- You can use the resources of a different computer.

  Adam uses a very powerful workstation and sophisticated software to design a rocket nose cone on his screen and to test his design.

  Adam's problem is that, even though his workstation is very powerful, it is not fast enough to run the solids-modeling software. However, because Adam's workstation is part of a computer network, he can execute his program on a Cray Research supercomputer that is attached to his network. He can access the Cray Research system with one or two simple commands and execute the program as if he were directly connected to the Cray Research system.

- You can send messages to other people on the network.

  After reviewing Adam's nose cone design, Jenny wrote a report recommending that the company implement Adam's design. She used her computer text editor to write the report, and then she sent copies electronically to other people who were either in the same building or in one of the regional offices. Everyone on her distribution list received a copy in a matter of minutes.

Forms of computer networks
1.1.2

A computer network is somewhat invisible (or *transparent*) to the people using it. For example, when Adam executes a command on a Cray Research system, he is aware of only two pieces of equipment: his workstation and the Cray Research system on which he executes the program. Adam perceives his network as an indistinct object; its physical components are unimportant to him.

In reality, a computer network is very complex because of the number and types of computers linked together, the various network media used to connect the computers, and the geographic distance between computers. Figure 1 illustrates what Adam's network might actually look like.

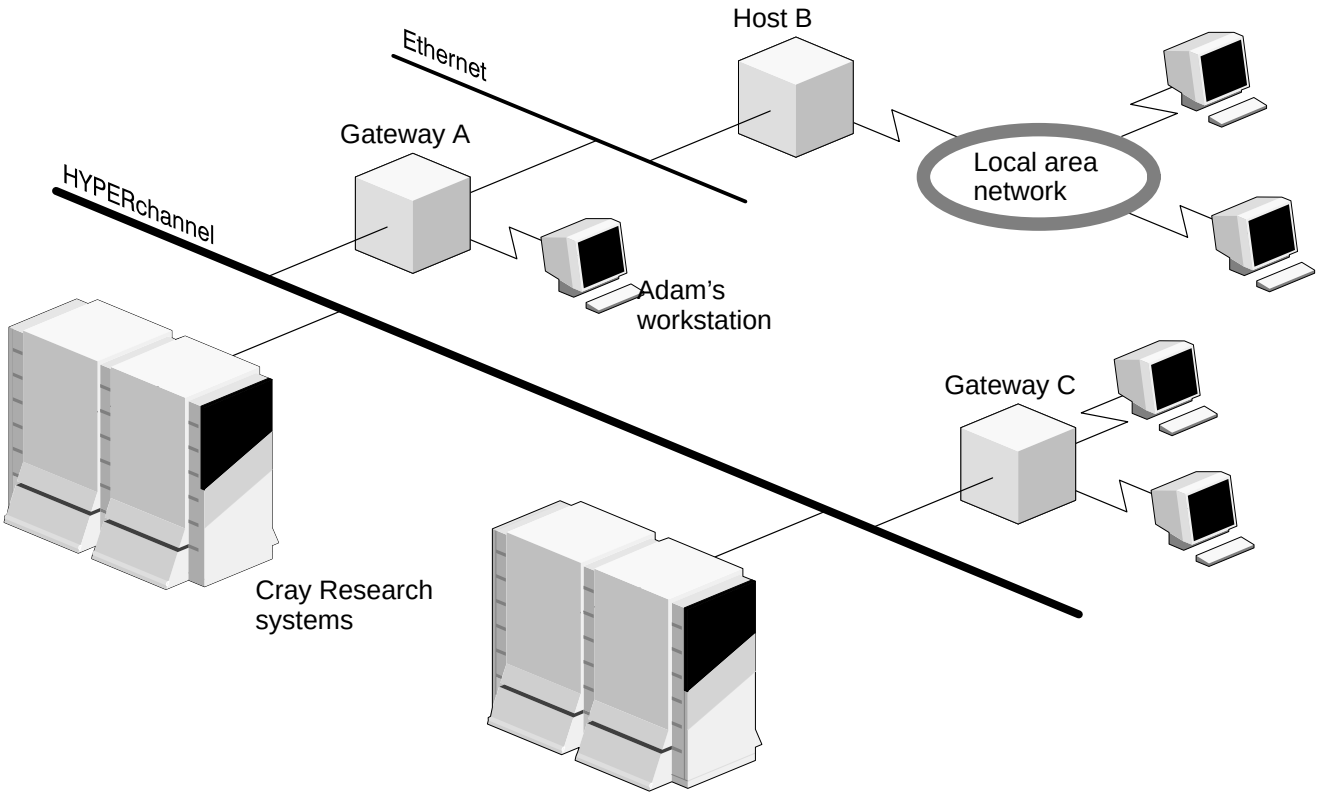

Figure 1. A map of a network

The following list explains how the composition of a network affects its functions.

- A computer network is composed of at least two, and possibly hundreds, of computers and peripheral devices (such as terminals, printers, and fileservers). Each item that can connect to the network is called a *node*.

  Each computer on a network is called a *host*. The computer from which you originate a networking command is called your *local host*. The other computers on the network are called *remote hosts*.

  A *gateway* is a computer that has connections to more than one network, enabling it to accept data from one network and transmit it to another network. (A gateway also can be a type of network hardware called a *router*.)

For example, Figure 1 shows that Adam's workstation gains access to a Cray Research system through gateway A. If this gateway were to become nonfunctional, Adam could not access the Cray Research system.

- Network media form the physical link between computers.

