
Microsoft®
Windows™ 95
Resource Kit

***Essential Technical Information
for Anyone Installing or Supporting
Microsoft Windows 95***

Microsoft
Windows 95
Beta-1

The information discussed in this guide is based on features and functionality present either in the Beta-1 release of Windows 95, or planned for a future release. The discussion of Windows 95 herein, does not represent a commitment on the part of Microsoft for providing or shipping the features and functionality discussed in the final retail product offerings of Windows 95.

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Welcome to Windows 95

As the successor to MS®-DOS, Windows™, and Windows for Workgroups, Windows 95 offers compatibility with the familiar Microsoft products you've been using for years. But more than that, Windows 95 offers lots of powerful new tools and a new, easy-to-use interface.

From its improved user interface and built-in networking functionality to its 32-bit pre-emptive multi-tasking architecture, the newest version of the Microsoft Windows operating system, named Windows 95 has been redesigned to provide you with a easier, more manageable operating system. Windows 95 includes many 32-bit technology features that you are familiar with in Windows for Workgroups 3.11, including faster file access, protected-mode network protocols, and Remote Access Services (RAS). In addition, Windows 95 has a wide range of new features to make computing even easier for both end-users and MIS professionals.

The purpose of this first draft of the *Windows Resource Kit for "Windows 95"* is to provide you with the information necessary to allow you to successfully install and configure Windows 95 in your environment. Although we don't have many of the implementation details for installing and configuring Windows 95 in this version of the *Resource Kit*, we expect the technical information we provide in this document will have enough details for you to begin your evaluation of Windows 95 in your environment. We will be updating this kit for both the second beta release and for the final release of Windows 95. We would appreciate any feedback on this *Resource Kit* to make it more useful to you. Feel free to suggest additional coverage or new topic areas that you'd like covered.

You can submit comments via the CompuServe® Windows 95 Beta forum or via Internet at wrk@microsoft.com.

New and Improved

We've spent the past several years working on this release of the Windows operating system and have added a wide array of features for both end-users and MIS professionals. The following are just some of the features in Windows 95 and, as you use Windows 95, you'll discover the breadth of improvements Windows 95 includes to ensure it's even easier to use, more powerful, and more compatible than ever before.

Features for End-Users

Even Easier

Windows 95 is easier for users to install because Setup is now a Windows application. Setup also includes Plug and Play auto-detection support for all types of hardware.

Windows 95 is easier for users to learn and to use because it includes these features:

- More intuitive user interface including the new Start button and Taskbar.
 - Novice users will appreciate the fact that they can get up and running up to four times faster than with Windows 3.1.
 - Current Windows 3.1 users will appreciate the fact that they can navigate through Windows faster and more efficiently.
 - Power users will appreciate features such as the ability to customize the interface and to create shortcuts.
- Support for long filenames of more than eight characters, thus removing the need for a three-character extension.
- Integrated networking provides a consistent way to browse and access resources whether they're on your PC or elsewhere on the network.
- New context-sensitive Help engine gives you the information you need in concise steps.
- Improved handling of application errors including enhancements to CTRL+ALT+DEL local reboot to close hung applications.

Faster and More Powerful

Users will appreciate these features that improve Windows 95's speed and power over earlier versions of Windows:

- 32-bit pre-emptive multitasking and multithreading
- 32-bit networking with full 32-bit protected-mode protocols and peer capabilities
- Built-in communications including a universal inbox via MAPI
- Mobile and remote support with remote dial-in, universal modem support, and hot-docking and hot-swapping devices for portable computers
- 32-bit integrated multimedia architecture, including a 32-bit CD file system and support for Video for Windows

Compatible

Windows 95 is compatible with the hardware and software that users use today. It includes support for existing MS-DOS® and Windows-based applications and can run on today's desktop and portable computers.

Features for MIS Professionals

Even Easier

Administrators will find that Windows 95's Setup process is easy to customize. They can define a batch installation for their organization.

A unified logon to the network and greatly improved user interface make Windows 95 easy for the administrator to learn and use.

Managing, administering and supporting is easier because Windows 95 includes the Registry, Plug and Play support, SNMP and DMI support, and features which let you set systems policies for individual workstations and users.

Faster and More Powerful

Windows 95 is faster and more powerful for administrators to use because of these features:

- 32-bit networking
- Built-in communications that includes a universal inbox that is fully compliant to MAPI 1.0 allows administrators to hook in a variety of mail services to this single client
- Remote dial-in over a variety of protocols

In addition, because users are also using this integrated, robust, 32-bit operating system, there will be fewer support issues for administrators to manage.

Compatible

Windows 95 interoperates with a variety of networking configurations including both NDIS and ODI drivers and includes protected-mode versions of TCP/IP, IPX, and NetBEUI protocols. It supports major systems management initiatives and backup providers including SNMP, DMI, and RPC. Windows 95 also works with current device drivers and applications.

How to Use This Document

This Resource Guide includes the following chapters:

Chapter 1: Windows 95 Setup

This chapter explains the setup and configuration options for Windows 95.

Chapter 2: Networking Basics

This chapter describes Windows 95's networking architecture.

Chapter 3: Network Integration

This chapter describes how to configure Windows 95 to work within your networking environment.

Chapter 4: The Windows 95 User Interface

This chapter describes the key user interface features and describes how you can customize the Windows 95 interface to suit your needs.

Chapter 5: Printing

This chapter describes Windows 95's improved printing system and explains how to set up printers with Windows 95.

Chapter 6: Windows 95 Security

This chapter describes Windows 95's logon, user-level, and share-level security options.

Chapter 7: Desktop Management and Remote Administration

This chapter describes how to use Windows 95's administrative tools to manage and monitor remote network resources.

Chapter 8: Mobile Services In Windows 95

This chapter describes Windows 95's Remote Access capabilities and the tools designed for mobile users. It describes how to manage multiple configurations and how to keep files between two computers synchronized.

Chapter 9: Troubleshooting Windows 95

This chapter describes how to troubleshoot this beta version of Windows 95.

Chapter 10: Windows 95 Testing Guide

This chapter explains how to install and test this beta release of Windows 95 in your work environment.

Windows 95 Corporate Evaluation Process

The rest of this *Resource Kit* provides you with information about the Windows 95 product that you will need to know as you evaluate and set up this beta release of Windows 95 in your environment.

To more effectively understand how Windows 95 can meet your organization's computing needs, we suggest that you use the following process:

1. Read this document to understand how to evaluate and set up Windows 95 in your environment.
2. If you want more technical information on individual features, the needs of the marketplace, or background on the goals of the development team, read the *Microsoft Windows "Windows 95" Reviewer's Guide* (which is either included in your beta kit, or available on CompuServe). Functionally, the *Reviewer's Guide* is a superset of this document with one exception: this document discusses installation and configuration issues within a corporate environment.
3. Since Windows 95 Beta-1 represents work in progress, it's important for you to read the *Beta-1 Release Notes* for the latest information about this beta release.
4. Please remember that this is a pre-release product. We are continually refining compatibility and performance. See "Areas Still Under Construction" for more information. If you have any suggestions on improvements or encounter problems with compatibility in your environment, please report bugs to Microsoft (see the *Beta-1 Release Notes* for details about how to do this).
5. We suggest installing this beta release in an environment similar to what your users would experience. You may want to install it over an existing copy of Windows or place it in a separate subdirectory from your current version of Windows. You cannot uninstall Windows 95 if you install Windows 95 over your existing copy of Windows.
6. After installing Windows 95, make sure your environment is properly configured. You should look at the network clients and the protocol and device driver settings (as detailed in the Control Panel's Network tool), and ensure that these are compatible with your environment. You should also install printers and workgroup configurations from within Windows 95, as appropriate. (For installation details, see Chapter 1, "Windows 95 Setup.")
7. You should install all of the applications that users run in your environment. Not only your personal productivity applications, but your in-house applications as well.
8. Install any network and/or systems management software.
9. Test the operation of your software under Windows 95. You should focus on compatibility and features of Windows 95 rather than performance. We are continuing to do performance tuning so performance tests today may not be indicative of the level of

performance you'll experience in the final product. (For testing details, see Chapter 10, "Windows 95 Testing Guide.")

After you test for compatibility, evaluate the new features in Windows 95. Take a look at our desktop systems management, user profiles, policies, Remote Access, and Plug and Play support. Take a look at the appropriate sections in this document to understand what each are and how you could use them in your environment.

Areas Still Under Construction

This is the first technical beta release of Windows 95. While most of the base functionality is present in this beta release of Windows 95, there are still several areas that are under construction and their present state is not entirely representative of the final Windows 95 product. For all practical purposes, Windows 95 as a whole is under construction and various components are likely to be changed or enhanced.

It is through feedback that we receive from Beta sites that we drive the development efforts, bug fixes, and functionality enhancements between now and the time that Windows 95 is shipped as final product. It is also based on feedback from Beta sites and analysis of the bugs that are reported that final determinations are made as to when Windows 95 will be released to manufacturing.

One of the purposes for pre-releasing technical beta versions of Windows 95 is to put the product in the hands of experienced MS-DOS and Windows users so they can provide feedback to Microsoft about compatibility with their existing applications, device drivers, and environment. While compatibility testing is being performed within the test labs at Microsoft, it is through a technical beta release that the product can be tested with a breadth of different application programs, network operating systems, MS-DOS-based device drivers, Windows-based device drivers, and hardware devices.

The following areas provided as part of this beta release will continue to receive close scrutiny by the Windows 95 development team. Please keep this in mind while examining Windows 95:

- **Performance.** Use the final released version of Windows 95 code, rather than this beta release, to formally test and report performance. Discussing relative performance improvements or degradations of a pre-final version of Windows 95 can be misleading to end-users and may not properly reflect the true performance levels they will observe when they try Windows 95 for themselves with the final product. Performance optimization is something you can look forward to in the final product. In a Microsoft product development cycle, implementation of features and functionality are completed in the early stages of development; code optimizations and performance tuning are refined towards the latter phases.

- **Compatibility.** Use the final released version of Windows 95 code, rather than this beta release, to formally test and report compatibility. Again, this is an area that is best tuned in the latter stages of development and will not be accurately represented for evaluation in this beta release. Through the beta test process, feedback from users about running their set of applications under Windows 95 is used by the development team to ensure that Windows 95 meets its final compatibility goals. Any issues related to compatibility that are identified while testing Windows 95 that results in behavior different from that of MS-DOS or Windows 3.1 should be reported as a bug as part of the Windows 95 Beta program.
- **User Interface Transition for Windows 3.1 Users.** The initial efforts for developing a new easy-to-use interface for Windows 95 is focused at new and novice users. During the time after this beta release of Windows 95 and the next wide-scale beta release, the shell interface and development teams will focus on implementing migration aids to make it easier for Windows 3.1 users to get up to speed with Windows 95. Once advanced and power users overcome the initial learning curve of the new Windows 95 user interface, they will become quickly familiar and comfortable with the additional functionality offered by the Windows 95 shell. The usability lab at Microsoft and the interface designers continue to work towards decreasing the time it takes to transition experienced Windows 3.1 users, allowing them to discover the power, flexibility, and robustness of Windows 95.

Windows 95 Setup

With Windows 95's Setup program, you can customize Windows 95 to suit the needs of your organization. It's best to decide how you want to set up Windows 95 before installation, but you can also use the Setup program, the Control Panel, and other tools to customize Windows 95 after it's installed.

This chapter explains the setup and configuration options for Windows 95, and includes information you'll need to know to install and use this version of Microsoft Windows 95.



In This Chapter

You'll find answers to these questions in this chapter:

- *How do I install Windows 95 from the network? (see page 12)*
- *How do I create a batch installation for Windows 95? (see page 23)?*
- *How do I upgrade a Microsoft Network Client? (see page 22)*
- *How do I install Windows 95 on a Novell Network? (see page 22)*
- *How do I uninstall Windows 95?(see page 13)*

Pre-Installation Considerations

Before you install this beta release of Windows 95, you should determine which version of Windows, if any, is already on the computer you want to use.

- If you have an alpha release of Windows 95 (such as M5), you must not upgrade your existing Windows 95 installation. Rather, you must remove your existing alpha version of Windows 95 before installing this Beta-1 version.
- If you have Windows 3.x or Windows for Workgroups 3.x, you can either upgrade your current installation to Windows 95 (the preferred method) or install this version of Windows 95 in a new directory.

There are advantages and disadvantages to both types of installations. If you upgrade from Windows to Windows 95, all of your previous applications will be migrated over to work in your new Windows 95 environment. If you install Windows 95 to a new directory, you must reinstall all of your Windows applications before they will function properly. If you choose to install Windows 95 in a separate directory, you can create a dual-boot installation. This way, if you press F4 as your computer boots, MS-DOS will start instead of Windows 95. If you upgrade your existing Windows 3.x installation, the dual-boot option is not available.

The table below describes the available options, and how you should install Windows 95 to enable them. Note that Windows 95 and Windows NT™ will work properly together if you currently have a dual-boot type of setup between MS-DOS and Windows NT.

Feature	Install Windows 95 to a new Directory	Upgrade existing Windows 3.x installation with Windows 95
Dual-boot Windows 95 and Windows 3.x	Yes*	No
Migrate existing Windows application settings and files (without reinstalling)?	No	Yes
Dual-boot Windows 95 and Windows NT	Yes	Yes
Previous MS-DOS directory left intact	Yes	No

* Requires MS-DOS version 5.0 or later

Setting Up Windows 95 Beta-1

You can install Windows 95 Beta-1 from one of two sources:

- **Floppy disks.** This is a standard floppy disk installation. Insert the Setup disk in the disk drive, change to that disk (for example, A:) and type **setup**. Then follow the instructions on the screen as the program prompts you for information or more disks.
- **CD-ROM.** This installation follows the same procedure as the floppy disk installation, but it is more convenient because there is no disk swapping, since all the files are contained on a single disc.
- **Network.** Setup from floppy disks or CD-ROM to a shared location on the network for others to use for setting up their workstations (with the **setup /a** option).

Setup Options

There are several options for starting the Windows 95 install process. Before you set up, it is important to decide which kind of installation is most appropriate for your organization. The command line syntax for the setup command is:

```
setup [/d] [/i] [/id] [/nostart] [batch file]
```

Option	Function
/d	Does not check for disk space. This version of Windows 95 uses approximately 19 MB of hard disk space. The Setup program generally ensures that there is room on your hard disk before installing, but not if you use this option.
/i	Ignores automatic hardware detection. The user will have to check settings and possibly make corrections on the System Information screen during Setup.
/id	Doesn't use the existing version of Windows for Setup. This option allows you to set up Windows 95 in a directory that is different than the one for the existing Windows 3.1 installation. Keep in mind that if you do install Windows 95 to a different location, you may have to reinstall the various Windows applications to make them to work properly under Windows 95.
/nostart	Copies a minimal installation of Windows 3.1 (called the Windows 3.1 standard mode stub) and then ends the Setup program. This option can be useful for debugging potential Setup problems.
<i>batch file</i>	Specifies the batch file that contains Setup options. With this option an administrator can customize an installation of Windows 95 to ensure uniformity between various users and workstations.

Local Versus Network Installation

Windows 95 can be installed either locally or from the network.

Local installation is probably the most common type of installation. In this case, all of the Windows 95 system files are stored on a local hard disk. Setup copies all of the necessary Windows 95 files into a temporary directory on the user's computer and runs Setup from the temporary directory.

In a network installation, floppy disks or CD-ROMs aren't necessary. The user connects to a shared directory created by the administrator, and then runs Setup. For a network installation, a user starts the computer and then connects to the shared directory where the Windows 95 software is located. The Windows 95 software is downloaded from the server to the user's own computer, then Setup configures the user's computer according to predefined options set by the administrator. (This assumes that the user has networking software either on the hard disk or on a bootable floppy disk.)

Support for Login Scripts

If you have a Microsoft Windows NT or Microsoft LAN Manager domain, you may already be using login scripts. Currently, login scripts are functional when centralized on a LAN Manager server or a Windows NT Advanced Server. Login scripts are run after domain validation occurs.

Batch Installation Support

An administrator can use the configuration options of the batch installation to create a hands-free set up. This method also allows you to customize the configuration of the Windows 95 desktop for all users installing from this shared network directory by specifying settings in a batch file for one or more of the following:

- Windows directory
- User name
- Company name
- Mouse type
- Keyboard type
- Network card (including driver type, IRQ, I/O, base memory, and protocol type and settings)
This feature is not implemented for this beta.
- Allow the user to see the "Customize" screen
- Network (including network name and workgroup name)
This feature is not implemented for this beta.
- Computer name
This feature is not implemented for this beta.
- Locale

- Display type
- Printers

For more information about configuring options for batch installation, see the “Batch Installation” section later in this chapter.

Upgrading from Windows to Windows 95

To upgrade an existing computer from Windows or Windows for Workgroups to Windows 95, follow these steps:

1. Backup your hard drive to protect your data in case of unforeseen problems.
2. Start Windows or Windows for Workgroups on your computer.
3. Insert the first Windows 95 setup floppy disk or CD in the appropriate disk drive.
4. From File Manager, select the disk drive you used in step 3.
5. Double-click Windows 95’s SETUP.EXE to run Setup.

The Windows 95 Setup program runs entirely in graphics mode from your existing Windows or Windows for Workgroups installation and upgrades that installation to Windows 95. All of your current system settings (such as program groups) are automatically migrated to Windows 95. Setup also allows you to continue to use the supported network configurations that you had previously.

You can still run Setup from the MS-DOS prompt.

Uninstalling Windows 95

In case you need to remove Windows 95 from your hard drive, follow these steps:

1. Reboot your computer using a bootable MS-DOS 5.0 or 6.x disk. Alternately, you can use F4 to boot a previously-installed version of MS-DOS, or boot from the Emergency Boot Disk.
2. From the DOS prompt, type the `sys` command for your C:\ drive.
3. Restore your pre-Windows 95 CONFIG.SYS and AUTOEXEC.BAT files from your hard disk or Emergency Boot Disk.

Note If you installed Windows 95 to a new directory, these files are called CONFIG.DOS and AUTOEXEC.DOS and are in the root directory of your boot drive. If you upgraded a previous version of Windows 3.x, these files are called CONFIG.BAK and AUTOEXEC.BAK and are in the root directory of your boot drive.

4. Delete the following files from C:\:

SULOGO.SYS	SETUPLOG.TXT	DETLOG.TXT	BOOTLOG.TXT
WINBOOT.SYS	SYSTEM.xxx	USER.xxx	

5. Use the **deltree** command to remove the directory tree into which Windows 95 was installed on your hard disk (for example, C:\WINDOWS and all of its subdirectories and files).

Caution This removes the whole Windows directory structure. Any information stored by other applications in these directories will be lost. In addition, if you uninstall Windows 95, you will need to restore your original MS-DOS and Windows 3.x configuration.

6. If you are using Windows NT or Windows NT Advanced Server, do the following to restore the original dual-boot configuration between Windows NT and your previous operating system:
- Use the Windows NT Setup Disk #1 to reboot your computer.
 - Choose Repair.
 - When prompted, insert the Windows NT Emergency Repair Disk and choose to Repair the Boot Files.
7. Restore your original MS-DOS and Windows 3.x configuration.

About the Setup Process

There are two different ways to start the Windows 95 Setup program. The recommended way to run Setup is from within your previous version of Windows (that is, Windows 3.1 or Windows for Workgroups 3.1 or higher). This is possible because Windows 95's SETUP.EXE is a Windows 3.1 application.

You can alternately run Windows 95 Setup from MS-DOS.

Note To run the Setup program from MS-DOS, you must be using MS-DOS version 3.3 or later. To enable the dual-boot feature, you must be using MS-DOS version 5.0 or later.

If you choose to install Windows 95 from MS-DOS, Setup imports and runs a short application called a stub (a Windows-like utility requiring about 500K of conventional memory). It is called a stub because its functionality is limited to activating the essential Windows portion of the installation. The stub originates in real mode but launches the installation process in protected mode. This stub starts the mini-version Windows 3.1 to run the Windows 95 Setup program.

The real-mode stub does the following:

1. Searches the user's local hard disk(s) for previous versions of Windows 3.x, then if one is found, asks the user if it is all right to start this version of Windows. With the user's approval, the real-mode stub starts the existing version of Windows and then the Windows version of Windows 95 Setup.
2. Performs minimum system checks to confirm that the system is capable of running Windows 95 (that is, it ensures that there is enough memory and disk space, and that the CPU and MS-DOS version are appropriate, for example).
3. Checks for an installed XMS provider, and installs one if one is not already present.
4. Detects problematic terminate-and-stay-resident programs (TSRs) and device drivers.
5. Installs the mini-Windows 3.1 components and starts the mini-version of Windows 3.1 to run the Windows 95 Setup program using the SHELL=SETUP.EXE option.

Plug and Play Hardware Detection

One of the most helpful new features of Windows 95 for users is the support of a new generation of hardware devices and peripherals called Plug and Play devices.

Plug and Play is both a design philosophy and a set of PC architecture specifications. Plug and Play is not proprietary to any one company; it is an independent set of specifications. These standards may be followed by any company producing computer devices. The ultimate goal of Plug and Play is to enable changes to a PC's hardware configuration without needing the user to change software settings. Device installation should be simple and fail-safe.

For devices, the installation is automatic—plug the device in, turn on the system, and it works. With a Plug and Play system, the user can insert and remove certain devices (such as PCMCIA cards), or connect to or disconnect from a docking station or network, without restarting the system or causing users to readjust configuration settings. The system figures out the optimal configuration, and applications automatically adjust to take full advantage of the new configuration.

For example, suppose you have a new Plug and Play card or monitor. As soon as you physically connect the card or monitor and turn the computer's power on, you're ready to go. Or, suppose you have a portable computer with infrared communications port. When you walk into a room with an infrared printer, your computer is automatically configured to print to that printer.

The Plug and Play Detection Stage

Setup launches the Plug and Play hardware detection module that searches the computer to detect its various hardware components. Once it detects a familiar component, Plug and Play enters its configuration information into the Registry (a hierarchical structure that replaces the need for AUTOEXEC.BAT, CONFIG.SYS, and .INI files) so that Windows 95 will incorporate it successfully each time the computer starts. Setup continues this until Plug and Play has written all the information to the hardware branch of the Registry. Using these Registry settings, Setup uses its Generic Installer to install device drivers. Plug and Play contributes by ensuring that the correct files are installed and that the configuration options are set properly.

For more information about the Registry, see Chapter 7, “Desktop Management and Remote Administration.”

Note For a device to be properly detected and configured, it doesn’t necessarily need to be a Plug and Play device. However, the information in the following sections describes how Plug and Play devices are detected.

Detecting and Configuring ISA Devices

The Plug and Play software optimally allocates system resources between the Plug and Play cards and other devices in the system while requiring no user intervention. The Plug and Play ISA specification requires no changes to the ISA buses, so Plug and Play ISA devices can run on existing PCs.

Setup automatically configures Plug and Play ISA cards as follows:

1. Setup puts all Plug and Play ISA cards in configuration mode.

The Plug and Play software identifies and configures devices using a set of commands that are run via three 8-bit I/O ports. A sequence of data (called the initiation key) written to one of the ports is used to enable the Plug and Play logic on the card.

2. Setup isolates one Plug and Play ISA card at a time and assign a “handle” to each card.

All Plug and Play ISA cards respond to the same I/O port addresses, but each must be assigned a unique address. The isolation protocol uses a unique number on each card (that is, the EISA device ID and a serial number) to isolate one Plug and Play card at a time. As each card is isolated, the Plug and Play software assigns a handle to the card. Using this handle is a relatively simple and efficient way for the operating system to select that specific Plug and Play card.

3. Setup reads the card’s resource data structure to determine the card’s resource requirements and capabilities.

Each Plug and Play ISA card supports a read-only resource data structure that describes the resources supported and those requested by the functions on that card. The structure supports the concept of multiple functions per ISA card. For example, some audio cards may provide sound generation, MIDI, joystick, and CD-ROM functions on a single card. Each function is defined as a logical device.

Plug and Play resource information is provided for each logical device and each logical device is independently configured through the Plug and Play standard registers.

4. Setup allocates conflict-free resources to each card.

Setup uses a process of resource arbitration to determine resource allocation to each ISA card, then by using the command registers specified for each resource type, begins configuring the ISA cards. If an ISA function isn't reconfigurable, Setup assigns an equivalent resource in place of the requested one. The resource data structure informs the configuration software that it cannot assign the requested resources to other Plug and Play cards in the system.

After the assignment of resources, an I/O conflict-detection mechanism may be invoked. This mechanism provides a means to ensure that I/O resources assigned are not in conflict with standard ISA cards. The command set also supports activating or deactivating the functions on the card.

5. Setup activates all Plug and Play ISA cards and remove them from configuration mode. To re-enable configuration mode, the initiation key must be reissued. This prevents the configuration information from being accidentally erased.

Setup Modularization

Early in the process, Setup copies everything it will need to a temporary directory on the computer's hard drive. From then on, Setup runs the installation entirely from the temporary directory on the local hard disk.

The setup process now becomes very modular. Setup now views the computer not as a single machine but as a collection of different devices. It identifies the devices on the computer, then uses the files it copied to the hard disk to run the corresponding installation modules for those devices. (If a device isn't found, Setup won't run the corresponding installation module.)

Modifying the Boot Track

Finally, Setup modifies the boot records and the boot track to point to WINBOOT.SYS. This file takes the place of the MS-DOS files IO.SYS and MSDOS.SYS.

Run Once

Run Once is a Setup process which occurs the first time Windows 95 is booted. This process implements the initial configuration, online registration, and modem detection. Run Once launches printer setup, the tutorial, and custom OEM setup programs.

Note If Run Once fails, simply restart the computer.

Setup Failure Detection and Recovery

Setup creates some safeguards that you can use in case of trouble during and after system setup:

- The Setup Log
- The Detection Crash Recovery Log
- The Emergency Boot Disk

The following sections describe each of these safeguard mechanisms.

