LANHOP/6000 Version 1.0

By Wayne G. Wachtstetter and Ralph E. Vosburg

As the number of portable and laptop computers increases, so does the need for travelling business executives to have remote access to crucial reports and databases. This article describes LANHOP/6000, a program that enables remote PCs to access LAN and mainframe resources. The article focuses on connectivity, control, and potential uses of LANHOP/6000 for cost-effective communication and information sharing.

Do you need to access your mainframe computer or Local Area Network (LAN) resources—such as clients or servers—from different locations? When you travel, would it be helpful to retrieve a report for the next important appointment without returning to the office? Would you like to work on the next programming project from home? Would your company like to have some of its employees work at home?

IBM's goal with Local Area Network Home Office Program/6000 (LANHOP/6000) is to make all office computing resources as easy to use remotely as in the office. Remote users can run applications such as spreadsheets and word processors, perform database inquiries, transfer files, execute commands, and send messages over dial-up lines.

LANHOP/6000 enables dial-in access to LAN-based resources from a hotel room, customer office, or home. The user's personal computer (running DOS, OS/2, or Microsoft Windows) establishes a secure connection with the dial-in server at the office, as shown in Figure 1. LANHOP/6000 uses a TCP/IP component called Serial Line Internet Protocol (SLIP) for asynchronous transmission of IP packets between the remote computer and the LANHOP/6000 server.

LANHOP/6000 communicates over LANs and Wide Area Networks (WANs) using the standard TCP/IP protocol. With portable computers, users can download files, work with them locally, then logon to the network again, and return the data to the network as shared files. Users can transfer files between LAN servers and mainframes, perform maintenance, print documents, log on to LAN domain servers or dedicated office computers, and log on to MVS or VM mainframe hosts.

LANHOP/6000, which emerged from an internal IBM product called Off-Premises Computing Program, became commercially available in December 1993.

LANHOP/6000 Components

Key components are the LANHOP/6000 client PC and the LANHOP/6000 server.

The client can directly address any LAN-based resource configured to participate within the TCP/IP environment. It can also access many applications running under OS/2 2.X, DOS 5.0+, and DOS/Windows 3.1. The LANHOP/6000 client application accommodates an array of Hayes®-compatible modems. Modems that support V.32bis or V.42bis data compression are recommended for increased data transfer speed.

The LANHOP/6000 client has a graphical user interface that can be customized by other vendors or customers via Application Programming Interfaces (APIs). APIs allow customers to personalize each client interface to interact with their in-house applications. For example, universities can design customized interfaces for remote users in different departments (such as Business, Computer Science, or English). Each department can access its own specialized applications via personalized menus, windows, and so on.

The LANHOP/6000 server is an AIX-based application on a RISC System/6000 with TCP/IP support. A server consists of a network interface, many modems, and managing software. Depending on its resources, a single server can support over 255 simultaneous communications ports.

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Using LANHOP/6000 to Access LAN Resources