  The physical connection to a Cray Research system is made with one of the following products:

  – Network Systems Corporation (NSC) HYPERchannel

  – FEI-3 network interface provided by Cray Research

  – High-speed External (HSX) Communications Channel provided by Cray Research

  – High Performance Parallel Interface (HIPPI) Channel provided by Cray Research

  – FCA-1 Fiber Distributed Data Interface (FDDI) adapter provided by Cray Research

  – Fiber Distributed Data Interface (FDDI) and/or Ethernet available on CRAY EL systems

  All of these products provide a connection to a Cray Research system. Each medium varies in speed and reliability, which in turn affects your communication.

- A general method of classifying networks is by the geographic distance between connected computer systems.

  Most networks fit into one of the following categories:

  – Local area network (LAN)

  – Wide area network (WAN) (also called *long haul network*)

A LAN consists of computer systems that are located relatively close together, such as in one building or on a campus. For instance, the computer systems linked together in Adam's office building compose a LAN.

A WAN is a network that connects computer systems located over a large geographic area.

Moreover, a LAN can be connected to a WAN, opening doors for even broader communication throughout the state, across the country, or around the world.

Benefits of TCP/IP

1.2

Besides the physical connection that allows computers on a network to communicate, there must be a medium for specifying communication protocols, or rules, that allow hosts to communicate with one another over the physical path. Some communications standard for these protocols must be available to enable two hosts to communicate effectively. The TCP/IP standard that the UNICOS system supports is described in the following subsections.

TCP/IP is made up of two components: Transmission Control Protocol and Internet Protocol. Figure 2 shows how TCP/IP interfaces with network applications.

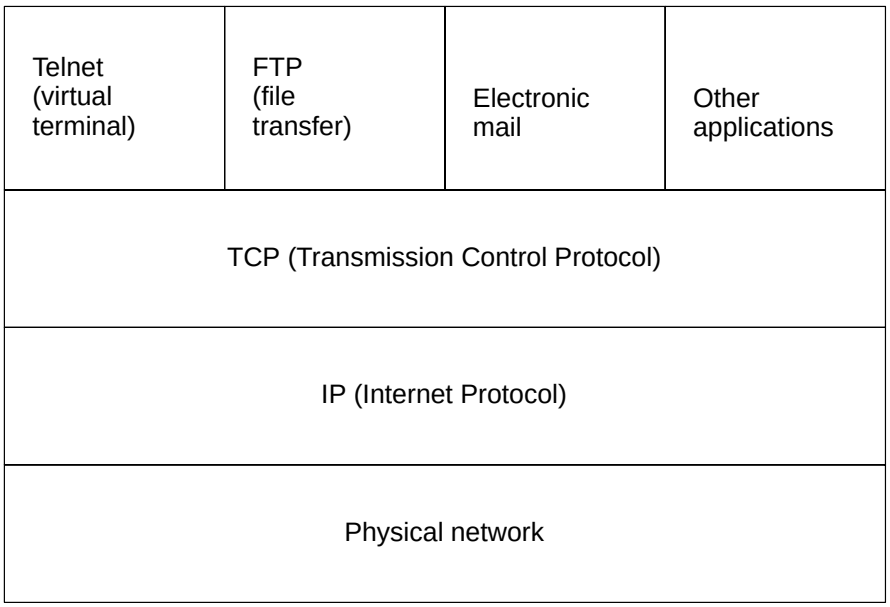

Figure 2. TCP/IP structure

TCP makes logical connections between hosts and ensures that data transmission is accurate. It also adjusts the flow of data between hosts.

IP routes data between hosts, and it forwards data in the network after determining the best available route.

The UNICOS TCP/IP network software offers the following features:

- You can transfer files interactively.
- You can execute commands interactively on remote systems.
- You can send messages interactively.
- You can start a UNICOS shell on a remote system.

Network environment security
1.3

When the UNICOS multilevel security (MLS) feature is enabled, access controls are applied automatically. A check is made to ensure that sensitive information that is transferred to or from a UNICOS system is within the security boundaries for a particular node. For more information about the UNICOS MLS feature, see section 8, page 91, and the *UNICOS Multilevel Security (MLS) Feature User's Guide,* publication SG–2111.

In addition to the UNICOS MLS feature, Cray Research network products support *authorization files* that contain host and user information that is verified by the system before user privileges are granted on a remote system. You create the `.rhosts` and `.netrc` files; the system administrator creates the `/etc/hosts.equiv` and `/etc/ftpusers` files. For more information about security in the UNICOS TCP/IP see section 7, page 77.

Topics covered in this manual
1.4

This subsection provides a synopsis of the topics covered in this manual.

"Getting Started," page 9, gives an overview of the ways in which you can use TCP/IP utilities and commands, display information, and obtain network authorization.

"Executing Commands on a Remote Host," page 17, describes the features and use of the TCP/IP `telnet`(1B), `rlogin`(1B), and `rsh` (see `remsh`(1)) utilities.

"Transferring Files Between Hosts," page 35, describes the features and use of TCP/IP file transfer utilities.

"Communicating Across the Network," page 65, describes the features and use of the TCP/IP utilities that send messages across the network.

"Displaying Host and User Information," page 69, describes the features and use of the TCP/IP utilities that display information such as users' names, terminal names, and so on.

"Network Authorization," page 77, describes security in the UNICOS TCP/IP environment.

"TCP/IP Network Security," page 91, describes TCP/IP and the UNICOS multilevel security (MLS) feature.

"Error Messages," page 119, describes system, `ftp`, and `telnet` error messages.