

# Casting the Net:

## The Market for Network Connection Devices

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### A New Market

*The dramatic growth of the Internet is creating a new market for network connection devices (NCDs) – distinct from the personal computer market.*

NCDs are designed specifically to access the Internet and its corporate sister the Intranet, which are replacing the desktop as the driving force for IT growth worldwide. An entire cast of NCD variants are being produced by manufacturers, based on three existing devices: the PC, the TV and the telephone.

*A new battle is raging to define the dominant technology set for NCDs, which as convergence begins to bite will increasingly set the development agenda in telecomms and media as well as IT. The Intel/Microsoft alliance which has captured the PC world will not necessarily win: there are other solutions, including the ARM architecture originating in Cambridge and promoted by Digital. This is now the world leader in design wins for NCDs of all types.*

Technology suppliers face a critical choice: whether to follow the well established route of developing ever-increasing power for the corporate desktop, or to aim for the lower price points and mass volumes of the emerging NCD market. It is difficult to define a marketing approach that will cover both.

*The current turmoil is shaping a new generation of NCD devices, which will be outselling PCs by early in the next century. It is defining new price points, new industry structures and new value chains, on a worldwide basis.*

### Access for All

This signals an upheaval in the information industry that can be compared with the birth of the PC in the early 80s. The PC was based on a simple core idea: ‘a computer on a desk’. The NCD is based on an equally simple idea: making the digital networks of the world accessible to all, including all the facilities of existing PCs, mainframes, databases, information banks, entertainment and telecommunication networks.

If it succeeds, it will have an even larger effect than the PC on all sectors of industry, and on society as a whole.

This summary report outlines the emerging NCD market, and the new industry which is developing to support it.

## The growth of the Internet

The Internet has grown, and continues to grow, faster than any technical development in history.

Figures for products, services and Internet usage frequently show an exponential growth pattern (Figure1). Growth rates do not slow, but remain constant or even *increase* as the market expands, in a self-reinforcing cycle. As initial markets saturate, new ones are being found. This growth pattern appears to be consistent across different cultures, economies and political systems, once initial barriers to market development have been overcome.

- ◆ In both Russia and New Zealand, Internet growth is 100% per annum.
- ◆ Internet usage in Japan grew by 60% between March and September 1997.
- ◆ In South Africa, usage is growing by 10% per month.
- ◆ In Latin America, online use grew by nearly 800% between 1995 and 1997.
- ◆ In the UK, home use more than doubled during 1996, to over a million surfers.
- ◆ Veronis Suhler predicts 46% of US households will be online by 2000.
- ◆ IDC estimates primary spend on Internet/ Intranet products and services will grow from about \$18.5 billion in 1996 to \$92.4 billion in 2000 (a 500% expansion)

### Table 1: Internet growth worldwide

The basic uses of the Internet, such as electronic mail and the World Wide Web, can be applied, like the telephone, to the full range of human activities, social and recreational as well as commercial and academic. In recognition of this the demographics of Internet use are changing, from researchers, corporate

executives and 'computer nerds' to a pattern closer to the population as a whole. 35% of all Internet surfers in the UK and in Sweden are now female. In the US, 45% of users are now over 40. Use by children has increased by more than 400% since 1995.

Data: Veronis Suhler & Associates

## The emergence of the Intranet

The growth of the worldwide Internet has sparked a minor revolution in corporate IT. In many organisations, internal networks based on proprietary standards are being replaced or superseded by solutions based on Internet technologies and standards.

*Intranets* offer all the facilities of existing networks, together with the information and communication features of the Internet. Intranets can be completely self-contained, or can be connected – with appropriate security filters – to the worldwide Internet. Early adopters report remarkable results, including 1,000%+ returns on investment and payback periods of six to twelve weeks.

Global economies of scale mean that Intranet technology is cheaper than proprietary alternatives. Maintenance and development is also easier, since Internet skills – from basic programming to multimedia authoring – are becoming widespread. These facts are beginning to tell on corporate users concerned with total cost of ownership, despite a continuing hard sell by suppliers of proprietary systems.

**We conclude, in company with IDC and others, that the Internet and Intranets have become the primary engine for IT growth worldwide.**

We predict that the same technology will set development agendas in telecommunications and media too, as digital technology becomes universal.

### **A new cast of characters**

The Net grew by connecting together personal computers designed for desk-top processing – adding new applications such as Web browsers and email readers to the established set of desktop programs.

