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## VT100 Emulation, 56KB Line, and Internetworking

Revised: 7/17/92  
Security: Everyone

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Article Created: 20 April 1992  
Article Last Reviewed:  
Article Last Updated:

TOPIC -----

I want to tie a Macintosh network (for example, AppleShare or Ethernet) into a 56KB line for the purpose of VT100 emulation for two purposes:

- An electronic time card system running on a 3090 with a TCP/IP front end.
- A UNIX-based E-mail system running on several types (Sperry 5080, Sperry 5095, Gould 9000, and Pyramids).

The standard PC setup includes using VT100 emulation through remote bridges (using Xyplex devices).

I have no idea how to set VT100 up as a gateway. And, would I need to set up a separate gateway for the time card system, or could the two be combined?

DISCUSSION -----

The choice of an application for the Macintosh is easy. Choose any MacTCP-based application that supports VT100 emulation (almost all of them do). You might consider the Intercon or Wollongong commercial products, or the widely-used NCSA public domain package. You might also consider a CommToolBox-based application. You could use any CommToolBox-based communications program (such as MacTerminal 3.0, VersaTerm Pro, and so on), and a telnet tool available from a variety of sources (like the VersaTerm product that ships with a telnet tool, InterCon, and so on).

Connecting the two networks together is also a simple task. You need to choose a router product that supports both Ethernet and high-speed serial links. The router will need to support IP routing at the minimum, and

depending on the other requirements, might also need to support other protocols as well.

You need to know how many users will be connected, and what their usage patterns will be before choosing specific products. Topology is also a major consideration:

- What, if any, other routers are installed on the network?
- Are you routing AppleTalk?
- Do you have more than one Ethernet network?
- Are there any users connected on LocalTalk?

There are a number of technological alternatives for internetworking to choose from. Network managers should base their decisions on levels and quality of service, in addition to price. Factors to consider in the selection include:

- User need for almost real-time service between linked networks
- What protocols provide the required services
- Matching the hardware to the applications used on the networks, and compatibility of the hardware with the network protocols
- Operating system and physical layer
- Security
- Technology-specific issues
- Whether users require near real-time access across network boundaries (Will slower packet-switching services suffice?)

