Why Buy A Network Computer Today

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Introduction

The first automobiles were expensive and often required a chauffeur to drive and maintain them. A car was a wonderful new way to travel for those that could afford one. Henry Ford changed history by producing cars that were affordable and useable by the masses. Today, the PC industry is going through a similar transformation.

The PC is one of mankind's most important inventions. At the moment, however, the real cost of using one in a business (including the cost of the technical "chauffeurs") is about the same as owning a luxury sedan. The largest part of this cost is not hardware or software but represents the value of the time needed to understand, set up, maintain, and support the PCs.

The scope of the problem is huge. There are currently well over 100 million full-function PCs being used in business around the world. Numerous studies have concluded that each one costs around $10,000 per year to buy and use. If these assumptions are correct, well over one trillion dollars per year is being spent on business use of PCs. This represents an amount larger than the total economic activity in all but a few nations.

The opportunity to save hundreds of billions of dollars per year in wasted human effort is naturally attracting a great deal of attention. More than money is at stake. There are not enough trained computer professionals available to provide adequate support for the growing number of PCs being installed.

Businesses don't want PCs themselves. They are bought to improve employee productivity, lower costs, communicate more efficiently with customers and suppliers, and improve business intelligence. If something other than a traditional PC can deliver these benefits at a lower cost, then organizations will flock to it. The alternative that is getting the most attention at the moment is the network computer or NC.

The movement to develop network computers is not being led by a single person or vendor. A loose coalition that includes Oracle, Sun Microsystems, IBM, Netscape, and Apple has created a set of basic specifications called the Network Computer Reference Standard. These and many other vendors have begun to offer hardware and software products that make the NC concept real.

At first, Microsoft resisted the idea of network computers. They still don't like the name or the NC Reference Standard but have reacted by supporting three new types of computers. Windows Terminals, NetPC, and even WebTV each attempt to solve some of the same problems addressed by network computers. Semantics aside, Microsoft has become serious about developing simpler computers that reduce PC cost and complexity.

This report provides a summary of what is happening with network computers. It will use non-technical language to help information technology decision-makers determine what to do about them. *Why Buy A Network Computer Today* is therefore a progress report on efforts across the industry to reduce PC costs by taking full advantage of network technology.

The subject of how to control PC costs is complex, rapidly changing, and of widespread interest. D.H. Andrews Group will therefore be covering this subject in a series of reports. The next report in the series is planned for availability early in 1998.

Why Buy a Network Computer Today

It is common in office buildings to see a small crowd surrounding a PC and its frustrated owner. A few people are usually huddled around the screen while others rubberneck as they pass the scene of the accident. The crowd usually breaks up when an expert from technical support arrives to fix the problem and undo the additional damage caused by those who offered first aid.

Within most organizations today, a great deal of time is wasted dealing with PC software. This includes installation, training, upgrades, backup, recovery, problem resolution, and just getting the darn thing to do what it is supposed to do. Help desks, computer-based training, and resident experts can reduce the problem to a manageable level, but it is still all too common for PC users to spend a number of hours each month in PC hell.

The high cost of ownership of PCs results from the need to maintain a complex body of system software, applications, and data on each one of them. Over time, this body of software tends to become different as users add applications and otherwise customize the PCs to meet their particular needs. Attempts within organizations to impose standards rarely succeed in eliminating the resulting high degree of complexity or support costs.

Evolution of the NC Concept

The birthday of the NC was September 4, 1995 at a technology forum in Paris when Larry Ellison, Oracle's CEO, declared that "the PC is a ridiculous device; the idea is so complicated and expensive." Bill Gates, who was also there, chose to disagree. Since then, Microsoft has conceded that networked PCs cost a great deal to manage.

The inspiration for Ellison was the growing excitement over the Internet, web computing, and Sun's announcement that Java was coming. Ellison's crystal ball offered a view of the future that has since become quite popular. His vision was:

- The Internet would provide a way to connect all computers into a single unified network.

- Bandwidth would increase as would network reliability.
- Java would make it possible to send applications and data to any type of computer on the network as needed.

As all this occurs, a new mode of computing will become possible. The role of devices at the end of the wire will change. The interface to the network will no longer need to be a self-sufficient computer full of applications and data. An increasing percentage of processing and data storage will move into the network. Costs will drop as complexity and administrative overhead decrease. In this view of computing, the interface device becomes a doorway into the network rather than a window from which to view applications running locally.

Ellison's ideas were quickly echoed by others. Not surprisingly, Sun Microsystems liked a concept that revolved around Java and confirmed the Sun mantra that "the network is the computer." Sun CEO Scott McNealy became one of the most passionate advocates of the new concept of network computing and a vocal critic of what he viewed as efforts by Microsoft to keep the future from happening.

Many PC vendors initially viewed network computers as a threat. IBM did not. Lou Gerstner used his keynote speech at the November 1995 Comdex meeting to make it very clear that IBM planned to be a leader in network computing. Behind the scenes, IBM helped organize the creation of the Network Computer Reference Standard early in 1996.

Netscape has also helped refine the vision of network computing. As acknowledged leaders in turning the Internet and its web into a tool for business, Netscape's support meant a great deal.

Most importantly, the concept of network computing has been embraced by a large number of technology buyers. It offers a solution to the most compelling problem in the industry—the cost, time, and effort needed to use PCs as business tools—a problem that is getting worse as time passes.

A Vision of the Future

Network computer advocates dream of a new era in computing. They envision an inexpensive device that takes up little room, provides the applications each user wants, and performs so rapidly that it appears as if everything is happening locally. The network computer will also be easy to sign on to, offer an attractive and unobtrusive interface, and allow users to customize its appearance to their unique needs. Reliability will be so high that concerns about outages will disappear.

The ideal NC will be able to quickly adapt to the unique preferences of each user. Travelers might draw a laptop from a pool and have it rapidly customized for their unique needs. As time passes, industry-standard NCs may become available in remote locations, such as hotels and airports, so that there will be less need to carry a heavy portable computer around.

The new world of the NC will provide storage drives (diskettes, CD, DVD), printers, and

scanners in convenient locations where they can be shared. New software releases will be made available rapidly without user effort. When appropriate, some users will continue using an older version. All software in an organization will be compatible so that any device can view and use data, documents, or applications that originated anywhere else. Making additional applications available or offering new versions will no longer force major upgrades in hardware.

Technical support will be readily available, but much less necessary. Users will no longer be concerned about things such as: what is on my local disk, how full is it, why is my machine suddenly running slowly, when will I need more capacity. Someone out of sight will quietly be managing the computing capability being delivered by the network.

This powerful vision has captured the imagination of the market even though it will be some time before all of its elements are practical. As a result, a race has begun to find ways to make as much of the vision real as soon as possible.

What Is a Network Computer?

For years there were only two ways to provide computer applications directly to workers: fixed function “dumb” terminals or full-fledged computers, most often in the form of a PC running Windows. Terminals are cheap but can’t do much. PCs can do a great deal but are often not affordable.

Network computers fill in the large gap between terminals and PCs. NCs are like terminals in the sense that permanent storage for data and applications take place on servers. Without servers and a network connection, NC devices can do very little. On the other hand, NCs are built around microprocessors capable of running applications locally. They can thus provide the graphical interfaces that most users prefer.

The Network Computer Reference Standard provides a useful definition of what a NC must include. The definition intentionally leaves a great deal of room for many different variations on the theme. The common elements include:

- A microprocessor and memory sufficient to run sophisticated applications.
- Connections for a monitor, keyboard, and mouse.
- A network interface that supports the TCP/IP protocol.
- Web browsing software.
- The ability to run applications written in Java.

A great deal of debate has centered over whether or not disks should be included. Most early NC vendors have not included them as a cost-saving measure. Conceptually, a network computer could include disk drives since the goal is to reduce complexity rather than to standardize on a single hardware design.

NCs lower the cost of ownership and provide other advantages versus PCs in many ways:

- Hardware is less costly to buy and maintain.
- Applications and data are sent to the NC only when needed.

- On-board software is much simpler than complex PC operating systems.
- Expanding the number of applications available does not force an upgrade.
- Product life tends to be much longer.
- Reliability is greater since there are no moving parts and much simpler software.
- Much less effort is needed to manage the inventory of software.
- Software upgrades and fixes are very simple to accomplish.
- Standards can more easily be enforced.
- Each person still has a personalized desktop. A unique environment can be established on any NC to which the user has access.
- Most NCs can also act as terminals; some will even be able to reuse terminal cables.

The original NC concept centered around the web model of computing. A standard browser capable of executing applications written in Java would sit over a basic operating system kernel and get all the logic and data needed through the network. This model works well for running any applications capable of interfacing with web browsers or that have been created using Java. It does not, however, provide a way to run applications written for Windows

Java

The Java programming language will be two years old in January of 1998. While obviously highly precocious, Java is still a toddler in the world of application development. No new programming language has ever caught on quite as fast. More than 500,000 programmers now spend most of their time developing code in Java. A large number of high visibility Java projects are underway.

Corel attempted without success to convert their office suite, including WordPerfect, to Java. Based on their experience, it will be necessary in most cases to completely redesign existing applications for Java.

In November 1997, Lotus announced e-Suite, a group of nine Java-based personal productivity applications. e-Suite components include word processing, a spreadsheet, e-mail, a browser, and an address book. Each is a 100% Pure Java Bean, meaning that it is a component that can be integrated with any other Java applications and that it will run on any device that includes a Java Virtual Machine. e-Suite is a completely new product and does not replace Lotus SmartSuite, in spite of the name similarity.

e-Suite is built around a proposed new standard user interface for network computers. Netscape, Oracle, Sun, AOL, Intel, and a number of other industry leaders have endorsed this interface and are planning products around it. The appearance of e-Suite and its broad industry support are evidence that it is practical to develop applications in Java.

The Multi-User Windows Issue

Network computers will have a limited appeal unless they can support popular applications such

as Word, Excel, SmartSuite, Notes, PageMaker, or PowerPoint. None of these applications has yet been converted to Java, and it is unlikely that any will be soon.

Fortunately, there is a proven approach to running Windows applications on NCs that does not rely on Java. It is based on middleware called WinFrame that was developed by Citrix. WinFrame makes it possible to run Windows applications on a server. As many as 200 intelligent devices can then run these server-based applications at the same time. The intelligent devices can be network computers, PCs, NetPCs, or Windows Terminals.

During 1997 Citrix WinFrame is only available on servers running NT Server 3.0. Microsoft and Citrix have agreed that during 1998 a new version of WinFrame will be integrated into NT Server 4.0. The Microsoft code name for this project is *Hydra*. Details are not yet available as to how Hydra will differ from WinFrame.

Network Computing Devices Corporation (NCD) has become a leader in building products around WinFrame. Its WinCenterPro software uses WinFrame to deliver Windows applications to NCs. NCD sells its own line of network computers, called Explora.

Using a NT server with WinFrame to provide Windows applications to network computers is a workable, if imperfect, solution. Performance tends to be surprisingly good, impact on LAN traffic modest, and overall cost very affordable. The current disadvantages are the inability to use NT 4.0 and the effort needed to set up and tune the configuration.

Network Computer Limitations and Problems Today

Network computers are not yet the answer to all aspects of the PC cost dilemma. Some of the current NC limitations include:

- Mobile devices, such as laptops, cannot yet be network computers.
- If the network fails, network computers stop functioning.
- Java is still immature.
- Windows applications require a fairly powerful server running NT Server 3.0.
- Establishing a NC network with WinFrame can be complicated.
- NC browsers do not support many popular plug-ins.
- Certain compute-intensive applications will not perform as well on a NC as on a PC.
- NCs do not have diskette or CD drives.

Microsoft and Network Computers

There is little debate that a new class of devices is needed to fill the large gap between terminals and PCs. The need to reduce the cost of owning PCs is also widely accepted. A holy war is, however, raging over exactly how these goals should be met. Not surprisingly, Microsoft is at the center of the controversy.

When the NC concept was first articulated, Microsoft reacted negatively. Part of the reason was

that many early NC advocates gleefully speculated that NCs would reduce the importance of Microsoft operating systems. It was natural for Microsoft to defend its territory.

As time has passed, it has become clear that PC cost of ownership is a serious problem for Microsoft customers. This high cost of PC ownership hurts Microsoft as well. Numerous studies have concluded that the annual cost of each PC is around $10,000. Of that amount, less than five percent is spent on Microsoft's products. The large amount spent on salaries for support technicians and on wasted effort by users benefits no one.

The challenge for Microsoft has been to find a way to reduce PC ownership costs while still protecting its business model. The cost of Microsoft products is currently low because they tend to be installed on hundreds of millions of computers. Traditional PC computing also encourages users to upgrade Microsoft software on a regular basis. The NC approach will do two things: reduce the number of copies needed by putting most software on servers and reduce the need to upgrade the desktop device so frequently.

In July, Microsoft President Steve Ballimer was quoted in the New York Times as saying, "If the network computers catch fire at all, they have the possibility of really retarding the growth of personal computers, and that's really scary for us."

The Microsoft strategy that has emerged revolves around two new hardware options and a series of enhancements to NT Server called Zero Administration Windows or ZAW. Together these initiatives hold out the hope of lowering costs while still requiring a Microsoft operating system within each device.

At the moment, Zero Administration Windows is more of a set of goals than a useable product. It will mature into a set of system management enhancements to NT Server that will reduce the effort required to load and support Windows applications within a network. ZAW is scheduled to become a part of NT Server 4.0 late in 1998.

Microsoft and Intel have developed an alternative that is more like a traditional PC than a network computer. It is called the NetPC and is a full-function PC with a Windows operating system that does not offer a diskette or CD drive. The goal is to reduce PC ownership costs by making it impossible for local users to change their software without going through a network administrator.

The NetPC includes a disk while other NC devices don't. The issue is not the cost of the disk, but the need to manage a complex body of software and data on each local device. The high cost of PC computing comes largely from the practical problems associated with managing distributed data and software. Microsoft's approach is to leave the software and data on the NetPC and use ZAW software on the server to manage it automatically.

The newest Microsoft hardware option, Windows Terminal, seems to be a tacit admission that there is something to the NC concept. When available sometime in 1998, Windows Terminals will be intelligent devices that use the planned Hydra feature in NT Server 4.0 to run server-based Windows applications. Windows CE will be the low-function, on-board operating system. It is

not yet clear what, if any, Java capability Windows Terminals will offer.

Microsoft now owns WebTV which could be considered a variation on the NC theme. WebTV is a set-top microprocessor that gives consumers the ability to access the Internet using their television as a monitor. At the moment, WebTV is targeted solely at consumers and is not part of the campaign to reduce the cost of using PCs within organizations.

The Dream Inspired by Java

The catalyst for much of the interest in network computers was Java. Sun Microsystems announced plans for Java in 1995, just as the industry was discovering the potential of the Internet and web computing. Java advocates painted a picture of a wonderful new computing era.

With Java, applications can be written once and run on many types of hardware. Java brought life to the Web by making it possible to imbed program logic within web pages. It also held out the hope of making object-oriented programming more practical and thereby dramatically increasing the productivity of software developers.

Industry futurists have painted a compelling picture of a new world that Java will help create. Low cost, powerful microprocessors will allow intelligence to be imbedded in an endless number of places. The Internet and Web will provide a way to interconnect all these microprocessors. Network bandwidth will increase and cost will drop. Java will then lead to a mode of computing where applications and data can be stored within the network and sent only when needed to end-user devices.

This line of thinking leads to the conclusion that only a fraction of the devices in the network will need to be PCs. The rest can be simple devices built around a processor, network connection, and display. Further reflection leads to the conclusion that such devices will be much simpler to manage and therefore cost much less to own than PCs.

A Funny Thing Happened on the Way to the Network Computer…

In less than two years on the market, Java has made remarkable progress. Java is still, however, more of a concept than something ready for widespread use today. It will take time before a critical mass of Java-based applications become available.

The key question for the NC in the near term is thus: What can be done before the Java applications arrive? It is possible to create a NC without Java applications. Such a NC would use its microprocessor to provide a graphical interface for applications running on a server. This is a workable idea but not a new one. Unix X-window terminals have been doing the same thing for years.

Many critics have pointed out that until Java matures, NCs are just a new type of X-window terminal. The observation is correct, but the implication that failure will follow is not. The limited

popularity of Unix X-windows caused vendors to give up on the idea. The network computer has inspired them to rethink the X concept and incorporate the latest microprocessors, bandwidth, browsers, and standards. This time success seems likely.

Packaged Java applications are just beginning to reach the market. Lotus e-Suite is only the first of many. NC hardware bought today to be used at first in X-terminal mode will become more useful as these Java applications arrive.

Where NCs Fit Best

Even the most optimistic advocates concede that NCs are well suited for certain functions and not others. Some of the best opportunities for NCs are in the following areas:

- *Terminal replacements.* There are over 30 million dumb terminals in use today and all will eventually be replaced. NCs represent a large step up at a modest cost.
- *Web applications.* When the main use involves accessing web sites or applications designed to interface with a browser, then NCs become a viable option.
- *Many workers performing the same function.* Examples include airline ticket counter agents, telemarketing, classrooms, bank branch employees, and point-of-sale devices.
- *Java applications.* When Java applications are available or are being developed, then NCs become an attractive alternative to PCs.
- *Cost sensitivity.* The high cost of PCs make it economically inadvisable in certain situations to provide intelligent devices. The lower cost of NCs expands the universe of what is possible.

Where NCs Are Not a Good Fit

There are certain situations where NCs are not likely to be the right answer including:

- *Mobile computing.* Laptop and other mobile computing devices cannot be NCs.
- *Power users*. Individuals who spend a high percentage of their day working on a PC using processor-intensive applications may not be good candidates for NCs.
- *Programmers.* In most cases, people who write applications will prefer to have a dedicated PC or Unix workstation.
- *Windows productivity applications only.* The case for NCs is less compelling if all the work being done is Windows personal productivity applications.
- *Limited bandwidth to a remote server.* If there is no local server and bandwidth to remote servers is narrow, then performance may not be acceptable with NCs.
- *CD or diskette drive.* Some users may need a CD or diskette drive at their desks.

Summary

The debate over network computers has already succeeded in focusing attention on the issue of PC cost of ownership. Network computers hold out the hope of reducing that cost significantly. They are not going to go away unless alternatives that achieve the same result appear.

Microsoft's combination of Zero Administration Windows, NetPCs, and Windows Terminals appear to be a step in the right direction. It will be a year or more before it is clear how much of the PC cost problem these products address. There is little chance that these alternatives alone will satisfy the diverse needs of a very large and complex market.

To any organization with more than a handful of PCs or terminals, the network computer is an alternative worth exploring. The simplest way to do so is to get a few and start a pilot project. The downside of doing so is low since the out-of-pocket cost may only be a few thousand dollars.

The introduction of the Model T Ford did not eliminate demand for more expensive automobiles. In a similar way, the emergence of network computers will not eliminate the market for PCs. The role of the NC is more to complement than to replace.

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