The Setup Log

If something happens during Setup to cause it to fail, the best thing to do is to restart the Setup program without deleting files or changing anything else.

Setup creates an event log called SETUPLOG.TXT in the root directory. If something causes Setup to fail and you have to rerun it, Setup uses this event log. The log shows Setup which parts were successfully installed and if any failure occurred. In the case of a failure, Setup notes where it occurred and uses that information to avoid the same conflict.

The Detection Crash Recovery Log

Setup creates another recovery file called the Detection Crash Recovery Log, DETLOG.TXT. Setup uses this file to log the detection process. If Setup crashes during its detection phase, the details are recorded for later recovery. As with the SETUPLOG.TXT file, Setup uses the information in DETLOG.TXT to avoid crashing twice on the same problem by by-passing known errors. By reading the Setup log file, Setup identifies which module caused the crash and skips it, then proceeds with the next module.

Windows 95 Setup continues after almost any interruption because the new Setup design keeps the base files for the original version of MS-DOS, Windows, and networking software intact until all new files are copied on the user's system. If Setup is interrupted, the system can

still boot the user's original MS-DOS, Windows, and network configuration. Then it will read the Setup Log and Detection Crash Recovery Log, and continue the setup process. If you reboot after a crash, you will be prompted to run Setup again.

After Setup has copied all of the Windows 95 files, it makes any changes required to allow Windows 95's real-mode components to access the hard disks and then reboots. If Windows 95 fails to boot into real mode, Setup installs simple default CONFIG.SYS and AUTOEXEC.BAT files and tries to restart again.

After Windows 95's real-mode components are initiated, WIN.COM runs to start automatically the full Windows 95 environment.

The Emergency Boot Disk

Setup provides one final safeguard—the Emergency Boot Disk—which is created during the initial stages of the setup process. If something happens to the system which cannot be fixed some other way, a user can reboot the computer with the Emergency Boot Disk to recover.

Converting Program Manager Groups

If you choose to upgrade your existing Windows 3.x installation with Windows 95, the Setup application converts all Windows 3.1 Program Manager groups to folders inside the Programs folder on the Windows 95 Start button. These folders can be opened or explored to find the applications previously contained in them. Windows 95 will automatically create a Shortcut for each original icon you had for each application under your previous version of Windows.

For more information on navigating the user interface in Windows 95, see Chapter 4, “The Windows 95 User Interface.”

Windows 95 Configuration Options

Unlike previous versions of Windows, Windows 95 separates all configuration settings into two types:

- User-specific settings describe a user's preferences, such as screen colors and application options.
- Computer-specific settings describe the hardware and network configurations that have to do with a particular computer. These include which drivers to use and their settings.

Because it makes this distinction, users sharing a computer can each have a separate set of configuration settings. Likewise, a user who moves around among several computers on a network can use a single set of configuration settings for each of the computers he or she uses.

Thus, a user-specific settings, collectively called a user's profile, travel with the user. (In the latter case, the user profile must reside on the network server. You will need to reserve approximately 16K per user profile.)

For details on how to define user profiles, see Chapter 7, "Desktop Management and Remote Administration."

System Policy Editor

Windows 95 also has the ability to allow administrators to set user or computer settings for an entire network from a centralized location. Administrators can control network options such as preferred server, domain logon, peer services, access to the Control Panel, ability to access network resources, or even background screen color. When you use this feature, you must store approximately 200K of data on a network server to which all users have access.

For details on how to use the System Policy Editor, see Chapter 7, "Desktop Management and Remote Administration."

Setting Up Windows 95 for Mobile Users

Windows 95 includes a number of features that make mobile computing easier. One key feature is Remote Access. This feature allows dial-in access to your Windows 95 network and can be configured in several different ways, depending on your security requirements. For example, you can restrict access of dial-in users to a single computer, or you can allow them access to some or all of the shared resources on your network.

Windows 95's Remote Access client software works in conjunction with many different back-end servers, including these:

- Another Windows 95 computer
- A Windows NT or Windows NT Advanced Server version 3.1 RAS server
- A Windows NT version 3.5 Point-to-Point Protocol (PPP) server
- A Microsoft LAN Manager RAS gateway
- A Novell IPXWAN server
- A Shiva dial-up router
- Other third-party PPP servers

Once connected to a Remote Access server, a remote can access any resource available to the server. In addition, if the client computer has the IPX protocol loaded, it can simultaneously access both Novell® NetWare® and Windows 95 servers using IPX.

When setting up a Windows 95 network for access by mobile users, be sure to consider any special needs your mobile users may have related to network topology and architecture. For example, suppose you have a mobile user uses a TCP/IP application to access to several different LANs. If that application requires a fixed Internet address to work properly, you would need configure network routers for mobile IP so that the required address could be used on multiple LANs.

Similarly, if a mobile user had an IPX/SPX application that required a fixed network number, you would need to adjust the network routers for IPX routing. For more information about mobile computing with Windows 95, see Chapter 8, “Mobile Services In Windows 95.”

Hardware and Software Requirements

The following table describes the basic hardware requirements for Microsoft Windows 95:

Component	Windows 95
Computer	386SX processor (or higher) with high-density floppy-disk drive and hard-disk drive.
Memory	At least 4 MB of RAM; more is recommended.
Disk space	30 MB of free hard-disk space is recommended. 14 MB of hard disk space is required for a minimal installation. The full installation requires 19 MB of hard disk space. You also need at least 5 MB free for your swapfile.
Video display	Video graphics adapter (VGA) or Super VGA monitor (recommended).
Modem	To use Remote Access.

Windows 95 also requires the following MS-DOS and network software:

- You will need MS-DOS version 3.3 or later. The latest version (6.x) is recommended. (To check your version, type **ver** at the command prompt.)
- Windows 95 comes with client and peer-sharing network software for both Microsoft Network and Novell NetWare networks. In addition, Windows 95 supports the network software of several third-party vendors using the Windows 3.1 compatible network drivers. For more information, see Chapter 3, “Network Integration.”

Windows 95 Setup automatically upgrades the following network clients to use the Windows 95 Microsoft Network client software:

- Microsoft LAN Manager for DOS
- Microsoft Windows for Workgroups

- Microsoft Workgroup Connection

Before running Setup, be sure that the network client software is correctly installed and is running. Verify network connectivity by connecting to a server before running Setup.

For more information on networking with Windows 95, see Chapter 2, “Networking Basics” and Chapter 3, “Network Integration.”

Upgrading a Microsoft Network Client

As mentioned in the preceding “Hardware and Software Requirements” section, Windows 95 Setup upgrades Microsoft Network clients to the version shipped with Windows 95. When it performs the upgrade, the following information is automatically migrated to Windows 95:

Supported in this beta	Not supported in this beta
Computer name	File sharing options
Workgroup name	LAN Manager logon
Logon domain name	Printer sharing options
Comment	Priority
	Enable sharing (on or off)

In this beta release, Windows 95 Setup will not migrate any shared resource definitions, any persistent connections (per CONNECT.DAT), nor any administrative options (per ADMIN.CFG).

Installing Windows 95 on a Novell Network

When Setup detects Novell NetWare, it automatically tries to install the Microsoft Client for NetWare software. This gives users full 32-bit protected-mode NetWare connectivity. In general, Setup will replace the network adapter driver, protocol, and shell with protected-mode components. If it detects Btrieve or LAN Workplace, however, Setup replaces only the shell. Setup also replaces Novell’s NetBIOS support program with the 32-bit IPX/SPX-compatible NetBIOS support driver, NWNBLINK. In addition, Setup upgrades Cheyenne ARCserve and Arcada’s Backup Exec backup agents to the new Windows 95 version.

Users can use the Custom Network dialog box in Setup to override the default settings. From this dialog box, simply remove the Microsoft Client for NetWare and add the appropriate Novell NetWare client.

For more information about installing Windows 95 for use with a Novell NetWare network, see Chapter 3, “Network Integration.” For more information about Cheyenne ARCserve and

Arcada's Backup Exec backup agents, see Chapter 7, "Desktop Management and Remote Administration."

Installed Windows 95 Files and Directories

The following shows the directory and file structure for a default Windows 95 installation.

```

c:\          c:\windows      c:\windows
winboot.sys  \command       win.ini
autoexec.bat \fonts         system.ini
config.sys   \help          *.plw
setuplog.txt \hypetrm       *.ini
detlog.txt   \inf           drwatson.log
bootlog.txt  \media         win386.swp
sulogo.sys   \online        user.dat
system.dat   \pif           real-mode network software
              \programs      himem.sys
              \start menu    ifshlp.sys
              \sysbckup      win.com
              \system        ...
              \iosysbus
              \viewers
              \vmm32
              \winboot

```

Batch Installation

Here is a list of the items you can currently change in a Setup batch file:

- Optional components that Setup will install
- System settings (such as the display monitor)
- Install directory
- Name and organization
- Network settings (not in this beta)

The following are samples of individual sections within a Setup batch file. A line that begins with a semicolon is a comment.

```

[OptionalComponents]
; This section contains the descriptions you see in the
; OC dialog, followed by a 1/0 - install/don't.
; These strings can change, and localize.

```

```
[System]
; This allows you to modify _some_ of the system settings. It is based
; on classes, and the following classes are 'recognized'
; The following are inf driven
;     Power
;     Locale
;     Machine
;     PenWindows
;     Tablet
; eg Tablet=WACOM_510_COM2
; the following use descriptions
;     Keyboard
;     Monitor
;     Display
;     Mouse
; eg Mouse="No mouse"
;
; The choice must be in the list of compatible devices for that class.
; Again these strings can change and localize.
; The entry
;     DisplChar=ColourDepth,X,Y
; can be used to set the initial video characteristics

[Setup]
;     Express = [0/1] ; To skip being asking you the majority of questions.
;     InstallDir = <where Windows 95 is to clean install to>

[NameAndOrg]
;     Name=<string>
;     Org=<string>
; If the user is to be shown the GetNameAndOrg dialog
;     Display=[0/1]
```

Maintenance

In previous versions of Microsoft Windows, you maintained your Windows installation with the Setup icon in the Main group of Program Manager. In Windows 95, all of the system configuration changes can be made through the Control Panel folder.

Note You cannot add optional components after initial setup in this release. You must rerun Setup to install additional components.

Networking Basics

Windows 95 includes a modular, open networking architecture which allows you to use highly-efficient interchangeable components that best suit the way you use networks in your corporation. This chapter describes the main elements of that architecture and describes how this design helps to make Windows 95's networking capabilities versatile.

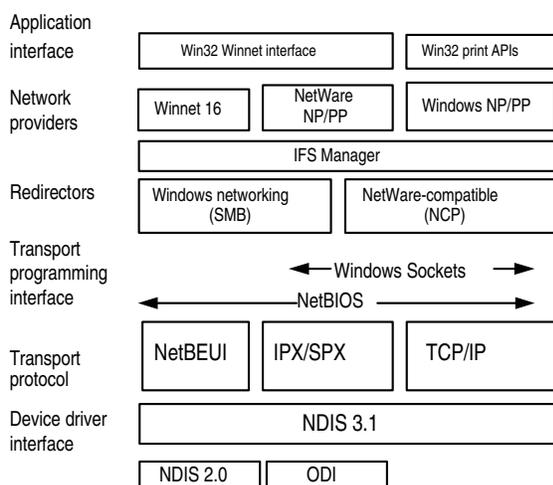
The key design points of Windows 95's networking architecture include the following:

- **Fast, 32-bit VxDs.** Windows 95's networking components are built as Windows Virtual Device Drivers (VxDs). VxDs are 32-bit, and have no conventional memory footprint. In addition, since the operating system and the device drivers are all running in protected-mode, network I/O performance is 50 to 200% faster than Windows 3.1 because there's no more overhead for mode switching between protected- and real-mode operation.
- **Reliable.** Since Windows 95's networking components run in protected-mode and are designed to a well-defined set of interfaces, they are more reliable than real-mode network components. Today's real-mode network components can conflict in memory or attempt to exclusively chain the same set of interrupts, which in turns leads to system hangs or error conditions. Windows 95 arbitrates the hardware resource allocation so that these errors won't occur with protected-mode network components.
- **Modular, Open Design.** Windows 95's networking architecture is highly modular, and includes a new Network Provider Interface, an Installable File System interface, and an enhanced version of Network Driver Interface Specification version 3.1 which has been enhanced for Plug and Play support.
- **Multiple Network Support.** Windows 95 is designed to accept multiple network providers, multiple network redirectors written to the IFS interface, and multiple NDIS drivers as needed.
- **Multiple Protocol Support.** Windows 95's protocol is one of the NDIS components. The NDIS interface enables Microsoft and third parties to independently write network adapter drivers and protocol stacks for Windows 95 that coexist well. Windows 95 includes built-in support for IPX/SPX, TCP/IP, and NetBEUI.
- **Plug and Play Enabled** All of Windows 95's networking components are designed for dynamic Plug and Play operation. For example, when a PCMCIA network adapter is inserted, the NDIS 3.1 network card driver is automatically loaded, and the network is available. Likewise, if the PCMCIA network card is removed, or the network cable is

removed, Windows 95 will not hang as many real-mode networks do, but will notify any applications using the network that it's no longer available and will continue to run.

Windows 95's Networking Architecture

The following figure provides an overview the network architecture built into Windows 95.



The following sections describe key aspects of this architecture, including:

The Network Provider Interface, which provides support for concurrent network servers

The Installable File System, which provides support for multiple redirectors

NDIS 3.1, which provides support for multiple protocols and ODI

Network Provider Interface: Support for Concurrent Network Servers

Windows 95 has an open, modular Network Provider Interface (NPI) to allow multiple network support to be installed in Windows 95 simultaneously. The NPI enables Microsoft or any third party network provider to integrate varied network services seamlessly into Windows 95. Key benefits of the NPI are:

- An open interface that allows any network vendor to supply tightly integrated support for their network servers in Windows 95

- Access and management of all supported networks through the Windows 95 Network Neighborhood user interface

The NPI abstracts the network services for the Windows 95 user interface components, as well as the various Windows 95 network and desktop management components. The NPI consists of two parts—the network provider API and the network providers. The network provider API is a single, well-defined set of API used by Windows 95 to request network services such as browse servers, connect and disconnect to servers, queue a print job, and so on. These requests are then passed to the network providers. The network provider layer sits below the API layer, and provides the needed network specific services. Conceptually, this model is similar to the design of Windows 95's various device driver interfaces, a well-defined set of interfaces used by the operating system, and the services provided by a device driver often written by a third party that honors the request.

One example of user visible support from the NPI can be illustrated when specifying server name strings. For example, Microsoft compatible networks use the Universal Naming Convention (UNC) which appears in this form:

\\server-name\share-name

However, NetWare servers are specified in this form:

server-name/volume-name:directory-name

Under Windows 95, when a request is made to connect to a specific server, the call is passed to the respective network providers which will correctly parse the syntax of their server name strings. This means that users need not be aware of these differences.

Installable File System Interface: Support for Multiple Network Redirectors

In addition to managing file systems, Windows 95's Installable File System (IFS) provides support for multiple network redirectors.

Windows 95's IFS interface is a well-defined set of APIs that are used to implement all file systems in the operating system including VFAT (32-bit FAT) and CD-ROM file systems. The Windows 95 IFS implementation is functionally similar to the IFS implementations on Windows for Workgroups and Windows NT.

For networking, the IFS is used to implement network redirectors. The IFS offers a number of key benefits for Windows 95 network redirectors:

- Designed for multiple redirector support

- Increased reliability, the IFS model arbitrates resource requests, removing the source of many real-mode redirector conflicts
- Improved performance, network redirectors will benefit from the unified IFS cache making available client side network redirector caching

The IFS consists of a set of file system APIs and loadable File System Drivers (FSDs). Multiple FSDs can be resident in the system simultaneously. The FSDs provide the logic necessary for the file system to provide a consistent logical view of devices, and arbitrates access, update, and control of devices consisting of very different physical media types. For network redirectors, the FSD provides mechanisms to locate, open, read, write, and delete files, as well as services such as named pipes and mailslots.

Both Microsoft supplied Microsoft Network Client and the Novell Compatible Client are implemented as IFS FSDs and there are many third-party network vendors currently working on IFS FSD redirectors.

NDIS 3.1: Support for Multiple Protocols and ODI

The Network Driver Interface Specification (NDIS) version 3.1 is a superset of the NDIS 3.0 functionality that exists for Windows NT and Windows for Workgroups 3.11. NDIS support in Windows 95 includes support for multiple protocols and ODI.

NDIS 3.1 has enhancements for Windows 95 in two key areas:

- Plug and Play enhancements to the Protocol Manager and Media Access Control (MAC) layer that enables network drivers to be dynamically loaded and unloaded
- A new NDIS mini-driver model, the Windows 95 mini-drivers are binary compatible with Windows NT Daytona's mini-driver implementation. The NDIS mini-driver model is similar to the driver models implemented for printers, disk drivers, and display drivers.

An NDIS 3.1 stack is composed of three component parts—the protocol, the MAC or mini-port, and the mini-port wrapper. NDIS contains the protocol manager which loads and unloads the protocol. This manager can manage multiple protocols loaded simultaneously. Just below is either the MAC or mini-driver wrapper, if using mini-drivers. Multiple MACs or mini-drivers can be loaded in systems that have multiple network adapter cards loaded. Finally, the mini-port wrapper layer below the mini-port does a mapping of Windows NT Hardware Abstraction Layer (HAL) layer APIs for I/O.

Novell NetWare Integration

Windows 95 provides a complete, Microsoft supplied Microsoft Client for NetWare. This client can be installed as the default network support for Windows 95, or it can coexist with the Microsoft Network client. The Microsoft Client for NetWare for Windows provides interoperability with NetWare 3.x and 4.x servers.

Windows 95 can also run on top of the existing Novell NetWare 3.x or 4.x clients, the NETX or VLM shells. This support is intended to help customers make the transition from their real-mode network to Windows 95's fully 32-bit protected-mode implementation in smaller steps if necessary.

The client is fully implemented as 32-bit virtual device driver components. The client runs in protected-mode and designed for operation in a multitasking environment, hence will be much more robust than real-mode networking components. By running in protected-mode, the drivers take no MS-DOS conventional memory space.

The Microsoft Client for NetWare is enabled for Plug and Play, meaning that it's possible on a portable system to hot-dock or undock a notebook computer and have the networking support properly load and unload, without hanging the system. This will also function in the same fashion for the emerging market of PCMCIA network cards. One easy way to understand how this work is to disconnect the network cable from your Windows 95 PC, and the system continues to function. In real-mode networks, this causes the system to hang.

Logon to Windows 95 is linked to either a NetWare 3.x Bindery, or 4.x NDS. This logs the user onto the Windows 95 system and to their preferred NetWare server.

The Windows 95 Microsoft Client for NetWare can load and run NetWare command line utilities. It also supports the MS-DOS level NetWare APIs, and the 16-bit Windows DLLs that NetWare supplies can be run with the Microsoft Client for NetWare.

Microsoft File and Print Services for NetWare

Windows 95 provides File and Print Services for NetWare clients. These services provide sharing for local files and printers on the Windows 95 system. During Windows 95 installation and via the Network Control Panel tool the option is provided to install either the Microsoft file and print services or the Microsoft file and print services for NetWare. Windows 95's File and Print Services for NetWare are meant to work in concert with an existing Novell NetWare server and add complementary sharing services.

For the Microsoft File and Print Service for NetWare to be activated there must be a Novell NetWare server on the network. Without this server, sharing cannot be enabled Microsoft's File and Print Services for NetWare because of the "pass-through security" model.

User-level security is implemented using the NetWare servers security authority namely the Bindery or the NDS, hence “passing through” the validation of users to the NetWare server. Before sharing is enabled, a NetWare server must be specified via the Security Control Panel tool. For more information on using and configuring user-level security, see Chapter 6, “Windows 95 Security.”

NetWare 4.x Support

Windows 95’s client has support for logging into and browsing the NetWare 4.x NetWare Directory Services (NDS). This means that the Microsoft Client for NetWare is able to logon into the NDS tree, connect to the NetWare 4.x NDS tree, and navigate the tree. Accessing the tree is simple, start in the Network Neighborhood and select a NetWare 4.x NDS tree.

The initial contents of the Network Neighborhood are the network resource contained in the Organizational Unit (OU) context that the user. This could include NetWare servers or any other services contained within the OU. By double-clicking the server icons, the user can further browse for resources contained on this server.

NetWare API Support

The Microsoft Client for NetWare includes support for both the MS-DOS APIs and Windows APIs defined by Novell. Both of the 16-bit Novell DLLs for Windows—NWNENET.DLL and NWCALLS.DLL DLLs—can be run with the Microsoft Client for NetWare. This ensures compatibility of any MS-DOS or Windows applications and utilities that are NetWare-aware will run compatibly with the Microsoft Client for NetWare.

For more information about integrating Windows 95 and Novell NetWare, see Chapter 3, “Network Integration.”

Microsoft Network Integration

Windows 95 includes a network client that implements support for Microsoft Network functionality. This allows Windows 95 to connect to Windows for Workgroups, Windows NT Advanced Server, LAN Manager and interoperate with IBM®’s LAN Server, DEC® Pathworks™, AT&T® StarLAN, and LAN Manager for UNIX®, as well as other SMB-compatible networks.

The Microsoft Network client is implemented as a collection of 32-bit, protected-mode components. The network provider, redirector, and NDIS 3.1 drivers are implemented as VxDs, and hence provide great performance since the components execute in protected-mode without the overhead of switching to real-mode. The network provider includes the implementation of Windows 95 client-side caching for additional performance boost. The client has higher reliability than real-mode components, it is designed for operation in a multi-

tasking environment and the components run in kernel Ring 0 context, hence they can't be touched by errant Windows applications like real-mode networks. And finally, since they run in protected-mode, they have no conventional memory footprint.

The client is enabled for key Windows 95 features like long filenames, links, auto-reconnect to servers, Point and Print, Plug and Play, and integrated tightly into the Windows 95 shell via the NPI discussed previously. The client is protocol-independent, it can use IPX/SPX (the default installed protocol), TCP/IP, or NetBEUI.

The client provides full interoperability with Windows for Workgroups, Windows NT Advanced Server, LAN Manager, and LAN Manager for UNIX. It also provides compatibility with AT&T StarLAN, IBM LAN Server, 3Com® 3+Open® and 3+Share® and DEC Pathworks.

Protocol Support

The protocols shipped with Windows 95 are implemented as 32-bit protected-mode NDIS components. Windows 95 can support multiple protocols simultaneously. Protocol stacks can be shared among the networks that are installed. As an example, a single TCP/IP protocol stack can service both the needs of the Windows Networks client and the Microsoft Client for NetWare.

All three protocols included with Windows 95 (IPX/SPX, TCP/IP, and NetBEUI) are Plug and Play enabled. This means that if the network is unavailable either due to undocking a notebook PC, or removal of a PCMCIA network card, the Windows 95 system continues to run. The protocol stacks will unload themselves after having notified any dependent applications that they will be unloaded from the system. Additionally, this also means protocols can automatically be loaded.

IPX/SPX

The IPX/SPX stack is compatible with the Novell NetWare IPX/SPX implementation. This protocol stack can be used to communicate to either a NetWare server, or a Daytona Windows NT Advanced Server. This protocol is routable, and will run compatibly on most network infrastructure (such as bridges, routers, and so on.) that are designed for IPX/SPX routing. Windows 95's IPX/SPX protocol includes support for "packet burst" which can offer improved network performance.

One enhancement made to the Microsoft IPX/SPX implementation is Windows Sockets programming interface support. The Windows Sockets interface is supported using IPX/SPX as the protocol. Hence, any WinSock applications can run on top of IPX/SPX with Windows 95. Support is provided for only Win32 WinSock applications.

The Windows 95 IPX/SPX implementation also has support for the NetBIOS programming interface.

TCP/IP

For connectivity to the Internet, and for many corporations implementation of an industry standard network protocol, TCP/IP is becoming widely accepted. Windows 95's implementation of TCP/IP is a 32-bit, high-performance VxD which consumes no conventional memory.

Windows 95 includes a full TCP/IP implementation that includes several of the more commonly used command line utilities, including telnet, ftp, arp, ping, route, netstat, nstat, ipconfig, tftp, rexec, rcp, rsh, and traceroute.

The Windows 95 TCP/IP protocol support includes the Windows Sockets programming interface, and includes a WinSock DLL. Support is provided for both 16-bit WinSock (for compatibility with existing WinSock applications) and 32-bit WinSock (for Win32 WinSock applications).

A NetBIOS programming interface support is also supplied with the TCP/IP support.

Dynamic Host Configuration Protocol Support

In an effort to make implementation of the TCP/IP protocol more manageable, Microsoft, working with other industry leaders, created a backward-compatible bootp mechanism for automatically allocating IP addresses. The Dynamic Host Configuration Protocol (DHCP) runs from a Windows NT DHCP server, which in turn allocates a network manager. In a centralized location on the network, the network manager automatically establishes a range of IP addresses per subnet for any Windows 95 TCP/IP client requesting and address. DHCP also allows the network manager to centrally establish a "lease time"-how long the allocated IP address is to remain valid. Unlike bootp, the address allocation is dynamic, not preconfigured. In this fashion it's possible to move from subnet to subnet and always have a valid IP address mask. Windows 95 includes a ipconfig utility that a user or administrator can use to quickly examine the IP address allocated, lease-time information, and other useful data about the DHCP allocation, as shown below.

```
Windows IP Configuration Version 0.1
Host Name . . . . . :
DNS Servers . . . . . :
DNS Lookup Order. . . . :
Node Type . . . . . : Mixed
NetBIOS Scope ID. . . . :
IP Routing Enabled. . . : No
WINS Proxy Enabled. . . : No
WINS Resolution For Windows Sockets Applications Enabled : No
DNS Resolution For Windows Networking Applications Enabled : No

Adapter Address 00-AA-00-18-B0-C4:
DHCP Enabled. . . . . : Yes
IP Address. . . . . : 11.105.43.177
```

```
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . : 11.105.0.1
DHCP Server . . . . . : 11.105.43.157
Primary WINS Server . . : 11.101.13.53
Secondary WINS Server . : 11.101.12.198
Lease Obtained. . . . . : Tue 10th. May 1994 6:44:40 am
Lease Expires . . . . . : Wed 11th. May 1994 6:44:40 am
```

DHCP support can be specified when you install Windows 95, or enabled via the Network Control Panel. If the user prefers, a “hand-entered” IP address can be used and DHCP support can be disabled.