Now, demand is growing for devices designed specifically for Net connection, which are lower cost, simpler and easier to use. The immense gravitational attraction of the Internet is creating new devices drawn from three different industries: computing, media and telecommunications (Figure 2). Net devices offer new facilities, and in the long term promise dramatic improvements in total cost of use, accessibility and manageability.

Digital networks based on proprietary technology have already delivered major cost savings, performance improvements and new facilities through applications within the telecommunications and media industries, and in corporate IT. NCDs – Network Connection Devices – promise to deliver these benefits direct to end users, using the open network standards of the Internet.

#### ***The network computer: the corporate NCD***

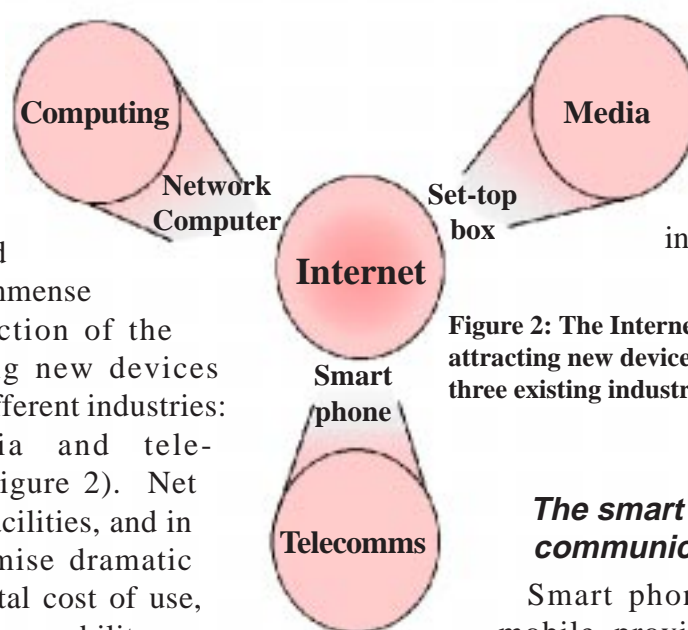
The network computer – promoted by Oracle, Sun, IBM, Acorn and others – is a lower cost

version of the PC, designed for network access rather than standalone computing. Corporations such as Southwestern Bell and Sears Roebuck are deploying tens of thousands of network computers to reduce cost, simplify training and improve manageability. Federal Express plans to save \$250 million a year by installing 50,000 network computers to replace thousands of 3270 terminals and PCs.

#### ***The set-top box: the media NCD***

Companies such as RCA, Zenith, Curtis Mathes, NetChannel and Web TV (now owned by Microsoft) are introducing devices which marry the mass market appeal of television with the new digital facilities of the Internet.

Coinciding with the world-wide launch of digital television and the emergence of new entertainment and information services, we expect this market to grow substantially over the next decade.



**Figure 2: The Internet is attracting new devices from three existing industries**

#### ***The smart phone: the communicating NCD***

Smart phones, both fixed and mobile, provide Internet access as well as voice telephony. Nokia's innovative *Communicator* combines a portable phone with a fold-out keyboard and screen for Net access. But the Internet is impacting the telephone industry in another way. 'Internet telephony' uses the digital infrastructure of the Internet to provide global voice communications, and even videoconferencing, for the price of a local Internet connection. Already available on the desktop, through NCDs these facilities will reach a much wider audience, bypassing conventional telecommunications operators. Still embryonic, this market has huge growth potential.

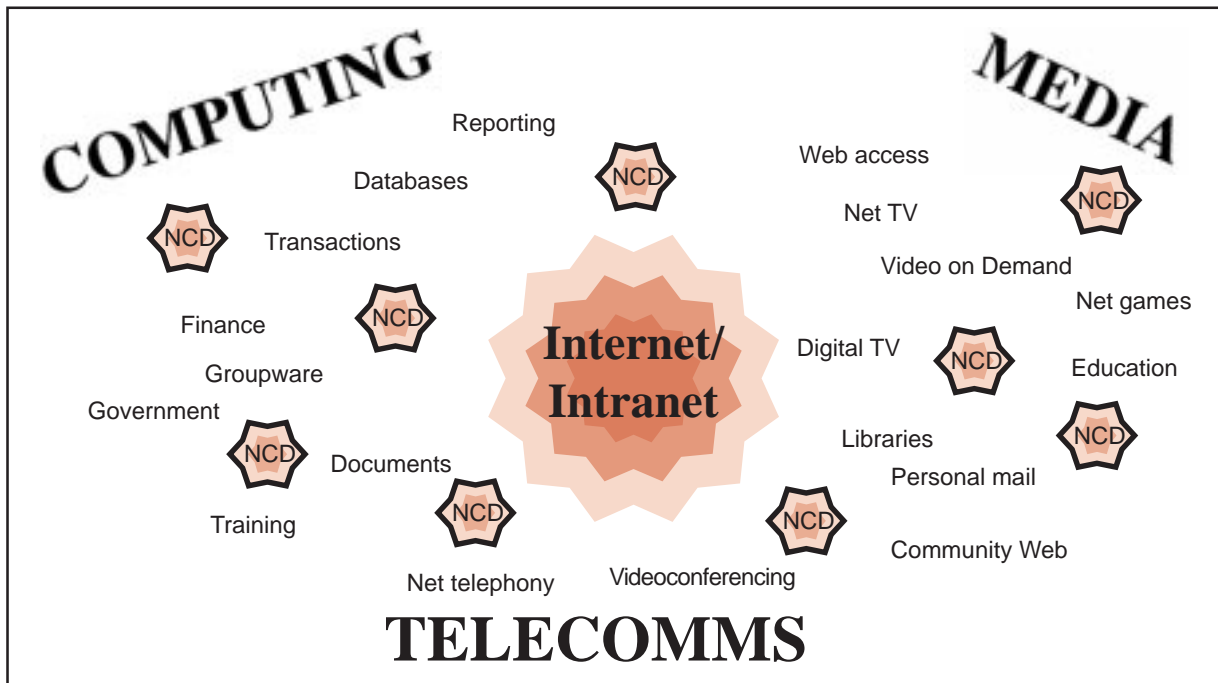


Figure 3: A new cast of NCDs will claim bit parts and starring roles in the expanding information universe.

### ***NCDs for all seasons***

In the longer term, we expect to see a much wider range of new product variants orbiting the new sun of the Net (Figure 3). These will combine many of the features of today's products, while offering a common set of digital facilities which will become as familiar to the global population as the operation of the telephone or the TV remote control.

Drawing on information from a range of sources, we expect the supply of NCDs – of all types – to overtake PCs early in the next century.

### **Technology for NCDs**

The technology of the personal computer was defined more than a decade ago, to meet the needs of the corporate desktop. Pricing levels and basic facilities have changed relatively little, although digital technology has improved perhaps a hundredfold. Suppliers have used this improvement to add and change features, but not to reduce prices or provide fundamentally new applications.

NCDs define a different set of requirements, creating demand for a new technology.

### ***Low cost***

The new global markets of the Internet demand much lower cost. The highest growth markets and the most profitable opportunities for Internet services are in non-US and non-corporate sectors. There is a strong commercial incentive to develop technology at the lowest possible cost, minimising barriers to access.

### ***Connectivity***

Connectivity was added to the original design of the personal computer, as a secondary requirement. It is a core function of the NCD. Designing for connectivity allows simplification – for example the sharing of facilities on a network which previously had to be built into each PC.

### ***Simplicity***

Simplicity of operation was not a high priority for the original personal computer. Much of the PC industry is built on selling the proposition that additional complexity delivers value, and many people and organisations make a living from interpreting that complexity. The Internet industry benefits from making access and basic facilities as simple as possible. These are conflicting goals.

## **A New Technology Set**

The new and different requirements of NCDs are leading to new developments at every level: chips, operating systems, user interfaces and services. The PC industry follows a long-established pattern of year-by-year increases in power and complexity. NCDs, by contrast, demand the *minimum* power and complexity needed to give network access.

NCDs require low cost, low power processors; modular OSs with minimum memory requirements; configurable user interfaces that need no manual; and low cost services accessible to all. These are becoming available from a new range of suppliers, including those listed below.

## **A growth industry**

The key suppliers in the PC market are familiar. The emerging NCD market is creating a new industry, with opportunities for new entrants, and new initiatives from established organisations.

### **Acorn**

Cambridge-based Acorn was chosen by Oracle to develop the original reference design for the Network. For the past decade, Acorn has designed and supplied a range of low cost desktop computers, based on the ARM processor, to the UK education market – creating a technology set which is a good match for NCD requirements. It has transformed itself into a global supplier of technology, with design wins from RCA, Zenith, Curtis Mathes, Casio, Samsung, Funai, NetProducts and NTT, among others. It is well placed to become a key global player, if it can develop its own marketing presence and emerge from the shadow of Oracle.

### **ARM**

ARM has developed a global business from supplying RISC processor designs into applications ranging from mobile phones and telecomms devices to NCs and desktop computers. Small, low cost and power efficient, the ARM design, now backed by Digital, is an ideal solution for many types of NCDs – especially outside the corporate market, where

the marketing force of ‘Intel inside’ is less crushing.

### **Citrix**

Citrix owns a key piece of technology, which allows Microsoft Windows and other corporate applications to be run by NCDs from a server, over a corporate network or even a 28.8kb/s modem link. Drawing on a mainframe heritage (the company was founded by ex-IBMers), Citrix’s technology offers a key bridge from the PC to the network world. Its importance is underlined by Microsoft’s acquisition of a minority stake, and the cross-licensing of Citrix technology for use in future Microsoft products.

### **IBM**

IBM is hedging its bets, offering both PC and NC solutions to its clients. But its presence in the market gives credibility to the NCD approach, and it is one of the most active deployers of NCDs in the corporate sector. The hosts of ageing 3270 terminals in existing applications convert naturally to an NCD approach, and major companies are now following this route.

### **Microsoft**

Microsoft has built its business on being gatekeeper to the desktop PC. It has no interest in changing the world too quickly, and its NetPC is widely interpreted as a defensive move rather than an enthusiastic endorsement of the NCD approach. But even big M cannot buck the trend forever. Microsoft’s software runs perfectly well in an NCD environment, as Citrix’s technology shows. Microsoft’s initiatives in the new network world include its acquisition of Web TV, its stake in Citrix and its joint venture with NBC.

### **NetChannel**

Established in both the US and the UK, NetChannel, like Web TV, is promoting Internet access into the home, through the TV set. NetChannel is pioneering a new approach and a new market (many of its customers are female), and is working with both media organisations and existing Web providers to create and adapt

material for the TV, not the PC screen. Still embryonic, this is a key growth area.

### **Netscape**

Netscape defined what the browser should look like and is still setting trends in Internet and Intranet applications, despite Microsoft's vigorous attempts at catch-up. The browser, not the desktop, is becoming the model for the majority of NCD interfaces. Netscape was one of the first companies to be created by the Net: its astonishing growth from nowhere followed the familiar Internet pattern. Netscape's heart is the Net, not the PC, although its software is designed for the personal computer platform. Netscape has placed its non-PC eggs in Oracle's NCI basket.

### **Oracle / NCI**

Oracle's Larry Ellison was the prime mover behind the launch of the NC, deliberately targeting Bill Gates, and Microsoft's stranglehold on the corporate desktop. Oracle's interest is in corporate databases; anything that makes access easier and cheaper is good. Oracle therefore funded Acorn to develop the reference design for the network computer, to encourage the development of lower cost devices, and has since promoted an Intel-based design. Oracle's NC interests were transferred to its subsidiary NCI (Network Computer Incorporated), which merged in 1997 with Netscape's subsidiary Navio. NCI is developing and promoting practical solutions based on the network computer concept. Larry Ellison retains a personal interest in the ideas behind the network computer, and their application to education and other sectors.

### **Sun / Diba**

Sun supplies Unix-based networks and servers, originally developed in the academic world and now applied successfully in business. Sun has been active in the development of the Net, and the shift to a Net-centric view (slogan: 'the network is the computer'). Sun originally developed the Java programming language for embedded consumer applications – microwave ovens and washing machines – then realised it was ideal for distributing device-independent software over the Net. Aided by Sun's publicity,

many see Java and NCs as synonymous. In reality there are many NCDs which do not use Java, though it is a good long term bet as a key component of NCD systems.

Sun recently acquired Diba, set up by former Oracle executives to develop IDEAs: Interactive Digital Electronic Appliances. It is too early to tell whether the acquisition will augment or stifle Diba's initiative.

### **What Next?**

As the outlines of the emerging network industry become sharper, divisions will harden and organisations will be forced to take clearer positions. Some organisations are clearly in the NCD camp; others straddle both NCDs and PCs.

Demand is growing for corporate solutions that minimise total cost of ownership, while new markets for devices with a different price point are now growing faster than the corporate desktop. The survival of NCDs is no longer in doubt; interest now centres on who will win the technology battle, and whether we will end up with a repeat of the desktop near-monopoly, or a more diverse range of solutions. For the time being at least, our money is on diversity.

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Mediation Technology is an independent Cambridge-based organisation specialising in online technology and applications. We combine research and market analysis with consultancy work in the development and application of digital technology.