security**	-	-
	- **graphic**	- X-Window (C/S)	- X-Window (/S)(2)
	- **name directory**	-	
	- **network management**	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remarks

- Use an FDDI connection, instead of Ethernet 100 Mbps, to avoid collisions!
- (1), (2), and (3) are provided with this optional software.
- (2): X-Vision is not an IBM product. Please see Chapter 7 for more information.

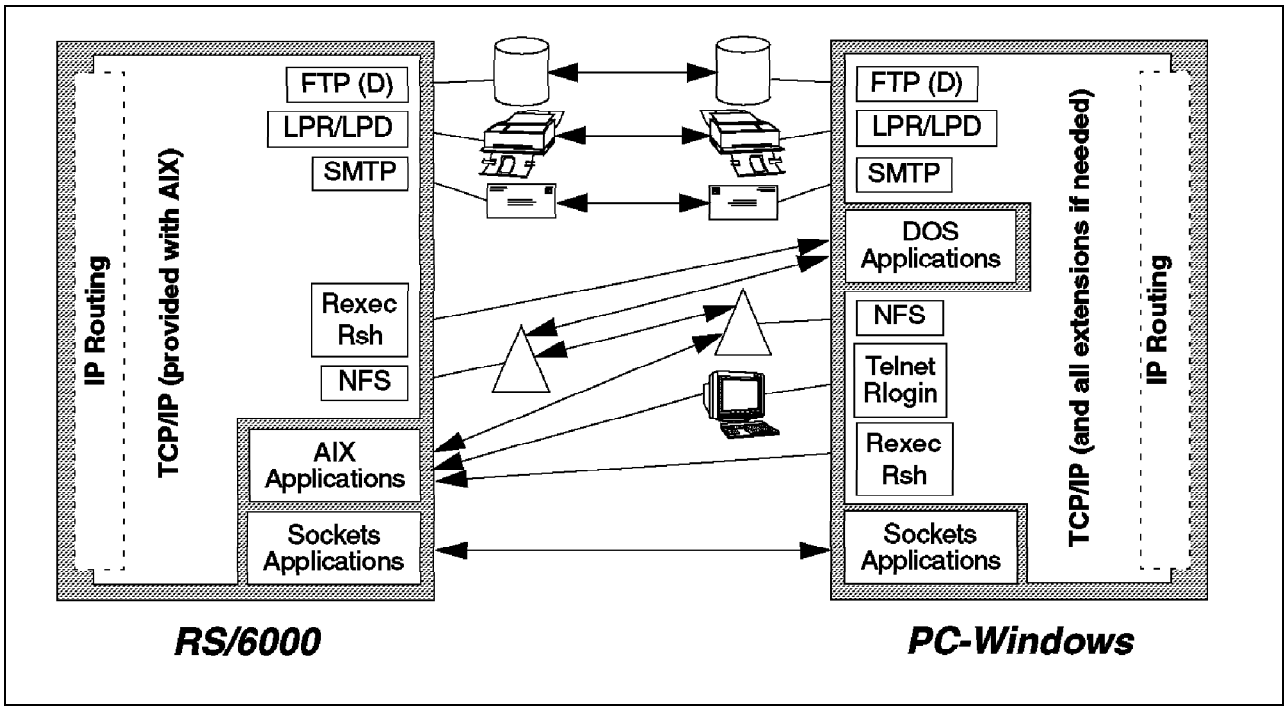


Figure 282. RS/6000 and PC-Windows - TCP/IP - FDDI: Logical View

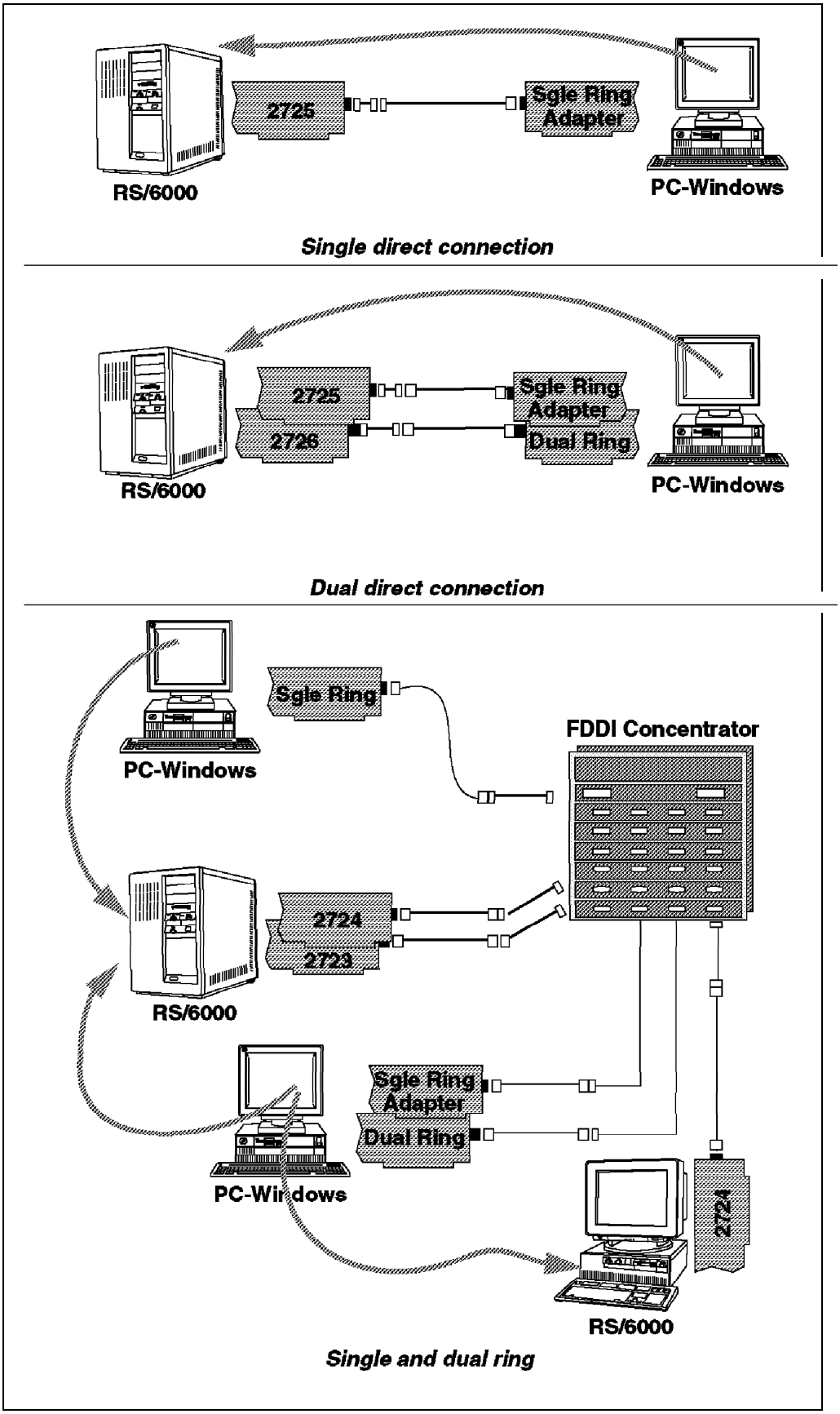


Figure 283. RS/6000 and PC-Windows - TCP/IP - FDDI: Physical View

9.7.2.4 Ethernet Network

Table 199. RS/6000 and PC-Windows - TCP/IP - Ethernet: Abstract

		RS/6000	PS-DOS
Hardware		- Std ports - 2981/2982/8210 - 2980/9980 - 8241 - 4221/9000 - 8022/8023/8024 - 4222/9001 - 8032/8033/8034 - 2992 - 2402/2406 - 2993 - 2403/2407 - 2987 (option transceiv- - 2985 ers: 4222/4223) - 8242 (100 Mbps)	- Ethernet adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP V2.1 for DOS option: NFS Kit(1) option: X-Vision(2) option: Programmer's ToolKit(3)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)(1)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	-	-
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), and (3) are provided with this optional software.
- (2): X-Vision is not an IBM product. Please see Chapter 7 for more information.

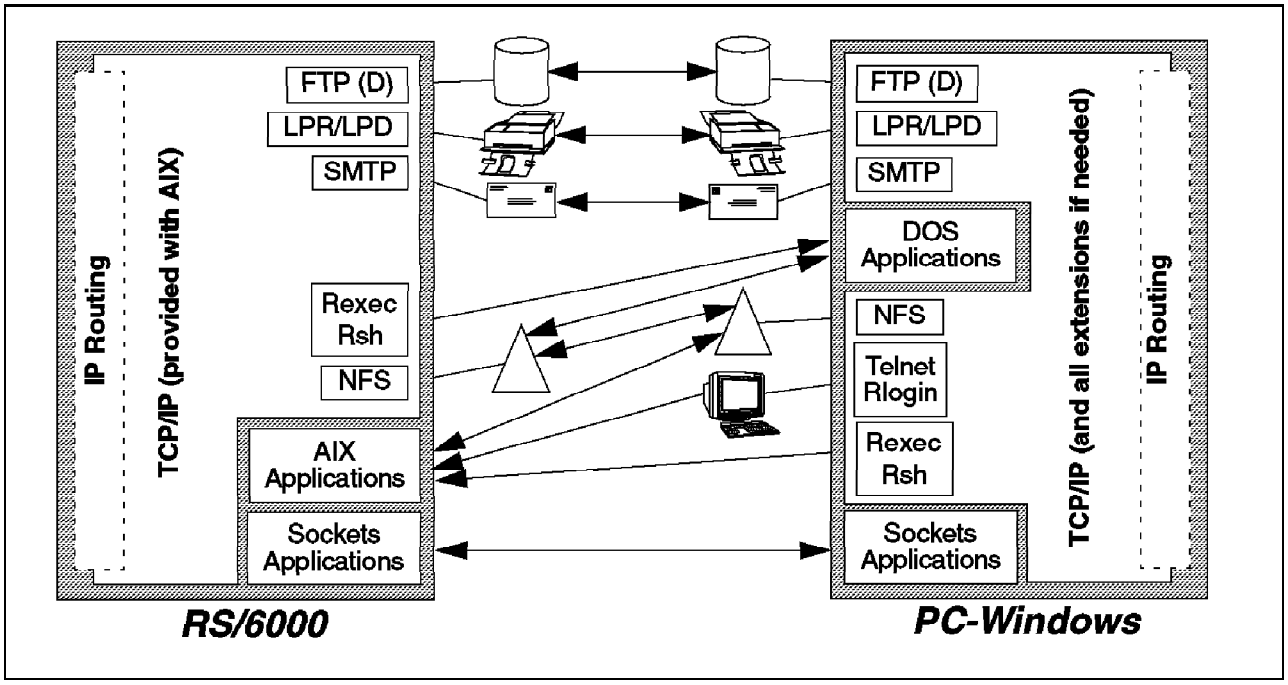


Figure 284. RS/6000 and PC-Windows - TCP/IP - Ethernet: Logical View

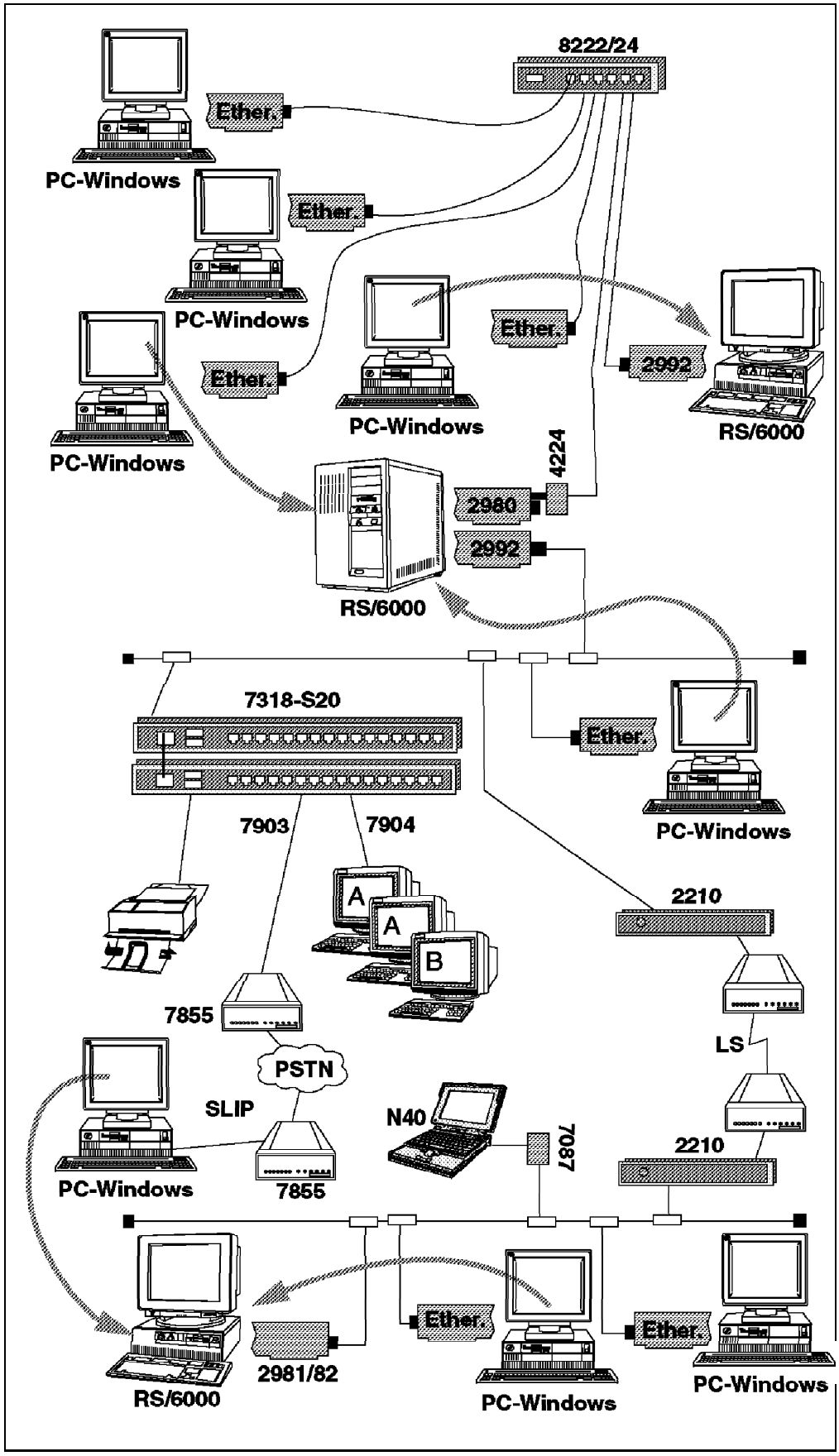


Figure 285. RS/6000 and PC-Windows - TCP/IP - Ethernet: Physical View

9.7.2.5 X.25 Network

Table 200. RS/6000 and PC-Windows - TCP/IP - X.25: Abstract

		RS/6000	PC-Windows
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- AIX V4 (TCP/IP included) - AIXLink/X.25 V1.1	- TCP/IP V2.1 for DOS option: Programmer's ToolKit(3)
Functions	- **emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- **file transfer**	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- **file sharing**	-	-
	- **print sharing**	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- **remote command**	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- **API**	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- **mail**	- SMTP (C/S)	- SMTP (C/S)
	- **security**	- Kerberos (C/S)	-
	- **graphic**	-	-
	- **name directory**	-	-
	- **network management**	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This configuration is not optimum for Telnet connections!
- In fact, X.25 packets transported on TCP/IP packets generate a lot of overflow. So, it's better to use some product (such as ECO-PAD) to compress this kind of communication. See the OEM software offerings for AIX V4 section to find more information on this product.
- (3) is provided with this optional software.

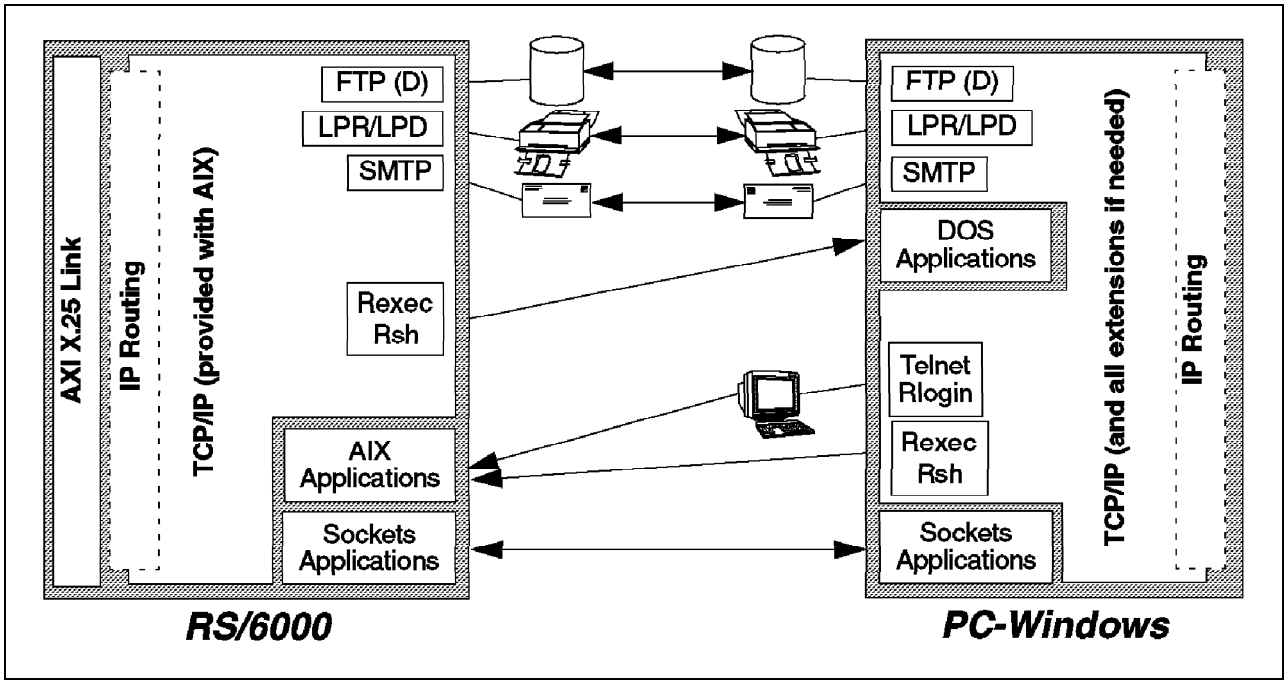


Figure 286. RS/6000 and PC-Windows - TCP/IP - X.25: Logical View

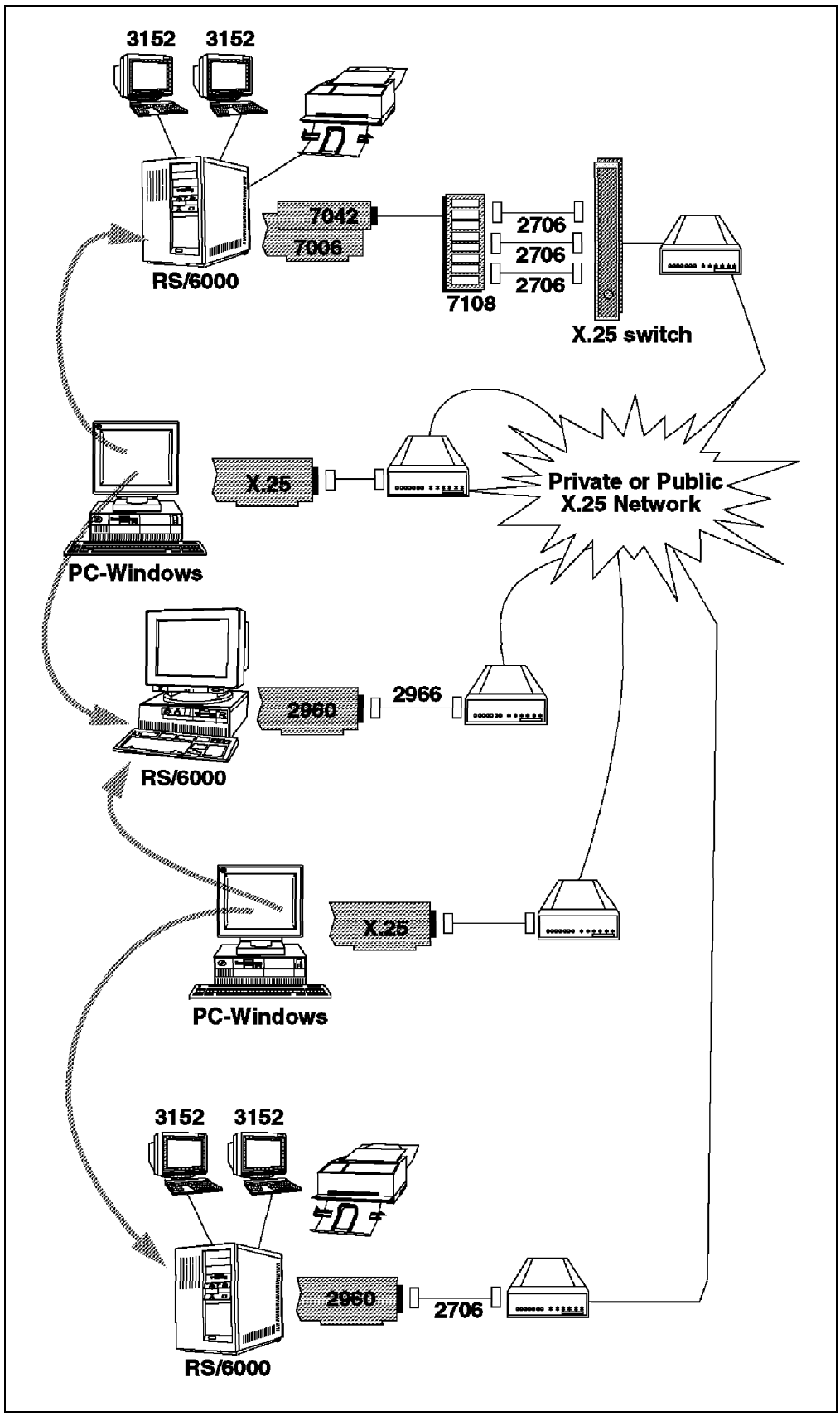


Figure 287. RS/6000 and PC-Windows - TCP/IP - X.25: Logical View

9.7.2.6 ATM Network

Table 201. RS/6000 and PC-Windows - TCP/IP - ATM: Abstract

		RS/6000	UNIX Platform
Hardware		- 2984 - 2989	- ATM adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP V2.1 for DOS option: NFS Kit(1) option: X-Vision(2) option: Programmer's ToolKit(3)
Functions	- **emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- **file transfer**	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- **file sharing**	- NFS (C/S)	- NFS (C/S)(1)
	- **print sharing**	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- **remote command**	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- **API**	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- **mail**	- SMTP (C/S)	- SMTP (C/S)
	- **security**	-	-
	- **graphic**	- X-Window (C/S)	- X-Window (/S)(2)
	- **name directory**	-	
	- **network management**	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), and (3) are provided with this optional software.
- (2) X-Vision is not an IBM product. Please see Chapter 7 for more information.

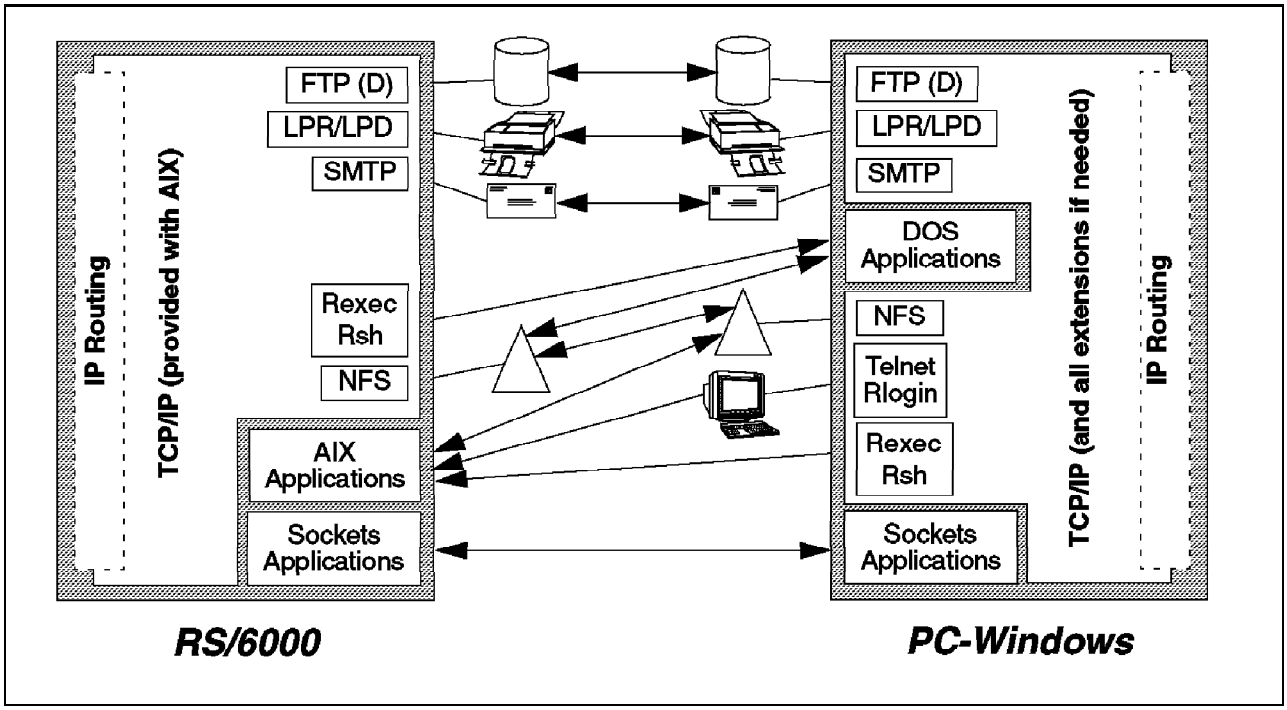


Figure 288. RS/6000 and PC-Windows - TCP/IP - ATM: Logical View

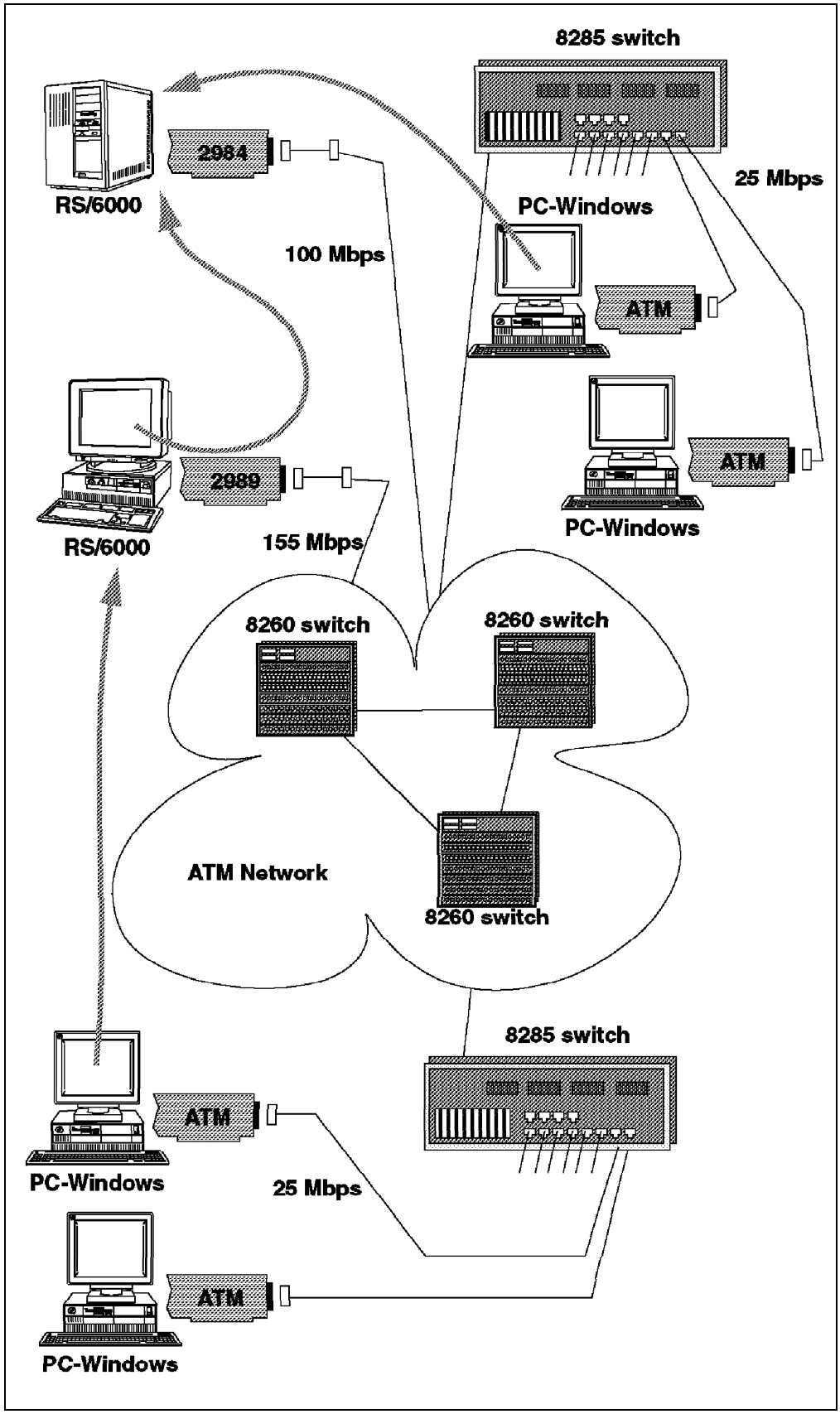


Figure 289. RS/6000 and PC-Windows - TCP/IP - ATM: Physical View

9.7.3 SNA

9.7.3.1 Token-Ring Network

Table 202. RS/6000 and PC-Windows - SNA - Token-Ring: Abstract

		RS/6000	PC-Windows
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Personal Communications for Windows option: AnyNet feature
Functions	**- emulation**	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- This point-to-point communication is not used very often.

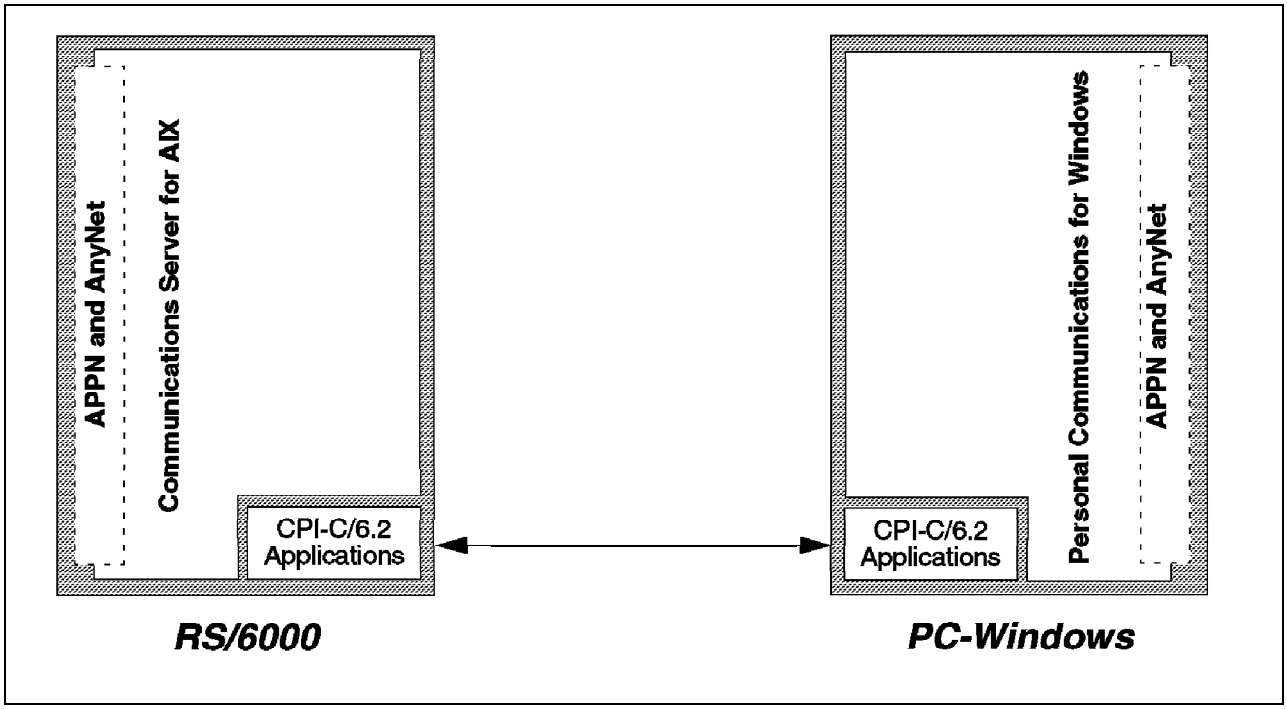


Figure 290. RS/6000 and PC-Windows - SNA - Token-Ring: Logical View

9.7.3.2 FDDI Network

Table 203. RS/6000 and PC-Windows - SNA - FDDI: Abstract

		RS/6000	PC-Windows
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- FDDI adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Personal Communications for Windows option: AnyNet feature
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- This point-to-point communication is not used very often.

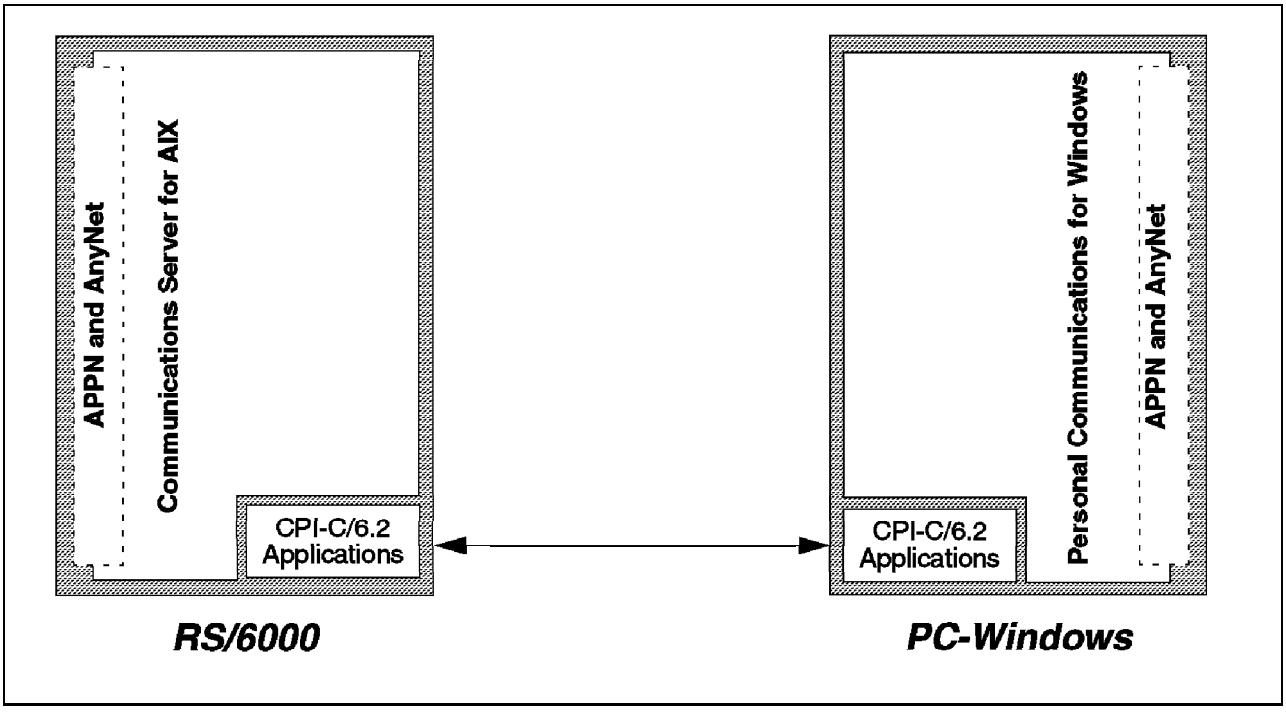


Figure 291. RS/6000 and PC-Windows - SNA - FDDI: Logical View

9.7.3.3 Ethernet Network

Table 204. RS/6000 and PC-Windows - SNA - Ethernet: Abstract

		RS/6000	PC-Windows
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Personal Communications for Windows option: AnyNet feature
Functions	**- emulation**	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- This point-to-point communication is not used very often.

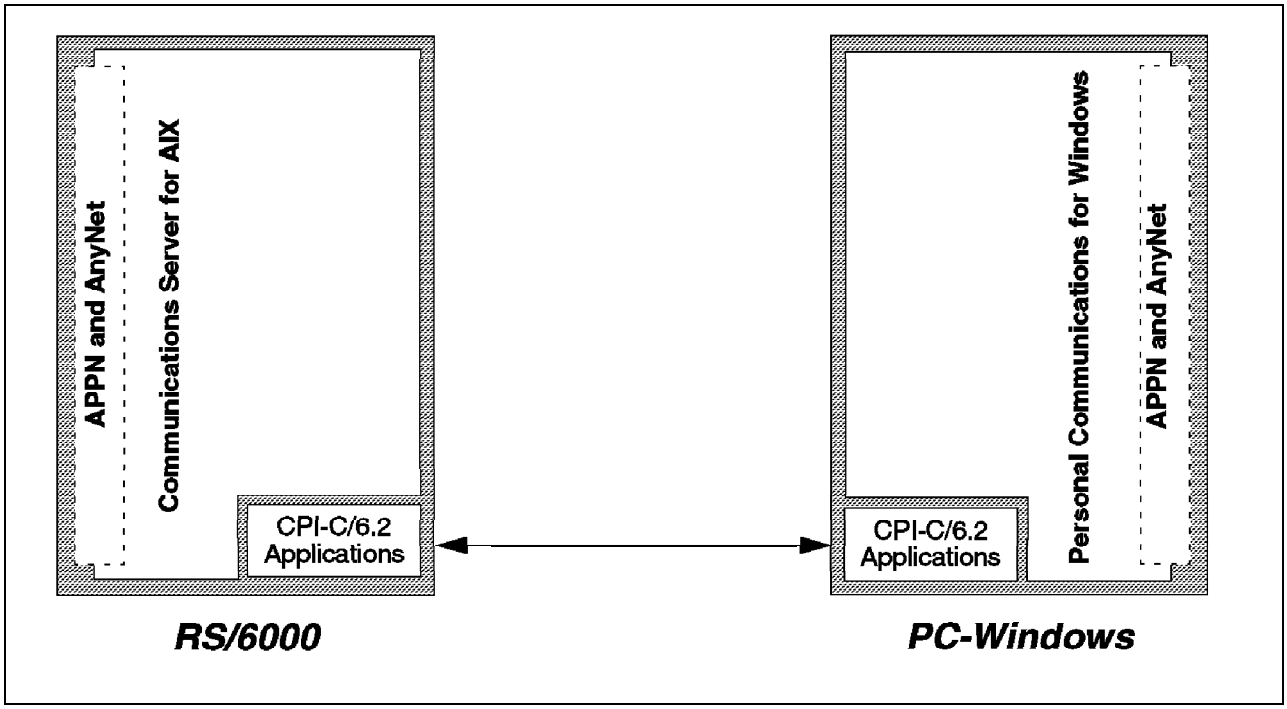


Figure 292. RS/6000 and PC-Windows - SNA - Ethernet: Logical View

9.7.3.4 X.25 Network

Table 205. RS/6000 and PC-Windows - SNA - X.25: Abstract

		RS/6000	PC-Windows
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - AIXLink/X.25 V1.1	- Personal Communications for Windows option: AnyNet feature
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- This point-to-point communication is not used very often.

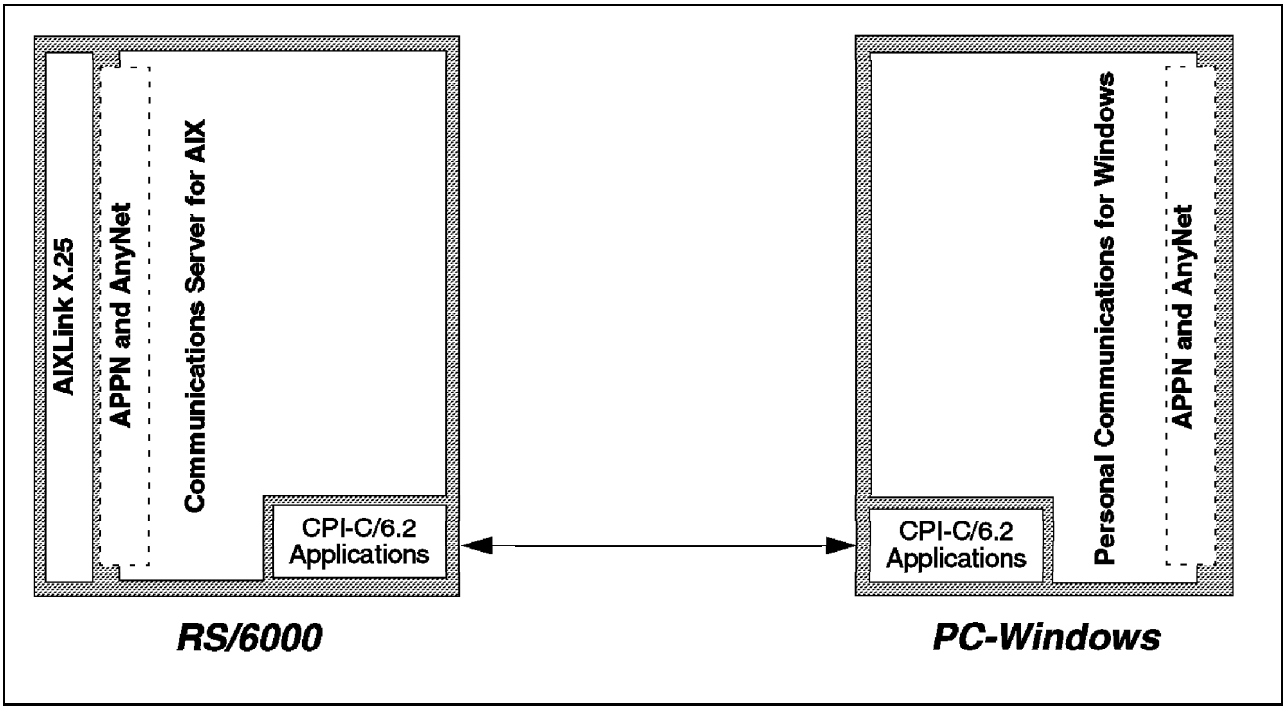


Figure 293. RS/6000 and PC-Windows - SNA - X.25: Logical View

9.7.3.5 Synchronous Network

Table 206. RS/6000 and PC-Windows - SNA - Synchronous: Abstract

		RS/6000	PC-Windows
Hardware		- 2959 - 2700 (+2705) - 2701 (+2705)	- SDLC adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Personal Communications for Windows option: AnyNet feature
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- This point-to-point communication is not used very often.

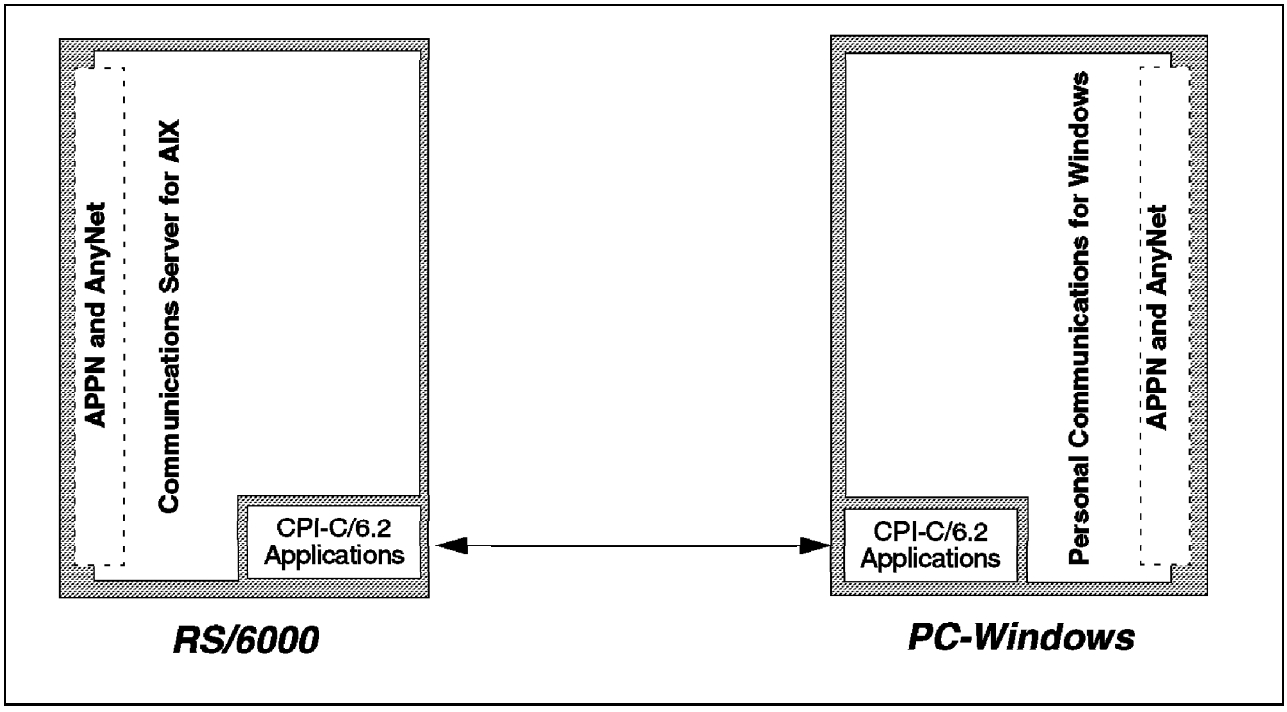


Figure 294. RS/6000 and PC-Windows - SNA - Synchronous: Logical View

9.7.4 NetBIOS

9.7.4.1 Token-Ring Network

Table 207. RS/6000 and PC-Windows - NetBIOS - Token-Ring: Abstract

		RS/6000	PC-Windows
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	- emulation	-	- Emulation vt102 (NBTerm)
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- smbadmin	-

Remarks

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBEUI.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

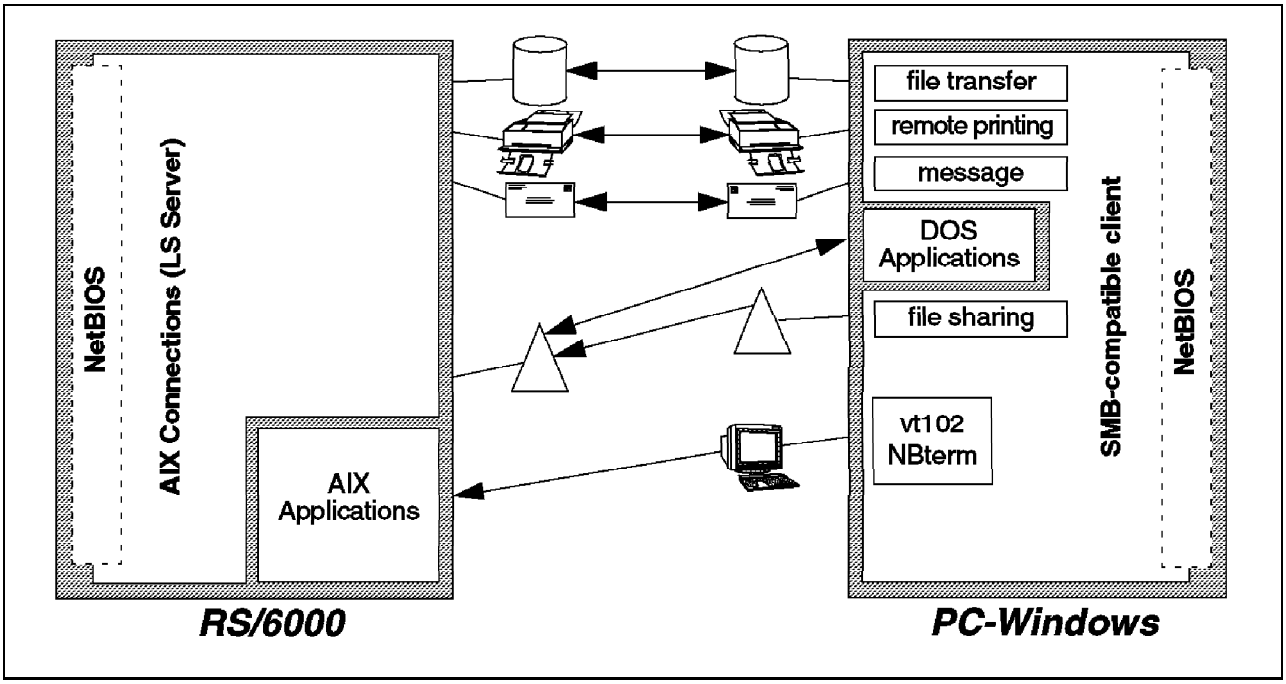


Figure 295. RS/6000 and PC-Windows - NetBIOS - Token-Ring: Logical View

9.7.4.2 Ethernet Network

Table 208. RS/6000 and PC-Windows - NetBIOS - Ethernet: Abstract

		RS/6000	PS-DOS
Hardware		- Std ports - 2981/2982/8210 - 2980/9980 - 8241 - 4221/9000 - 8022/8023/8024 - 4222/9001 - 8032/8033/8034 - 2992 - 2402/2406 - 2993 - 2403/2407 - 2987 (option transceiv- - 2985 ers: 4222/4223) - 8242 (100 Mbps)	- Ethernet adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB compatible client
Functions	**- emulation**	-	- emulation vt102 (NBTerm)
	- file transfer	-	- file transfer
	- file sharing	-	- file sharing
	- print sharing	-	- remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- message
	- security	-	-
	- graphic	-	-
	- name directory	- name service	-
	- network management	- smbadmin	-

Remarks

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBEUI.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

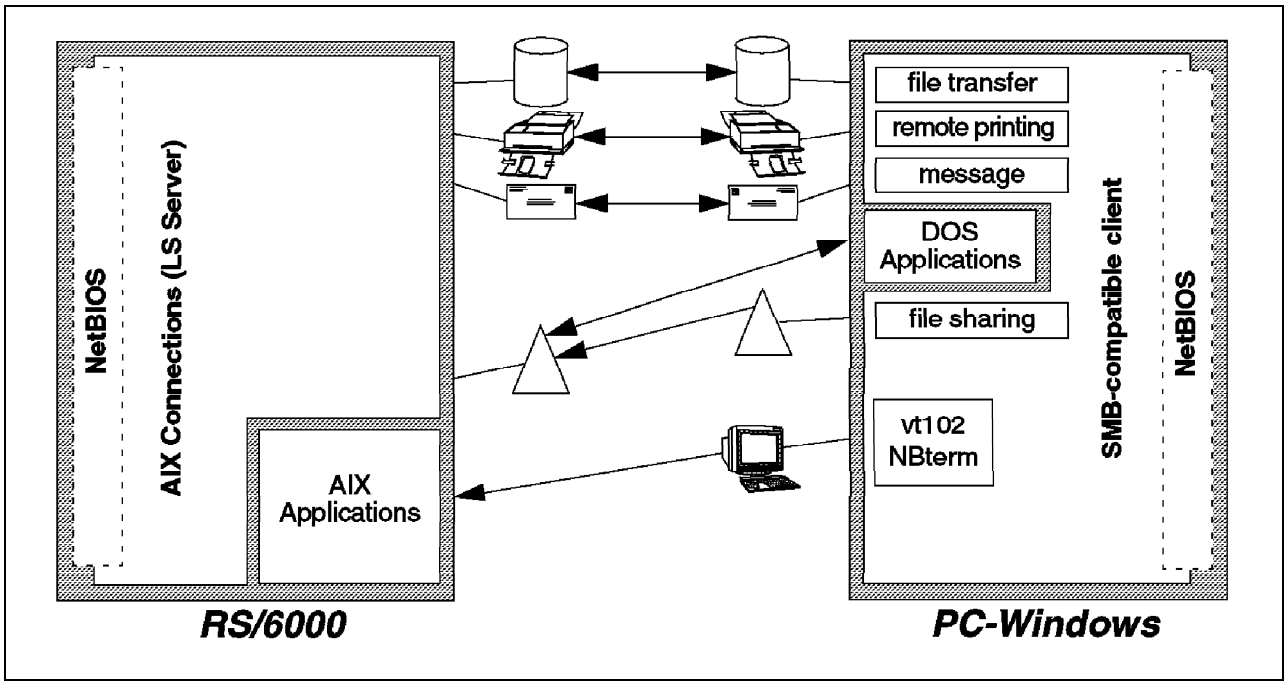


Figure 296. RS/6000 and PC-Windows - NetBIOS - Ethernet: Logical View

9.7.5 IPX/SPX

9.7.5.1 Token-Ring Network

Table 209. RS/6000 and PC-Windows - IPX/SPX - Token-Ring: Abstract

		RS/6000	PC-Windows
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 option: AIX Connections (NW Server)	- Novell NetWare-compatible client
Functions	- emulation	-	-
	- file transfer	-	- NWmap
	- file sharing	-	- NWmap
	- print sharing	-	- NWprint
	- remote command	-	-
	- API	-	-
	- mail	-	- NWmessage
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- nwadmin	-

Remark

- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

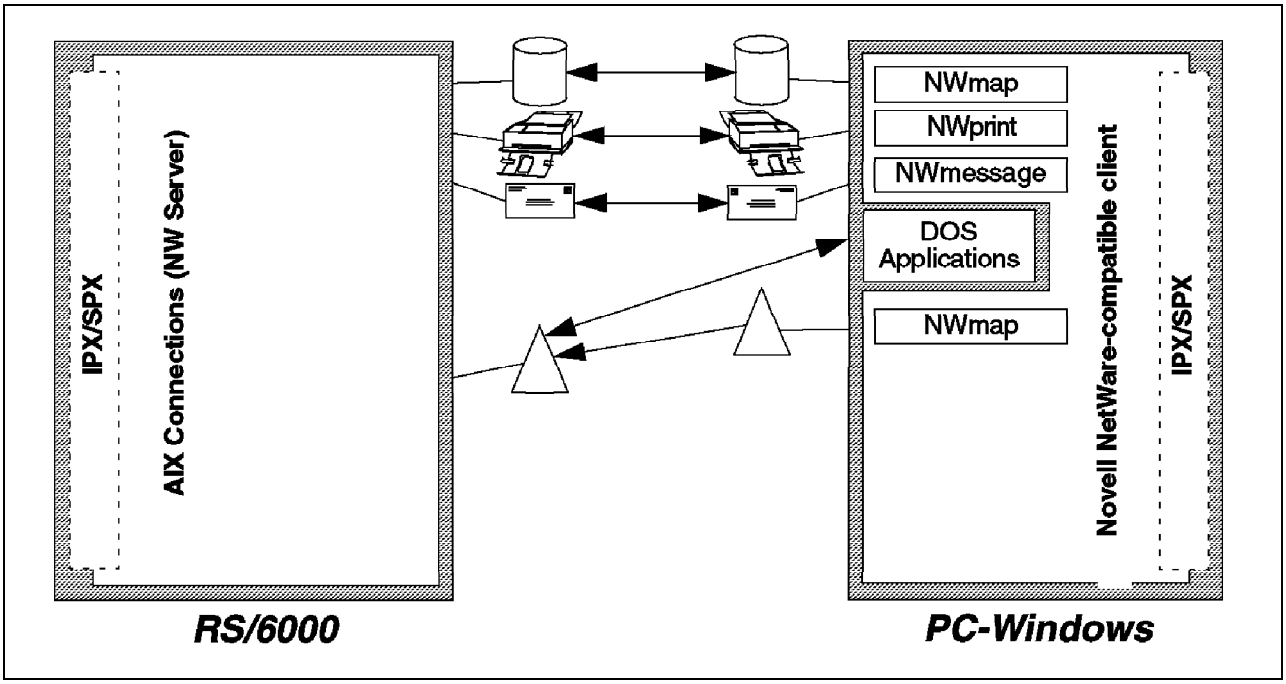


Figure 297. RS/6000 and PC-Windows - IPX/SPX - Token-Ring: Logical View

9.7.5.2 Ethernet Network

Table 210. RS/6000 and PC-Windows - NetBEUI - Ethernet: Abstract

		RS/6000	PS-DOS
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- AIX V4 option: AIX Connections (NW Server)	- Novell NetWare-compatible client
Functions	**- emulation**	-	-
	- file transfer	-	- NWmap
	- file sharing	-	- NWmap
	- print sharing	-	- NWprint
	- remote command	-	-
	- API	-	-
	- mail	-	- NWmessage
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- nwadmin	-