Windows Internet Naming Service Support

The Windows 95 TCP/IP protocol stack lets the user choose to install support for either the Windows NT Windows Internet Naming Service (WINS) or the OSF DCE Domain Naming Service (DNS). The naming services provides name resolution by binding the node name and the currently allocated IP address. This provides for correct addressing of any requests for resources from a node anywhere on the network, thus minimizing the amount of network traffic to locate the node on the network. Windows 95 supports a single DNS server and up to two WINS servers.

NetBEUI

Windows 95 provides a NetBEUI protocol stack that’s compatible with existing networks that use NetBEUI. This provides compatibility with Windows for Workgroups, Windows NT Advanced Server, LAN Manager, and other networks. A NetBIOS programming interface is also supported.

Long Filename Support

Windows 95’s network clients include long filename support. If the network server to which the Windows 95 system is connected supports long filenames, then filenames on the server will include identical support to Windows 95’s local long filename support.(On some servers, however, the length of filenames and restricted characters may differ from Windows 95’s.) This means that it’s possible to have long filename support on both the Windows NT Advanced Server and NetWare servers if the servers are properly configured.

Network Integration

Windows 95 includes the networking components to connect your computer with existing Windows NT, LAN Manager, and Novell NetWare networks. You can also connect to other third-party networks.

This chapter describes how to configure Windows 95 to work within your networking environment.



In This Chapter

You'll find answers to these questions in this chapter:

- *How do I install Windows 95 to work with Windows NT or LAN Manager?*
(see page 40)
- *How do I install Windows 95 to connect to Novell NetWare?*
(see page 41)
- *How do I install Windows 95 to work with other networks?*
(see page 49)
- *How do I add the Microsoft Network Client in addition to a third-party client?*
(see page 51)

Connectivity With Multiple Network Servers

Windows 95 is designed to support concurrent communication with several different networks. For example, a user's workstation can have connections to Windows 95 servers, Windows NT servers, NetWare servers, and the Internet all at the same time. This capability is available because of Windows 95's modular Network Provider Interface, which is described in Chapter 2, "Networking Basics."

Windows 95 includes several components you can use to connect with other networks:

- Microsoft Networking Client (for use with Windows NT and LAN Manager networks)
- Microsoft Network File and Print Sharing
- Microsoft Client for NetWare
- Microsoft File and Print Sharing for NetWare

These components are discussed in the sections called "Integrating with Windows NT and LAN Manager" and "Integrating with Novell NetWare" later in this chapter.

In addition, this beta release of Windows 95 supports the following third-party network clients:

- Artisoft LANtastic version 5.0 and greater
- Banyan® VINES® version 5.52 and greater
- Beame and Whiteside BW-NFS 3.0c and greater
- DEC Pathworks version 4.1 and greater (installed as a protocol)
- DEC Pathworks version 5.0 and greater (installed as a protocol)
- Novell NetWare version 3.11 and greater
- SunSelect PC-NFS® version 5.0 and greater
- TCS 10-Net versions version 4.1 or greater

Most of these network clients can be installed along with any Microsoft networking component (Microsoft Networking Client, Microsoft Client for NetWare, Microsoft Network File and Print Sharing, Microsoft File and Print Sharing for NetWare). Windows 95 does not include the files for these networks; you must obtain them from the vendor. Windows 95 does include the support necessary to work with these networking components.

You must have the third-party network installed and running before installing Windows 95. In this case, Setup should detect the network and will choose to install support for it by default. You can check this during Custom Setup by clicking Network Options.

For more information about these third-party network clients, see “Support for Other Networks.”

General Network Configuration Options for Windows 95

All networking options for Windows 95 are available through the Network icon of Control Panel. When you double-click the Network icon, its property sheets are displayed. From these three property sheets, you can set network options and configure properties of:

- Configuration
- Identification
- Security

From the Configuration property sheet, you can configure information about the user’s client software, network adapter card driver, protocol, and peer service.



- The Client option installs client software for the various types of networks on your network. You can use either a 32-bit compatible client, which needs no real-mode

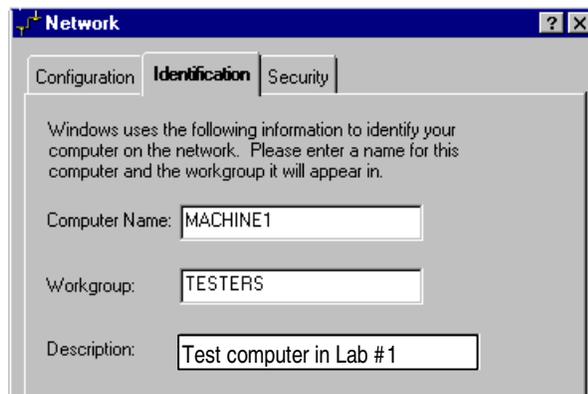
components, or older real-mode components. There is no limit to the number of 32-bit network clients you can install, but you can have only one real-mode client installed at a time. Some networks are supported only as primary networks. See at the section called “Support for Other Networks” for any specifics about installing your network client software to run with Windows 95.

- The Adapter option lets you install drivers for the network adapter cards that are installed in your computer. You can select the type of driver to use (enhanced-mode NDIS, real-mode NDIS, or ODI), specify the resources the cards you are using (such as I/O, IRQ, and transceiver type), and define bindings and other options for the card.
- The Protocol option lets you install protocols and set related options and bindings.

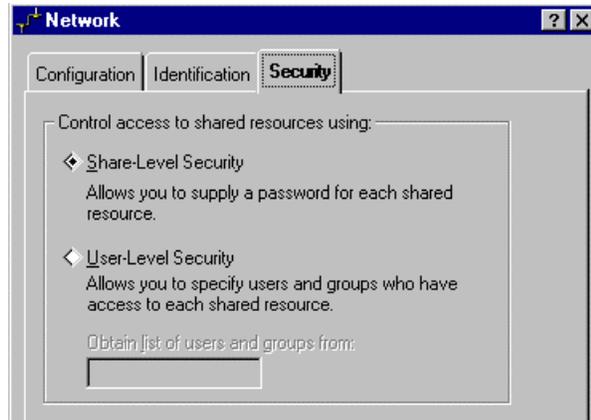
Note This beta release does not support installing additional protocols or network adapter cards.

- The Service option lets you specify which type of peer service you want to run and allows you to install and configure other types of services, such as backup agents and additional print services.

From the Identification property sheet, you can specify the computer name, workgroup, and description for a computer.



From the Security property sheet, you can specify whether you will be using either share-level security or information from a Windows NT or LAN Manager domain, or from a NetWare 3.x Bindery.



If you are running Microsoft Networking peer services you will have the option for either share-level and user-level security. If you are using Novell peer services you can only use user-level security.

Share-level security creates a secure computing environment by allowing system administrators or users to protect shared network resources by assigning a password to network share names. For example, after a system administrator assigns a password to a network share, the user who wants to access a file on the protected shared resource must type in the appropriate password to access it. If the shared resource is not password-protected, everyone with access to the network has full access to that resource.

User-level security creates a tightly secured computing environment by requiring each user on the network to have a type of identification. Windows 95 uses pass-through authentication, meaning that another server authenticates user account information. Each user has a user name and password which must be authenticated by the network's security database to determine which privileges the user has on the network. When a user tries to access a shared network resource, the user's name and password are passed to the authenticating server for authentication of the account. The authenticating server responds by telling the Windows 95 computer whether or not the account was valid. If valid, the Windows 95 computer uses the user name to determine permissions for any given shared resource.

For more information about user-level security in Windows 95, see Chapter 6, "Windows 95 Security."

Resource Sharing and Permissions

The ability to share resources in Windows 95 is integrated into the Windows 95 shell. To share a resource, you can simply use the secondary mouse button to click ("right-click") the resource to be shared, then choose to display the property sheet for that resource. When you

select the Share property sheet, you'll see either a Share-Level Security or User-Level Security property sheet, as appropriate.

If you are using the Share-Level Security property sheet, you can assign one or more passwords to a shared resource and, for each password, define the level of access for that resource. Then, when a user tries to access the resource by typing a password, the server compares the password that the user typed with the passwords defined on the server for access, and if it finds a match, grants the appropriate access level to the user for the resource.

If you are using the User-Level Security property sheet, you can assign a name to the resource, then specify which users will have which level of access to that resource. Then when a user tries to access the resource, the server checks the user's security information to see if he or she is allowed access to the resource. This user account information is located on either a Windows NT Advanced Server or a Novell 3.x Bindery or a 4.x computer running Bindery emulation. (This information can also be found in the Security property sheet of the Network Properties tool.)

Integrating with Windows NT and LAN Manager

Windows 95 was built to be a great desktop client for Windows NT. Support for features such as domain security and peer services help to increase the ability to transfer information easily with little user interaction. The Microsoft Network Client for Windows 95 is a 32-bit implementation which provides users with faster, more robust, and more reliable network access. It also gives users the ability to access network resources as easily as they can access local ones.

Users in a domain environment can participate in their domain security by enabling logon validation from a Windows NT or LAN Manager domain. This is done by modifying the properties of the Microsoft Network Client in the Network option of Control Panel.



Integrating with Novell NetWare

One of Windows 95's main goals is to be a great desktop client for Novell NetWare. Because an important part of this goal is interoperability with Novell's existing 16-bit clients-NETX and VLM-Windows 95 will continue to work with these clients. Even better, Windows 95 includes a fully 32-bit NetWare client which take advantage of Windows 95's new architecture. Windows 95 also includes another component developed in the interests of improved interoperability with Novell NetWare-NetWare-compatible peer sharing.

The following sections describe these components.

The Microsoft NetWare-Compatible Client for Windows

In Windows 95, Microsoft is introducing a NetWare-compatible client for Windows. This client provides full NetWare client functionality. It is fully written as a 32-bit component, runs in protected-mode, supports auto-reconnection, and takes advantage of caching. It is robust, exhibits high performance, and takes up no conventional memory. It also supports long filenames, and is Plug and Play aware, which means that it can be loaded and unloaded dynamically. It currently supports most documented NetWare 3.x and 4.x APIs. This means that with this client you can access all of the NetWare resources that you can access with Novell's NETX client or Novell's VLM client.



Configuration Information

When using this client, you do not need to load any Novell drivers or components. In the default configuration, this client runs with Windows 95's IPX/SPX-compatible protocol and Windows 95's NDIS drivers. Windows 95 Setup installs these components for you automatically. If you want to use your current ODI driver instead of an NDIS driver, you can. You can also run Novell's real-mode IPXODI. Windows 95's IPX/SPX-compatible protocol can run with Novell's IPXODI.

The NetWare-compatible client does not access the settings in NET.CFG. Any of the NET.CFG settings that the NetWare-compatible client uses are moved to the Registry during Setup and are stored in the Registry. You can specify these settings when you run Windows 95 Setup or change these settings later via the Network Control Panel. The Network Control

Panel includes options for the network adapter, the IPX/SPX-compatible protocol (and other protocols), and the NetWare-compatible client. Of these options, only Preferred Server is used in this beta release. This option is used by the NetWare compatible client for the first connection. You are not required to set it.

With the NetWare-compatible client, drive mappings are always global; you cannot have a different set of drive mappings in each MS-DOS session. This means that the SYSTEM.INI setting NWShareHandles can only be set to True.

Logging Onto the Network

You'll notice that the NetWare-compatible client is different from NETX and VLM because there is no real-mode login before Windows 95 starts. The goal is to have one unified login prompt for Windows 95. This prompt allows the user to log onto the system and to all networks at the same time. Note that the first time a user starts Windows 95, there will be two separate logon prompts—one for the system and one for NetWare (to the preferred server). As long as the user makes the two passwords the same, the second logon prompt will not display again.

The NetWare-compatible client is also different from NETX and VLM because it does not map the first network drive to the login directory of the preferred server as do NETX and VLM.

All subsequent connections to NetWare servers must be made in the Windows 95 shell.

Upgrading from Novell Clients

If Setup detects Novell NetWare running, it will replace the Novell client software with the 32-bit Microsoft Compatible Network driver. Setup will remark references to the older drivers in your initialization files.

Login Scripts

For this beta release, login scripts are not processed when using the NetWare-compatible client. The next beta release should include a way to run login scripts. If you must run login scripts, you can run the NETX client or VLM client instead.

In this beta release, there are new configuration management components which can perform some of the functions contained in login scripts. For related information about system policies and user profiles, see Chapter 7, "Desktop Management and Remote Administration."

Note that you can make persistent connections (that use the same drive letter each time) to NetWare volumes and directories. By using persistent connections, the need for map commands in login scripts is eliminated.

Windows 95's Microsoft Print Server for NetWare

The Microsoft Print Server for NetWare (MSPSRV.EXE) is designed to run on a Windows 95 computer configured as a NetWare client. It provides Print Server functionality, allowing you to despool print jobs from a NetWare queue to a local printer. MSPSRV is a 32-bit application that can be enabled from the property sheet of any locally-attached printer with access to a NetWare server.

To enable this feature, select the "Enable Microsoft Print Server for NetWare" option on the Print Server property sheet. All NetWare servers to which you have access is listed in the NetWare Server drop-down list. Once a NetWare server is selected, the available Print Servers appears in the Print Server drop-down list.

You can adjust the time interval for polling the print queue. This setting can be adjusted as high as 15 seconds for maximum Print Server performance, or as low as 3 minutes for increased local performance. The default is 30 seconds.

Administrative control over MSPSRV is coupled with the Printer Sharing control—the one option controlling the user's ability to both share a local printer and act as a Microsoft Print Server for NetWare. If the administrator has specified that print sharing is not allowed, MSPSRV won't load and the user enable/disable options will be unavailable.

Note In this beta release, you cannot be attached to the same server simultaneously as a user and as a PServer.

Running NetWare Utilities

With the NetWare-compatible client, you can run all Novell 3.x utilities that reside on the NetWare server, such as SYSCON. To do this, first map a drive to the volume by using the Windows 95 shell. Next, start an MS-DOS session, switch to that network drive, and then run the utilities.

Note VLM's NWUser tool is not supported when running the Microsoft Client for NetWare.

In this beta release, Novell NetWare 4.x utilities are not supported by the Microsoft Client for NetWare. For information about problems with specific NetWare 3.x utilities, see the *Windows 95 Beta Release Notes*.

Using Novell's NetWare Client

Windows 95 interoperates with Novell's NETX client and Novell's VLM client. You should continue to load the necessary MS-DOS TSR programs via AUTOEXEC.BAT or

STARTNET.BAT. You should also make sure that you still have necessary Novell files for Windows 3.1 support, which can be obtained from Novell.

By default, Setup automatically installs the Microsoft Client for NetWare whenever it detects that you are running the Novell NetWare Client. If possible, Setup also replaces your network adapter and protocol drivers with 32-bit versions, thus giving you fully 32-bit protected-mode NetWare connectivity.

If you run any NetWare TSR programs or 3270 emulators, you should run one of Novell's Workstation Shells instead of the Microsoft Client for NetWare. Windows 95 will support Novell's monolithic protocol stack, IPX.COM, and Novell's ODI protocol stack. If you are currently using IPX.COM, you should either upgrade to the 32-bit Microsoft Client for NetWare or use the ODI driver.

The following sections describe how to install a Novell client in more detail.

➔ **To maintain current NetWare Client support during Setup**

1. When asked if you want to begin Setup or customize, choose Customize.
2. Click the Network button to display the Custom Network dialog box.
3. Click the Client button to display the Change Clients dialog box.
4. Select the Microsoft Client for NetWare and click the Delete button.
5. Click the Add button and specify either the Novell NetWare 3.x or 4.0 client.
6. Click Close to return to the Custom Network dialog box.

Note If you are not using the Microsoft Client, the adapter protocol and services dialog boxes should be empty.

7. Click OK to return to the main Custom Setup dialog box and continue with the rest of Setup.

➔ **To replace protected-mode NetWare support with Novell Client software**

If you let Setup automatically install the Microsoft Client for NetWare and decide to return to your original Novell NetWare configuration, follow these steps:

1. Open an MS-DOS window.
2. Run the Novell NetWare installation program and choose to install NetWare with Windows.
3. Edit your SYSTEM.INI file to remove the line beginning with "network=" from the [386Enh] section.
4. Type **exit** to close the MS-DOS window.

5. In the Network Control Panel, click Protocol.
6. Remove the IPX/SPX-compatible protocol by selecting it and clicking Delete.
7. Click OK to return to the Configuration property sheet, then click the Client button.
8. Select the Microsoft Client for NetWare and click Delete.
9. Select either Novell NetWare (Workstation Shell version 3.x) or Novell NetWare (Workstation Shell version 4.0), then click Add.
10. Click Close to return to the Configuration property sheet.
11. Click OK to save the changes.
12. Restart the computer.

ODI Drivers Versus Monolithic IPX.COM

Windows 95 supports the NETX and VLM clients running with ODI drivers. This is the configuration that Novell currently supports, and it is more stable than the configuration using monolithic IPX.COM. We *strongly* recommend that you upgrade to ODI drivers if you are still running IPX.COM.

Configuration Information for NETX

To run Novell's NETX client with Windows 95, you must do the following:

- Configure Windows 95 to run with NETX, by specifying this either during Windows 95 Setup or later from the Network Control Panel.
- Continue to load the necessary Novell MS-DOS TSR programs (LSL, ODI driver, IPXODI, and NETX) in AUTOEXEC.BAT or other batch file, just as you do with MS-DOS or Windows 3.1.

Configuration Information for VLM

As with the NETX client, you must configure Windows 95 and load the appropriate TSR programs to run Novell's VLM client with Windows 95.

Because the VLM installation program installs Windows support, there is a certain order that you must follow to set things up properly. Follow the instructions under the heading that most closely describes your configuration.

- ➔ **If you are already running VLM with Windows 3.1, and install Windows 95 over Windows 3.1**
1. Install Windows 95.

2. During Setup, or in the Network Control Panel after Setup, choose support for Novell NetWare 4.0. You can also install support for Microsoft Networking at this time.
3. Reboot the computer.

→ **If you are already running VLM with Windows 3.1, but install Windows 95 to a new directory or**

If you are running VLM with MS-DOS

1. Install Windows 95 with *no* networking support.
2. Reinstall VLM and respond Yes to installation of Windows support. Specify the name of the directory where Windows 95 is installed.
3. In the Network Control Panel, choose support for Novell NetWare 4.0. You can also install support for Microsoft Networking at this time.
4. Reboot the computer.

Using NETX and VLM

When running NETX or VLM with Windows 95, the behavior of the NetWare shell is the same as it is with MS-DOS or Windows 3.1. You should still load the Novell TSR programs and run login from AUTOEXEC.BAT, STARTNET.BAT, or other batch file. Login scripts work the same as in MS-DOS and Windows 3.1. Once Windows 95 starts, you can still run NetWare commands in a MS-DOS session.

The Windows user interface, however, has changed. There is no longer a NetWare button in the Connect Network Drive dialog box. This is because the Windows 95 shell incorporates all of the functionality of Novell's Windows 3.1 NetWare user interface.

Note You may still run the NWUser tool with the VLM client. The following section describes more about using the Windows 95 user interface with NetWare.

Shell Support for NetWare

The Windows 95 shell includes support for browsing and connecting to network resources on Novell NetWare and other networks. This shell support is the same whether you are using the Microsoft Client for NetWare or Novell's NETX or VLM client.

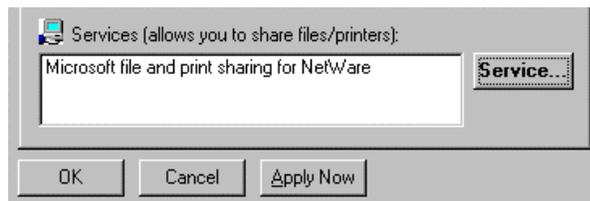
The toolbar on every window includes the familiar Connect Network Drive button. In this dialog box, you can type in the name of a NetWare volume (or directory), or graphically browse the network for the resource you want. When typing in a volume or directory name, you may use either a UNC pathname, or NetWare-style naming. For example, suppose you

want to connect to the server CORP, volume DOCS, directory WORD, sub-directory Q1. The UNC name is \\CORP\DOCS\WORD\Q1. The NetWare name is CORP/DOCS:WORD\Q1. You can make any drive mapping permanent by checking the “Reconnect at Startup” check box.

The Network Neighborhood tool is the primary means by which you can browse the network. When you open the Network Neighborhood, you will see all of the NetWare Bindery servers that you are connected to. If you open the Entire Network icon within the Neighborhood, you will see a list of all NetWare servers on your network. In both the Network Neighborhood and Entire Network views, you can open up a server to access its contents without having to map a network drive. The context menus (displayed when you click an object with the right mouse button) show you all of things that you can do with servers, volumes, and directories. You will be prompted for authentication if necessary, and you can opt to save password so that you will not have to type it in the next time.

Microsoft File and Print Sharing for NetWare

This beta release introduces Microsoft File and Print Sharing for NetWare.



This component, like all other Windows 95 networking components, is 32-bit, runs in protected-mode, supports long filenames, and is Plug and Play aware. Like the peer sharing component in Windows for Workgroups, it allows users to share their directories and/or printers with other users on the network. However, Microsoft File and Print Sharing for NetWare differs from Windows for Workgroups peer sharing in two fundamental ways.

First, the Microsoft File and Print Sharing for NetWare components communicate using the NCP protocol instead of the SMB protocol that Windows for Workgroups peer sharing uses. This means that any NetWare client (Microsoft Client for NetWare, Novell’s NETX, or Novell’s VLM) can connect to a Windows 95 computer running Microsoft File and Print Sharing for NetWare. This is advantageous because Windows 95 computers already on a Novell NetWare network can run peer sharing without having to run a separate peer-networking client and can access NetWare, Windows for Workgroups, Windows NT, and LAN Manager servers concurrently.

Second, Microsoft File and Print Sharing for NetWare operates under user-level security. Access to a shared resource is based on the identity of the user trying to access that resource,

instead of being based on a password associated with that resource. The user database that Microsoft File and Print Sharing for NetWare uses to verify identity is simply the Bindery on a specified NetWare server.

Configuration Information

The Microsoft File and Print Sharing for NetWare can be enabled during Windows 95 Setup, or from the Network Control Panel.

Microsoft File and Print Sharing for NetWare cannot run at the same time as Microsoft networking (SMB-based) peer sharing. To set up Microsoft File and Print Sharing for NetWare on your Windows 95 computer, from Security property sheet for Microsoft File and Print Services, type the name of a NetWare server for your network. This is server that provides the list of users and groups from which you can choose when granting access to a shared resource. This server is also responsible for verifying users identities when they try to access shared resources on your Windows 95 computer.

Browsing and Access Options

When you use Microsoft File and Print Sharing for NetWare, you can choose one of two methods for browsing computers on the network. You can use the Browse Master, or you can use SAP browsing. (To specify your preference, from the Network Control Panel, choose Services. Then choose the Microsoft File and Print Sharing for NetWare and click Properties.)

By default, peer sharing uses a workgroup model. This means that Windows 95 computers running peer sharing are placed in workgroups and can be browsed by workgroup. You can use the Identification property sheet for the Network Control Panel to specify the workgroup and computer name for the computer.

Each workgroup must have a designated "Browse Master" at all times. The Browse Master keeps track of the name and address for each computer in the workgroup. From the Properties property sheet, you can select Enable to allow your computer to be the Browse Master, or select Disable so that it cannot be elected Browse Master.

All Windows 95 computers that are running the Microsoft Client for NetWare can see and connect to Windows 95 computers in Microsoft File and Print Sharing for NetWare workgroups. Computers running Novell's NETX client or Novell's VLM client cannot connect to Windows 95 computers in workgroups.

If you want NETX and VLM clients to be able to connect to your Windows 95 computer, you must enable SAP Browsing. When you enable this option, the workgroup will not be used. SAP stands for Service Advertising Protocol and is the way that Novel NetWare 2.x, 3.x and 4.x servers advertise their presence on the network. Thus, if you enable SAP Browsing,

Windows 95 computers will appear in the list of NetWare servers that you can see from the Windows 95 shell or from Novell's utilities.

Although Windows 95 computers with SAP Browsing enabled appear in the list of NetWare servers, you cannot use them in all of the same ways that you use NetWare servers.

- When using NETX, you cannot login to one, though you can attach to one and map drives to its directories.
- When using VLM, you cannot login to one at the command line, but you can run a **login /ns** command, and use the login button in the NWUser tool.
- If you run SYSCON on a NetWare server, you can change the server to one of these Windows 95 computers. However, the Windows 95 computer does not have a Bindery, so when you display all of the users (or groups) in SYSCON, you will see the user list (or group list) from the NetWare server that was selected to participate in user-level security.
- If you run VolInfo on a NetWare server, you may select one of these Windows 95 computers and display its volume information (if you are attached to it). This shows all of the available shared resources for the Windows 95 computer.

In the Windows 95 shell, you can do the same things to Windows 95 computers running peer sharing as you can to any other network resource. For example, when you open the icon to view its contents, you will see only the resources that are shared, and that you have rights to see. You can also create a link to the computer, or map a drive to its shared directories, and so forth.