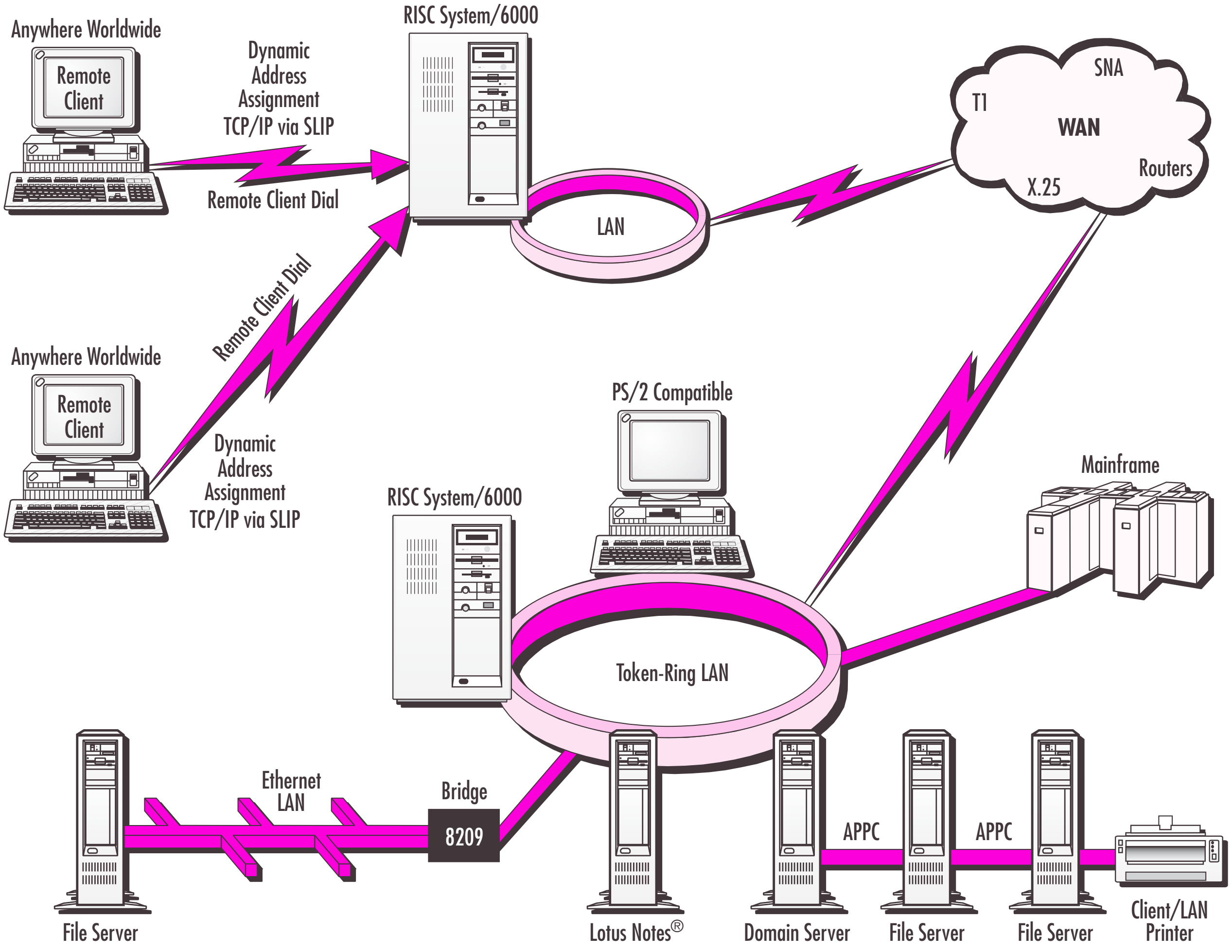

Anywhere Worldwide
Remote Client
Dynamic Address Assignment TCP/IP via SLIP
Remote Client Dial
RISC System/6000
LAN
SNA
T1
WAN
X.25
Routers
Remote Client Dial
Anywhere Worldwide
Remote Client
Dynamic Address Assignment TCP/IP via SLIP
PS/2 Compatible
RISC System/6000
Mainframe
Token-Ring LAN
Ethernet LAN
Bridge
8209
APPC
APPC
File Server
Lotus Notes®
Domain Server
File Server
File Server
Client/LAN Printer

Figure 1. Remote access to LAN resources via LANHOP/6000

Since the server is not dedicated to LANHOP/6000, other applications can also run on the server. The server has a full range of functions for managing user IDs and passwords on local and remote gateways, gathering accounting information, controlling security and authentication, and using Simple Network Management Protocol (SNMP) agents for system management.

Remote Node Initialization

Initially, the modem is not connected to a TCP/IP port at the LANHOP/6000 server. The port is connected to and monitored by the server. When an authenticated user requests a session, the modem and its communications line are then connected to TCP/IP.

The server first validates the user's password. Then, from a pool of addresses, the server assigns an IP address to the remote client for the duration of this session. The remote client now becomes a node on the network.

Server Operations

LANHOP/6000 maintains several databases that store information about all remote users and usage statistics. Easy-to-use database commands allow a LANHOP/6000 administrator to set up, manage, and support the entire LANHOP/6000 environment. Figure 2 shows the type of information stored in the LANHOP/6000 databases. These databases tie together all the functions of the server.

User Authentication

Authenticating users is an extremely important part of defending against security attacks. LANHOP/6000 uses passwords for this purpose. Since the LANHOP/6000 server is an entry into the Internet, this is a crucial security consideration.

The LANHOP/6000 server maintains a User Profile database to authenticate a user's identity. This database holds information about various objects, such as user ID, password, local hostname, password expiration date, and other information that the server must protect against unauthorized access.

In operation, a unique user identification name is entered at the client and passed to the server. After successful validation, a pair of distinct and complementary keys is created. One key is passed to the new client to encrypt the password for the current connection. The server checks the password against an encrypted value stored in a server database before the user is allowed access.

Fencing

Fencing is an authorization technique to control which resources users can access. Each IP packet from the client is checked to determine if the user will be granted access to the designated resource or destination. In order to know which resources a user is authorized to access, each user is linked to a particular group that defines the resources—by name or IP address—available to each member of the group.