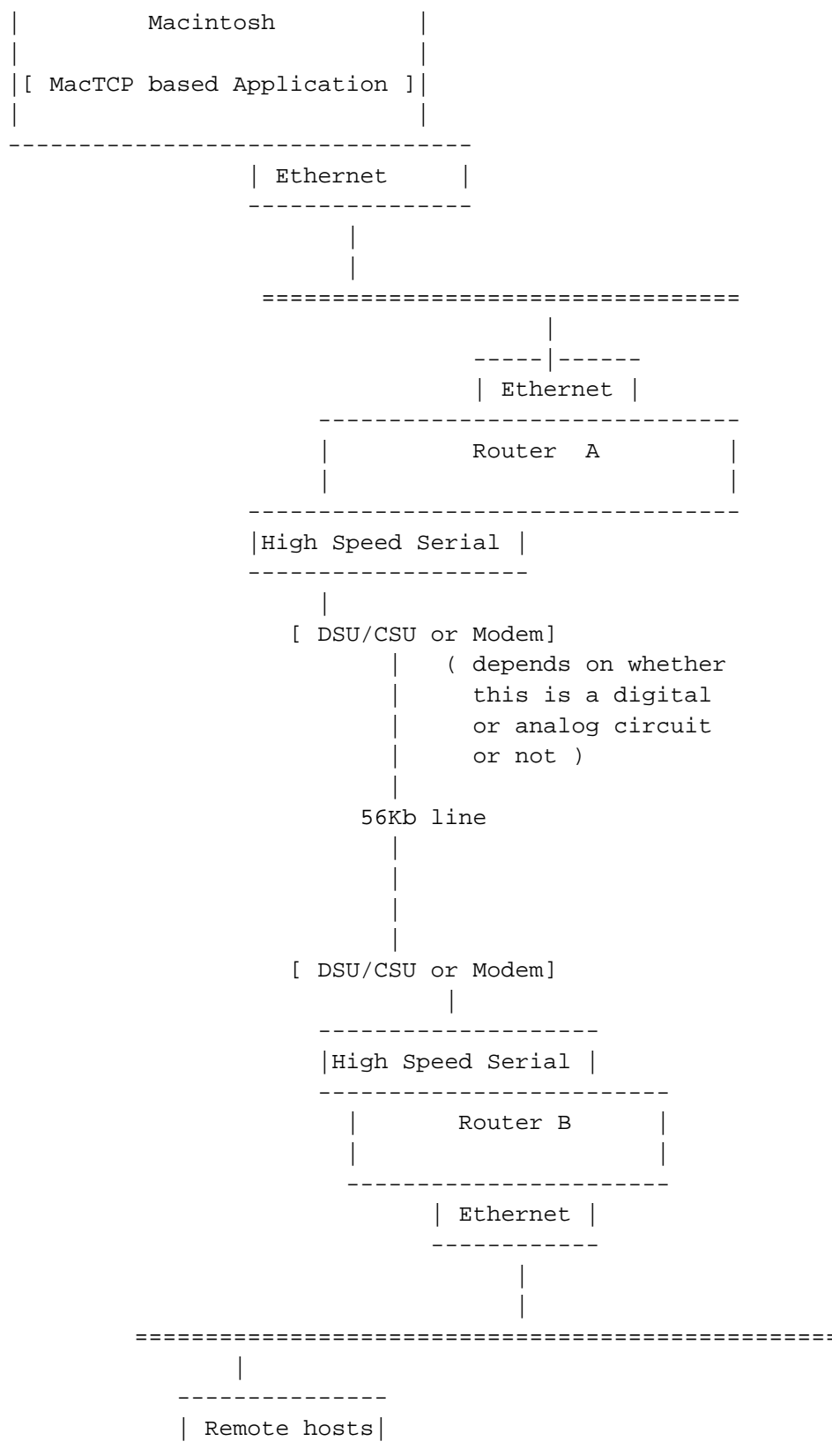
The choice will largely depend on the expected traffic through the router and existing topology considerations. There are several high-end routers for heavy usage environments, and there are a few low-end routers capable of supporting high-speed serial links. Cisco is the industry leader, and is the router we use internally at Apple. Cisco offers a full range of products. This article includes a brief description of products from Cisco as well as other vendors.

If the environment calls for the use of a DDP/IP router, the CommTalk by APT would be an excellent choice. The router doesn't support native TCP/IP routing, although it does provide a DDP/IP gateway which all AppleTalk connected Macintosh computers can use for IP services. The DDP/IP gateway provides a mechanism for MacTCP-based applications to encapsulate IP packets in AppleTalk DDP packets. This allows an existing Macintosh network with AppleTalk-only routers to communicate with computers using the IP protocol anywhere on the connected IP network.

The CommTalk router is available in several configurations, both as a local and remote router. It's configurable for up to 6 local network attachments, either Ethernet or LocalTalk, and 1 high-speed serial port for wide area communications. The CommTalk supports speeds up to 1.544MB (T1) on the high-speed serial port.

So what we have now is this:

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Note: Router A and router B must speak a compatible protocol over the high-speed serial connection.