Support for Other Networks

If you are not running the third-party network when you set up Windows 95, and Setup detects a network adapter, Windows 95 will choose to install the Microsoft Network Client by default. You can check and/or change this during Custom Setup by clicking Network Options.

You must install support for a third-party network during Windows 95 installation. Choose Custom Setup, and click Network Options. This dialog box displays the adapter, protocols, clients, and services that Windows 95 will install.

➔ To add a network client

1. Click Clients, and then click Add.
2. Choose the vendor, and the name of the network.
3. After adding a client, make sure that the correct protocol has been added.

The dialog box that allows you add and remove networking components is also in the Network Control Panel. You can try adding support for a network after Windows 95 is installed; however we suggest that you install networking support during Windows 95 Setup.

In general, Setup tries to direct any line containing the **net** command to the C:\WINBOOT directory. This will create problems if the **net** line is from a third-party network. Check your AUTOEXEC.BAT file after Setup to ensure all commands point to the correct directory.

In this beta release, Windows 95 does not support OEMSETUP.INF files for network adapters. If you have a network adapter that is not listed in the Select Device dialog box, you will not be able to use this adapter.

All real-mode networking components including PROTOCOL.INI are now located in the C:\WINBOOT directory. The settings in PROTOCOL.INI only affect real-mode network components. You should not change these values since they will have no effect on the protected-mode network. If you need to change anything in PROTOCOL.INI, use the Network Control Panel to make changes.

Installing Support for the Third-Party Network

To install support for a third-party network, first read the general notes for all networks in the preceding section. Then follow the instructions in this section, followed by the instructions for your particular network. (See the appropriate section for your network later in this chapter.)

1. Be sure the third-party client is already installed under MS-DOS, Windows 3.1, or Windows for Workgroups. It should be running when you install Windows 95.
2. Install Windows 95, and choose Custom Setup. Click Network Options.
3. Setup should have detected the network you are running. This is displayed in the Clients section. If it is correct, click OK to exit the Networks dialog box and continue with Setup.
4. Because the third-party clients keep track of the network adapter and protocols, these sections should remain empty in the Network Setup dialog box.
5. If you need to manually add the network client, click Client, then click Add to display the Network Options dialog box.
6. Select the vendor in the left pane, and the name of the network client in the right pane. Click OK, then click Close. You should be back in the main Network Configuration dialog box. You should not have any protocols or network adapters shown in that dialog box.
7. If you want to install the Microsoft Network Client in addition to the third-party client, follow the steps in the next section. Otherwise click OK to exit the Network Configuration dialog box.

Adding the Microsoft Network Client in Addition to the Third-Party Client

Note In this beta release, you cannot run the Microsoft Network Client with Artisoft LANtastic, Beame and Whiteside BW-NFS, or TCS 10-Net.

To install the Microsoft Network Client in addition to a third-party client, follow these steps:

1. From the Network Configuration dialog box, click Clients, then click Add.
2. Select Microsoft in the left pane, and Microsoft Network Client in the right pane. Click OK. Then click Close.
3. You must add a network adapter. Click Adapters, then click Add. Select the name of the adapter vendor in the left pane, and the name of the adapter in the right pane. Click OK.
4. From the Network Adapters dialog box, select the adapter and click Properties. Verify the settings on the Advanced and Resources property sheets.
5. Click OK to exit Properties, and click Close to get back to the main Network Configuration dialog box.
6. Setup automatically chooses the appropriate protocols.
7. Click OK to exit and continue with Setup.

Artisoft LANtastic

To set up Windows 95 with Artisoft LANtastic support, follow the steps in the “Installing Support for the Third-Party Network” section. No other setup steps are necessary.

Note The LANtastic server cannot be run when Windows 95 is setting up.

To connect to a LANtastic server, you must type the complete server name and sharename in the Map Network Drive dialog box or at a MS-DOS prompt.

In this beta release, browsing is not functional with LANtastic.

A drive connected through the Windows 95 user interface will not be available at a MS-DOS prompt, and vice versa. However, drive connections made before starting Windows 95 will be available through the user interface or at a MS-DOS prompt.

Banyan VINES

To set up Windows 95 with Banyan VINES support, follow the steps in the “Installing Support for the Third-Party Network” section.

Next, follow these steps:

1. Restart your computer while holding down SHIFT+F5. This prevents Windows 95 from running automatically and allows you to edit your AUTOEXEC.BAT.
2. Use a text editor to open AUTOEXEC.BAT. Ensure the necessary lines for starting the Banyan network come after the following command line:

```
\winboot\net init /dynamic
```

and immediately after the following line:

```
cd <banyan directory>
```

In most cases, Setup places these lines at the end of your AUTOEXEC.BAT file.

Note You must change to the Banyan directory to run these commands.

3. Ensure also that the **net start** line includes a full path to the C:\WINBOOT directory and appears between the **redirall** and **arswait** lines.

If you are installing Windows 95 after you have installed the Banyan VINES client, a Banyan dialog box will appear when VINES.DRV loads. When this happens, follow these steps to allow the Banyan VINES client to run correctly:

1. Check the box for keeping files on the network.
2. Click Install. Windows 95 will then exit and restart.
3. When the Banyan dialog box reappears, check the box for keeping files on the network.
4. Click Cancel.

DEC Pathworks

To set up Windows 95 with DEC Pathworks version 4.x or 5.x support, follow the steps in the “Installing Support for the Third-Party Network” section.

Next, follow these steps:

1. Install Windows 95, and choose Custom Setup. Click Network Options.

2. Click Client, then click Add.
3. Select Microsoft in the left pane, and Microsoft Network Client in the right pane. Click OK, then click Close. You should be back in the main Network Configuration dialog box.
4. Click Protocols, then click Add.
5. Select DEC in the left pane, and the appropriate Pathworks 4.x or 5.x protocol in the right pane. Click OK, then click Close to return to the main Network Configuration dialog box.
6. Click OK to exit this dialog box and continue with Setup.

Note There is no 4.x- or 5.x-specific client support in this beta release.

SunSelect PC-NFS

To set up Windows 95 with SunSelect PC-NFS support, follow the steps in the “Installing Support for the Third-Party Network” section. Also see the *Beta Installation* document and the *Release Notes*.

Next, follow these steps:

1. Ensure that the SOCKDRV.SYS, PCNFS.SYS, and NFS-NDIS.SYS files are copied to the C:\WINBOOT directory.
2. Copy PCNFS.386 to the WINDOWS\SYSTEM directory.
3. Remove the PC-NFS **netbind** command from AUTOEXEC.BAT.

Note Connections to a PC-NFS server can be made only from an MS-DOS prompt. Connections made through the Map Network dialog box will result in errors.

TCS 10-NET

To set up Windows 95 with TCS 10-NET support, follow the steps in the “Installing Support for the Third-Party Network” section. No other steps are necessary.

If you are running TCS 10-NET, and MS-DOS displays the message “Invalid Drive Specification,” run the MS-DOS **setver** command on the file 10NET.COM to correct the problem.

Beame and Whiteside BW-NFS

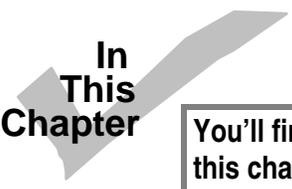
To set up Windows 95 with Beame and Whiteside BW-NFS support, follow the steps in the “Installing Support for the Third-Party Network” section. Also see the *Beta Installation* document, and the *Release Notes*.

IBM DOS LAN Requester

This beta release does not support installation of IBM DOS LAN Requester. To access your IBM LAN Server, install the Microsoft Network Client and remove all references to DOS LAN Requester from your CONFIG.SYS and AUTOEXEC.BAT files before starting Windows 95. All networking operations should be successful to the LAN Server.

The Windows 95 User Interface

Windows 95 has a completely redesigned user interface that combines simplicity with power. This chapter describes the key user interface features and describes how you can customize the Windows 95 interface to suit your needs.



In This Chapter

You'll find answers to these questions in this chapter:

- *How do I customize the Start button?*
(see page)
- *How can I browse files and folders?*
(see page 59)
- *How can I use Find to search for files?*
(see page 65)
- *How can I set properties for an object?*
(see page 66)
- *How do I set up shortcut links from the applications to the desktop?(see page 69)*
- *How can I start Program Manager and File Manager so that my desktop looks like Windows 3.1?* (see page 70)
- *How do I set up and use long filenames?*
(see page 60)

Building a Better User Interface

Through customer feedback and usability testing, we found out a lot about what people do and don't like about user interfaces. It turns out that people's wants and needs cover the gamut. New users want an interface that makes performing a task easy to learn, even at the expense of efficiency. Experienced users want efficiency, power, and customizability.

In response to all of the feedback we've received from users, we've completely redesigned the user interface for Windows 95, giving it a whole new look. The major goal for Windows 95 was to make PCs even easier for *everyone* to use. The most common and essential features of Windows 95 user interface (such as switching tasks, launching an application, and finding a file) are easy for beginners to discover. At the same time, the product includes several powerful tools that enable experienced users to control and customize the Windows 95 environment. Windows 95 also includes lots of familiar features to make it compatible with the Windows 3.1 interface.

This chapter describes the features in the Windows 95 interface that make it a simple, powerful, and compatible user interface.

Windows 95 Has a Simpler Interface

The first thing noticeable difference in Windows 95 is the simplicity of the desktop.

After you boot into Windows 95, you are presented with the new Windows 95 desktop (shown below). It's neat and clean with only a few graphical objects on the screen. It's like moving into a new office before you have the chance to really get it messy.



The simplicity of the desktop appeals to all users' sense of cleanliness but also serves to focus the novice user on the essentials:

- **Taskbar.** Quickly start a program from the Start button. Easily switch tasks.
- **My Computer:** Makes browsing your PC logical and easy.
- **Network Neighborhood.** In the world of mapped drives and complex interfaces, users are unable to browse the network. Windows 95's Network Neighborhood makes browsing networks possible and easy, independent of the network provider (such as Windows NT Advanced Server, NetWare, or Windows 95 itself).
- **Info Center.** Optionally installed. Gives the user a single place to go to access all MAPI-provided information (such as Mail and Microsoft At Work faxing).

The Taskbar

The Taskbar provides the user with a home base of operations. Any application currently running in Windows 95 can be accessed by a single mouse click on the appropriate button on the Taskbar.



Task Buttons resize automatically depending on the number of active tasks. If the buttons become too small to be useful, the user can reconfigure the Taskbar. In fact, there are many Taskbar configuration options that allow you to customize to fit your needs including repositioning, resizing, and “popup” (which hides the Taskbar until you move the pointer to the edge of the screen).

The Taskbar makes switching among multiple applications as simple as changing channels on a television set. Every new window that is opened automatically gets a button on the Taskbar. To change tasks, users simply click buttons on the Taskbar. They can also see which tasks are currently running by looking at the Taskbar.

The Start Button

The most common task any user does with an operating system is launch a program. However, the Start button is much more than a super-efficient program launcher. When you click on the Start button, a menu pops up giving you the following choices:

- **Programs.** Windows 95’s Setup program will transfer your existing Windows 3.1 applications to the Programs menu. You’ll notice that the menu choice has an arrow that indicates there is more information available. By following the arrow, you’ll see the program groups that you had under Windows 3.x.
- **Documents.** The Documents menu of the Start button contains a list of the last 10 documents the user opened. It provides very quick access to the most recently-edited files.
- **Settings.** This provides quick access to the Control Panel, the Programs menu, the Printers folder, the Font Manager, and the Taskbar. These settings allow you to customize the way that these items appear.
- **Find.** Find is a new feature of Windows 95 that goes far beyond File Manager’s File Search feature in Windows 3.x. Searches do not need to conform to the *.* searching syntax, and criteria such as last modification date, size of file, and full text can now be used.
- **Help Topics.** Help has been completely revised and improved in Windows 95 and is easily accessible from the Start menu.
- **Run.** This option provides command-line type functionality from Start button.
- **Shutdown.** This provides safe, easily-accessible shutdown of the Windows 95 PC.

File Management and Browsing

In Windows 95, you can create folders within other folders. You can also cut, copy, paste, and drag-and-drop files and folders, just like text and objects within applications. You can also customize views within windows.

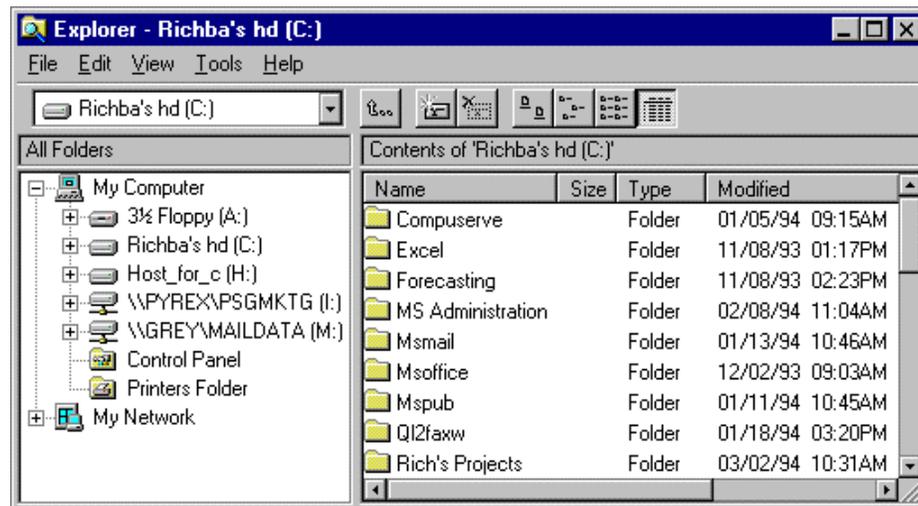
Windows 95 includes several ways to browse files.

- Through “My Computer,” from which users can open a folder or drive by double-clicking (or selecting it and choosing File Open).
- Through File Manager, which Windows 95 includes for compatibility with Windows 3.1.
- Through the Explorer, which is a powerful dual-pane browsing application.

When you double-click My Computer, you’ll see a window containing files and folders on your computer. Double-click any of folder to view its contents. Double-click a file to open it.

You can also use the secondary mouse button (usually the right button) to click a file or folder. When you do, a context menu offering several options (such as open, move, copy, create link, properties, and explore) displays.

Choosing the Explore option is another way to browse files and folders. This displays the two-pane Explorer window (shown below). The Explorer’s left pane is a hierarchical view. It shows the object’s files and folders in the context of the entire system. The right pane shows the traditional view produced by opening an object.



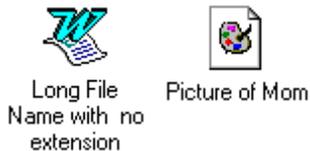
Each time another object is opened with the Explorer, the same window arrangement displays the new object's contents. If it is necessary to descend several subdirectory levels down during a search, the directory structure will appear in the left window while the target level appears in the right window. This approach makes it easy to keep track of where you are and keeps the screen from getting cluttered.

Multiple drives can be easily viewed using this same hierarchy. In fact, almost everything in Windows 95 can be viewed through the Explorer tool, including such diverse items as the Control Panel and the Info Center.

The Explorer helps locate resources faster and displays more information about them than File Manager because the Explorer uses icons more extensively than File Manager.

Support for Long Filenames

Windows 95 supports long filenames, such as those shown below.



Files can be renamed in place in Windows 95 by selecting the file, clicking on the filename, and typing a new name. The hidden file extension is not affected by renaming the file. Files can also be renamed from within the new Windows 95 common dialog boxes (such as File Open and Save).

To ensure backwards compatibility with existing MS-DOS and Win16 applications, extensions have not been eliminated, just hidden from view by default. Users who want to view extensions can certainly do so through View Options.

Document-Oriented Object Management

The Windows 95 user interface picks up on the concept of document-oriented object management in several subtle, but powerful ways; for example:

- A window is just an open view of an object. When the user opens a folder from anywhere in the interface, a new window opens. The title of the new window is the same as the name of the folder. For example, when a user double-clicks a Word for Windows 95 document called "My document" from the anywhere in the interface, a new window (Word itself) is opened entitled "My Document—Microsoft Word".

In this beta release, this feature is partially implemented in with Wordpad and Paint.

- “New” templates are available from within folders and in the Explorer. From within any folder in Windows 95 or from the desktop, users can create new files by selecting File New and then choosing a file type. This is very convenient for creating and managing files based on project you’re working on rather than the application that happens to be open.

Network Neighborhood: Making Network Resources More Accessible

Networks can often be so large that browsing a large list of servers and services is both arduous and intimidating. With the Network Neighborhood, Windows 95 presents a constrained view of the network that contains potentially the most interesting servers and services on the network for the specific user logged in.

Specifically, Windows 95 creates a "Network Neighborhood" container which displays the following:

- All NetWare 3.x servers to which the user is connected and authenticated
- All NetWare 4.x servers associated with the lowest-level organizational unit in their context
- All Windows servers in the user’s workgroup
- An “Entire Network” container that shows a hierarchical tree of the entire network
- Remote Access folder, which provides dial-in access

The Network Neighborhood is completely dynamic—that is, it is populated every time the Network Neighborhood is opened and displays only currently accessible resources. The Entire Network contains a hierarchical view of the whole network.

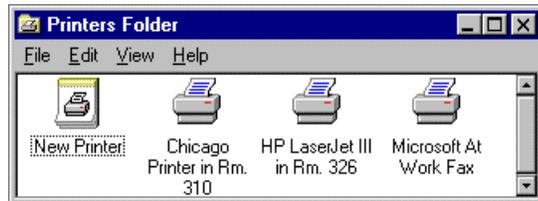
Configuring the Network Neighborhood is a function of what persistent mapped drives you have to NetWare servers (or what NetWare 4.x context you associate with) and/or Windows workgroup you choose to associate with. Network hierarchies play an added role in the user interface. As a result, as you define the workgroups and network hierarchies in your organization, think about workgroups also in terms of the people that work together and share resources.

Printers Folder

From the Printers folder, users can install and configure printers. This folder can be viewed either through the Explorer, or by opening My Computer.

Network printing is simplified in Windows 95 in several ways. You can create a shortcut to a printer and keep this icon on your desktop. Then, if you want to print a document, all you need

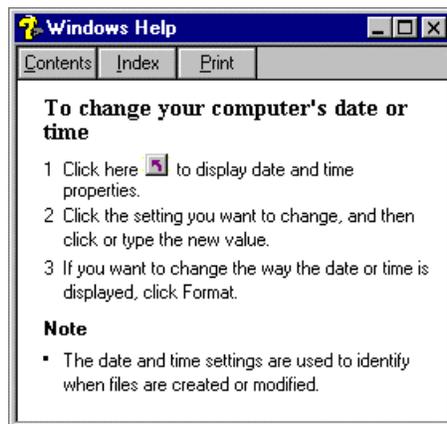
to do is drag and drop the document to the printer icon. Windows 95 also makes changing printer properties easier since you can simply use the secondary mouse button to select the printer and choose Properties.



Clearer, More Interactive Online Help

Online help has been redesigned to be easier to use. Windows 95's Help is redesigned to be more book-like. It includes two tabs—Contents and Index—that you can choose for more information. In the Help contents displays top-level “chapters” (represented by book icons) that include subtopics (represented by page icons). Many chapters also have “Tips and Tricks” subsections.

The topics themselves are short, usually fitting on one screen, to keep users from having to scroll through large, complicated help topics. Many topics also contain a Shortcut button which a user can choose to get to the appropriate place in Windows 95 to do the task he or she wants to do. For example, a user who is searching for help on how to change the clock on the PC can “jump” right to the Clock Control Panel tool, right from within Help.

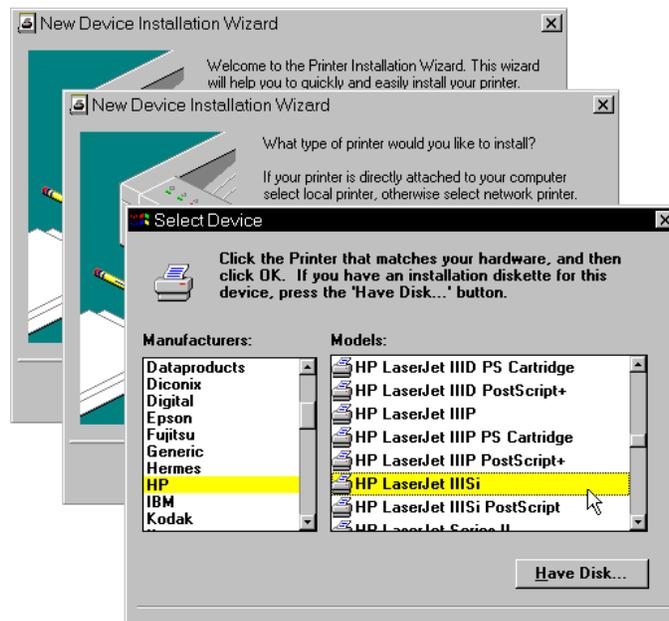


In addition, from within all Windows 95 Control Panel tools, a new “?” icon appears on the upper-right of the Title Bar. By selecting this the user’s cursor changes to a “?” and can be

dropped on any target in the dialog box. This brings up a short description of whatever was selected. “What’s this?” can also be accessed by right-clicking within Control Panel tools.

Wizards: Your Guide to Powerful Capabilities

Started in Microsoft’s Applications Group, Wizards are a proven tool that make it easy for users at all levels to take advantage of powerful but complex functionality. A series of questions are posed to the user in a friendly and straight-forward way, as illustrated below.



Windows 95 uses Wizards throughout the system, including:

- Add Printer wizard in the Printers Folder
- New Device wizard in the Control Panel
- Remote Access setup wizard in the Network Neighborhood

Windows 95 Has a Powerful Interface

While simplicity appeals to new users, it may be the power of Windows 95 that most appeals to the experienced users. With Windows 95, experienced users can customize the user interface, define shortcuts, and perform a wider variety of tasks than beginners.

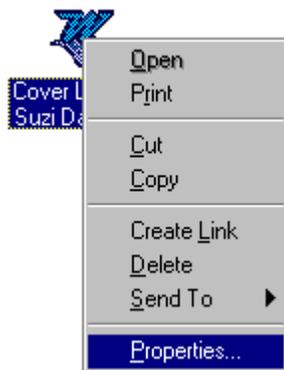
Windows 95 Mouse Features

Windows 95 takes greater advantage of the capabilities of the mouse by making extensive use of both the primary and secondary (often called left and right, respectively) buttons.

The primary (left) button is used in the traditional mouse activities of choosing, selecting, pointing, and dragging. Drag and Drop defaults to the primary mouse button.

The secondary (right) button is the object menu button—the key to the object structure. Clicking an object with the secondary mouse button displays a menu offering choices of what you can do with the object. (This is often called “right-clicking.”)

The menu shown below is the result of single-clicking an icon with the secondary mouse button. Notice that the choices presented depend on the object selected. For example, since this was a Microsoft Word document, there is an option to print. If the object were a Shortcut to a screen saver, Print would not be listed, but other options, such as Test, Configure, and Install, would be listed.



Advanced File Management Features

The Windows 95 Explorer is powerful, flexible, efficient, and extensible. It also solves many fundamental problems with the Windows 3.1 File Manager, like having to have a new window for every drive. Explorer includes these powerful features:

- **Single view local and network resources.** With Explorer, users can view all resources on the local computer and on the network. My Computer and the Network Neighborhood can be browsed and managed, and, if the MAPI 1.0 subsystem and Windows 95 Mail are installed, the Info Center can be browsed giving access to mail, shared folders, and any installed MAPI service providers (such as CompuServe email).
- **Flexibility and customizability.** Through the Explorer toolbar and View menu, users can view folder contents in several ways including large icon, small icon, list, and details

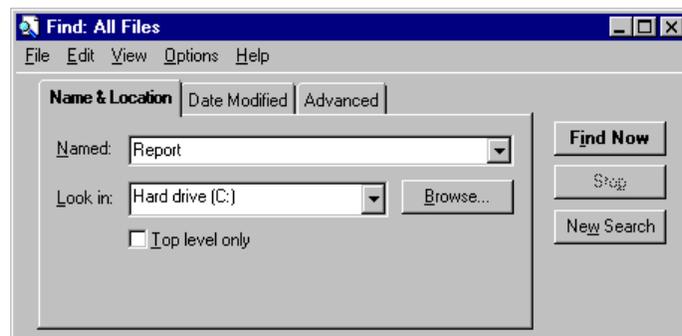
views. Folder contents can easily be sorted by name, size, type, and modification date by selecting the column title. Users can also map network drives from the Explorer toolbar.

- **Detailed information about objects.** The Details View option provides a wealth of context-sensitive information about folder contents.

Note File Open and Save As also offer file browsing. Save As also displays the same file structure as the Explorer and offers an opportunity to create a folder for storing the target file. This means it is no longer necessary to leave an application, go into File Manager, create a folder, and return to Save As, in order to save a file.

Improved File Searching

A powerful new Find utility is built into Windows 95. It goes far beyond the functionality of the File Manger's Search utility in Windows 3.1.

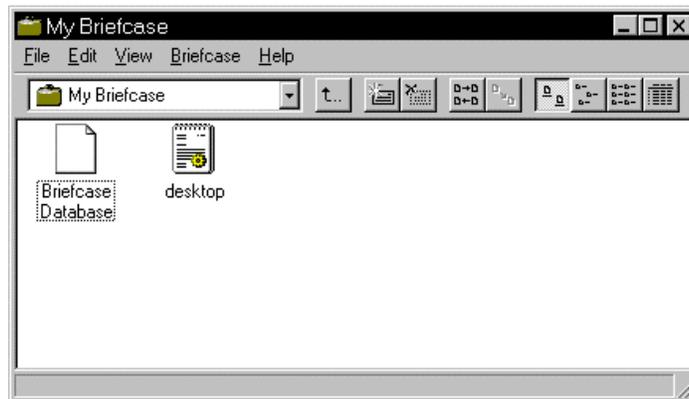


Find includes these features:

- **Partial name searches.** Type **rep** in the Find Files Named window and all files and folders with “rep” in the name will be found.
- **Search on “Last Modification Date”.** Files can be searched on last modification date. Therefore, the user can perform searches like: “Find all Word documents modified in the last 3 days”.
- **Full text search.** Full text of documents can also be searched.
- **Search results save.** Complex or useful searches can be saved.
- **File management from search results pane.** Rename files, create new folders, look at file properties all from within the results pane just as if you were in the Explorer.

