CHAPTER 1

Product Overview

This chapter provides an overview of remote access server functionality. Remote access servers include communication servers and routers. Each of these is described in the sections that follow.

Note The communication server is not supported in Internetwork Operating System Release 10, but communication server functionality is supported on the AUX port of the router.

Communication Server Overview

You will find the following information in this section:

- Communication Server Functionality
- Supported Protocols
- Supported Interfaces and Connections
- Supported Communication Servers

Communication servers connect terminals, modems, microcomputers, and networks over serial lines to local-area networks (LANs) or wide-area networks (WANs). They provide network access to terminals, printers, workstations, and other networks. For example, a user can use Serial Line Internet Protocol (SLIP) or Point-to-Point Protocol (PPP) and dial into a communication server at a remote office (see Figure 1-4). This function is called *telecommuting*, and is one of the four functions of a communication server. The following section, "Communication Server Functionality," describes each of these functions.

Communication Server Functionality

Your communication server supports four types of server operation (see Figure 1-1):

- Terminal services—Connecting asynchronous devices to a LAN or WAN through network and terminal-emulation software such as Telnet, rlogin, TN3270, and Local Area Transport (LAT). See Figure 1-2.
- Telecommuting services—Connecting devices over a telephone network using XRemote (NCD's X Windows terminal protocol), SLIP, or PPP. See Figure 1-3 and Figure 1-4.
- Protocol translation services—Converting one virtual terminal protocol into another protocol.

- Routing services—Full-featured Internet Protocol (IP) and Internet Packet Exchange (IPX) routing. This is the same routing functionality found on the AGS+ router platform. See Figure 1-6.

Figure 1-1 illustrates the four types of server functionality available on the communication server.

- Terminal service between the terminals and hosts running the same protocol (LAT or TCP).
- Telecommuting service by the remote PC connection running SLIP, PPP, or XRemote.
- Protocol translation service between terminals and hosts running dissimilar protocols (LAT-to-TCP or TCP-to-LAT).
- Asynchronous IP or IPX routing by the PC running SLIP or PPP, and between the two communication servers.

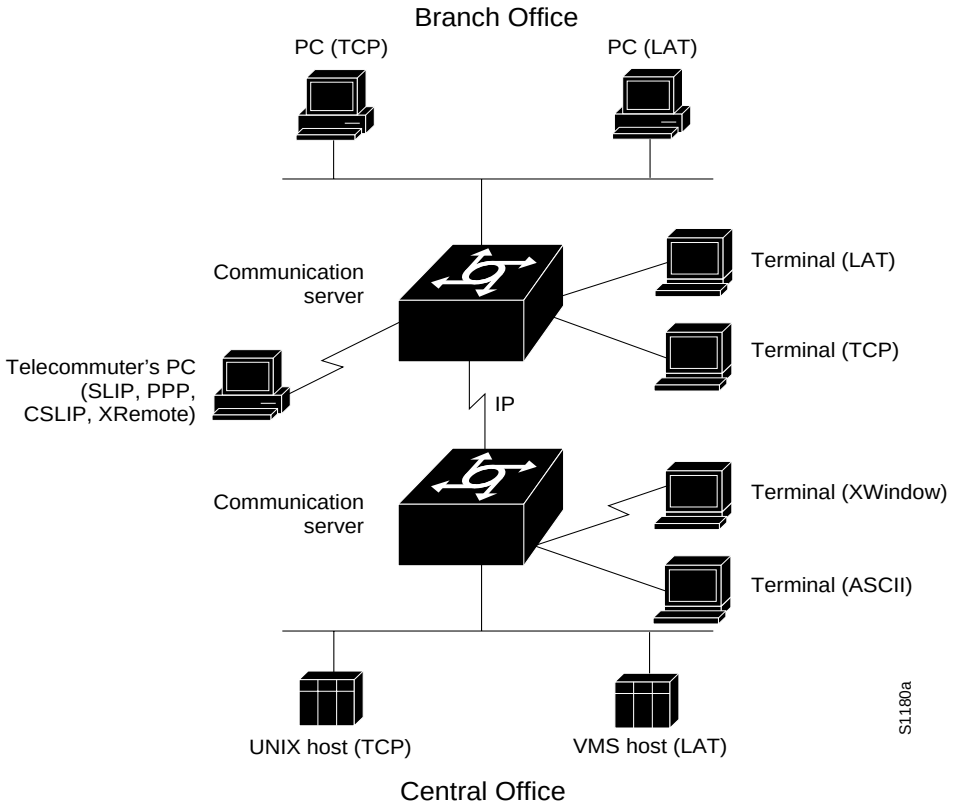

Figure 1-1 Functions of the Communication Server

LANs and WANs

On LANs, terminal services support the following types of connections:

- Telnet and rlogin connections using Transmission Control Protocol/Internet Protocol (TCP/IP) to UNIX machines
- TN3270 connections using TCP/IP to IBM machines
- LAT connections to Digital Equipment Corporation (Digital) machines

You can use the protocol translation services of the communication server to make connections between hosts and resources running different protocols, including connections to X.25 machines using X.25 PAD.

Telecommuting services support WAN connectivity with XRemote, SLIP, and PPP. Other WAN services include X.25, Switched Multimegabit Data Service (SMDS), and Frame Relay. Full IP and IPX routing services are also supported. Communication servers are network-compatible with routers, which you can use to extend your network to any size you need.

Terminal Services

The communication server provides terminal-to-host connectivity using virtual terminal protocols including Telnet, LAT, TN3270, rlogin, and X.25 PAD on serial lines. Modems can be set up for rotary connections, so that you can connect to the next available modem. A host can also connect directly to a communication server. In IBM environments, TN3270 allows a standard ASCII terminal to emulate a 3278 terminal and access an IBM host across an IP network. In Digital environments, LAT support provides a terminal with connections to VMS hosts.

X.25 PAD enables terminals to connect directly to an X.25 host over an X.25 network through the communication server. X.25 PAD eliminates the need for a separate PAD device. This connection requires a synchronous serial interface. For more information, refer to the section “Router Overview.”

Figure 1-2 illustrates terminal-to-host connections using a communication server.

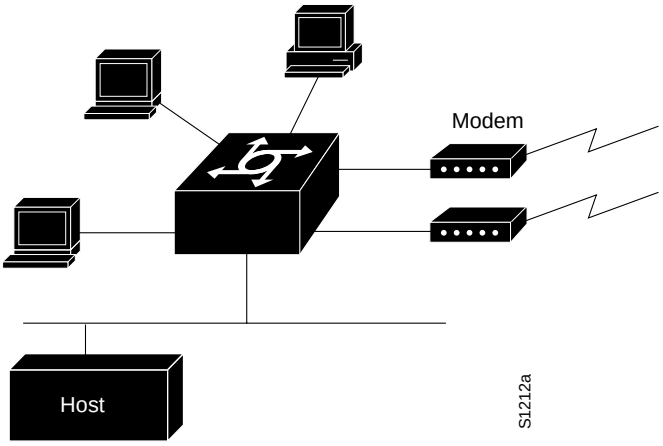

Figure 1-2 Terminal-to-Host Connectivity

Telecommuting

Using SLIP or PPP, you can run TCP/IP applications including Telnet, Simple Mail Transfer Protocol (SMTP), and File Transfer Protocol (FTP) over serial lines. You can get remote connectivity with the same functionality as a PC attached to a local network. Or you can use the XRemote protocol over asynchronous lines, because the communication server can provide network functionality to remote X display terminals.

Figure 1-3 illustrates an XRemote connection using a communication server. See the *Communication Server Configuration Guide* for additional possible XRemote configurations.

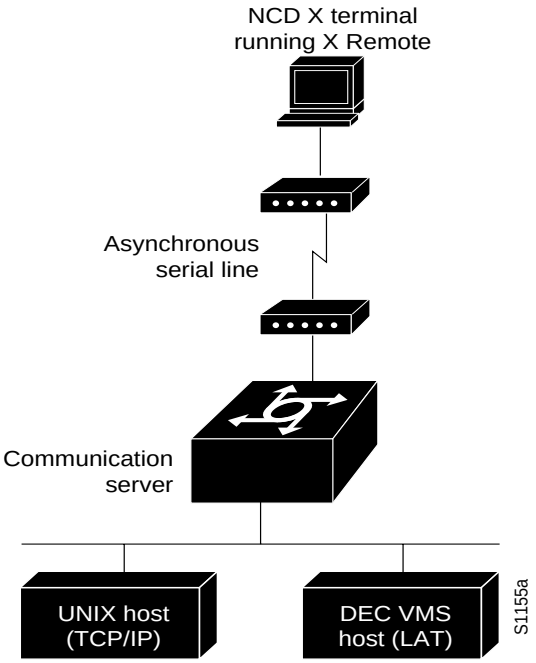

Figure 1-3 XRemote Connection

Figure 1-4 illustrates telecommuting connections where remote users dial into a communication server and connect to network services.