Accounting

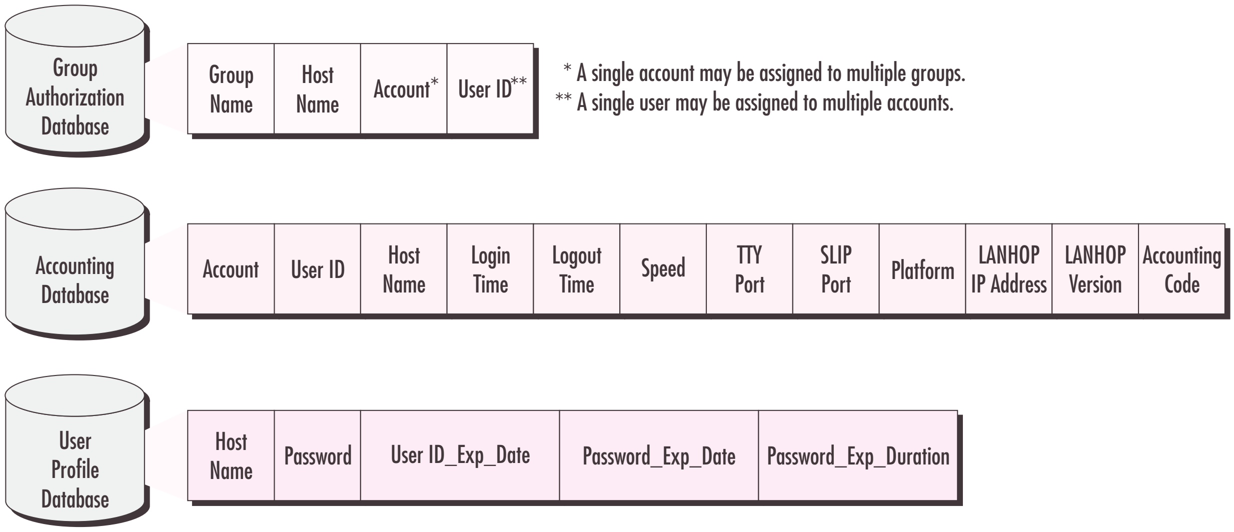
The LANHOP/6000 server generates accounting records and provides current and historical accounting information. Information is gathered by user session and stored in an Accounting database. All data is routed to selected servers at periods defined during installation.

This facility provides a way to bill for resource usage, if desired. Accounting API services allow external programs to retrieve resource-usage data.

The following types of information are logged into the Accounting database:

- User and account IDs
- Start and stop times
- Modem speed
- Gateway server name
- Dialing platform (DOS, OS/2, DOS/Windows, and so on)
- Port number
- Server IP address
- Code version

LANHOP/6000 Database Records


Group Authorization Database
Group Name
Host Name
Account*
User ID**
Accounting Database
Account
User ID
Host Name
Login Time
Logout Time
Speed
TTY Port
SLIP Port
Platform
LANHOP IP Address
LANHOP Version
Accounting Code
User Profile Database
Host Name
Password
User ID_Exp_Date
Password_Exp_Date
Password_Exp_Duration

* A single account may be assigned to multiple groups.
** A single user may be assigned to multiple accounts.