Product Information

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- cisco Systems AGS+  
AGS + is a TCP/IP, DECnet, Apple, and IPX router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports RS-232, V.35, RS-422, frame relay, SMDS, X.25, and T-1. The router can simultaneously bridge. This 32-port router can forward 20,000 pps. It uses the RIP, OSPF, IS-IS, BGP, FGP, IGRP, or RTMP routing protocols.
  - cisco Systems CGS  
CGS is a TCP/IP, DECnet, Apple, and IPX router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports RS-232, V.35, RS-422, frame relay, T-1, satellite, microwave, X.25, RS-449, X.2 1, and SMDS. It can simultaneously bridge. This four-port router can forward 20,000 pps. It uses the RIP, OSPF, IS-IS, EGP, GRP, IGRP, or RTMP routing protocols.
  - cisco Systems IGS  
IGS is a TCP/IP, DECnet, Apple, and IPX router for Ethernet. For WAN connections, it supports RS-232, V.35, RS-422, frame relay, T-1, satellite, microwave, X.21, RS-449, and SMDS. The router can simultaneously bridge. It can forward 6,000 pps. It uses the RIP, IS-IS, IGRP, BGP, or EGP routing protocols.
  - cisco Systems MGS  
MGS is a TCP/IP, DECnet, Apple, and IPX router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports RS-232, V.35, RS-422, frame relay, T-1, satellite, microwave, X.25, X.21, RS-449, and SMDS. The router can simultaneously bridge. This 11-port router can forward 20,000 pps. It uses the RIP, OSPF, IS-IS, IGRP, EGP, BGP, or RTMP routing protocols.
  - Hewlett-Packard HP, HP ER  
The HP (HP 27270A) and HP ER (HP 27285A) are TCP/IP, DECnet, Apple, IPX, X.25, and XNS routers that support RS-232, V.35, RS-422, T-1, and X.21 WAN connections. They use RIP. The HP router runs on Ethernet and Token Ring networks, while the HP ER runs on Ethernet. Both can simultaneously bridge. A two- to 16-port router can forward 8,500 pps, and the HP ER, a four-port router, can forward 9,000 pps.
  - Network Systems 6000 Series  
The 6000 Series RISC includes TCP/IP, DECnet, Apple, IPX, XNS, and OSI bridge/routers for Ethernet, Token Ring, and FDDI. For WAN connections, they support RS-232, V.35, frame relay, T-1, T-3, SMDS, satellite, and microwave. Each router can forward 15,000 pps for Ethernet and 50,000 pps for FDDI. The routers use the RIP, OSPF, or IS-IS protocols.
  - Newbridge Networks  
8100 MULTIPROTOCOL The 8100 Multiprotocol is a TCP/IP, DECnet, Apple, IPX and XNS router for Ethernet, Token Ring, and FDDI networks that supports RS-232, V.35, RS-422, frame relay, T-1, and X.25 WAN connections. It can simultaneously bridge. This router can forward 14,800 pps. It uses RIP.

- Proteon CNX 500

The CNX 500 is a TCP/IP, DECnet, Apple, IPX, XNS, Domain, and OSI bridge/router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports RS-232, X.35, RS-422, T-1, PPP, and X.25. It can simultaneously bridge. This six-port router can forward 25,000 pps. The CNX 500 uses RIP or OSPF.

- Proteon P4100

The p4100 is a TCP/IP, DECnet, Apple, IPX, XNS, Domain, and OSI bridge/router for Ethernet and Token Ring. For WAN connections, it supports RS-232, V.35, RS-422, T-1, X.25, PDN, and DDN. The router can simultaneously bridge. This four-port router can forward 3,000 to 4,000 pps. It uses RIP or OSPF.

- Proteon P4200

The p4200 is a TCP/IP, DECnet, Apple, IPX, XNS, Domain, and OSI router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports RS-232, V.35, RS-422, T-1, and SMDS. This nine-slot router, with up to 14 connections, can forward 4,000 to 6,000 pps. It uses RIP or OSPF.

- RAD Network Devices Open Gate

Open Gate is a TCP/IP, DECnet, Apple, and IPX router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports V.35, RS-422, frame relay, T-1, satellite, and microwave. The router can simultaneously bridge. This two- to 24-port router can forward 150,000 pps. It uses RIP or OSPF.

- Chipcom Online Module

The Online router module is a TCP/IP, DECnet, Apple, and IPX router for Ethernet. For WAN connections, it supports RS-232, V.35, RS-422, frame relay, T-1, satellite, and microwave. The router can simultaneously bridge. This two-port router can forward 6,000 pps. It uses the RIP, IGRP, BGP, RTMP, ZIP, or EGP routing protocols.