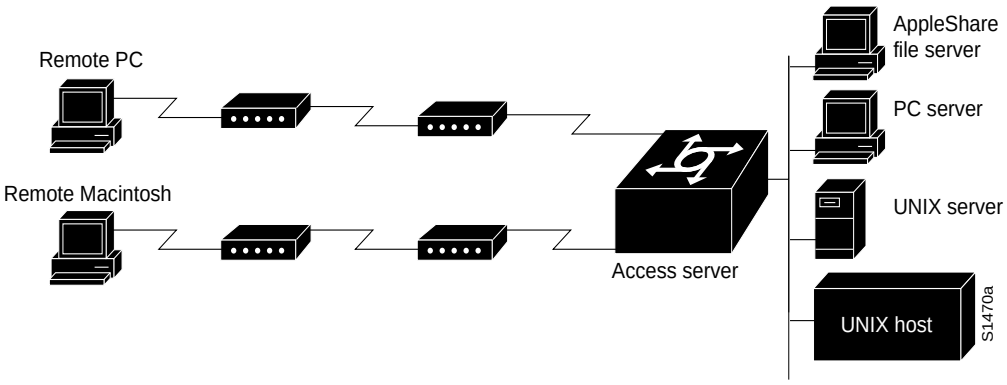

Figure 1-4 Telecommuting Connection

Protocol Translation on the Communication Server

The communication server translates virtual terminal protocols so that devices running dissimilar protocols can communicate. Protocol translation on the communication server supports Telnet, LAT, and X.25.

There are two ways to make connections using the protocol translator: the one-step method and the two-step method. With the one-step method, you perform bidirectional translation between any of the following protocols:

- X.25 and TCP (on the ASM-CS)
- X.25 and LAT (on the ASM-CS)
- LAT and TCP

The two-step method enables connection to IBM hosts from LAT, Telnet, rlogin, and X.25 PAD environments. Users must first connect to the communication server, then use the TN3270 facility to connect to the IBM host. Figure 1-5 illustrates LAT-to-TCP protocol translation.

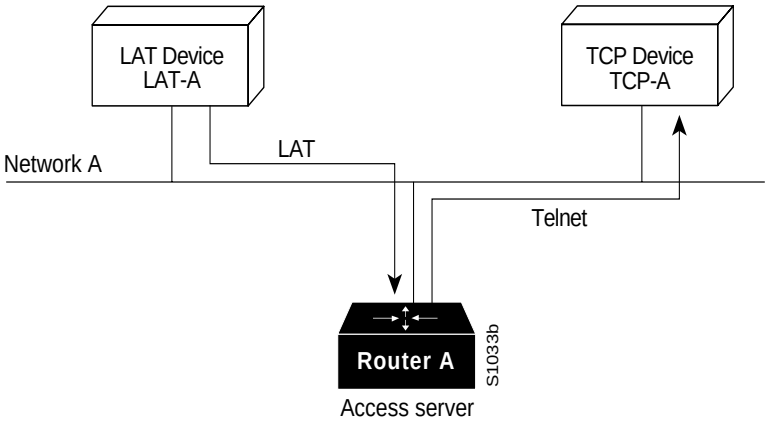

Figure 1-5 LAT-to-TCP Protocol Translation

IP Routing

Routing is the process of determining the most efficient path for sending data packets to an address outside the local network. The communication server gathers and maintains routing information to enable the transmission and receipt of such data packets. Routing information takes the form of entries in a routing table, with one entry for each identified route. The communication server creates and maintains the routing table dynamically to accommodate changes in the network configuration.