File Synchronization With Briefcase

The Briefcase in Windows 95 is used for maintaining synchronized copies of files that you might use in multiple locations. For example, you might work on a document at work and then want to take it home to make further changes. The Briefcase is a centralized database that will verify that you always have the latest copy of the document available to you. For more information on using the Briefcase, see Chapter 8, “Mobile Services In Windows 95.”

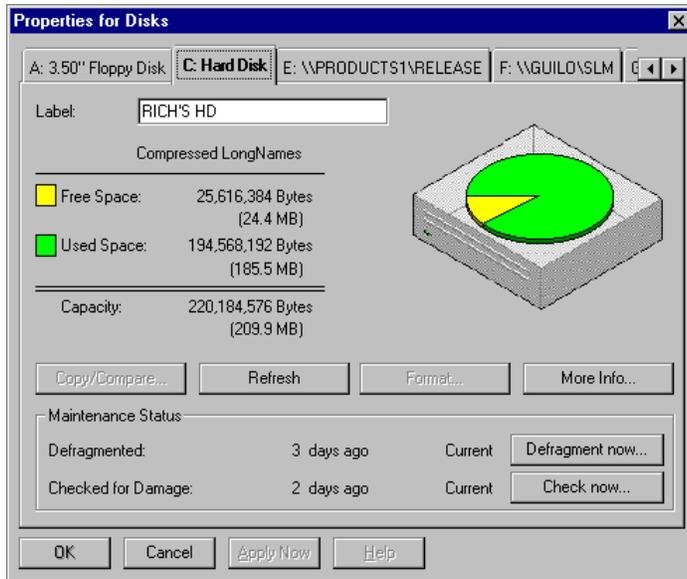


Object Properties

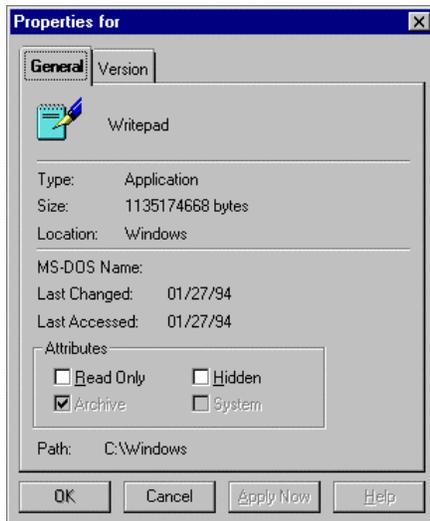
Each type of object has a distinct set of characteristics. For most objects, you can view these characteristics—or properties—by right-clicking the object. You can use the property sheets that display to customize the particular object.

Here are some examples of property sheets for various objects in Windows 95:

This first property sheet is for a hard disk. Notice that you can select other tabs to view information about other disks (including drive letters which are assigned to shared network directories) for your system.



The next property sheet is for a file—in this case NOTEPAD.EXE. Notice that there are fewer properties on a file than on a Disk.



The last example shows the properties for a Shortcut. Notice that the properties for a Shortcut are different than for a file since a Shortcut is essentially a pointer to a file. (For more information, see the following section called “Shortcuts.”)



Control Panel

Windows 95 includes the familiar Control Panel. Control Panel is a special folder containing property sheets for key system objects used in customizing the computer's configuration. For each Control Panel option, there is a corresponding command on the Settings menu.



There are several ways to activate the Control Panel functions:

- Directly, through the Control Panel icon.
- Through the Start menu. (Choose the Start button, then choose Settings, then Control Panel.)
- Through the Windows 95 Command Control Panel.
- By using the Explorer to go through the Control Panel to open a utility directly.
- By linking individual Control Panel icons to the desk top. Their property sheets can be opened from there.

Shortcuts

Shortcuts are an abstract but extremely powerful tool for increasing efficiency and are especially useful in a networked environment. A user can create a shortcut to an object (such as file, program, network folder, Control Panel tool, or disk drive) in Windows 95 and place it anywhere else in the user interface or in an application. When this shortcut is opened, it opens the related object. For example, suppose a user creates a shortcut for “My network folder” and place it on the desktop. When the shortcut is opened, it actually opens the user’s network folder located on a remote network server.

Shortcuts look like regular icons with a small “jump” arrow in the lower-left corner.



To create a shortcut, simply select an object, then choose Create Shortcut from the File menu or from the context menu (displayed when the user clicks the secondary mouse button).

Windows 95 keeps track of any renaming related to shortcut for objects created since Windows 95 was last installed. This means that a user can create a shortcut to `\\Server\Share\My Network Folder` and put it on the desktop. Then if someone later renames the network folder, the shortcut will still work in spite of the fact that the name of the folder to which it points has changed.

You can also rename shortcuts themselves. In addition, a shortcut can be deleted without affecting the object to which it points.

Here are some examples for how users might user shortcuts:

- **Shortcuts in the Programs Folder.** Similar to how icons appeared in the Windows 3.1 Program Manager as “shortcuts” to typing “**run filename**”, in Windows 95, you can include shortcut icons in the Start Programs menu (available through the Start button). Users can keep shortcuts to all their favorite programs in one central place, regardless of where the programs are actually installed. When a shortcut is added or deleted from the programs folder, likewise it is added or deleted from the Start Programs menu.
- **Shortcuts on the Desktop.** Users can create shortcuts to commonly accessed files, programs, drives, folders, and utilities right on their desktops. This is especially powerful with network resources, because no complicated browsing or drive letter mapping is required to access network folders.
- **Embedded Shortcuts in applications.** Users can, for example, drag a shortcut to a large file sitting on the network somewhere into a mail message. When the message recipient double-clicks the shortcut the network file, rather than a copy, opens. This is much more efficient than embedding the actual file because it is much smaller and it cuts down on version proliferation.

Windows 95 Has a Compatible Interface

Compatibility with Windows 3.1 is an important attribute of Windows 95’s user interface. Individuals who have used Windows 3.1 already will recognize the following features from Windows 3.1:

- **Program Manager and File Manager.** With minimal changes in appearance, the Program Manager and the File Manager run on Windows 95 and are easily accessible via the Start button. Several designs for access and default configuration for these Managers are underway. For example, when an upgrade boots into Windows 95 for the first time, the Program Manger might be opened as a window. Or, perhaps there will be a “Windows 3.1 compatibility” menu item on the Start button that will launch the Program Manager and the File Manger. Independent of the final design decision, there will be many help and learning devices (like the “Click Here to Begin” arrow that zooms across the Taskbar when you first boot into Windows 95) that are specifically designed for the Windows 3.1 users who upgrade to Windows 95.
- **MS-DOS box.** For the “command-line junkie”, the usability and power of the MS-DOS box have been dramatically improved. New capabilities include Windows application launching, TrueType fonts, cut-copy-paste support, auto-sizing, UNC pathname support, and drag and drop target.

Tip

You can start an application from the MS-DOS box by typing “**start** *application-name*” (for example, type “**start wordpad**” to launch the Wordpad tool). In addition, you can open a document by typing “**start** *document-name*”(for example, type “**start readme.doc**” to open the readme.doc file in Wordpad).

- **The Run command.** Available from the Start button, this feature has also been improved. It now supports UNC pathnames and has new browsing capabilities.
-

Tip You can connect to a server’s shared resource by using the Run command. First choose the Run command, then type a server name (in the form *\\server-name*). When you do, Windows 95 displays an Explorer window showing all of the shared directories and printers for the server. Choose a resource to connect to it.

- **Improved ALT+TAB task switching.** Despite the fact that task switching has been made dramatically easier and more accessible via the Windows 95 Taskbar, the familiar ALT+TAB “cool switch” has been updated. It now displays an iconic road map of all active tasks, to prevent getting lost in the infinite ALT+TAB loop that was common under Windows 3.1. Try it and see.

Printing

With Windows 95, printing is even faster and easier than before. This chapter describes the improvements made to this printing system over the Windows 3.1 printing system. It also explains how to set up printers with Windows 95.



**In
This
Chapter**

You'll find answers to these questions in this chapter:

- *How do I install a printer? (see page 73)*
- *How do I connect to a network printer? (see page 80)*
- *How does Point and Print work? (see page 81)*
- *How can I use Point and Print to a NetWare server? (see pages 81)*

Improved Printing in Windows 95

Windows 95 includes several significant improvements for printing over Windows 3.1. These include:

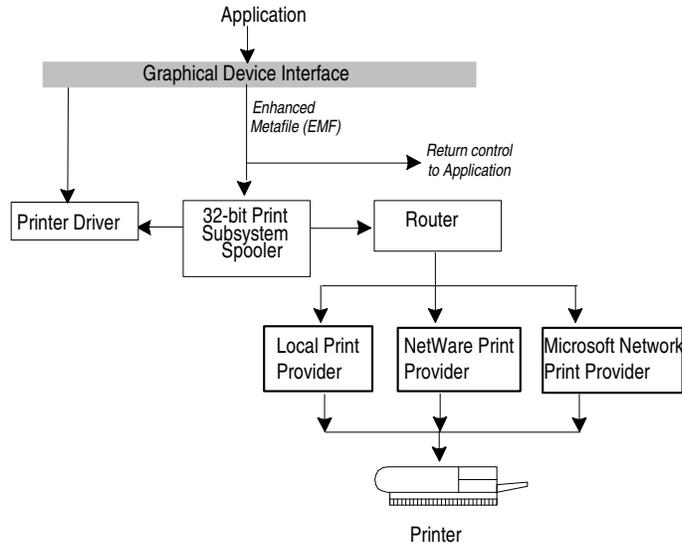
- **A new 32-bit print subsystem.** Windows 95's print subsystem is compatible with Windows NT 3.1 print subsystem including monitors which facilitate bi-directional communications with printers.
- **Quicker "return to application" time.** Background spooling and the use of enhanced metafile (EMF) spooling can significantly decrease the time it takes to return control to the application, depending on job content.
- **Better conflict resolution.** Spooling from MS-DOS applications solves conflicts when multiple MS-DOS or MS-DOS and MS-Windows applications are trying to print at the same time.
- **"Point and Print" support.** Windows 95 provides "hands-free" printer installation. Additionally, users can Point and Print to Windows 95, Windows NT, and NetWare based printers.
- **Improved network printer connections.** UNC connections are used whenever possible to eliminate the need for LPT port redirection.

32-Bit Print Subsystem

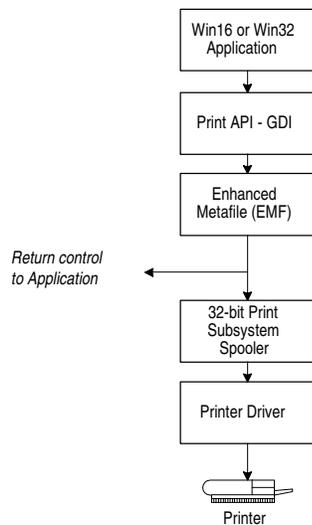
In Windows 3.1, print spooling functionality was handled by Print Manager and was supported by code in several different Windows components. In Windows 95, the print spooler is implemented as a series of 32-bit virtual device drivers and DLLs, and consolidates the spooler functionality into a single architecture.

The new spooler provides smooth background printing. In Windows 3.1, Print Manager passed a fixed amount of information to the printer, whether the print was ready to receive it or not. If the printer wasn't ready to receive more data, the Windows 3.1 system was suspended until the printer was ready. Unlike Print Manager, the Windows 95 spooler passes data to the printer only when the printer is ready to receive more information by using background thread processing. This helps to reduce what often seemed like "jerkiness" when printing documents with Windows 3.1 Print Manager.

The new spooler provides quick "return to application" time. Due to the smooth background printing, made possible by the new 32-bit print subsystem, Windows 95 spools enhanced metafiles (EMF) when printing from Windows-based applications rather than raw printer data to result in quicker return to application time. Once spooled, the EMF information is interpreted in the background, and output is then sent to the printer.



EMF information is generated by the Graphical Device Interface, and is spooled instead of the raw printer data generated by the printer driver. For example, if a document contains a solid black rectangle, the EMF would contain a command to draw a rectangle with the given dimensions, that should be filled in solid, with the color black. Once the EMF is created, control is returned to the user, and the EMF file is interpreted in the background on a 32-bit print subsystem spooler thread and sent to the printer driver. This results in control being returned to the user in significantly less time than having to wait for the print calls to be fully interpreted by the printer driver directly.



The new spooler is much more powerful and flexible. It allows the user to select printer attributes on a per-printer basis instead of requiring global printing attributes as in Windows 3.1. For example, each printer can have a different separator page and the option of printing directly versus printing via a queue.

Improved Printing Support for MS-DOS–based Applications

Windows 95 improves on support for printing from an MS-DOS–based application in the Windows environment over that provided by Windows 3.1 by allowing MS-DOS-based applications to spool print jobs to the Windows 95 print subsystem 32-bit spooler. With Windows 3.1, users printing from MS-DOS applications could not take advantage of the Windows–based spooling functionality offered by Print Manager, and encountered device contention issues when trying to print from MS-DOS–based applications at the same time as printing from Windows–based applications.

Windows 95 addresses the print issues in Windows 3.1 by incorporating the functionality for an MS-DOS–based application to spool directly to the 32-bit Windows 95 print spooler. This support is integrated into a print spooler virtual device, which takes the output destined for a printer port and first places it in the Windows 95 print spooler before sending the data to the printer. This functionality works with all existing MS-DOS–based applications, and results in quicker “return to application” through the use of the spooling mechanism. While MS-DOS–based applications do not benefit from EMF spooling, which is supported only for printing from Windows–based applications, users won’t encounter device contention issues, but will benefit from smoother background printing and from improved printing performance in Windows 95. The print spooling functionality for use with MS-DOS–based applications is automatically installed and configured. Handling is transparent to the user.

Support for Deferred Printing

To benefit mobile computer users, the Windows 95 print subsystem also features support for deferred printing. This capability allows users not connected to a printer to generate print jobs, which are stored on their local computers. This feature is handy for users working in a location away from the printer, and for users in the office who temporarily lose printer connections because of network or printer problems, for example. Mobile users can create print jobs from Windows–based applications (Win16 or Win32 applications) or MS-DOS–based applications while on the road, then print on a physical printer once reaching their home or office. Items not immediately printed are held in the print queue until the user reconnects to a printer.

Image Color Matching Support

Windows 95 includes Image Color Matching (ICM) support, enabling applications to offer better consistency between the color of images displayed on the screen and the color of images generated by an output device.

Using technology licensed from Kodak®, Windows 95 includes image color matching (ICM) support for display and printer drivers. ICM provides consistent, predictable color rendering from input, through monitor preview, to output. Applications that use ICM functionality enables portability of color information across applications that manipulate the graphic information, across users to provide consistent use of colors, and across platforms allowing color information to be easily moved to different systems where the ICM technology has been implemented.

Because Windows 95 includes ICM support as part of the operating system, application vendors can integrate ICM functionality into their applications, and thus take advantage of this new system service. To provide support for device-independent color matching, colors used in applications are tied to international (CIE-based) colorimetric standards, rather than in device-dependent form to specific hardware devices. The operating system will then do the appropriate color transformations to map the device-independent color representations to the colors supported by the physical device.

The key to ICM support is the use of a *profile*, which represents the color properties of a monitor, printer, or scanner device. The profile format used by the ICM support in Windows 95, is the result of an industry consortium called *ColorSync 2.0* and is made up of many industry hardware vendors (including Kodak, Microsoft, Apple Computer Inc., Sun Microsystems®, and Silicon Graphics, among others) and industry standard-setting bodies. The ColorSync efforts provide for a consistent cross-platform color standardization process that will result in industry-wide standards for defining ICM properties of output and display devices.

Installing a Printer

Installing a printer is quick and easy. Everything you need, whether you are installing a local or remote printer, manipulating a print job, or managing a printer, is all conveniently located in one place—the Printers folder. Additionally, you can access the Printers folder either from the Settings menu from the Start button.



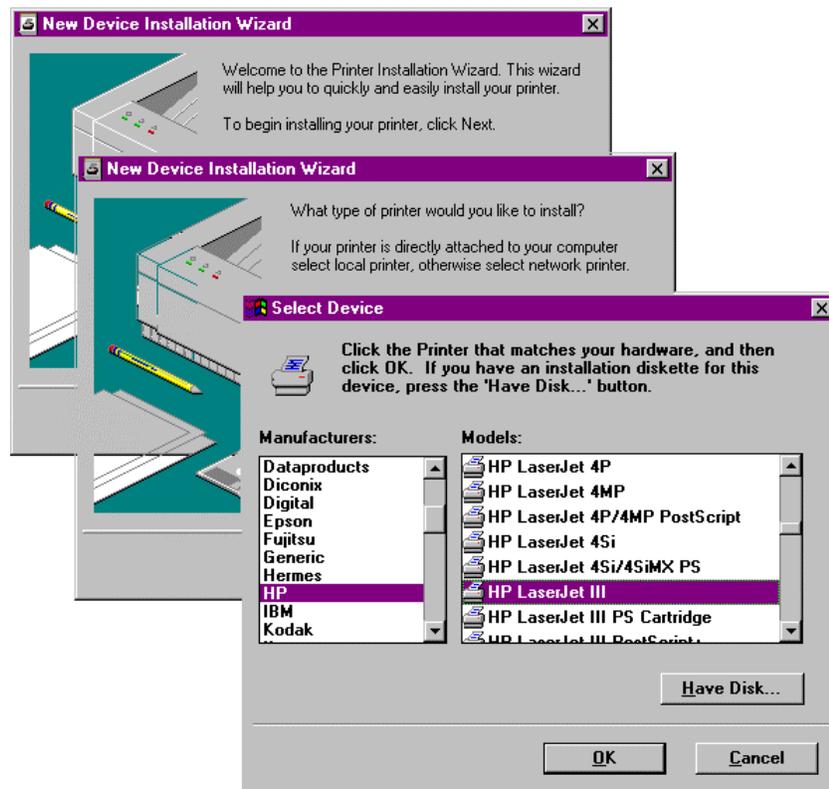
To set up a new printer, open the Printers folder and select the “Add Printer” icon.

The New Device Installation Wizard is designed to help the user install a printer in an easy, step-by-step fashion. The Wizard dialog boxes walk you through the process of setting up and configuring a printer.

Some printers take advantage of the built-in bi-directional communications ability and be able to initially configure device driver settings such as available fonts and the amount of installed memory without any user intervention.

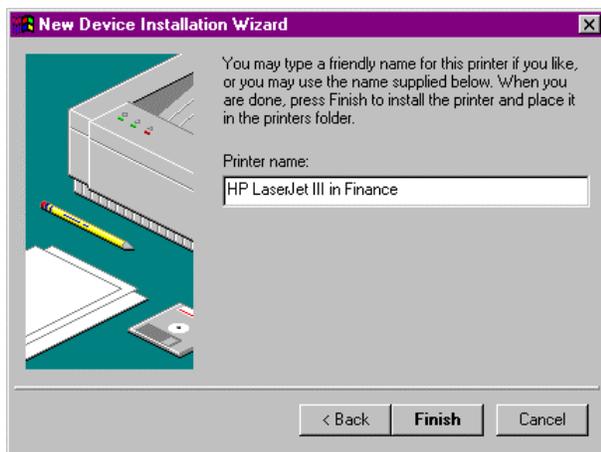
Setting Up a Local Printer

It's much easier to find the correct printer to install with the New Device Installation Wizard which groups printer models by manufacturer. When you select a printer manufacturer on the left side of the dialog, the list of available printer models are displayed on the right. Choose the printer you want to install by either double-clicking on the model or by highlighting the model and choosing OK.



If the printer you are installing is not “Plug and Play” capable, the Wizard prompts you for the port that you want to use with your printer. Next, you can choose to configure that port if necessary, as in the case of COM ports where you may need to select the appropriate baud rate.

Next, the Wizard prompts you for a “friendly” printer name—one that people, not just computers, will find useful. For example, if you plan to share this printer with others on your network, it's a good idea to have the reflect information user's may need to know in order to use this printer properly such as its physical location.



When you choose Finish, the system begins copying the necessary files. If you already have all of the files needed to install the printer, you can either use the files you already have or you can choose to install new files. You can install new files from your Windows floppy disks or CD, from a disk supplied by your manufacturer, or from a location on your network.

Once installation is complete, you can print a test page to ensure that the printer is functioning properly.

Setting Up a Remote Printer

The easiest way to set up a remote printer is to simply print to it! Really! Windows 95 supports Point and Print to any Microsoft Windows 95 server and many other servers such as Novell NetWare.

Note Point and Print is only fully supported to Windows 95 servers and partially supported to NetWare servers in this beta release.

Whether you find the printer in the Explorer, drag a printer onto your desktop, or drop a document onto a remote printer, Windows 95 automatically tries to install the printer for you. Depending on the type of server to which the printer is connected, Windows 95 may be able to completely install the printer correctly without asking you any questions at all.

If the print server you're using doesn't support Point and Print, you can use the New Device Installation Wizard to select the printer you want to install. The only difference between setting up a remote printer and a local printer using the New Device Installation Wizard is that you will need to specify the name of the print server.

Point and Print

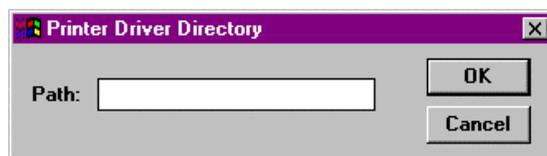
When you want to install a new remote printer, Windows 95 makes intelligent choices to install all necessary components and properly configure the print device without any user intervention. What information is available and how Windows 95 determines the correct information depends on which print provider is used and how much information the provider can determine about the print device.

Point and Print functionality means Windows 95 attempts to identify the printer you want to install and copy the driver and any printer specific information from either the server or an alternate location on the network. If some of the information is not available, Setup prompts you for any missing information or, if it's not found locally, for a location of the printer driver.

When you install a local printer under Windows 95, all of the information about the installed printer is stored in the Windows 95 Registry. If you are using the print sharing capabilities built into either of the Windows 95 peer servers, you don't need to do anything other than share your printer and grant appropriate sharing permissions to configure Point and Print. When a user wants to set up and connect to your printer, the client computer asks for the information about the installed printer from the server and the server responds with the appropriate information. The printer driver is also copied from the server and installed on the local computer.

Configuring a Novell NetWare Server to Support Point and Print

If you are using the Microsoft Client for NetWare and are logged onto a server for which you have administrative privileges, you can configure a Novell NetWare server to store Point and Print information in the NetWare Bindery. Simply bring up an Explorer window for the server and right-click a printer. Choose the Point and Print Setup menu option. If you want to set the printer Model, the Select Device dialog box displays. (This is the same one as for installing a local printer.) If you select the "Set Driver Path" option, you are presented with the Printer Driver Directory dialog box displays. Type in the path for the printer drivers directory that you want to be used when others are setting up this printer.



Notes For this beta release:

- If you are using user-level security you must grant access to both the printer and the printer drivers directory on your computer.
 - If you are using NetWare 4.x, you must be using Bindery emulation to support Point and Print.
 - You can only choose the printer manufacturer and model; you cannot add additional configuration information to the printer information.
-

Using a Printer

Printing a document is simple. If the document is open, from the File menu, click Print. If the document is not open, drag and drop the document onto either a locally-installed printer or a network printer.

To view documents waiting to be printed, open the Printers folder and double-click the appropriate printer. This displays the print queue of the print jobs. If you have administrative privileges for the printer, you can manipulate print jobs remotely.

To change printer settings, double-click the printer in the Printers folder. Then from the Printer menu, click Properties. The settings you can change depend on the type of printer you have.

Tip For easy access to your printer, use your right mouse button to drag the printer's icon from the Printers folder to the desktop, and then click Shortcut on the pop-up menu that displays. Then you can quickly print a document by dragging the document's icon onto the printer icon.

Using a Network Printer

With the Microsoft Windows 95 Network clients or other third-party network supporting Uniform Naming Convention (UNC) paths, you no longer need a physical redirection to a printer to print. Instead, as soon as you double-click the installed network printer or drop a document onto a network printer in your printers folder, the connection is automatically made for you.

Tip You can quickly locate a printer on a particular server by choosing Run Application from the Start button, and typing the server name (for example, \\myserver). You will be logged onto the server and prompted for a password if needed. Then an Explorer window will be displayed.

If you use a network client that does not support UNC connections, or if you need to have a physical redirection to support printing from a particular application, you can still make a connection to a printer by using the appropriate network commands (such as “**net use lpt1: \\server\printer**” or “**capture lpt1:**”).

To share a locally-installed printer with other people, follow these steps:

1. Open the Printers folder, then from the Printer menu, click the printer you want to share.
2. Click Properties and choose the Sharing tab.
3. From the Sharing property sheet, specify the options you want.

For more information on sharing printers and related options, see Chapter 3, “Windows 95 Networking.”

You can use a shared printer just as you would a locally-installed printer. Print either an open document by selecting Print from the File menu and printing to a network printer or an unopened document by dragging and dropping it on the printer you want to use.

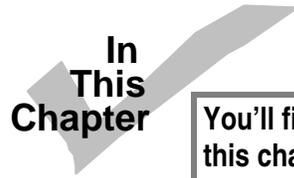
Tip You can use WinPopup to send a message from a printer that a print job is done. The Microsoft Windows Network must be running first. For information about how to use WinPopup, from the Help menu in WinPopup click Help Topics.

