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# Upgrading a CD-ROM Network for Multimedia Applications

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# Upgrading a CD-ROM Network for Multimedia Applications

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by
Margaret Sylvia

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*"The most important*

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Why should we worry about using multimedia applications on our library networks? Essentially because they're powerful, they're informative, and they're *here*. More and more serious CD-ROM applications, such as encyclopedias, are integrating multimedia into their design these days. Even over the Internet, simple text is no longer enough. Sound and video clips, real-time voice and video conferencing, and other multimedia applications are becoming more important and are commonly requested network applications. Here are some things to consider in upgrading a network to take advantage of all this multimedia.

First and most obvious, your library's workstations need to be able to run Windows, since most, though certainly not all, CD-ROM multimedia applications require Windows. Make sure that your workstations are at least 386/33 MHz machines with at least 4 MB of memory.

## Security Issues

Next, address security issues, because an unsecured network can cause you more problems than just about anything else. Running Windows on a network can present new security problems because it is much more difficult to prevent casual users from browsing and making configuration changes than in a typical DOS system.

In such situations, it is more important than ever that network-wide security be maintained at appropriate levels. Give network users only the minimum rights necessary to run the software.

Unfortunately software developers often do not understand the problems inherent in granting these rights to users on a network, and some applications require these rights in order to run properly. We've noticed this particularly with CD-ROMs that come from the federal government, although it occurs with commercial software as well.

Specifically, you can limit users' ability to tinker with your network's Windows configuration by editing the PROGMAN.INI file. Add the line [restrictions] to the end of the file if it is not already there and make the following additions as needed. (You only need to add one of the EditLevels in this restriction area, not all of them (Tweney, 1993).)

[restrictions]

NoRun=1 (no access to the RUN command)

NoFileMenu=1 (no access to the FILE menu)

NoSaveSettings=1 (prevents saving new settings)

EditLevel=1 (no creating, deleting, renaming Program Manager groups)

EditLevel=2 (no creating, deleting, renaming Program Manager groups and program items)

EditLevel=3 (no creating, deleting, renaming Program Manager groups and program items, and no changes can be made to an item's command line)

EditLevel=4 (prevents all changes to groups or program items)

NoClose=1 (prevents exiting Windows once it has been started)

To lock up Control Panel features, edit the CONTROL.INI file. At the end

of the file add [DON'T LOAD] on a new line, and below that type the name of each icon you want to disable followed by =0 (Grech, 1993).

If you only want to run one Windows program, you can edit the SYSTEM.INI file to change the SHELL=PROG-MAN.INI line. Changing the SHELL= to the executable application you want to run will start the application automatically when you start Windows, and exit Windows automatically when you exit the application. You can only load one shell statement in the SYSTEM.INI file, so this trick can be used only when you have a single Windows application you want to use it on.

However, you could make several copies of SYSTEM.INI using several different names (SYSTEM1.INI, SYS-TEM2.INI, etc.) and load a different Windows application in the shell statement for each. Then, using a batch file to copy the appropriate file to SYS-TEM.INI when the program is called, you could use this trick with more than one application.

If you have been running only DOS applications, you may need a different menuing system in order to help maintain security using Windows. We switched to Saber Lan Workplace in order to take advantage of its Windows menuing system, and we find that it is very helpful. The only problems we have are that the documentation, while extensive, is not very explanatory; it is difficult to get started since the system is so complex; and the reporting functions, while very detailed, don't include the summary reports that I find useful.

## Workstations and Multimedia Performance

The power of the workstation affects how well multimedia applications function. No matter how much extended memory a workstation carries, DOS applications are still constrained by the 640K conventional memory barrier. Loading network drivers, sound board drivers, and all the other things you need to make the workstation perform requires lots of conventional memory. Multimedia applications are notorious

for requiring high levels of free conventional memory at the workstation. We have teased out the necessary conventional RAM on our workstations thus far by using the DOS program MEMMAKER, but a commercial memory utilization program such as QEMM or 386Max may eventually become a necessity.

If you install sound boards in your PCs, you'll probably want to add headphones to reduce noise levels. Get good quality name-brand sound boards. There are too many software and hardware problems in running multimedia already without dealing with tiny incompatibilities in off-brand sound board software. PC Magazine recently recommended Turtle Beach Multi-Sound Monterey as an Editors' Choice, though this board does not offer Sound Blaster compatibility. Another Editors' Choice award went to Turtle Beach Tropez, which does offer Sound Blaster compatibility. PC Magazine honorable mentions went to the Antex Z1e, Creative Labs Sound Blaster AWE32 Value Edition, Creative Labs Sound Blaster 16 Value Edition, Reveal SoundFX, Reveal SoundFX Wave, Advanced Gravis UltraSound Max, and Mediatrix Audiotrix Pro (Quain, 1995).

If your budget absolutely precludes purchasing sound boards, there is a Windows sound driver available from Microsoft for the PC speaker. Depending on the quality of the speaker, the audio quality can range from very poor to acceptable. This can be obtained via ftp from FTP.MICROSOFT.COM using the filename SPEAK.EXE. However, this option is probably not an appropriate choice for PCs in a public area as headphones are not an option in this scenario. Also, it only works with some sound file varieties like WAV files.

Video at the workstation requires a VGA monitor using 256 colors to display most multimedia applications properly. Using the Windows default of 16 colors may result in grainy, oddly colored, or difficult-to-see video output. Be sure to install the software driver for 256 colors and get a high-quality video board with one MB of memory on it. PC Magazine recommends as Editors'

Choice the NEC Multisync 4FGe, the Nokia Multigraph 449E, the Optiquest 1500D, and the Sony CPD-1430 in the 14- and 15-inch monitor category (Crabb, 1994).

## Network Performance Bottlenecks—and Solutions

Network wiring can be the source of a performance bottleneck, although a number of different protocols hold the promise of improved network communication performance. Ethernet, Token Ring, and FDDI are the three most popular LAN configurations. None of these allows for the continuous streaming of data across the network that multimedia applications' video and audio require. They do suffice for simple sounds and still pictures, however, as these only require bursts, or "packets," of information.

A solution to this problem is Asynchronous Transfer Mode (ATM), which recognizes and provides for multimedia data streams. The fast Ethernet proposals (100BaseAnyLAN and 100Basejpg) also hold the promise of faster delivery pipelines. ISDN (Integrated Services Digital Network) was designed to integrate voice, video, and data services on a single network, and can generally accommodate multimedia applications. Of course, cost can be a problem in implementing any of these options, because you generally have to rewire the entire network all at once in order to take advantage of them.

FDDI II is another wiring option that operates in a similar manner to isoENET, but FDDI II is not directly compatible with existing FDDI I products. This makes it expensive to switch, since, once again, the entire network must be rewired.

Isochronous Ethernet or isoENET recognizes the differences between data and video communications and combines isochronous and packet traffic on the network. It creates connections for open bit pipes between computers and can offer response times and throughput rates similar to those of conventional telephone systems. Isochronous Ethernet can be introduced using con-

ventional 10BaseT wiring with the addition of special isoENET hubs and boards. Because these may be added only when and where needed, *without* a complete overhaul of the network, isoENET can be more economical to implement while also providing for multimedia traffic on the network (Biery, 1994).

## Server Performance Bottlenecks

The network server can also cause performance bottlenecks. A PC-class server should be at least a 486/50 or 486/66 EISA (Extended Industry Standard Architecture) with fast SCSI-2 hard drives. This type of file server can sustain a 20 to 30 MB/sec data transfer rate that should generally be sufficient for multimedia capabilities. The most recent *PC Magazine* Editors' Choice for file servers is the Compaq ProSignia 500 Model5/90-2100. This machine is built around a 90 MHz Pentium processor. An honorable mention was given to the IBM PC Server 300 (Boyle, 219). Either of these would deliver far more than the minimum amount of power needed for multimedia (Boyle, 1995).

## CD-ROM Drives

A performance bottleneck can also exist at the level of the networked CD-ROM drive. Even a quadruple-speed drive can show performance problems when many different simultaneous multimedia requests are made for the same product. If this occurs, consider downloading the data to a hard disk if the CD-ROM publisher permits. Another possibility for increasing performance is to limit the number of simultaneous users of multimedia CD-ROMs. *PC Magazine* recently recommended the Toshiba XM-3501 as its Editors' Choice for the quadruple-speed CD-ROM drives, with honorable mentions going to the NEC MultiSpin 4Xi and the Pioneer DRM-604X. For double-speed drives, the Editors' Choice went to the Sony CDU-55S and the Philips CDD300 with the Panasonic LK-MC579BP getting an honorable mention (Needleman, 1995).

## Internet Connection

If users are to have access to multimedia via the Internet, the speed of the Internet connection is crucial. For a direct connection, get the fastest one you can possibly afford. (It will soon seem much too slow!) If dial-in access is in use with a SLIP connection, 9600 baud is the absolute minimum.

If you are connecting your network to the Internet with a dedicated line, costs start at about $130 per month for a 14.4 kpbs connection and go up rapidly for faster connections. Heavy use of the Internet by others all over the world can slow down even the fastest interconnections. So even though all the network bottlenecks at your site have been attended to, be prepared for the Internet to be slow at busy times of the day (Abernathy, 1995).

## Summary

The most important thing you can do to ease the transition to multimedia is to begin checking your network now for performance bottlenecks. Check your workstations to be sure they are able to handle the load. They should be Windows-ready even if you are not yet running Windows. Check your workstation security so that users are not reconfiguring the workstations and the whole network for you with Windows. Examine your workstation memory since you may need to add a commercial memory manager if you are not already using one. Use good quality name-brand sound and video cards to help alleviate small incompatibilities that could make you tear your hair out.

Check your network security to be sure users have access to what they need, but not excessive rights that could cause network problems. You may need to purchase a new menuing system if your current one is not compatible with Windows. Examine your wiring and connections to be sure that they can carry the load that multimedia will place on them. Upgrade your server if necessary so that it can handle the extra work. And last but not least, be aware that multimedia CD-ROMs may not work well when they are placed in a network environment with many simultaneous users. Limiting the number of simultaneous users or downloading the data to a hard disk may help. ▲

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