- Timeplex Time/LAN 100

Time/LAN 100 is a TCP/IP, DECnet, Apple, IPX, XNS, X.25, and DDN bridge/router for Ethernet, Token Ring, and FDDI. For WAN connections, it supports RS-232, V.35, RS-422, T-1, PPP, G.703, satellite, and microwave. It can simultaneously bridge. This 12-port router can forward 14,000 pps. It uses RIP or OSPE.

- Wellfleet Concentrator, Feeder, Link Nodes

The Concentrator, Feeder, and Link Nodes are TCP/IP, DECnet, AppleTalk, IPX, XNS, and X.25 routers. The Concentrator and Link nodes run on Ethernet, Token Ring, and FDDI. The Feeder Node operates on Ethernet and Token Ring. They can simultaneously bridge, use RIP or OSPF, and can forward 14,5000 pps. For WAN connections, they support RS232, V.35, RS-422, X.25, SDLC, HDLC, T-1, E-1, fractional T-1, satellite, microwave, frame relay, and SMDS.

- Telebit Netblazer

The NetBlazer TCP/IP router for Ethernet networks supports RS-232, V.35,

and RS-422 WAN connections. It uses RIP. The entry-level model has three ports.

## MacTCP-Based VT100 Compatible Applications

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- InterCon Systems Corp.  
TCP/Connect-II
- VersaTerm-PRO  
NCSA maintains a professional-looking TELNET package for the PC and the Macintosh which supports remote login, multiple VT102 emulation, Tek 4014 emulation, subnetting, and dynamic IP address assignment via RARP.

Features included in NCSA Telnet:

(\* means new in version >= 2.2)

- DARPA standard telnet
- Built-in standard FTP server for file transfer
- VT102 emulation in multiple, simultaneous sessions
- Full subnetting support
- Tektronix 4014 graphics emulation
- Scrollback for each session
- Domain name lookup with default domain suffix
- \*RARP for dynamic IP address assignment
- Full color support (PC and \*Macintosh II)
- \*Font and size support (Macintosh)
- \*MacBinary FTP transfer (Macintosh)
- \*New Ethernet board support (PC, PS/2)

How to obtain a copy:

- 1) From a friend  
The documentation, program and source code are now in the public domain. Copy, modify, distribute.
- 2) Anonymous FTP from ftp.ncsa.uiuc.edu (128.174.20.50)  
You may want to ftp the README file(s) to determine which files to transfer to your home computer.

For the PC version, you have your choice of tar files which contain the documentation, the programs, and supporting files. For each tar file, there is also a compressed tar file with the same contents. After the files are extracted from the tar file, some transfer method (for example, kermit, NCSA Telnet) should be used to download the files to the PC. The documentation is available in line printer format, and Macintosh Microsoft Word format. Remember to download .EXE files in binary mode.

The Macintosh version consists of several files encoded with Stuff-It. The BinHex (.HQX) version is a duplicate copy for those who need a non-binary distribution. Download the selections you need with a binary transfer method (kermit, NCSA Telnet), and extract the individual files. The documentation is in Microsoft Word 3.X format.

3) Diskette or Tape

On-disk copies and printed manuals are available for a small fee which covers materials, handling, and postage. The anonymous FTP tape covers the contents of all disks. Orders can only be accepted if accompanied by a check in U.S. dollars made out to the University of Illinois. You can get an order form by contacting NCSA Telnet Orders.

CommToolBox-Based MacTCP Tools

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These are current products available that provide telnet access for programs that use the Communication ToolBox:

- TCPack  
Supports telnet and ftp protocols.
- InterCon's Telnet Driver/Tool  
Telnet support only.
- VersaTerm-Pro  
Ships with a telnet tool

On AppleLink, you can find contact information for the various vendors by clicking the Library Index button to view the folder structure in the Tech Info Library. An alphabetic listing of vendors is in the Third Party Company Directory folder.

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Tech Info Library Article Number:10124