Print Troubleshooter

This Print Troubleshooter helps you identify and solve printer problems. To use the Print Troubleshooter, open online help (press F1). From Printing Options, select the Print Troubleshooter. Print Troubleshooter provides a series of questions. Click on the answers that apply and try the suggested steps to fix the problem.

Windows 95 Security

Windows 95 is an easy-to-use desktop environment with full local and network security features. This chapter describes Windows 95's logon security mechanisms to control local access to data. It also describes user-level and share-level security options to secure data that is accessible via the network.



**In
This
Chapter**

You'll find answers to these questions in this chapter:

- *How do I create a single unified logon for my system? (see page 87)*
- *How do I set up share-level security? (see page 90)*
- *How do I install user-level security? (see page 92)*
- *How do I grant permissions for shared resources? (see page 94)*

Local and Network Security

Windows 95 includes security for resources that can be accessed locally and for shared resources that are available on the network.

Local security pertains to users who physically access the computer via the keyboard, the mouse, or other input device. Here, Windows 95 provides security user by user, based on the user logon name and password.

Network security in Windows 95 pertains to access of shared network resources rather than access of a computer. Windows 95 provides two general types of network security:

- Share-level security, where access to shared resources is determined by passwords assigned to resources.
- User-level security, where access to shared resources is determined by permissions granted to individual users.

The following sections provide more details about Windows 95's local logon security, share-level security for shared network resources, and user-level security for shared network resources.

Log On Security

By default, Windows 95 prompts each user for a password at startup. If a user wants to work locally with files that are not shared for other network users, no password is required.

Note You can change default logon requirements via the Security Control Panel.

The only resources available to local users who by-pass the logon screen are:

- Local resources which have not been shared or assigned any security
- Network resources which have not been assigned any security

Note In general, to gain access to network services, you must supply a password. In addition, because Remote Access connections are also stored on a per-user basis in the Registry, you must supply a valid local logon password to use it.

The password the user types initially becomes the user's Master Key password. The local password is a per-user configuration—that is, each user is assigned his or her own username and password combination for logon.

Storing Passwords in Windows 95's Password Cache

When you use share-level security, a password can be assigned to any shared resource. The Password Cache stores these passwords in an encrypted file of resources and passwords on a local hard drive. Each resource typically has its own password. If there are 30 shared resources, for example, there will be 30 passwords stored in the password cache. This could be a problem if users had to remember and type each password for each of these resources.

Password caching solves this problem by storing passwords for resources in the password cache at the time you use the resources. At logon, when you type your logon name and Master Key password, this cache is unlocked and all the resource passwords stored in the cache are made available. Then, when you need to access a shared, passworded resource you have accessed before, password cache automatically takes the password from cache and unlocks the resource. To prevent unauthorized access of password files, the cached file can be "unlocked" only by the user's logon name and password.

If you choose Cancel while logging on to bypass the logon screen, the cache will not be opened and you will be prompted for a password each time you attempt to use a protected device.

If you are accessing a passworded resource for the first time and choose Save This Password In Your Password List, password caching will save your password to the password file. Password caching builds the password file as you type new passwords. Once a password has been cached, Password Cache will automatically enter it for you the next time you want to access that resource. The Password Cache works for any device that requires a password, but it only works from within Windows 95.



Note Passwords can contain up to 14 characters and must not contain spaces or punctuation marks.

The password caching list is stored in the *.PWL files in the Windows directory. Passwords for network connections are stored encrypted in the SHARES.PWL file. Passwords are encrypted using the Data Encryption Standard (DES) algorithm. A non-encrypted password is never sent across the network.

Caution If you delete the *.PWL files, you will lose all previously listed password. You will need to retype each password.

Windows 95's customized password cache allows users to determine which passwords they want keyed to their master password and which they want entered separately. For example, a user can choose to cache passwords for the main directories and printers he or she uses, but not cache passwords for Microsoft Mail, Schedule+, and other networks he or she sometimes accesses.

The Security Balance

Password caching makes accessing network resources convenient. Occasionally, however, caching raises questions about security, because users need to know only one password to access all the resources.

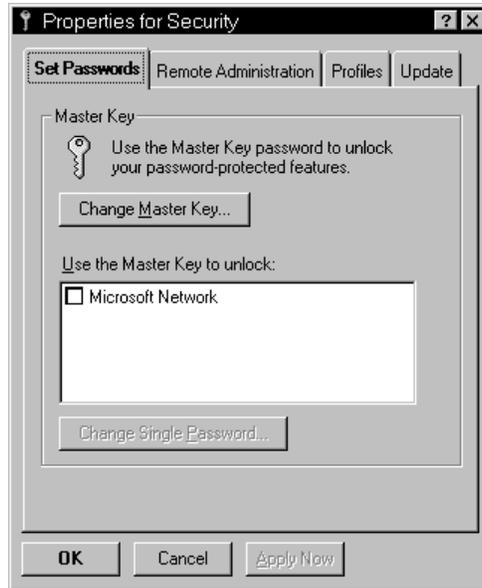
Resource security and data integrity is a balance between security and convenience. The idea is to maintain security without losing the convenience. If 30 or 40 resources are passworded, people tend to write the passwords down so they won't forget them. Which would be safer, passwords written down or stored in an encrypted, passworded, local file?

The Master Key Password

Windows 95's Master Key password can provide a unified logon for all system components requiring password authentication services, as well as any applications that choose to use the Master Key services. For example, spreadsheets or databases can use the Master Key services to keep data secure.

The Master Key associates the username and password supplied at Windows 95 logon to other authentication-aware programs or system components. However, it's also possible to maintain separate password, in essence for higher security. A network manager can choose to associate other passwords, for example, with vital corporate data access or other sensitive network services.

The figure below shows the Master Key property sheet (which you can access from the Control Panel).



The Master Key provides a mechanism to individually manage components that choose to use the unified password cache. On a service by service, or application by application basis, Windows 95 can be configured to use the Windows 95 logon for authentication. This makes it possible for a user to achieve a “single logon” for access to all resources on the Windows 95 system, as well as the network using Windows 95’s Master Key. One example of how the Master Key service is used within Windows 95 is providing a single logon to both the network and email. Once a user has logged onto their Windows 95 PC, the password typed to log on to Windows 95 will also automatically log on to email.

Network Security

In Windows 95, there are a number of ways in which remote users can access resources on your Windows 95 computer. The most obvious example is file and print sharing; any Windows 95 user using one of Microsoft’s file and print services providers can opt to share files and printers with other users on the network. Other examples of remote-accessibility are remote administration, Remote Access, and Remote Procedure Call (RPC). All of these (optional) components enable remote users, via the network or a modem, to access a Windows 95 computer in some way. Thus, there must be security mechanisms to control who can access your computer and what rights they have.

Windows 95 provides two different security models—share-level security and user-level security. Windows 95 can be configured to use one or the other of these models; the chosen

model then applies to all components that require security, such as file and print sharing, remote administration, Remote Access, and network backup agents.

Notes

In this beta release, RPC is not secured.

Windows 95 provides two options for file and print sharing—Microsoft Network File and Print Sharing, and Microsoft File and Print Sharing for NetWare. (For more information, see Chapter 3, “Network Integration.”) If you run Microsoft File and Print Sharing for NetWare, then you can use only user-level security. If you are running Microsoft Network File and Print Sharing, then you can use either share-level or user-level security. If you are not running any file and print sharing, then RPC can use either share-level or user-level security to access resources.

Share-Level Security

In this model, a password is associated with any resource or service that can be accessed remotely. Any user that knows this password can access the resource or service. In Windows for Workgroups, file and print sharing uses share-level security, as does remote administration. For example, each shared directory has a password associated with it; in order to access that shared directory over the network, users must type the password.

Note If you are running Microsoft File and Print Sharing for NetWare, you cannot use share-level security. (However, in this beta release, Remote Access will still use share-level security in this case).

Setting Up Share-Level Security

Share-level security is enabled by default, unless you are running Microsoft File and Print Sharing for NetWare.

You can access the Network Security property sheet by selecting the Security tab from the Network Control Panel. This property sheet has two option buttons—one for share-level and one for user-level security. If you select share-level security, then all installed components that require security on the network (or over a modem) will use share-level security.

Using Share-Level Security

Each shared directory and shared printer can have a read-only and/or full access password associated with it.

→ To set the password on a shared directory or printer

1. Using the right mouse button, select the directory and then choose Properties from the context menu.
2. Select the Sharing tab to view the Sharing property sheet.
3. Specify that you want to share the directory.
4. Specify whether you want users to have read-only or full access to this resource.
5. Type a password for the resource.

Remote administration, which is the ability for an administrator to remotely run Net Watcher to manage your shared directories, can be secured with a password.

→ To set a password for remote administration on a share-level computer

1. From the Security Control Panel, click the Remote Administration tab.
2. Check the box to enable Remote Administration.
3. Type a password.

User-Level Security

User-level security is different from share-level security because it is user-based, not password-based. Access to remote resources is granted or denied depending on the identity of the user that is attempting to access them. You can control the remote resources on your Windows 95 computer by specifying which users and groups have access to them, and what rights they have. For example, if you share one of your directories on the network, you can specify that the whole Accounting group has read-only access on that directory, and that Sue and Bob have full access.

When a user tries to access a resource on your computer, Windows 95 must have some way to determine if the username and password are valid. In other words, Windows 95 needs to verify their identity against some list of valid users. Similarly, when you grant access to your resources, you must have some list of users to choose from. Rather than maintain a user database on every Windows 95 computer, Windows 95 leverages an existing user database on a network server. This server provides the Windows 95 system with the list of valid users and groups. The Windows 95 system contacts this server to authenticate user connection requests.

- If you are running Microsoft Network File and Print Sharing, then the provider of the user list and authentication must be a Windows NT domain. In the next beta release, the provider can be either a Windows NT Advanced Server or a domain.
- If you are running Microsoft File and Print Sharing for NetWare, then the user list and authentication provider must be either a Novell NetWare server or a Novell NetWare 4.x server running Bindery emulation.

- If you are not running any file and print sharing, then the provider must be a Windows NT domain for this beta release. In the next beta release the provider can be a Windows NT domain, a Windows NT Advanced Server, or a Novell NetWare server.

Setting Up User-Level Security

This section describes how to set up user-level security and the related security implications for various file- and print-sharing scenarios.

➔ To set up user-level security if you are running Microsoft Network File and Print Sharing

1. From the Network Control Panel, click the Security tab.
2. Select the option button for user-level security.
3. Type the name of the Windows NT domain that will provide the user list and authentication.

User-level security will now apply to file and print sharing, Remote Access, and remote administration. In the next beta release, Remote Procedure Call (RPC) and network backup agents may also be secured via user-level security.

➔ To set up user-level security if you are running Microsoft File and Print Sharing for NetWare

1. From the Network Control Panel, click the Security tab.
2. Check the box for user-level security.
3. Type the name of the NetWare server that will provide the user list and authentication.

In this beta release, user-level security will now apply only to file and print sharing. In the next beta release, Remote Access, Remote Procedure Call (RPC), remote administration, and network backup agents may also be secured via user-level security. In this beta release, these services will use share-level security, except for remote administration, which is not available in this release.

➔ To set up user-level security if you are not running any file and print sharing

1. From the Network Control Panel, click the Security tab.
2. Select the option button for user-level security.
3. Type the name of the Windows NT domain that will provide the user list and be used for authentication of users.

(In the next beta release, a NetWare server or Windows NT Advanced Server also may be used as the provider.)

If you are not running any file and print sharing, and you select user-level security, then this applies to only Remote Access. In the next beta release, this will apply to Remote Procedure Call (RPC) and network backup agents as well. Remote administration applies to file and print sharing, and thus is not available.

Permissions in User-Level Security

For each resource or service that is governed by user-level security, there is a list of users and groups—called trustees—that can access that resource. For each trustee, there is a set of rights assigned for a resource. The kinds of rights that you can give depend on the kind of resource you are securing.

- For shared directories, you can allow a user to have read-only access, full access, or custom access. Within custom access, you can grant the user any or all of the following rights: read, write, create, list, delete, change file attributes, and change permissions.
- For shared printers, a user either has the right to access the printer or not.
- For Network DDE objects, you can allow a user to have read-only or full access.
- For Remote Access, you can give a user the right to dial in to your computer, or to dial in to your computer and have network access.
- For remote administration, a user either has the right to be an administrator or not.

Permissions are enforced on a resource as follows: If the user has explicit rights to the resource, then those rights are enforced. If the user does not have explicit rights to the resource, then the permissions are computed by taking all of the rights of each group to which the user belongs. If none of the groups to which the user belongs have any rights for that resource, then the user is not granted access to the resource.

When access rights for a file or directory on a Windows 95 computer have not been assigned explicitly, implied rights are used instead. The file or directory inherits the access rights assigned to its nearest “ancestor” (such as the parent directory). If none of its ancestors, up to and including the root directory of the drive, have explicit rights, no Remote Access is allowed.

Note It is not possible to set explicit trustee lists on individual files in Windows 95.

It is possible for a user to connect to a shared directory (or to make a directory the current directory) even if the user has no access to files in that directory. Under user-level security, the rights that a user has to a file or directory are always the same regardless of the path through which the user is accessing this resource. This is not always the case under share-level security.

Windows 95 supports a special World group, which includes anyone who is able to connect to the Windows 95 system. The World group is a useful means for setting default permissions to a resource.

How to Grant Permissions

Setting permissions is the same for both shared directories and shared printers.

→ **To set permissions on shared directories and shared printers**

1. Right-click on the directory and choose Properties from the context menu.
2. From property sheet for the directory, click Sharing.
3. Use the Add and Remove buttons to add and remove users that are allowed to access that directory.

→ **To set permissions for remote administration**

1. From the Security Control Panel, select Remote Administration.
2. Use the Add and Delete buttons to add and remove users that are allowed to access that directory.

→ **To set permissions for Remote Access**

1. In the Remote Access folder, choose Dial-In Options of Security.
2. Choose Allow Caller Access and choose Add.

For more information about Remote Access, see Chapter 8, “Mobile Services In Windows 95.”

Desktop Management and Remote Administration

Windows 95 includes tools that make it easier for the administrator to manage workstations on the network from a central location. This chapter describes how to use Windows 95's administrative tools to manage and monitor remote network resources.



In This Chapter

You'll find answers to these questions in this chapter:

- *How do I view and edit the Registry?*
(see page 97)
- *How do I define user and workstation profiles?*
(see page 98)
- *How do I set up and enable remote administration?* (see page 101)
- *How do I monitor Windows 95 workstations remotely?*
(see page 104 and 106)
- *How can I set up network-based applications?* (see page 106)
- *How do I set up a network backup agent?*
(see page 108)

Key Improvements

Administration of networked computers is easier now than with Windows 3.1 because Windows 95 includes several new features and infrastructural enhancements.

This beta version of Windows 95 includes new features which makes an administrator's day-to-day tasks easier:

- Assign remote administrative access for computers on the network
- Set the master password, define user profiles, and (for this beta version) specify administrative updates through the Security property sheets
- Remotely manage a server's resources using Net Watcher
- Monitor performance of Windows 95 computers using System Monitor
- Monitor Windows 95 remote connections from a SNMP console
- View and control configuration and settings of Windows 95 operating system
- Permit user to use centrally located desktop settings when using different PCs on the network
- Allow multiple desktop configurations on one computer, or restrict all computer users to one local desktop configuration

This chapter provides details about the features that help simplify administrative tasks.

The Windows 95 Registry

The Windows 95 Registry is a centralized repository of information needed to set up and configure the computer. It takes the place of AUTOEXEC.BAT, CONFIG.SYS, and .INI files.

The Registry contains three types of information:

- Per-user information for a specific individual is in the HKEY_CURRENT_USER key
- Global information about the computer is in the HKEY_LOCAL_MACHINE key
- Specific information about a particular configuration that is not user-specific is in the HKEY_CURRENT_CONFIG key

Hardware devices can automatically place their information into the Registry via the Plug and Play interfaces. Software applications can place their information in the Registry by writing to standard APIs.

Rather than containing information about a single configuration and a single user—as CONFIG.SYS, AUTOEXEC.BAT, and .INI files did—the Registry can contain information about several configurations and several users. For example, it can contain information about multiple configurations which each apply to the computer at different times, such as when the computer is connected to a TCP/IP network, when it is connected to a NetBEUI network, when it is docked, when it is undocked, and so on.

Because Windows 95 includes an auto-detection feature for Plug and Play and other hardware devices, Windows 95 automatically detects and identifies most hardware as it is added to or removed from the system. When Windows 95 encounters a new hardware configuration, it asks the user to provide a name for that configuration and adds the configuration to a configuration-mapping table. When Windows 95 checks the hardware configuration, one of three things occur:

- In most situations, the configuration ID is mapped to a unique configuration and Windows 95 selects the appropriate one automatically.
- If the user is booting with a new docked or undocked configuration for the first time, the Windows 95 creates a new configuration for the new configuration ID.
- If the configuration ID is mapped to more than one configuration (for example, because Windows 95 cannot distinguish between two configurations), Windows 95 asks the user which one to use.

Because per-user Registry information can be maintained on a central network server, a user can move from one computer to another within the workgroup and maintain all the same per-user settings (such as desktop and network access settings). This makes the administrator's job easier because access permissions can be set once for each person regardless of the computer he or she chooses to use. For more information about setting network policy, see the "Defining User and Workstation Policies" section later in this chapter.

Remote Access of Registry Information

A set of Registry APIs make Registry information available through Remote Procedure Calls (RPCs) to standard Windows 95 and third-party management tools. This permits administrators to remotely view and modify configuration information for hardware and software components which store their information in the Registry. Note that the Registry APIs are remotely accessible via named pipes (client-side only), NetBIOS over NetBEUI, Windows Socket on IPX, and Windows Socket on IP.

For more information about RPC in Windows 95, see Chapter 2, "Networking Basics."

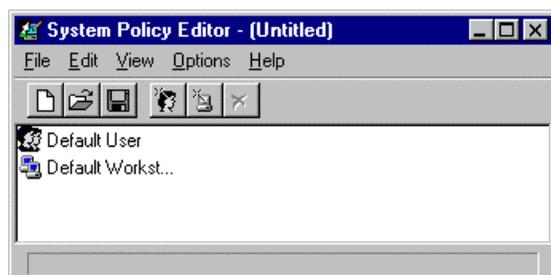
In this beta release, to set up a Windows 95 computer to respond to remote Registry requests, you need to start the Registry server-side RPC application. (From the Startup menu, choose Run and type **regserve.exe**.) Once started, you can use the Registry Editor utility

(REGEDIT.EXE) to view and modify the Registry information on another Windows 95 computer. You can even use the Windows 95 Registry Editor to view and modify Registry information on Windows NT computers if you have the proper user privileges. (You cannot set or change permissions on a subkey from Windows 95. However, you can create new keys that inherit the permissions of their parent key.)

Note The this beta release version of Registry Editor does not yet allow remote functionality. An updated version of the utility will be placed on the CompuServe shortly after you have received this beta release.

Defining User and Workstation Policies

Administrators are responsible for defining policies for user activities and workstation functionality. To help with this task, you can use the System Policy Editor to create user and workstation profiles which specify applicable policies for specific individuals and workstations.



Note The System Policy Editor is such a powerful utility that an administrator should consider restricting its use to other trusted administrators. The administrator can use the System Policy Editor to restrict its use.

Pointers to the Registry

When you set resource policies using the System Policy Editor, it creates an ASCII-formatted input file (by default, named ADMINCFG.ADM) which acts as a template listing the policies an administrator can set. This file includes pointers to information contained in the Registry and when it is used by the System Policy Editor, acts as a front-end to the Registry.

How Policies Works

When a policy is created, the administrator uses a UNC path to indicate the policy's location. Policies can be stored in a shared network directory, on either a local or a remote server.

When someone logs on, the logon process checks the user's configuration information for the location of the policy file that applies to the user and/or workstation. Logon then tailors the user's work environment to meet the specified policies as follows:

- Logon checks for a profile to match the computer name. If one exists, logon applies the computer-specific policies to the user's work environment. If a profile for that computer name doesn't exist, logon applies the Default Workstation policies.
- Logon checks for a profile to match the user name. If one exists, logon applies the user-specific policies to the work environment. If not, logon applies the Default User policies.

Managing System Policies

Administrators can set policies to control both user-specific and computer-specific configuration of the desktops from a central location. The policies are placed in a file (by default, named POLICIES.DAT) on central server which is accessible to all the workstations whose configuration needs to be controlled. This information is downloaded by Windows 95 when it boots from this central server.

For the new computer-specific policies to take effect, Windows 95 must be rebooted. For new user-specific policies to take effect, the user must log on.

Note In this beta release, there is a limited set of administrative policies implemented. These policies will be extended to other operating system features after this beta release. These can be extended by the administrator, but complete documentation is not yet available.

Also after this beta release, Microsoft will publish the format of the output file so that administrators and third-party software developers can write their own applications for editing the policy file.

Setting Policies with the System Policy Editor

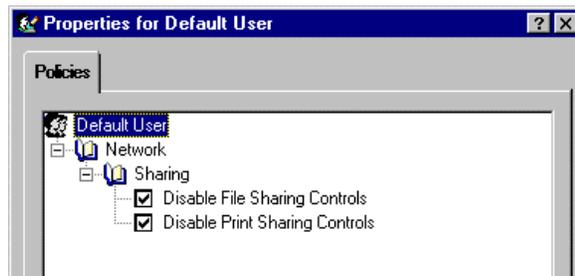
When you use the System Policy Editor to define policies for your organization, follow these three steps:

1. Set the default user and workstation policies (via the Default User and Default Workstation icons).

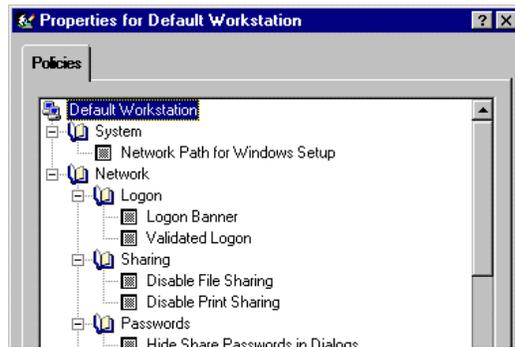
2. Create profiles for individual users and workstations (via the Add New User and Add Workstation icons). By default, these will include the policies you defined for Default User and Default Workstation.
3. Select users and computers that need to function outside the defaults and modify their policy settings as appropriate.

Setting Default User and Workstation Profiles

By clicking the Default User icon, the default user policies display. You can use this property sheet to implement users' default network policies. These policies determine the extent of user network activity for connections, sharing, passwords, and network traffic.



When you double-click the Default Workstation icon, the following property sheet displays. From this property sheet, you can implement workstation default settings for system and network policies. The System policies determine whether user profiles will be used. The Network policies determine the user's default network environment for logon, sharing, passwords, auditing, password caching, and remote updating.



Creating Individual User and Workstation Profiles

Once you set the Default User and Default Workstation policies, these become the templates for any new user and workstation profiles you create. To create a new user profile, from the System Configuration Manager toolbar, click the Add New User icon. When the corresponding dialog box displays, you can change policies to suit the individual user.

Likewise, to create a new workstation profile, click the Add Workstation icon and change policies as appropriate for that workstation.

Downloading System Policies to the Workstation

To set up Windows 95 computer to download system policies, follow these steps:

1. Open the Security Control Panel and click the Update tab.
2. Select Update Administrator Policies at Logon.
3. Type the UNC pathname of the file that contains the policy information. For example, you might type a pathname like this one:

```
\\myserver\policiesdir\policies.dat
```

Windows 95 updates policies from before the user logs on. Each user should have at least read-only privilege for this file.

Note After this beta release, Microsoft will enhance the system policies feature to automatically download policies central locations on Novell NetWare (SYS:LOGIN directory) and Windows NT (\\PDC\LOGIN directory) servers without the administrator having to individually set up each desktop.

Configuring Remote Administration

When you use remote administration to access another computer, there is no difference between what you see in the application window on your screen and what would appear on the remote computer's screen—it's as if you were sitting at the remote computer.

Granting someone remote administration privilege gives the user full access to all shared resources on the system (including the ability to add and remove other remote administrators). Granting or removing remote administrator access from a user does not take effect until the user next connects to the Windows 95 system.

To set up remote administration for a computer, follow these steps:

1. From the Control Panel double-click the Security icon.
2. When the Security property sheet displays, choose the Remote Admin tab.
3. Use the Add key to add new administrators to the list of remote administrators for this computer when using user-level security.



Note For user-level security, the property sheet lists administrators allowed to remotely manage files and printers. For share-level security, the property sheets allows you to specify the password needed to remotely manage this server's resources.

Use the check box to enable or disable remote administration, and then add and remove users and groups as appropriate.

Remotely Setting Passwords, Profiles, and Updates

In addition to granting remote administration access, you can perform the following administrative tasks through the Security property sheets:

- From the Set Password property sheet, you can set the Master Key password. It also controls cached passwords to other services determined by the administrator.
- From the Profiles property sheet, you can determine if users will be able to create their own desktops or have them set by the administrator. Depending on what the administrator decides, Windows 95 will store the desktop parameters in the computer profile or a user profile. "User-specific" profiles are stored in the local Profiles directory (C:\WINDOWS\PROFILES) and generic profiles are stored in the local user Registry.

- From the Update property sheet, you can determine which computers will issue administrative updates.

Note The Update property sheet appears only in this beta version of Windows 95. Policy update will be controlled by a separate administration application in subsequent releases.

For more information about security in Windows 95, see Chapter 6, “Windows 95 Security.”

Monitoring Remote Connections From an SNMP Console

Windows 95 includes a Simple Network Management Protocol (SNMP) agent which conforms to the SNMP version 1 specification. This agent allows you to monitor remote Windows 95 connections from an SNMP console.

The agent is implemented as a Win32 service and works via Windows Sockets over both TCP/IP and IPX. The Extension Agents are implemented as Win32 DLLs. (For more information about writing SNMP MIBs under Windows 95, see the SNMP section in the *Windows 95 Beta-1 SDK*.)