Figure 2. Example of LANHOP/6000 database records

LANHOP/6000 Client/Server

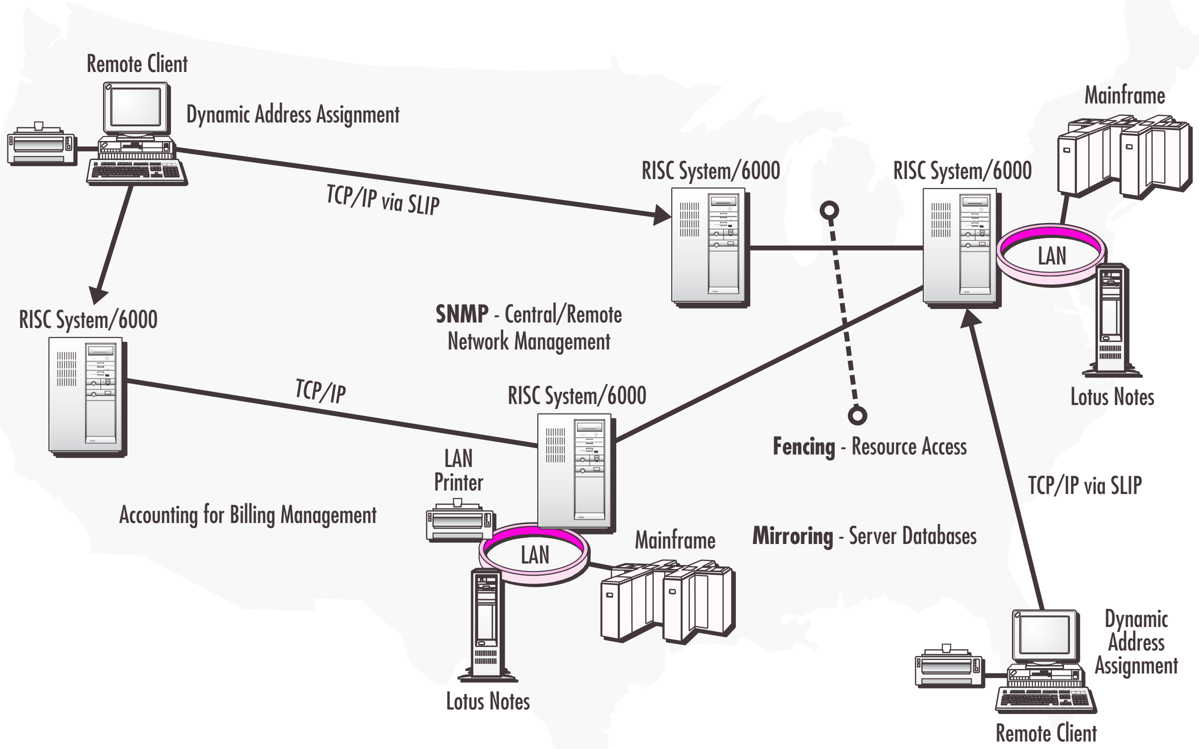

Remote Client
Dynamic Address Assignment
TCP/IP via SLIP
RISC System/6000
RISC System/6000
Mainframe
LAN
RISC System/6000
SNMP - Central/Remote Network Management
TCP/IP
RISC System/6000
Lotus Notes
Fencing - Resource Access
LAN Printer
TCP/IP via SLIP
Accounting for Billing Management
Mainframe
Mirroring - Server Databases
LAN
Dynamic Address Assignment
Lotus Notes
Remote Client

Figure 3. LANHOP/6000 client/server relationships

Mirroring

Mirroring can interchange LANHOP client profile information among LANHOP/6000 servers through an Internet network. If the target LANHOP/6000 server or the link to it is unavailable, using store-and-forward allows the information to be stored and sent to the next LANHOP/6000 server. Eventually, each server will be updated.

Mirroring is useful for large installations of LANHOP/6000 in which synchronization of several servers is critical for clients' access across geographical areas.

The User Profile, Group Authorization, and Accounting databases contain information about clients for LANHOP/6000 services. Updates to these databases can be mirrored to all LANHOP/6000 servers on the LAN or WAN.

Since mirroring is automatic, there is no need for manual maintenance to multiple LANHOP/6000 servers. At installation time, a server can be designated as the control-point for setting up the User Profiles and Groups. This designated server will be the location used by an administrator to make changes.

LANHOP/6000 information routing is based on the relationship between the client and its server. Client changes—such as adding a new user or changing a password—result in updates to the attached LANHOP/6000 server. Within seconds, the information is routed to neighbor LANHOP/6000 servers, allowing the client to log in through any server, as shown in Figure 3. Data is shared and transferred transparently between interconnected LANHOP/6000 servers.

LANHOP/6000 Server Management

LANHOP/6000 uses SNMP and Management Information Base (MIB) to operate concurrently with network management software such as NetView/6000. A MIB specifies the set of variables that the server must maintain. The management system uses SNMP agents to interrogate and obtain statistical information from the server. Software provides automatic statistical reporting via

NetView/6000 for tracking performance and errors for each dial-in connection. NetView/6000 monitors the activity of LANHOP/6000 databases (User Profile, Group Authorization, and Accounting). Local and remote updates, remote receives, total sends, and total resynchronizations are monitored.

Using NetView/6000, administrators can display information about LANHOP/6000 User Profile, Group Authorization, and Accounting databases.

Client Operations

The LANHOP/6000 client provides an easy-to-use interface that allows users to configure their remote workstations and connect to all of their LAN resources. Any Hayes AT® -compatible modem can be used to dial-in to the server. The following sections briefly describe the concepts behind the LANHOP/6000 client.