Remark

- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

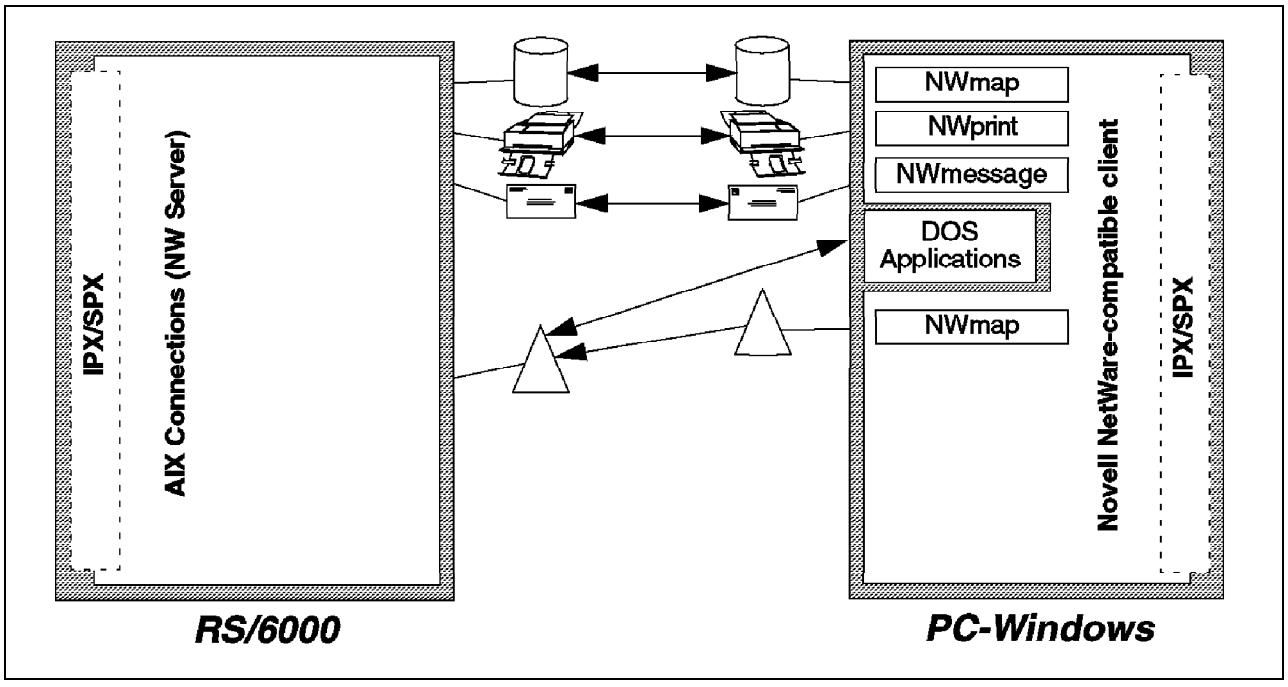


Figure 298. RS/6000 and PC-Windows - IPX/SPX - Ethernet: Logical View

9.7.6 NetBEUI

9.7.6.1 Token-Ring Network

Table 211. RS/6000 and PC-Windows - NetBEUI - Token-Ring: Abstract

		RS/6000	PC-Windows
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	- emulation	-	-
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- smbadmin	-

Remark

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBIOS.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

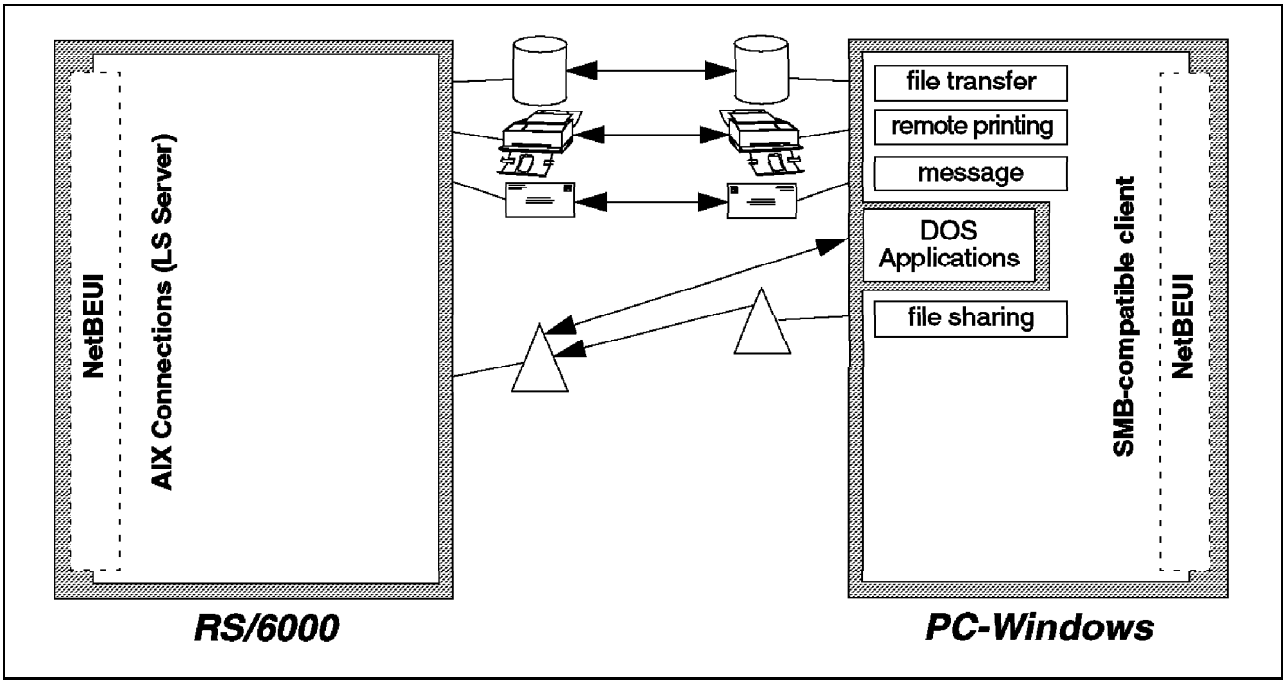


Figure 299. RS/6000 and PC-Windows - NetBEUI - Token-Ring: Logical View

9.7.6.2 Ethernet Network

Table 212. RS/6000 and PC-Windows - NetBEUI - Ethernet: Abstract

		RS/6000	PS-DOS
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	**- emulation**	-	-
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- smbadmin	-

Remark

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBIOS.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

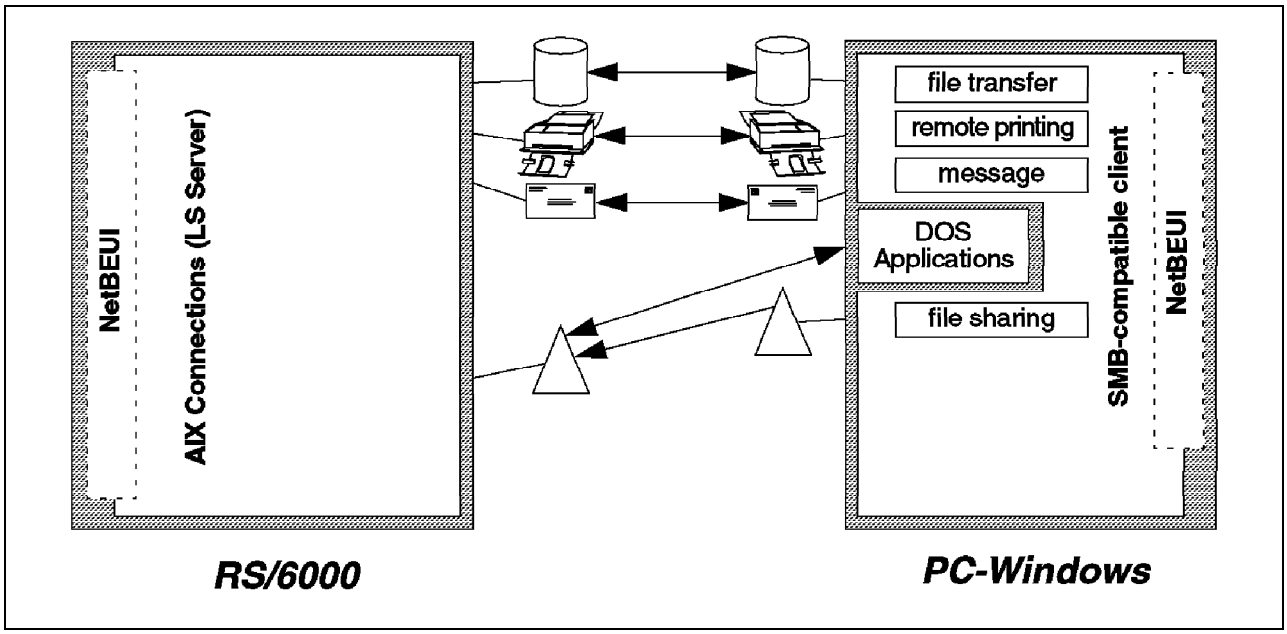


Figure 300. RS/6000 and PC-Windows - NetBEUI - Ethernet: Logical View

9.7.7 Asynchronous

9.7.7.1 Asynchronous Network

Table 213. RS/6000 and PC-Windows - Asynchronous. - Asynchronous: Abstract

		RS/6000	PC-Windows
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Asynchronous serial port
Software		-	-
Functions	**- emulation**	-	- vt100 (included in Windows)
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- The most simple connection!

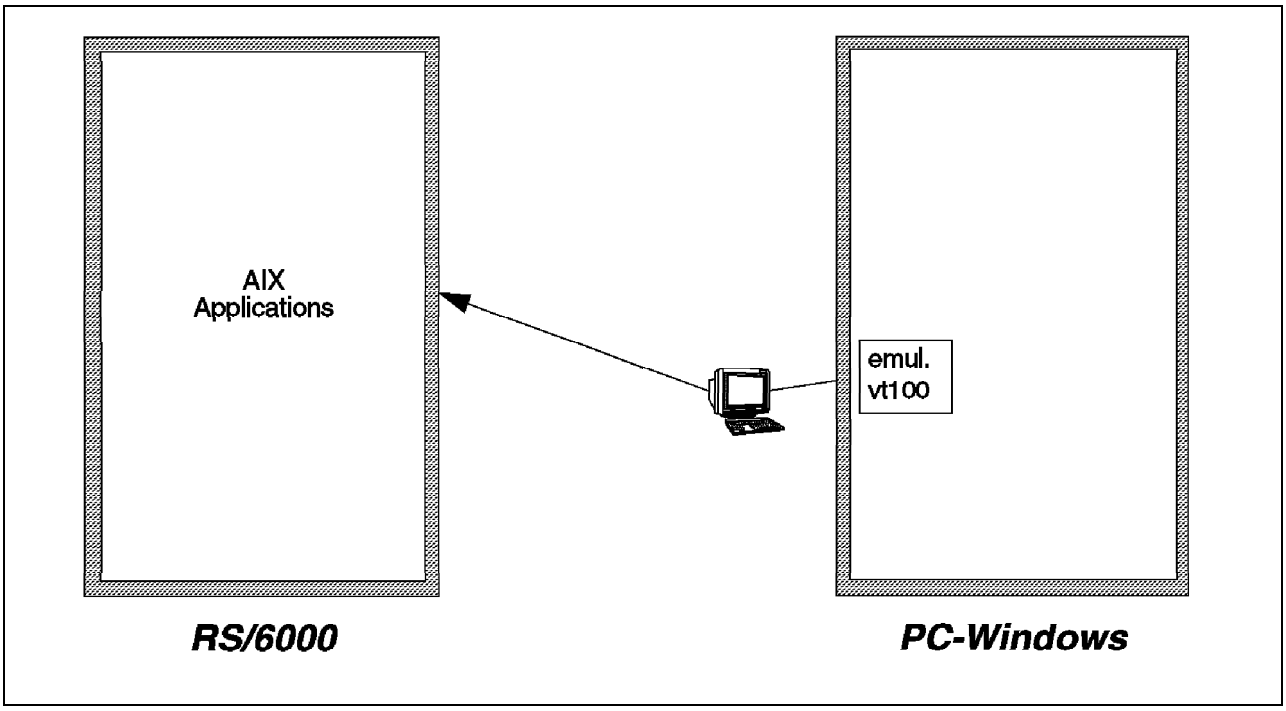


Figure 301. RS/6000 and PC-Windows - Asynch. - Asynch.: Logical View

9.8 RS/6000 and PC-OS/2

We could write an entire redbook on this topic. In fact, there are many products to connect PC-OS/2 environment to a UNIX system:

- You can integrate your PC-OS/2 as a TCP/IP workstation. Implement TCP/IP protocol on the PC and use common functions such as Telnet, FTP, or RPC. If you connect just a few PCs, it's a very simple method.
- You can also implement PC native protocols (IPX/SPX, NetBIOS, NetBEUI) on the 6000 and transform it into a PC server. In fact, you may install a program on the RS/6000, such as AIX Connections or TotalNet. If you connect hundreds of PCs, you will prefer this method because you don't need to update all the PCs with the new version of TCP/IP, just one platform (RS/6000). You will also use AIX facilities such as the Logical Volume Manager or System Management Interface Tool (SMIT).

9.8.1 Abstract

Table 214. RS/6000 and PC-OS/2 Abstract

RS/6000 / PC-OS/2	TCP/IP	SNA	NetBIOS	IPX/SPX	NetBEUI	Asyn-chronous
Asynchronous	SLIP/PPP					
Token-Ring	AIX Con. (1)		AIX Con. (1)	AIX Con. (1)	AIX Con. (1)	
FDDI						
Ethernet	AIX Con. (1)		AIX Con. (1)	AIX Con. (1)	AIX Con. (1)	
X.25						
Synchronous						
Coaxial						
S/370 Channel						
ESCON						
BLKMUX						
Fibre Channel						
ATM						
HIPPI						
SOCC						
Twinax						

Remark

- (1) AIX Connections is supported on Ethernet and token-ring LANs.

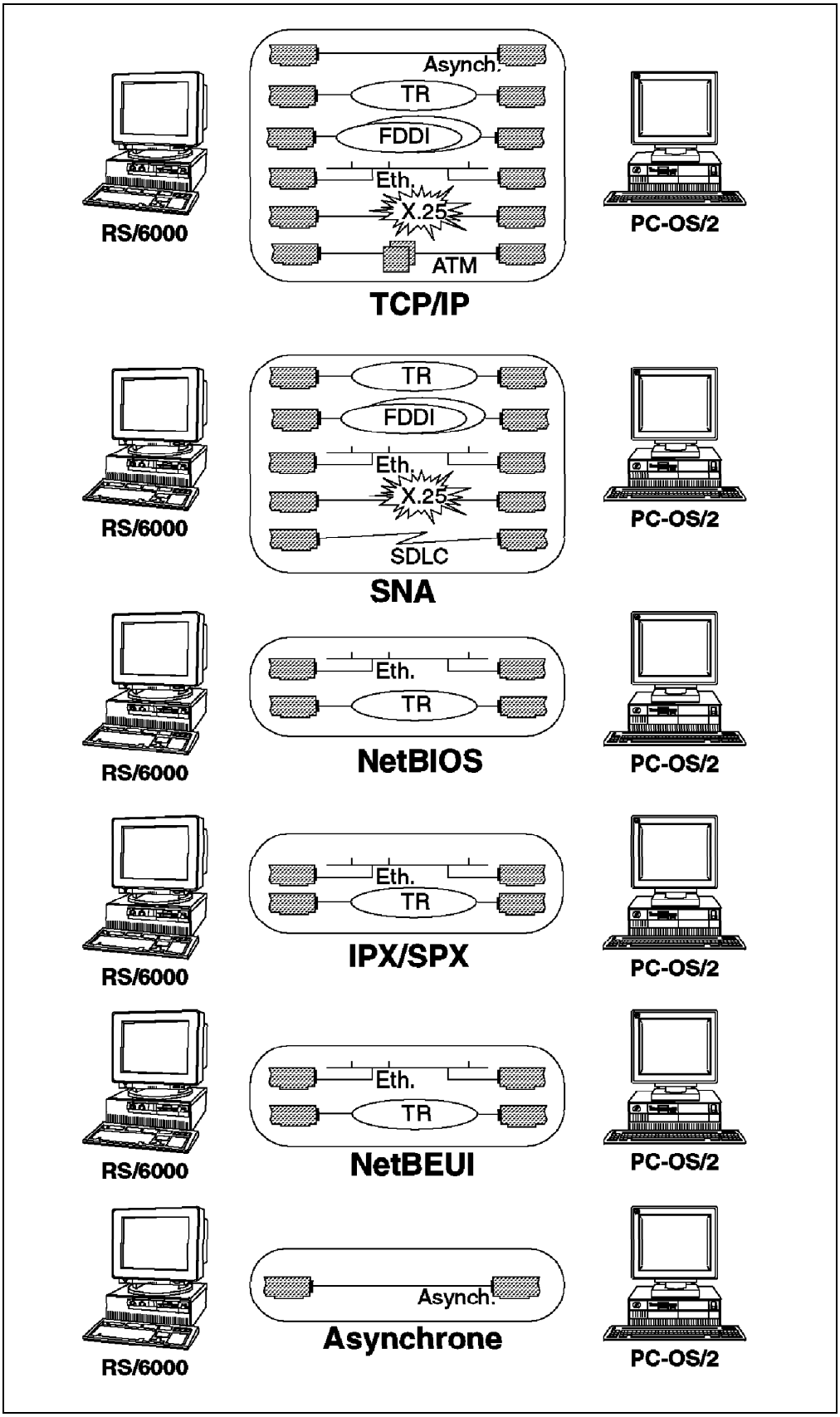


Figure 302. RS/6000 and PC-OS/2 Abstract

9.8.2 TCP/IP

9.8.2.1 Asynchronous Network

Table 215. RS/6000 and PC-OS/2 - TCP/IP - Asynchronous: Abstract

		RS/6000	PC-OS/2
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Asynchronous connection
Software		- AIX V4 (TCP/IP included)	- TCP/IP for OS/2 option: Programmer's ToolKit(3) option Domain Name Server Kit(4)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)(4)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Use PPP rather SLIP. It's faster and more economical in terms of packets.
- (3) and (4) are provided with this optional software.

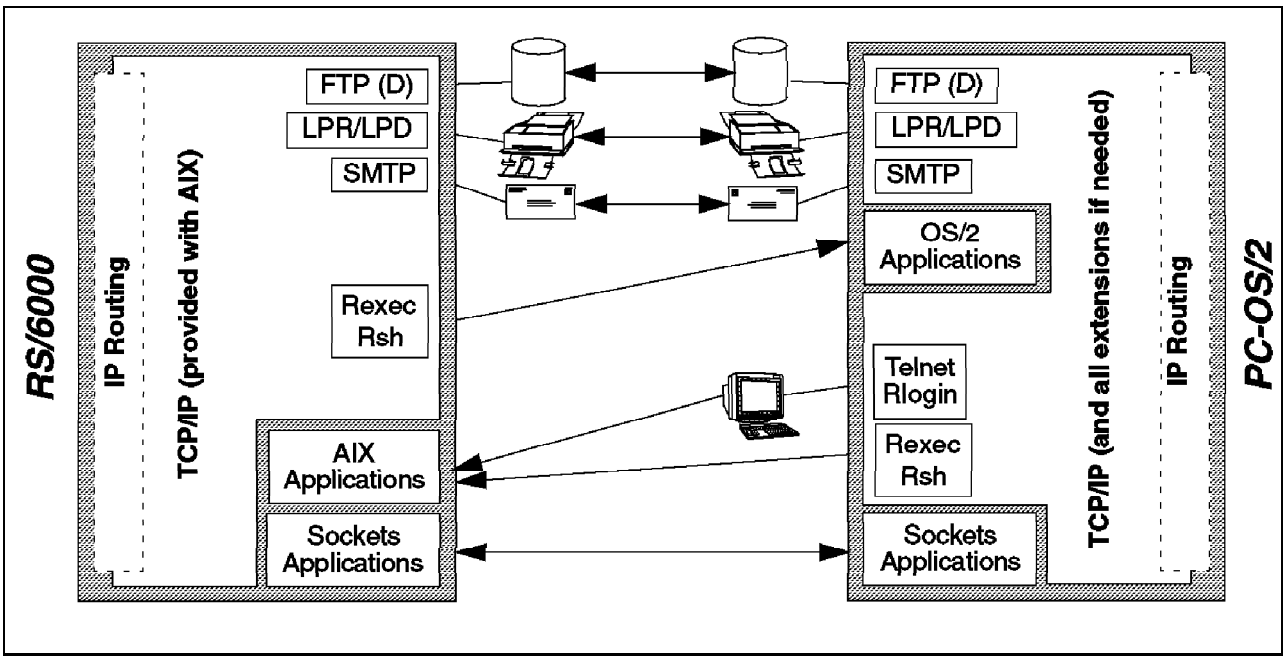


Figure 303. RS/6000 and PC-OS/2 - TCP/IP - Asynchronous: Logical View

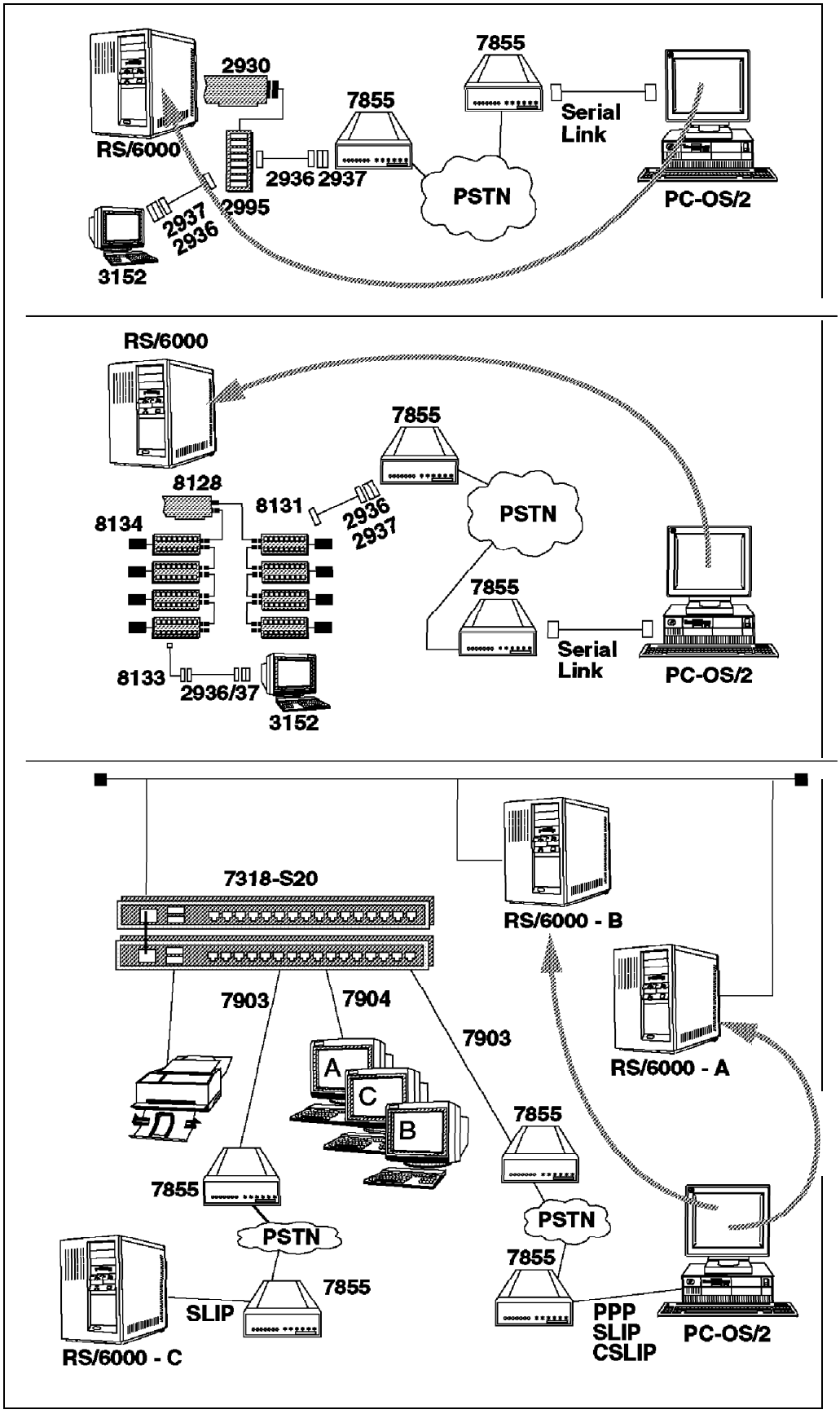


Figure 304. RS/6000 and PC-OS/2 - TCP/IP - Asynchronous: Physical View

9.8.2.2 Token-Ring Network

Table 216. RS/6000 and PC-OS/2 - TCP/IP - Token-Ring: Abstract

		RS/6000	PC-OS/2
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP for OS/2 option: NFS Kit(1) option: X-Window Kit(2) option: Programmer's ToolKit(3) option Domain Name Server Kit(4)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)(1)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)(4)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.

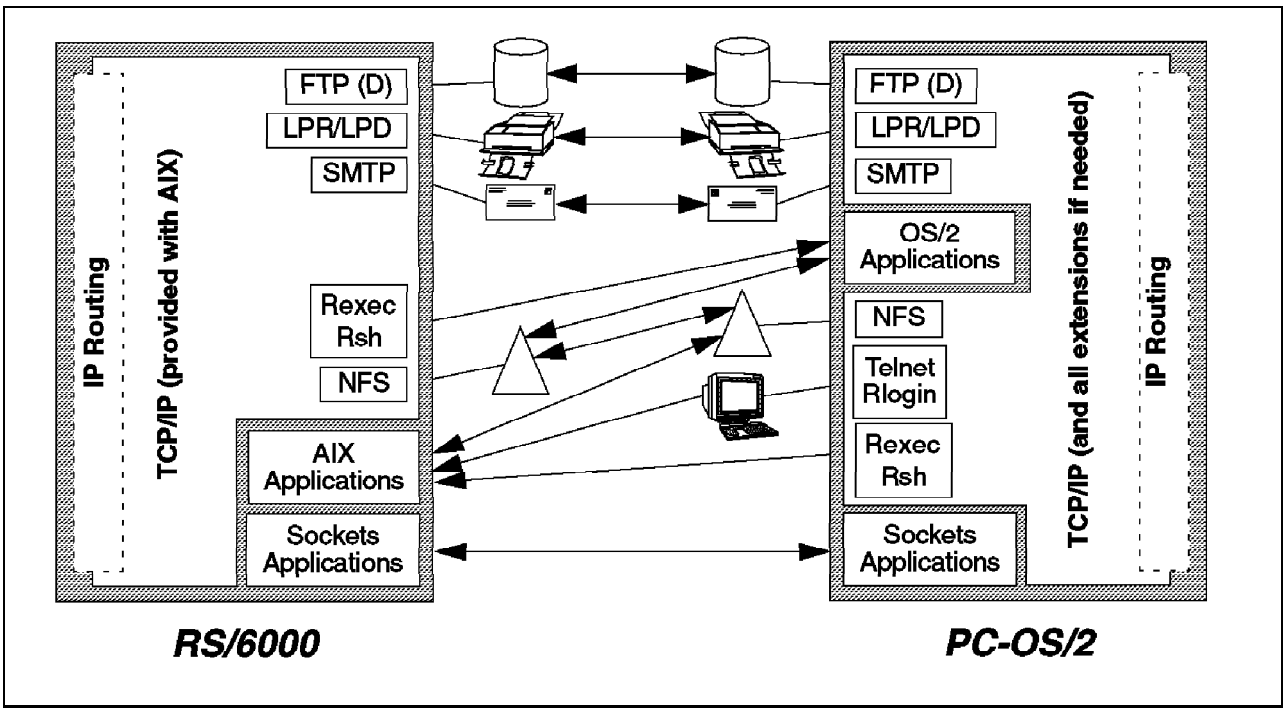


Figure 305. RS/6000 and PC-OS/2 - TCP/IP - Token-Ring: Logical View

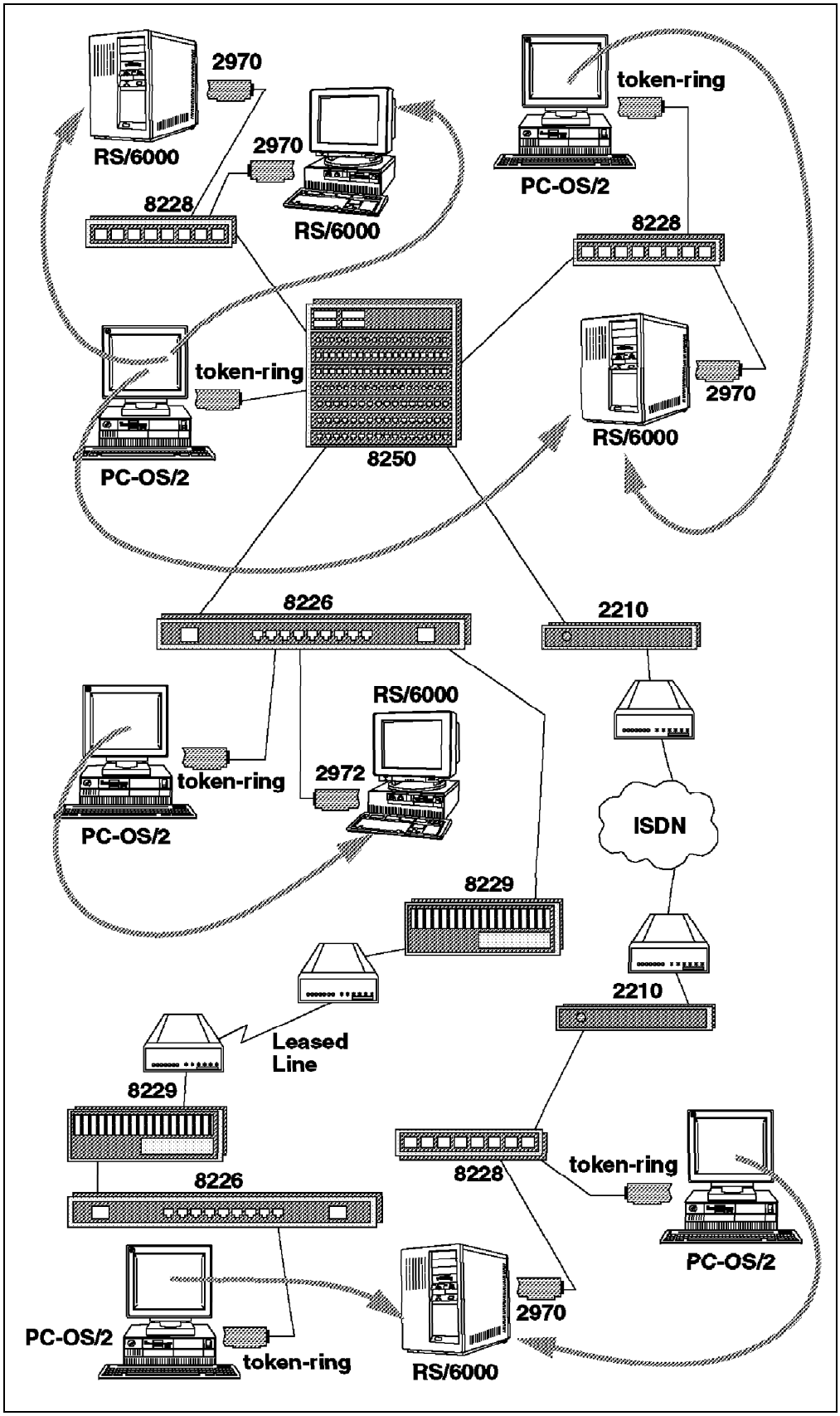


Figure 306. RS/6000 and PC-OS/2 - TCP/IP - Token-Ring: Physical View

9.8.2.3 FDDI Network

Table 217. RS/6000 and PC-OS/2 - TCP/IP - FDDI: Abstract

		RS/6000	PC-OS/2
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- FDDI adapter (Fibre or Copper)
Software		- AIX V4 (TCP/IP included)	- TCP/IP for OS/2 option: NFS Kit(1) option: X-Window Kit(2) option: Programmer's ToolKit(3) option Domain Name Server Kit(4)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)(1)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)(4)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remarks

- Use FDDI an connection, instead of Ethernet 100 Mbps, to avoid collisions!
- (1), (2), (3), and (4) are provided with this optional software.

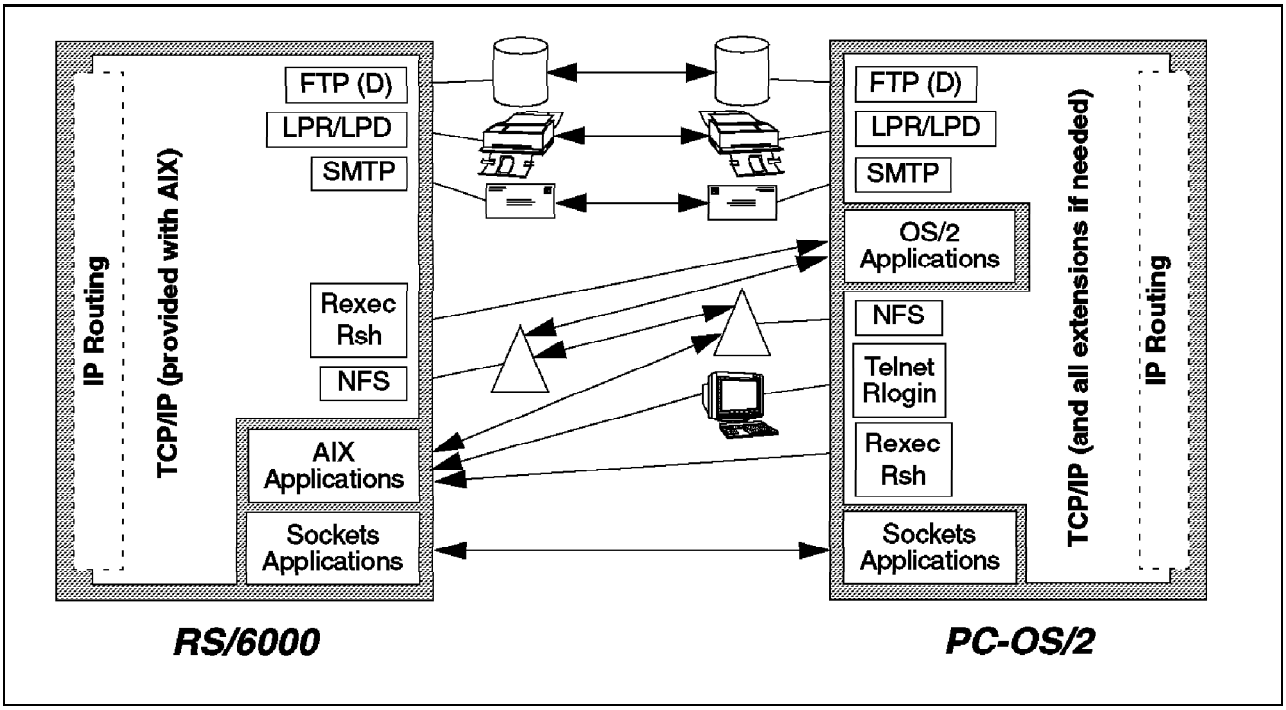


Figure 307. RS/6000 and PC-OS/2 - TCP/IP - FDDI: Logical View

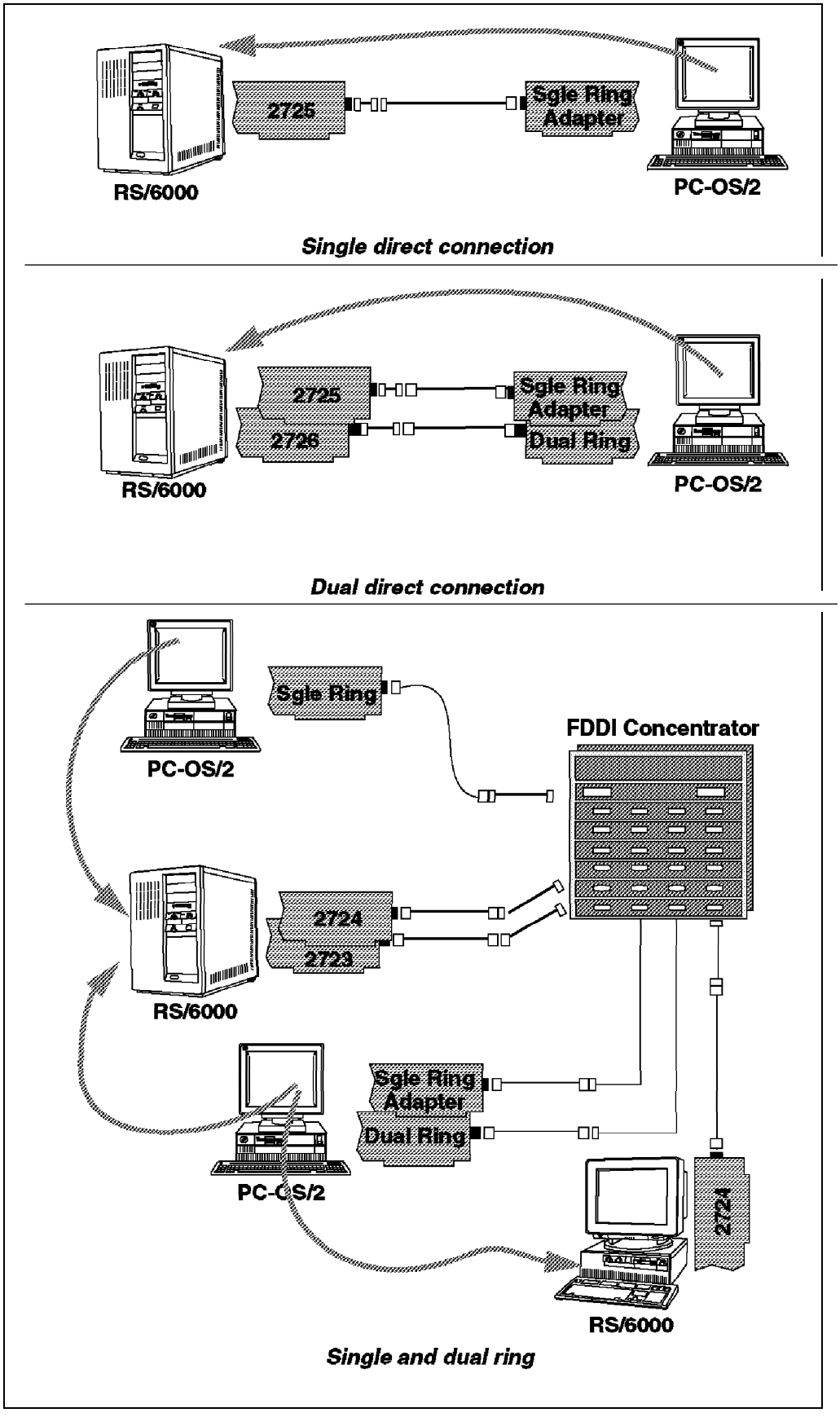


Figure 308. RS/6000 and PC-OS/2 - TCP/IP - FDDI: Physical View

9.8.2.4 Ethernet Network

Table 218. RS/6000 and PC-OS/2 - TCP/IP - Ethernet: Abstract

		RS/6000	PS-OS/2
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP for OS/2 option: NFS Kit(1) option: X-Window Kit(2) option: Programmer's ToolKit(3) option Domain Name Server Kit(4)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)(1)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)(4)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.

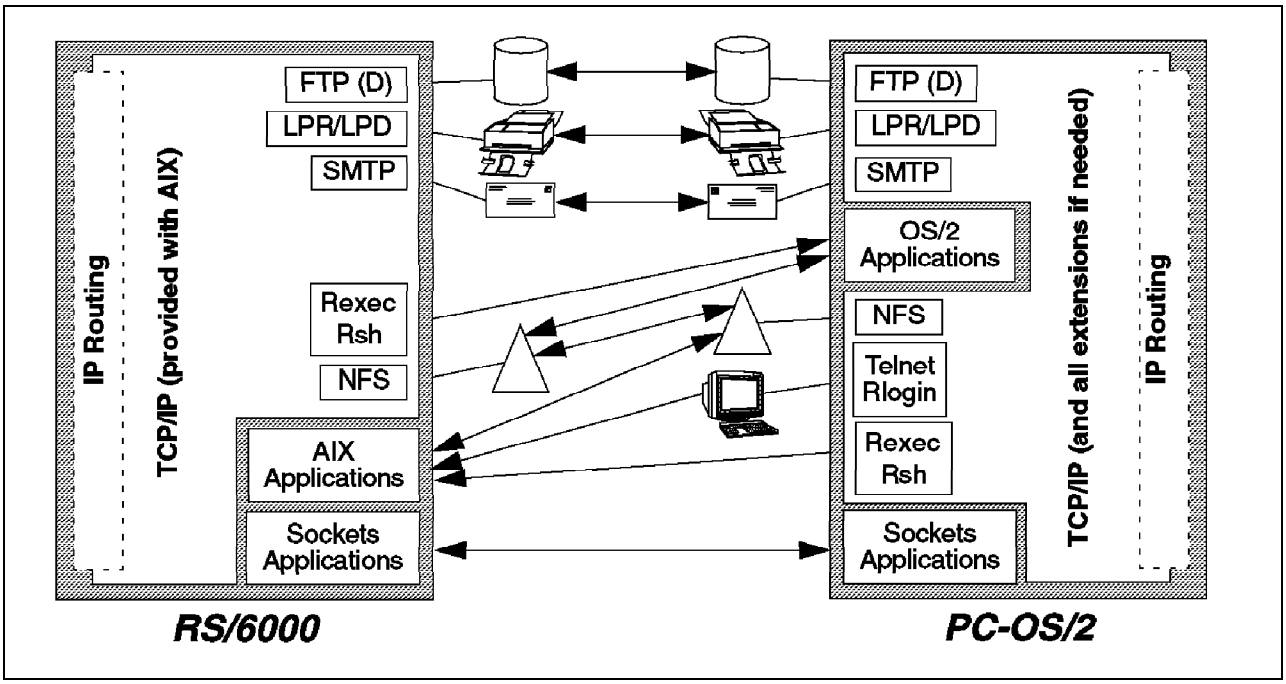


Figure 309. RS/6000 and PC-OS/2 - TCP/IP - Ethernet: Logical View

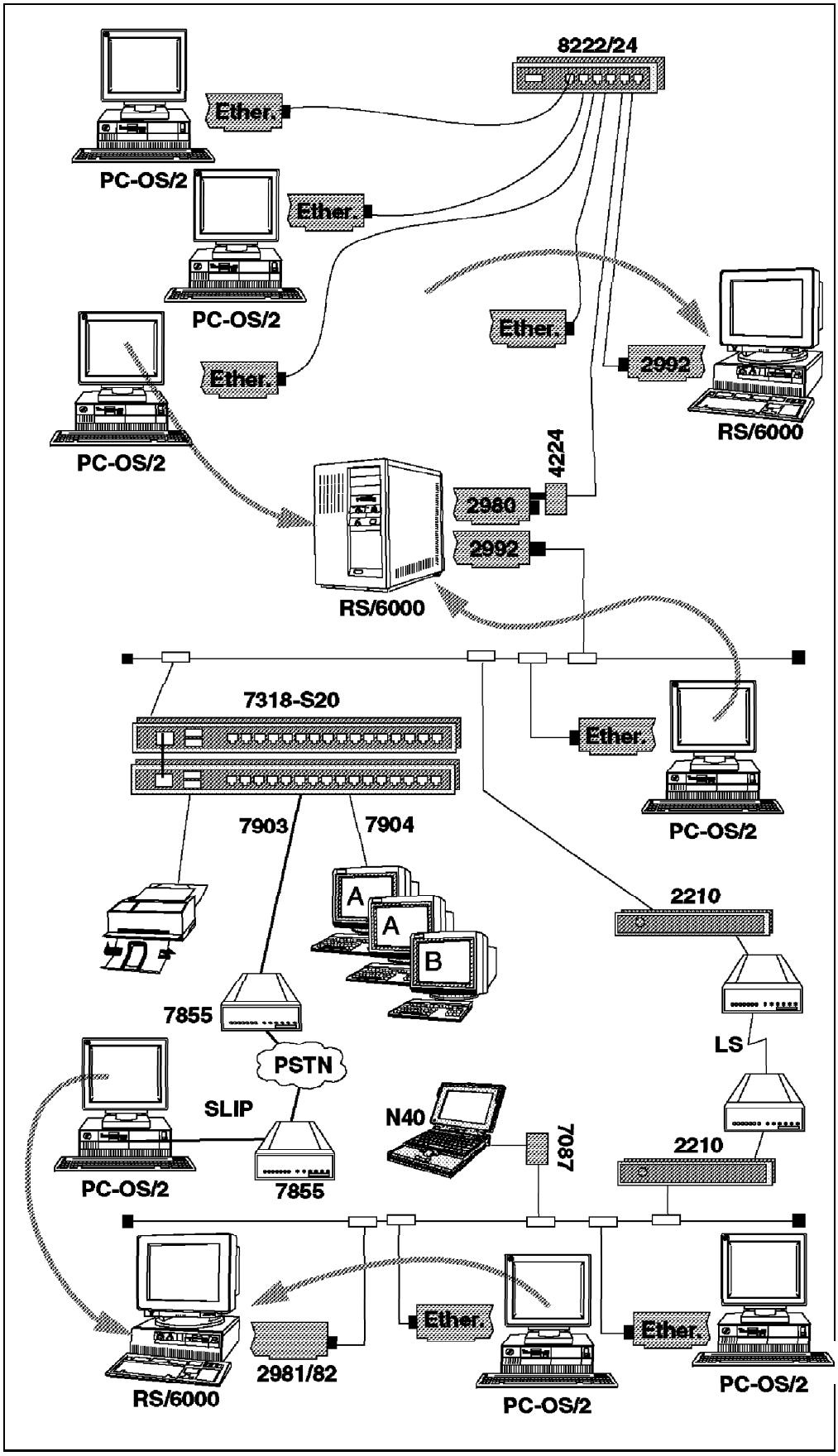


Figure 310. RS/6000 and PC-OS/2 - TCP/IP - Ethernet: Physical View

9.8.2.5 X.25 Network

Table 219. RS/6000 and PC-OS/2 - TCP/IP - X.25: Abstract

		RS/6000	PC-OS/2
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- AIX V4 (TCP/IP included) - AIXlink/X.25 V1.1	- TCP/IP for OS/2 option: Programmer's ToolKit(3) option Domain Name Server Kit(4)
Functions	- emulation	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	-
	- graphic	-	
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)(4)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- This configuration is not optimum for Telnet connections!
- In fact, X.25 packets transported on TCP/IP packets generate a lot of overflow. So, it's better to use some product (such as ECO-PAD) to compress this kind of communication. See the OEM software offerings for AIX V4 section to find more information on this product.
- (3) and (4) are provided with this optional software.

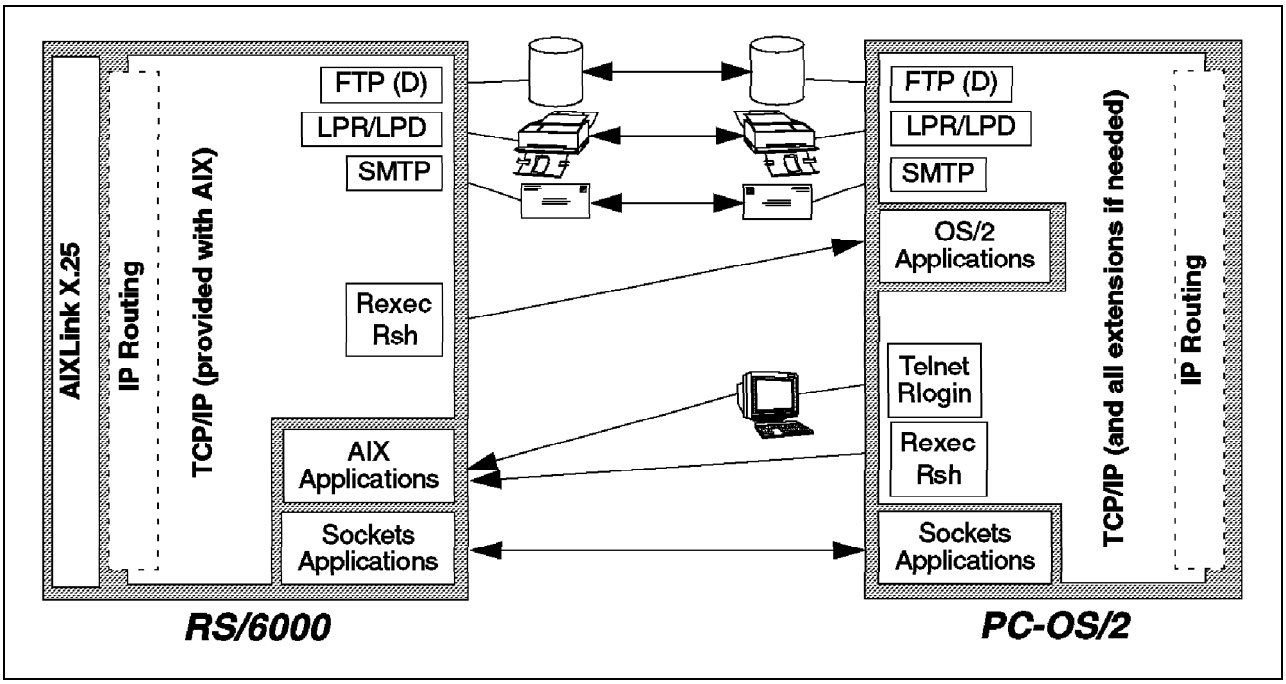


Figure 311. RS/6000 and PC-OS/2 - TCP/IP - X.25: Logical View

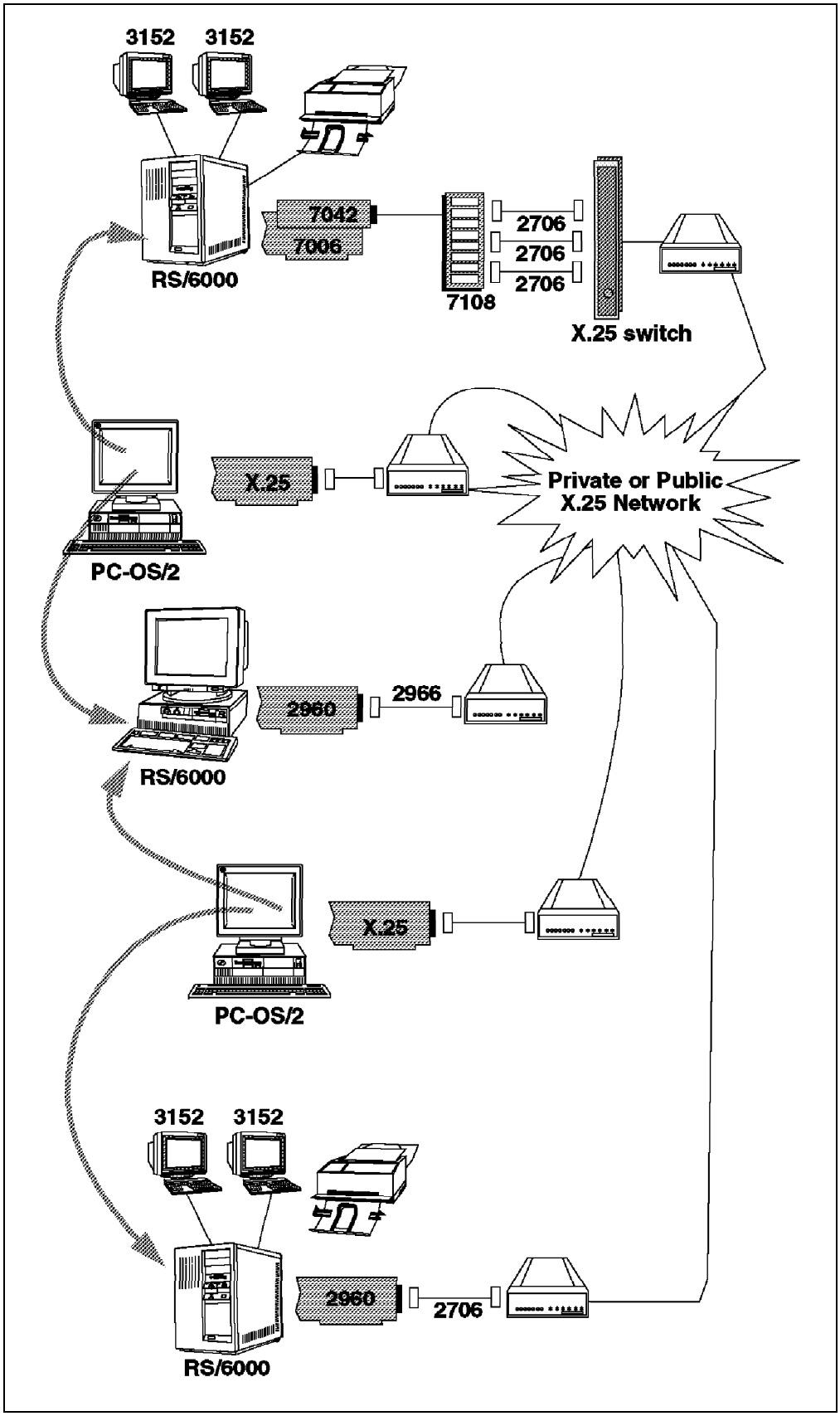


Figure 312. RS/6000 and PC-OS/2 - TCP/IP - X.25: Logical View

9.8.2.6 ATM Network

Table 220. RS/6000 and PC-OS/2 - TCP/IP - ATM: Abstract

		RS/6000	UNIX Platform
Hardware		- 2984 - 2989	- ATM adapter
Software		- AIX V4 (TCP/IP included)	- TCP/IP for OS/2 option: NFS Kit(1) option: X-Window Kit(2) option: Programmer's ToolKit(3) option Domain Name Server Kit(4)
Functions	- emulation	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)(1)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)(3)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)(4)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1), (2), (3), and (4) are provided with this optional software.

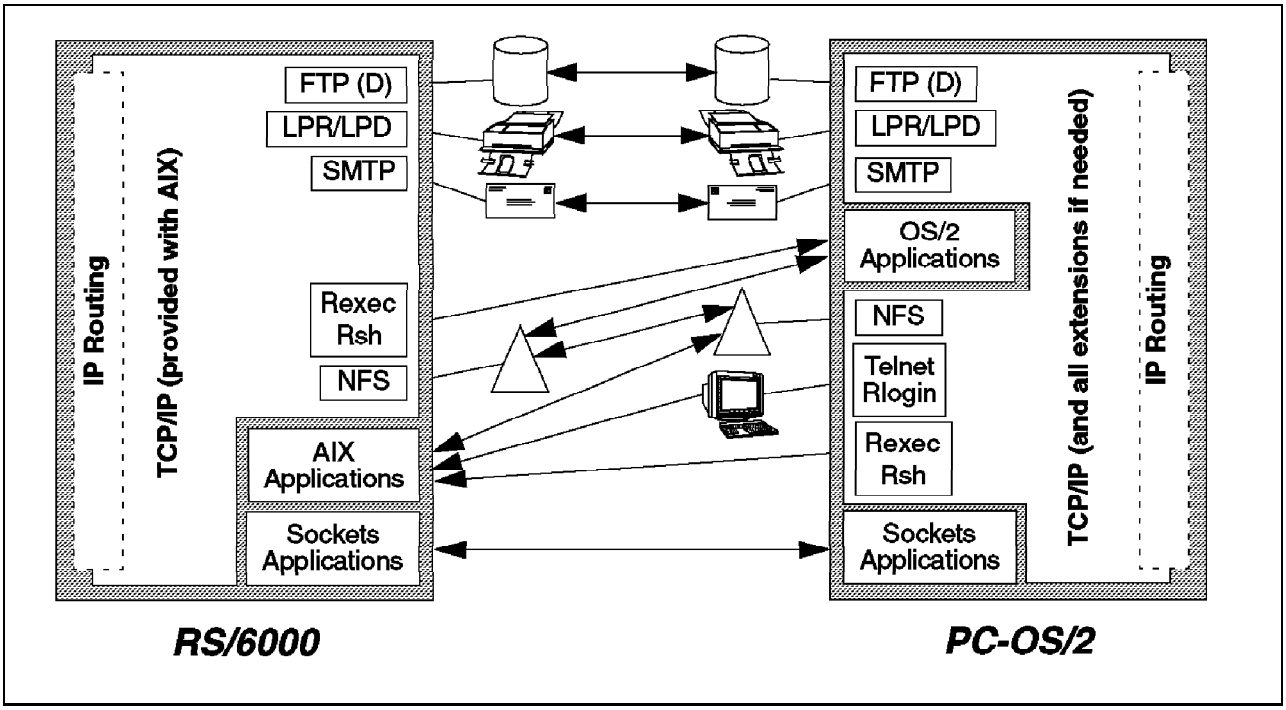


Figure 313. RS/6000 and PC-OS/2 - TCP/IP - ATM: Logical View

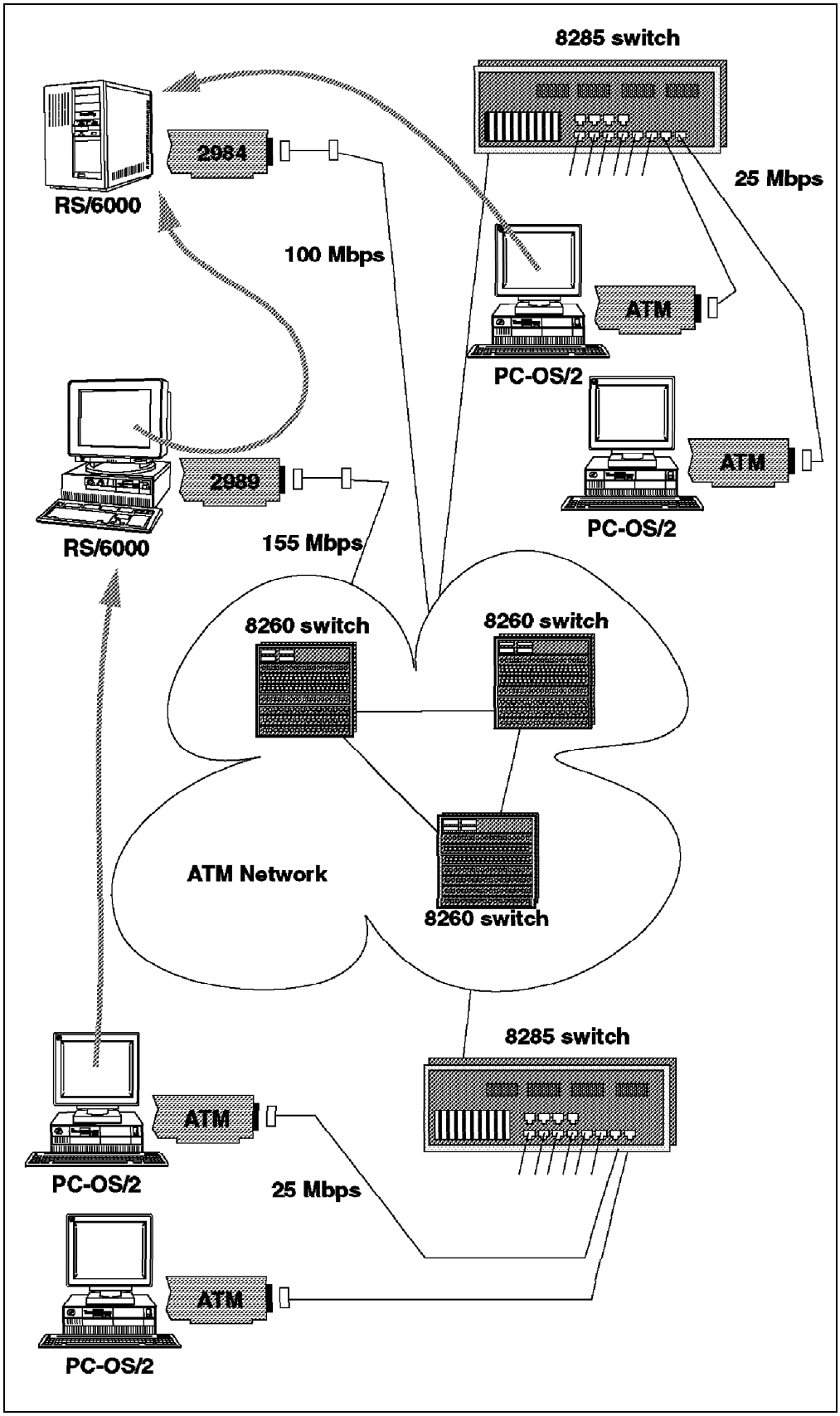


Figure 314. RS/6000 and PC-OS/2 - TCP/IP - ATM: Physical View

9.8.3 SNA

9.8.3.1 Token-Ring Network

Table 221. RS/6000 and PC-OS/2 - SNA - Token-Ring: Abstract

		RS/6000	PC-OS/2
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for OS/2 Warp V4.0 option: Personal Communications for OS/2 (with AnyNet features)
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used very often.

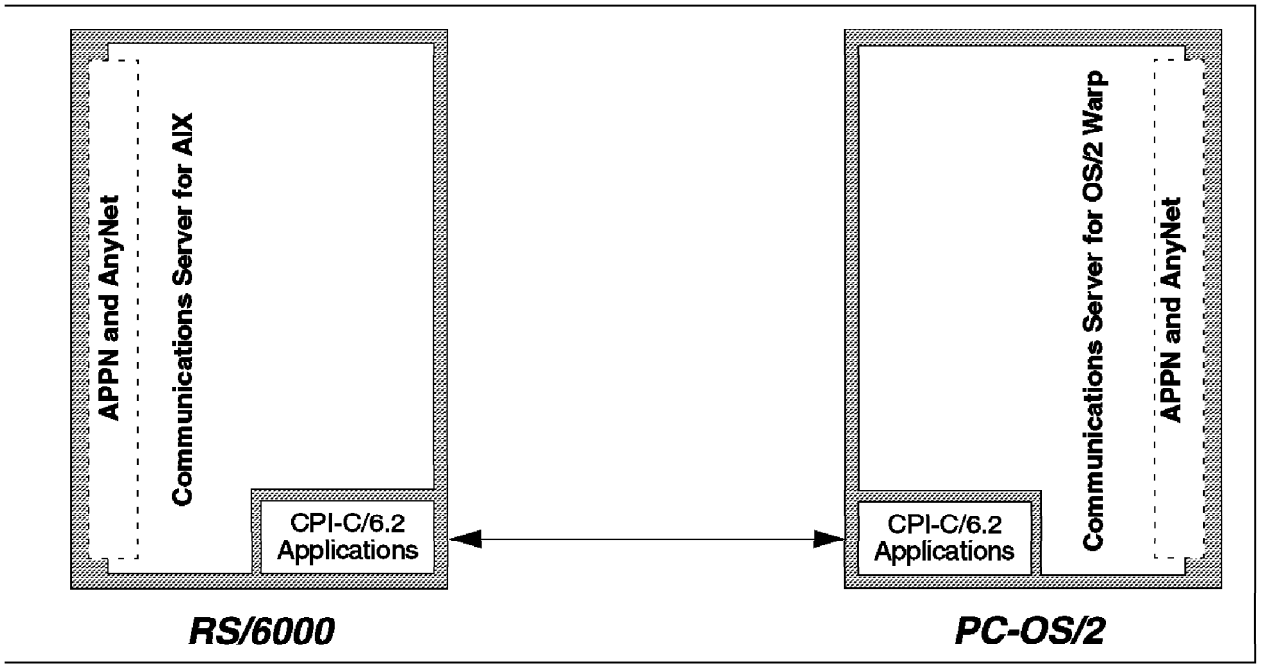


Figure 315. RS/6000 and PC-OS/2 - SNA - Token-Ring: Logical View

9.8.3.2 FDDI Network

Table 222. RS/6000 and PC-OS/2 - SNA - FDDI: Abstract

		RS/6000	PC-OS/2
Hardware		- 2725/2726 - 2720/2722 - 2724/2723	- FDDI adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for OS/2 Warp V4.0 option: Personal Communications for OS/2 (with AnyNet features)
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used very often

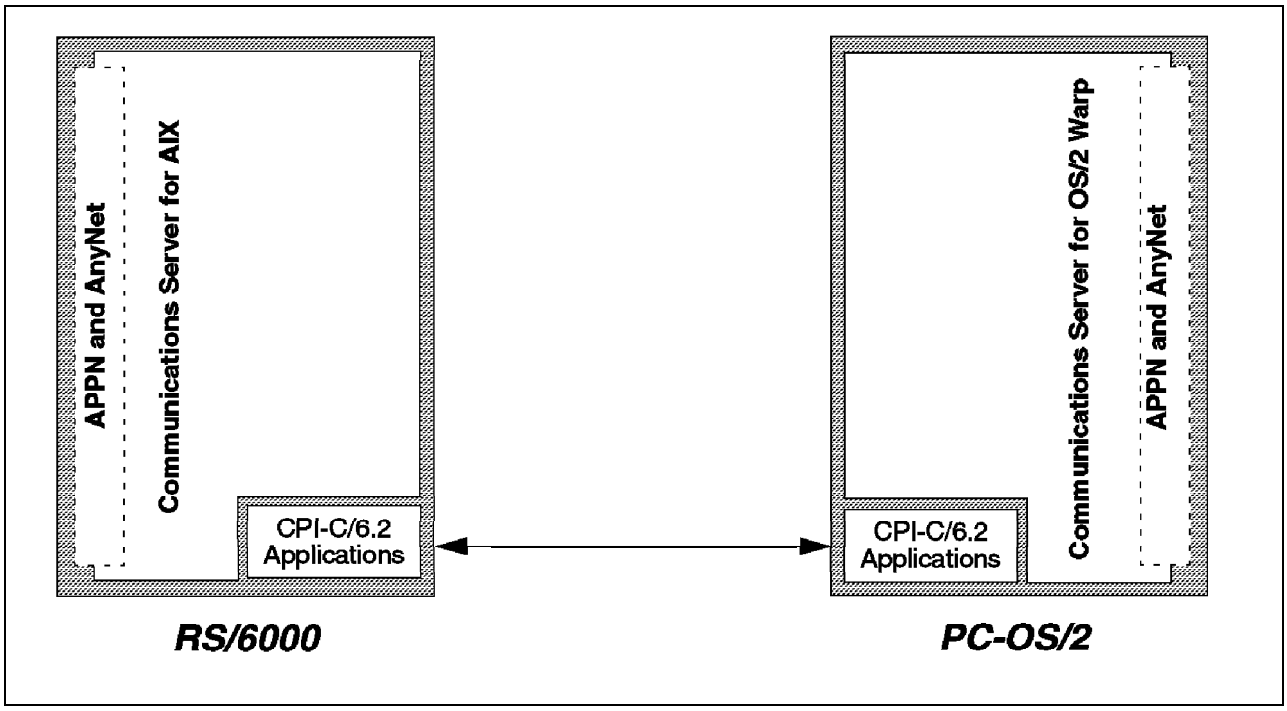


Figure 316. RS/6000 and PC-OS/2 - SNA - FDDI: Logical View

9.8.3.3 Ethernet Network

Table 223. RS/6000 and PC-OS/2 - SNA - Ethernet: Abstract

		RS/6000	PC-OS/2
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for OS/2 Warp V4.0 option: Personal Communications for OS/2 (with AnyNet features)
Functions	**- emulation**	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used very often

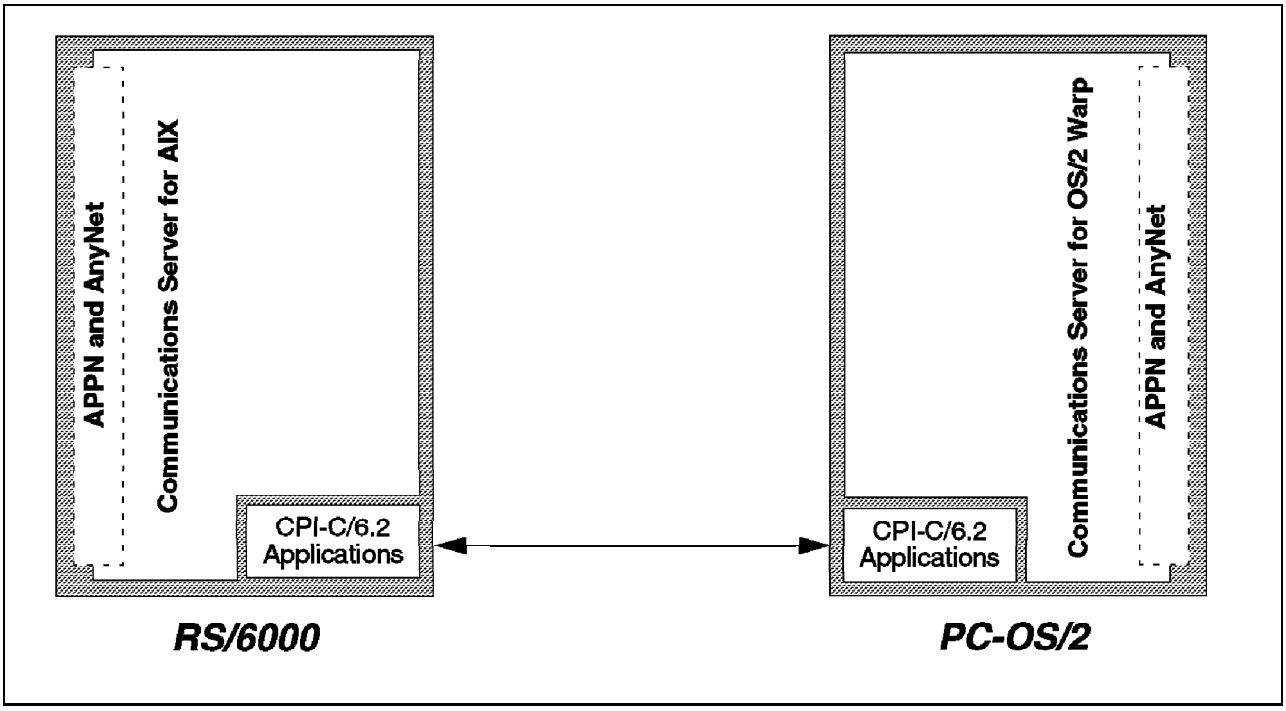


Figure 317. RS/6000 and PC-OS/2 - SNA - Ethernet: Logical View

9.8.3.4 X.25 Network

Table 224. RS/6000 and PC-OS/2 - SNA - X.25: Abstract

		RS/6000	PC-OS/2
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included) - AIXlink/X.25 V1.1	- Communications Server for OS/2 Warp V4.0 option: Personal Communications for OS/2 (with AnyNet features)
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used very often.

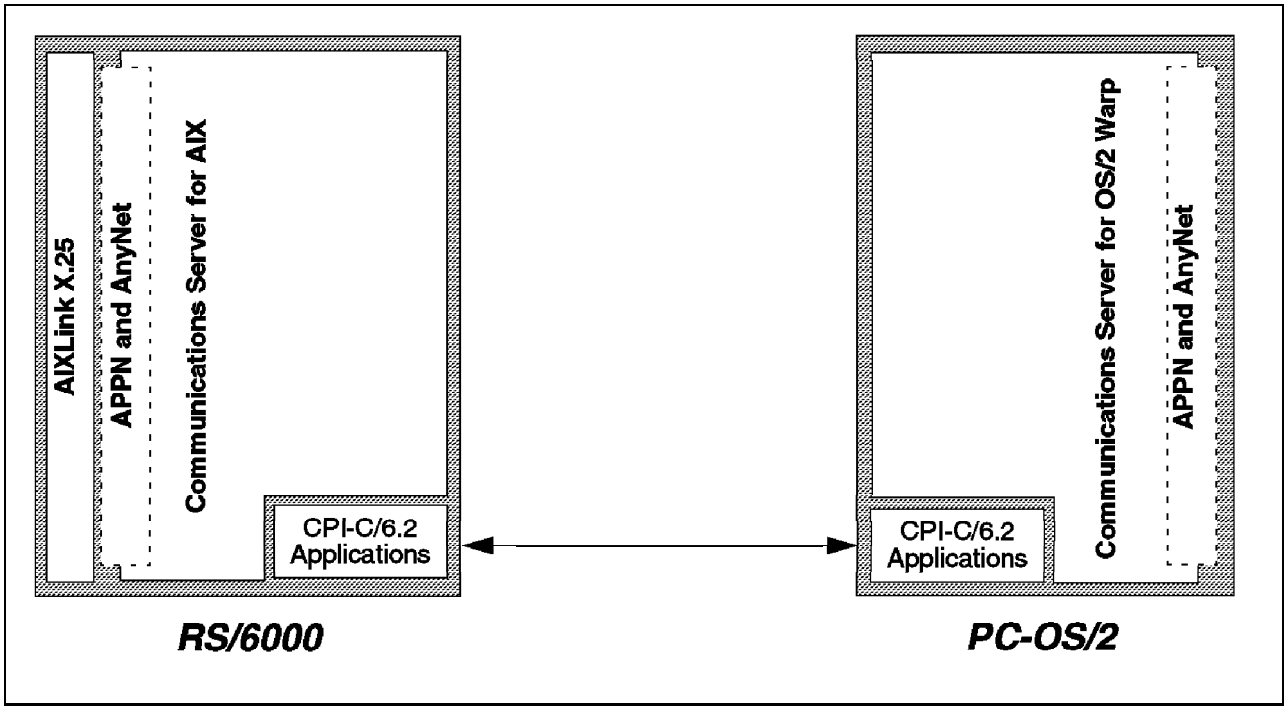


Figure 318. RS/6000 and PC-OS/2 - SNA - X.25: Logical View

9.8.3.5 Synchronous Network

Table 225. RS/6000 and PC-OS/2 - SNA - Synchronous: Abstract

		RS/6000	PC-OS/2
Hardware		- 2959 - 2700 (+2705) - 2701 (+2705)	- SDLC adapter
Software		- Communications Server for AIX V4.0 (AnyNet and Gateway included)	- Communications Server for OS/2 Warp V4.0 option: Personal Communications for OS/2 (with AnyNet features)
Functions	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)	- LUs 0, 1, 2, 3 and 6.2 (APPC & CPI-C)
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	- APPN (EN, NN) and AnyNet	- APPN (EN, NN) and AnyNet

Remark

- This point-to-point communication is not used very often.

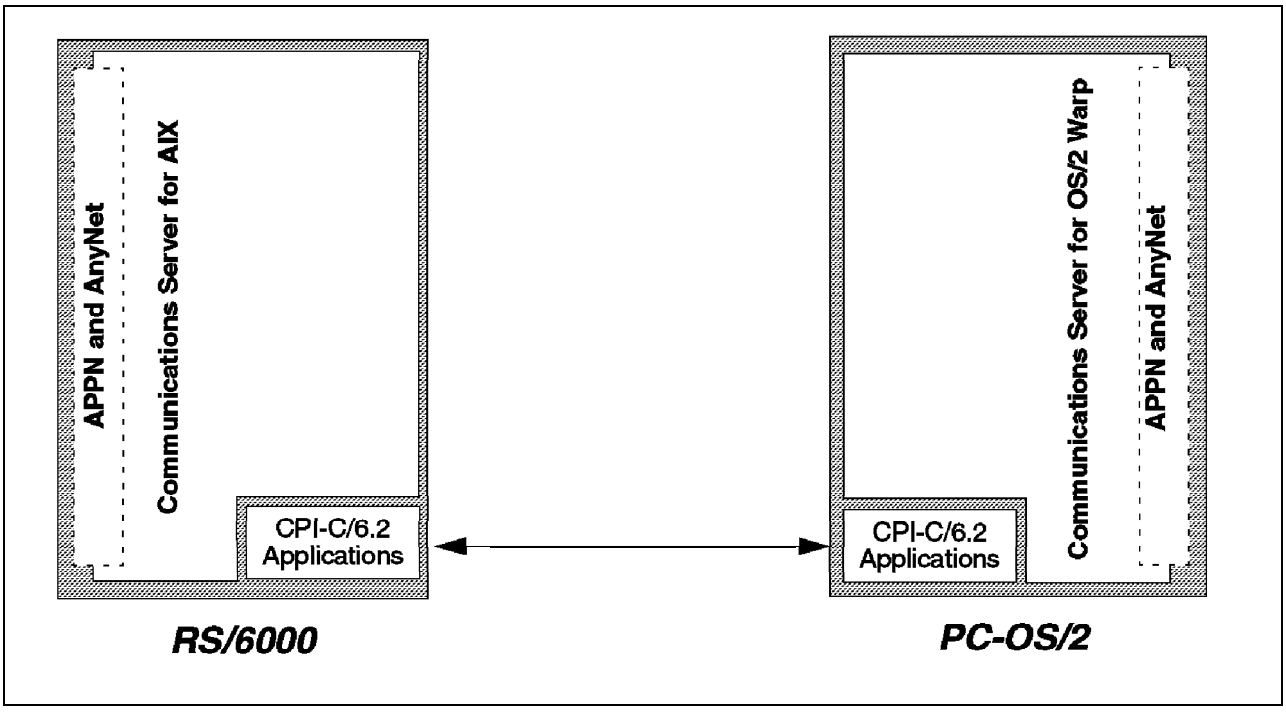


Figure 319. RS/6000 and PC-OS/2 - SNA - Synchronous: Logical View

9.8.4 NetBIOS

9.8.4.1 Token-Ring Network

Table 226. RS/6000 and PC-OS/2 - NetBIOS - Token-Ring: Abstract

		RS/6000	PC-OS/2
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	**- emulation**	-	- Emulation vt102 (NBTerm)
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- smbadmin	-

Remarks

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBEUI.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

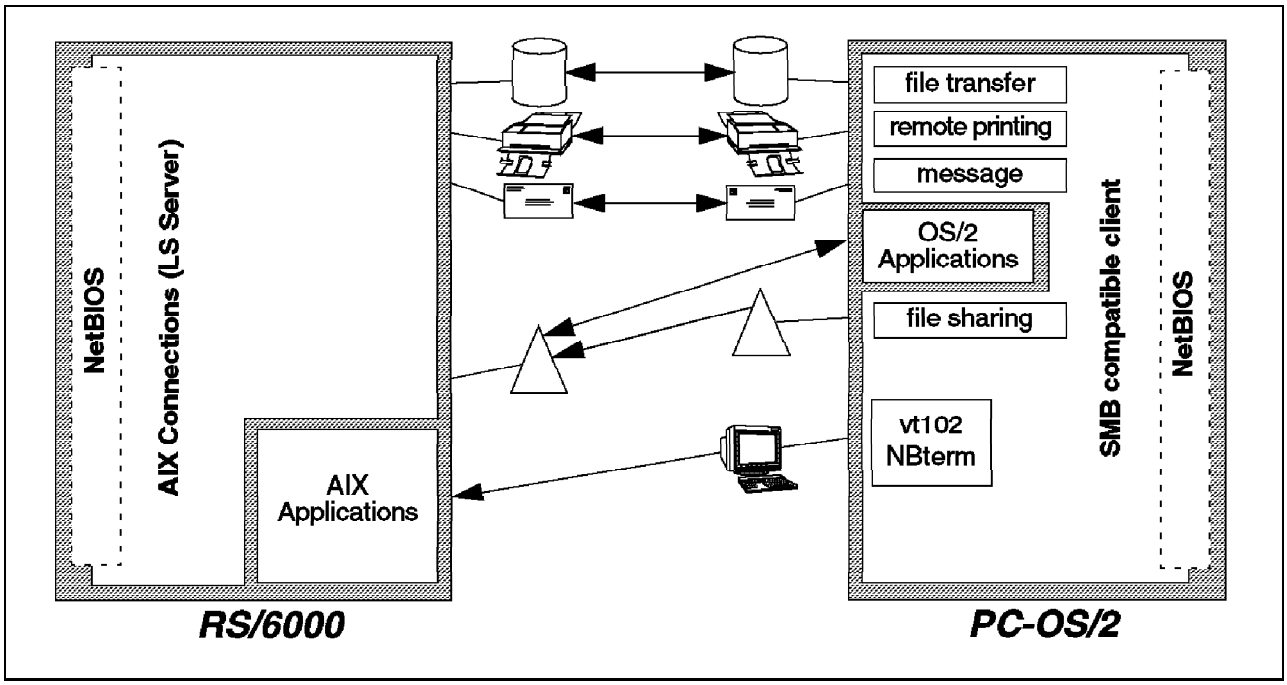


Figure 320. RS/6000 and PC-OS/2 - NetBIOS - Token-Ring: Logical View

9.8.4.2 Ethernet Network

Table 227. RS/6000 and PC-OS/2 - NetBIOS - Ethernet: Abstract

		RS/6000	PS-OS/2
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	**- emulation**	-	- Emulation vt102 (NBTerm)
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- name service	-
	- network management	- smbadmin	-

Remarks

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBEUI.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

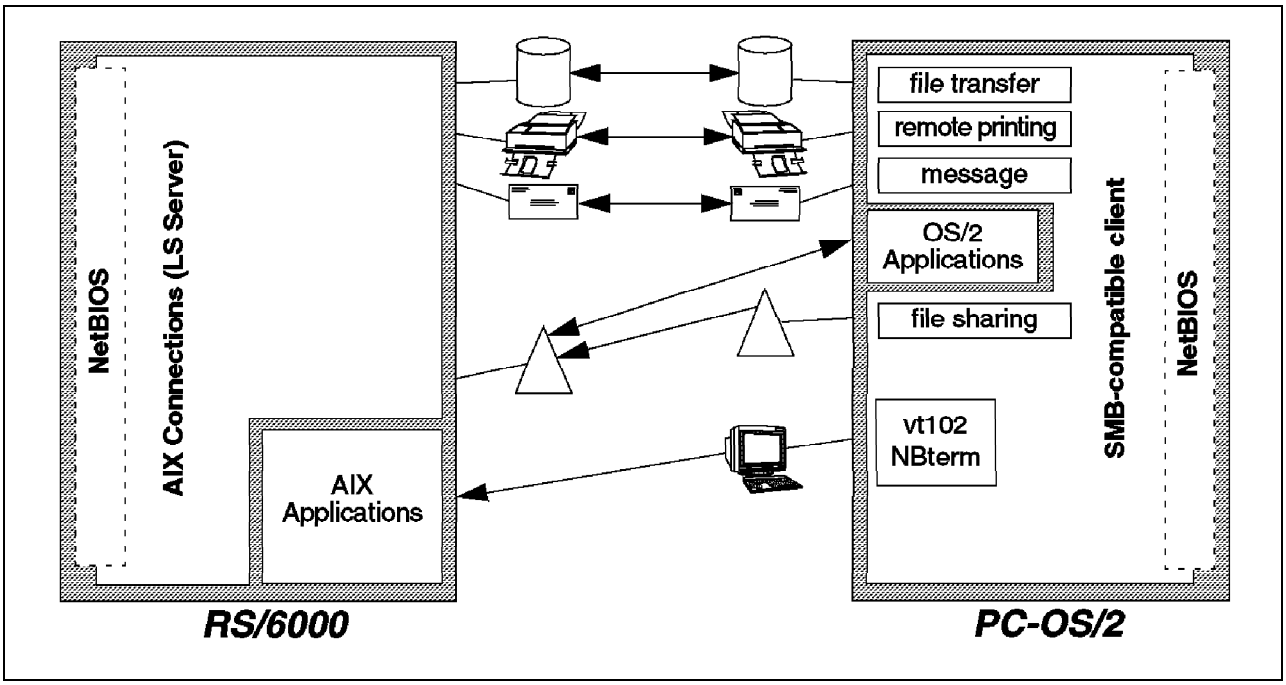


Figure 321. RS/6000 and PC-OS/2 - NetBIOS - Ethernet: Logical View

9.8.5 IPX/SPX

9.8.5.1 Token-Ring Network

Table 228. RS/6000 and PC-OS/2 - IPX/SPX - Token-Ring: Abstract

		RS/6000	PC-OS/2
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 option: AIX Connections (NW Server)	- Novell NetWare compatible client
Functions	**- emulation**	-	-
	- file transfer	-	- NWmap
	- file sharing	-	- NWmap
	- print sharing	-	- NWprint
	- remote command	-	-
	- API	-	-
	- mail	-	- NWmessage
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- nwadmin	-

Remark

- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

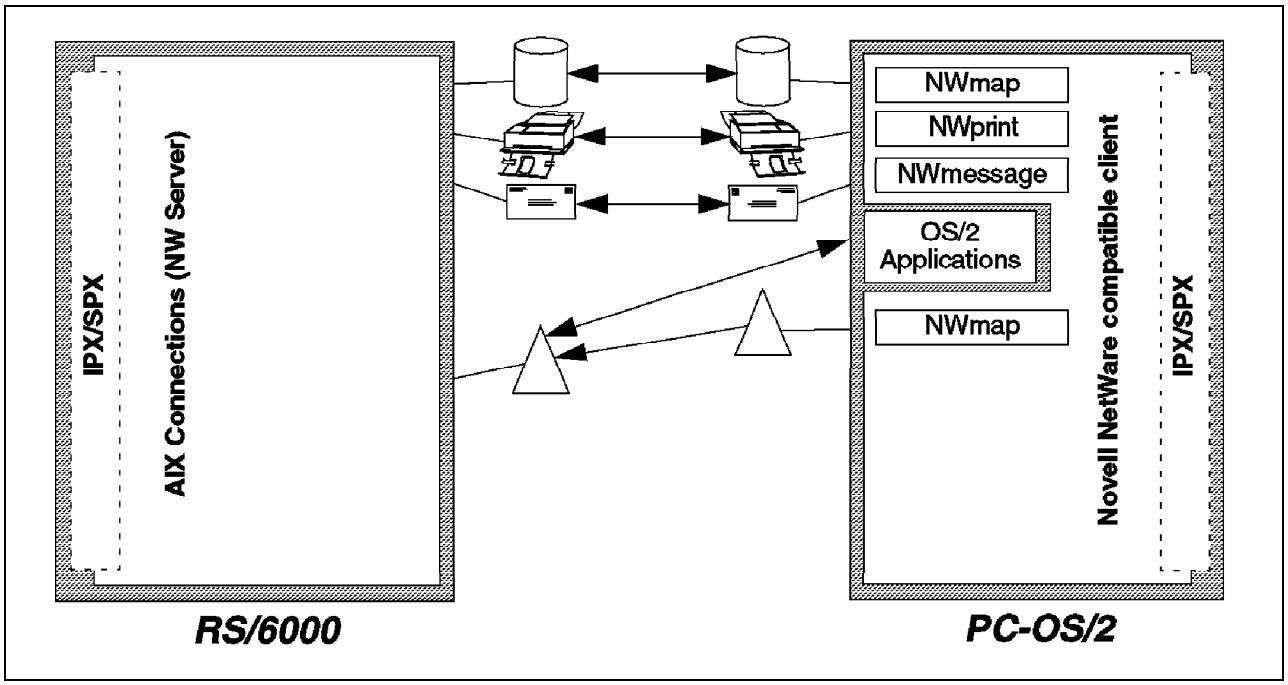


Figure 322. RS/6000 and PC-OS/2 - IPX/SPX - Token-Ring: Logical View

9.8.5.2 Ethernet Network

Table 229. RS/6000 and PC-OS/2 - NetBEUI - Ethernet: Abstract

		RS/6000	PS-OS/2
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceiv-ers: 4222/4223)	- Ethernet adapter
Software		- AIX V4 option: AIX Connections (NW Server)	- Novell NetWare compatible client
Functions	**- emulation**	-	-
	- file transfer	-	- NWmap
	- file sharing	-	- NWmap
	- print sharing	-	- NWprint
	- remote command	-	-
	- API	-	-
	- mail	-	- NWmessage
	- security	-	-
	- graphic	-	-
	- name directory	- name service	-
	- network management	- nwadmin	-

Remark

- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

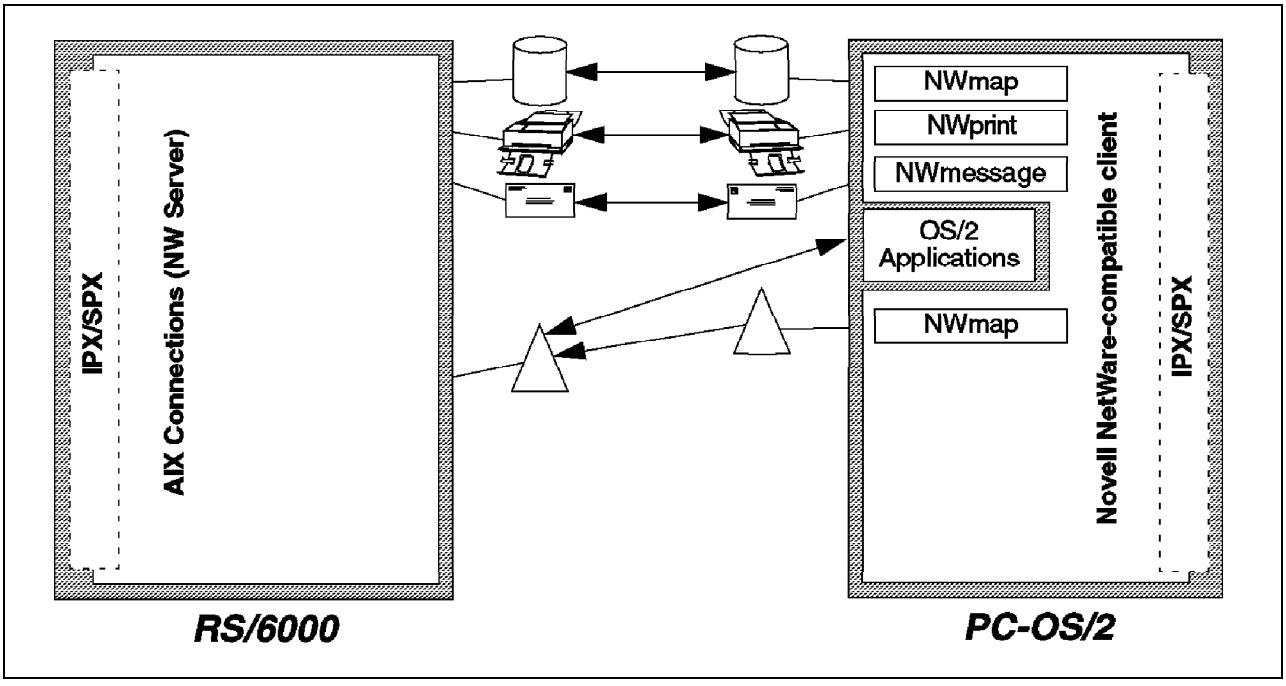


Figure 323. RS/6000 and PC-OS/2 - IPX/SPX - Ethernet: Logical View

9.8.6 NetBEUI

9.8.6.1 Token-Ring Network

Table 230. RS/6000 and PC-OS/2 - NetBEUI - Token-Ring: Abstract

		RS/6000	PC-OS/2
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-Ring adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	- emulation	-	-
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- smbadmin	-

Remark

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBIOS.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

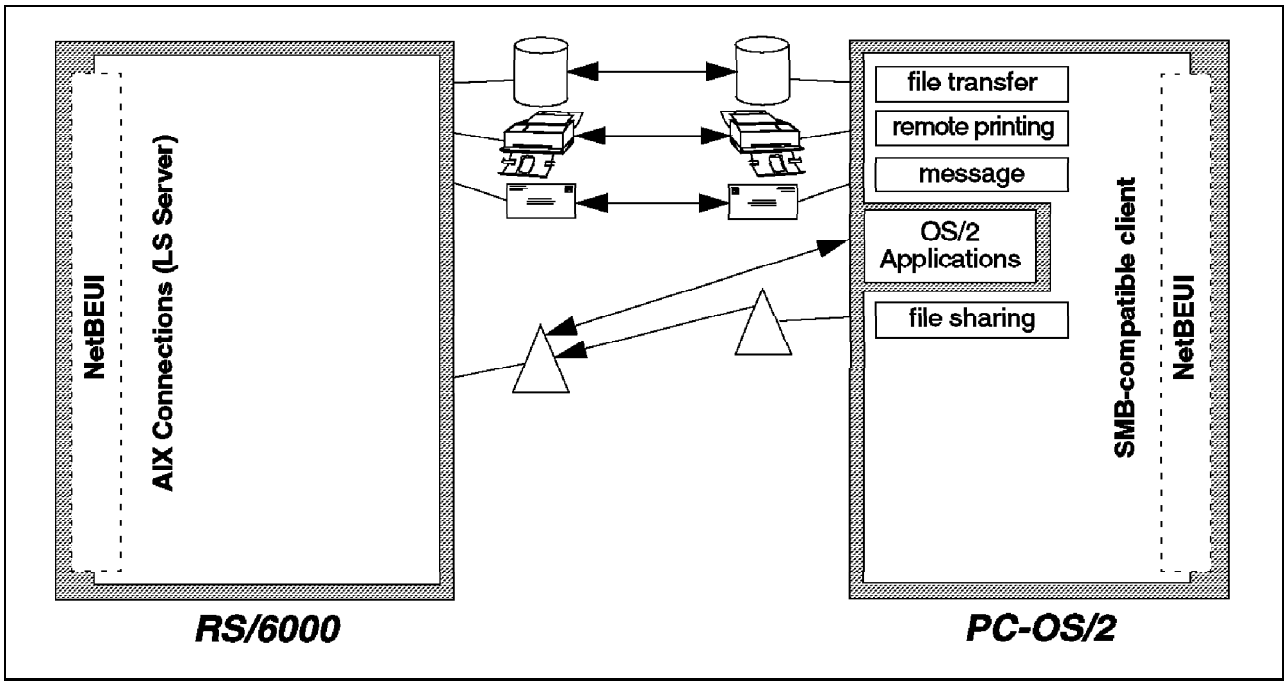


Figure 324. RS/6000 and PC-OS/2 - NetBEUI - Token-Ring: Logical View

9.8.6.2 Ethernet Network

Table 231. RS/6000 and PC-OS/2 - NetBEUI - Ethernet: Abstract

		RS/6000	PS-OS/2
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet adapter
Software		- AIX V4 option: AIX Connections (LS Server)	- SMB-compatible client
Functions	**- emulation**	-	-
	- file transfer	-	- File transfer
	- file sharing	-	- File sharing
	- print sharing	-	- Remote printing
	- remote command	-	-
	- API	-	-
	- mail	-	- Message
	- security	-	-
	- graphic	-	-
	- name directory	- Name service	-
	- network management	- smbadmin	-

Remark

- AIX Connections (LS Server) provides the same functions on TCP/IP and NetBIOS.
- TotalNET Advanced Server or other nonIBM products provide the same functions or more. Please refer to Chapter 6 for more information.

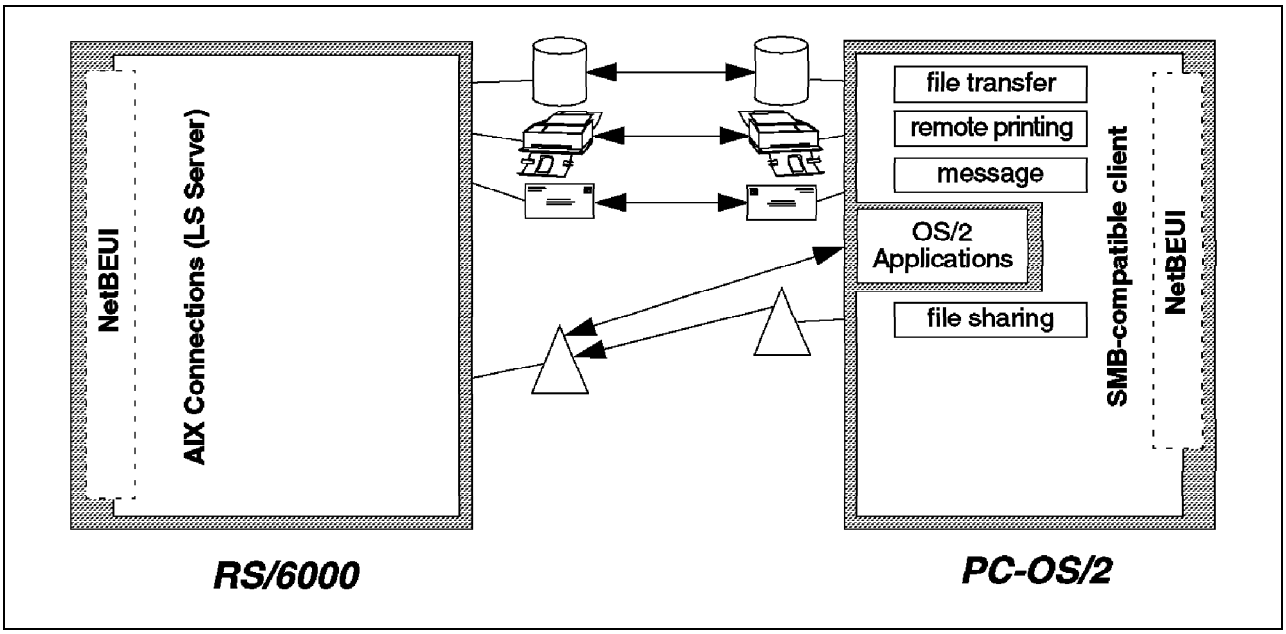


Figure 325. RS/6000 and PC-OS/2 - NetBEUI - Ethernet: Logical View

9.8.7 Asynchronous

9.8.7.1 Asynchronous Network

Table 232. RS/6000 and PC-OS/2 - Asynchronous - Asynchronous: Abstract

		RS/6000	PC-OS/2
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Asynchronous serial port
Software		-	-
Functions	**- emulation**	-	- vt100 (included in OS/2 Warp)
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- Only if you cannot use TCP/IP on Ethernet!

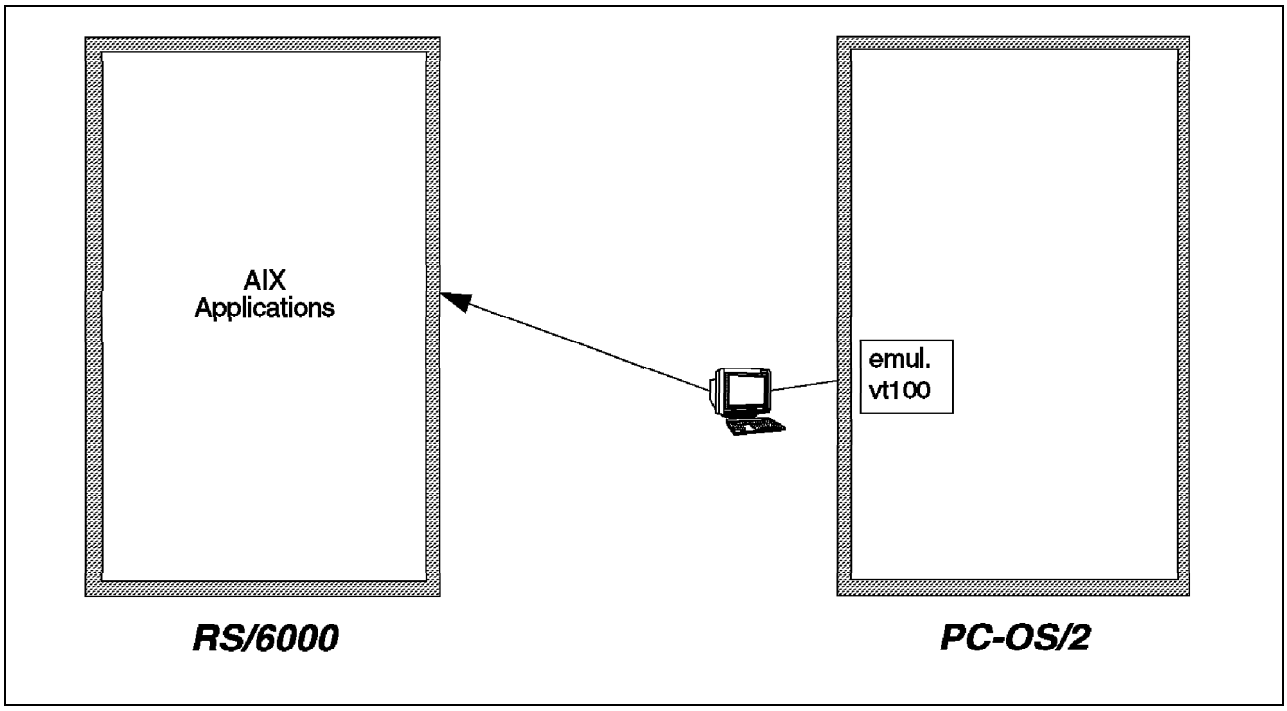


Figure 326. RS/6000 and PC-OS/2 - Asynchronous - Asynchronous: Logical View

9.9 RS/6000 and Asynchronous Devices

Before choosing the network, do a financial analysis of the considered solution including all scenarios (maintenance cost, simulation during five years, increased number of users or files size). Please refer to Chapter 2 for more information. The following statements about RS/6000 asynchronous connectivity are provided for your consideration:

- The simplest way is to use a serial link (local or remote) to connect asynchronous devices.
- You can also use a Serial Communications Network Server (7318 or nonIBM product). These network servers run TCP/IP or IPX/SPX protocols.
- You can also use an X.25 network to connect asynchronous devices. In this case, you also need two PADs (Packets Assembler Disassembler): one software PAD on the RS/6000 and one remote hardware PAD to connect devices.

9.9.1 Abstract

Table 233. RS/6000 and Asynchronous Devices

RS/6000 / Async. Dev.	TCP/IP	Asynchronous	X.25 packet	IPX/SPX
Asynchronous				
Token-Ring	8250/8260			
FDDI				
Ethernet	7318-S20			7318-P10
X.25			PAD	
Synchronous				
Coaxial				
S/370 Channel				
ESCON				
BLKMUX				
Fibre Channel				
ATM				
HIPPI				
SOCC				
Twinax				

Remark

- That's the most common communication method!

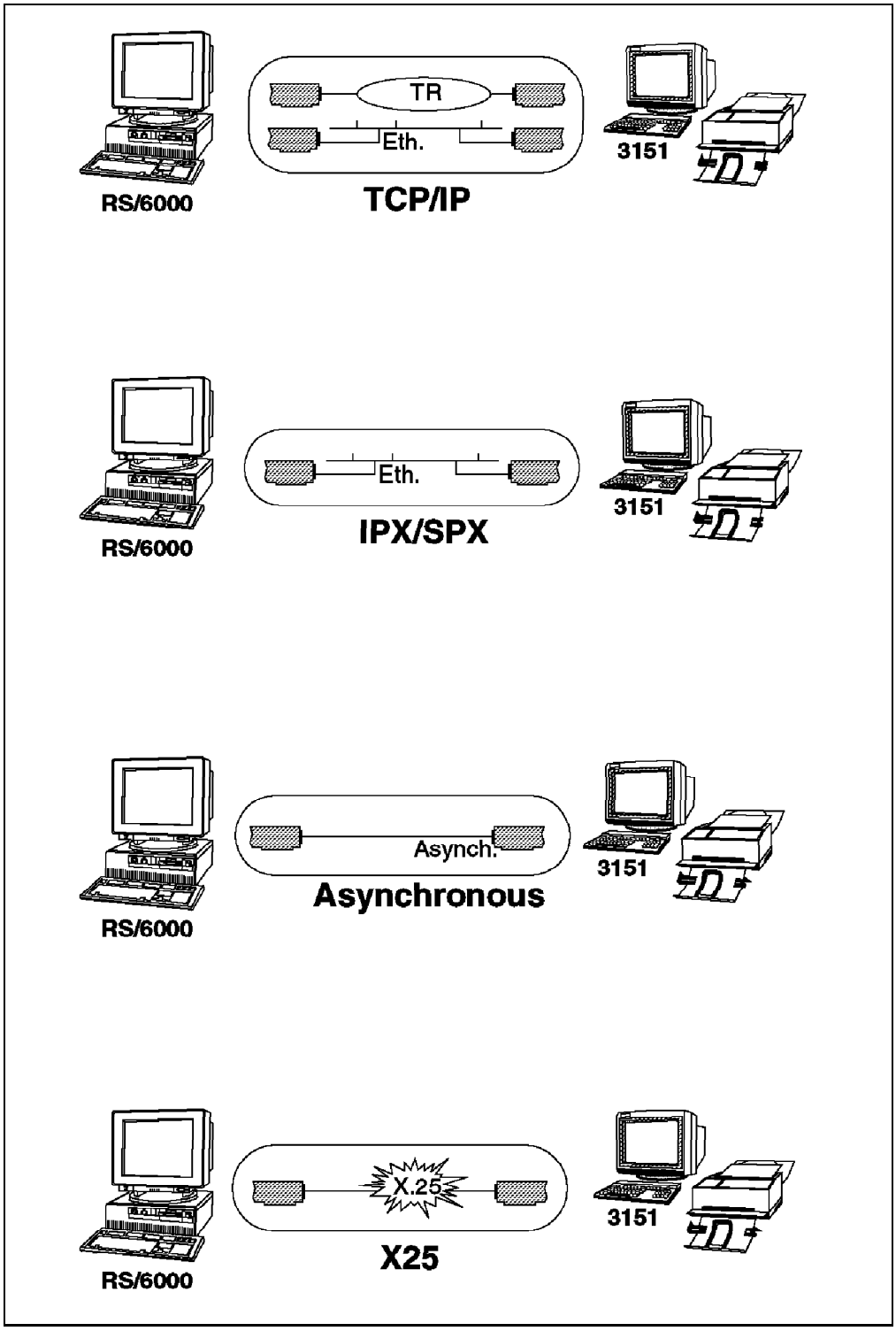


Figure 327. RS/6000 and Asynchronous Devices Abstract

9.9.2 TCP/IP

9.9.2.1 Token-Ring Network

Table 234. RS/6000 and Asynchronous Devices - TCP/IP - Token-Ring: Abstract

		RS/6000	Asynchronous devices
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Asynchronous Terminal Server connected on Ethernet as 8250 or 8260 with token-ring and asynchronous terminals adapters - Printer attachment node as MarkNet provided by Lexmark.
Software		- AIX V4 (TCP/IP included) - MarkNet software	-
Functions	- emulation - file transfer - file sharing - print sharing - remote command - API - mail - security - graphic - name directory - network management	- - - - - - - - - - -	- Connection - - - Printing - - - - - - -

Remark

- It could be an expensive solution.

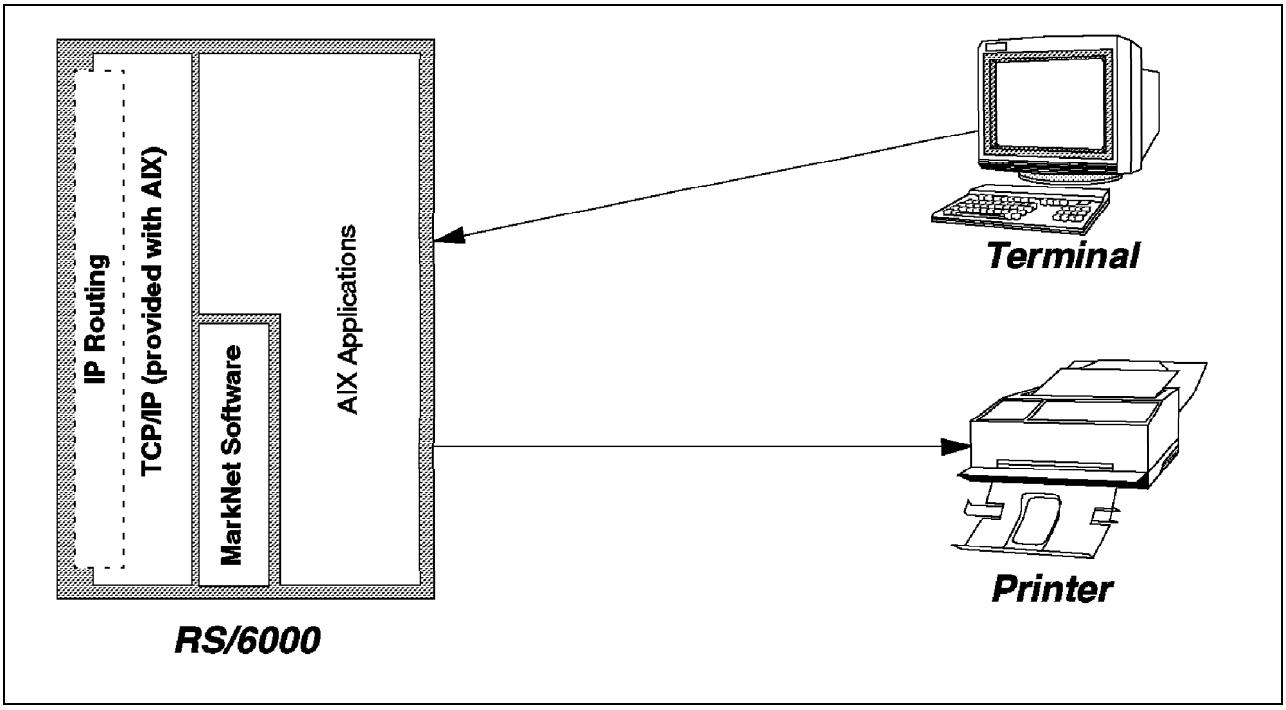


Figure 328. RS/6000 and Asynchronous Devices - TCP/IP - Token-Ring: Logical View

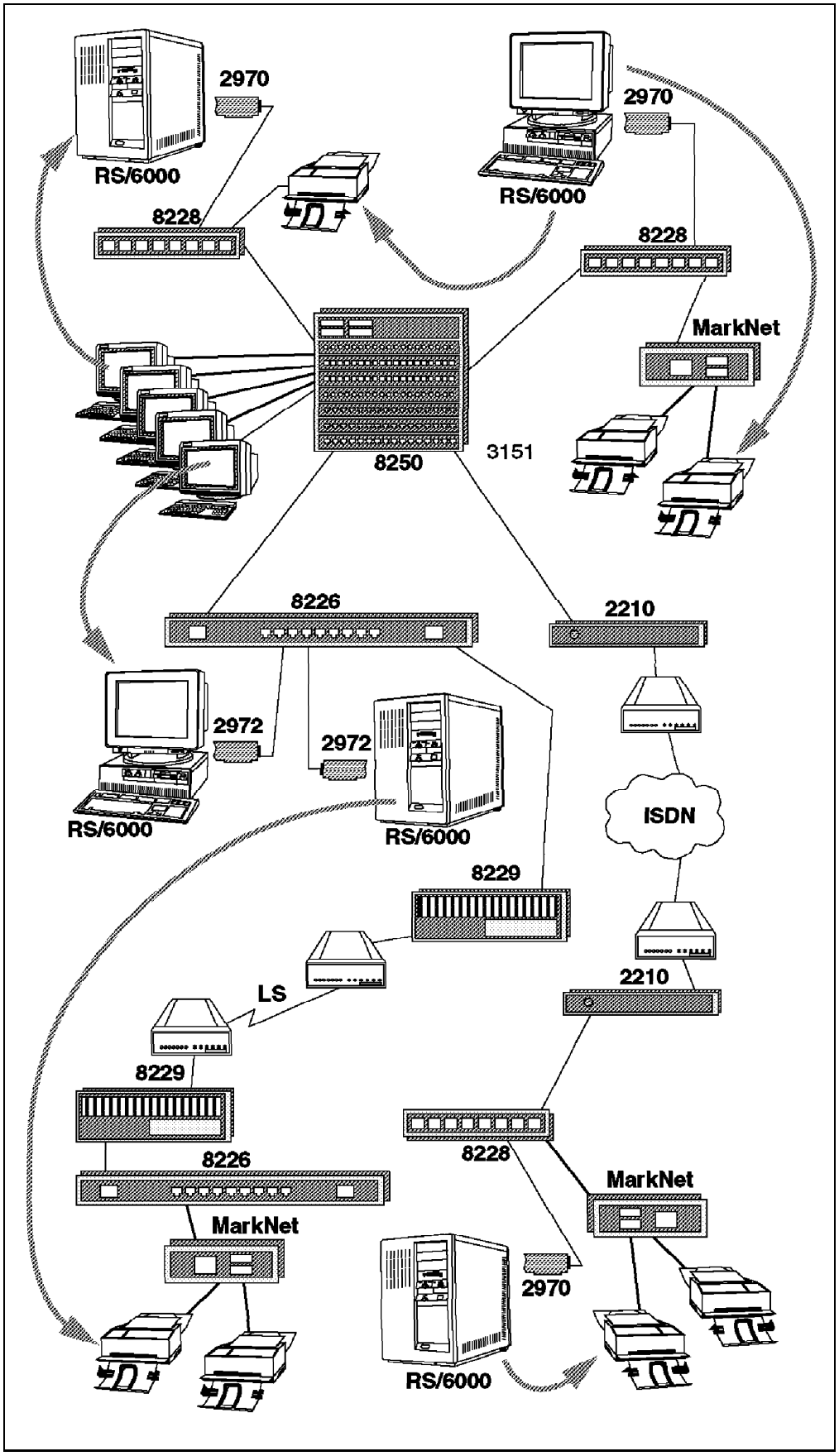


Figure 329. RS/6000 and Asynchronous Devices - TCP/IP - Token-Ring: Physical View

9.9.2.2 Ethernet Network

Table 235. RS/6000 and Asynchronous Devices - TCP/IP - Ethernet: Abstract

		RS/6000	Asynchronous devices
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Asynchronous Terminal Server connected on Ethernet as 7318-S20 - Printer attachment node as MarkNet provided by Lexmark.
Software		- AIX V4 (TCP/IP and AIX Asynchronous Terminal Server included)	-
Functions	**- emulation**	-	- Connection
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	- Printing
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- More and more use nowadays.
- Support for Serial Communications Network Server (machine type 7318, models P10 and S20) is provided in AIX V.4.1 and AIX V4.2.

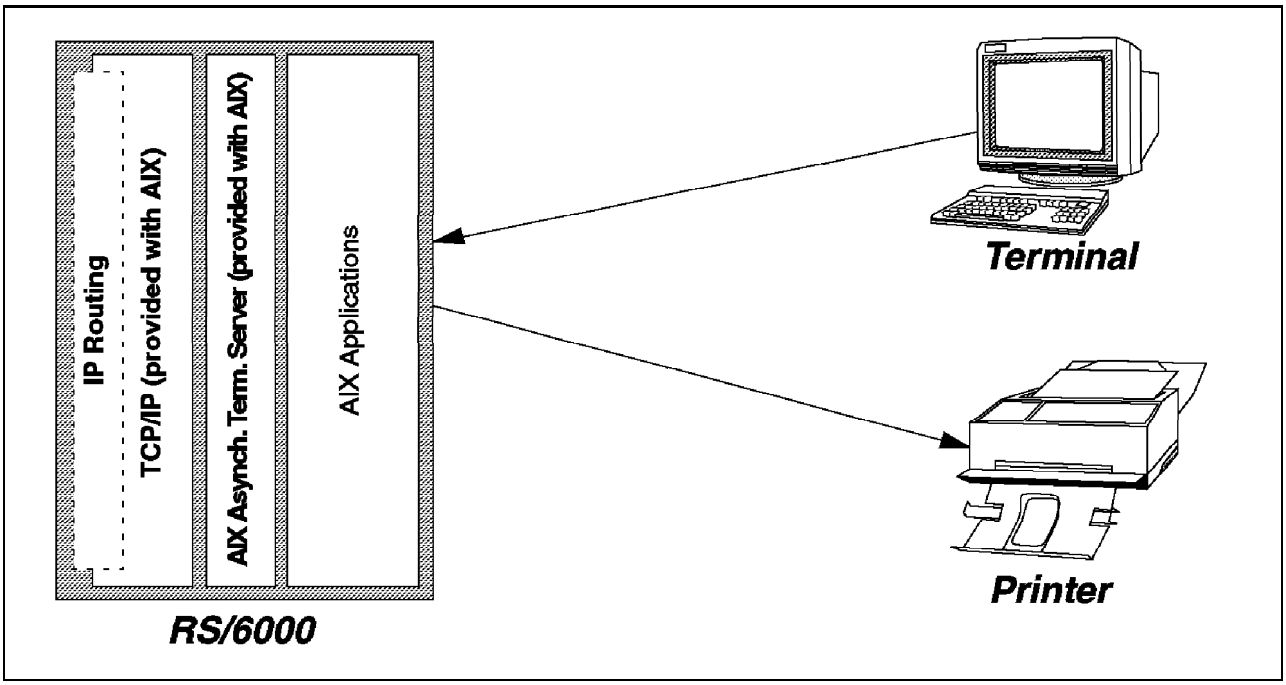


Figure 330. RS/6000 and Asynchronous Devices - TCP/IP - Ethernet: Logical View

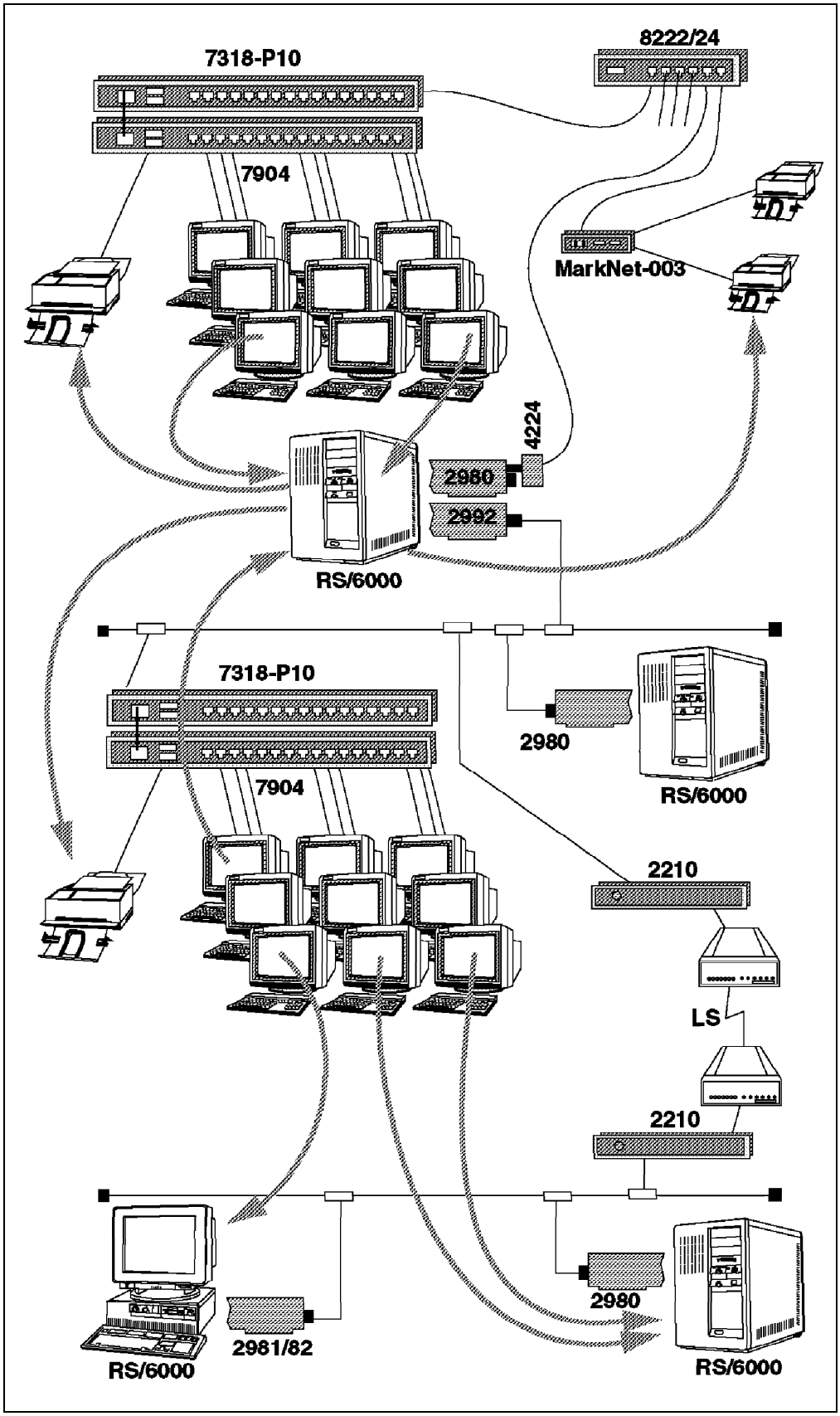


Figure 331. RS/6000 and Asynchronous Devices - TCP/IP - Ethernet: Physical View

9.9.3 Asynchronous

9.9.3.1 Asynchronous Network

Table 236. RS/6000 and Asynchronous Devices - Async. - Async.: Abstract

		RS/6000	Asynchronous devices
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Local or remote asynchronous connection
Software		-	-
Functions	**- emulation**	-	- Connection
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	- Printing
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- The basic connection!

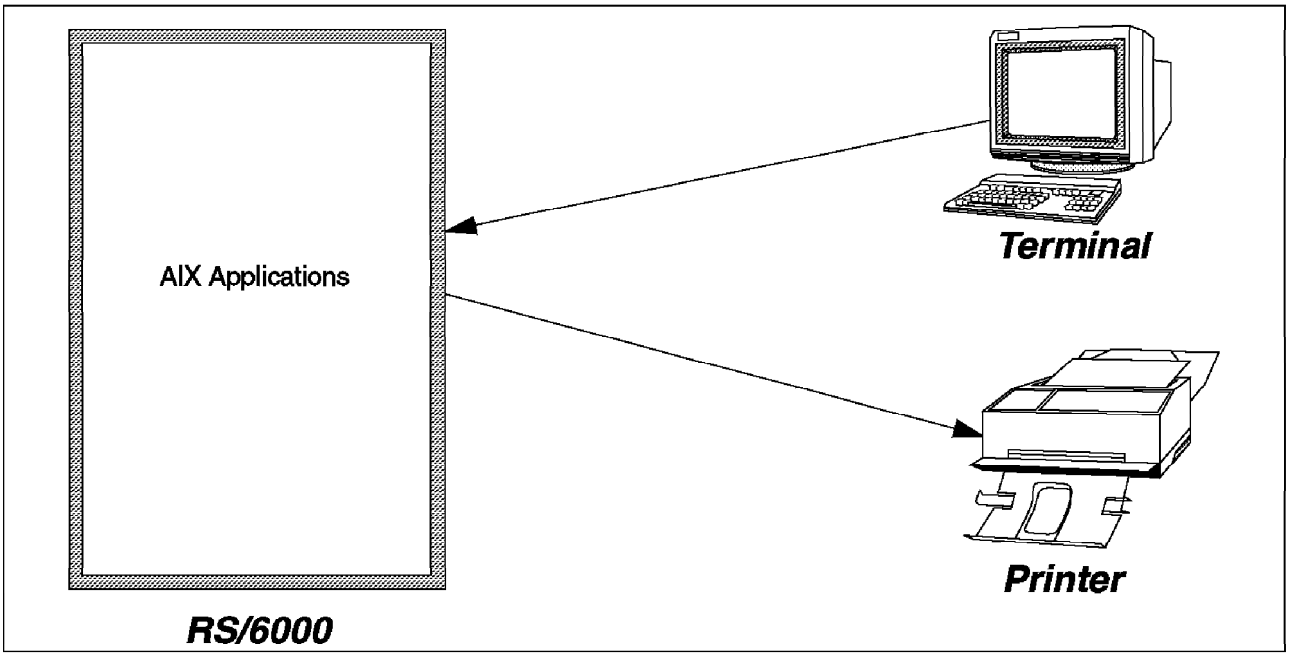


Figure 332. RS/6000 and Asynchronous Devices - Async.-Async.: Logical View

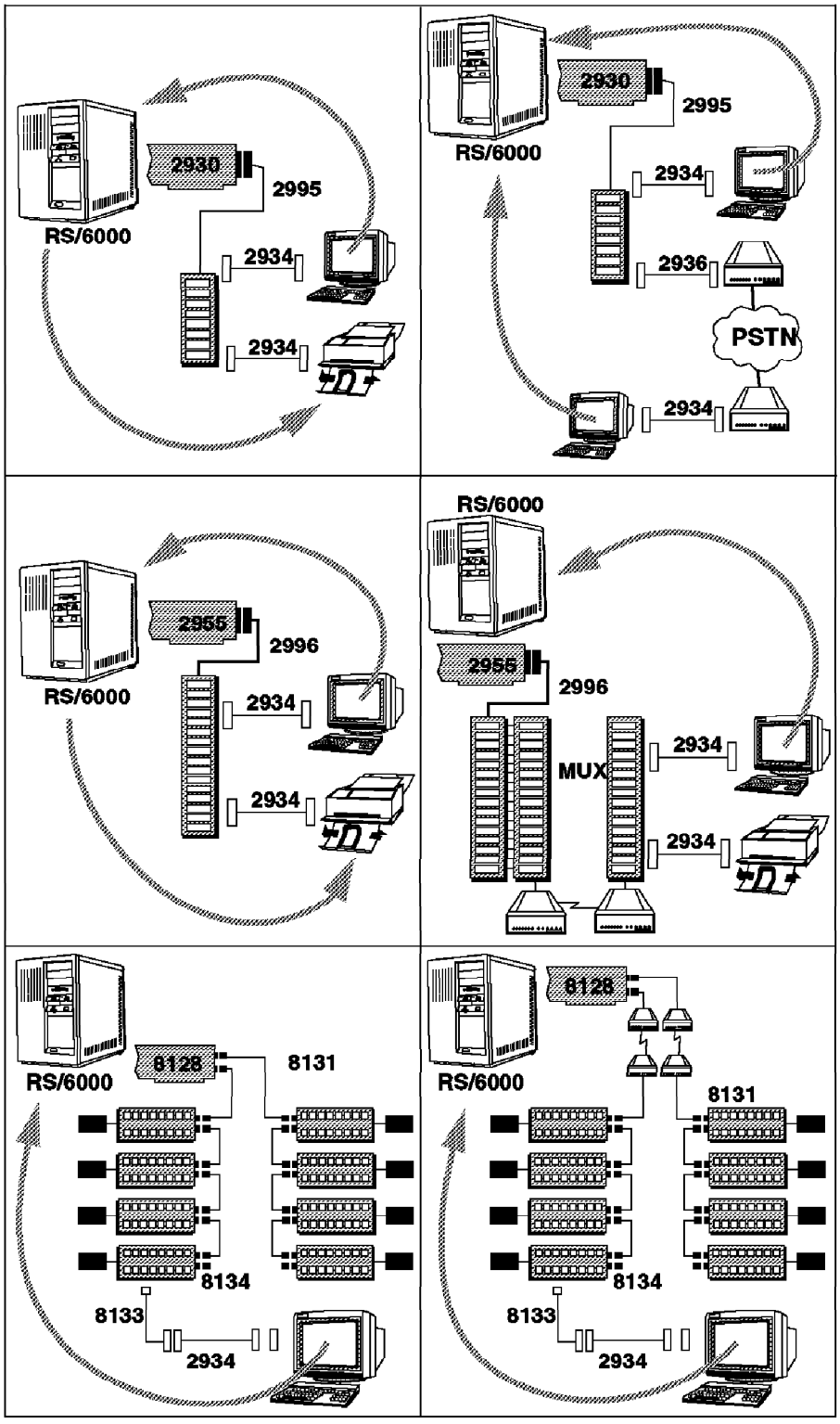


Figure 333. RS/6000 and Asynchronous Devices - Async.-Async.: Physical View

9.9.4 X.25 packet

9.9.4.1 X.25 Network

Table 237. RS/6000 and Asynchronous Devices - X.25 Packets - X.25: Abstract

		RS/6000	Asynchronous devices
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- Physical PAD (Packet Assemble/Dis-sembler)
Software		- AIX V4 (TCP/IP included) - AIXLink/X.25 V1.1 option: SX-PAD and ECOPAD	-
Functions	- emulation	-	- Connection
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	- Printing
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- This configuration is not optimum for Telnet connections!
- In fact, X.25 packets transported on TCP/IP packets generate a lot of overflow. So, it's better to use some product (such as ECOPAD) to compress this kind of communication. See the OEM software offerings for AIX V4 section to find more information on this product.

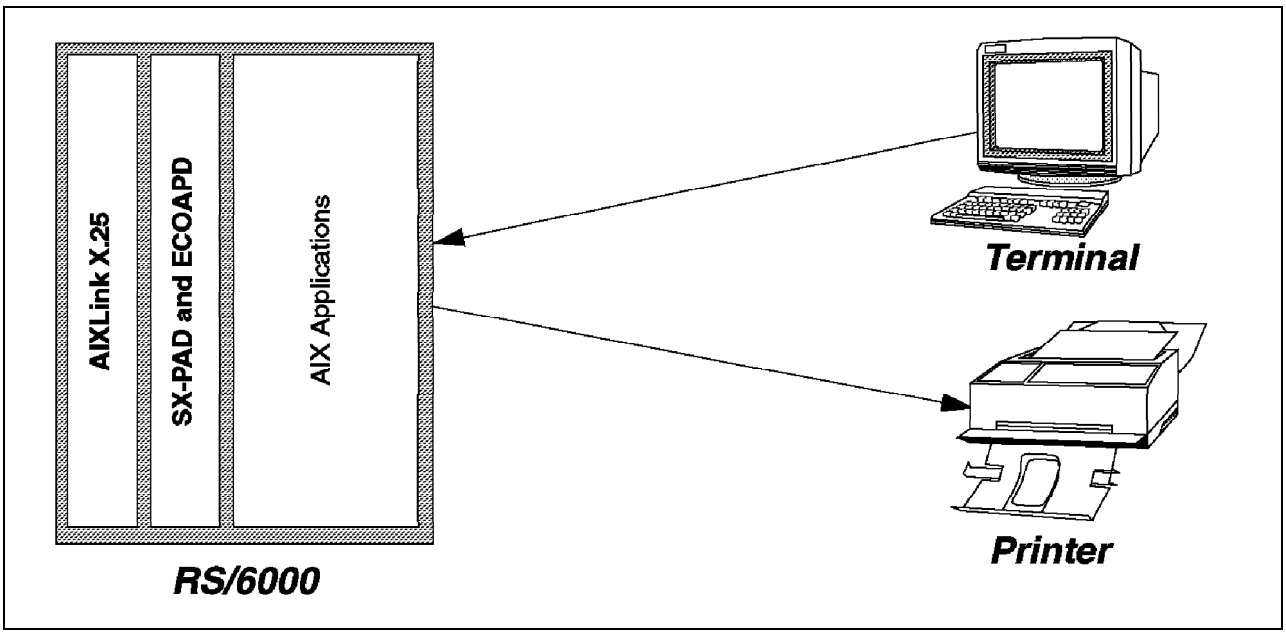


Figure 334. RS/6000 and Asynchronous Devices - X.25 Packets - X.25: Logical View

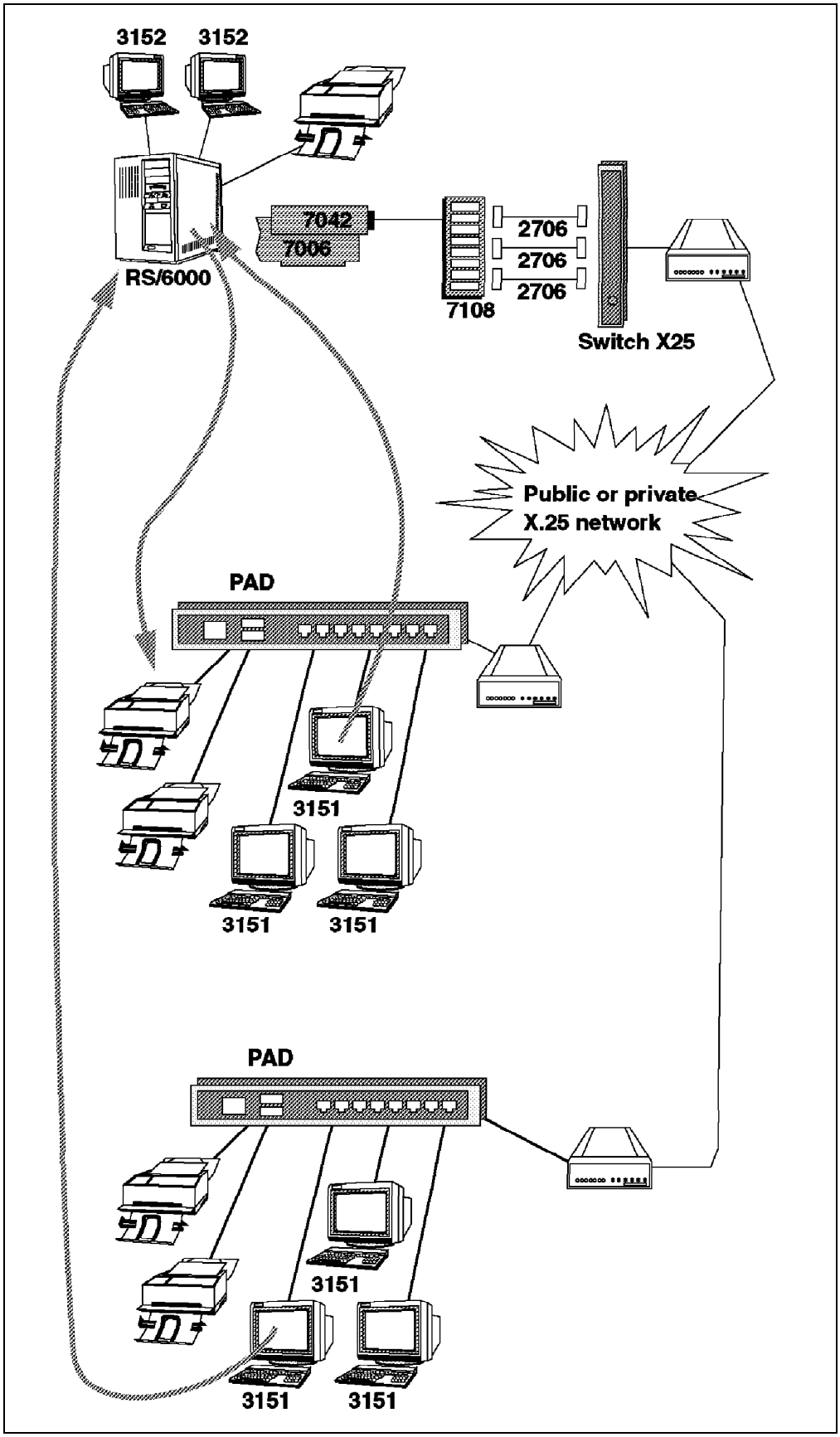


Figure 335. RS/6000 and Asynchronous Devices - X.25 Packets - X.25: Logical View

9.9.5 IPX/SPX

9.9.5.1 Ethernet Network

Table 238. RS/6000 and Asynchronous Devices - IPX - Ethernet: Abstract

		RS/6000	Asynchronous devices
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceiv- ers: 4222/4223)	- Asynchronous Terminal Server connected on Ethernet as 7318-P10
Software		- AIX V4 (TCP/IP and AIX Asynchronous Terminal Server included)	-
Functions	**- emulation**	-	- Connection
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	- Printing
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- Use 7318-P10 only. The 7318-S20 uses the TCP/IP protocol.

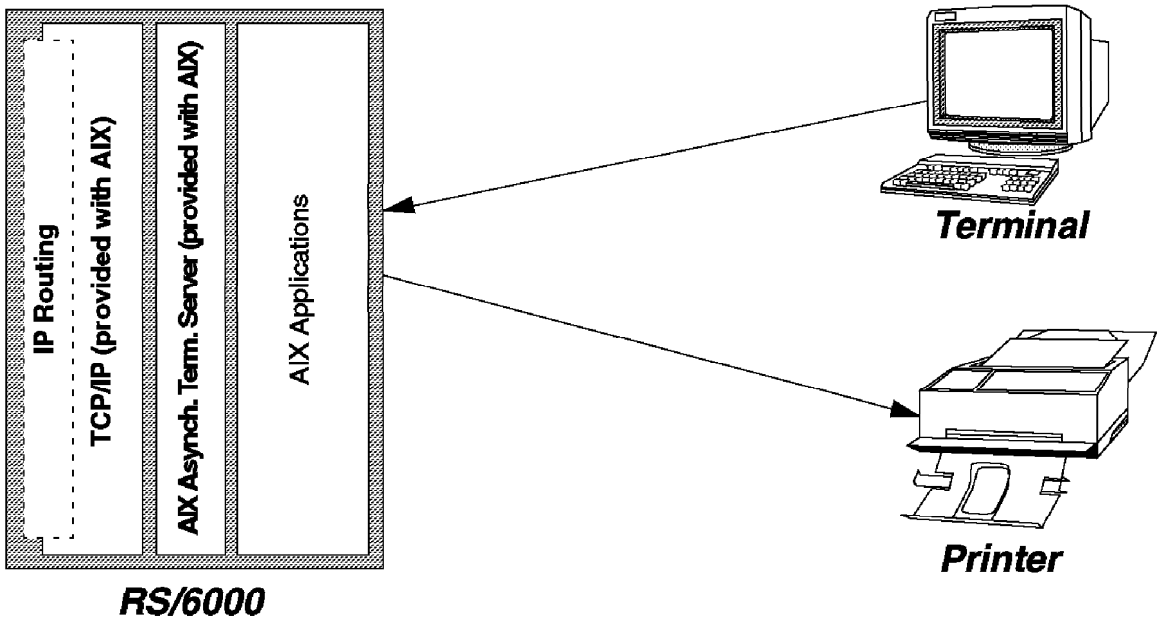


Figure 336. RS/6000 and Asynchronous Devices - IPX - Ethernet: Logical View

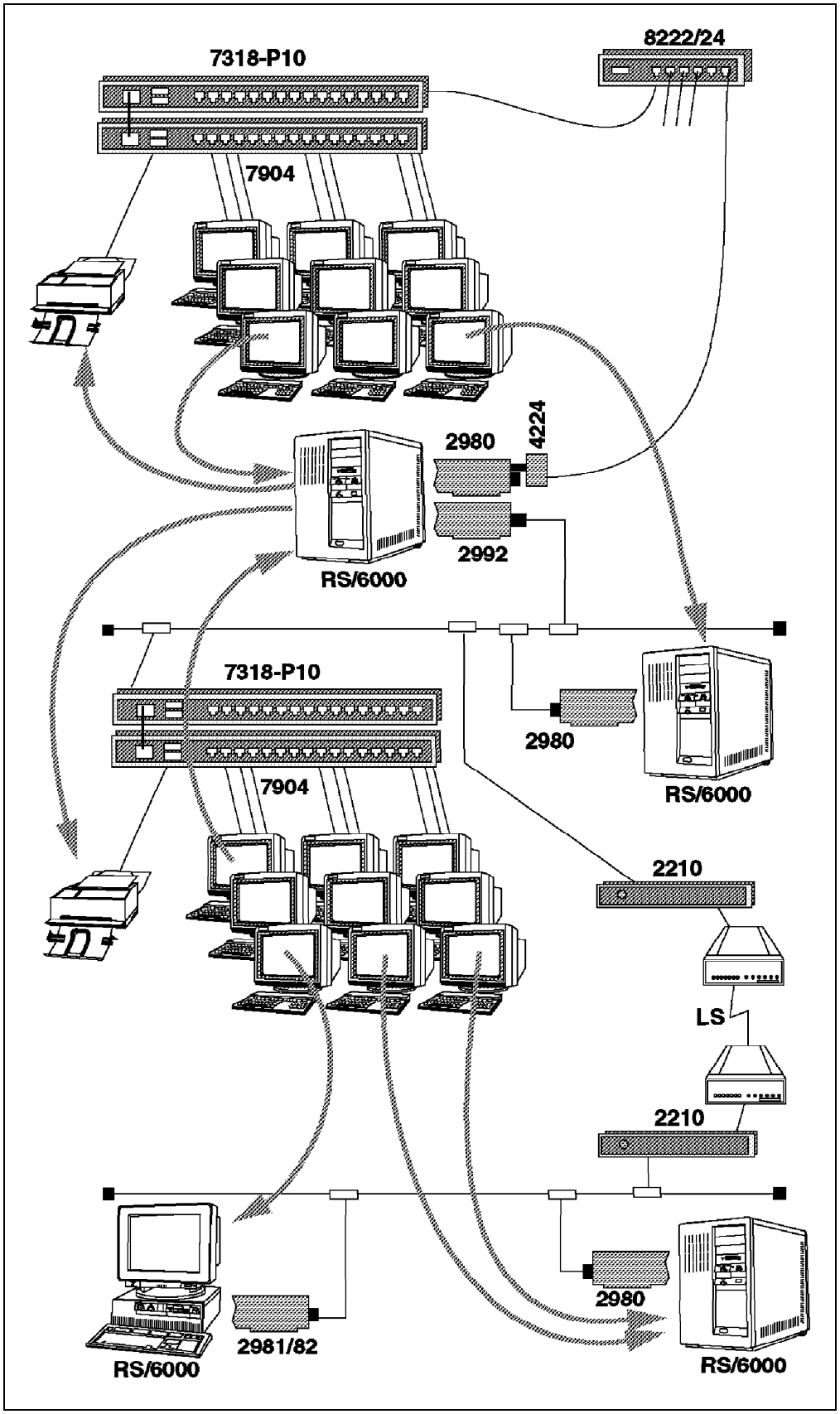


Figure 337. RS/6000 and Asynchronous Devices - IPX/SPX - Ethernet: Physical View

9.10 RS/6000 and Macintosh

A Macintosh is a true Personal Computer!

- You can integrate your Macintosh as a TCP/IP workstation. Implement the TCP/IP protocol on the Mac and use common functions, such as Telnet, FTP or RPC. If you manage just a few Macs, it's a very simple method.
- You can also implement Macintosh native protocol (AppleTalk) on the RS/6000 and transform it into a Mac server. In fact, you install a program on the RS/6000 as AIX Connections, TotalMac or Etherhshare. If you manage hundreds of Macs, you will prefer this method because you don't need to update all Macs with the new version of TCP/IP, just one platform (RS/6000). You will also use AIX facilities such as the Logical Volume Manager or System Management Interface Tool (SMIT).

9.10.1 Abstract

Table 239. RS/6000 and Macintosh Abstract

RS/6000 / Macintosh	TCP/IP	AppleTalk	Asynchronous
Asynchronous	SLIP/PPP		
Token-Ring			
FDDI			
Ethernet		AIX Connections(1)	
LocalTalk			
X.25			
Synchronous			
Coaxial			
S/370 Channel			
ESCON			
BLKMUX			
Fibre Channel			
ATM			
HIPPI			
SOCC			
Twinax			

Remark

- (1) AIX Connections is only supported on Ethernet with the AppleTalk protocol.

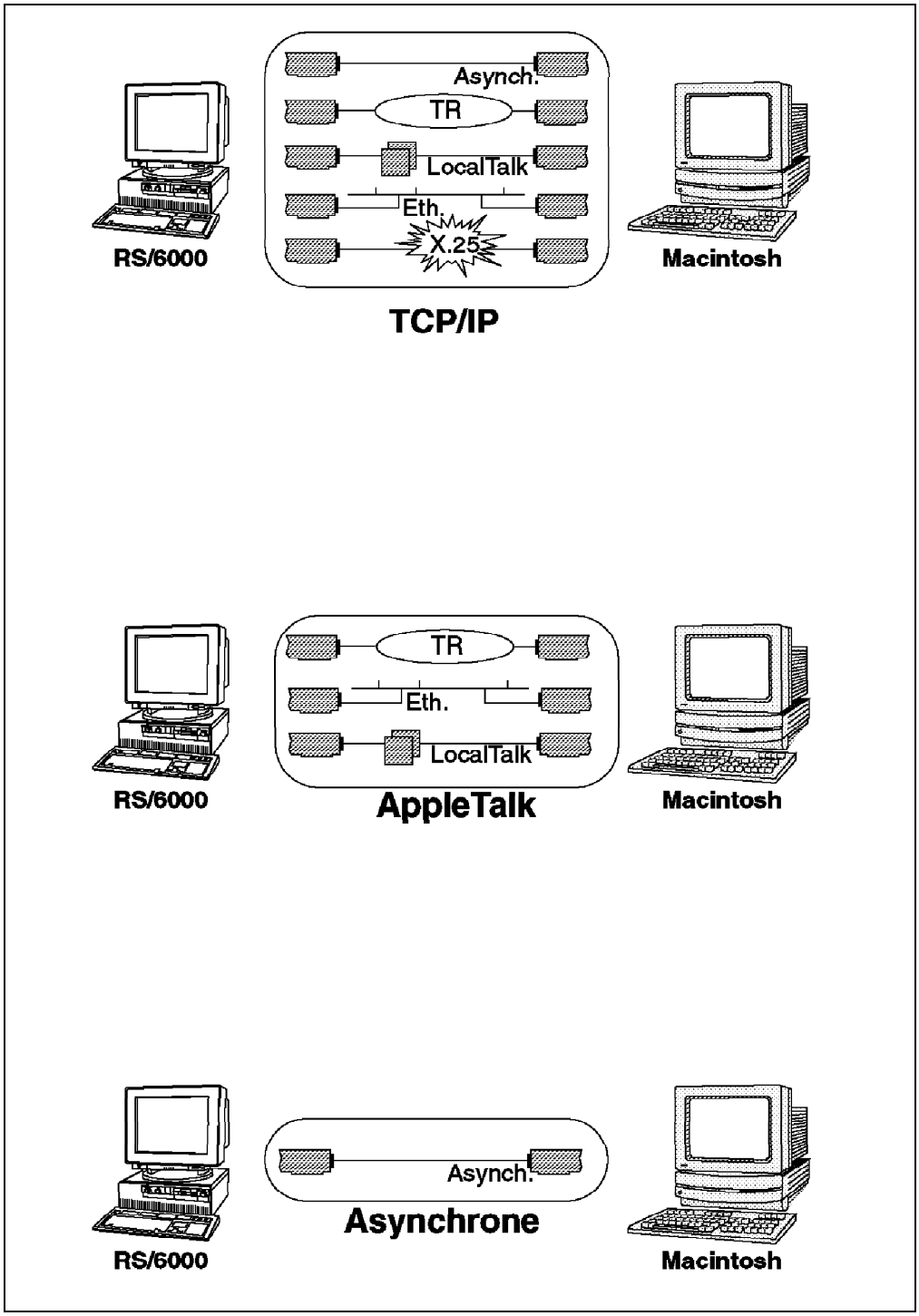


Figure 338. RS/6000 and Macintosh Abstract

9.10.2 TCP/IP

9.10.2.1 Asynchronous Network

Table 240. RS/6000 and Macintosh - TCP/IP - Asynchronous: Abstract

		RS/6000	Macintosh
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Asynchronous connection
Software		- AIX V4 (TCP/IP, SLIP and PPP included)	- MacTCP (1) (and all extensions if needed, especially SLIP and PPP protocols)
Functions	**- emulation**	-	- Telnet (C/), tnvt100 (C/), tnvt220 (C/)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	-	-
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S)	- Rexec (C/), Rcp (C/), Rsh (C/).
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1) MacTCP is not is not an IBM product, but some other products provide the same functions. Please refer to Chapter 7 for more information.
- Use PPP rather SLIP. It's faster and more economical in terms of packets.

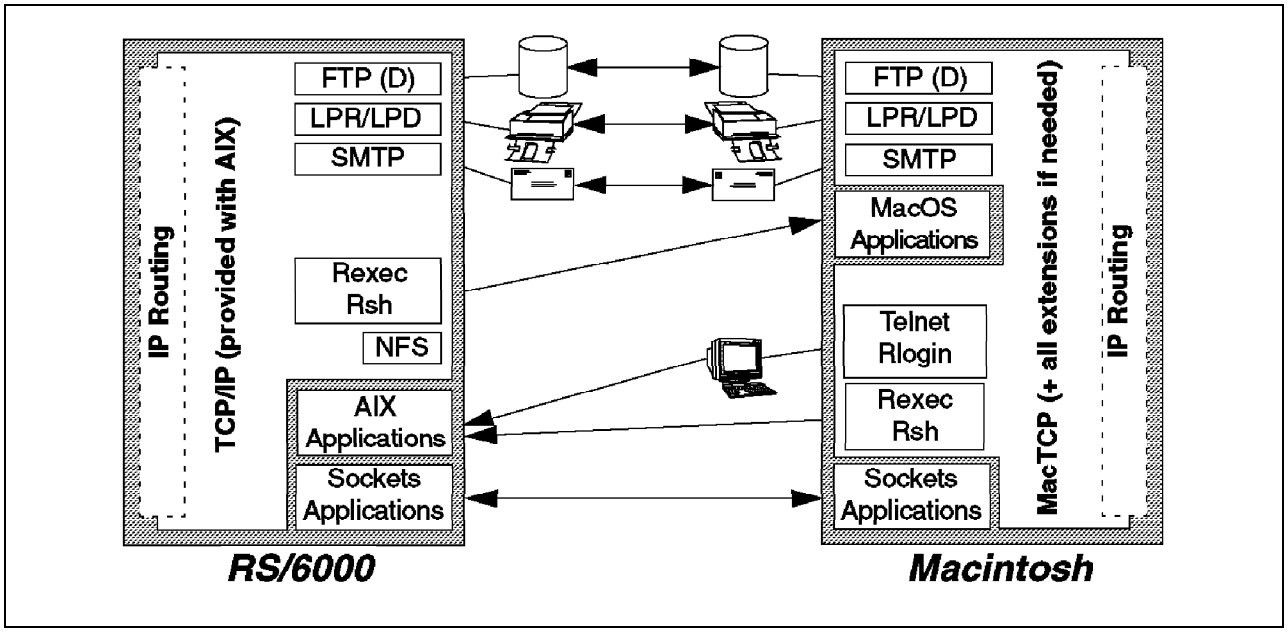


Figure 339. RS/6000 and Macintosh - TCP/IP - Asynchronous: Logical View

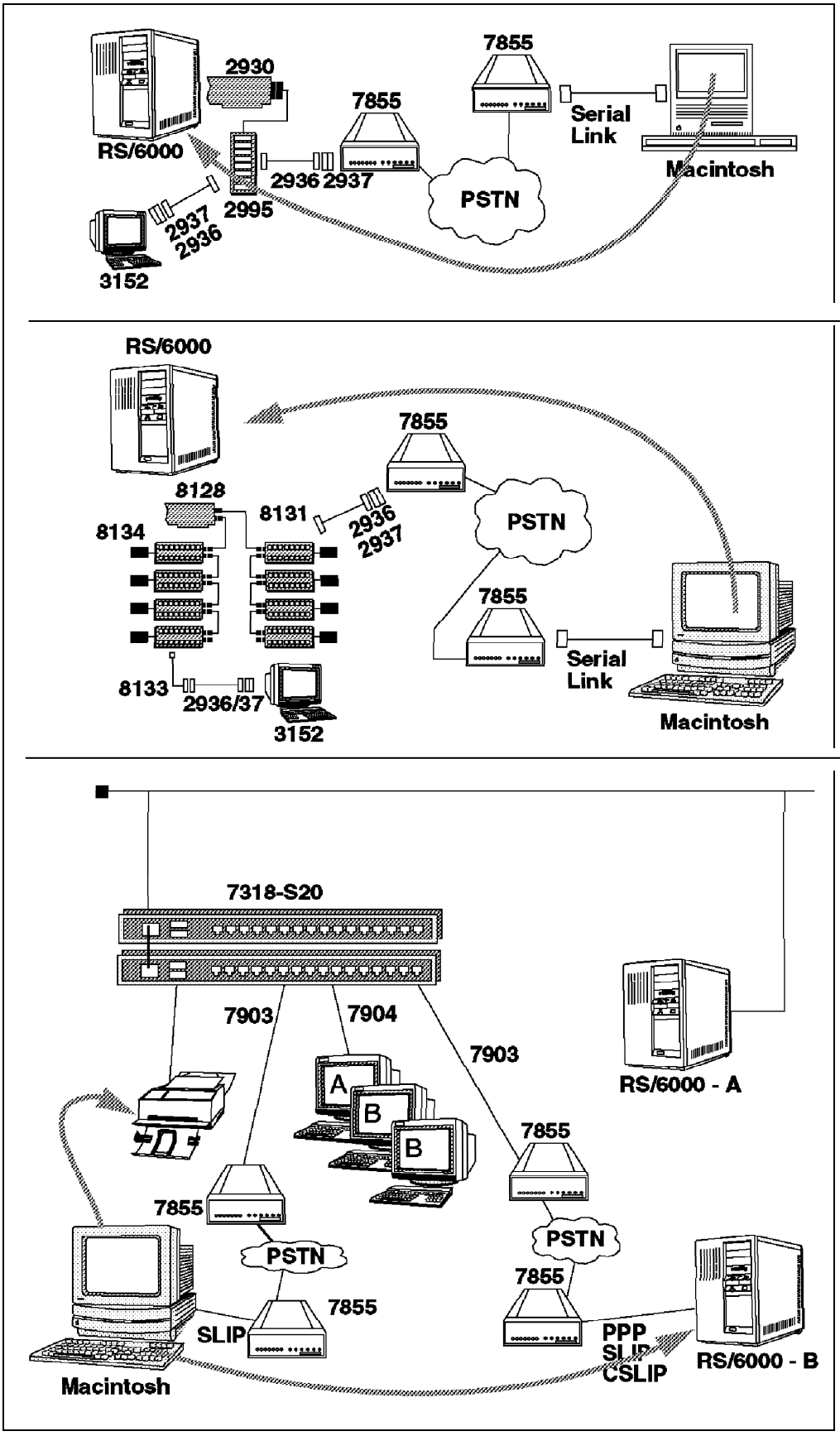


Figure 340. RS/6000 and Macintosh - TCP/IP - Asynchronous: Physical View

9.10.2.2 Token-Ring Network

Table 241. RS/6000 and Macintosh - TCP/IP - Token-Ring: Abstract

		RS/6000	Macintosh
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- Token-RIng adapter
Software		- AIX V4 (TCP/IP included)	- MacTCP (1) (and all extensions if needed)
Functions	**- emulation**	- Telnet (/S), tnvt100 (/S)	- Telnet (C/), tnvt100 (C/)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S)	- Rexec (C/), Rcp (C/S), Rsh (C/)
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remarks

- (1): MacTCP is not is not an IBM product, but some other products provide the same functions. Please refer to Chapter 7 for more information.
- (2) With additional products, such as eXodus.

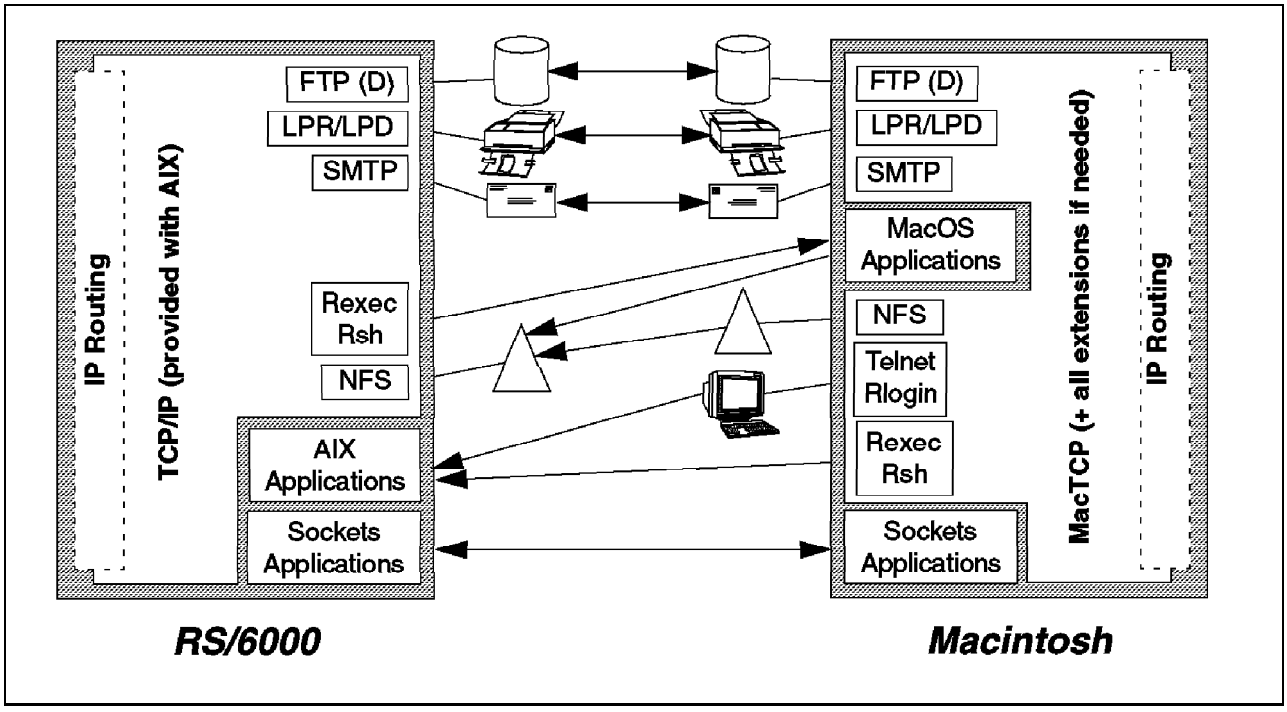


Figure 341. RS/6000 and Macintosh - TCP/IP - Token-Ring: Logical View

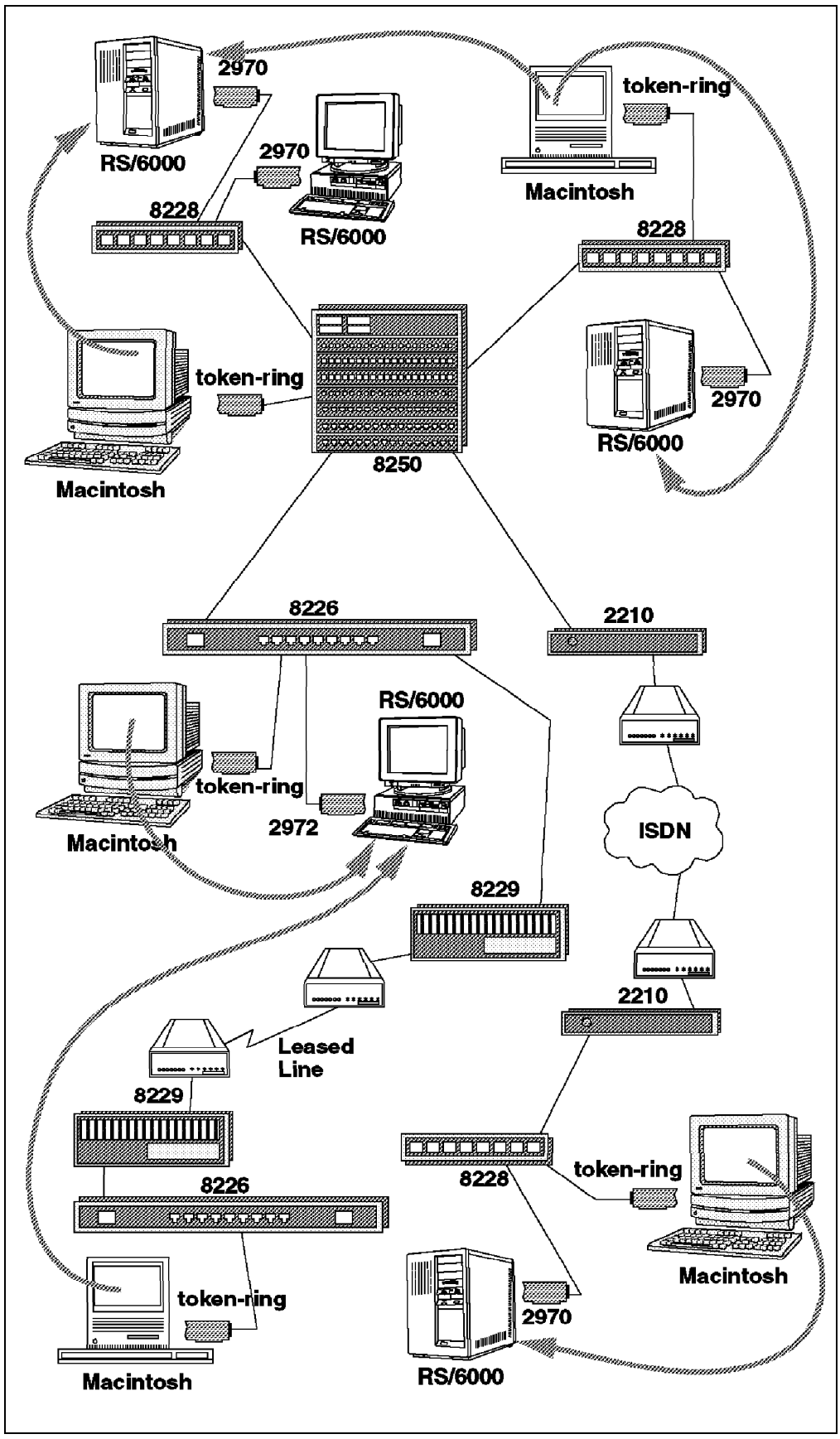


Figure 342. RS/6000 and Macintosh - TCP/IP - Token-Ring: Physical View

9.10.2.3 LocalTalk Network

Table 242. RS/6000 and Macintosh - TCP/IP - LocalTalk: Abstract

		RS/6000	Macintosh
Hardware		- Std ports - 2981/2982/8210 - 2980/9980 - 8241 - 4221/9000 - 8022/8023/8024 - 4222/9001 - 8032/8033/8034 - 2992 - 2402/2406 - 2993 - 2403/2407 - 2987 (option transceiv- - 2985 ers: 4222/4223) - 8242 (100 Mbps)	- LocalTalk port (integrated)
		- GatorBox[2] router used to interconnect Ethernet/TCP-IP and LocalTalk networks.	
Software		- AIX V4 (TCP/IP included)	- MacTCP [1] (and all extensions if needed)
Functions	**- emulation**	- Telnet (/S), tnvt100 (/S)	- Telnet (/S), tnvt100 (/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (/S)	- NFS (C/)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	-	-
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	-	-
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remarks

- (1) and (2) MacTCP and GatorBox are not IBM products, but some other products provide the same functions. Please refer to Chapter 7 for more information.

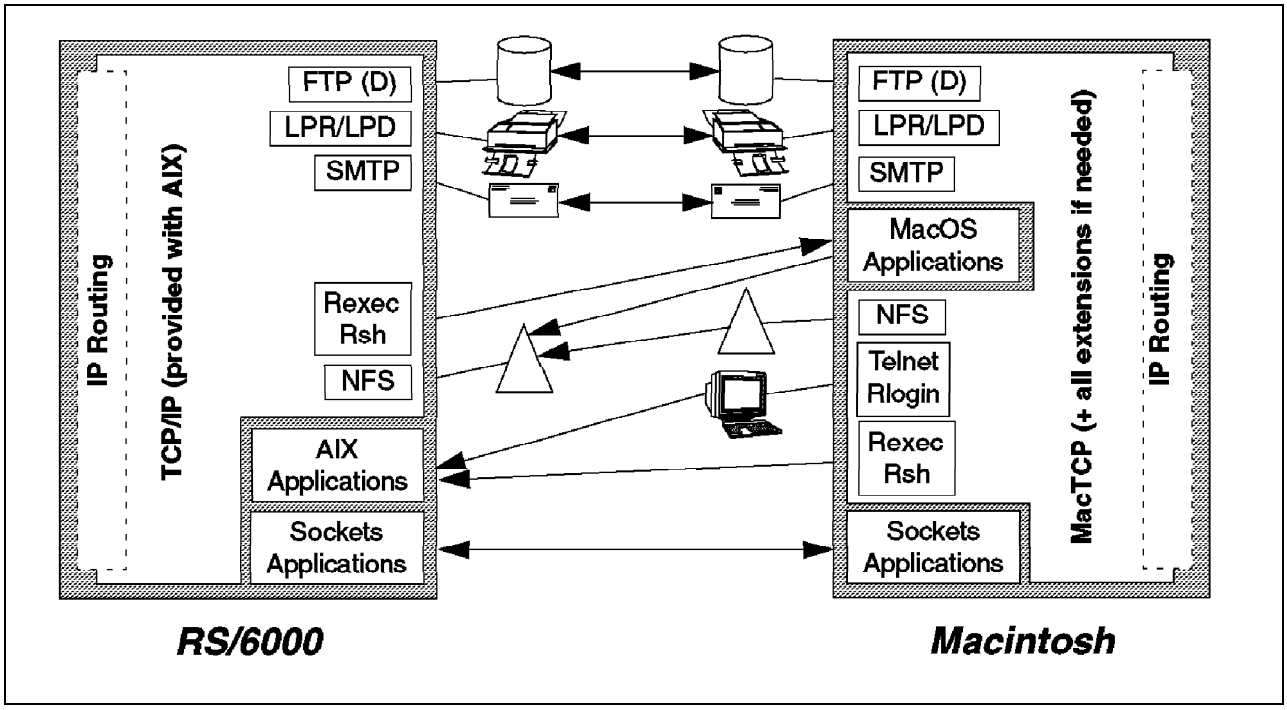


Figure 343. RS/6000 and Macintosh - TCP/IP - LocalTalk: Logical View

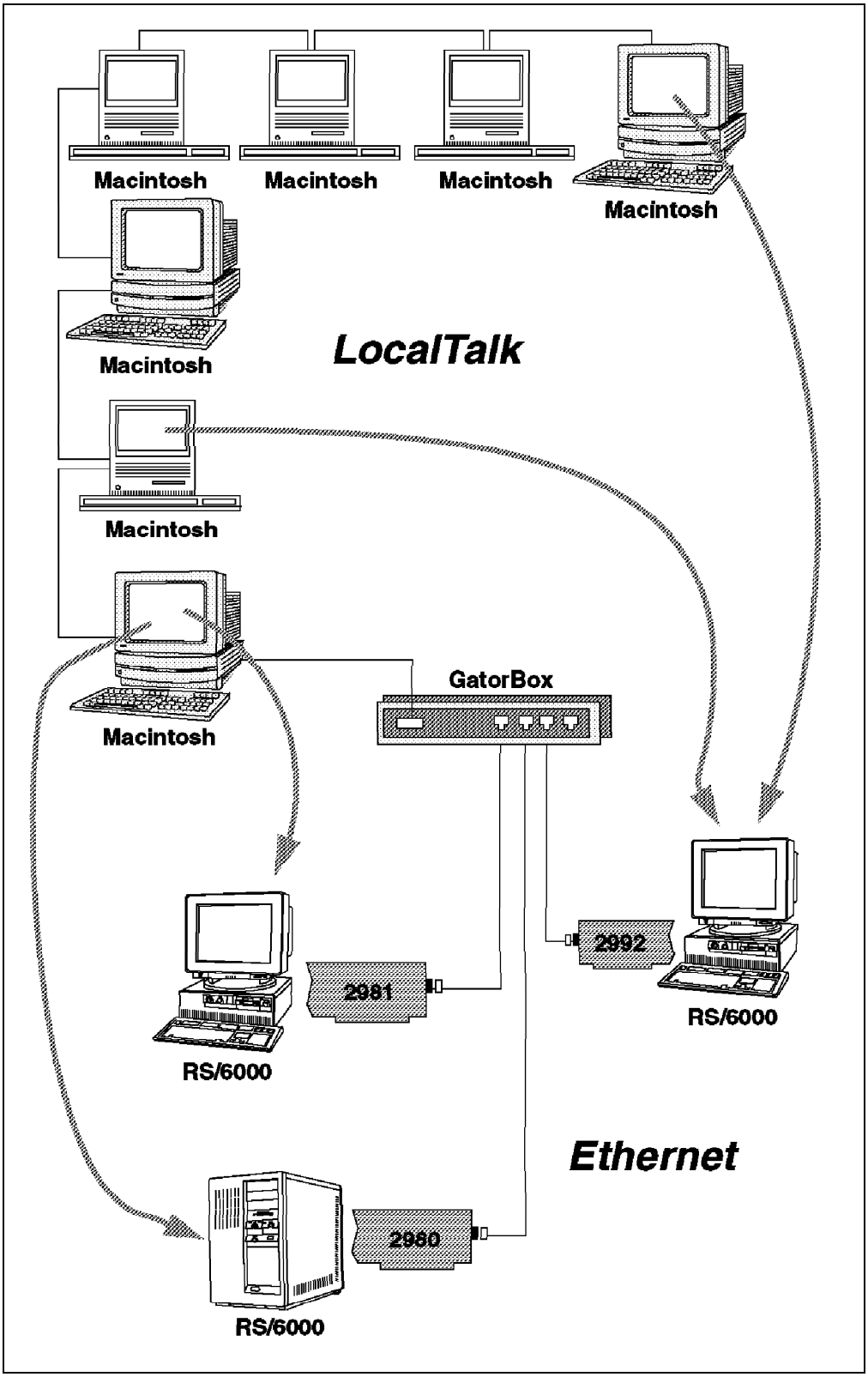


Figure 344. RS/6000 and Macintosh - TCP/IP - LocalTalk: Physical View

9.10.2.4 Ethernet Network

Table 243. RS/6000 and Macintosh - TCP/IP - Ethernet: Abstract

		RS/6000	Macintosh
Hardware		- Std ports - 2981/2982/8210 - 2980/9980 - 8241 - 4221/9000 - 8022/8023/8024 - 4222/9001 - 8032/8033/8034 - 2992 - 2402/2406 - 2993 - 2403/2407 - 2987 (option transceiv- - 2985 ers: 4222/4223) - 8242 (100 Mbps)	- Ethernet connection (very often integrated)
Software		- AIX V4 (TCP/IP included)	- MacTCP (1) (and all extensions if needed)
Functions	**- emulation**	- Telnet (/S), tnvt100 (/S)	- Telnet (/S), tnvt100 (/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S)	- Rexec (C/S), Rcp (C/S), Rsh (C/S)
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	-	-
	- graphic	- X-Window (C/S)	- X-Window (/S)(2)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remarks

- (1): MacTCP is not an IBM product, but some other products provide the same functions. Please refer to Chapter 7 for more information.
- (2) With additional products, such as eXodus.

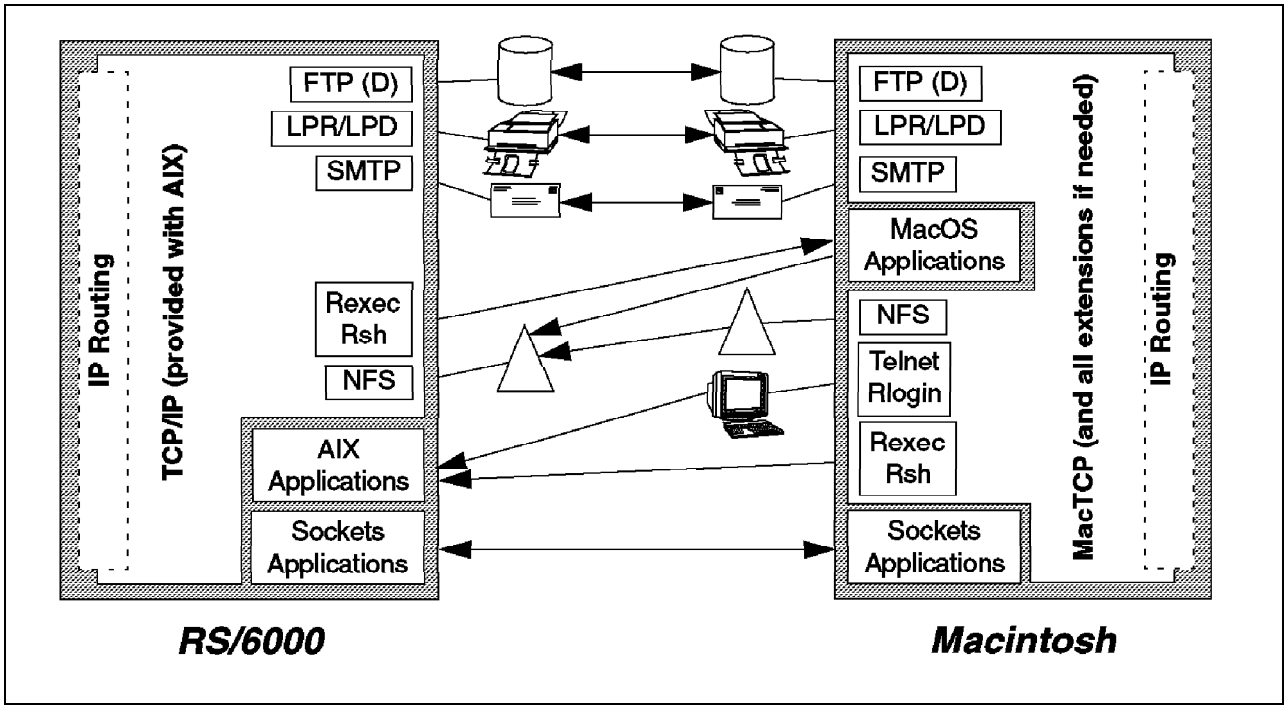


Figure 345. RS/6000 and Macintosh - TCP/IP - Ethernet: Logical View

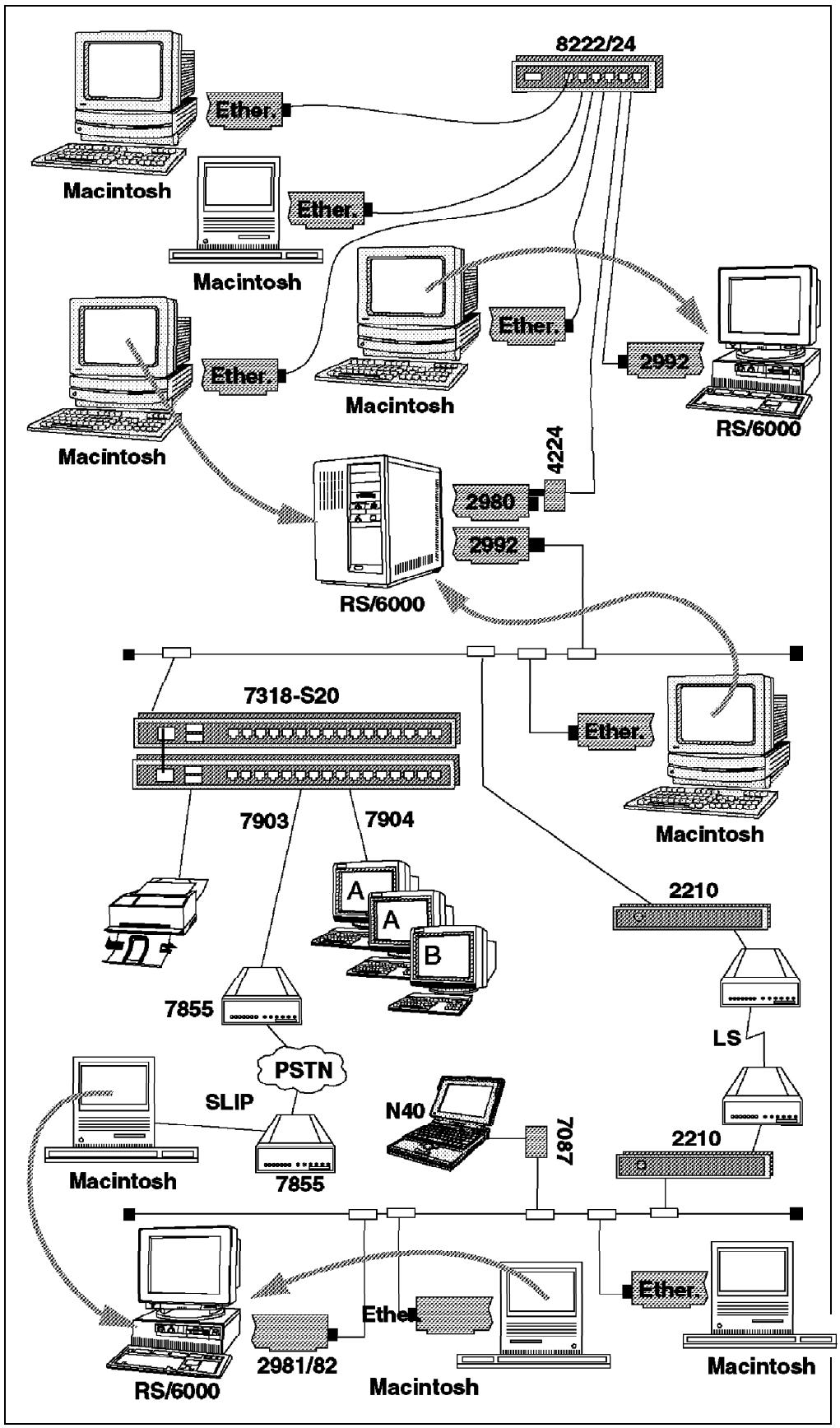


Figure 346. RS/6000 and Macintosh - TCP/IP - Ethernet: Logical View

9.10.2.5 X.25 Network

Table 244. RS/6000 and Macintosh - TCP/IP - X.25: Abstract

		RS/6000	Macintosh
Hardware		- 2960 - 2961/2962/8211 - 7006/7008 (+7042/44/46/48 +7106/7108)	- X.25 adapter
Software		- AIX V4 (TCP/IP included) - AIXLink/X.25 V1.1	- MacTCP (1) (and all extensions if needed)
Functions	- **emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (/S), tnvt100 (/S)
	- **file transfer**	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- **file sharing**	-	- NFS (C/S)
	- **print sharing**	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- **remote command**	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S)
	- **API**	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- **mail**	- SMTP (C/S)	- SMTP (C/S)
	- **security**	- Kerberos (C/S)	-
	- **graphic**	-	-
	- **name directory**	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- **network management**	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- (1) MacTCP is not an IBM product, but some other products provide the same functions. Please refer to Chapter 7 for more information.
- This configuration is not optimum for Telnet connections!
- In fact, X.25 packets transported on TCP/IP packets generate a lot of overflow. So, it's better to use some product (such as ECO-PAD) to compress this kind of communication. See the OEM software offerings for AIX V4 section to find more information on this product.

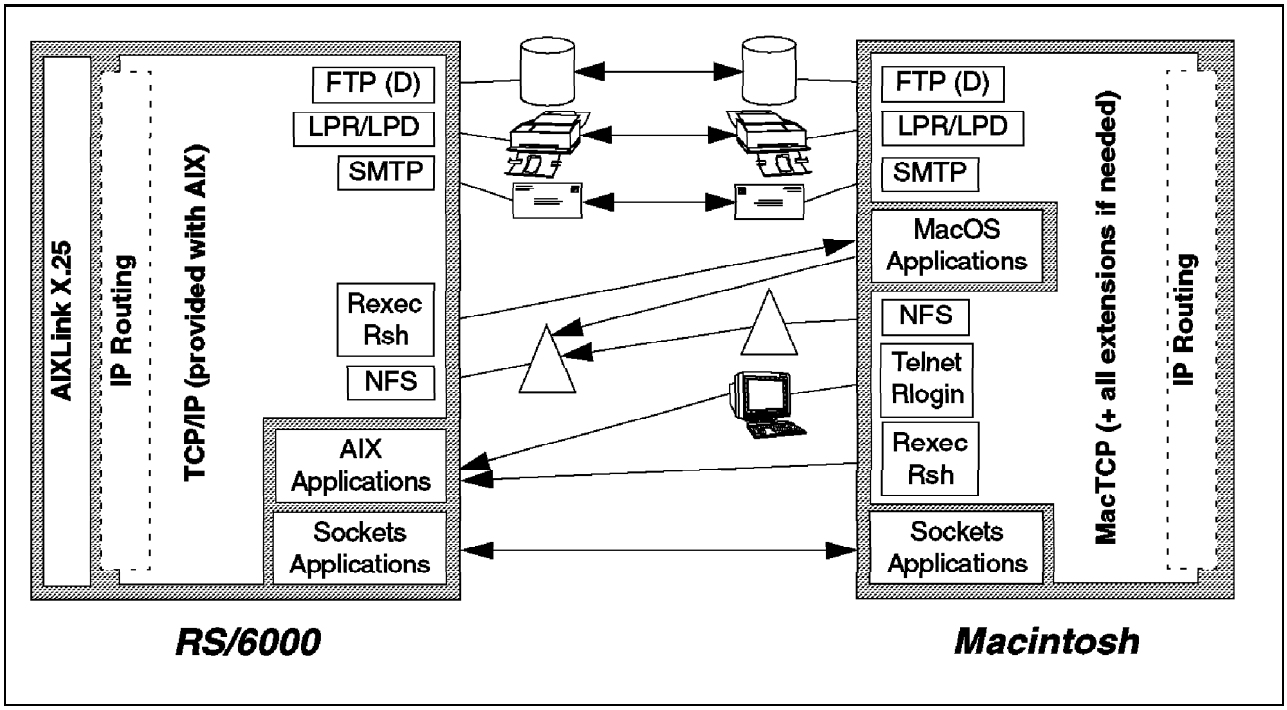


Figure 347. RS/6000 and Macintosh - TCP/IP - X.25: Logical View

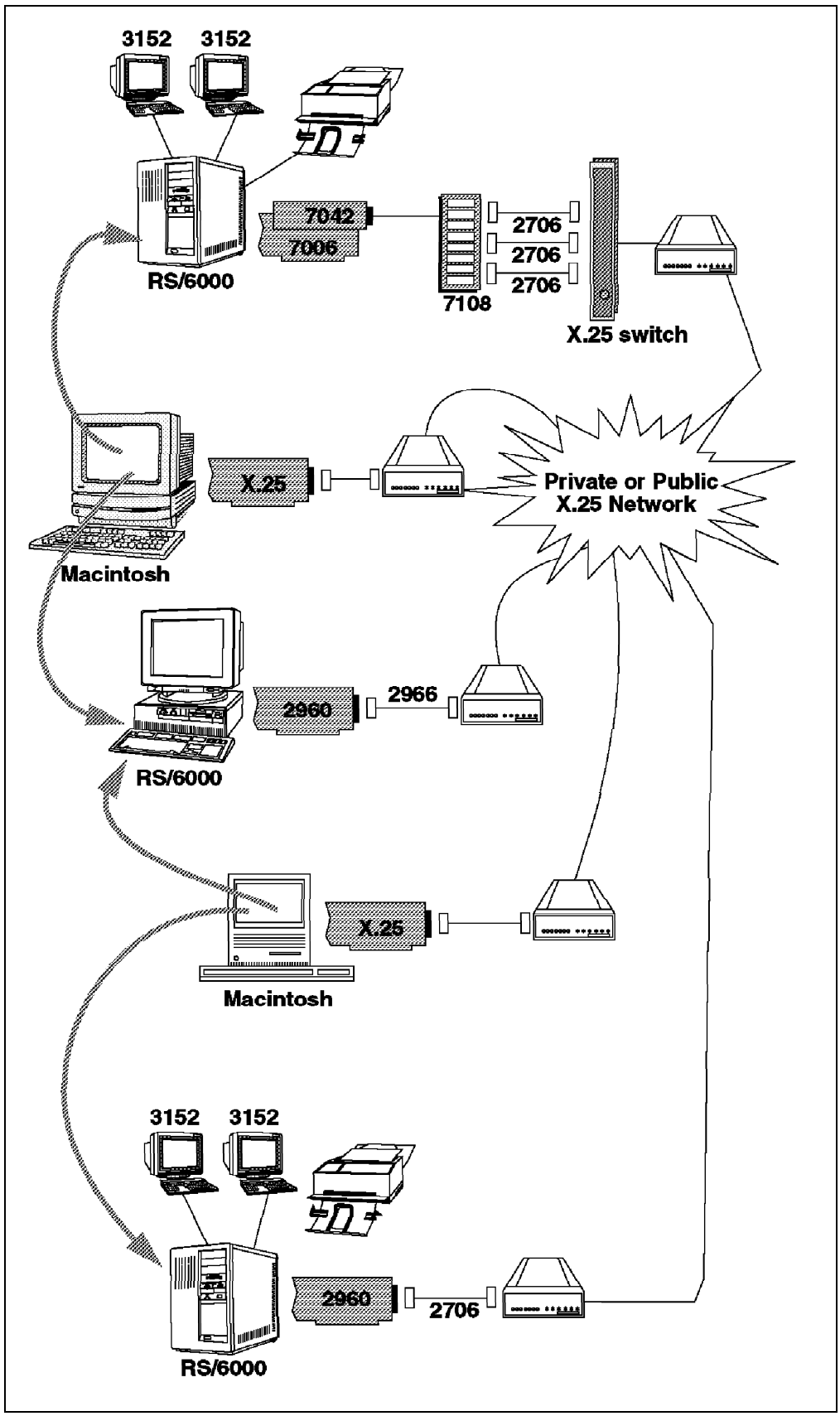


Figure 348. RS/6000 and Macintosh - TCP/IP - X.25: Physical View

9.10.3 AppleTalk

9.10.3.1 Token-Ring Network

Table 245. RS/6000 and Macintosh - AppleTalk - Token-Ring: Abstract

		RS/6000	Macintosh
Hardware		- 2970/9970 - 8246 - 2972 - 7092 - 2971/2973/8209 - 8042/8043/7044 - 2979	- Token-RIng adapter
Software		- EtherShare - MacServer - TOTALMac	- AppleTalk (included in MacOS)
Functions	**- emulation**	-	- Emulation
	- file transfer	- File transfer (/S)	- File transfer (C/)
	- file sharing	- File sharing (/S)	- File sharing (C/)
	- print sharing	- Remote printing (/S)	- Remote printing (C/)
	- remote command	- Remote command (/S)	- Remote command (C/)
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- AIX Connections is not supported on token-ring with the AppleTalk protocol. You can find other products, such as Ethershare, MacServer or TOTALMac, to transform the RS/6000 into a complete Macintosh Server (emulation, remote command,...). Please refer to Chapter 7 for more information.

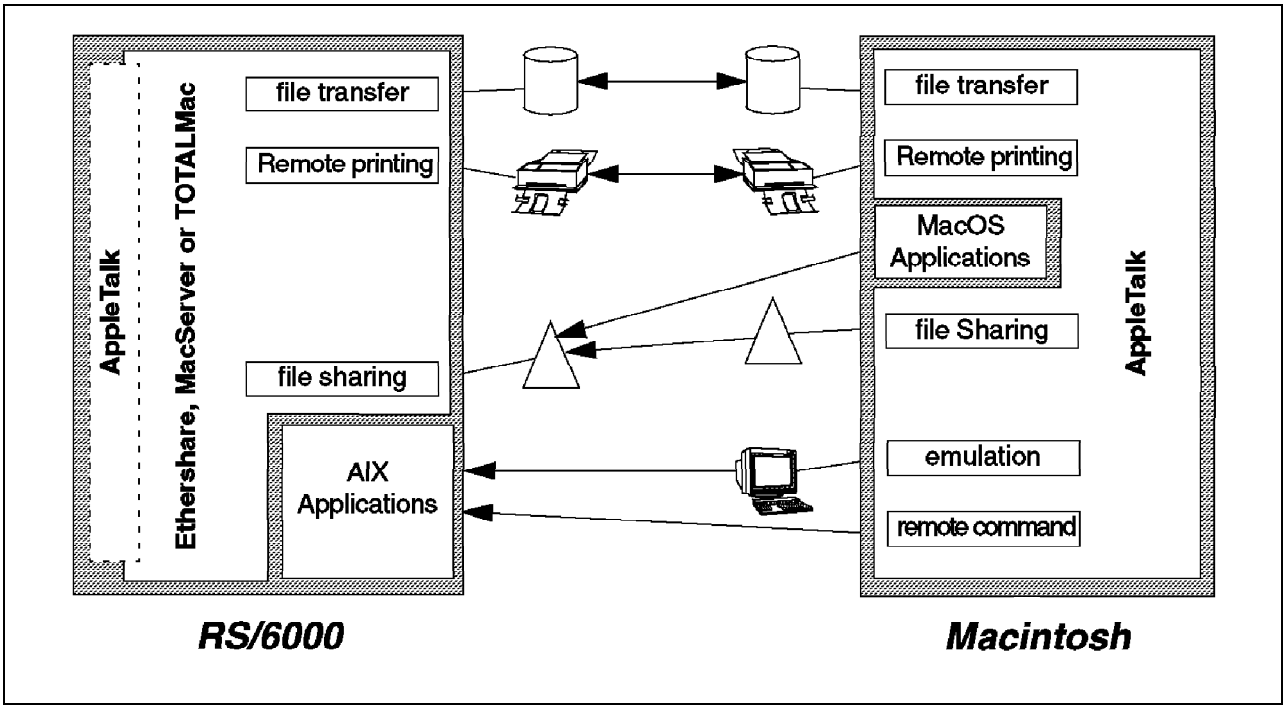


Figure 349. RS/6000 and Macintosh - AppleTalk - Token-Ring: Logical View

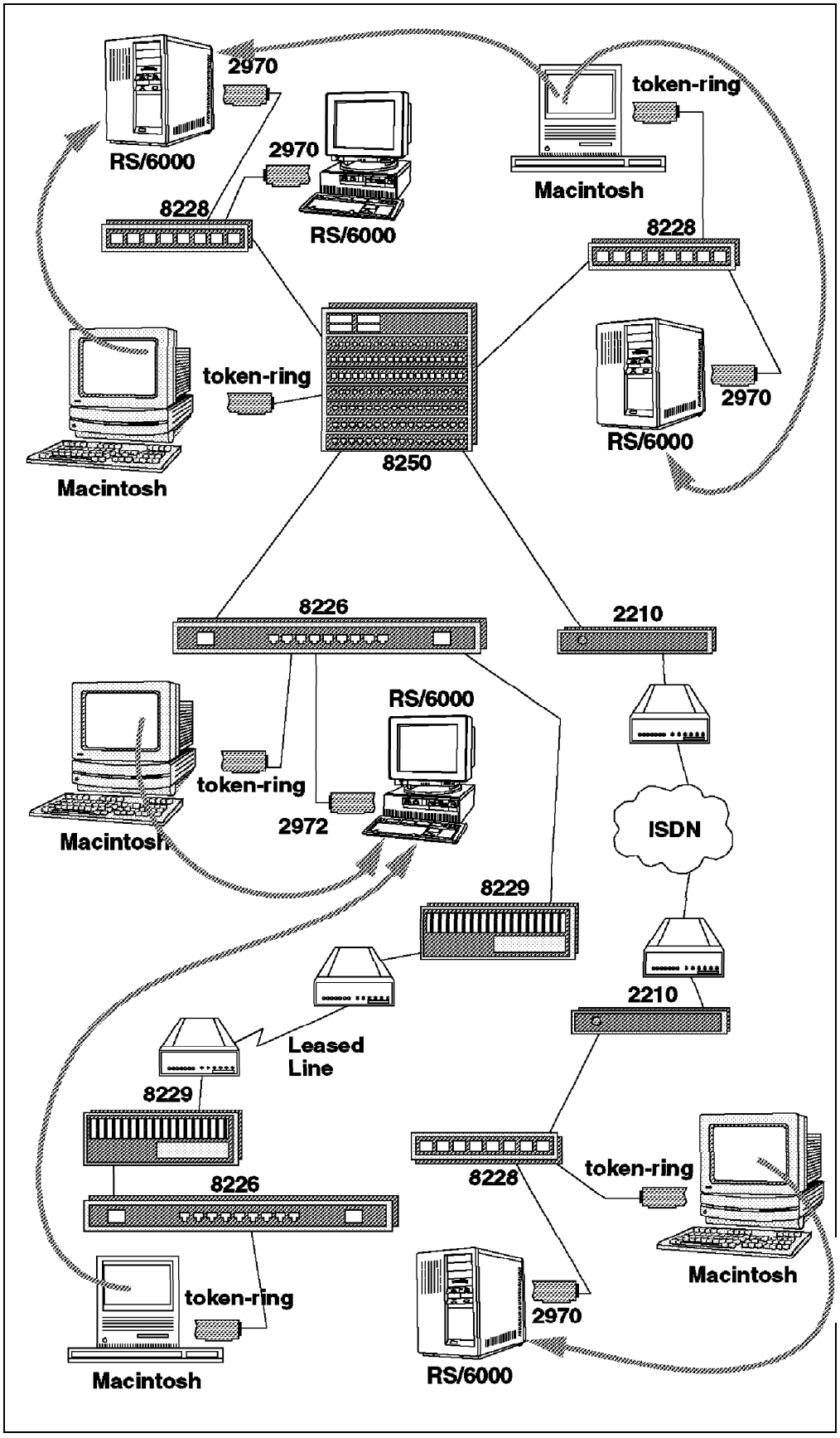


Figure 350. RS/6000 and Macintosh - AppleTalk - Token-Ring: Physical View

9.10.3.2 LocalTalk Network

Table 246. RS/6000 and Macintosh - AppleTalk - LocalTalk: Abstract

		RS/6000	Macintosh
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- LocalTalk port (integrated)
		- GatorBox router used to interconnect Ethernet and LocalTalk networks.	
Software		- EtherShare - MacServer - TOTALMac	- AppleTalk (included in MacOS)
Functions	**- emulation**	-	- Emulation
	- file transfer	- File transfer (/S)	- File transfer (C/)
	- file sharing	- File sharing (/S)	- File sharing (C/)
	- print sharing	- Remote printing (/S)	- Remote printing (C/)
	- remote command	- Remote command (/S)	- Remote command (C/)
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remarks

- AIX Connections is not supported on token-ring with the AppleTalk protocol. You can find other products, such as Ethershare, MacServer or TOTALMac, to transform the RS/6000 into a complete Macintosh Server (emulation, remote command,...). Please refer to Chapter 7 for more information.

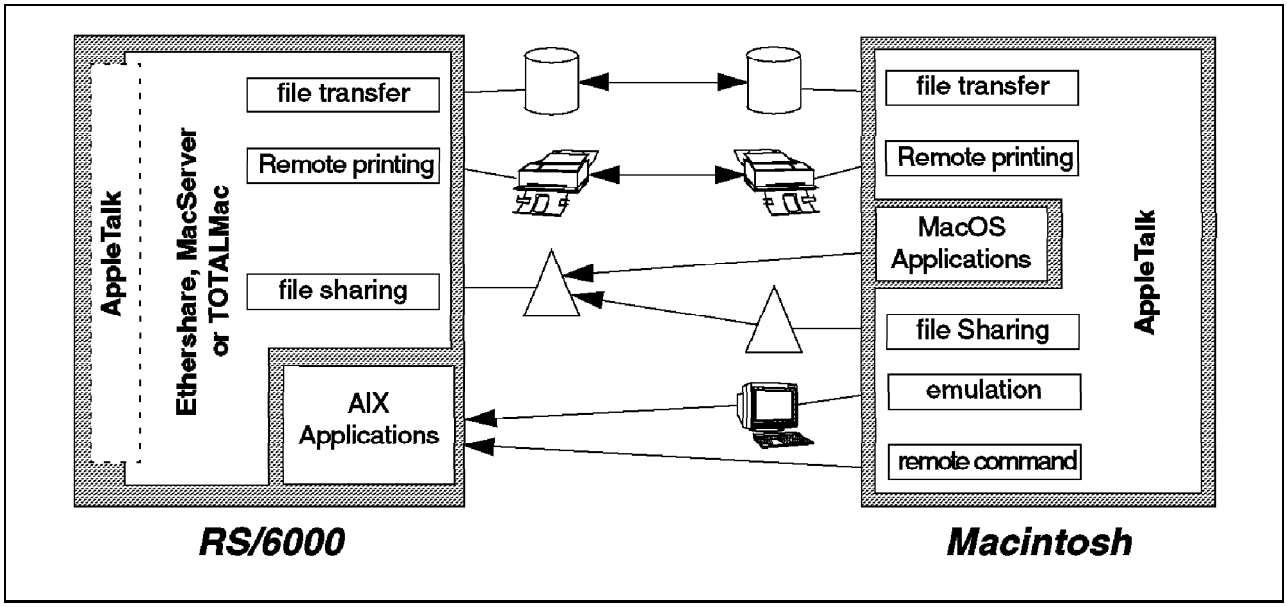


Figure 351. RS/6000 and Macintosh - AppleTalk - LocalTalk: Logical View

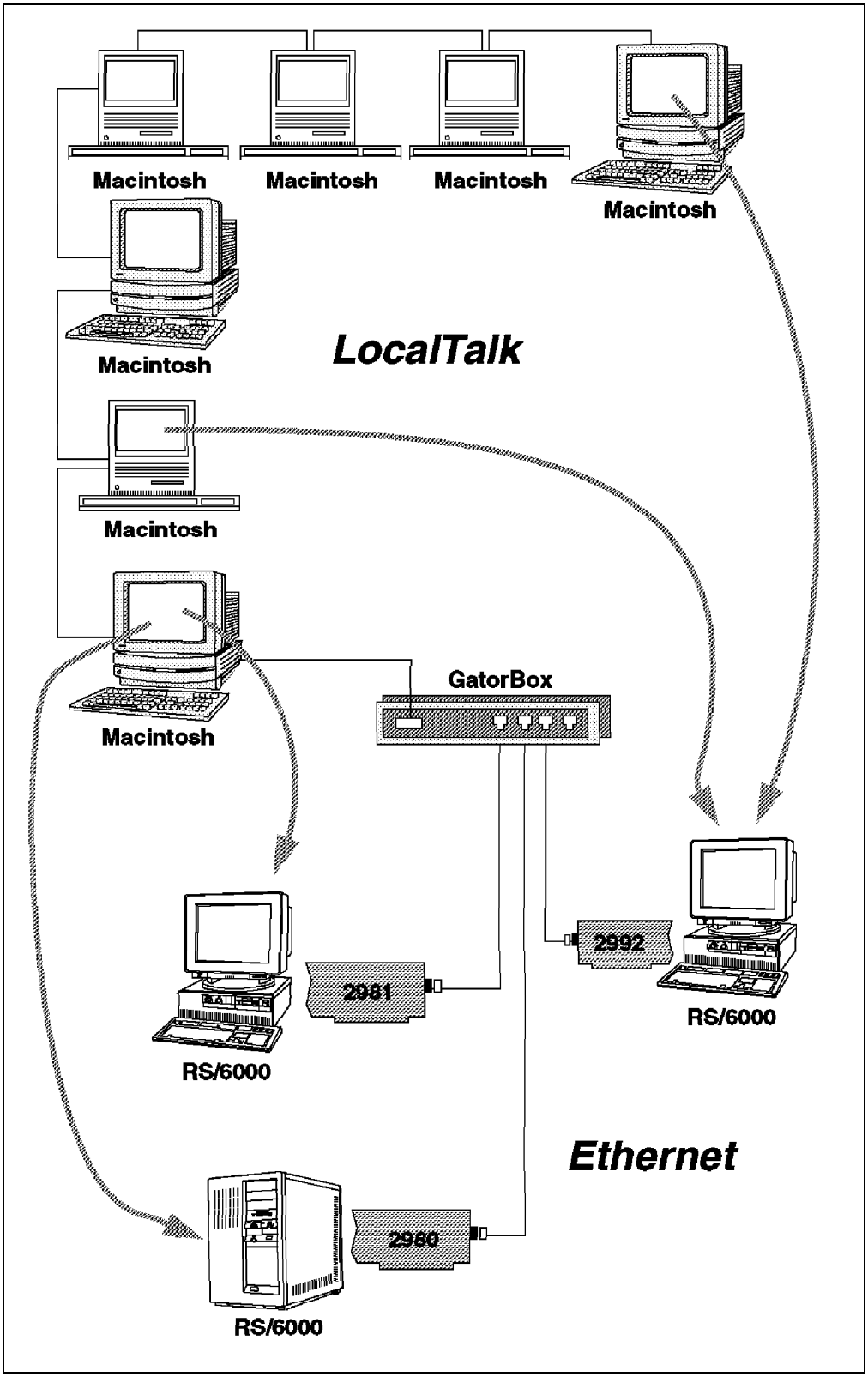


Figure 352. RS/6000 and Macintosh - AppleTalk - LocalTalk: Physical View

9.10.3.3 Ethernet Network

Table 247. RS/6000 and Macintosh - AppleTalk - Ethernet: Abstract

		RS/6000	Macintosh
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet connection (very often integrated)
Software		- AIX V4 (option: AIX Connections)	- AppleTalk (included in MacOS)
Functions	**- emulation**	-	-
	- file transfer	- File transfer (/S)	- File transfer (C/)
	- file sharing	- File sharing (/S)	- File sharing (C/)
	- print sharing	- Remote printing (/S)	- Remote printing (C/)
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remarks

- AIX Connections is not supported on token-ring with the AppleTalk protocol. You can find other products, such as Ethershare, MacServer or TOTALMac, to transform the RS/6000 into a complete Macintosh Server (emulation, remote command,...). Please refer to Chapter 7 for more information.

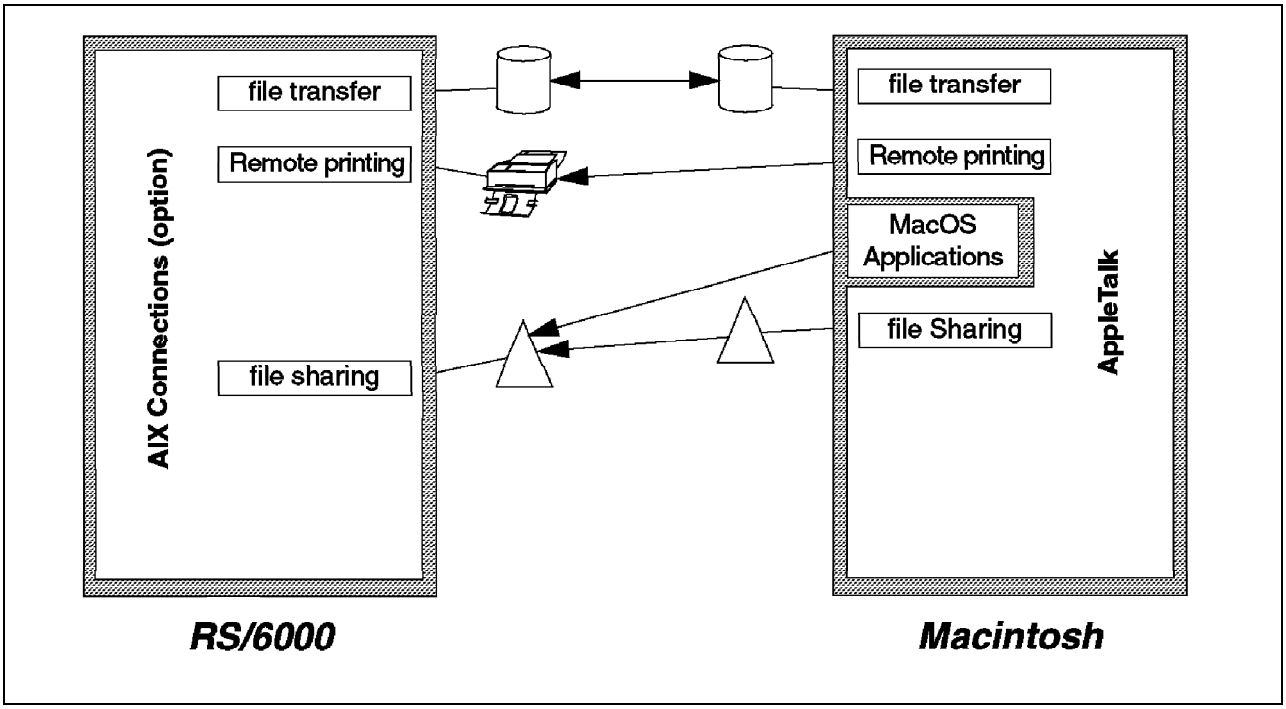


Figure 353. RS/6000 and Macintosh - AppleTalk - Ethernet: Logical View

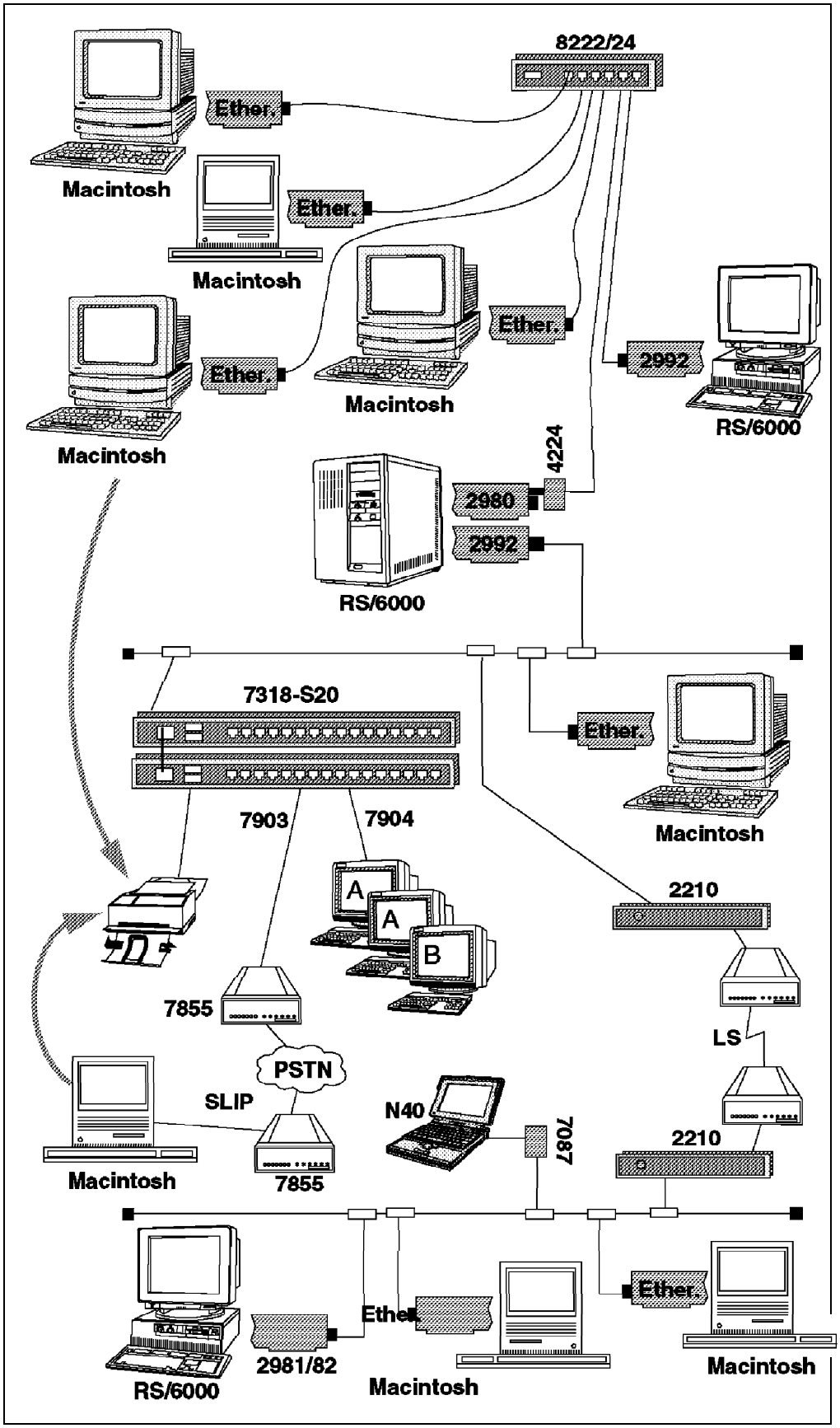


Figure 354. RS/6000 and Macintosh - AppleTalk - Ethernet: Physical View

9.10.4 Asynchronous

9.10.4.1 Asynchronous Network

Table 248. RS/6000 and Macintosh - Asynchronous - Asynchronous: Abstract

		RS/6000	Macintosh
Hardware		- Std ports - 2930 (+2995) - 2931/8207 (+multi. port included) - 2955/2956 (+2996) - 6400 (+6401) - 8128/8127 (+8134/8130) - 2933 (+8134/8130) - 2940 (+2995) - 2932 (+multi. port included) - 2957 (+2957)	- Asynchronous connection
Software		- AIX V4 (TCP/IP, SLIP and PPP included)	- Mac Terminal(1) - Mac PPP
Functions	**- emulation**	-	- Emulation
	- file transfer	-	- File transfer
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1): MacTerminal is not an IBM product, but some other products provide the same functions. Please refer to Chapter 7 for more information.

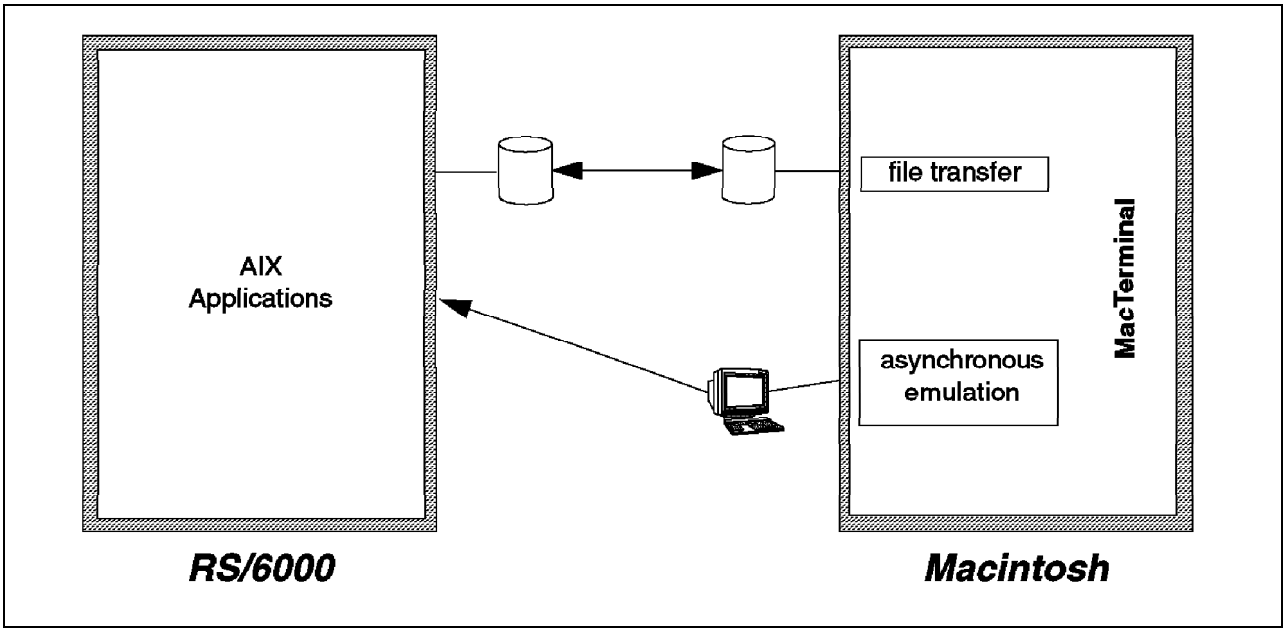


Figure 355. RS/6000 and Macintosh - Asynchronous - Asynchronous: Abstract

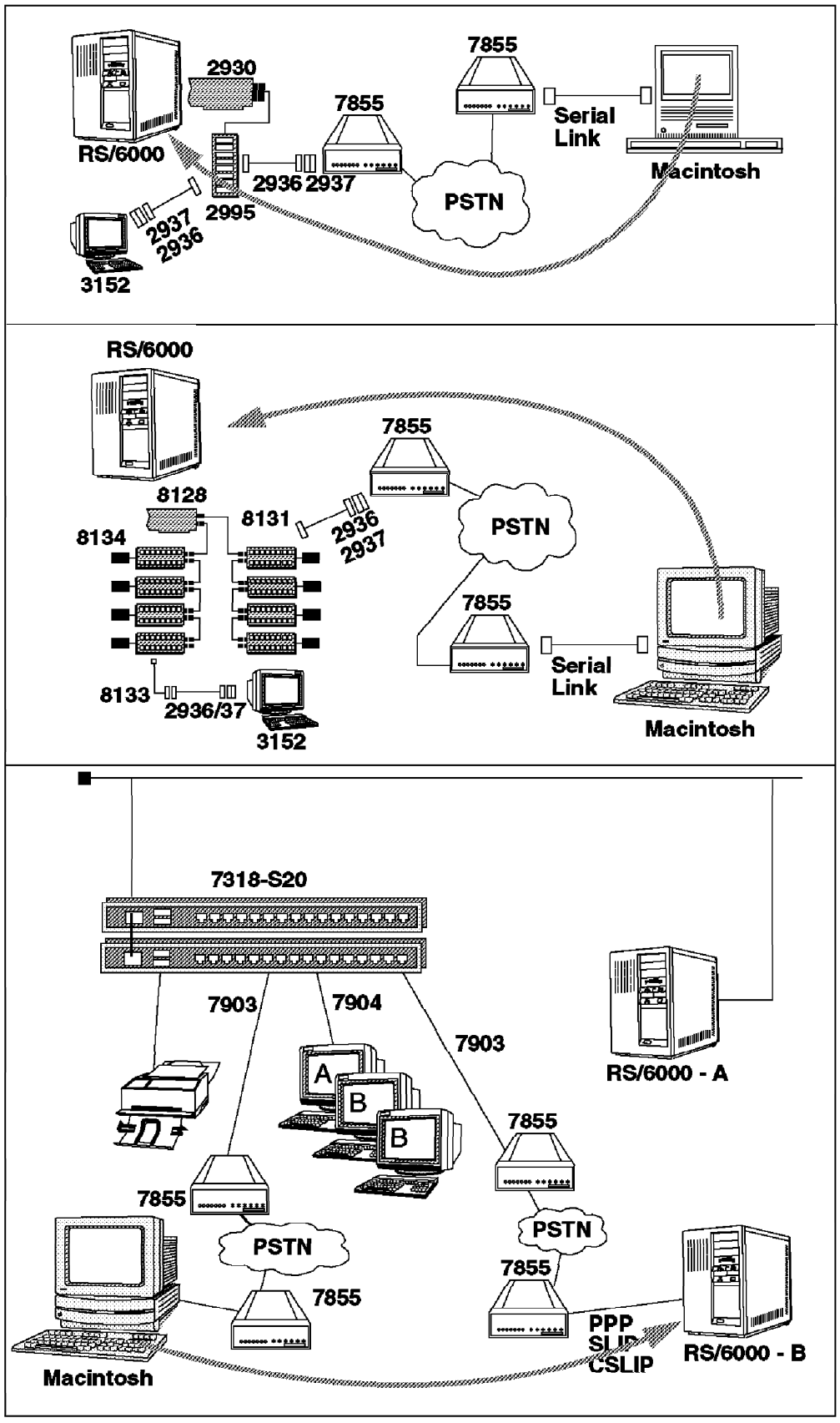


Figure 356. RS/6000 and Macintosh - Asynchronous - Asynchronous: Physical View

9.11 RS/6000 and DEC-VMS

If you need to connect a DEC system running VMS to an RS/6000, you can use migration products; most of them provide emulation and file transfer.

Please refer to Chapter 6 for more information on DEC-VMS integration products.

The Internet can help you

You can find more information on the WWW at this address:

`http://info6000.austin.ibm.com/products/oemhw/`

9.11.1 Abstract

Table 249. RS/6000 and DEC-VMS Abstract

RS/6000 / DEC-VMS	TCP/IP	DECNet
Asynchronous	PPP using OEM product	
Token-Ring		
FDDI		
Ethernet		
X.25		
Synchronous		
Coaxial		
S/370 Channel		
ESCON		
BLKMUX		
Fibre Channel		
ATM		
HIPPI		
SOCC		
Twinax		

Remark

- Don't forget that VMS displays use vt100 emulation.

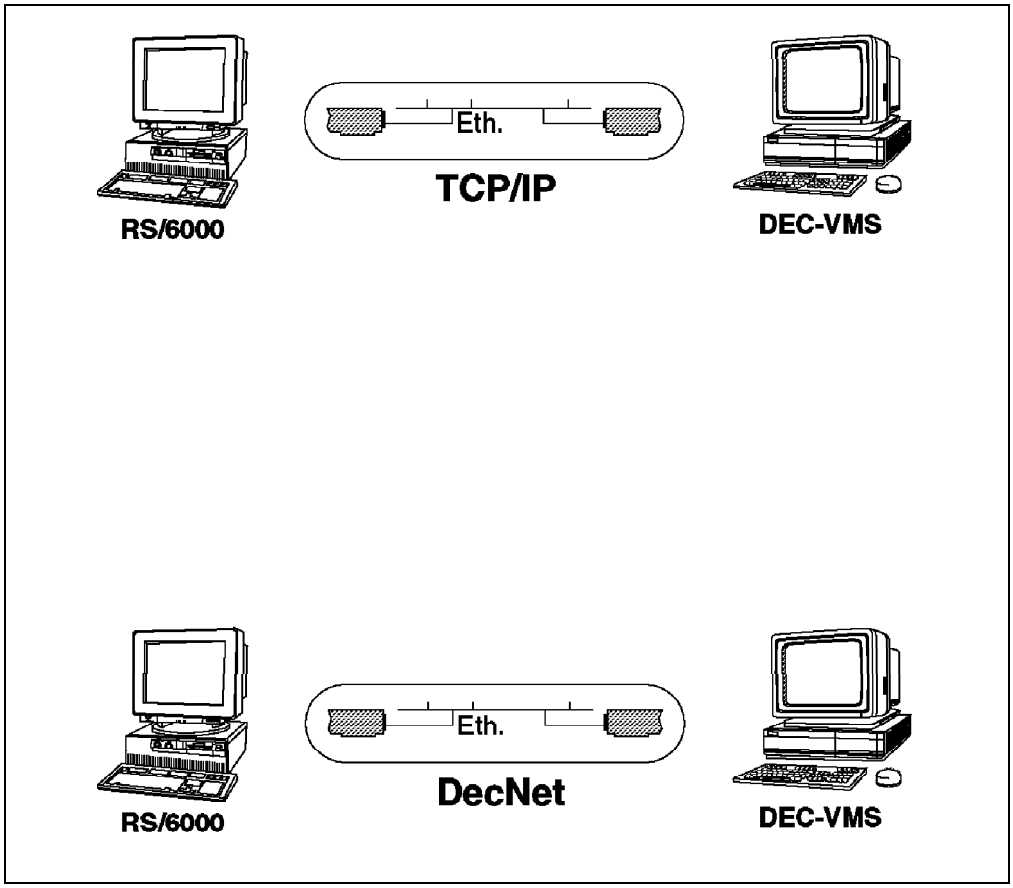


Figure 357. RS/6000 and DEC-VMS Abstract

9.11.2 TCP/IP

9.11.2.1 Ethernet Network

Table 250. RS/6000 and DEC-VMS - TCP/IP - Ethernet: Abstract

		RS/6000	DEC-VMS
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceiv-ers: 4222/4223)	- Ethernet connection
Software		- AIX V4 (TCP/IP included)	- TCP/IP (and all extensions if need)
Functions	**- emulation**	- Telnet (C/S), tn3270 (C/), tnvt100 (C/S)	- Telnet (C/S), tnvt100 (C/S)
	- file transfer	- FTP (C/S), TFTP (C/S)	- FTP (C/S), TFTP (C/S)
	- file sharing	- NFS (C/S)	- NFS (C/S)
	- print sharing	- LPR/LPD (C/S)	- LPR/LPD (C/S)
	- remote command	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...	- Rexec (C/S), Rcp (C/S), Rsh (C/S),...
	- API	- RPC (C/S), NCS (C/S), Sockets (C/S)	- RPC (C/S), NCS (C/S), Sockets (C/S)
	- mail	- SMTP (C/S)	- SMTP (C/S)
	- security	- Kerberos (C/S)	- Kerberos (C/S)
	- graphic	- X-Window (C/S)	- X-Window (C/S)
	- name directory	- Domain Name Server (R/S)	- Domain Name Server (R/S)
	- network management	- SNMP (MIB II), Ping, Netstat, RouteD	- SNMP (MIB II), Ping, Netstat, RouteD

Remark

- Some TCP/IP packages provide more or less functions.

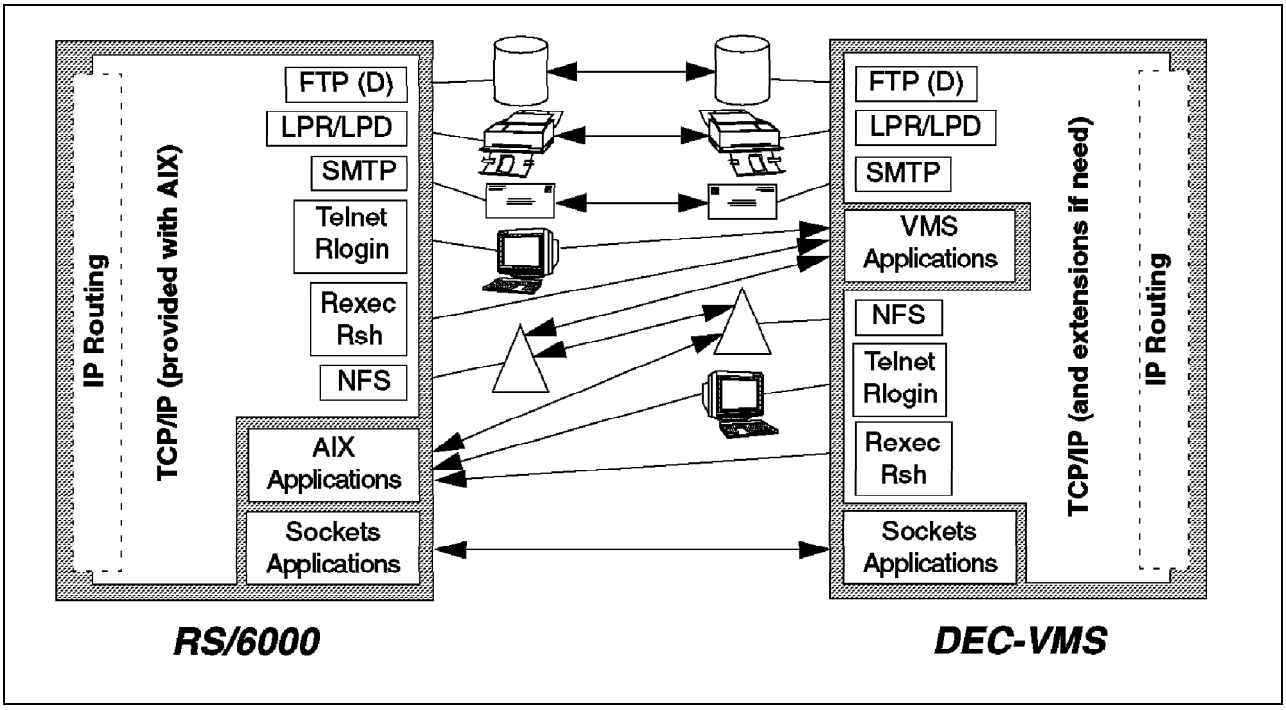


Figure 358. RS/6000 and DEC-VMS - TCP/IP - Ethernet: Logical View

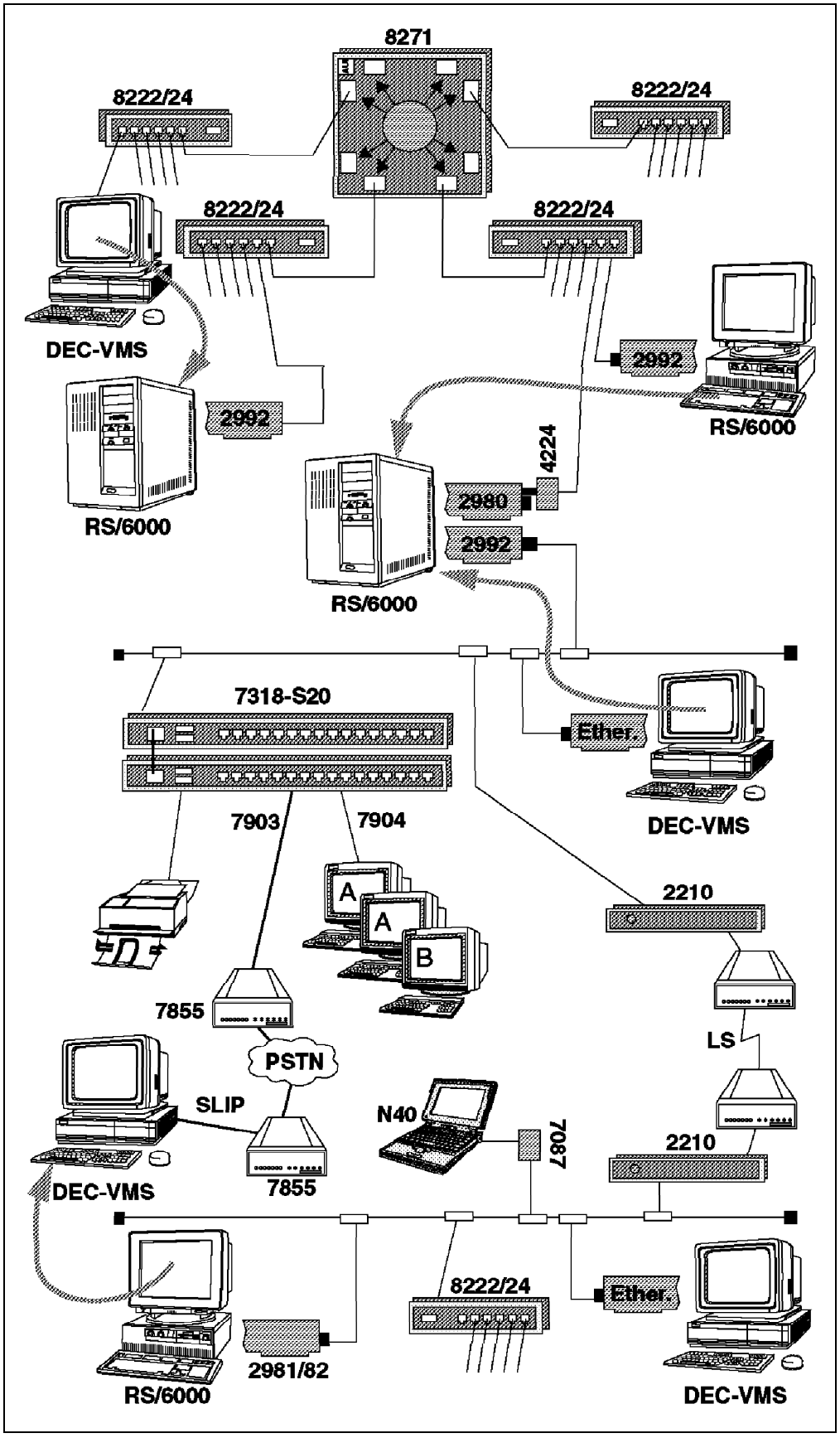


Figure 359. RS/6000 and DEC-VMS - TCP/IP - Ethernet: Physical View

9.11.3 DECNet

9.11.3.1 Ethernet Network

Table 251. RS/6000 and DEC-VMS - DECNet - Ethernet: Abstract

		RS/6000	DEC-VMS
Hardware		- Std ports - 2980/9980 - 4221/9000 - 4222/9001 - 2992 - 2993 - 2987 - 2985 - 8242 (100 Mbps) - 2981/2982/8210 - 8241 - 8022/8023/8024 - 8032/8033/8034 - 2402/2406 - 2403/2407 (option transceivers: 4222/4223)	- Ethernet connection
Software		- KiNET(1) - TSSNet(1)	-
Functions	**- emulation**	- Emulation	-
	- file transfer	- File transfer	-
	- file sharing	-	-
	- print sharing	- Remote printing	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- (1) KiNET and TSSNet are not IBM products; however, other products provide the same functions. Please refer to Chapter 6 for more information.

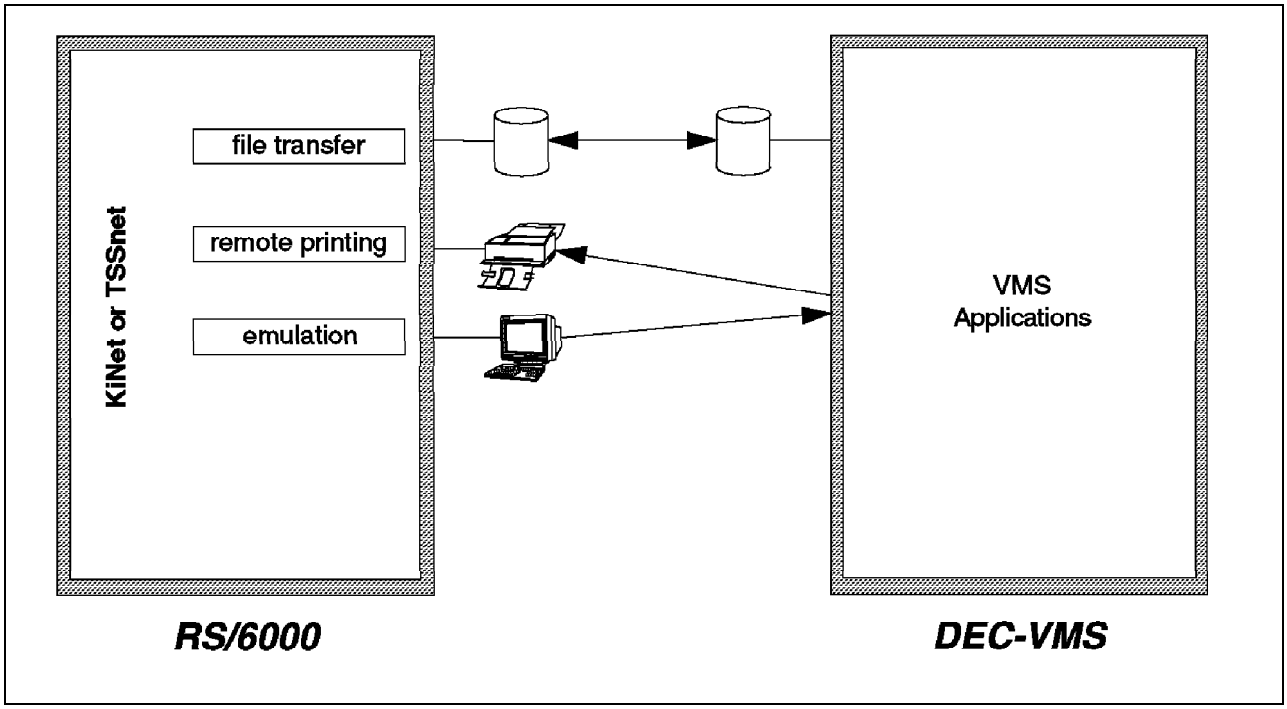


Figure 360. RS/6000 and DEC-VMS - DECNet - Ethernet: Logical View

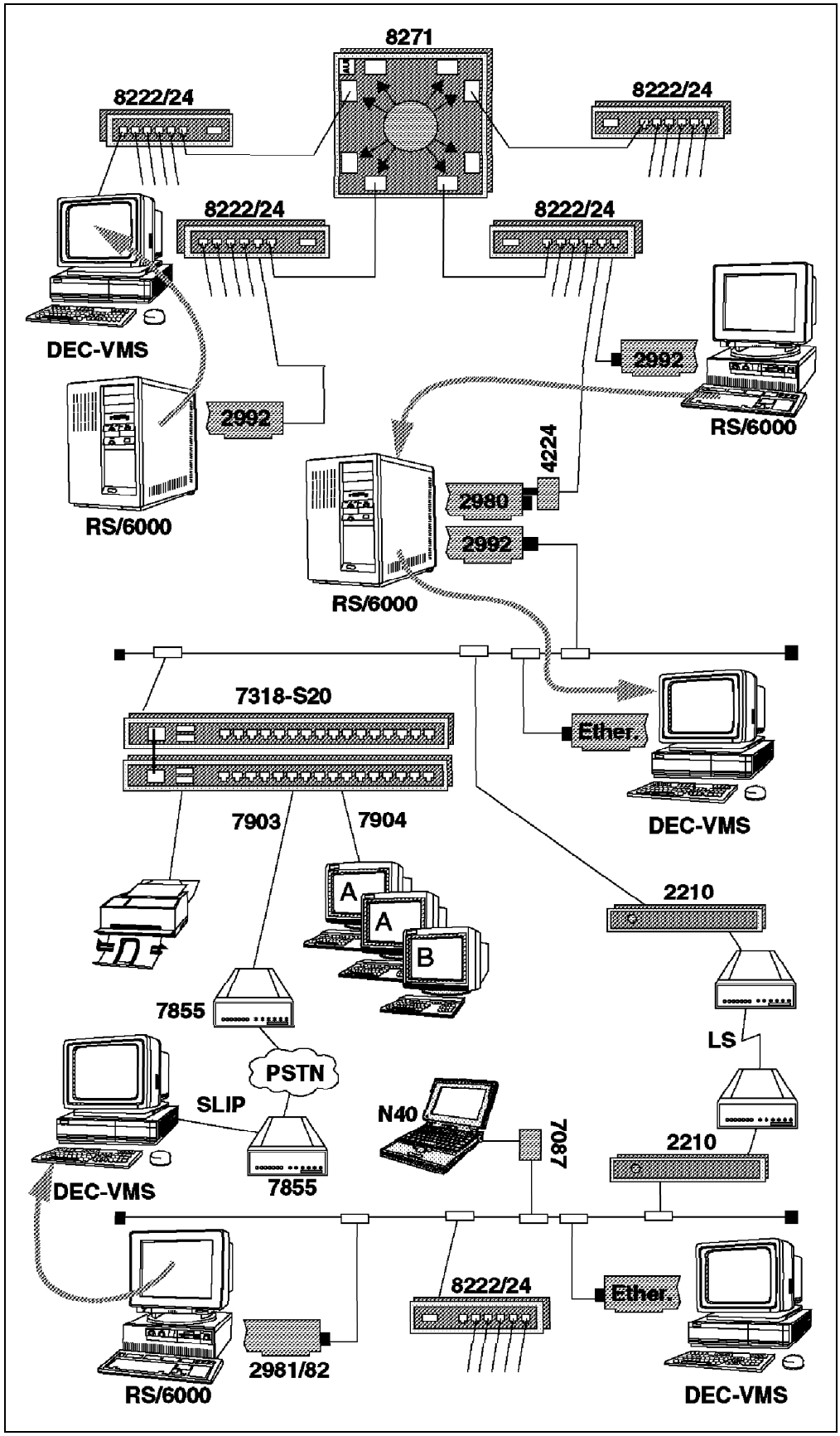


Figure 361. RS/6000 and DEC-VMS - DECNet - Ethernet: Physical View

9.12 RS/6000 and X-Terminals

All IBM X-Terminal models and features are withdrawn. However, this section summarizes communications capabilities with X-Terminal models 120, 130, 140, 150, and 160.

Only the TCP/IP protocol is used to connect X-Terminals to UNIX clients.

9.12.1 Abstract

Table 252. RS/6000 and X-Terminal Abstract

RS/6000 / X-Terminals	TCP/IP
Asynchronous	
Token-Ring	
FDDI	
Ethernet	
X.25	
Synchronous	
Coaxial	
S/370 Channel	
ESCON	
BLKMUX	
Fibre Channel	
ATM	
HIPPI	
SOCC	
Twinax	

Remark

- Also true for non IBM X-Terminals.

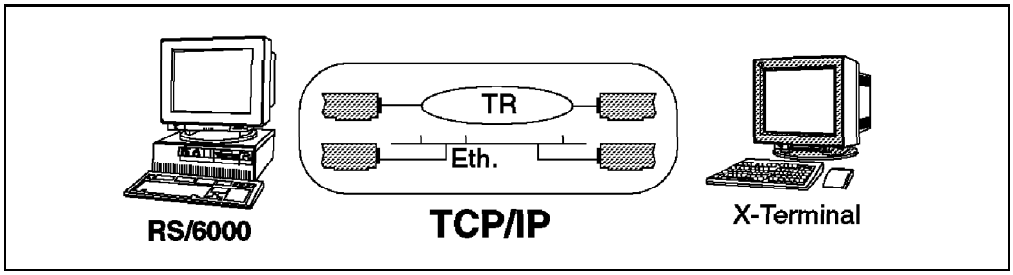


Figure 362. RS/6000 and X-Terminal Abstract

9.12.2 TCP/IP

9.12.2.1 Token-Ring Network

Table 253. RS/6000 and X-Terminal - TCP/IP - Token-Ring: Abstract

		RS/6000	X-Terminal
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- 0888 + 4218 (X-120) - 4225 + 4218 (X-140) - 2973 + 4218 (X-150) - 4223 + 4218 (X-160) - Token-ring adapter for OEM X-Terminal
		- AIX V4 (TCP/IP, X-Window and X-Station Manager included)	-
Functions	**- graphic**	- X-Window client	- X-Window server
	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- In this configuration, the server (X-Window) is the X-Terminal, and the client (X-Window) is the RS/6000.

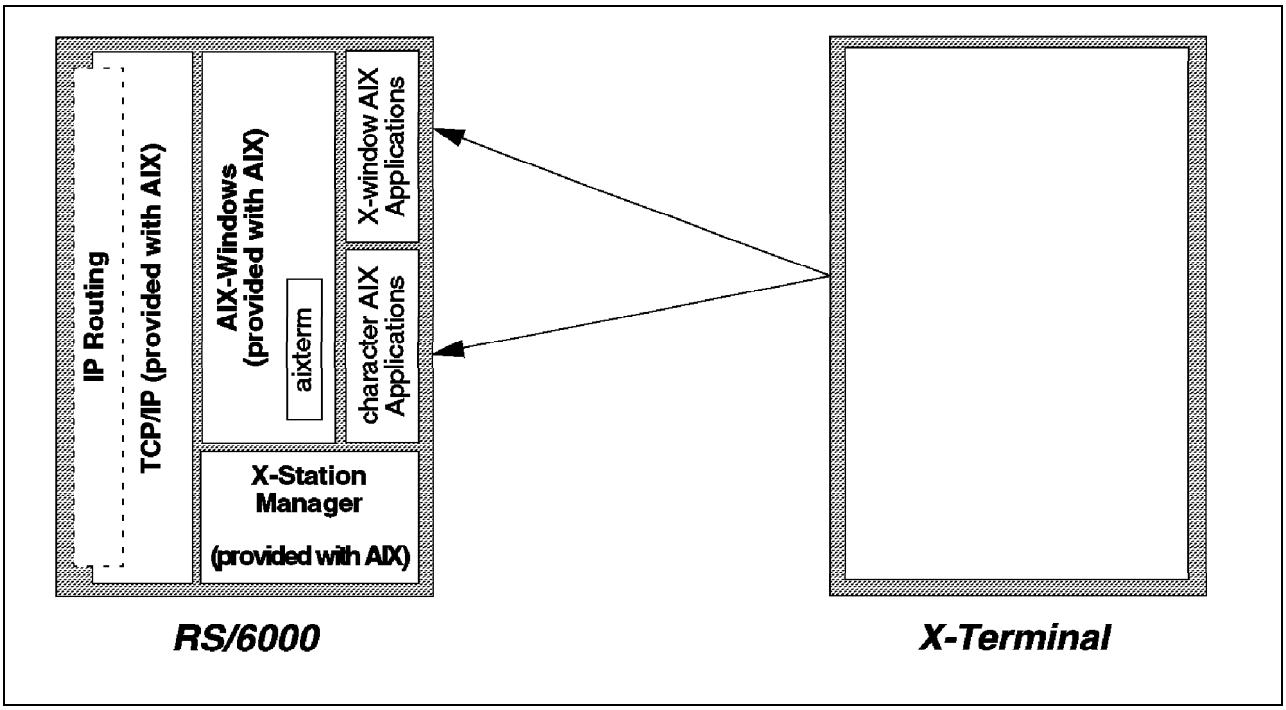


Figure 363. RS/6000 and X-Terminal - TCP/IP - Token-Ring: Logical View

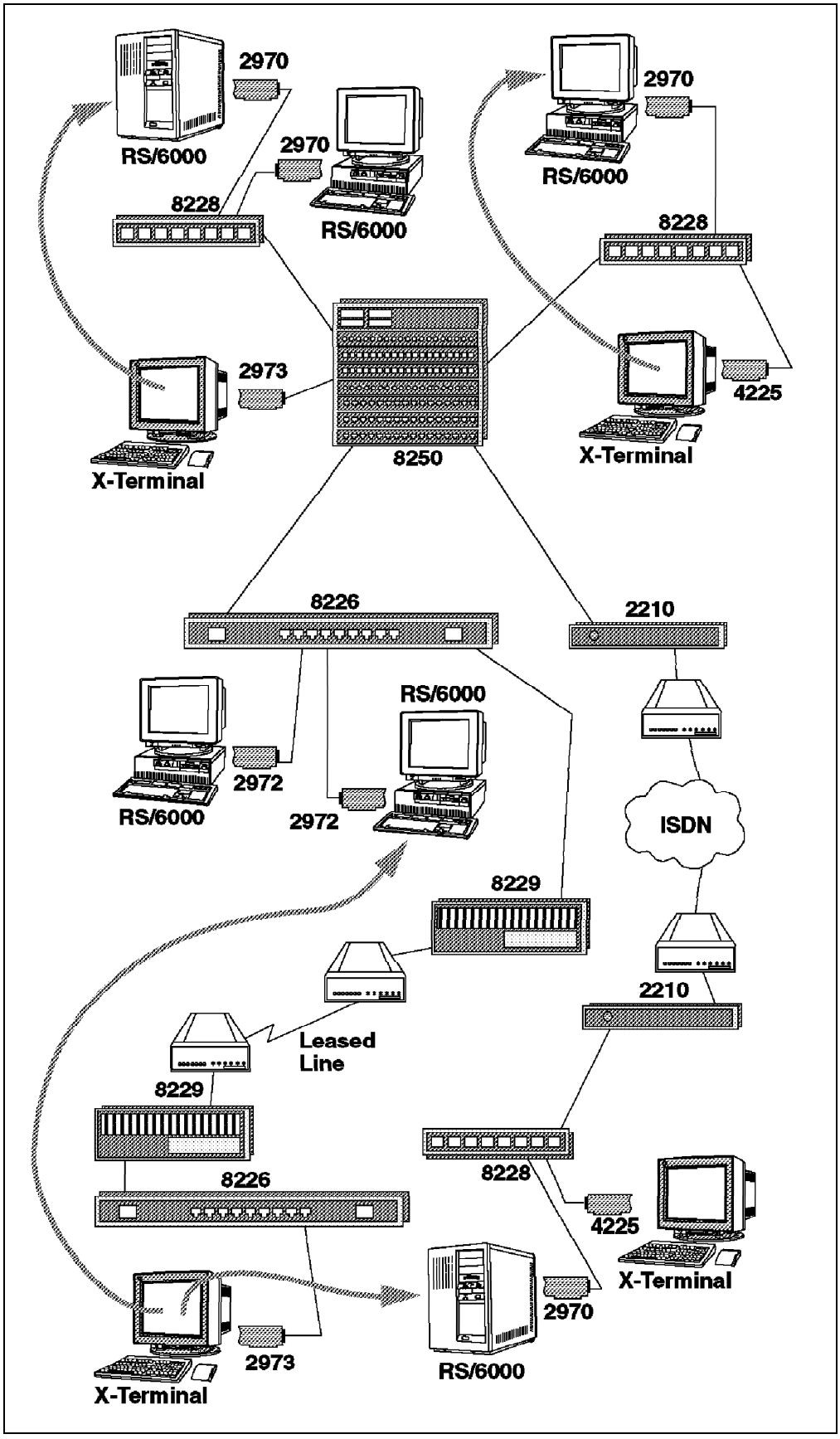


Figure 364. RS/6000 and X-Terminal - TCP/IP - Token-Ring: Physical View

9.12.2.2 Ethernet Network

Table 254. RS/6000 and X-Terminal - TCP/IP - Ethernet: Abstract

		RS/6000	X-Terminal
Hardware		- 2970/9970 - 2972 - 2971/2973/8209 - 2979 - 8246 - 7092 - 8042/8043/7044	- 9000, 2982 (X-120) - 4226, 4220 (X-140) - 2983 (X-150) - 4226 (X-160) - Ethernet adapter for OEM X-Terminal
Software		- AIX V4 (TCP/IP, X-Window and X-Station Manager included)	-
Functions	- graphic	- X-Window client	- X-Window server
	- emulation	-	-
	- file transfer	-	-
	- file sharing	-	-
	- print sharing	-	-
	- remote command	-	-
	- API	-	-
	- mail	-	-
	- security	-	-
	- graphic	-	-
	- name directory	-	-
	- network management	-	-

Remark

- In this configuration, the server (X-Window) is the X-Terminal and the client (X-Window) is the RS/6000.

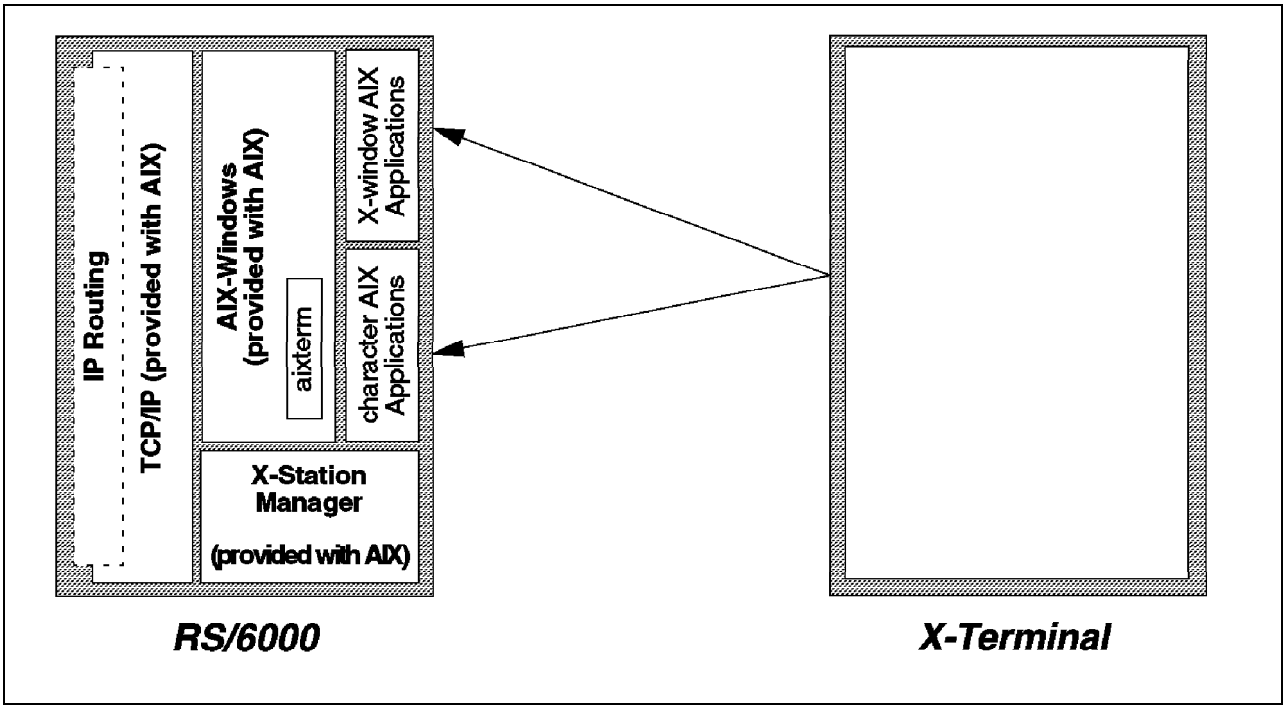


Figure 365. RS/6000 and X-Terminal - TCP/IP - Ethernet: Logical View

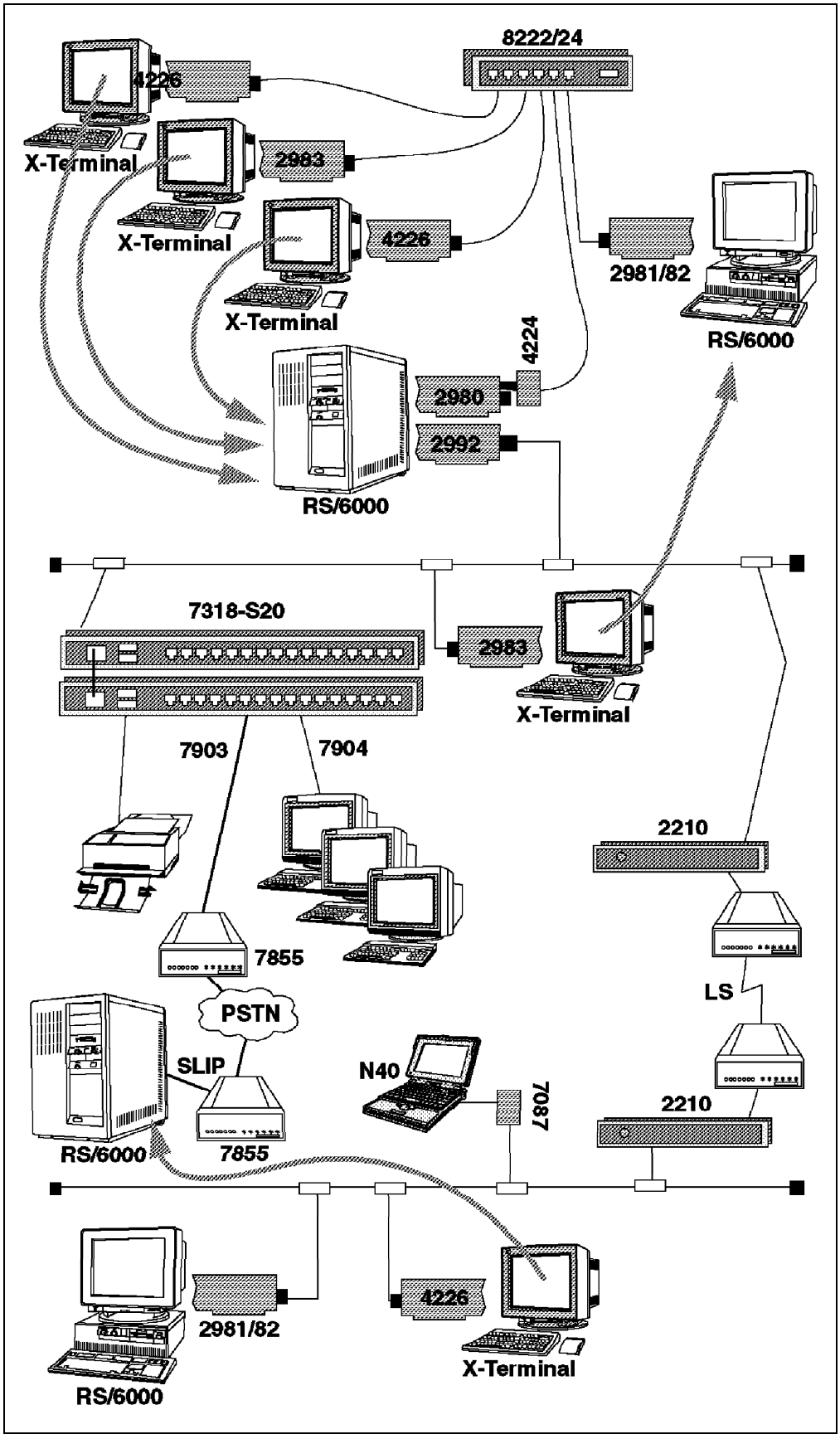


Figure 366. RS/6000 and X-Terminal - TCP/IP - Ethernet: Physical View

Chapter 10. Complex Communication Solutions

This chapter contains examples of solutions that involve a few different platforms (for example, PC, AS/400, Terminals) and/or communication networks (for example, Ethernet, token-ring, X.25, Switched lines). Therefore, these solutions are called complex, as compared to solutions described in the previous chapter.

This chapter, as well as previous one, can serve as set of samples for developing your specific RS/6000-based communication solutions.

The position of this chapter in the whole process of designing a communication solution is shown in the following figure.

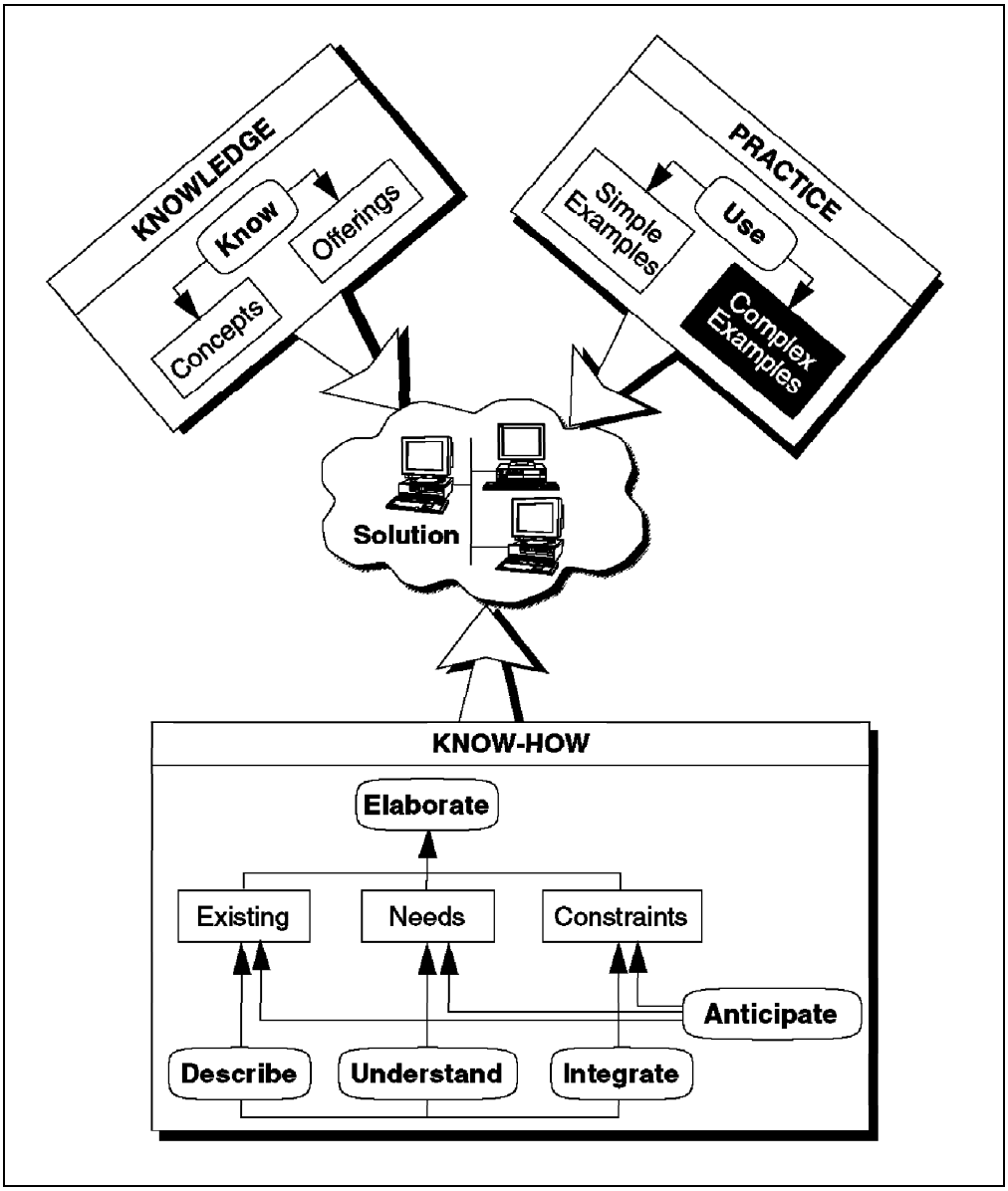


Figure 367. Position of Chapter 10 in Solution Design

10.1 RS/6000, AS/400, and X-Terminals

This example demonstrates interconnectivity between two powerful server platforms, RS/6000 and AS/400, and also between clients connected directly to each server (X-Terminals to RS/6000, 3486 terminals and PCs to AS/400). The example also shows WAN communications using an ISDN network.

The example is based on a real customer situation. The solution described here was provided to the customer by one of the authors of this book.

10.1.1 Hypothesis

One company that specialized in distribution and export/import operations is going to connect stock in a remote location (Dallas) to a central office (Austin). The stock application is running on an RS/6000 (located in the stock building). The central office uses an AS/400 running typical business and financial applications.

10.1.1.1 Existing Environment

- One AS/400 (running OS/400 V3.6, POWER PC, TCP/IP included) in Austin (business and financial applications in character mode)
- Six PCs running DOS/Windows 3.1 (token-ring connection to the AS/400) with Personal Communications AS/400 V4.1 for Windows
- Six character terminals (Twinax connection)

10.1.1.2 Constraints

- Three times per day, the stock application (RS/6000) sends to the business application (AS/400) some data (about 3 MB). This transfer must to be done within 3 minutes and 30 seconds.

10.1.1.3 Communication Needs

- The stock application is provided by a business partner (graphic application).
- People using stock applications also need access (emulation and printing) to the business applications.

10.1.2 Functions

This figure shows the functions carried out between the RS/6000, AS/400, and X-Terminals.

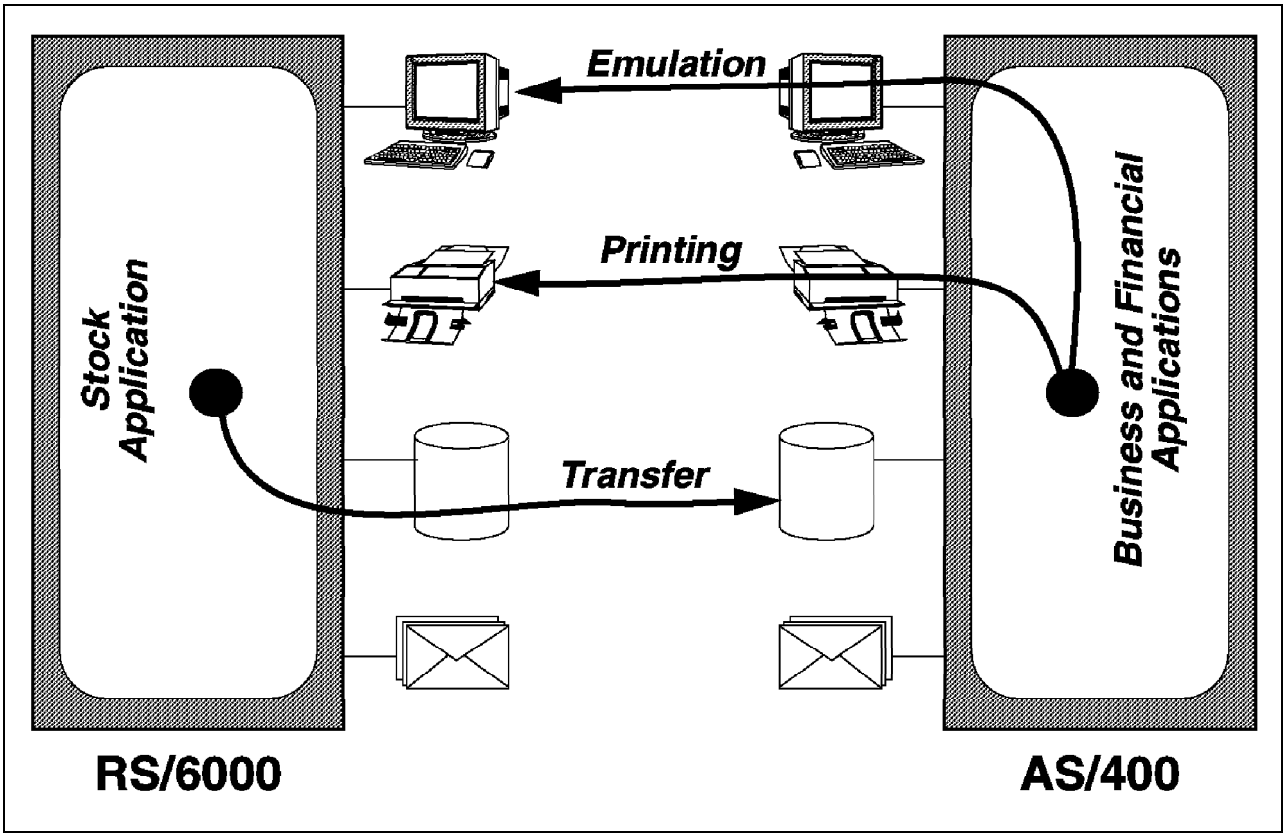


Figure 368. RS/6000, AS/400 and X-Terminals: Functions

10.1.3 Network

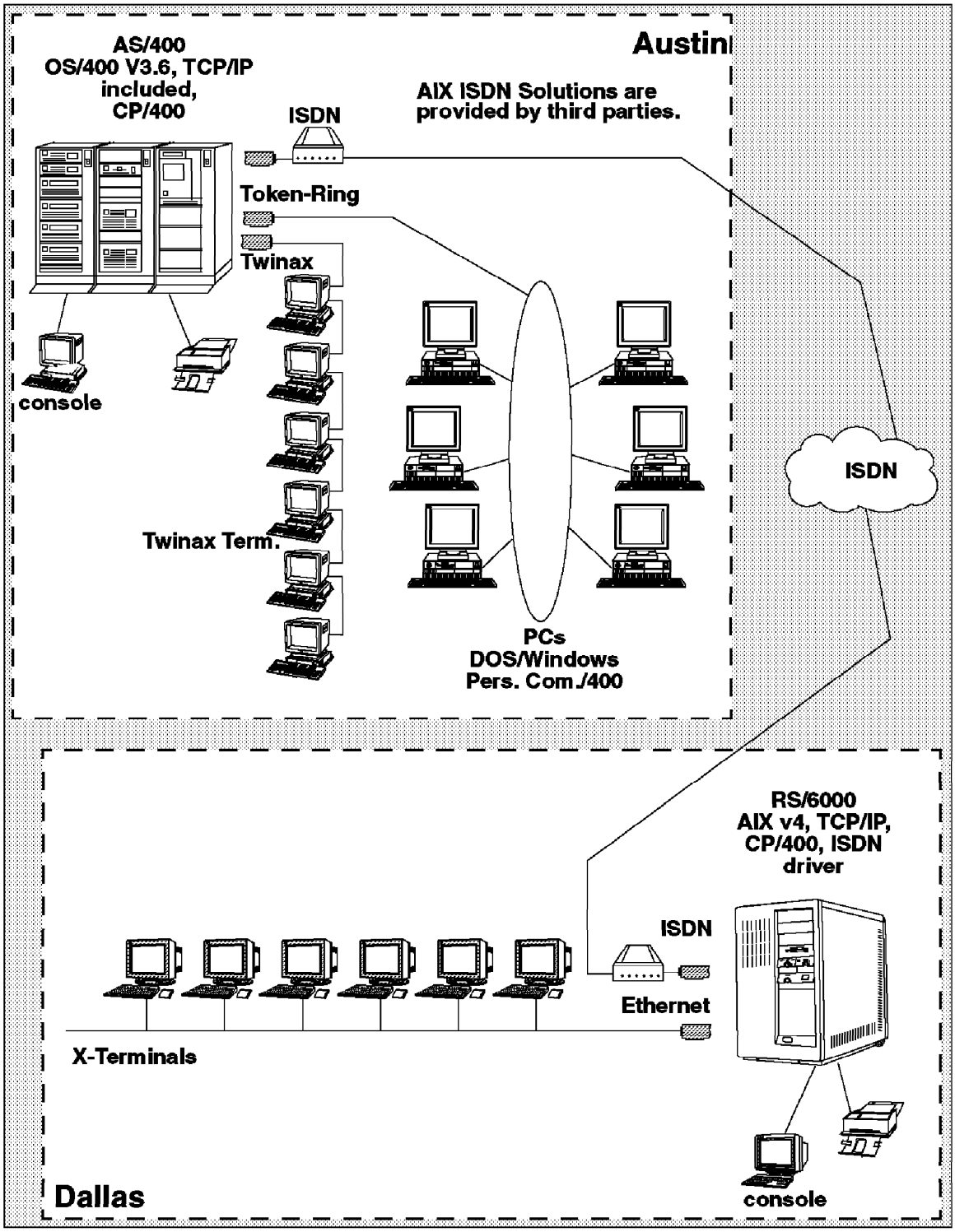


Figure 369. RS/6000, AS/400 and X-Terminals: Functions

10.1.4 Products and Functions

Why do we decide to use a ISDN connection?

The distance between Dallas and Austin is about 200 miles (340 Kms). For infrequent connections, it's cheaper to use an ISDN network rather than a leased line. In fact, base access multiplexed is sufficient:

- Data (one file): *3 MBytes=3x8 Mbits=24 Mbits*
- ISDN: Rate 64 Kbits/s, so if you use multiplexing, two times more=128 Kbits/s
- [*24 Mbits*] / [*128 Kbits/s*] = *187.5 seconds* or 3 minutes and 7.5 seconds.

Table 255. RS/6000, AS/400 and X-Terminals: Products and Functions

	Dallas		Austin		
	RS/6000	**X-Terminals**	**AS/400**	**PCs**	**Twinax Terminals**
Hardware	- 1 Ethernet adapter - 1 ISDN adapter - 1 console (asynchronous display)	- 6 X-Terminals (NCD) with Ethernet connection	- 1 Token-Ring adapter - 1 ISDN adapter - 1 Twinax adapter - 1 Console	- 1 Token-Ring adapter / PC	-
Software	- AIX version 4.2 - TCP/IP included - ISDN driver (provided with your local adapter) - CP/400 (UNIX module) - X-station Manager (NCD)	-	- OS/400 V3.6 - TCP/IP included - CP/400 (AS/400 module)	- Personal Communications AS/400 V4.1 for Windows	-
Function	- Character emulation (5250 type) toward AS/400 - file transfer (automatic) from RS/6000 toward AS/400 - AS/400 spools local printings	- Character emulation (5250 type toward AS/400)	-	- Character emulation (5250) type) toward AS/400	- Connection to AS/400
Service	- Connection ISDN (2xB+D) (modem provided)	- Ethernet cabling in the warehouse	- Connection ISDN (2xB+D) (modem provided)	- Token-Ring cabling (8228)	- Twinax cabling

10.2 RS/6000 and Asynchronous Devices

This example shows many ways of connecting asynchronous devices (terminals and printers) located in local and remote offices to an RS/6000 server. Methods shown here use different underlying networks (X.25, PSTN, Leased lines, and Ethernet LAN) and as a result different connectivity equipment (modems, X.25 PADs, Remote Asynchronous Nodes and Serial Communications Network Servers).

This example is based on a real customer situation. The solution described here was provided to a customer by one of the authors of this book.

10.2.1 Hypothesis

One retail sale company that specializes in distribution fruits and vegetables is going to connect its remote offices to a central location and add a few more workplaces in central locations. They do not have any computer equipment installed in the remote offices. As a result of growing business, this company has recently acquired additional office on the next floor in the same building. And, they are going to set up 10 additional workplaces there.

10.2.1.1 Existing Environment

- The central office in Austin has started to use an RS/6000 to run retail business applications.
- There are five remote offices:
  The Houston office needs to connect to the central host computer from time to time
  The Galveston office needs to connect to the central host computer from time to time.
  The San Antonio office needs to connect to the central host computer frequently.
  The San Marcos office needs to connect to the central host computer frequently.
  The Del Rio office needs to connect to the central host computer a few times per year.
- There are five synchronous modems. They were used in a very old installation to connect terminals to the host computer.

10.2.1.2 Constraints

- You need to use the most economical communication method possible!
- You need to use the four existing synchronous modems to reduce the cost of newly ordered communication equipment.
- You need to reduce data-packet flow to reduce the cost of provided communications expenses (Leased lines, X.25 network, PSTN network).

10.2.1.3 Communication Needs

- Users in every remote and central location need access to business applications running on the RS/6000 server (by terminal emulation).
- Users in every remote and central location need the capability to share their locally attached printers (in their locations) while using host applications.

10.2.2 Functions

This figure shows the functions carried out between the RS/6000 and the asynchronous devices.

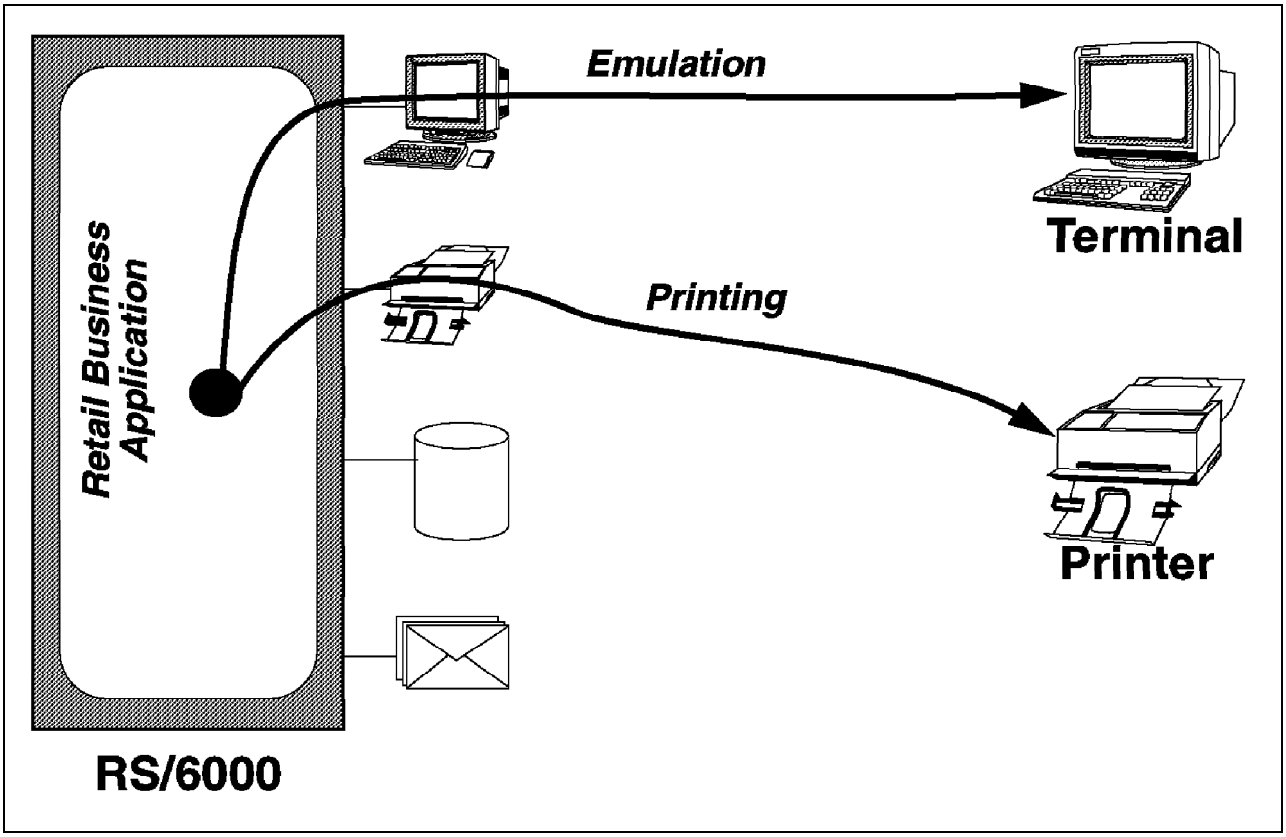


Figure 370. RS/6000 and Asynchronous Devices: Functions

10.2.3 Network

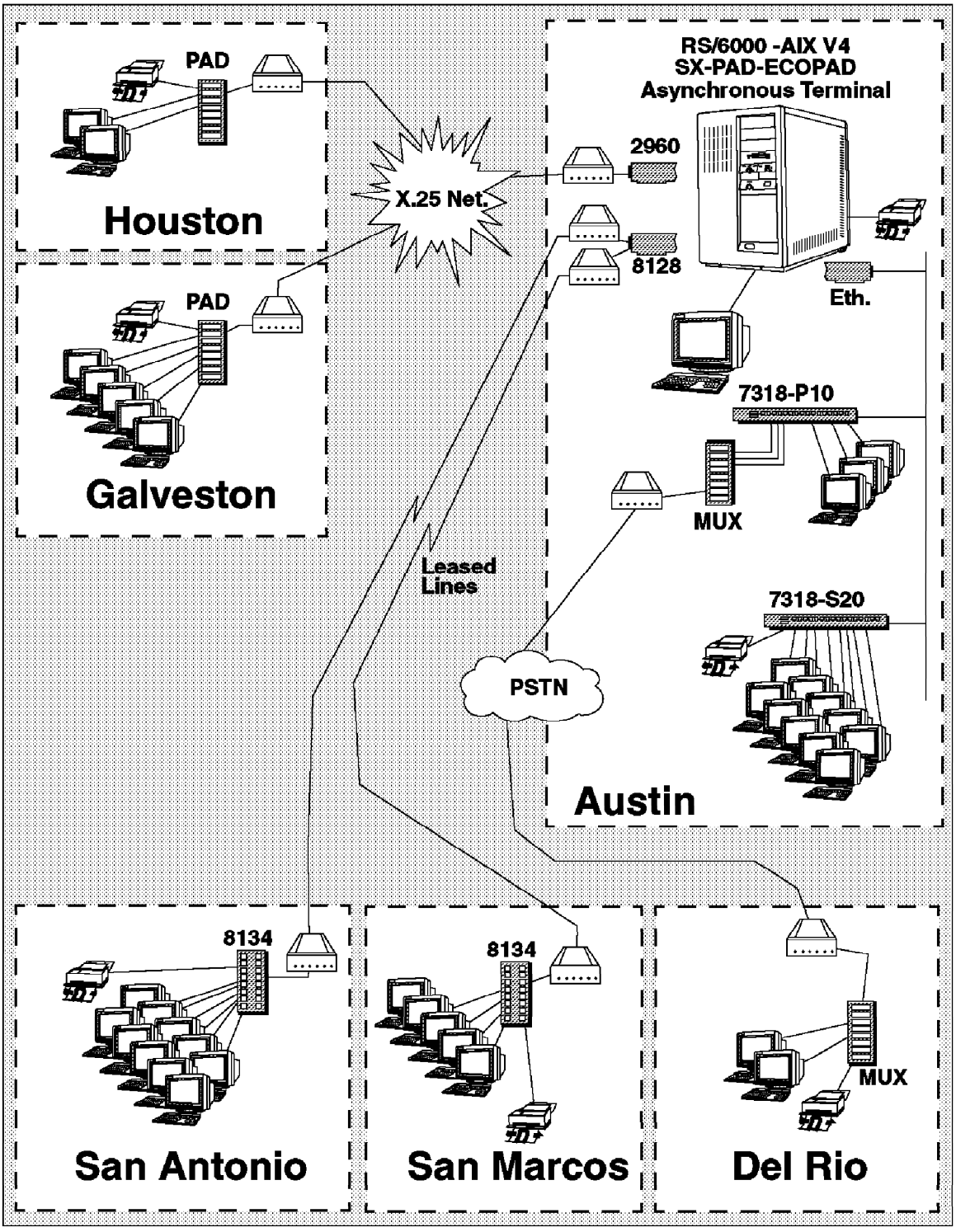


Figure 371. RS/6000 and Asynchronous Devices: Physical View

10.2.4 Products and Functions

These components are like those used in the scenario on the previous page.

Table 256. RS/6000 and Asynchronous Devices: Products and Functions

	Austin		Houston	Galveston	San Antonio	San Marcos	Del Rio
	RS/6000	**Terminals**	**Terminals**	**Terminals**	**Terminals**	**Terminals**	**Terminals**
Hardware	- 1 X.25 adapter - 1 128 ports asynchro-nous adapter - 1 Ethernet adapter - 1 console	- 1 Serial Network Server (7318-P10) - 1 Serial Network Server (7318-S20) - 1 MUX - 1 Ethernet thin cable (termina-tors,...)	- 1 PAD	- 1 PAD	- 1 Remote Access Node (8134)	- 1 Remote Access Node (8134)	- 1 MUX - 1 PSTN modem
Software	- AIX V4 - Asynchro-nous Terminal Server included - AIXLink X.25 - SX-PAD (for the printing) - ECOPAD (to reduce traffic)	-	-	-	-	-	-
Function	-	- Emulation - Printing	- Emulation - Printing	- Emulation - Printing	- Emulation - Printing	- Emulation - Printing	- Emulation - Printing
Service	- Connec-tion to the X.25 public network (9.6 Kbps) - Plus modem if not provided - 2 leased lines (19.2 Kbps) - Using the existing modem - Connec-tion to the PSTN network (9.6 Kbps) - Asynchro-nous modem	-	- Connec-tion to the X.25 public network (9.6 Kbps) - Plus modem if not provided	- Connec-tion to the X.25 public network (9.6 Kbps) - plus modem if not provided	- 1 leased line (19.2 Kbps) - Using the existing modem	- 1 leased line (19.2 Kbps) - Using the existing modem	- Connec-tion to the PSTN network (9.6 Kbps) - Asynchro-nous modem

10.3 RS/6000 and PCs and Macs (Single-Protocol)

This example deals with connectivity between RS/6000s and PCs by using only the transport protocol, TCP/IP, over several LANs (Ethernet, token-ring). It shows a general method of integrating multiple PCs to a UNIX environment by simplifying network and desktop PC management.

10.3.1 Hypothesis

One company that runs its business on an RS/6000 and TCP/IP network has acquired a small business. They need to integrate the existing RS/6000 TCP/IP environment with a heritage LAN of PCs (Windows 3.1 and Windows 95) and Macintoshes. The company management decided to use the only communication protocol, TCP/IP, and to use RS/6000 as the only platform for file and print sharing (and print management) and application access.

10.3.1.1 Existing Environment

- There is an RS/6000 server that runs most company processes (for example accounting, stock, production management)
- There is an existing token-ring network and 25 PC-DOS/Windows users communicating with the RS/6000 via TCP/IP.
- There is a new Ethernet/802.3 network, 16 PC-DOS/Windows and Windows 95 users, and five Macintosh users.

10.3.1.2 Constraints

- New Ethernet users must be fully integrated into the RS/6000 environment and have file, print, and application access in the same manner as the existing token-ring users.

10.3.1.3 Communication Needs

- A common TCP/IP communication environment must be established throughout the company; that means all PCs and Macs must communicate with the RS/6000 and with each other via TCP/IP.
- The RS/6000 must act as file and printer server and also provide application access for every desktop user.
- There must be transparent connectivity between the two LANs; that means there is a need to integrate the token-ring and Ethernet networks to a common LAN environment by allowing users to communicate to each other regardless of network architecture.
- There is a need to provide printing flexibility (to allow users to print from their application to any printer located on the network) while preserving the ease of print management by relying on RS/6000 as the common print server platform.

10.3.2 Functions

This figure shows the functions carried out between the RS/6000, PCs, and Macs.

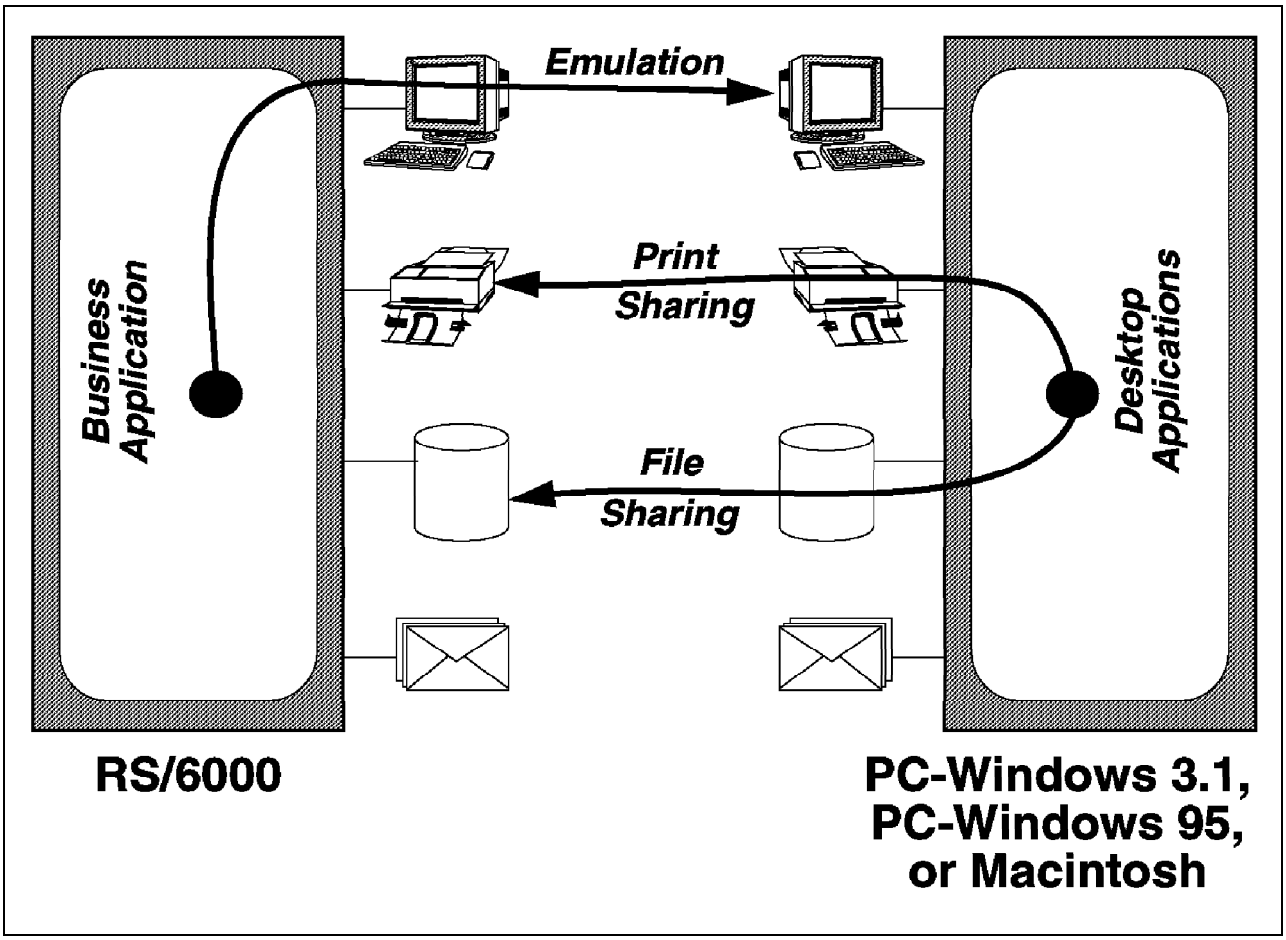


Figure 372. RS/6000 and PCs and Macs (Single-Protocol): Functions

10.3.3 Network

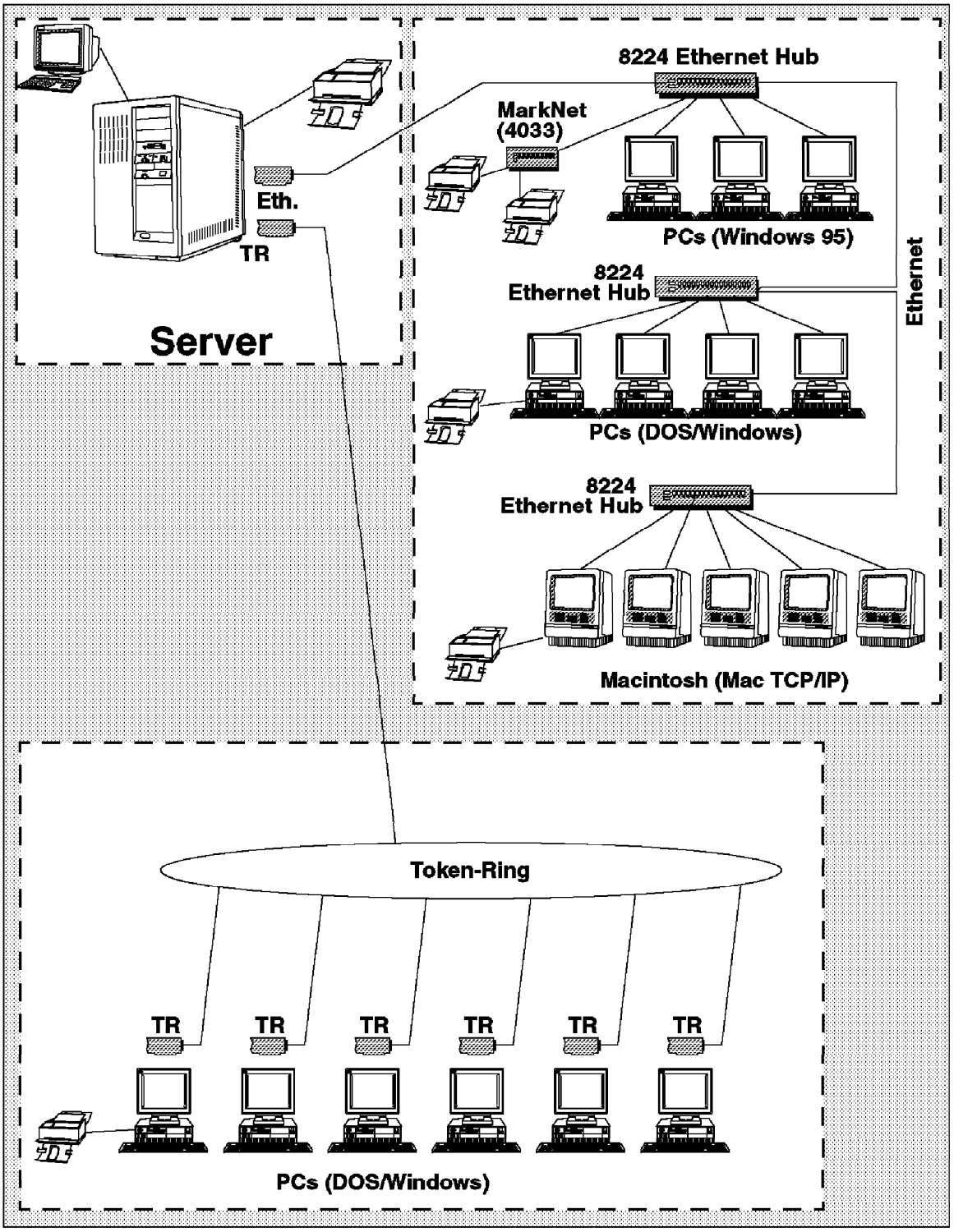


Figure 373. RS/6000 and PCs and MACs (Single-Protocol): Physical View

10.3.4 Products and Functions

These components are typical of those used in the scenario depicted on the previous page.

Table 257. RS/6000 and PCs and MACs (Single-Protocol): Products and Functions

		Token-Ring clients		Ethernet clients			Server
		PCs	**Equip.**	**PCs**	**Macs**	**Equip**	**RS/6000**
Hardware		- Token-Ring adapter	- Token Ring equipment (for example 8226, 8228,8238) - printers	- Ethernet adapter	- Ethernet adapter	- 3 Ethernet Hubs 8224 - MarkNet, LAN printer attachment - printers	- 1 Ethernet adapter - 1 Token-Ring adapter - printer
Software		- DOS/ Windows 3.1 - TCP/IP for DOS v2.1	-	- PC-DOS - Windows 3.1 - TCP/IP for DOS v2.1 - or - Windows 95 (TCP/IP included)	- MacOS - Mac TCP/IP	-	- AIX V.4 (TCP/IP included)
Functions	Emula-tion	- Telnet client	-	- Telnet client	- Telnet client	-	- Telnet server (Telnetd)
	File Sharing	- NFS client - FTP c/s	-	- NFS client - FTP c/s	- NFS client - FTP c/s	-	- NFS server - FTP c/s
	Print Sharing	- Remote print, LPR - [PC with printer]: LPD program, acts as print server	-	- Remote print, LPR - [PC with printer]: LPD program, acts as print server	- Remote print, LPR	- MarkNet: LPD server	- Primary LPD server (print to local printer, MarkNet, remote host (PC printer)
Service		-	- Token-Ring cabling	-	-	- Ethernet cabling	-

10.4 RS/6000 and PCs (Multiprotocols)

This example demonstrates the AIX capability to perform as an integrated server platform and shows how to integrate UNIX-based servers to existing PC desktop environments. An RS/6000 server running AIX Connections operates as a LAN server for connecting many of popular client workstations (LAN Manager PC clients and Macintosh clients, in this example).

This example is based on a real customer situation. The solution described here was provided to the customer by one of the authors of this book.

10.4.1 Hypothesis

One advertising company expands its area of activity by acquiring a small publishing company with an office located on the next floor of the same building.

10.4.1.1 Existing Environment

- The parent company has 40 PCs running DOS/Windows 3.1 and Windows 95. All PC workstations are connected to a LAN Manager PC server via Ethernet.
- The parent company has just bought an RS/6000 server. Top management is going to run several business applications on this computer.
- The publishing company has seven Macintoshes connected to a Macintosh server via a LocalTalk LAN.
- The parent company also has three portable PCs used by mobile marketing representatives.

10.4.1.2 Constraints

- By integrating their computer environments (RS/6000, PCs, Macs), top management decides not to do any, even small, configuration changes on the desktop computers. This will protect end users who use the desktop workstations in many different ways.

10.4.1.3 Communication Needs

- Users of both Ethernet and LocalTalk local area networks must share files and printers to increase their productivity. A single server platform should be used for this reason, such as an RS/6000 running AIX.
- Mac and PC users must have access to business applications intended to run on the RS/6000 server.
- Mobile PC users (planned for up to 10) must have access to company's LAN (integrating Ethernet and LocalTalk network) from distant locations when traveling.

10.4.2 Functions

The following figure shows the functions carried out between the RS/6000 and PCs in a multiprotocol environment.

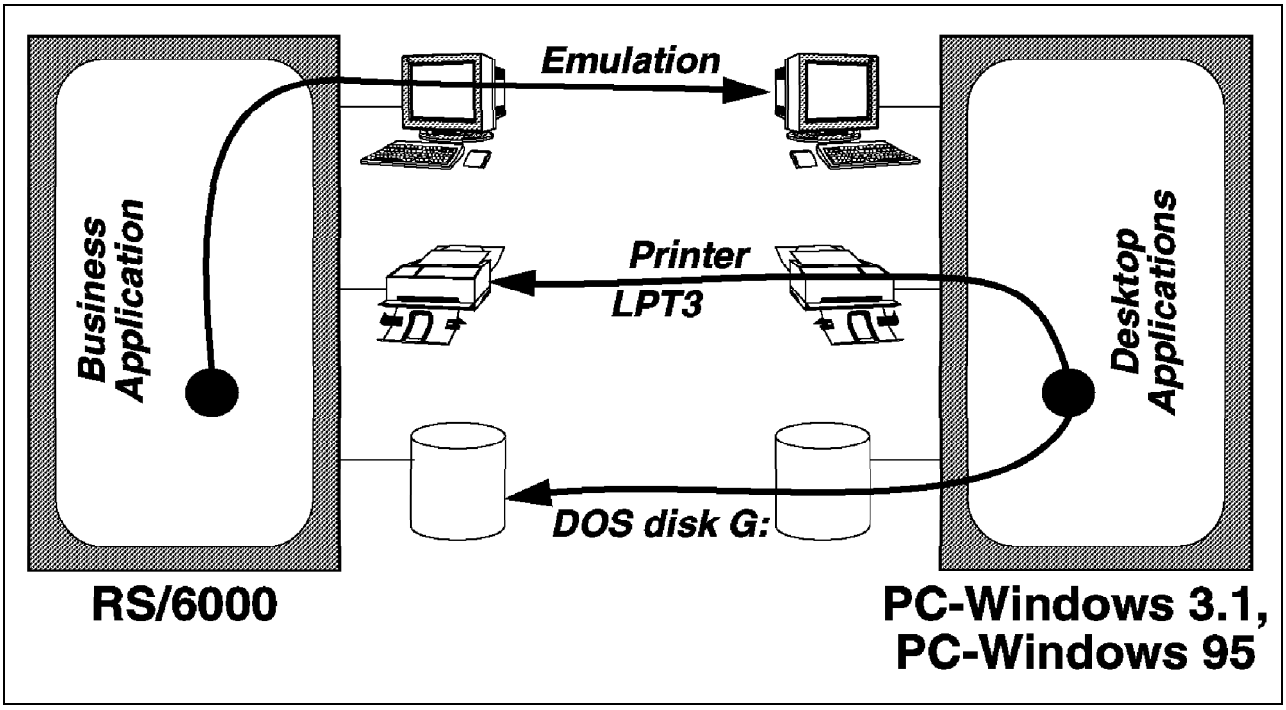


Figure 374. RS/6000 and PCs (Multiprotocols): Functions

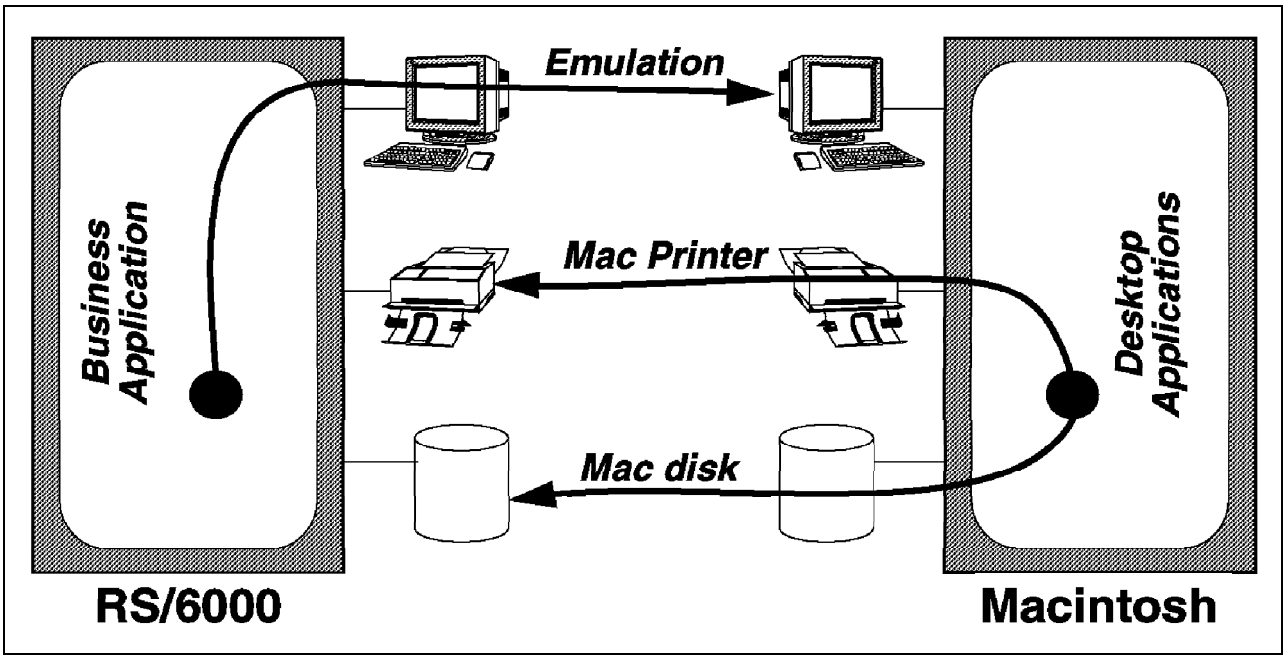


Figure 375. RS/6000 and PCs (Multiprotocols): Functions

10.4.3 Network

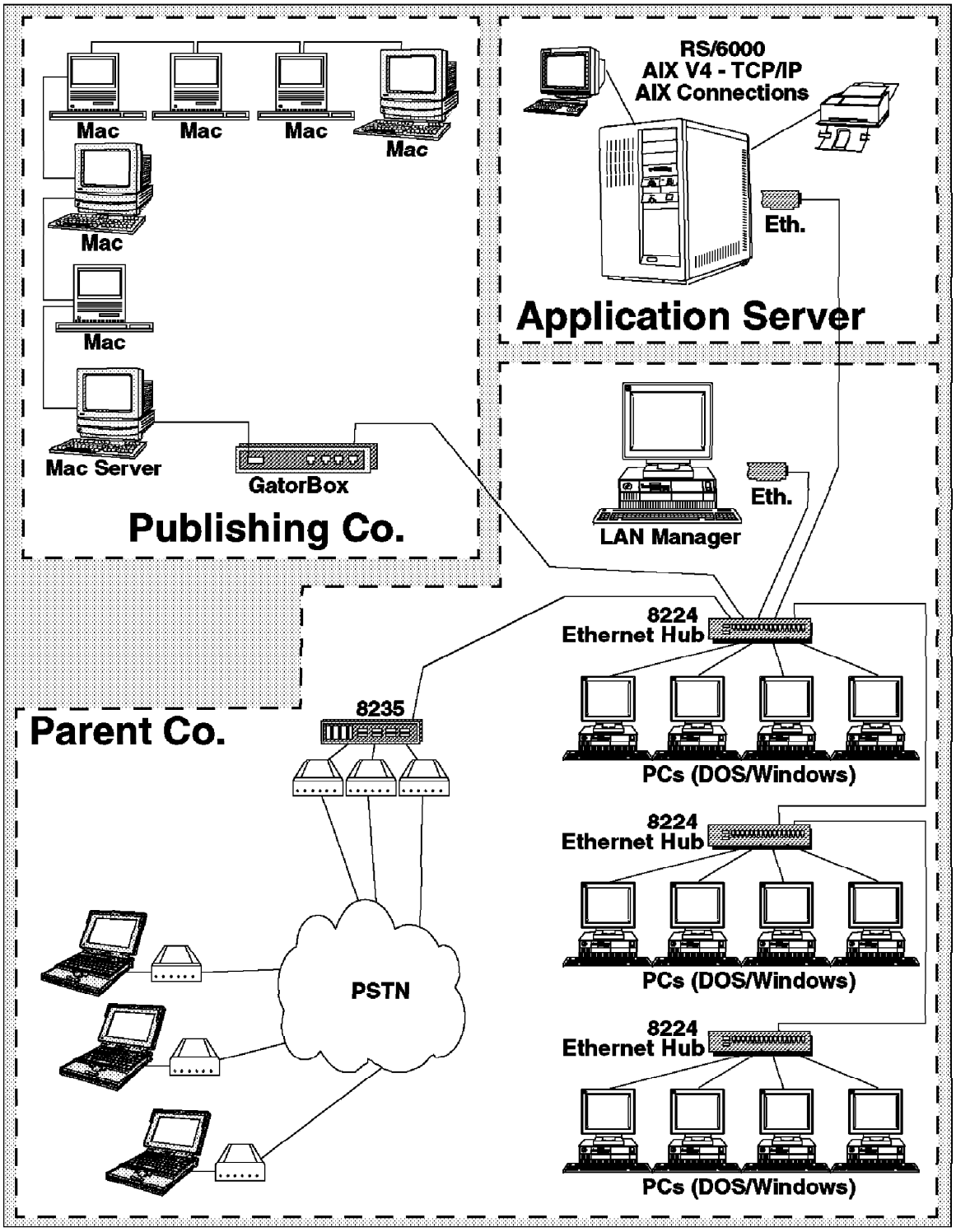


Figure 376. RS/6000 and PCs (Multiprotocols): Physical View

10.4.4 Products and Functions

These components are typical of those used in the scenario depicted on the previous page.

Table 258. RS/6000 and PCs (Multiprotocols): Products and Functions

	Application Server	Parent Company				Publishing Company	
	RS/6000	**LAN Mgr**	**PCs**	**Portable**	**Equip.**	**Mac.**	**Equip.**
Hardware	- 1 Ethernet adapter - 1 console (type 3151)	- 1 Ethernet adapter	- 1 Ethernet adapter	- 1 Ethernet adapter PCMCIA	- 1 remote LAN access (8235) - 3 PSTN modems	- 1 Local-Talk port integrated	- 1 bridge (GatorBox)
Software	- AIX V4 (TCP/IP included) - AIX Connections (LMServer and MacServer)	- LAN Manager	- DOS/Windows 3.1 or DOS/ Windows 95	- DOS/Windows 3.1 - 8235 client software	-	- MacOS - MacTCP (TCP/IP)	-
Function	- Emulation	- Applications and data server	- Character emulation toward RS/6000 (using NBterm) - File and print sharing - RS/6000 seems to be a second LAN Mgr server	- Remote connection - emulation, print and file sharing	-	- Character emulation toward RS/6000 (using Telnet) - File and print sharing - RS/6000 seems to be a second Netware server	- Bridge between LocalTalk and Ethernet
Service	-	-	-	- PSTN connection	- 3 PSTN access	-	-

10.5 Internet: The RS/6000 as a Client

This example shows the way to connect a small LAN of PCs and X-stations to the Internet by relying on the rich TCP/IP facilities provided by the AIX for RS/6000 platform.

10.5.1 Hypothesis

One company decides to connect one of its office networks to the Internet.

10.5.1.1 Existing Environment

The following items are in the existing environment:

- An RS/6000 running AIX V4.2 is used primarily as file and print server.
- There are 25 PCs running DOS/Windows 3.1 and Windows 95.
- There are five X-stations using RS/6000 as an X-Window client machine.
- The Ethernet/802.3 network is built on the 10BaseT topology.

10.5.1.2 Constraints

- The Internet access provided must not be too costly (compared to dedicated Internet access), but it must provide full Internet access, including mail, FTP, and HTTP (WWW access).
- The company won't make any investment in communication hardware and software except to buy one modem that is required for connection to the Internet-access provider.

10.5.1.3 Communication Needs

- All users of Ethernet LAN must have full Internet access.
- The RS/6000 must serve as the communication server and router for the IP-network while continuing its role as file and print server.
- Some elements of network security must be implemented, such as authentication of remote users.

10.5.2 Functions

The RS/6000 machine performs two roles. It works as a client, from the Internet's point of view, by requesting some services from Internet servers. At the same time, it provides communications services to other LAN workstations (client). The figure below shows the functionality of the RS/6000 from the Internet's point of view.

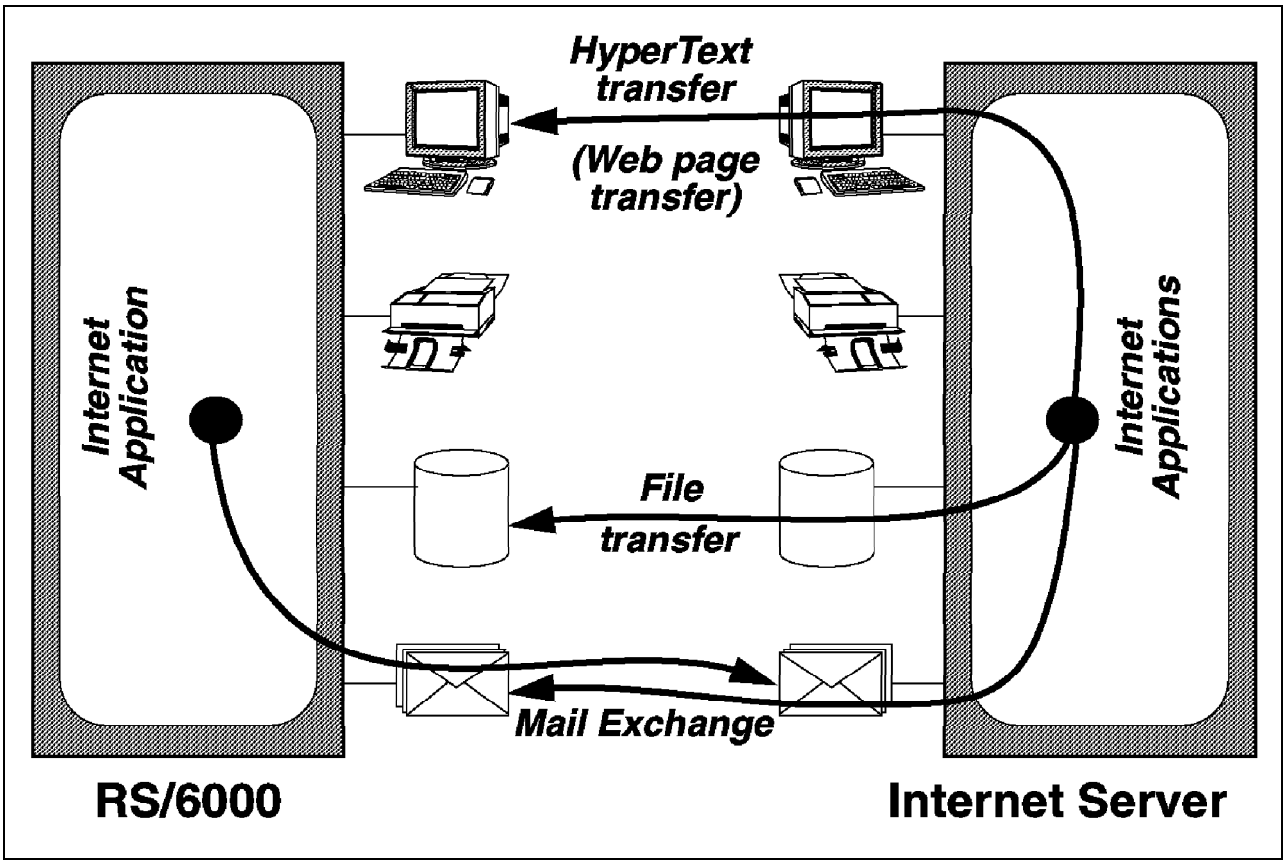


Figure 377. Internet: RS/6000 as a Client: Functions

10.5.3 Network

The company's Ethernet LAN is connected to the Internet via the Point-to-Point Protocol (PPP) implemented as a part of TCP/IP in AIX Version 4. In addition, AIX Version 4.2 includes enhancements to the PPP protocol to conform to RFC1334 PPP Authentication, like Challenge Handshake Authentication Protocol (CHAP).

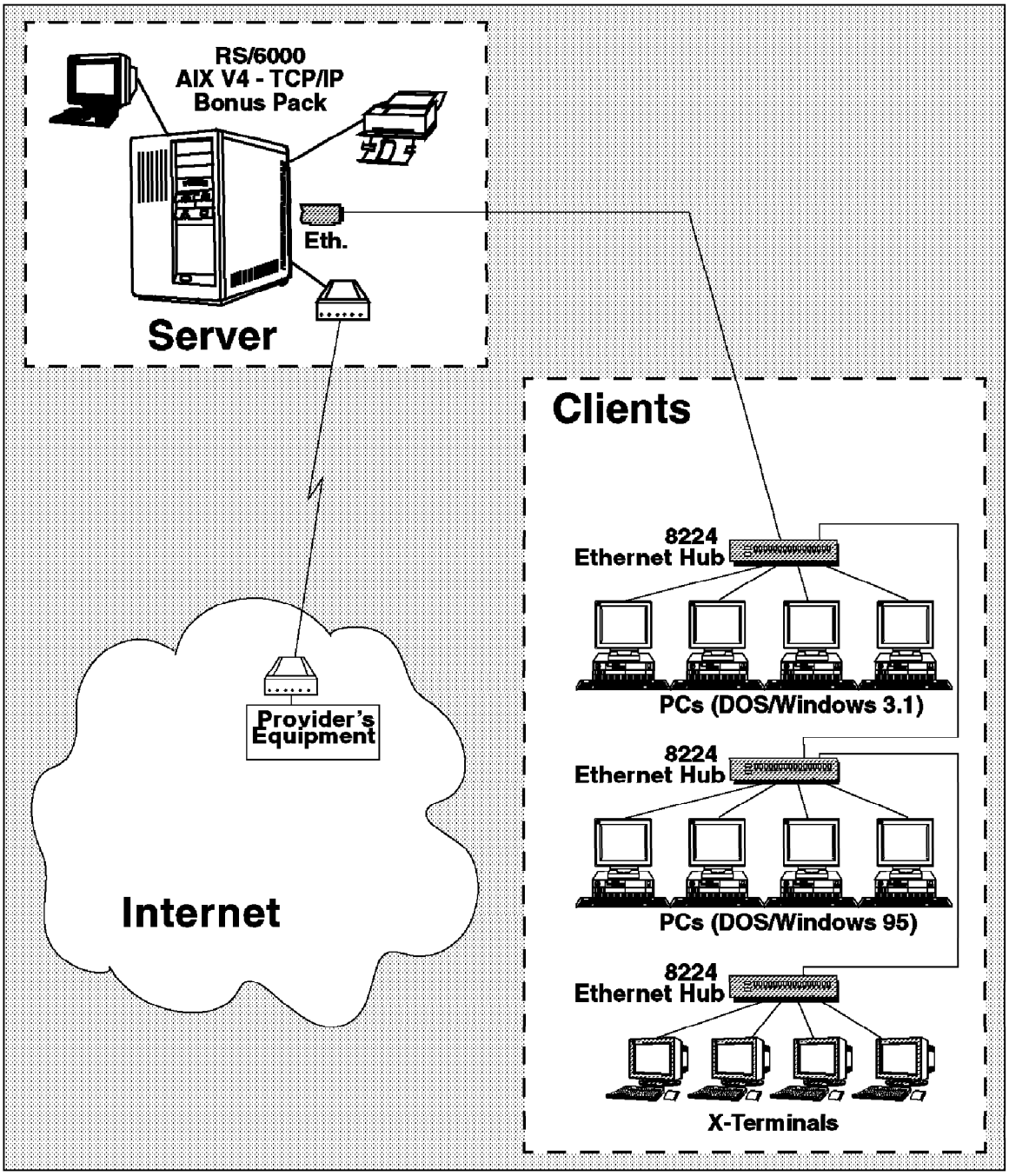


Figure 378. Internet: RS/6000 as a Client: Physical View

10.5.4 Products and Functions

These components are typical of those used in the scenario depicted on the previous page.

Table 259. Internet: RS/6000 as a Client: Products and Functions

		Server	Clients			
		RS/6000	**PC (DOS/Windows)**	**PC (Windows 95)**	**Xstation**	**Equip.**
Hardware		- 1 Ethernet adapter - 1 Modem	- 1 Ethernet adapter	- 1 Ethernet adapter	- Ethernet adapter	- 3 Hubs 8224
Software		- AIX V.4.2 - Netscape Navigator (from Bonus Pack)	- PC-DOS - MS Windows 3.1 - TCP/IP for DOS v.2.1	- Windows 95 (and Internet Connections Kit)	-	-
Function	File transfer	- FTP	- FTP	- FTP	-	-
	Mail	- SMTP client	- SMTP client	- SMTP client	-	-
	HyperText transfer (Web access)	- HTTP client (Web browser)	-	- HTTP client (Web browser)	-	-
	TCP/IP connect's	- IP routing - X station management (X Window)	-	-	-	-
Service		- Internet access via PPP (modem line)	-	-	-	-

10.6 Internet: The RS/6000 as a Web Server and Gateway

This example shows the use of an RS/6000 as an Internet/Intranet server and as a secure gateway to the Internet (firewall server).

10.6.1 Hypothesis

One mid-size manufacturing company decides to establish a commercial presence on the World Wide Web (WWW) and integrate WWW presence into core business applications. By doing this, the company is going to provide better customer service and to improve customer satisfaction and relations. At the same time, they decide to exploit Internet technology (WWW technology) in the company's Intranet by setting up an internal WWW server to increase their productivity (development, in particular), collaboration, and quality control.

10.6.1.1 Existing Environment

The following items are in the existing environment:

- There is an RS/6000 server running the internal mail system.
- The TCP/IP environment has different PCs communicating via TCP/IP protocol.
- There is an Ethernet/802.3 network using 10BaseT Stackable Hub technology; a few 8224 Hubs are installed.

10.6.1.2 Constraints

- There is a need to provide a secure and reliable Intranet environment, meaning one protected against any intrusion from the outside or from an internal disruption.

10.6.1.3 Communication Needs

- For the Internet, there is a need to set up an external Web server (WWW server) for advertising, customer service, order entry/tracking, and external e-mail.
- For the Intranet there is a need to set up an internal Web server (WWW server) for internal communications, sales and development support, supplier applications, and internal e-mail.

10.6.2 Functions

In the figure below, the functional relationship between an RS/6000 Web server and any workstation in the Internet or Intranet (for example PCs, Macs, or UNIX workstation) is shown. The only difference between workstations in the Internet and Intranet is the access allowed. A workstation in the Internet (that means outside of company) is allowed to connect only to the external Web server, but Intranet users are allowed to connect to both internal and external Web servers.

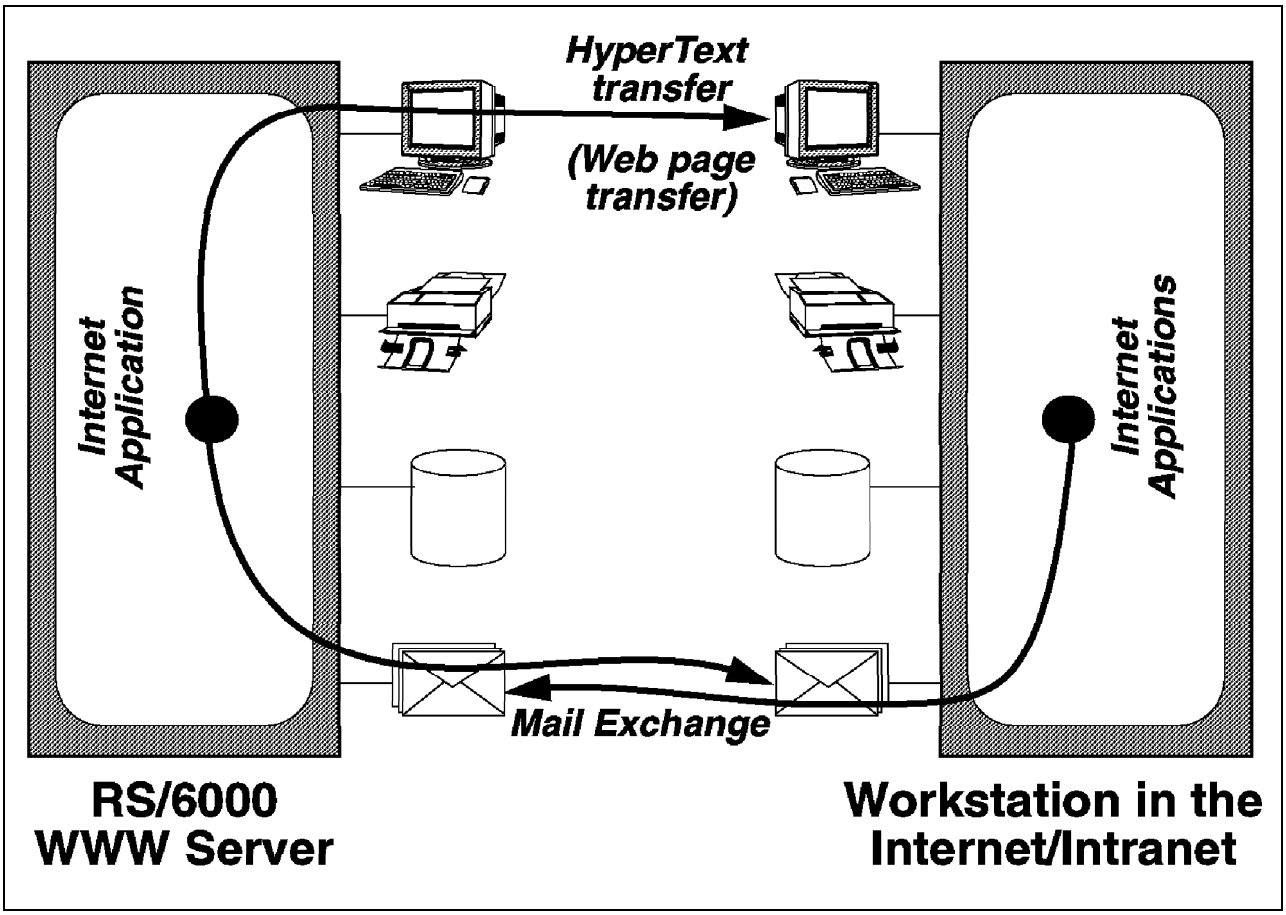


Figure 379. Internet: RS/6000 as a Web Server and Gateway: Functions

10.6.3 Network

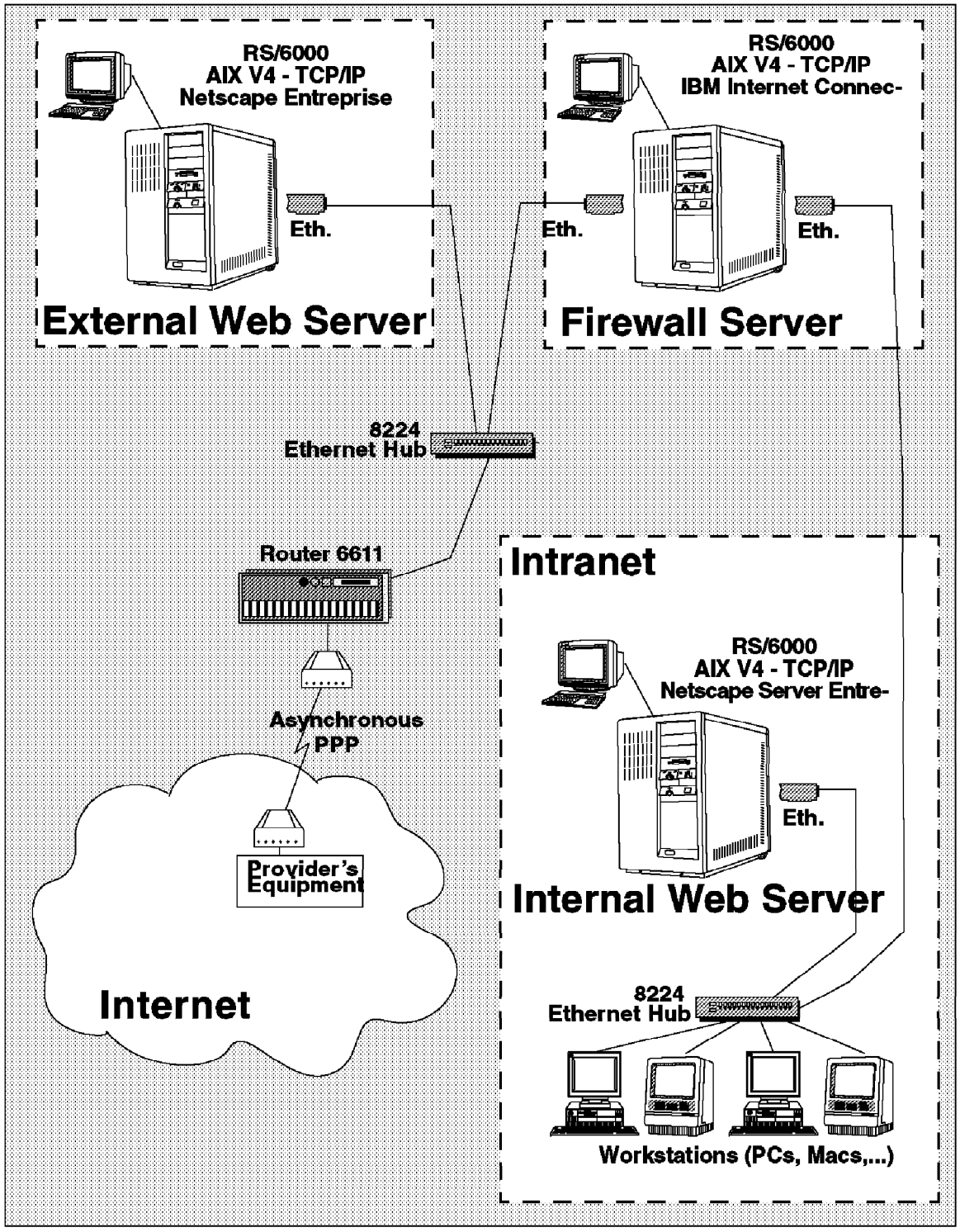


Figure 380. Internet: RS/6000 as a Web Server and Gateway: Physical View

10.6.4 Products and Functions

Special networking equipment, like modems, 6611 Nways Routers, 2210 Routers, and 8224 Ethernet Hubs, are not shown in following table. They satisfy the same communications needs and have the same network functions as described in previous examples.

Table 260. Internet: RS/6000 as a Web Server and Gateway: Products and Functions

		External Web Server	Internal Web Server	Firewall Server	Internet/Intranet Clients
		RS/6000	**RS/6000**	**RS/6000**	**PC**
Hardware		- 1 Ethernet adapter	- 1 Ethernet adapter	- 2 Ethernet adapter	- 1 Ethernet ad.
Software		- AIX V.4.2 - Netscape Enterprise Server (from Bonus Pack)	- AIX V.4.2 - Netscape Enterprise Server (from Bonus Pack)	- AIX V.4.1 - IBM Internet Connection Secured Network Gateway	- PC-DOS + MS Windows 3.1 + TCP/IP for DOS - or Windows 95
Function	Mail	- SMTP server	- SMTP server	-	- SMTP client
	HyperText transfer (Web access)	- HTTP server (WWW server)	- HTTP server (WWW server)	-	- HTTP client (Web browser)
	Security	-	-	- Intranet security	-
Service		- Internet access via PPP (modem line)	-	-	-

10.7 RS/6000 and S/390: Three Methods for Application Communications

This example shows three possible methods of communication between an S/390 system (and equipment like communications controllers and terminals) and RS/6000 systems.

- Access S/390 MVS block mode applications by RS/6000 users.
- Provide S/390 legacy users (for example 3278 terminals) with the capability to access RS/6000 AIX block mode applications (for example DB2/6000, CICS/6000).
- Enable S/390 legacy users to access RS/6000 AIX character mode applications and traditional UNIX applications.

10.7.1 Hypothesis

One manufacturing company expands its product line by acquiring two smaller businesses to leverage its strength. These businesses are engineering and design shops with an internal TCP/IP network and RS/6000 application servers running AIX. To exploit this competitive advantage, the parent company must update its data communications network as well as its manufacturing process. This company has been using an S/390 system to run their business and manufacturing applications. To prevent additional investments in their traditional application platform (that means upgrade S/390 system) and to expand its manufacturing enterprise, top management decides to migrate some business applications to the RS/6000 platform, as selected by the acquired businesses.

10.7.1.1 Existing Environment

- There is an S/390 running MVS and business applications on top of it, 3745 Communication Controllers, and 3278 terminals (attached to the 3174 Establishment Controller via coaxial wires).
- The engineering shops operate in LAN environment and contain RS/6000 servers and PC workstations. Engineering and design applications are running on the RS/6000 servers.
- There are PCs running DOS/Windows and communicating via TCP/IP.

10.7.1.2 Constraints

- Management wants no additional investments in their traditional application platform. For example, do not upgrade the S/390. To meet expanded business requirements, migrate some business applications to the RS/6000 platform, as selected and approved by acquired businesses.
- The engineers and designers from the acquired shops have become part of the larger company. They need access to data on the corporate database and to applications running on the S/390 system.
- To expand its manufacturing enterprise, the company must develop new applications on AIX systems. While all users may eventually move to distributed systems, it is not cost effective to move everyone immediately.

10.7.1.3 Communication Needs

- The newly acquired businesses, primarily TCP/IP and RS/6000-based, must be able to access central host data.
- The new businesses' engineering and design applications (which will reside on the AIX system and run in character mode) must be accessible by users who currently run 3270-type displays.

- The business applications, migrated from S/390, (which will reside on AIX system and run in block mode) must be accessible by users who currently run 3270-type displays.

10.7.2 Functions

The following figure shows the functions carried out between the RS/6000 and the S/390.

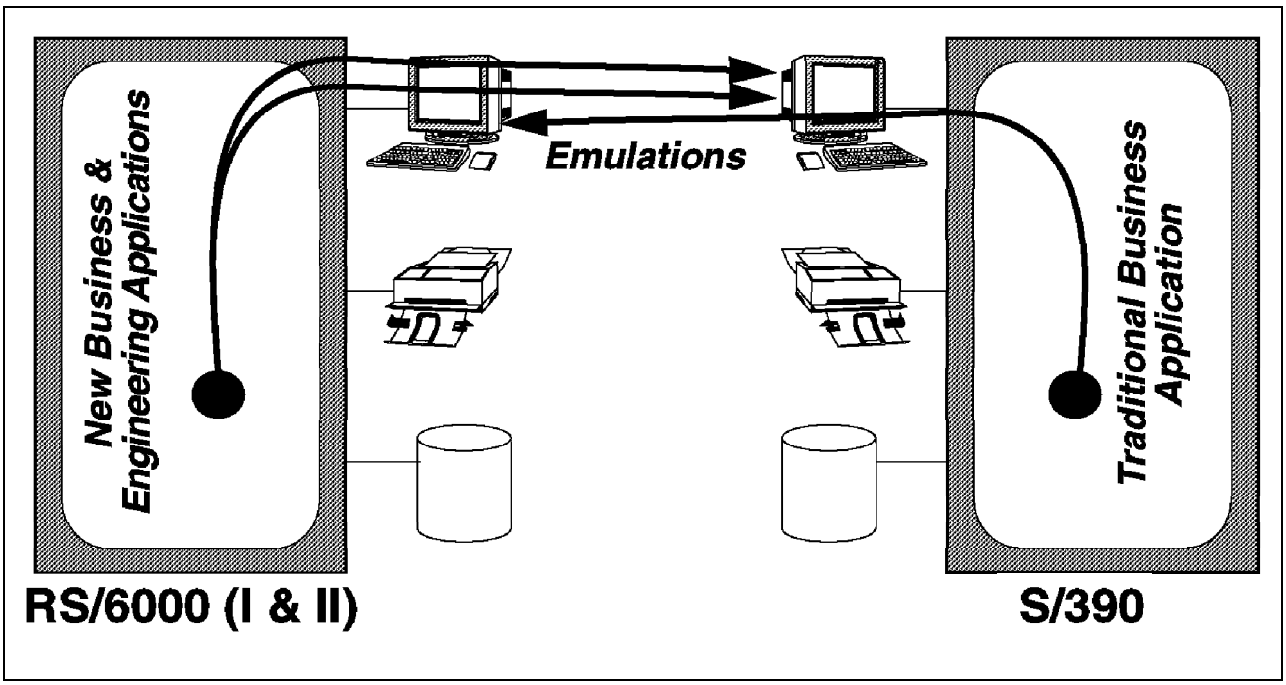


Figure 381. RS/6000 and S/390: Functions

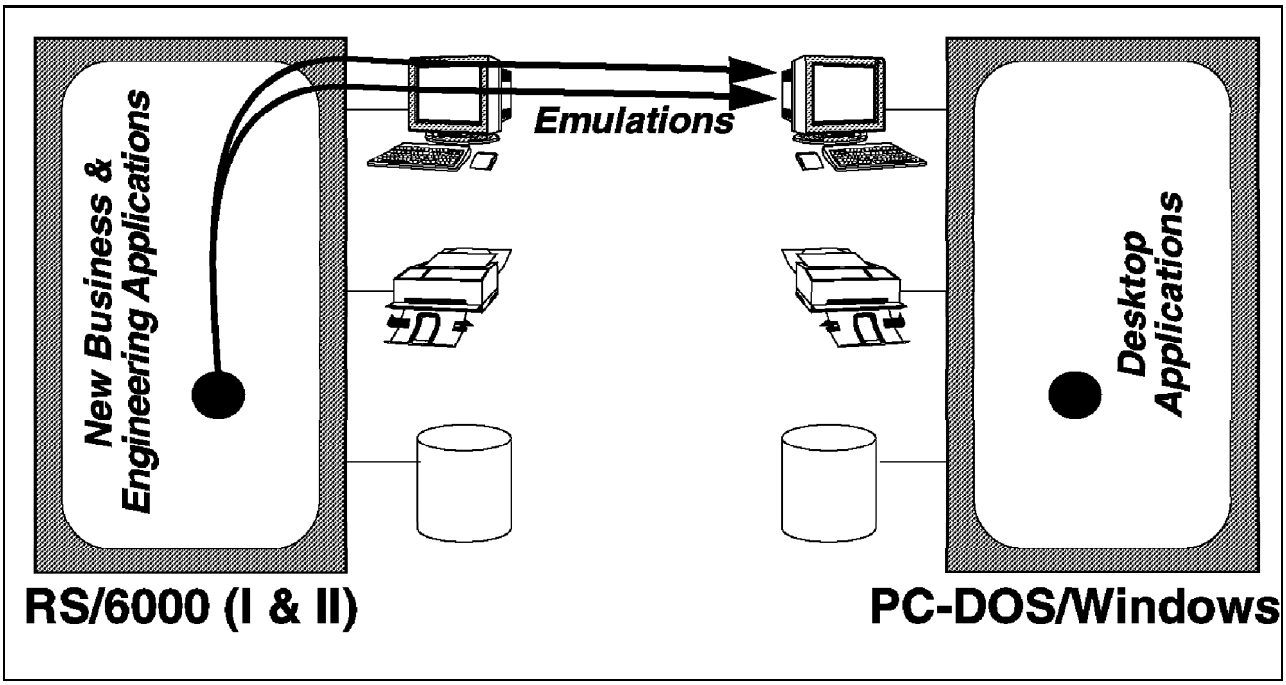


Figure 382. RS/6000 and S/390: Functions

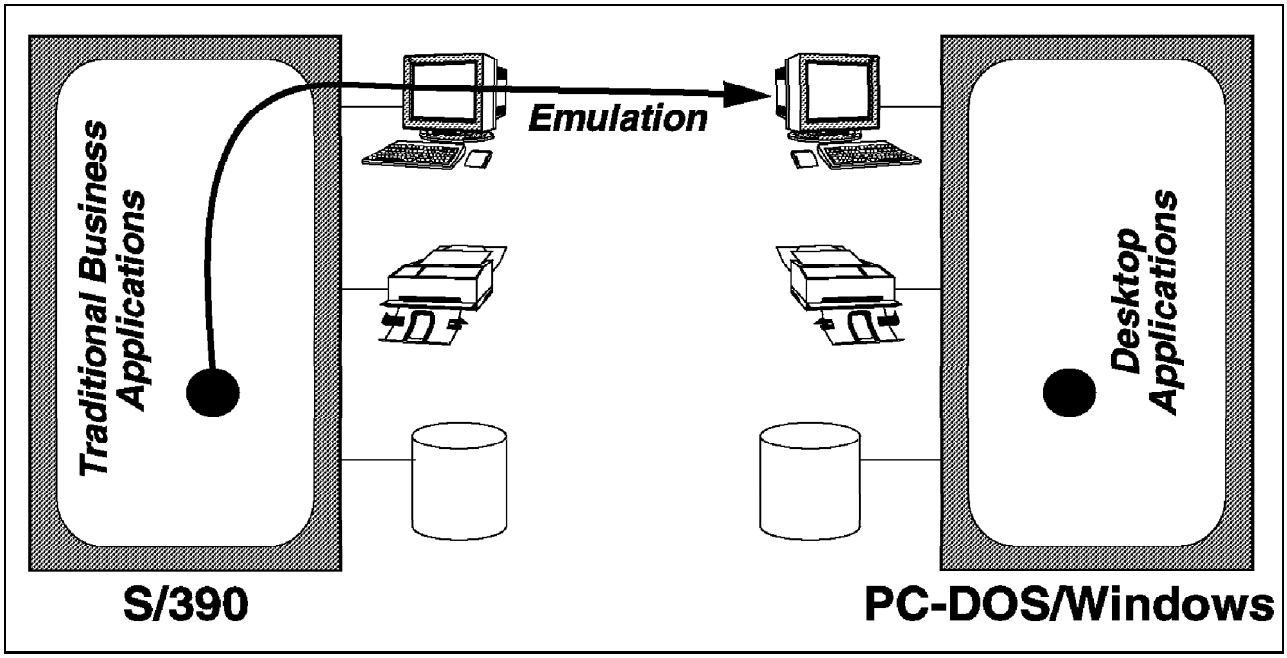


Figure 383. RS/6000 and S/390: Functions

Table 261. RS/6000 and S/390: From One Terminal to One System

	3278 Terminal	X-terminals	PCs DOS-Windows
RS/6000 (II) **Engineering Application** **AIX Character mode**	- **«PFK 1»** Character connection toward RS/6000 (II) using 3174 controller microcode C5 capabilities	- **«aixterm»** Direct character connection toward RS/6000 (II) using X-Window environment (aixterm window)	- **«tn RS/6000 (II)»** Character connection toward RS/6000 (II) using Telnet vt100 provided by TCP/IP installed on this PC (in a Windows 3.1 window)
S/390 **Traditional Business** **MVS Block mode**	- **«native mode»** Direct block connection toward S/390	- **«aixterm» - «e789 a»** Block connection toward S/390 using 3270 emulation provided by Host Connection Program installed on RS/6000 (II) or - **«aixterm» - «tn3270 S/390»** Block connection toward S/390 using Telnet 3270 capabilities provided by SNA Client Access installed on RS/6000(II)	- **«tn3270 S/390»** Block connection toward S/390 using Telnet 3270 capabilities provided by SNA Client Access installed on RS/6000(II)
RS/6000 (I) **New Business Application** **AIX Block mode**	- **«PFK 2»** Block connection toward RS/6000 (I) using 3174 controller and SNA Application Access installed on RS/6000 (II)	- **«aixterm» - «tn RS/6000 (I)»** Block connection toward RS/6000 (I) using Telnet vt100 (aixterm window)	- **«tn RS/6000 (I)»** Block connection toward RS/6000 (II) using Telnet vt100 provided by TCP/IP installed on this PC (in a Windows 3.1 window)

10.7.3 Network

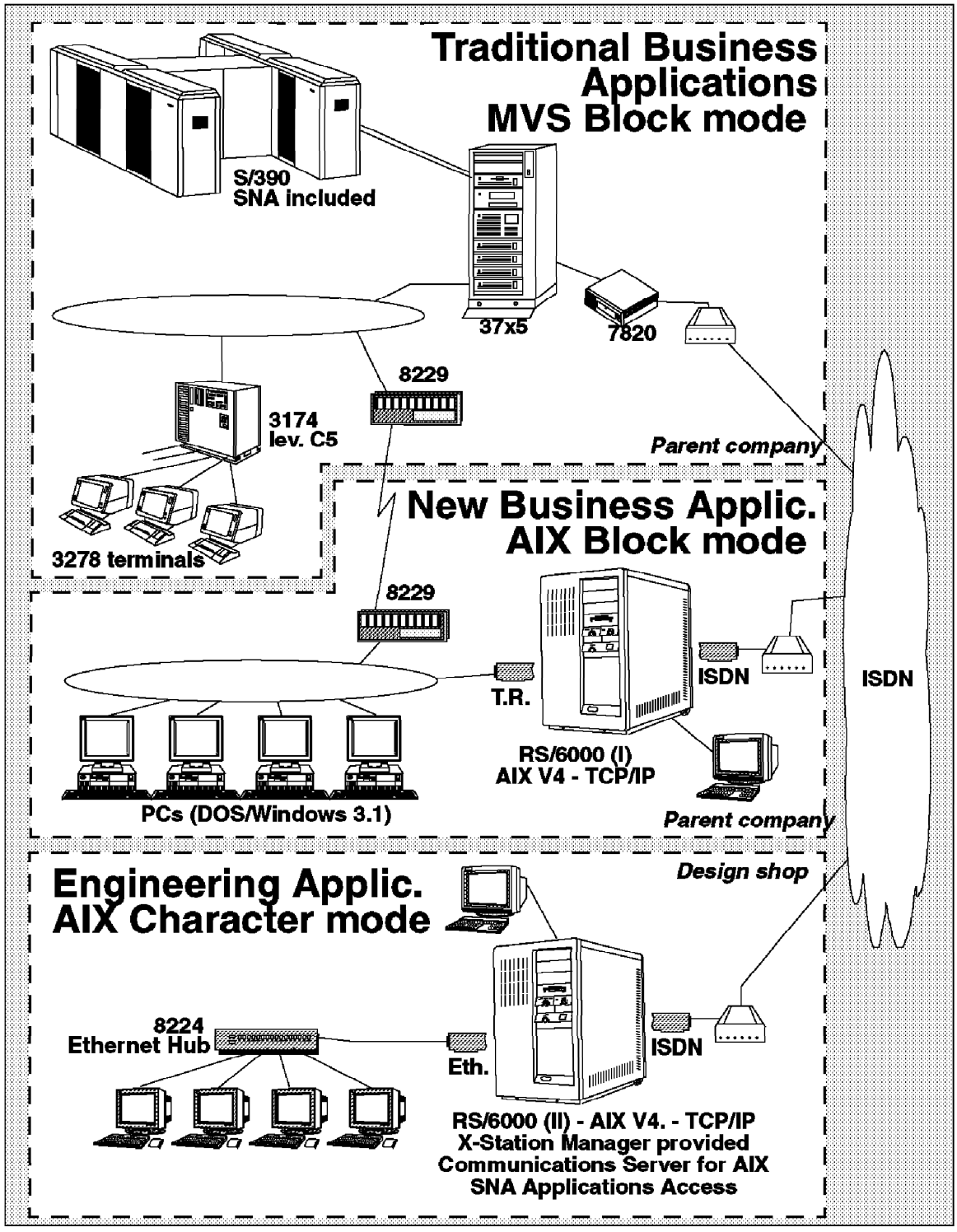


Figure 384. RS/6000 and S/390: Physical View

10.7.4 Products and Functions

These components are typical of those used in the scenario depicted on the previous page.

Table 262. RS/6000 and S/390: Products and Functions

	Traditional business Applications			Engineering Applications			New business Applications		
	S/390	**3278 Term.**	**Equip.**	**RS/6000 (II)**	**X-Term.**	**Equip.**	**RS/ 6000 (I)**	**PCs**	**Equip.**
Hardware	-	-	- 3174 - 37x5 - 7820 (ISDN)	- ISDN adapter - Tok.Ring adapter	- Tok.Ring adapter	-	- ISDN adapter - Tok.Ring adapter	- Tok.Ring adapter	-
Software	- MVS - SNA	-	- Micro-code C5	- AIX v4 - TCP/IP included - ISDN driver - X-st-Mgr included - Commu-nications Server for AIX - SNA Applic. Access - SNA Client Access - Host Connec. Program	-	-	- AIX v4 - TCP/IP - ISDN Driver	- DOS - Win-dows 3.1 - TCP/IP for DOS	-
Function	-	- Emula-tion toward S/390 - Emula-tion toward RS/6K (II) - Emula-tion toward RS/6K (I)	- Backup net-work	- X-Term. server - 3270 emulation server	- Emula-tion toward S/390 - Emula-tion toward RS/6K (II) - Emula-tion toward RS/6K (I)	- Backup net-work	-	- Emula-tion toward S/390 - Emula-tion toward RS/6K (II) - Emula-tion toward RS/6K (I)	- Backup net-work
Service	-	-	- ISDN connec-tion (modem provided)	-	-	- ISDN connec-tion (modem provided)	-	-	- ISDN connec-tion (modem provided)

10.8 RS/6000 and SNA Environment: TCP/IP over SNA Connectivity

This example demonstrates an actual example of interconnectivity between two worlds: TCP/IP (as native communication protocol for AIX) and SNA. It explains how to connect TCP/IP applications (using standard Sockets API) over a corporate-wide SNA network.

10.8.1 Hypothesis

Here we continue the example situation described in the previous section. There are just a few sentences to recall. One manufacturing company expands its product line by acquiring two smaller businesses to leverage its strength. To exploit this competitive advantage, the parent company must update its data communications network as well as its manufacturing process. Top management in the parent company requires that the new system have the following capabilities:

- There must be one primary network in order to contain costs and to deliver data quickly, accurately, and securely.
- The current manufacturing process must become more automated.

The businesses the parent company acquired are an engineering and design shops with an internal TCP/IP network. For this example, suppose that the second engineering and design shop acquired has its own set of design applications written to the sockets interface. Within the newly integrated company, both design shops would find these applications useful and, once the shops are connected, could share application data. Typically, sockets applications operate over TCP/IP networks, but the parent company chooses not to pay the cost of duplicating networks.

10.8.1.1 Existing Environment

- There is an SNA network environment, including an S/390 system, 37x5 Communication Controllers, and communication lines.
- The first engineering shop's Ethernet LAN contains an RS/6000 server, a PC-based (OS/2) server, and PC workstations. Design applications are running on the RS/6000 and PC-based application servers.
- The second engineering shop's token-ring LAN contains an RS/6000 server and PC workstations. Design applications are running on the RS/6000 application server.

10.8.1.2 Constraints

- There must be one primary network to contain costs and to deliver data quickly, accurately, and securely. This network is the parent company's existing network, an SNA network.

10.8.1.3 Communication Needs

- The shops must share their application data (and files) by connecting sockets applications (running on RS/6000 and PC servers) over the corporate SNA network (which uses ISDN services for WAN connections).
- Users in every shop must have access (that means log in) to any application server (local or remote).
- A mail exchange system must be provided between the shops.
- Local shop's users must continue to communicate to application servers (RS/6000 and PC-based) via TCP/IP.

10.8.2 Functions

The following figure illustrates the functions carried out by the RS/6000 in an SNA network.

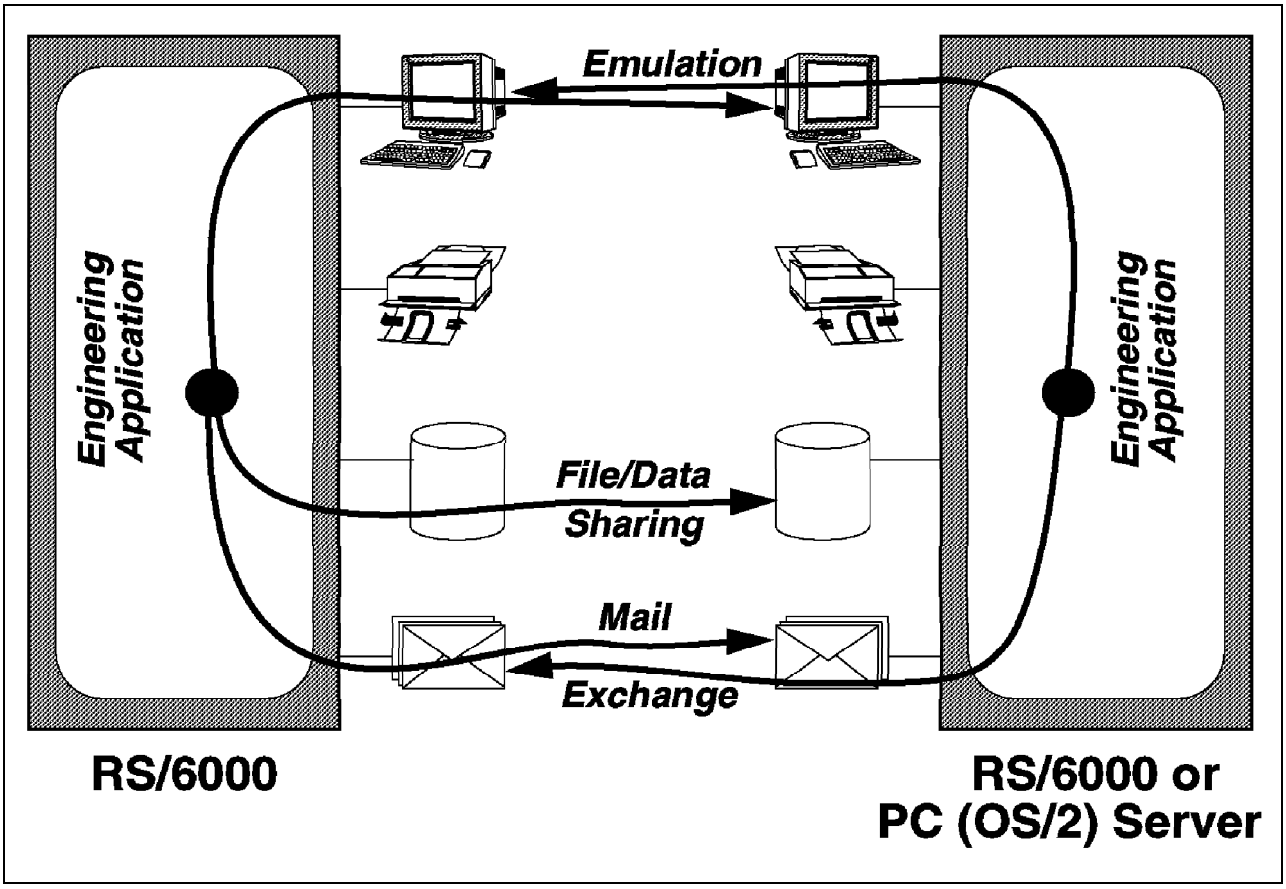


Figure 385. RS/6000 and SNA Environment: Functions

10.8.3 Network

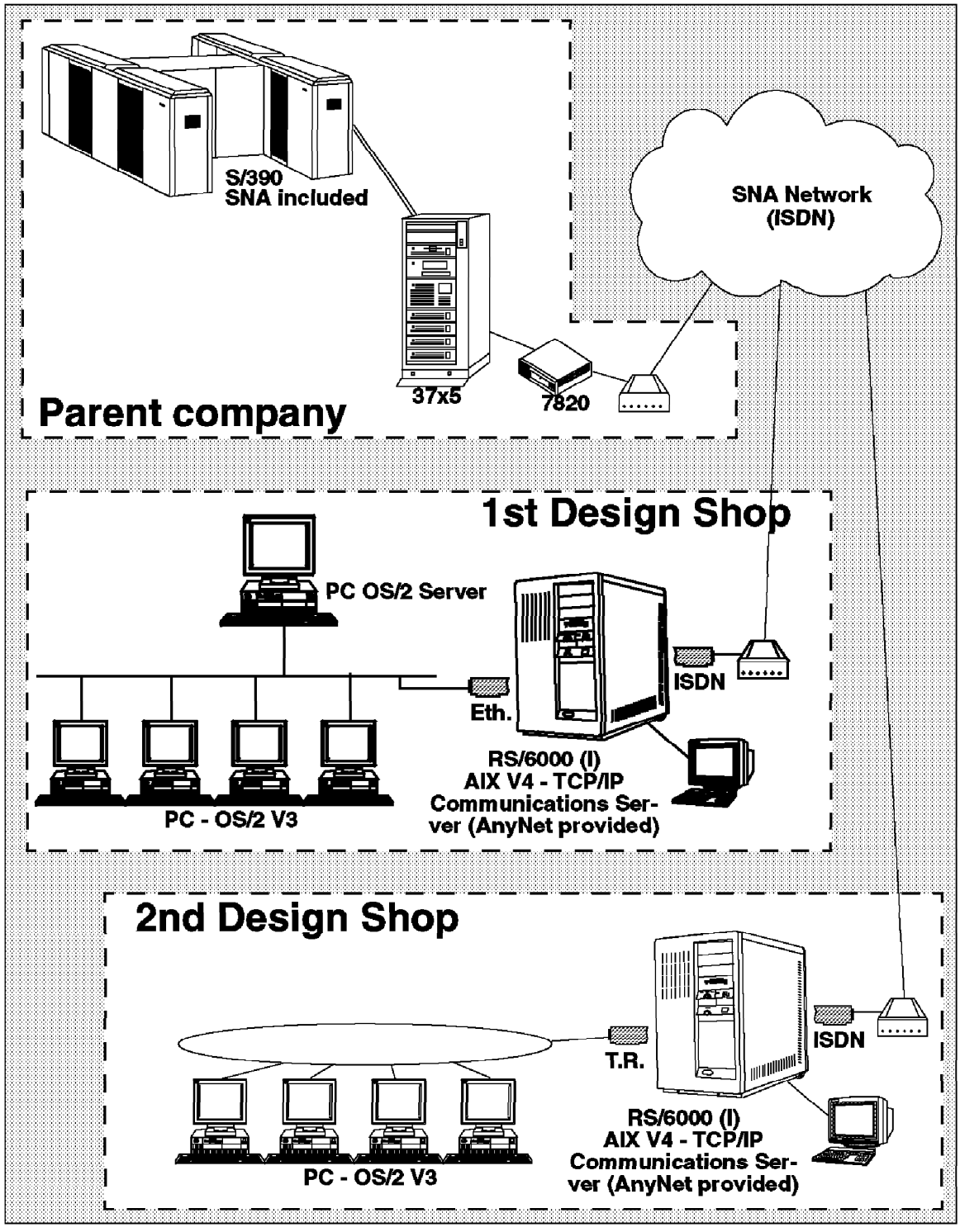


Figure 386. RS/6000 and SNA Environment: Physical View

10.8.4 Products and Functions

Communications Server's AnyNet "sockets over SNA" function solves this company's problem of communication of TCP/IP applications over an SNA backbone network. As shown in the figure above, once the application servers are connected with SNA, sockets applications can run over the SNA network. The RS/6000 server with AnyNet software may also communicate with any AnyNet-enabled platform. In our case, another platform is a PC running OS/2 and AnyNet/2 Sockets over SNA.

These components are typical of those used in the scenario depicted on the previous page.

Table 263. RS/6000 and SNA Environment: Products and Functions

		Application Servers		
		1st shop - RS/6000	**1st shop - PC server**	**2nd shop - RS/6000**
Hardware		- Ethernet adapter - ISDN adapter - Modem	- Ethernet adapter	- Token-Ring adapter - ISDN adapter - Modem
Software		- AIX V.4.1.4 - Communications Server for AIX (include AnyNet Sockets over SNA)	- OS/2 Version 3 - TCP/IP Version 2 for OS/2 - AnyNet/2 Sockets over SNA Version 2.0	- AIX V.4.1.4 - Communications Server for AIX (include AnyNet Sockets over SNA)
Functions	Terminal emulation	- Telnet client/server	- Telnet client/server	- Telnet client/server
	File Sharing	- NFS client/server - Customer applications based on Sockets API	- NFS client/server - Customer applications based on Sockets API	- NFS client/server - Customer applications based on Sockets API
	Mail	- SMTP client/server	- SMTP client/server	- SMTP client/server
Service		- Phone company: ISDN service	-	- Phone company: ISDN service

10.9 ATM Communications between RS/6000s and UNIX-Based Systems

A high-speed ATM network connecting a powerful RS/6000 and other UNIX-based servers with workgroups is described in this example.

10.9.1 Hypothesis

A big medical equipment design company that also has medical diagnostic center is going to establish a high-speed ATM networking environment to connect high-capacity UNIX-based servers with workgroups populated by PCs and UNIX-based workstations. They use servers for medical image consolidation and to run medical applications that require a lot of computing power.

10.9.1.1 Existing Environment

- There are three RS/6000 servers and two other UNIX-based servers.
- There are many PCs and UNIX-based workstations that are used in workgroups.
- This is primarily a TCP/IP environment for communications.

10.9.1.2 Constraints

- The underlying network must provide enough bandwidth for communications between servers and between workstations and servers.
- For cost saving, a two-level network should be established—a high-speed and high bandwidth (and, consequently, expensive) level for inter-server and inter-workgroup communications and a less expensive level for communications within workgroups.
- Costs of workgroup hardware upgrade must be reasonable (that means comparable to more inexpensive solutions).

10.9.1.3 Communication Needs

- A backbone high-bandwidth network must be set up to provide high-speed communications between servers. It must allow servers to distribute their computing power and to share and exchange data at the higher speed.
- A backbone network must be used for connections between workgroups and servers to allow workgroup users to share data, exchange information, and access image processing data and applications running on the servers.

10.9.2 Functions

The following figures show the ATM functions carried out between he RS/6000 and UNIX-based systems.

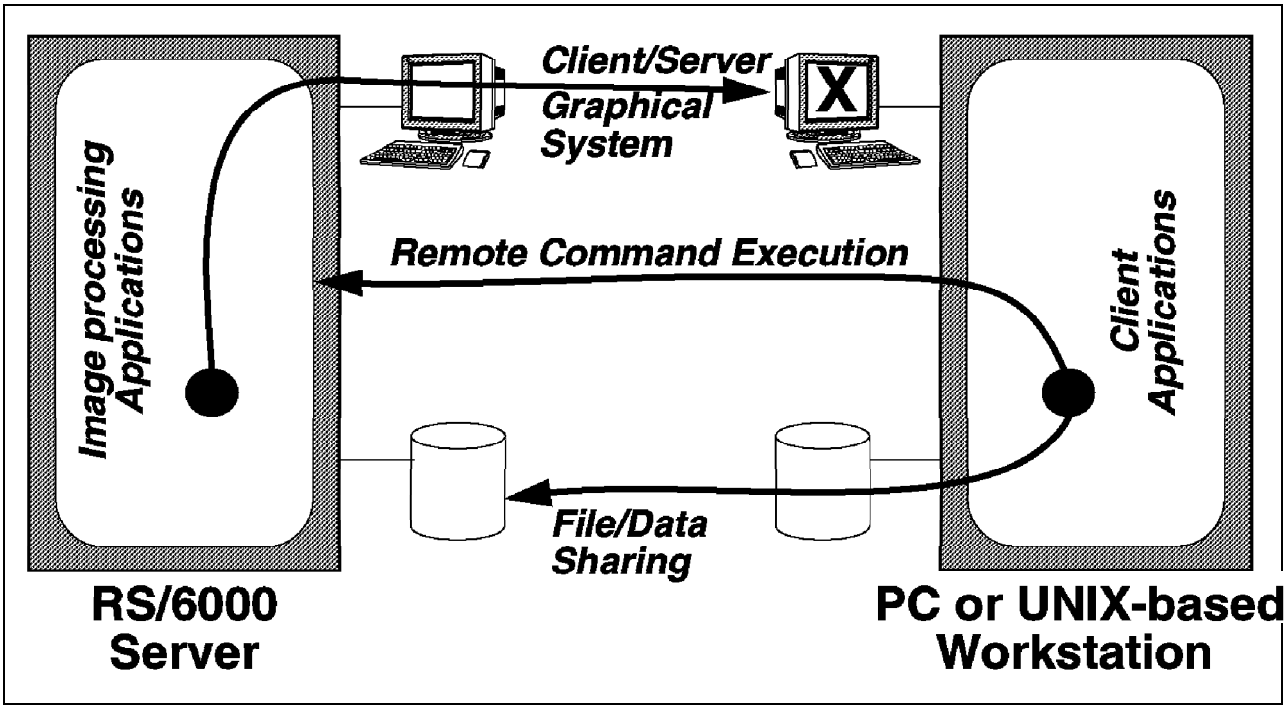


Figure 387. ATM between RS/6000s and UNIX-Based Systems: Functions

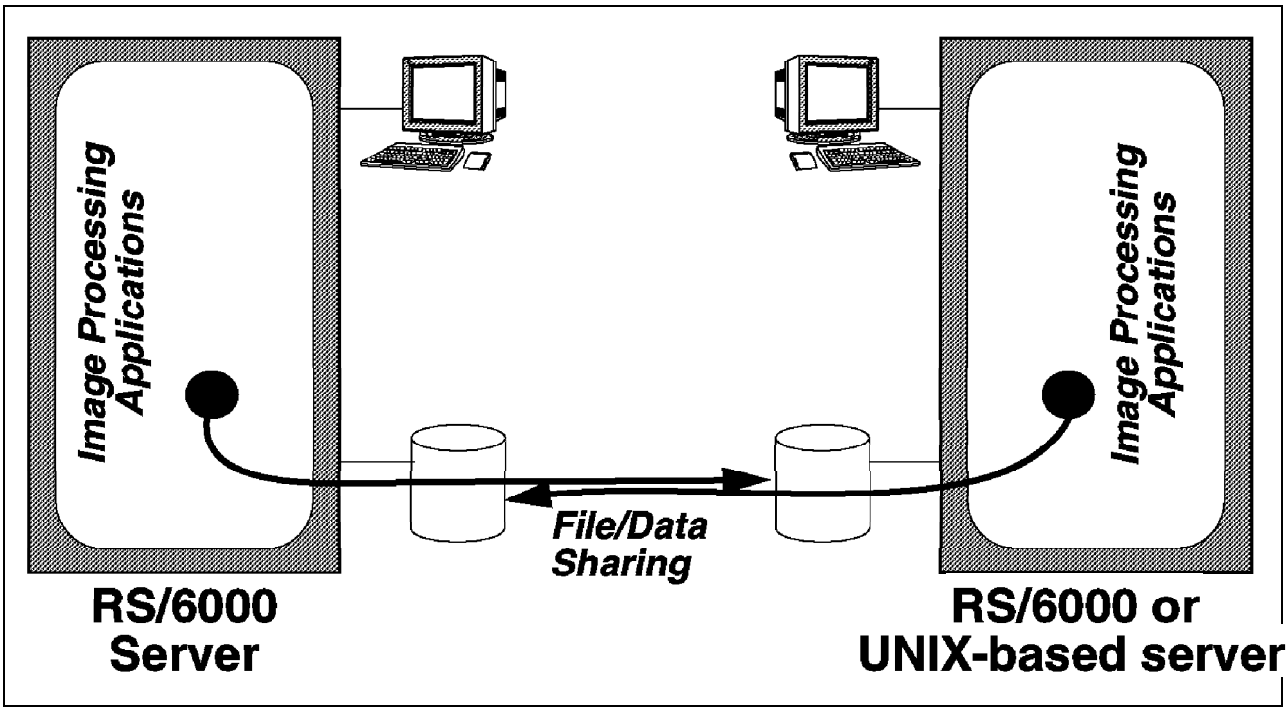


Figure 388. ATM between RS/6000s and UNIX-Based Systems: Functions

10.9.3 Network

The figure below shows the ATM backbone network and ATM workgroup networks. The ATM backbone network consists of two 8260 Multiprotocol Intelligent Switching Hubs (see description in Chapter 4) communicating with each other at 155 Mbps. Servers also are connected at 155 Mbps to the backbone network. Workgroups of workstation users are connected to 8282 Nways ATM Workgroup Concentrators (see description in the Chapter 4) at 25 Mbps. And 8282 Concentrators are connected to 8260 Switching Hubs (ATM backbone) at 100 Mbps.

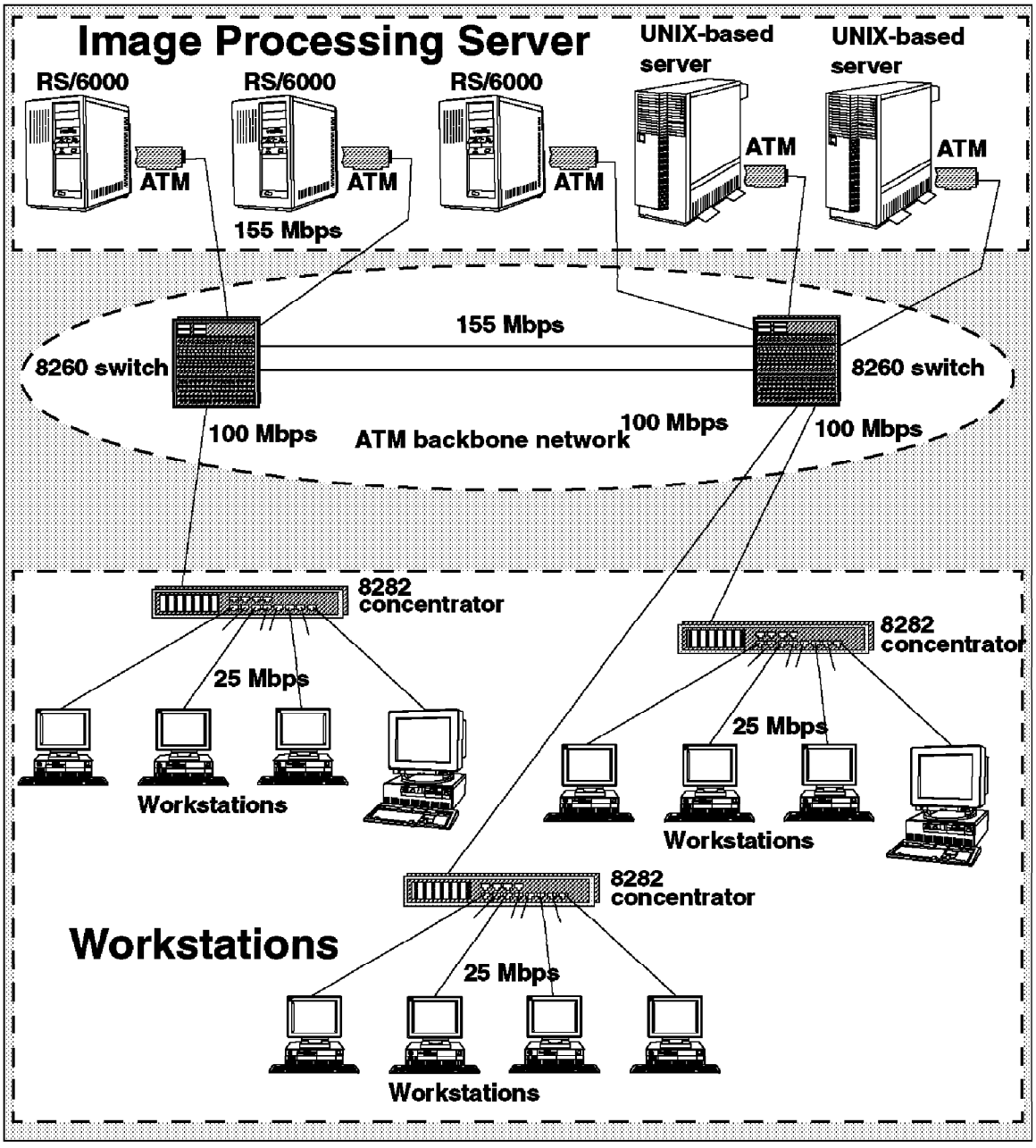


Figure 389. ATM between RS/6000s and UNIX-Based Systems: Physical View

10.9.4 Products and Functions

These components are typical of those used in the scenario depicted on the previous page.

Table 264. ATM between RS/6000s and UNIX-Based Systems: Products and Functions

		Image Processing Servers		Workstations
		RS/6000	**UNIX-based**	**PC**
Hardware		- ATM adapter (155 Mbps)	- ATM adapter (155 Mbps)	- ATM adapter (25 Mbps)
Software		- AIX V.4.1.4	- (UNIX brand)	- OS/2 Version 3 - TCP/IP Version 2 for OS/2 (with NFS Kit and X Window System Server Kit)
Functions	Client/Server Graphical System	- X-Window client	- X-Window client	- X-Window server
	Remote Command Execution	- REXEC server	- REXEC server	- REXEC client
	File Sharing	- NFS client/server	- NFS client/server	- NFS client
Service		- ATM cabling	- ATM cabling	- ATM cabling

Appendix A. TCP/IP IBM Offering

This appendix summarizes the TCP/IP offerings on different platforms.

Table 265. TCP/IP: Connectivity Summary

	TCP/ IPV2.3 for VM	TCP/ IPV3.1 for MVS	TCP/ IP V2.1.1 for DOS	TCP/ IPin OS/400 V3.1/3.6	TCP/ IPV2.0 for OS/ 2	TCP/ IP in AIX V4.1/4.2	3745 NCP
Link Level Protocols							
Token-Ring	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethernet V2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IEEE 802.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FDDI	via 3172	via 3172	Yes		Yes	Yes	
PC Network	Yes	Yes	Yes		Yes		
X25	Yes	Yes	Yes (1)	Yes	Yes	Yes	
Channel DLC	Yes				Yes	Yes	Yes
Frame Relay					Yes		Yes
WAN Access							
3174	Yes	Yes					
3172 ICP	Yes	Yes					
3172 Offload	Yes	Yes					
SNA LINK	LU 0	LU 6.2 LU 0			LU 6.2		LU 0
Channel Access							
HYPERchannel	Yes	Yes					
HIPPI		Yes					
LAN Access							
ODI			Yes				
Coax			Yes		Yes		
NDIS			Yes		Yes		
SLIP			Yes		Yes	Yes	

Notes

- (1) Using OEM product only.

Table 266. TCP/IP: Functions Summary

	TCP/ IPV2.3 for VM	TCP/ IPV3.1 for MVS	TCP/ IP V2.1.1 for DOS	TCP/ IPin OS/400 V3.1/3.6	TCP/ IPV2.0 for OS/ 2	TCP/ IP in AIX V4.1/4.2
End User Functions						
Telnet	C/S	C/S	C/	C/S	C/S	C/S
TN3270	C/S	C/S	C/	C/S	C/	C/
TN5250			C/ (9)	C/S	C/S	
Telnet vt100	C/S (7)	/S (1), (7)	C/	C/S	C/S	C/S
Telnet vt200		C/S (6)	C/	C/S	C/	C/S
FTP	C/S	C/S	C/S (2)	C/S	C/S	C/S
TFTP	C/		C/ (2)		C/S	C/S
SMTP	C/S	C/S	C/S (9)	C/S	C/S	C/S
REXEC	C/S	C/S	C/ (2)	/S	C/S	C/S
Remote Shell (RSH)	C/S	C/S	C/ (2)		C/S	C/S
Network Database (NDB)	/S	C/S				C/
X-Windows	C/	C/	/S (10)		/S (5)	C/S
NFS	C/S	/S	C/	/S	C/S (5)	C/S
LPR/LPD	C/S	C/S	C/S (2)	C/S	C/S	C/S
RPC	C/S	C/S	C/	C/S (12)	C/S	C/S
NCS	C/S	C/S				C/S
Talk					C/S	C/S
Kerberos	C/S	C/S		C/S (12)		C/S
Internet Access (WWW)		/S (8)	C/ (4)		C/ (11)	C/
Gopher			C/ (4)		C/ (11)	
Sockets	C/S	C/S	C/		C/S	C/S
Network Management						
Finger			C/		C/	C/S
BootP			C/ (2)		C/S	C/S
SNMP	M/A	M/A	/A (2)	C/	M/A	M/A
PING	Yes	Yes	Yes	Yes	Yes	Yes
NETSTAT	Yes	Yes	Yes	Yes	Yes	Yes
RouteD	Yes	Yes	Yes (2)		Yes	Yes
Domain Name Server	R/S	R/S	R/	R/	R/S (5)	R/S

Legend

- A—Agent support
- C—Client support
- M—Monitor support
- R—Resolver support
- S—Server support

Notes

- (1) 3270 DBCS transform mode
- (2) DOS application (under Microsoft Windows 3.1, will run in a DOS box)
- (3) With FTP
- (4) By installing TCP/IP V2.1.1 for DOS, then doing an application only install of Internet Connect V3.0 for Windows
- (5) TCP/IP V2.0 for OS/2 + TCP/IP V2.0 for OS/2 Kit or Warp Connect (TCP/IP V3.0 for OS/2) + TCP/IP V2.0 for OS/2 Kit.
- (6) Via Communications Subsystem For Interconnection (CSFI) R2 - (5688-132)
- (7) Available as a separate program: IBM Cooperative Software - A-Net for TCP/IP from Teubner and Associates
- (8) Available as a separate program: IBM Internet Connection Server (5655-156)
- (9):Available under Microsoft Windows 3.1 only
- (10) Using OEM products only. OEM X-Windows products exist that can use TCP/IP V2.1.1 for DOS as a transport.
- (11) Only with Warp 3.0
- (12) With DCE Base Services/400 (5733-167)

Appendix B. PTY and TTY Architectures

This appendix includes two figures that explain tty (terminal-type) and pty (pseudo-terminal-type) architectures.

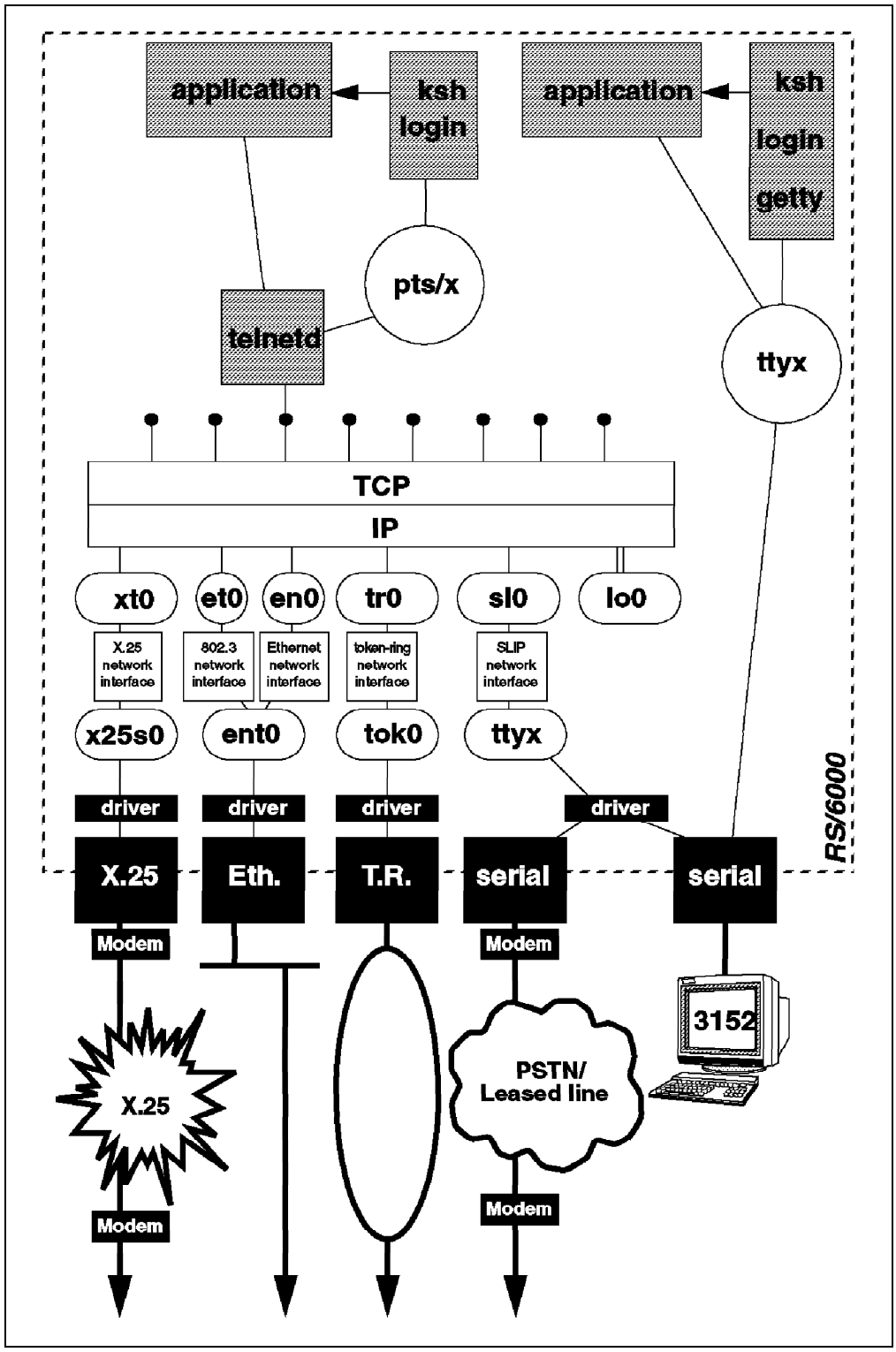


Figure 390. PTY and TTY Architectures

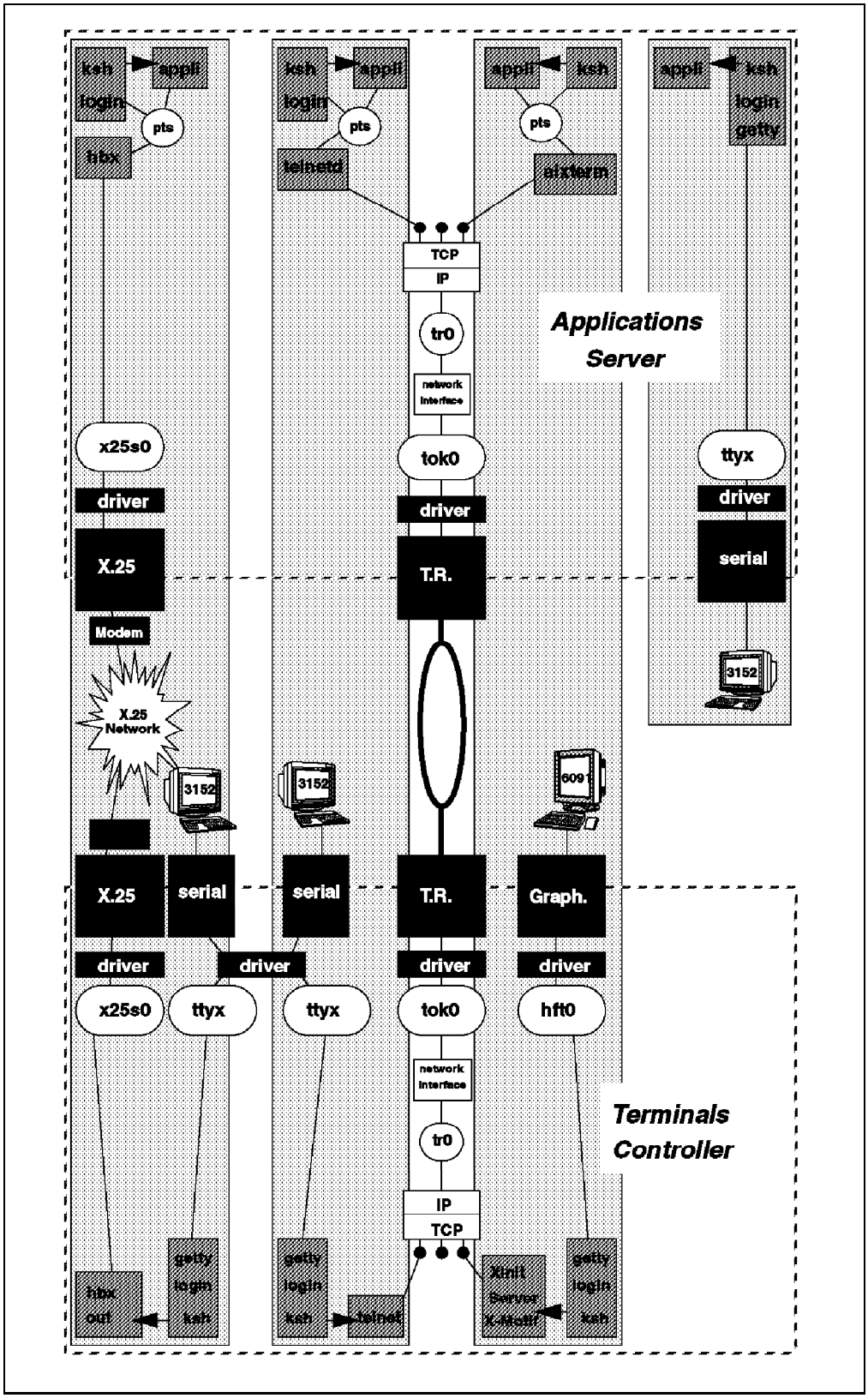


Figure 391. Terminal - Application Architecture

Appendix C. AIX V4 Communications Architecture

This appendix summarizes the AIX V4 Communications Architecture.

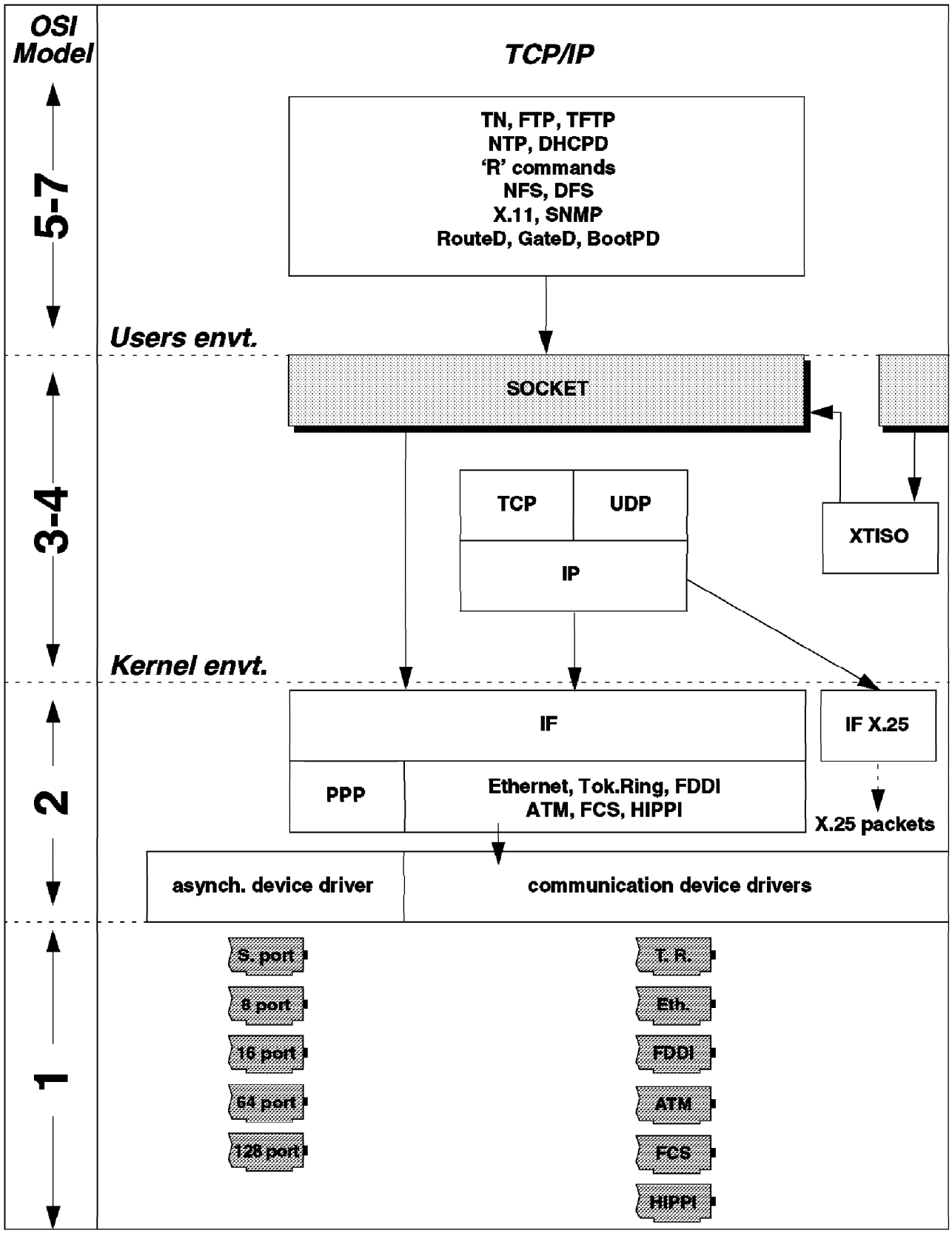


Figure 392. AIX V4 Communications Architecture

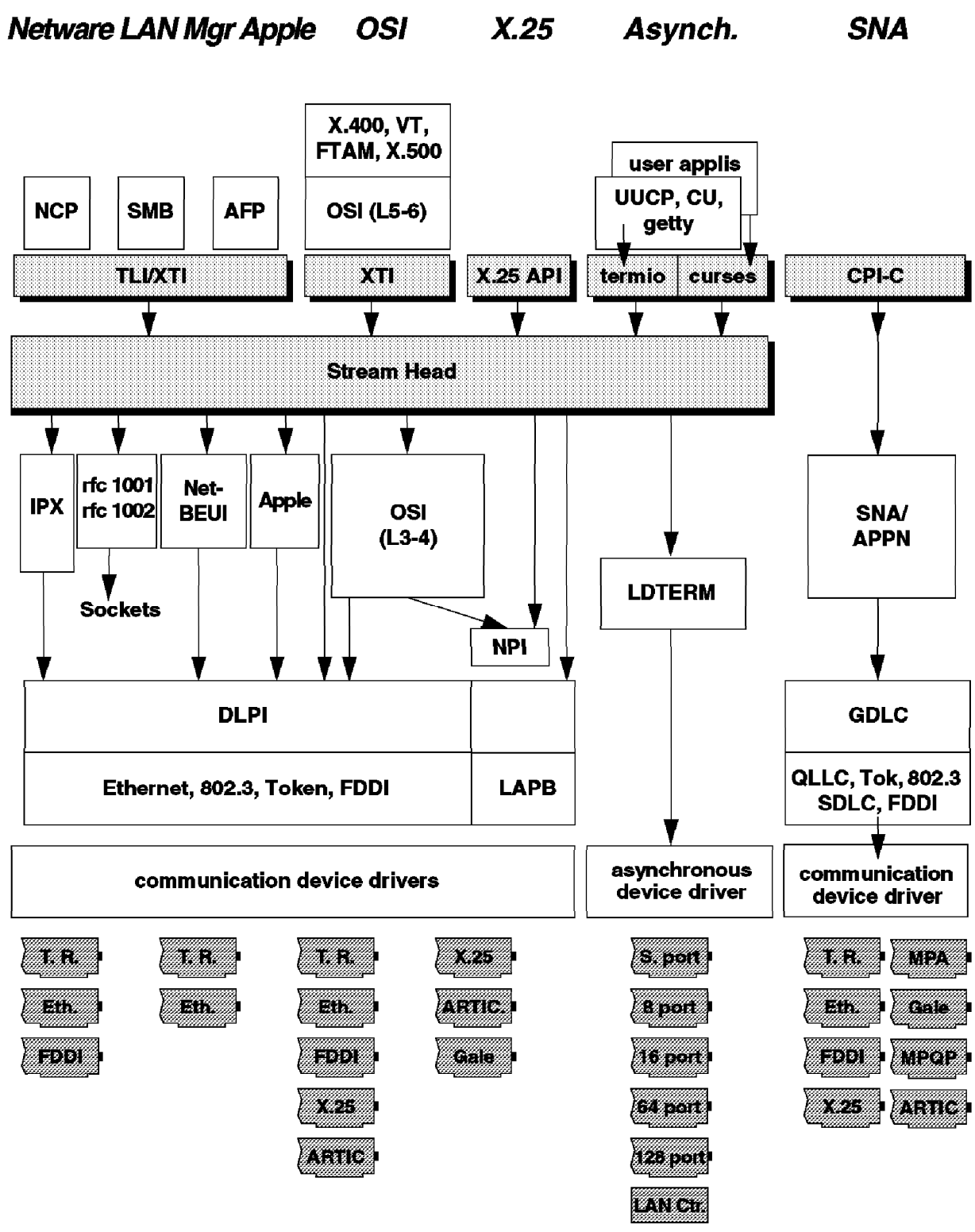


Figure 393. AIX V4 Communications Architecture (continued)

Appendix D. Special Notices

This publication is intended to help both customers and system engineers to design communication solutions in an AIX V4 environment. The information in this publication is not intended as the specification of any programming interfaces provided by any IBM product. See the publications section of the applicable IBM Programming Announcement for the specific product for more information about which publications are considered to be product documentation.

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Appendix E. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

E.1 International Technical Support Organization Publications

- *IBM Connectivity Guide*, SG24-4169
- *IBM Network Products Samples*, GG24-3649
- *IBM LAN Bridge and Switch Summary*, SG24-5000
- *An Inside Look at IBM Workgroup* Hubs and Switches, GG24-2528
- *Local Area Network Concepts and Products - LAN Architecture*, SG24-4753
- *Local Area Network Concepts and Products - Adapters, Hubs and ATM*, SG24-4754
- *Local Area Network Concepts and Products - Routers and Gateways*, SG24-4755
- *Local Area Network Concepts and Products - LAN Operation Systems and Management*, SG24-4756
- *Asynchronous Transfer Mode*, SG24-4625
- *RS/6000 to Mainframe Using S/370 Channel Connections*, SG24-4589
- *AIX Connections for Beginners*, SG24-4588
- *High-Speed Networking Technology: A Introductory Survey*, GG24-3816

A complete list of International Technical Support Organization publications, known as redbooks, with a brief description of each, may be found in:

International Technical Support Organization Bibliography of Redbooks, GG24-3070.

E.2 Redbooks on CD-ROMs

Redbooks are also available on CD-ROMs. **Order a subscription** and receive updates 2-4 times a year at significant savings.

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RISC System/6000 Redbooks Collection (PostScript)	SBOF-7205	SK2T-8041
Application Development Redbooks Collection	SBOF-7290	SK2T-8037
Personal Systems Redbooks Collection	SBOF-7250	SK2T-8042

E.3 Other IBM Publications

These publications are also relevant as further information sources.

- *Guide des solutions de Communications RS/6000 V4, Pierre Liger,July 1995*
- *AIX Version 4.1 Communications Programming Concepts*, SC23-2610
- *AIX Connections Version 4: Up and Running!*, SC23-1758
- *AIX Connections Version 4: LSserver User's Guide*, SC23-1759
- *AIX Connections Version 4: MACserver User's Guide*, SC23-1760
- *AIX Connections Version 4: NWserver User's Guide*, SC23-1761
- *AIX Connections Version 4: TNclient User's Guide*, SC23-1762
- *Adapters, Devices, and Cable Information for Multiple Bus Systems*, SA38-0516
- *Adapters, Devices, and Cable Information for Multiple Bus Systems*, SA23-2778
- *Adapters, Devices, and Cable Information for Micro Channel Bus Systems*, SA23-2764

How To Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, CD-ROMs, workshops, and residencies. A form for ordering books and CD-ROMs is also provided.

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- **Redbooks Home Page on the World Wide Web**

  `http://w3.itso.ibm.com/redbooks`

- **IBM Direct Publications Catalog on the World Wide Web**

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List of Abbreviations

AAL	ATM Adaptation Layer
AARP	AppleTalk Address Resolution Protocol
ACSE	Association Control Service Element
ADSP	Appletalk Data Stream Protocol
AEP	AppleTalk Echo Protocol
AFP	Apple Filing Protocol
AFP	AppleTalk Filing Protocol
ANSI	American National Standards Institute
API	Application Programming Interface
APPC	Advanced Program-to-Program Communications
APPN	Advanced Peer-to-Peer Networking
ARP	Address Resolution Protocol
ASP	AppleTalk Session Protocol
ATM	Asynchronous Transfer Mode
ATP	AppleTalk Transaction Protocol
BAN	Boundary Access Node
BMPX	Block Multiplexer Channel Adapter
BNU	Basic Network Utilities
BRI	Basic Rate Interface
BSD	Berkeley Software Distribution
CCA	Concurrent Communication Adapter
CCIT	International Telegraph and Telephone Consultative Committee
CES	Circuit Emulation Service
CHAP	Challenge Handshake Authentication Protocol
CIR	Committed Information Rate
CLIO/S	Client Input Output/Sockets
CLNS	Connectionless Network Service
CMIP	Common Management Information Protocol
CNM	Communication Network Management
COML	Connection-Oriented Network Layer
CONL	Connection-Oriented Layer
CONS	Connection-Oriented Network Service
CPLINK	Client Input Output/Sockets Cross-System Pipe Link
CSLIP	Compressed Serial Line Interface Protocol
CSMA/CA	Carrier Sense Multiple Access with Collision Avoidance
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
CUT	Coax-attached dependent displays
DBCS	Double-Byte Character Set
DCE	Data Circuit-terminating Equipment
DDP	Datagram Delivery Protocol
DFT	Distributed Function Terminal
DHCP	Dynamic Host Configuration Protocol
DIAL	Dial-In Access to LAN
DLPI	Data Link Provider Interface
DLSw	Data Link Switching
DLUR	Dependent LU Requestor
DNA	Digital Network Architecture
DNS	Domain Name Service
DPI	Distributed Processing Interface
DS	Directory Services
DSE	Data-Switching Equipment
DSPU	Down-Stream Physical Unit
DTE	Data Terminal Equipment
DTE	Data-Terminal Equipment
EI-IS	End System to Intermediate System
ELAP	EtherTalk Link Access Protocol
EMA	Enterprise Management Architecture
ETP	Extended Transport Protocol
FDDI	Fiber Distributed Data Interface
FMI	Ford Microelectronics Interface
FOIRL	Fiber Optic Inter Repeater Link
FRFH	Frame-Relay Frame Handler
FRTE	Frame-Relay Terminating Equipment
FSIOP	File Server Input/Output Processor
FSS/400	File Server Support/400
FTAM	File Transfer, Access, and Management
FTP	File Transfer Protocol
FTP	Foiled Twisted Pair
GUI	Graphical User Interface
HDLC	High-level Data Link Control
HPR	High-Performance Routing
IBM	International Business Machines
ICMP	Internet Control Message Protocol
IDP	Internetwork Datagram Packet

IEEE	Institute of Electrical and Electronic Engineers
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPX	Internet Packet Exchange
IPX/SPX	Internetwork Packet Exchange/Sequenced Packet Exchange
IS	Information Systems
IS-IS	Intermediate System to Intermediate System
ISA	Industry Standard Architecture
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITSO	International Technical Support Organization
LAM	Lobe Attachment Module
LAN	Local Area Network
LAPB	Link Access Procedure Balanced
LIU	Lobe Insertion Unit
LLAP	LocalTalk Link Access Protocol
LLC	Logical Link Control
LMI	Local Management Interface
LNM	IBM LAN Network Manager
LPD	Line Printer Daemon
LPR	Line Printer Requester
LPR	Line Printer Remote
MAC	Medium Access Control
MAN	Metropolitan Area Network
MAU	Multistation Access Unit
MCA	Micro Channel Adapter
MDI	Medium-Dependent Interface
MDI-X	Medium-Dependent Interface-Crossed
MFIOP	Multi-Function Input/Output Processor
MH	Messaging Handler
MHS	Message Handling System
MIB	Management Information Base
MIME	Multipurpose Internet Mail Extension
MMS	Manufacturing Message Specification
MPTN	Multiprotocol Transport Network
MVS/TSO	Multiple Virtual Systems/Time Sharing Option
NBBS	Network Broad Band Services
NBP	Name Binding Protocol
NCB	Network Control Block
NCP	NetWare Core Protocol
NCS	Network Computing System
NetBIOS	Network Basic Input Output System
NFS	Network File System
NIS	Network Information Service
NLSP	NetWare Link Services Protocol
NNI	Network to Network Interface
NTP	Network Time Protocol
NVT2	Novell Virtual Terminal
ONC	Open Network Computing
OSA	Open System Adapter
OSFP	Open Short Path First
OSI	Open Systems Interconnection
OSSC	Open Systems Standard Communications
PABX	Private Automatic Branch Exchange
PAD	Packet Assembler/Disassembler
PAP	Password Authentication Protocol
PAP	Printer Access Protocol
PBX	Private Branch Exchange
POS	Point-of-Sale
PPP	Point-to-Point Protocol
PRI	Primary Rate Interface
PROFS	Professional Office System
PSDN	Packet-Switched Data Network
PSE	Portable Streams Environment
PVC	Permanent Virtual Circuits
RARP	Reverse Address Resolution Protocol
RCU	Remote Configuration Utility
REXEC	Remote Execution Protocol
RFC	Requests for Change/Comments
RI/RO	Ring-In/Ring-Out ports
RIP	Routing Information Protocol
RMON	Remote Monitoring
ROSE	Remote Operations Service Element
RPC	Remote Procedure Call
RTMP	Routing Table Maintenance Protocol
RTSE	Reliable Transfer Service Element
SAP	Service Advertising Protocol
SBCS	Single-Byte Character Set
SCSI	Small Computer System Interface
SDDI	Shielded Distributed Data Interface
SDLC	Synchronous Data Link Control
SDS	Simple Directory Service

SLIP	Serial Line Interface Protocol
SLLC	Six-Line Communications Controller
SMIT	System Management Interface Tool
SMP	Symmetric Multiprocessor
SMT	ANSI Station Management
SMTP	Simple Mail Transfer Protocol
SNA	Systems Network Architecture
SNMP	Simple Network Management Protocol
SOCC	Serial Optical Channel
SPX	Sequenced Packet Exchange
STP	Shielded Twisted Pair
SVC	Switched Virtual Circuits
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
TLAP	TokenTalk Link Access Protocol
TLI	Transport Layer Interface
TP	Transaction Program
UDP	User Datagram Protocol
UNI	User to Network Interface
UP	Uniprocessor
UTP	Unshielded Twisted Pair
UUCP	UNIX-to-UNIX Control Protocol
VCI	Virtual Connection Identifier
VM/CMS	Virtual Machine/Conversational Monitor System
VPI	Virtual Path Identifier
VT	Virtual Terminal
WAC	Wide Area Connector
WAN	Wide Area Network
WWW	World Wide Web
XDR	eXternal Data Representation
XTI	X/Open Transport Interface
ZIP	Zone Information Protocol

Index

Numerics

A

B

C

D

E

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