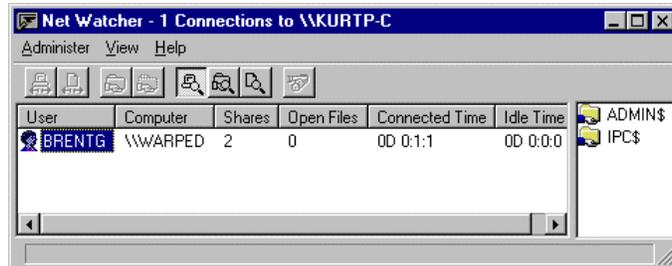
In this beta release, the agent and its corresponding RFC1156 Extension Agent are installed automatically when you install the TCP/IP protocol. To start the agent on a PC, from the Startup menu choose Run and type **snmp.exe**.

The configuration information for the RFC1156 Extension agent is placed in the Windows 95 Registry under HKEY_LOCAL_COMPUTER\System\CurrentControlSet\Services\SNMP\Parameters.

Managing Shared Resources Remotely

Net Watcher is Windows 95's tool for creating, controlling, and monitoring remote shared resources. Net Watcher includes a set of icons that make it easy to do the following:

- Add a shared resource
- Show shared resources
- Stop sharing a resource
- Show a log
- Show users
- Disconnect a user
- Show files
- Close a file



You can also use Net Watcher to create computer profiles and implement password security.

Setting Up a Net Watcher Window for a Remote Computer

You can display a Net Watcher window for a remote computer in one of two ways:

- Select the target computer on the network
- Use the secondary mouse button to choose Watch Server

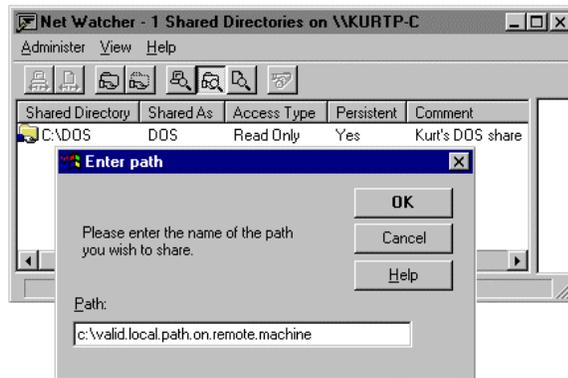
(Windows 95 will prompt you for the appropriate password, if needed.)

From the Network Neighborhood window, you can also right-click any networked computer you have the option to remotely manage the file system of another computer. Choose Admin File System from the menu that displays.



Remotely Creating a Shared Resource with Net Watcher

A local resource is normally shared through its property sheet. An administrator can also share a resource remotely through Net Watcher. To do so, select the Add Share icon to display the Enter Path dialog box. Then type the path of the resource that you want to share.



ADMIN\$ and IPC\$

In the process of enabling remote administration on a computer, two special resources are created.

- ADMIN\$ gives administrators access to the file system on the remote computer.
- IPC\$ provides an interprocess communication (IPC) channel between the two computers.

Stopping Access to a Shared Resource

When you use Net Watcher to close any specific file being used by a remote user, the user remains connected to the shared directory but is disconnected from the file. However, if you do not take preventative measures, such as stop sharing the directory, the user may immediately reconnect and start using the same file again.

Note As with local computers, when you stop access to resources on a remote computer, be sure to stop sharing the resource rather than simply disconnecting the user or closing the file. If you don't stop sharing the resources, users can simply reconnect and start using that resource again. However, if you change the password for a resource, any users connected to that resource will be disconnected. They cannot reconnect without the new password.

Setting Up Network-based Applications

The Shortcut features of the Windows 95 shell provide very powerful opportunities for centrally-managed software applications. Administrators can place applications on a network server and create shortcuts that appear both on computers that run Windows 95 over the network as well as on standalone workstations. When coupled with Windows 95's user profiles features, users can create their own shortcuts and desktop configurations that travel with them from computer to computer while also having the corporate-wide programs created by an administrator.

To create a network-based shortcut, follow these steps:

1. Create a directory on a network server to which all users have access.
2. On all Windows 95 computers, create a shortcut to the directory by dragging the directory's icon from the Network Neighborhood to the Programs folder.
3. From the context menu, choose Create Shortcut Here.

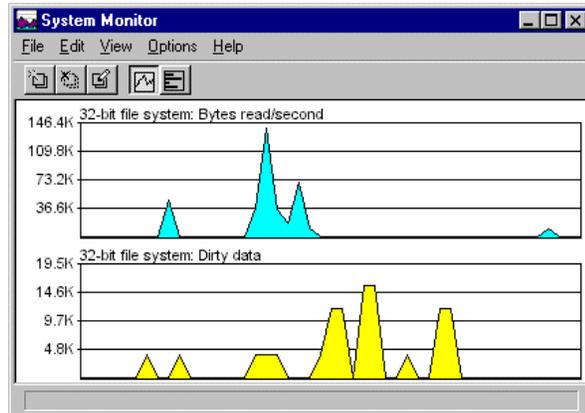
Once this is done, you can put just about anything you want in the directory on the server—programs, shortcuts to programs or folders, subdirectories, and so on.

One big advantage for setting up shortcuts like this is that system administrators can make software upgrades relatively painless for users, since the files that need changing reside only on the application server, and not users' workstations.

Monitoring System Performance

System Monitor is a tracking tool that monitors the real-time performance of various computer components, functions, and behaviors and displays the results in graphs or charts. This information is useful in locating bottlenecks and solving other performance problems.

Collected over time, counter statistics show performance trends. These can help an administrator tune or troubleshoot the computer. For example, monitoring memory and swapping activity can help determine if the computer needs a new hard drive or just some more RAM.



System Monitor tracks the following five categories:

- 32-bit file system
- NWLink
- VMM 32 Memory Manager
- NCP redirector
- SMB Redirector

Note Additional categories will be added in future beta versions of Windows 95. Also, by using System Monitor's extensible interface, third-party companies can add their own categories and data items.

Each category includes multiple items which System Monitor also tracks. For example, the VMM 32-bit Memory Manager has more than 15 items, including allocated memory, free memory, page-ins, and swapfile in use. (You can choose the Explain button for a description of any item.)

To create a picture of a computer's performance, choose the categories and items to be tracked, and then click the graph or chart button.

With the appropriate privileges, you can use System Monitor over the network to track the performance of remote computers.

Note The network version of the System Monitor is not shipped with this beta version, but can be downloaded from the CompuServe beta forum.

Network Backup Agents

This beta release of Windows 95 includes two network backup agents. A network backup agent enables your computer to be backed up to a tape drive on a network server. However, you must also have the corresponding server-based network backup software to do this.

In this beta release, there is a network backup agent from Arcada Software and a network backup agent from Cheyenne Software.

The Cheyenne agent works with Cheyenne's ARCserve for NetWare product and enables backup of a Windows 95 computer to a tape drive on a NetWare server.

The Arcada agent works with Arcada's Backup Exec product for NetWare (Enterprise Edition or Single Server Edition), which also enables backup to a tape drive on a NetWare server. Both Arcada and Cheyenne are concurrently developing products to enable backup of a Windows 95 client to a Microsoft Windows NT Advanced Server. This support will be integrated into the current backup agent which only supports NetWare.

Setting Up and Using the Arcada Agent

To use the Arcada agent for backup, you must have the following components:

- Arcada Backup Exec for NetWare—Enterprise Edition or Single Server Edition
- New versions of the Arcada NLMs. These have been updated specifically for Windows 95 and can be obtained by contacting Arcada Software directly.
- The Windows 95 agent—WIN_AGNT.EXE and related files, PUB.EXE, PUB.HLP, WIN_AGNT.RES and WIN_SPX.DLL. These five files are automatically copied to your hard disk during Windows 95 Setup, as long as you chose to install support for Microsoft Networking or Novell NetWare.

To back up a Windows 95 computer with the Arcada agent, follow these steps:

1. Run the publisher (PUB.EXE). This will allow you to specify which directories you want to make available for backup.
2. From the publisher, select the Enable button. This will automatically load the agent (WIN_AGNT.EXE), which means that your computer is ready to be backed up. Once the agent is enabled, it should start up automatically each time Windows 95 is booted.
3. You must be attached to the backup server to have your computer backed up, but you do not have to be logged in to the server.
4. Run Arcada Backup Exec (NetWare Enterprise Edition or Single Server Edition). See the Arcada Backup Exec product documentation for further information and instructions.

5. Within the Backup Exec software, the Windows 95 computer will show up in the list of backup sources. Find the Windows 95 computer in the list of backup sources by looking for the name that was given to the workstation in the publisher utility.
6. Follow Backup Exec instructions for backing up a Windows workstation.

Setting Up and Using the Cheyenne Agent

To use the Cheyenne agent for backup, you must have the following components:

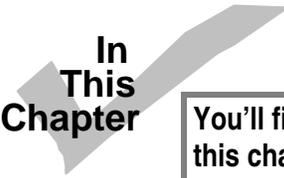
- Cheyenne ARCserve for NetWare (Version 5.01).
- New versions of two Cheyenne NLMs—APROCESS.NLM and WSTAPE.NLM. These have been updated specifically for Windows 95; they can be obtained by contacting Cheyenne Software directly.
- The Windows 95 agent—ARCSRV32.EXE. This file is automatically copied to your hard disk during Windows 95 Setup, as long as you chose to install support for NetWare.

To back up a Windows 95 computer with the Cheyenne agent, follow these steps:

1. Double-click ARCSRV32.EXE to run the agent. You will see a user interface for the agent which normally shows various parameters and statistics. However, in this beta release, you will not see values for any of these fields.
2. In the agent user interface, select the Options menu, and choose Status Log File. This will show the name and location of the agent log file. In this log file, you should see the network address of your Windows 95 computer.
3. Run Cheyenne ARCserve for NetWare. The Windows 95 computer is shown in the list of PC clients, as are computers running MS-DOS and Windows 3.1. (See the Cheyenne ARCserve product documentation for further information and instructions.)
4. Find the Windows 95 computer in the list of PC clients by looking for the network address found in the agent log file.
5. Follow ARCserve instructions for backing up a Windows workstation.

Mobile Services In Windows 95

Windows 95 includes several features designed especially for mobile users. This chapter describes how Windows 95 tools make it easier for users who have both portable and desktop computers to manage multiple configurations and to keep files between two computers synchronized. It also describes how users can use Windows 95's tools to remotely access the network and other services such as Internet and Online.



In This Chapter

You'll find answers to these questions in this chapter:

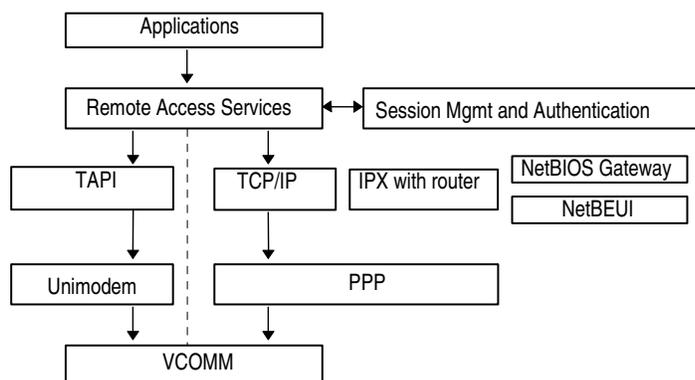
- *How do I set up Remote Access so other computers can dial in to my computer or other Remote Access servers?*
(see page 112)
- *How do I set up Remote Access so I can dial in to other computers?(see page 112)*
- *How do I set up a Briefcase and synchronize files?* (see page 118)
- *How can I set up separate configurations for docked and undocked states for my system?* (see page 120)

Remote Network Access

Windows 95's Remote Access feature gives users complete workgroup computing capabilities whether it be running a client-server application accessing a customer database, downloading and/or browsing email, or accessing shared files. Remote Access is smoothly integrated into the Windows 95 shell so it doesn't seem like users are running a separate application.

Establishing a remote connection works the same as establishing a connection in the office—the user simply double-clicks on the network object to connect. Similarly, if the user double-clicks on Mail, a remote connection is automatically established.

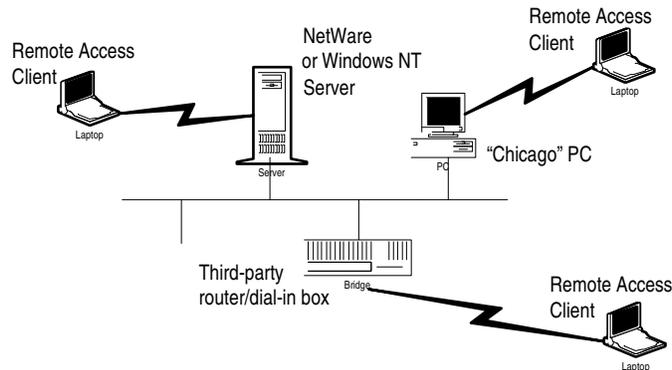
The Remote Access client software component, like the rest of Windows 95 networking, connects to a broad set of networks and provides an open architecture for universal connectivity. Windows 95's Remote Access functionality includes support for IPX, NetBEUI, and TCP/IP network protocols using industry standard point-to-point protocol (PPP) over the wire, as shown below. Because Remote Access support uses the dynamic, 32-bit, protected-mode network architecture of Windows 95, users don't have to reboot their computers or exit Windows to continue working after establishing or ending a connection.



On the host computer—that is, the one into which the user is dialing—Windows 95 provides an easy to use, single-port host, capable of multi-protocol routing for IPX and NetBIOS with pass-through user-level security. This security uses Windows NT or NetWare authentication mechanism and user database to validate the user. Of course, share-level security is also an available option. Using Windows 95's desktop management capabilities, an administrator can disable dial-in access so users cannot dial into a particular desktop PC, or remotely access the entire network.

If the user chooses to use a host system such as Windows NT, Shiva Netmodem/LanRover, or NetWare Connect, Windows 95's Remote Access feature offers full connectivity. This also means that the Windows 95 desktop PC can be used as a convenient access point to a small LAN or simply to the desktop PC itself. (The "Daytona" release of Windows NT Advanced

Server supplements the Remote Access support in Windows 95 to provide a large network solution that allows for as many as 256 simultaneous dial-in sessions.)



Windows 95 provides a modular, open architecture to support applications establishing a “pipeline” to the network remotely. Applications can use the Remote Access API to initiate resume a remote connection and to gather information about the type and status of the connection.

The Remote Access subsystem is network- and device-independent which enables universal connectivity. This means, for example, that Windows 95 supports ISDN boards, PBX modems, and so on. This capability is accomplished through service providers—software components that manage physical connections, and network traffic over the remote media. Finally, the Remote Access subsystem has a modular authentication provider that can be supplemented or replaced to provide custom security services. For instance, suppose the BrandX Company wanted to provide its own custom services. That company can replace Windows 95’s authentication DLL with its own to take advantage of BrandX-specific security features.

You can use Remote Access with either IPX or NetBEUI networks. Whether you use IPX or NetBEUI for Remote Access depends on how you choose to configure your overall network. For more information on these protocols, see Chapter 2, “Networking Basics.”

Remote Access With IPX

Remote Access can be set up to provide access to IPX networks. Setting up an IPX Remote Access installation requires installing the Remote Access PPP driver. Install only the IPX/SPX-compatible protocol for this driver.

The IPX router (part of NWLINK.386) is active only when more than one network driver supports IPX.

Remote Access With NetBEUI

NetBEUI is recommended for use with Microsoft peer services and for use with applications that use NetBIOS. Because Windows 95 supports multiple protocols, both IPX and NetBEUI can coexist in the same computer at the same time.

Installing Remote Access

The Windows 95 Remote Access service requires:

- One or more compatible installed modems. See the Hardware Compatibility List for a complete list of compatible modems. (This list is available when you setup a modem with Windows 95 Setup.)
- Enough available hard disk space to install the Remote Access Service. It requires about 2 MB of free disk space to install the client, server, and administration portions of Remote Access.

Optionally, the following can be used with Remote Access server:

- A certified NDIS 3.0 driver with Remote Access extension
- Remote Access PPP extension drivers (available in next beta release of this product)

Installing Remote Access is different than installing previous Microsoft communication programs because the Remote Access installation process builds Remote Access into the operating system whereas other versions were installed as additional applications. As part of the installation process, Remote Access deletes and replaces the Windows for Workgroups 3.11 Remote Access.

To install Remote Access (client or server), follow these steps:

1. Use the Control Panel to set up the modem.
2. Specify whether your Remote Access computer will be a client or a server. The Remote Access wizards can help with this.
3. Enter the proper settings for dial-in.

Note To change the configuration of the server later, from the Remote Access folder, choose the Connection menu, then choose Dial-In options.

Remote Access Security

Windows 95 Remote Access has the following security features.

- **Integrated domain security.** Windows 95 Remote Access server uses the same account database as a Windows NT Advanced Server or NetWare server. This provides for easier administration, because users will log on with the accounts that they use while at the office. This ensures that users will have the same privileges and permissions they normally have.
To connect, a user must have explicit Remote Access permission as well as a valid Windows NT account. Users must be authenticated by Remote Access before they are even allowed to attempt to log on to Windows NT.
- **Encrypted authentication and logon.** All authentication and logon information is encrypted when transmitted over the phone lines.

For more information on setting user-level security for use with Windows NT and NetWare servers, see Chapter 6, “Windows 95 Security.”

Implicit Connections

Remote Access in Windows 95 will “remember” network connections.

Once Remote Access is installed, if you try to access a network resource when you are not connected to any network, you will be prompted to select a Remote Connection. The connection you select will be used to start a Remote Network session. Once the session is established, the network operation you initiated resumes to completion. If the network operation completes successfully, the connector you have chosen will be remembered for future operations that use the same network resource.

Implicit connections leaves a “ghost” mapping which reconnects when you need to use the resource. If you don’t need to use the resource, the connection remains inactive.

Implicit connections are basically a convenience so you don’t have to keep reconnecting to resources each time you want to use them.

Persistent Network Connections

Ghosting incorporates the idea of persistent network connections, a LAN Manager feature that “remembered” network connections so that the user didn’t have to reconnect every network drive each time he or she logged on.

Planning Your Remote Access Installation

Planning is a critical part of installing and configuring Remote Access successfully in your organization. You should ask the following organizational questions:

1. How many users need to dial-in?

If you need to allow a small number of users dial-in access for short sessions, then your installation should consist primarily of users' Windows 95 computers configured as hosts on an as-needed basis. Set up security for this configuration by defining a password on the access port, or by restricting the access to selected users.

If you need to support a medium to large number of users for dial-in access, it's better to choose a multi-port server. Windows NT Advanced Server 3.5 is a high performance, scaleable multi-port PPP host that supports IPX, NetBEUI, and TCP/IP. This host integrates seamlessly into a Windows NT enterprise network while allowing you to support a large number of clients centrally. Shiva corporation's LanRover series of devices are dedicated multiport PPP hosts that integrate well into NetWare network environment while offering robust Remote Access. (Other compatible PPP servers include those from Cisco and Telebit.)

2. How many of these users are telecommuters? How many are mobile users?

Telecommuters need to connect few times during the day, and stay connected for long periods of time. So if you have a high percentage of telecommuters, plan to make more ports available. Telecommuters will normally use low cost local telephone calls, therefore you can choose a cost effective telephone service for the multiple users. Most telecommuters dial in from a fixed location, therefore you can use dial-back (or callback) as an effective security means. The Windows 95 client supports dial-back from Windows NT 3.1 or Windows NT 3.5.

Mobile users need to connect often during the day, but don't stay connected for long. Most connections are performed over long distance telephone lines which suffer from poor quality. Because the cost of connection to the mobile user is an inhibitor to effective use, it's recommended that you set up 1-800 access service, local access numbers, or provide you users with appropriate calling card accounts. It's best to use error-correcting high quality host/client modems to compensate for the added line noise.

3. What network protocols and services do these users need access to?

Here are some common requirements:

- Accessing NetWare file and print services implies IPX protocol access is needed.
- Accessing Windows NT file and print services implies NetBEUI, IPX, or TCP/IP access is needed.
- Typical SQL databases need TCP/IP or IPX access.
- Windows 95 peer services require NetBEUI or IPX access.

4. How many users need access to the network versus access to their PCs only?

Windows 95 hosts can be set up to provide PC access only. If a large percentage of your users need access only to their own computers, they can set up their Windows 95 computers to be PC-access only hosts.

5. What level of dial-in security do you need for your network?

Windows 95 hosts support password or user-level security. Windows NT hosts support user-level and domain security. Shiva LanRover provides user-level and Bindery security. Add-on third-party security products can be used to enhance the security of any of these hosts. The Windows 95 client supports add-ons that require user to type tokens.

6. Does your organization use a PBX telephone system?

If your organization uses a PBX system, it may be difficult to equip individual Windows 95 computers with modems to grant PC or network access. Several PBX vendors provide modem-like devices that plug into the PBX wiring system, these devices tend to be more expensive than modems of similar capability. Other third-party vendors provide PC cards that connect a PC to a PBX system giving modem functionality. Both types of devices can be used by the Windows 95 host/client functionality.

7. Do you allow end-users to have personal modems and telephone lines?

This is primarily a security issue. Your organization may not allow modems on individual desktop computers. In this case, it is preferable that Remote Access is provided through centralized Remote Access hosts such as the Windows NT Advanced Server 3.5 or Shiva LanRover.

Windows 95 Slow Connection Features

Windows 95 has integrated, full-featured Remote Access capability. This Remote Access support is composed of client components, server components, and several enhancements to Windows 95 networking and user interface components. The enhancements include not only the Remote Access pipeline but also slow-connection-awareness features that increase usability and thus add value above the pipeline:

- **Reliable transmission.** The protocol used on slow connections provides reliable data transfer on phone lines spanning satellite or circuit cellular connections.
- **Adaptive protocols.** Mobile Windows 95 adapts NetBEUI for slow connections. These changes improve the reliability of third-party routers-for example, Shiva's remote networking solution for Windows for Workgroups.
- **Compression on data transfer.** The Windows 95 Remote Access PPP driver supports software compression based on Microsoft disk space technology. Software compression provides roughly a 2:1 performance improvement without requiring high serial port rates.

- **Redirector adapts to slow connections.** The Windows 95 redirectors will disable read-ahead and write-behind operations when accessing data through a slow connection.

Synchronizing Files with the Windows 95 Briefcase

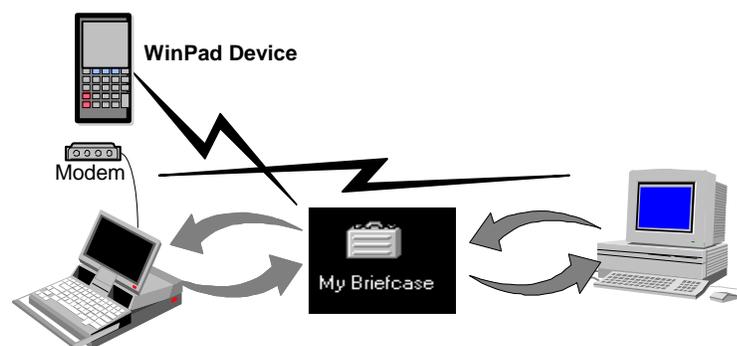
Portable PC owners who also have a desktop PC constantly work to keep the most up-to-date files on the computer they are currently using. The Windows 95 Briefcase minimizes these headaches by keeping track of the relationships between the files on their two computers using a simple metaphor that users are already comfortable with—a briefcase.

A sales person, for example, might need to collect data in certain files during a business trip. Later, it will be important for the files on that sales person's office computer to be synchronized with the files which were changed during the trip. Briefcase tracks and synchronizes the files.

With the Briefcase, a user can:

- Create a Briefcase folder.
- Add files to the Briefcase.
- Check the status of files in the Briefcase and their related files.
- Update related files, either individually or all at once.
- Split related files to maintain them separately.

To create a Briefcase, users simply choose Create Briefcase from the Accessories folder (found with in the Programs folder).



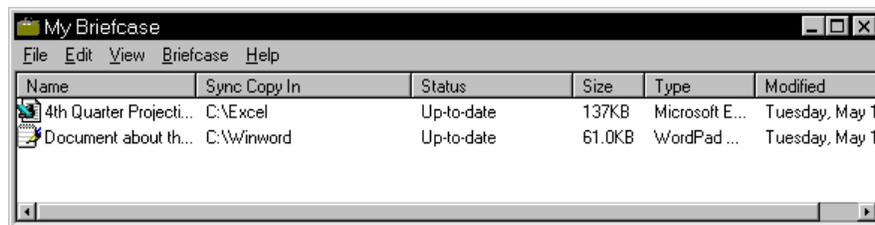
After installing the Windows 95 Briefcase software on the portable PCs, a user can specify which files and directories he or she wants to take keep up-to-date between the two PCs by dragging and dropping those objects into the Briefcase. When the user reconnects the portable

and desktop PCs, he or she simply opens the Briefcase and chooses Update from the Briefcase menu. This automatically replaces unmodified files with modified files. If both files have changed, Windows 95 calls the appropriate application (if available) to merge the disparate files. (For details about using Briefcase, see online Help.)

Windows 95 provides a set of OLE 2 interfaces that allow applications to bind reconciliation handlers to it, track the contents of the Briefcase, and define the outcome of any reconciliation on a class-by-class basis. For example, when both the file in the Briefcase and its synchronized copy outside have changed, Windows 95 calls the appropriate reconciliation handler to merge the two files.

You can also synchronize network files and folders with the Briefcase. Simply drop the resource you want to synchronize with into the Briefcase.

When you open the Briefcase folder, you can check the status of any file in the Briefcase. You can also update files or split related files listed in the Briefcase.