Client User Interface

LANHOP/6000 provides for an asynchronous dial-up connection. The connection may be tethered (line-based) or untethered (circuit-switched cellular). The client's window interface allows users to set up a workflow desktop using OS/2 Presentation Manager® or DOS/Windows. A window interface makes it possible to access messages and LAN-based resources asynchronously using TCP/IP protocols. Users can query application databases and obtain information. Data files can be transferred between a client and a LAN-based system and/or a remote mainframe. For example, you can capture database information from Lotus 1-2-3® and send it to a remote mainframe.

Users have complete interactive control over configuration and customization. Prompts are provided for selecting information to identify users, defining the resources to be accessed, configuring the connectivity medium, and setting up other vital data. LANHOP/6000 delivers the user's office resources through a powerful window interface using pull-down menus, pushbuttons, radio buttons, and dialog boxes. This is an interactive front-end with limitless connectivity and application access. Users can customize the interface by integrating familiar applications unique to their daily use.

The remote client provides an easy-to-use interface for end users. All setup, configuration, and connection tasks can be performed from pull-down options on the main window action bar. The interface allows end users to be productive immediately.

The LANHOP/6000 platform gives users access to data across mixed networks of LANs. Through TCP/IP encapsulation of NetBIOS protocol, client/server applications are extended to remote users. This enables the communications between NetBIOS-compliant applications. Also, TCP/IP applications (Telnet, TN3270, FTP, REXEC, and PING) are available with a pop-up dialog. An additional Telnet client emulator for TN3270 is available using TalkThru® from Software Corporation of America. TalkThru for OS/2 provides an Emulator High-Level Language API (EHLLAPI) interface and Presentation Manager front-end for TCP/IP.

LAN Environment

LANHOP/6000 supports TCP/IP NetBIOS (compliant with RFC1001 and RFC1002). LANHOP/6000 extends the Ethernet or Token-Ring LAN-connected node to the remote client machine.

The TCP/IP protocol, common to most transport systems, enhances the remote user's connectivity environment. This commonality among different environments provides an interface to all LAN-connected servers. All operations and applications run at the remote machine, as though it were a LAN-connected machine.

LANHOP/6000 provides for an asynchronous dial-up connection.

Usage Examples

The following examples show some ways to use LANHOP/6000.

- Salespeople can process orders and provide information to their customers faster with remote access to LAN- and mainframe-based information.
- LANHOP/6000 can provide remote access to patient records and other medical information to health-care professionals in remote doctors' offices or health-care facilities.
- Insurance policies or claim information can be reviewed and processed from the homes of customers or policyholders.
- System and LAN administrators can remotely support and manage LAN resources.
- Programmers can compile and debug programs, and support customers from any remote site. They can also perform remote backup and maintenance of client hard drives.
- Service industries such as trucking or delivery firms find wireless communications invaluable. Truck drivers can access all company resources

(such as routing schedules or delivery changes) from the convenience of their cabs.

- College students can work from home or from their dorms to access all types of information on the campus network.

COMMON Fall 1994 Conference

The COMMON Fall Conference will be held October 16–20 in San Antonio, Texas. The keynote speaker will be Lou Gerstner, CEO of IBM. For more information, contact:

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Hardware and Software Requirements

The LANHOP/6000 server requires no special hardware except a modem.

The RISC System/6000 supports the 64- or 128-port asynchronous controller and the 16-port async adapter. Depending on the RISC System/6000 being used, a range of async ports (from 64 ports to 1,026 ports) is supported. Each communication port can be configured up to 38,400 bps (except the 64-port controller, which must be configured at 19,200 bps or below). The effective throughput will average between 2,400 bps and 25,000 bps, based on system loading and application dependencies.

The LANHOP/6000 client requires no special hardware other than a modem of the client's choice. The appropriate versions of OS/2, DOS, or DOS/Windows and TCP/IP software are required on the client machine.

Future Enhancements

Future enhancements to LANHOP/6000 are expected in the following areas:

- Expanded client and server platforms
  - UNIX server
  - UNIX client
  - AIX client
  - Macintosh® client
- Optional applications
  - E-mail
  - Pager system
  - Multimedia
  - ISDN support
  - Cellular support
- Integration with other products
  - Support for OEM TCP/IP
  - Support for OEM X-Server applications, such as Hummingbird eXceed and Andataco™ Liken
- Additional protocols
  - Point-to-point
  - AppleTalk®
  - Internetwork Packet Exchange (IPX)
  - DECnet®

Conclusion

Remote computing will open many business opportunities. New digital communications networks such as Integrated Services Digital Network (ISDN), Asynchronous Transfer Mode (ATM) using cellular or satellite communications, and wireless connectivity will help spread the use of remote access. Remote users will have complete access to network resources from virtually anywhere, with or without telephone lines.

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