Communication servers allow you to route IP and IPX packets over synchronous and asynchronous lines. Asynchronous routing provides low-cost operation over normal dial-up telephone networks. The communication server's routing capabilities provide home and sales offices with cost-effective access to a central site. For example, traffic from PCs and UNIX workstations can be routed through the communication server, eliminating the need for multiple phone lines and modems. Routing over asynchronous lines also provides significant phone-line savings for small offices by using dial-up telephones rather than more costly leased lines.

All of the IP and IPX routing protocols and special features that are implemented on routers are available on your communication server. Routing protocols include Open Shortest Path First (OSPF), Interior Gateway Routing Protocol (IGRP), Routing Information Protocol (RIP), Exterior Gateway Routing Protocol (EGP), and Border Gateway Protocol (BGP). Special routing features include route filtering, priority queuing, access lists, and more.

Figure 1-6 illustrates an IP routing configuration across asynchronous serial lines. In this configuration, the host is connected to an Ethernet network and forms a routing connection with communication servers at remote sites.

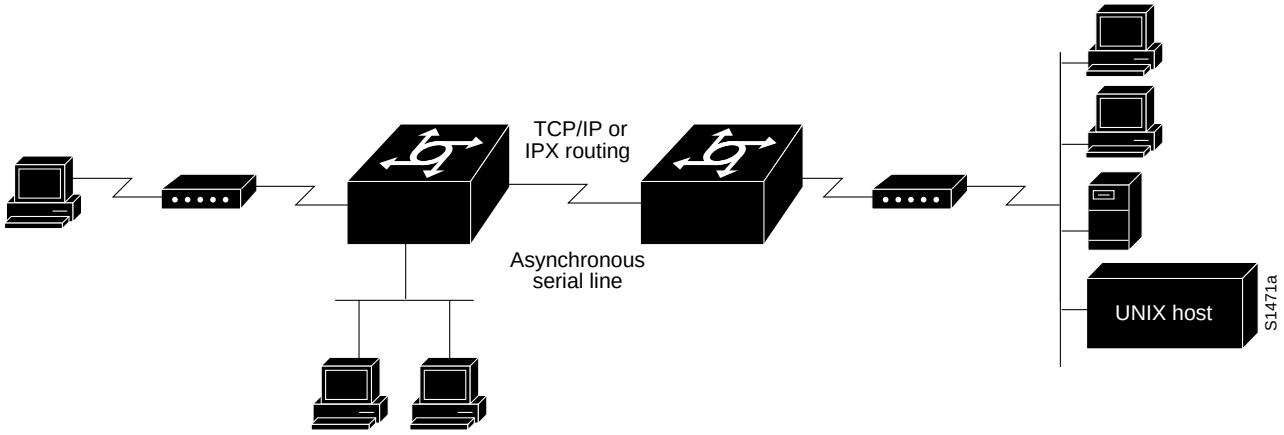

Figure 1-6 Asynchronous Routing Connectivity

Supported Protocols

A user can dial in and use a port for any of the following types of connections:

- Telnet
- LAT
- rlogin
- X.25 (on the ASM-CS only)
- TN3270
- XRemote
- SLIP and PPP connections to a single PC
- IP and IPX routing

This range of functionality is possible because multiple roles can be assigned to each asynchronous interface. Each asynchronous line can be used as a network interface for IP routing, as a source of data for terminal-server communications (using Telnet, LAT, rlogin, and so forth), for protocol translation, and for telecommuting (using XRemote and SLIP).

Following are brief descriptions of the protocols and connection services supported by the available communication server models.

- TCP/IP is the most widely implemented protocol suite on networks of all media types. TCP/IP is today's standard for internetworking, and is supported by most computer vendors, including all UNIX-based workstation manufacturers.
- SLIP is an inexpensive means of connecting a personal computer or workstation to a network using asynchronous dial-up modems.
- LAT protocol is Digital's proprietary terminal connection protocol used with Digital minicomputers.

- The X.25 specification permits cost-effective, as-needed access to major public networks in the United States and Europe.
- IBM 3278 terminal emulation provides TN3270-based connectivity to IBM hosts over serial lines.
- Network Computing Devices Inc. XRemote terminal facility allows for remote X Window operation.

Supported Interfaces and Connections

Communication servers handle multiple device interfaces. They multiplex asynchronous RS-232 serial lines onto a high-speed network interface. ASCII terminals, modems, printers, and host serial ports are among the devices you can connect to the communication servers. You can use a number of methods to connect serial devices, including RJ-11, RJ-45, and 50-pin Telco connectors. The 500-CS supports RJ-45 connectors only. The ASM-CS supports Telco and RJ-11 connectors.

Network interfaces for communication servers provide easy connectivity. The network interface is typically Ethernet, but it can also be synchronous serial lines and Token Rings (on the ASM-CS only).

Using communication servers, any RS-232-compatible device, such as a serial laser printer, film recorder, or plotter, can become a shared resource to your organization over a local network.

Supported Communication Servers

Part of the power and flexibility of your communication server components is derived from their physical configuration options. You can choose from single-board systems or card-based chassis configurations that offer processor, back-panel connector mountings, and communications interfaces best suited to your network.

Communication Server Models

The following communication server models are available:

- The ASM-CS model is built on the 9-slot A chassis and can support from 16 to 112 asynchronous lines. Network interfaces include synchronous serial, Ethernet, or Token Ring.
- The 500-CS model can support 8 or 16 asynchronous lines. Network interfaces include synchronous serial and Ethernet.

Microprocessors

The ASM-CS offers a choice of an MC68020 microprocessor with 4 MB of memory or an MC68040 microprocessor with 16 MB of memory. The 500-CS is based on the MC68331 processor, which comes with 2 MB of RAM and is expandable to 4 MB or 10 MB of RAM, and offers both RS-232 and RS-423 serial connectors, as well as hardware and software flow control. All system microprocessors contain onboard RAM, system ROM holding all operating system, bootstrap, and diagnostic software.

The communication server also includes nonvolatile memory that retains configuration information even when there are power losses or system reboots. With the nonvolatile memory option, the terminal and network servers do not rely on other network servers for configuration and boot service information.

Router Overview

Complex internetworks have grown past the point where network administrators can depend on equipment from a single vendor. At the same time, administrators of small, independent networks are finding it necessary to interconnect and interoperate. Virtually all organizations creating and connecting LANs and WANs today have major commitments to hardware and software from many different vendors. Therefore, current and future internetworking requires products that support multiprotocol and multimedia networks with multivendor products.

Our routers connect LANs and WANs and interoperate with equipment from most vendors over most available media. This chapter describes the protocols and media that our routers support.

You will find the following information in this section:

- Supported Network Protocols
- Supported Media

Supported Network Protocols

Our routers support many networking protocols, as well as several routing protocols. These protocols are based on both open standards and proprietary protocols from a variety of vendors. Our routers also support a wide set of bridging and IBM connectivity solutions.

Our routers can receive and forward packets concurrently from any combination of the following:

- WAN protocols
  - Asynchronous Transfer Mode (ATM)
  - Dial-on-demand routing (DDR)
  - Frame Relay
  - High-level Data Link Control (HDLC)
  - Integrated Services Digital Networks (ISDN)
  - Point-to-Point Protocol (PPP)
  - SLIP (for asynchronous lines)
  - Switched Multimegabit Data Service (SMDS)
  - X.25 and its derivatives, including LAPB and DDN X.25
- LAN protocols
  - Apollo Domain
  - AppleTalk (Phase 1 and Phase 2)
  - Banyan VINES
  - DECnet Phase IV, Phase IV Prime, and Phase V
  - Internet Protocol (IP)
  - ISO Connectionless Network Services (CLNS) and Connection Mode Network Services (CMNS)
  - Novell IPX
  - XNS and two variations developed by Ungermann-Bass and 3Com

- Bridging types
  - Transparent bridging (TB) and source-route transparent (SRT) bridging
  - Source-route bridging (SRB) and remote source-route bridging (RSRB)
  - Source-route translational bridging (SR/TLB)
- Support for IBM networking
  - Serial tunnel (STUN)
  - LLC2 and Synchronous Data Link Control (SDLC)
  - SDLLC

Supported Media

Our routers support the following industry-standard networking media:

- Ethernet—IEEE 802.3 and Type II
- Token Ring—IEEE 802.5
- FDDI—single and dual mode
- Synchronous serial—V.35, RS-232, RS-449, RS-530, and X.21
- High-Speed Serial Interface (HSSI)—supports T3, E3, and SONET rates