Sample Briefcase Contents Showing Document Status

Accessing Internet and Online Services

Online services are a critical network for PC users to gather information and communicate with other PC users.

Windows 95 integrates a variety of access points into online services. Windows 95 mail users can send and receive mail through gateways to the Internet community directly from the mail client. Windows 95's Terminal tool ships with scripts for a variety of existing online services including CompuServe, Dow Jones, and America Online.

Support for "Local" Connections

Establishing a local connection—that is, with serial or parallel cables—is accomplished using the Remote Access folder.

Note

In this beta, this means creating a connection using a “local” modem. To install a “local” modem, from the Modem Control Panel, choose Add. Then choose Local from the list.

Hardware Configurations and Docking

As described in Chapter 7, “Desktop Management and Remote Administration,” the Windows 95 Registry contains per-configuration information for each computer. For example, the Registry keeps a record of the configuration for the computer when it is undocked and another record for when it is docked.

Users can edit, delete, and create new configurations from the Profiles property sheet of System Control Panel. To specify device settings on a per-configuration basis, follow these steps:

1. From System Control Panel, open the Device Manager property sheet.
2. Choose Properties.
3. Edit the Profile Specific Settings.

Windows 95 can switch automatically between configurations stored in the Registry—no user intervention to make the switch is needed. For example, the following happens automatically when a user chooses “Eject PC” from the System menu to undock the computer:

1. Windows 95 checks for any potential problems before undocking. For example, Windows 95 lets a user know if he or she has a file open on a network drive at this time.
2. The system undocks, without powering down if the user chooses.
3. Once undocked, Windows 95 changes to the new configuration’s Registry settings. For example, Windows 95 could switch from a docked 1024x768 video resolution to an undocked 640x480 resolution.

Applications also read and store settings based on this per-configuration information. For example, when Windows 95 switches from one video monitor to another, a graphics application could switch from one color palette to another, choosing the best match for the monitor being used. Likewise, an email application could switch from a fast-connection network provider with one of set preferences to an offline/slow connection provider with a different set of preferences.

For each device, the Registry contains two configuration-specific bits of information. The first defines whether information describing the device is kept in the Registry (useful for Plug and

Play and other device detection). The second defines whether or not to keep the device's driver loaded.

Windows 95 ships with a full complement of dynamically loadable drivers from network drivers to mouse drivers that load and unload depending on the configuration that is currently being used.

Troubleshooting Windows 95

Troubleshooting a beta product is somewhat different than troubleshooting packaged products. In addition to the normal steps you might take to track down a problem, with a beta product, you'll need to consider two additional issues-isolating and reporting bugs and finding work-arounds for existing problems that are likely to be fixed by the next release.

General Troubleshooting Tips

When doing any kind of software and/or hardware troubleshooting, there are some preliminary questions to ask:

- What hardware/software is involved?
- Does the problem occur in just one application?
- Does the problem occur on just one computer or device?
- Does the order of the steps to reproduce the problem make a difference?
- Has it ever worked?
- What changed?

Troubleshooting Strategy

Try these steps in order to troubleshoot any difficulty you may experience with this Windows 95 beta.

1. Check to see if the problem you're having is a know problem.
2. Make an assumption.
3. Test.
4. Write down results
5. Verify fixes.

The following sections detail each of these steps.

Check to See if the Problem You're Having is a Known Problem

Make sure you thoroughly read the *Release Notes*, *Beta Installation Guide*, online Help, the *Frequently Asked Questions* (FAQ) posted in the Windows 95 CompuServe forum, and any *.DOC or *.RTF files included on the beta distribution disks.

Also, post your problem on the forum. You will often find that yours is a problem that others have already discovered, reported, and found work-arounds for. If it's not a known problem, suggestions from others may save you time tracking down the source of the problem and give you ideas that can help you.

You will also find that the Windows 3.1, Windows for Workgroups 3.1, and Windows for Workgroups 3.11 *Resource Kits* contain valuable troubleshooting information.

Make an Assumption

Decide what you think the cause and solution might be. Make modifications to your system or the application and re-test. Minimize the number of things you change between tests and if you find the problem goes away at some point, try adding things back in until you (hopefully) find the single cause of the problem.

Test

Test each modification to see if it fixed the problem. For detailed suggestions for how to approach your testing, see Chapter 10, "Windows 95 Testing Guide."

Write Down Results

Note all symptoms, causes, and solutions. This will provide you with the information you need to submit a good bug report and makes an excellent reference for future troubleshooting.

Verify Fixes

If you find a work-around for a specific problem and have submitted a bug report, make sure you try removing the work-around when you receive updated beta software. It's easy to forget that you've changed the system to allow something to work and forget to re-test the original problem once it's been fixed.

If you are told that a problem is fixed in a new file or release, it's important to verify that the original problem has been fixed. Sometimes the fix may not really be what you expected or will reveal other problems.

Troubleshooting Setup Problems

Windows 95 has several built-in mechanisms to help in the event that something goes wrong during Setup. The next few sections describe some of the most important methods you can use to troubleshoot these problems.

Boot Log

Windows 95 creates a file called SETUPLOG.TXT in the root directory of the boot drive. This file allows Setup to know if there were any problems during the last attempted boot of Windows 95. It keeps track of progress made, so that if a particular component is keeping Windows 95 from running properly, it will attempt to diagnose this for you. This way, you can boot the system in fail-safe mode and correct the problem.

Note Starting Windows 95 in fail-safe mode disables the protected-mode device drivers, networking capabilities, and runs in standard VGA mode.

Detection Problems

The Detection Crash Recovery Log (DETLOG.TXT) records the detection process. This means that if Windows 95 crashes during the detection phase, it records the crash details and, therefore, can refer to them in subsequent detection processes.

Windows 95 uses this log to avoid crashing twice on the same problem. Rather than repeating the same installation-stopping errors over and over again, Detection Crash Recovery Log keeps the installation process moving forward by recognizing and by-passing previous errors. When it gets to the module that caused the crash and learns from the log that this was the problem module, Setup skips the module and continues.

Even though the system may crash several times during the Setup process, Setup will always move forward because it won't be tripping over the same problem.

Windows 95 Setup will continue after almost any interruption because the new Setup design will keep the base files for the original version of MS-DOS, Windows, and Microsoft Networks intact until all of the new files have been copied on the user's system.

If Setup is interrupted, the system will still boot the user's original MS-DOS, Windows, and Microsoft Networks, and, by examining the Setup Log, Setup will be able to continue at the approximate place it was interrupted.

Emergency Boot Disk

The Emergency Boot Disk provides only those files necessary to fix the system if it is damaged and there is no other means of fixing it. Normally, this disk contains the following files:

ATTRIB.EXE	FORMAT.COM	SCANDISK.EXE
COMMAND.COM	MEM.EXE	SCANDISK.INI
EDIT.COM	MORE.COM	SETVER.EXE
EXTRACT.EXE	MSD.EXE	SYS.COM
FDISK.EXE		

This disk may also contain drivers specific to your computer such as disk compression drivers and drivers necessary to access hardware on your computer.

Troubleshooting Booting Problems

The following sections describe what you can do when you have trouble booting your computer.

Fail-Safe Boot

If you press F8 when the message “Starting Windows” displays, you will be prompted to accept or reject each of the startup option messages. Choose to accept them—these messages are helpful in pin-pointing a particular failure.

These options allow you to bypass different functions that are otherwise started for you automatically when you load Windows 95. For troubleshooting purposes, it may be helpful to temporarily disable one or more of these items if there is a problem loading Windows 95 because of it.

Some of the startup commands include the following:

```
Process system registry [Y,N]?
Create start-up log file [Y,N]?
Process start-up device drivers [Y,N]?
DOS=HIGH,UMB [Y,N]?
DEVICE=HIMEM.SYS [Y,N]?
LASTDRIVE=32 [Y,N]?
DEVICEHIGH=IFSHLP.SYS [Y,N]?
DEVICEHIGH=C:\WINDOWS\COMMAND\SETVER.EXE [Y,N]?
Process start-up command file [Y,N]?
call C:\WINBOOT\NETSTART.BAT [Y,N]?
```

```
C:\WINBOOT\net start [Y,N]?  
SET PATH=...[Y,N]?  
SET TEMP=C:\TEMP[Y,N]?  
SET TMP=C:\TEMP[Y,N]?  
WIN [Y,N]?
```

Tips

- Always make backups of configuration files.
 - It is a good idea to have a startup disk.
 - Test your startup disk before you need it.
-

Troubleshooting Network Problems

Network problems can usually be classified into two distinct areas—hardware and software.

Diagnosing Network Hardware Problems

Some of the most common hardware problems are due to improperly terminated network adapter cards, incorrect or non-functional cabling, improper settings for the network adapter card, or faulty network adapter cards.

Note If you are upgrading from a previous version of Windows or Windows for Workgroups, with a properly functioning network card, it is unlikely that you will find the network card itself faulty.

Generally, it's best to first rule out the possibility that you may have hardware problems by running a network diagnostic tool to ensure that your computer can see the network and can be seen by other computers on the network.

To run the Microsoft Network Diagnostics:

1. From within an MS-DOS session (or from outside of Windows if you are testing the real-mode network), type “**net diag**” at the MS-DOS prompt.

The Microsoft Network Diagnostics will identify the types of protocols that are currently installed. If you have both an IPX provider and a NetBIOS provider, you will have the option to choose which protocol to use. Select the protocol that is common to all computers that will be involved in the diagnostics.

Network Diagnostics then tries to detect a diagnostic server on the network. If you have not already started a diagnostic server, you have the option of specifying the local computer as the diagnostic server with which other computers can try to communicate. If you already started a diagnostic server and this server is not detected, you may have a hardware problem.

The first computer that you run Microsoft Network Diagnostics on becomes the diagnostic server with which the other computers on your network will attempt to communicate.

2. Run Microsoft Network Diagnostics on another workstation. This workstation will then exchange information with the diagnostic server and will display messages about any problems on its screen.

Troubleshooting Network Software Problems

To troubleshoot software-related problems, follow these steps:

1. Check the Network Control Panel to make sure the correct components (Windows client, network drivers, and protocols) are installed.
2. If the installed components appear to be correct, check the properties for each of the installed components. Items to check for are logical network IDs, frame types, transceiver settings, and so on.
3. If all the settings appear to be correct and you know you do not have a hardware problem, see if there is another computer with the same configuration that you have that can access the network properly. Check to see if any settings for that computer are different than those for your computer.

Troubleshooting Modem Problems

The AT modem service provider (ATSP) is very sensitive to the degree of Hayes compatibility that your modem provides. Many modems claim to be Hayes compatible but are only partially Hayes compatible. If you find that ATSP is not hanging up calls correctly or seems to be freezing your computer for periods of 20 to 30 seconds, then your modem may be at fault.

To determine whether or not a modem will run with ATSP, start a terminal emulation program (such as Windows 95's Hyper Terminal Connections) and follow these steps:

1. Dial a number with a semi-colon (;) appended to the number so that the modem returns immediately after dialing. The modem should dial and return the following responses:

When the modem shows this response	You type this
AT	OK
ATDT16364;	OK

2. Send the ADT command to begin busy detection. The modem should not return until it detects a call state or times out. You will see this:

ATD
BUSY

3. Before the modem detects a call state, press ENTER. This should hang up the call. Send an ATH0 to hand up the modem just in case.

When the modem shows this response	You type this
ATD	(press ENTER)
(modem hangs up)	
NO CARRIER	
ATH0	OK

If you can make it through these steps, then ATSP should drive your modem.

Windows 95 Testing Guide

This chapter provides information and instructions on installing and testing this beta release of Windows 95 in your work environment. It is designed to help you evaluate this beta product and understand how to effectively test this product in your environment with the applications and tools you use daily.

Note Remember that this is still pre-release software. Be sure to back up any important existing data and programs before installing or running this or any other any pre-release software.

Before You Install

There are several steps you should follow before installing the Windows 95 beta. Follow these steps to help you avoid known pitfalls and save you time both during the installation process and while testing this beta release:

1. Review the beta documentation.
This contains valuable information on installing this beta product. Often, this documentation contains information not found anywhere else.
2. Plan your installation.
Before you install this beta version of Windows 95, review Chapter 1, “Windows 95 Setup” and Chapter 3, “Network Integration” of this *Resource Guide*. This will help you to make sure that you are prepared with any information that may be requested of you during Setup and that your hardware and network operating system software is compatible with this beta release of Windows 95.
3. Back up important files.
Back up all critical files on the hard disk and both your MS-DOS and previous Windows installation to the network or to floppy disks. This will save you valuable time in the event you need to remove your Windows 95 installation or experience any data loss.
4. Check your hardware.
Run CHKDSK or your favorite disk utility to make sure that you have no pre-existing hardware defects that may cause Setup to fail.

Installing Windows 95

You are now ready to run Setup. Insert either the Setup CD or the Setup Disk #1 in the appropriate drive, switch to that drive, and type **setup**.

Here are some details you will want to know about as Setup runs:

Setup first asks you if you want to install the Plus Pack components. In this beta, you will need to select this option if you want to install the Remote Access services or the extensions for WinPad or Pen Windows.

Plug and Play devices and existing standard hardware devices are detected during the Hardware Detection phase. This can take quite some time, so be patient. If your system hangs during the Hardware Detection phase, you can rerun Setup and the hardware detection that caused your system to hang will be automatically avoided the second time. You should, however, try to determine what caused your computer to hang by reviewing the DETLOG.TXT in the root of the drive where you installed Windows 95. Save DETLOG.TXT before rerunning Setup and please file a bug report with the contents of this file included.

Next, the Customization dialog box displays. With the Installed Components option, you can customize your installation by choosing the options you want to install. Be sure to choose all of the options you potentially want to test in this phase as this beta release does not contain a method to add these components after initial Setup.

The Network Options screen allows you to verify the network hardware and software detection as well as to modify the default setting. If your network hardware or software has been incorrectly detected, you should file a bug report indicating what was detected and what you felt should have been detected. See Chapter 3, "Network Integration" for more information on what Setup should be detecting for your network.

Be sure that the correct network adapter card drivers, protocols, and redirectors will be installed.

Note For this release, Setup will let you install components which may result in a non-functioning network.

From the Computer Options dialog box, you can confirm and change the installed devices on your computer if necessary. Again, if you feel that Setup incorrectly detected your hardware, please file a bug report.

The Advanced button allows you to change the location where Windows 95 will be installed on your computer. It also has two check boxes that allow you to customize the way Windows 95 will behave on your system.

- If you check the Windows 3.1 Compatibility Mode box, it will disable the new file system functions that may be incompatible with your existing applications or your network operating system such as long filenames, last access date, and so on.
- The check box which will force installation of the protected-mode drivers will provide you with optimal performance but will disable any devices and TSRs which may conflict. In some cases, you may need these devices to boot your computer or run certain applications. If you choose to enable this feature, make sure you review the changes that Setup will make to your system so that you can boot your computer and run properly. If Setup attempts to remark out a device that is necessary for your computer to run properly and you feel that this device should not conflict with the protected-mode components of Windows 95, please file a report so that this can be investigated. Alternately, if Setup does not remove a device which causes one or more of the protected-mode components to fail to load, you should also report this. If you do not check this box, you should test these functions when running your existing applications.

You should choose Yes when asked if you want to create a Startup Disk. This will create disk from which you can boot your computer should your system fail to start up from the hard drive for any reason. After setting up Windows 95, make sure that a valid Startup Disk was created by using this disk to boot your computer. If a valid Startup Disk was not created, please file a bug report.

Throughout the Setup process, you should note things that do not work as expected and file complete bug reports, such as:

- Setup fails to complete and installation step properly
- Any device, such as your keyboard, monitor, floppy, or hard disk does not work properly either during or after Setup.
- Dialogs, error messages, or explanatory text which is unclear, misleading, or contains typographical errors.

If you get any error messages and believe that Setup is not behaving as it should, please submit a bug report (see the *Windows 95 Beta-1 Kit* for details about bug reporting). Please be sure to report any problems with the installation to Microsoft.

After Installation

When the installation is complete, Setup will restart your computer. Press ESCAPE during the initial “Flying Windows” logo screen to see additional system messages. Please watch your screen carefully and check to see if any error messages are printed to the screen as your system Registry and startup files are processed.

Once you have successfully booted Windows 95, you should review the *Release Notes* and be sure to note any special procedures that apply to your particular PC configuration. The *Release Notes* contain information about known problems in this release and will provide you with possible work-arounds.

Finally, before beginning to test this product, you should check your configuration to make sure that all devices are installed and working properly and that all of your chosen optional components have been installed.

Testing This Release

Now you're ready to see how Windows 95 performs in your work environment. The next few sections describe how to plan your test and some suggestions for testing various categories of Windows 95 functionality, including:

- System components
- Networking components
- Interaction with applications and utilities

Because we feel that the Windows 95 product should be thoroughly tested, we've included sections on performing different types of testing. Though this list is not intended to be complete, we've included these sections as suggestions to help you fully evaluate this product in your work environment. Use these as suggestions, modifying and adding to them as you need to based on your particular installation and needs.

Planning Your Testing

Every good test begins with a test plan. Your plan for testing Windows 95 should include verification that all applications that you use work properly and that all hardware you have is properly supported. It's not necessary to test on every computer that you have, but you should test on a representative number of computers. It's also important to test Windows 95 with every piece of hardware that may be different than your normal installed base, such as high-end video displays and unique printers.

Once you determine which hardware and software you should test with, formalize your plan by including such things as stress and error-condition testing. Remember while it's important to test that the system performs correctly, it's just as important to test for appropriate responses when things go wrong (for example, when the printer is down or when a network cable is unattached). Make sure that the system performs well and responds properly when problems arise with your network or an application.

System Testing

System testing ensures that all of Windows 95's base functionality works properly and is compatible with your system. Some ideas for areas that you should concentrate on are:

- **Display drivers.** Is the video driver that Windows 95 installs on your computer the correct one? Is it the best driver for your system?
If you have a video display capable of high resolution, load a file which uses the maximum amount of memory or colors and make sure the image is properly drawn. Also, look for stress cases (such as loading a display intensive application or file) and make sure the video output is correct. Perform actions which typically cause the screen to repaint (such as switching between the application and a full screen MS-DOS box), and make sure the repaint is done properly.
- **Printers.** You should test printing with every application that you verify and particularly over the network. Try using different ways to install and connect to the printer (see Chapter 5, "Printing" for information on the many different ways you can install and use a printer). Verify that the output is correct.
- **Devices.** Make sure you fully exercise all attached devices such as disk drives, CD-ROM drives, and modems. Try to test these to make sure not only that they function properly, but that they handle error conditions (such as disk full conditions, empty drives, and disk errors) properly.

The Windows 95 test team has written a number of automated tests to verify that Windows 95 is compatible and working properly with your hardware. These tests ship with the *Windows 95 Beta-1 Device Developer's Kit*, but are only partially complete with this beta release.

It's also key to test TSRs and real-mode device drivers. Also, if you are using the Windows 95 protected-mode drivers, check to ensure that these work properly with your system.

Windows 95's biggest performance improvements happen when your disk, SCSI, and CD-ROM drivers run in protected-mode instead of using MS-DOS device drivers or the real-mode BIOS. However, you need to run in real mode if you have unsupported hardware or have an unknown device driver for which Windows 95 cannot take over. The IOS.LOG file in your Windows directory indicates if you are using real mode for one or more drives.

Note

For this beta release, using unsupported real-mode devices will prevent Microsoft File and Print Services from running. See the *Release Notes* for more information.

Windows 95 will not route all INT 21h APIs through real mode so that TSRs that rely on seeing all file and disk activity may not work properly. Windows 95 includes the Windows 3.1 compatibility switch to force all I/O through the old real-mode code path, but this causes a

great impact on performance. Windows 95 tries to detect real-mode TSRs that are no longer necessary and remove them for better performance.

Network Testing

Most of your network testing should parallel your local tests. That is, application testing, printer testing, stress testing, and so on should all be performed both locally and over the network.

In addition, you should test network-specific functionality, such as the following:

- **Access to multiple servers.** If you have multiple network clients installed (for example, both the Microsoft Networking Client and the Microsoft Client for NetWare), make sure that you have full access to all servers you should be able to access and that they are properly displayed in the Windows 95 user interface. Perform tests such as copying files from one type of server (such as a Windows NT server) to another type of server (such as a Novell NetWare server). Make sure that the files are properly copied. Verify that the two files are identical after copying them.
- **Access to servers by multiple users.** Whether or not an application specifically supports use by more than one individual at a time, you should make sure that you can run applications from the network. If your application does specifically support concurrent use by multiple users, make sure that the application works properly, preferably as it is being accessed by the maximum number of concurrent users allowed. If the application allows multiple users to concurrently access the same file, make sure that all multiple-access functions work properly and do not result in data corruption.
- **Security.** If you installed user-level security, make sure that the permissions you grant to each user are properly granted by the system. Configure special permissions and make sure the permissions are properly maintained. For example, grant permissions at one level of a subdirectory and deny them at a different level. If possible, change the user authorization on the pass-through server and verify that the permissions are properly changed.

If you're using share-level security, make sure that all different methods of granting access rights such as Read-Only, Read-Write, and Custom work properly.
- **Microsoft Windows NT compatibility.** If you are using Windows 95 in a Windows NT network, make sure that all of the Windows NT-compatibility features such as logon scripts and logon validation work properly.
- **Novell NetWare compatibility.** If you are using Windows 95 in a Novell NetWare environment, make sure that all NetWare functionality works as expected. It's particularly important to make sure that all NetWare utilities and NetWare-specific applications work properly.
- **Stress testing.** Make sure you include stress testing for all configurations. You can do this by opening up two different MS-DOS boxes and running a looping batch file which

continually copies files between two different server at the same time or by having multiple clients access the same server at the same time.

- **Real-mode networks.** If you are using a Windows 3.1-compatible network, make sure that all Windows 3.1 functionality works as expected.

Application and Utility Testing

Application and utility testing helps to ensure that Windows 95 will work with all of your existing applications as well as, if not better than, they ran on Windows 3.1. Areas to consider in your testing are:

- **Long filename support.** Do long filenames work with your documents and applications?
Windows 95's file system has a feature called "tunneling" that will track operations on a short filename and keep the long filename associated with it even though applications may create a temporary file and rename during the save process. Make sure that applications that support long filenames as well as existing applications that do not both work properly with this feature enabled.
- **MS-DOS application support.** Start up your favorite MS-DOS program to make sure it works normally. Check the display, open a file, print the file, and save the file.
- **Games.** Can graphical MS-DOS applications and games run in an MS-DOS window?
Windows 95 includes lots of improvements to run graphic and timer-intensive MS-DOS applications. Many, many games are now supported in Windows 95 and some are supported even in MS-DOS windows. See? Testing can be fun!
- **TSRs and disk utilities.** Do your disk utilities work?
To protect Windows 95's file system from applications that are not aware of long filenames, last access date, creation date, and so on, Windows 95 will not allow any application to perform low-level writes to the disk until that application has called a new API to "lock" that disk. Application that do not take the lock will probably think that the disk is write-protected.
This issue affects defragmentation utilities, undelete utilities, virus-repair utilities, and disk maintenance utilities. For existing MS-DOS utilities, we have added the **lock** command that will lock a volume on behalf of an application. This allows utilities to run in single application MS-DOS mode. Windows 95 will not run existing Windows disk utilities without using this method. Make sure that you receive proper error messages for utilities that do not support the new API, and that utilities that support the new locking API work as expected.
- **Printing.** MS-DOS applications now run their print jobs through the Windows 95 spooler—Do MS-DOS applications print properly? Can you print from multiple MS-DOS sessions concurrently?

Windows 95's enhanced metafile spooling improves return time to an application by creating a metafile and spooling it to the printer in the background. Some applications have had problems with embedded bitmaps or encapsulated PostScript. Do Windows applications print properly? Do they print properly with EMF spooling enabled?

Also, make sure that Windows applications properly maintain print settings associated with a document.

The following checklist has been designed to aid you in your application testing of Windows 95. It should be used as a template in developing a suite of tests to ensure application compatibility.

DATE(S) TESTED: _____ MACHINE: _____

RATING SCALE:

- 5 Performs equal to or better than Windows 3.1 and is acceptable for mission critical applications.**
- 4 Performs comparable to Windows 3.1 and applications can be used normally.**
- 3 Requires manual changes to work properly. Some display or performance problems.**
- 2 Major performance or compatibility problems. Unacceptable for normal use.**
- 1 Cannot run or install on Windows 95. Hangs or GPF faults.**

1) APPLICATION INSTALL:

From Cabinet: _____
 From VM (EXE based): _____
 From VM (Start command): _____

* Over duration of testing, alter install scenario (i.e. drive installed to, full/partial install, et. al.)

2) APPLICATION USAGE:

A. DISK USAGE-

Loading files -
 Saving files -
 Deleting files -
 Appending files -
 View directories -
 Finding files on disk -
 Append data files -

B. DISK USAGE OVER NET:

Loading files -
 Saving files -
 Deleting files -
 Appending files -
 Viewing directories -
 Find files on disk -
 Appending data files -

3) MEMORY INTENSIVE TASKS:

Recalc Spreadsheet -
 Sorting a DB -
 Formatting a chart -
 Open maximum # files -

4) PRINTING TASKS (try to utilize sample docs):

LPT Port -
 Save screen/file -

5) ERROR CONDITIONS:

Access empty drive -
 Print to invalid port -
 Out of memory -
 Write to write-prot. disk -
 Read from unfrmt disk -
 Write to unformat disk -
 Save to invalid disk -
 Write to full disk -

6) CHICAGO/WIN SPECIFIC SHELL FUNCTIONS

Folder created for app -
 Icons created for app -
 Under what Folder was the sub-Folder (i.e. Program) created -
 Run app w/created icon -
 Create linked icon on Desktop and start applications -
 Run applications help -
 Try move/copy/shortcut of app-specific files -

7) APPLICATION SPECIFIC TESTING NOTES:

