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Compaq Computer Corporation

Contents

Overview.....3
Background History3
 Birth and Infancy of the
 Computer Industry3
 In the Beginning with
 Compaq4
 In the Beginning with Novell8
 Building for the Future 10
A Partnership Emerges 11
 Partnership Mission
 Statement..... 12
 Partnership Strengths 12
 Partnership Highlights 13
 Joint Engineering and
 Testing 14
 Joint Training and Support 14
 Joint Marketing Efforts 14
**A Partnership Focuses on
the Future** 14
 Partnership Strategies..... 14
 Future Products and
 Deliveries 14

Synergy: The Compaq and Novell Connection

Abstract: Success in today's computer industry depends upon many factors: market demands, timing, innovative technology, pricing strategies, marketing techniques, and partnering with other successful companies whose products and services complement your own line. Compaq Computer Corporation and Novell, Inc. have been jointly engineering and testing products for more than thirteen years. In fact, this dynamic and synergistic partnership pushed the computing technology window into the age of networking.

When the rest of the industry focused on their own turnkey systems or provided software to run solely on mainframe equipment, these two visionary companies focused on developing high-quality industry-standard, PC products, products the customer wanted.

Success arrived in 1989 when Compaq produced the first PC-based server, the Systempro 386; and, in parallel with this technology, Novell released the first server-based network operating system, NetWare 386. The network revolution began.

The winning combination of ingenuity, innovative technology, and adherence to industry-standards still drives the Compaq and Novell (C and N) Partnership and ensures that customers receive the best products, the best training, and the best technical support.

The Partnership remains committed to jointly develop, test, and market products that will propel enterprises into the next millenium.

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Synergy: The Compaq and Novell Connection
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Overview

From the halls of Brigham Young University (BYU), in Utah, and from a small pie shop in the midst of the hectic metropolis of Houston, Texas, arose the seeds of the lucrative computer partnership of Compaq Computer Corporation and Novell, Inc. Unlike most computer companies who had focused their energies and resources on single-vendor products, Compaq and Novell embraced the concept of open architecture and industry standards. Combining their technology, ingenuity, and experience, these two companies rose to the pinnacle of success by pushing industry technology from segregated mainframes to the world of distributed systems.

Through a partnership of continued trust and integration, these two major computer companies continue to push the industry-standard technology window even further, by providing the highest quality, state-of-the-art network products that businesses rely upon to run mission-critical operations. With robust Compaq servers, installation aids, and proven track record and with efficient Novell network operating systems, directory services, and expanded storage systems; the future for the Compaq and Novell Partnership remains promising.

This white paper describes

- background and strategies of Compaq Computer Corporation and Novell, Inc.,
- steps leading to the successful partnering arrangement,
- joint engineering of products and services,
- joint training and support,
- joint marketing efforts,
- major account wins, and
- partnership strategies and future deliveries.

Background History

Birth and Infancy of the Computer Industry

Weighing over 30 tons and crammed with vacuum tubes, the first computers loomed over man and occupied entire warehouses. Expensive and intricate, these first computers were mainly operated by the individuals who had developed and built them. With the technology revolution, these early dinosaurs evolved into smaller, more powerful mainframes, then minicomputers, workstations, PCs, and, today, network computers.

With each computing landmark, computers had become more complex, but less expensive and easier to use. Integrated circuits (microchips) replaced earlier vacuum tubes; keyboards, then the mouse replaced bulky punch cards. Each technology advancement brought computer access closer to the end user. And with computing power closer, users hungered for more information, from more places, and they wanted it faster. Businesses were no longer satisfied with dumb terminals linked to mainframes with access available to only a few users. They demanded more. Networking was only a matter of time.

In 1989, two relatively small computer companies, Compaq Computer Corporation and Novell, Inc., met the network challenge and helped to create the first local area networks (LANs). Compaq designed and built the industry's first PC server, and Novell developed the first server-

based network operating system. Finally, isolated and remote PCs could connect to each other or to a LAN where more people could use the same network to receive and send information.

Today, many businesses are building and maintaining heterogeneous, multi-protocol computing environments that combine intranets, the Internet, and extranets so they can browse enormous volumes of information in record time and collaborate with people anywhere in the world. Computer companies now face the daily challenge of providing reliable information, as inexpensively as possible, right at your fingertips, 24 hours a day, 365 days a year.

Compaq and Novell daily meet this networking challenge head on by continually reinforcing their dynamic engineering, training, and marketing partnership. Their motto best summarizes the C and N Partnership focus, direction, and commitment: **We Make the Net Work!**

In the Beginning with Compaq

Introducing the First Portable PC

In 1982, the first artificial heart was implanted in a human, the space shuttle Columbia made its first non-test flight, E.T., the Extra-Terrestrial, landed on movie screens everywhere, and in Houston, Texas, on February 16, Compaq Computer Corporation emerged. Only a few months earlier, with the help of graphic designer Ted Papajohn, entrepreneurs and former Texas Instrument managers Rod Canion, Jim Harris, and Bill Murto had sketched the design for the first portable personal computer on the back of a placemat. Perhaps this birth site of Compaq—a Houston pie shop—was an auspicious omen for the company that now owns the largest slice of the world market *pie* for PCs and servers, according to preliminary 1998 market share data compiled by International Data Corp (IDC).

In the early development phase of the personal computer, the concept of different machines running on the same, or compatible, software did not exist. Actually, no one knew the true definition of compatibility. But the early founders and employees of Compaq did know one thing: their customers wanted to run the same software on Compaq portables that they ran on their IBM PC. So with the addition of more talented folks like Gary Stimac, retired Sr. VP and Gen. Mgr., Systems Division; and Steve Flannigan, now VP, Corporate Strategic Relations, Enterprise Computing Group (ECG), Compaq created the first truly compatible machine—something that had never been done to this level and quality.

Flannigan comments, “Much of the early success of Compaq came from hiring the right people, conducting the right research, making good decisions, and working hard to make the best product—and those are practices that Compaq has continued to this day.”

If you think back to 1953, only about 100 computers existed in the entire world. In contrast, in its first full year of sales (1983), Compaq shipped 53,000 units of its sole product—the Compaq Portable PC—for revenues of \$111 million, a U.S. business record! Compaq was on the right track. Interestingly, that first portable was lovingly called *The Luggable*, weighing almost 28 lbs. That’s almost 60,000 lbs. lighter than the first computers, yet seven to eight times the weight of today’s slim-lined notepads that fit in the palm of your hand. Through the years, Compaq would continue to focus on customer needs and industry-standards. Its portables would decrease in weight, while its product line and corresponding revenues would soar to unheard of heights.

With its industry-standard personal computers—including the first portable PC—Compaq defined the paradigm of the 1980s and 1990s. In what may well be record time, Compaq transformed itself to become a truly global company. The company accelerated from startup to global recognition in fewer than 10 years, a feat most of the world’s largest firms have needed decades

to achieve. And after only 12 years of operation, Compaq became the largest supplier of PCs in the world—a position the company still holds today.

Introducing the First Network Server

One of the early Compaq goals was to introduce an industry-standard, PC-based server capable of application solutions. The Compaq standards-based strategy encouraged the partnering with other industry leaders to provide innovative technologies, such as multiprocessing, disk arrays, software management and integration tools, and eventually created the market for multiuser systems.

During the same period, Novell folks were looking closely at Compaq. If they could integrate their own ingenuity and expertise with those same attributes in Compaq engineers, Novell could give customers what they needed: industry-standard network computing power. Compaq managers were thinking the same. So, the two companies formed a dynamic, synergistic partnership that ignited the spark of the network computing revolution, moving away from proprietary minicomputers and mainframes toward network-centric, or distributed processing.

In 1989, after several years of joint engineering, development, and testing with Novell, Inc., Compaq achieved its goal and produced the Systempro 386, the first PC-based network server and the preferred platform for the newly developed Novell NetWare 386, the first server-based network operating system. The Compaq model for server success continues to exemplify the company's initial strategy of a) linking with strong partners, b) designing for industry standards, c) developing open-architecture systems, d) producing quality, state-of-the-art products, and e) selling through an indirect channel of distribution.

This philosophy has helped Compaq quickly climb through the ranks of not only the worldwide PC industry, but also the entire computer industry. In 1995, Compaq had surpassed Hitachi and the Digital Equipment Corporation to become the world's 5th largest company in computer sales. By 1996, Compaq worldwide sales had reached \$18 B across a comprehensive product line spanning from notebooks to servers to networking equipment. This accomplishment placed Compaq among the world's top 200 corporations, thus inducting it into the Global Fortune 200 Hall of Fame.

Also in 1996, after only seven years of server sales, Compaq produced its one-millionth server—a ProLiant 5000—at the Compaq Center Manufacturing facility in Houston, Texas. Compaq is the first company to achieve this milestone, according to IDC research data, far surpassing volumes of x86-based servers shipped by IBM, Hewlett-Packard, and Digital combined.

The ProLiant 5000 itself is impressive. In less than a decade, the Compaq server had taken a quantum leap in power and capacity from the 1989 Systempro 386. Table 1 illustrates that the online storage, alone, increased from 4.28 GB to 361 GB.

Table 1. Comparison of 1989 Systempro to 1996 5000 ProLiant

Parameter	Systempro 386	ProLiant 5000	Increase
Online Storage	4.28 GB	361 GB	80 times
Memory Capacity	256 MB	4 GB	16 times
Core Processor Speed	33 MHz	200 MHz	6 times

Storage, memory capacity and processor speeds were not the only technology advancements during those seven years. Other engineering breakthroughs incorporated in the ProLiant 5000 that were not even available for x86-based servers include failover technology, hot-pluggable drives, ECC memory, redundant NICs, redundant power supplies, four-way symmetric multiprocessing,

rack-mount configurations, database integration, Insight Manager and SmartStart. For more detailed information, visit our website at <http://www.compaq.com/newsroom>.

Compaq continues to engineer value into its enterprise product lines. The ProLiant 6000 and 7000 servers take full advantage of the performance gains possible—in systems with up to four Intel Pentium II Xeon processors—and clearly demonstrate why Compaq is the world's leading standards-based server vendor. Ideal for business-critical databases and enterprise-wide database applications, the new ProLiant 6000 and 7000 feature

- a high-performance, cable-free, three-channel intelligent array controller,
- an enhanced PCI Hot Plug implementation, and
- a faster PCI-systems architecture, standards-based technology enhancements.

The servers' three PCI buses and 64-bit PCI slots complement the three-channel array controller and can double the bandwidth to storage, network, and peripheral devices; reducing system bottlenecks.

And in 1999, Compaq rolled out its latest powerful server, the ProLiant 7000 Pentium III Xeon. Now take a look at how much processing power, capacity, and internal storage have increased since the Systempro 386.

Table 2. Comparison of 1989 Systempro to 1999 ProLiant 7000 Pentium III Xeon¹

Parameter	Systempro 386	ProLiant 7000 ¹	Increase
Online Storage	4.28 GB	11.2 TB	260 times
Memory Capacity	256 MB	8 GB	32 times
Core Processor Speed	33 MHz	500 MHz	15 times

To achieve the phenomenal increase in online storage, Compaq has upgraded Fibre Channel Host Controllers, Hubs, and Array Storage Subsystems. Other new technologies designed into the ProLiant 7000 Pentium III Xeon include support for the newly designed 18 x 1" hot-plug disk drives, and a planned upgrade path to 8-way symmetric processor technology.

In addition, for customers who require a high-availability Internet server, Compaq also offers its Standby and OnLine Recovery Server options, which give customers high availability at very aggressive prices. These options allow one Compaq server to act as a backup to another Compaq server. For a complete listing of Compaq products and solutions, visit our website, <http://www.compaq.com>.

While you're at the website, check out the latest 1998 Compaq achievement: the shipment of its two (2) millionth server! That's right! In November of 1996, Compaq had shipped its one-millionth server. An awesome feat at the time. But on September 14, 1998, Compaq doubled its own record and shipped its two-millionth server. And it only took two years. This milestone represents unmatched experience in designing, integrating, testing, and shipping servers. In fact, Compaq has shipped 400% more servers than HP, 500% more servers than IBM, and 800% more servers than Dell. Compaq plans are to ship another million within 12 months.

With all of its superior products, Compaq also provides in-depth technical support. That's why it has more than 700 NetWare engineers deployed around the world to guide customer implementations.

"From the beginning, Compaq has earned a reputation for innovative technology, superior quality, and unsurpassed value to customers," states Eckhard Pfeiffer, former Compaq president

and CEO. "Focusing on these three core strengths has been critical to our past success, and will continue to drive our ambitious and aggressive plans for the future."

Building for the Future

"Success in our industry is a constant process of invention and re-invention," continues Pfeiffer. "How could it be any other way in a world where market rules that seemed clear one day appear to be out-of-date the next, or where product lifecycles continue to shrink, from years to months, and even to weeks?"

The Internet has evolved into an explosive force, changing forever communications, computing, and commerce. And the world is poised for still a new era of growth. As the computer market continues to expand and evolve, Compaq is moving to secure its leadership position. The company has extended its traditional areas of strength—PCs and servers—with new, highly acclaimed offerings in the workstation, networking, storage solutions, and consumer product markets. For example, with its recent acquisition of Digital, Compaq can now officially lay claim to being the world's largest vendor of multiple storage systems, having risen from 5th to 1st in less than 3 years. With the acquisition, Compaq can also officially lay claim to being the overall second largest computer company in the world. Its products, options, and solutions are sold and supported in more than 100 countries.

Unlike commodity-based providers, Compaq offers flexible computing platforms by driving the adoption of useful innovations for higher performance and higher availability into industry-wide standards. Some prime examples include the following:

- Compaq Insight Manager
- Compaq SmartStart
- PCI Hot Plug
- Intelligent Hot-Pluggable Power Supply
- Virtual Interface Architecture
- Fibre Channel
- Support for I₂O
- Compaq Recovery Server Option
- RAID
- Redundant NIC Technology
- Advanced Error Detecting and Correcting Memory
- Next Generation Microprocessor and 8-way symmetric processor support
- Rack-Mount Design for serviceability
- Advanced clustering techniques

Compaq continues to address future industry trends and offers integrated, high-performance, fault-tolerant solutions that cost less and are more flexible than traditional networking environments. That's what Compaq was built upon and that's why Compaq leads the way into the next millenium and the new information age. By the year 2000, Compaq intends to rank 1st in customer satisfaction and hit over \$40 billion in revenues. Compaq 2000 is the framework that

houses this global leadership objective and the strategy by which Compaq will meet these new opportunities and achieve its aggressive goal.

Pfeiffer sums up the Compaq directive for the future. “Our goal is really very simple: to empower customers to new levels of flexibility, simplicity, and efficiency.

In the Beginning with Novell

The Early Years

Novell is currently the world’s leading provider of network software and the fourth largest software company in the world. It offers a wide range of network solutions for distributed networks and small business markets. More than 81 million users worldwide rely on Novell for the connectivity to share resources and dramatically boost productivity. The Novell installed base of NetWare—approximately 4 million servers—is so widespread that Novell cannot be ignored by any significant hardware or software company. Yet, like Compaq, Novell had a humble beginning.

In 1979 when mainframes dominated the computer industry, Novell Data Systems emerged and began producing intelligent terminals. Sales grew and employees soon reached 100. However, by 1982, the personal computer had entered the market and quickly began to erode the mainframe/terminal business. The founders of Novell Data Systems and others jumped ship, leaving only twenty employees. Safeguard Scientific, who had originally funded Novell, now took full control of the small computer company.

If Novell ever hoped to compete in this fast-paced technology of information exchange, changes had to be made. Safeguard hinged its success on turnaround specialist Ray Noorda. As president, one of the first management decisions Noorda made, was to assign a short-term programming assignment, Share Net, to a small group of BYU graduates.

This small group of computer software developers, along with two principal architects—Drew Major and Kyle Powell—had recently started a company known as Superset, Inc. They were excited to take on the challenging job of developing Share Net—a way of linking IBM PCs running DOS to Z80 micros running CP/M. In this time period, everyone wanted their products to be IBM-compatible. To steer away from this market philosophy could mean certain death. Yet a few years later, Novell would change its vision.

Introducing the Novell Network Operating System

In 1983, Novell Data Systems incorporated as Novell Inc. and introduced two net operating systems: a Star topology, NetWare/S; and a bus topology, NetWare /X. NetWare S had a dedicated 68000-based network server that could connect as many as 24 PCs. These network operating systems would be the forerunners of the 16-bit NetWare 286 and its prestigious *offsprings*.

From 1985-1989, The Novell strategy was a growth and leveraging strategy through the acquisition of other computer companies:

- Santa Clara System (SCS) which later becomes the Novell Hardware Division
- Softcraft (Austin, TX) which later becomes the Novell Development Products Division
- CXI (Sunnyvale, CA), which later becomes Novell Communication Products Division
- Sixty percent of Indisy Software (Toronto, Canada).

- Excelen (San Jose, CA), including the Kinetics Division (Walnut Creek, CA)

During this period, Novell shipped the 16-bit NetWare 286, a networking operating system that could run on most IBM-compatible personal computers, and, more importantly, a forerunner of the 32-bit NetWare 386, the server-based operating system which would begin the network revolution.

For a short time, Novell had even built servers. In fact, at one time you could buy a Novell turnkey system. Needless to say, there was some competition between Compaq and Novell during this time, however, Novell soon began to shift away from the hardware business; Samsung assumed the job of co-marketing the Novell line of PCs. Later in the year, Novell makes another astute corporate commitment to drop its server line, exit the hardware business, and team with Compaq Computer Corporation to develop the first industry-standard network operating system.

Compaq liked the Novell strategy. Unlike some vendors, such as Orchid, 3-COM, and AST, who had single-vendor solutions, Novell offered global solutions and embraced the concept of developing standards-based products. Novell and Compaq began to navigate the waters of distributed processing together, including joint engineering, testing, and design modifications. This early informal partnering ensured that Novell operating systems would run best on Compaq equipment, and that Compaq equipment optimized the power of Novell operating systems.

In 1989, the visionary strategy of the C and N Partnership paved the way for the next generation of computing: local area networks (LANs). Novell introduced its revolutionary NetWare 386, v3.00, the industry's first server-based software for linking computers, storing data and providing access to shared files, and managing the delivery of print jobs to network printers. Since NetWare 386 had been tested on and primarily developed for Compaq equipment, the software maximized the network server open-architecture of Systempro 386, the Compaq server network solution. The first, truly industry-standard, local area networks (LANs) emerged.

Novell continued to concentrate on and expand upon its visionary network operating systems as well as develop industry-standard complementary products. Table 3 lists release dates of Novell operating systems and other major product releases.

Table 3. Novell major product releases

Year	Product Announcement/Release
1990	Ships NetWare 3.1.
1991	Ships NetWare 3.11, NetWare 2.2, Portable NetWare.
1993	Ships NetWare 4.0, NetWare 3.12, Personal NetWare. Announces Novell DOS 7.
1994	Ships Novell DOS 7, NetWare 4.02, GroupWise 4.1, NetWare 4.1, NDS.
1995	Announces intraNetWare (NetWare 4.11).
1996	Ships intraNetWare (NetWare 4.11).
1997	Announces Novell Replication Services (NRS) and NetWare 3.2; ships BorderManager and ManageWise.
1998	Ships NSS, NetWare 3.2, NetWare 5, Z.E.N.works.

Today, that same Novell innovative and standards-based technology continues to result in premier products. Currently, more than 81 million users worldwide rely on Novell for the connectivity to share resources and dramatically boost productivity.

Building for the Future

Building on the world's largest installed base of servers and nodes, Novell is strategically expanding the value of its products. From enabling file and print sharing on local area networks, to providing universal network services, Novell gives businesses and software developers what they need to leverage the exciting power of networking.

The release of NetWare 5 cements the Novell leadership as an Internet solution provider by enabling enterprises of all sizes to conduct business over the Internet. An intelligent networking platform, NetWare 5 arrives with the following features that enable network administrators to easily manage and control multiple operating systems, protocols, applications, and desktops.

- Support for a *pure* IP to ensure interoperability with open-standards-based networks, such as the Internet
- Single kernel that supports 1-32 processors
- Console One management framework, which provides a central point of administration that can be accessed anywhere a Java Virtual Machine is present, including a NetWare server
- A free, five-user license of Oracle8, the best-selling database technology from Oracle, Corp
- An enhanced version of Novell Directory Services (NDS) with innovative management capabilities such as catalog services, simplified login, role-based management, and LDAP v3 support
- Upgrade Wizard for automating the move from NetWare 3.x servers to directory-based NetWare 5 servers
- Compatibility Mode that allows customers to run current IPX applications on a *pure* IP, NetWare 5 environment
- DNS and DHCP management utility that ties network services together in a trusted NDS-based system
- Support for other industry-standard products, including JAVA, Active X, and CORBA
- Novell Storage Services (NSS), the next generation, 64-bit, indexed storage system that shatters current file limitations and remount times

Compaq has also added significant value to NetWare 5 and, as usual, can feel confident about the compatibility and high performance of the Compaq server/NetWare 5 integrated solution for business enterprises. Not only developed and tested on Compaq servers and storage, NetWare has been integrated with the latest feature of PCI Hot Plug: Hot Expansion (Hot Add).

In 1998, the business objective of Novell was to become a *pure* Internet/intranet network software provider by the end of the year. Its latest release of NetWare 5 did just that and is just the vehicle to nudge Novell into the winner's circle.

To solidify its commitment, Novell has recently focused its product efforts on prime solutions that facilitate web usage. Products; such as NDS, GroupWise, and ManageWise, continue to gain in popularity as more businesses increase their dependency on intranets and the Internet.

- Network Directory Services (NDS) – a universal directory service for organizing, accessing, authenticating, and managing network information and resources. A core component of NetWare 5, NDS enables customers to administer and manage diverse systems from a single location. NDS for NT allows an administrator to integrate and manage NT servers from the

same point. NDS is also supported on UnixWare, and soon will be supported on HP PA RISC and other operating systems.

- GroupWise 5.5 – an email package that provides scheduling, calendaring, task management, and work flow management.
- ManageWise – management software that provides a single-point of management for servers, printers, and SNMP devices.

To clearly exemplify its new strategic direction and commitment to the Internet, Novell also introduced a number of new products in 1998.

- Z.E.N.works – management software for the entire network, from client desktops to servers. Complements ManageWise technology.
- BorderManager – an integrated family of directory-based services that help accelerate user access to the Internet or intranet, provide security, and offer a single-point of maintenance on the network.

For the complete range of Novell products and services access the Novell website, <http://www.novell.com>.

Novell has also built the network computing industry's most comprehensive education and technical support programs. These programs insure that administrators, developers, resellers, consultants, and other Novell users have the knowledge and tools to provide maintenance, service, support, and training for Novell networks. Novell certification—including the Certified Novell Administrator (CNA), Certified Internet Professional (CIP), Certified Novell Engineer (CNE), and Master CNE—is the global standard for hiring, promoting, and compensating network support personnel. Through education and certification programs, Novell has assembled an army of network support personnel. Novell proudly provides its latest training statistics.

- 1,450 Novell Authorized Education Centers
- 3,000 Novell-certified instructors (CNI)
- More than 200,000 Novell-certified support and service providers
- 180,000 candidates working toward certification
- More than 150 high schools, colleges, and universities offering courses on Novell products

With its excellent products, close-at-hand technical support, Internet focus, and a powerful partnership with Compaq, the Novell vision to provide network software that connects every kind of business, every kind of computer, and every kind of information can be a reality.

A Partnership Emerges

Although the formal, or a legalized, *partnering* of Compaq and Novell occurred in 1992, by 1985 Compaq had already established strong bonds with Novell. The relationship had begun as a *grass roots*, peer-to-peer relationship between individuals, in particular, other engineers in the trenches. Trust was a key factor.

Engineers from Novell and Compaq started to test products together, then troubleshoot each other's products and recommend modifications. The C and N Partnership continued to grow stronger as each company became committed to produce software and hardware that together couldn't fail. Soon, Compaq and Novell engineers helped one another in designing efficient

installation aids. Compaq helped to change Novell disk drivers; Novell opened its SuperLab for Compaq to test its products.

Unlike most vendors, who were engineering single-vendor solutions, Novell and Compaq embraced industry standards and wanted to produce reliable, highest-performance global solutions for their mutual customers. That way, their customers would not be locked into one company's turnkey system. Besides, it just made sense: Standards-based products would lower ticket prices, increase compatibility with other products, and increase performance, across the board. The more that these two companies exchanged ideas, investigated and resolved problems, the more reliable and higher quality their products became.

Compaq engineers perfected the IDA Array Controller to optimize the Novell file system; developed extended storage space (ESDI); partitioned the ESDI; and tested these products with Novell products. Jointly, the two companies developed fault-tolerant hardware and software integration; designed multiprocessing technology optimized for Compaq PC-servers; and developed the first mirror-server link. In 1989, now referred to as the beginning of open networks, Novell introduced NetWare 386, v3.00, the first server-based network operating system; Compaq, the first PC server (industry-standard, multiprocessing, Intel-based server). Partnership bonds tightened. It was a perfect match. Novell had one functionality; Compaq another. David Wenzel, NASE, probably states it best when he talks about Compaq having the "right box," and Novell having the "right OS."

Even more importantly, the dedication, cooperation, and technology sharing of Compaq and Novell engineers guaranteed success. The integration of these two powerful evolving technologies still dominates the marketplace today. Building on this technology, Compaq and Novell are using standard Internet technology to turn traditional networks into powerful, easily manageable intranets.

Partnership Mission Statement

Novell and Compaq will develop closely integrated Systems for the purpose of enhancing the ease of use, ease of operation, dependability, and interoperability of our products for our customers.

Partnership Strengths

The Compaq and Novell fourteen-year relationship has been built on a solid foundation of trust and a commitment to excellence. These principles permeate every facet of the partnership: engineering and testing, training and support, and marketing. Listed below are five more-specific C and N Partnership core strengths:

- The same basic belief in standards-based computing for the good of the customer
- More than a decade of exchanging ideas, technologies, and even finished products
- Continual joint testing of new products and services
- Combining of capital and other resources to market and promote each other's product line
- Faith in one another's products by using them in each other's own critical operations

Yes, Compaq and Novell are linked together in more ways than just developing and marketing products. They whole-heartedly endorse each other's products and depend upon those products to

run their own businesses. The following are a few examples of the strong link between Compaq and Novell.

- GroupWise messaging system at Novell is deployed on the Compaq ProLiant 5000.
- Compaq is the key platform for NetWare 5 and clustering development, testing, and certification.
- All Novell mission-critical systems run on Compaq servers.
- Compaq is the largest Novell OEM.

Partnership Highlights

Over the years, Compaq and Novell have jointly developed many industry-leading products and continue to stack up success stories. Here are just a few of the C and N Partnership highlights that span a fourteen-year period.

- Joint development of SFTIII (Server Fault Tolerance) introduces the first high-availability solution.
- In September 1995, Compaq and Novell engineers working in the Novell SuperLab successfully simulated the largest workload to that date: 2,000 clients. Using a ProLiant 4500 attached to 500+ SuperLab clients each simulated the network traffic of 4 clients.
- In December 1996 Novell established a real-world testing event known as ServerFest, or *The Shoot-Out*. As a team, Compaq and Novell developed the first stress test for the intraNetWare (NetWare 4.11) large enterprise network. It's here at ServerFest that hardware vendors can respond to real-world customer situations and then measure the performance and reliability of their products. Compaq hooked its ProLiant 2500 and 5000 Servers to 1,200 SuperLab clients. Compaq servers were the first industry servers recognized for passing the Novell ServerFest simulated workload stress test.
- In the fall of 1997 at Comdex Connecting Points (COMDEX), Compaq and Novell set up intraNetWare (NetWare 4.11) on a ProLiant 6000, the Client from NetWare 5, GroupWise, and BorderManager and allowed 250,000 attendees to each have an email account to test the messaging throughput rate. They sent 5.6-M messages, in five days, with no losses—the largest messaging solution ever attempted.
- SmartStart now lands with every Compaq server and facilitates the integration of NetWare 3.2, 4.11 (intraNetWare), and NetWare 5 with Compaq servers across the system.
- NDS is being implemented on a Compaq ProLiant 850 at AT&T with 2,000,000 objects in the directory and with no downtime.
- The C and N Partnership website was created as an integrated web page that includes a partnership brochure, press releases, joint engineering of products, technical solutions, archive information, magazine articles, success stories, documentation, marketing news, and white papers.
- The C and N Partnership Video and the Power Resource Paq CD-ROM emphasize the integration of Compaq and Novell technologies, and serve as a focal repository for key information, such as partnership strengths, success stories, technical solutions, and product lines.
- Over ½ of Compaq servers are running NetWare.

- In the Novell market, Compaq leads the closest competitor 2 to 1.

Joint Engineering and Testing

Compaq and Novell share a long history as engineering and testing partners. In fact, Novell helped introduce Compaq into the network server market in 1989, and during the same period, Compaq helped modify the first Novell disk drivers. The partnership has been sharing and developing ideas ever since. For over a decade, Compaq has been integrating its products with Novell products and jointly testing them in the Novell multi-million dollar, state-of-the-art testing facility, SuperLab, in Provo, Utah. Mutually beneficial, both companies can repeatedly test and improve their products before they hit the market. It's truly a win-win situation.

Although Compaq and Novell are actually independent companies and each a computer-industry giant in its own right, their synergistic joint engineering and testing of compatible and complementary products cannot go unnoticed. In fact, one wonders just where the network industry would be today without this innovative partnering and amassing of knowledge and skills. To understand just how deeply rooted this C and N Partnership is, Table 4 details the most important Compaq and Novell joint engineering/testing of projects.

Table 4. Joint Compaq and Novell engineering

Year (s)	Product/Service	Definition
1988-1989	NE3200 Network Interface Controller Card (NIC)	Compaq and Novell jointly develop the industry's first 32-bit EISA Ethernet adapter, the NE3200.
	Drive Array	Compaq designs a drive array to group physical drives into logical drives in order to optimize NetWare 386-file server with RAID technology; optimized in the Novell SuperLab.
	16-MB RAM	RAM increases from 8 MBs to 16 MBs.
1989-1990	Hardware striping for optimization	Jointly develop and modify hardware striping.
	Software mirroring	Compaq develops the Mirror-Server Link where two SFT IIIs can <i>talk</i> to each other and know what's going on.
	SCSI software architecture	Design and test highly optimized, modular, small computer system interface parallel bus used to connect peripheral devices (up to 7) to a complete system.
1990-1991	Server Fault-Tolerance Features (SFTIII)	Fault-tolerant NetWare file server technology that offers <i>non-stop</i> computing for many single hardware failures in the server. Novell and Compaq jointly develop the high-speed link technology used in SFT III. In addition, Compaq runs against Tri-Cord at the same level in the Super Lab, yet Compaq has the most connections. Compaq and Novell continue to jointly test SFTIII.
	NetFlex Dual-Protocol Adapter	Compaq designs the first combination Ethernet and Token-Ring Adapter for NetWare.
	High-speed, Mirrored-Server Link (MSL)	Jointly develop and test MSL.
	Asynchronous, point-to-point protocol solution.	Jointly test protocol solution.
	Extended disk capacity for NetWare 3.X	Jointly develop extended disk capacity.
1991-1992	NetFlex-2 Adapter Family	Compaq builds new high-performance, 32-bit Adapter Family for NetWare, including the first Dual-Port Ethernet and Token-Ring Adapters.
1992	Automatic Server Recovery	Jointly develop and test Compaq hardware features with NetWare ABEND feature.

Table 4. Joint Compaq and Novell engineering (cont)

Year (s)	Product/Service	Definition
1992	ABEND Recovery/Logging	Jointly develop and test Compaq drivers with Novell operating system ABEND feature. Improves logging of error information.
1993	SmartStart integration of Novell and Compaq products	Compaq develops intelligent integration tool that optimizes platform configurations and simplifies the installation of tested and reliable servers. SmartStart also increases Internet server performance by optimizing key operating system parameters for the Compaq platform, while ensuring a stable, reliable, well-integrated platform configuration for Novell network operating systems.
	SNMP standards-based network management protocol (TCP/IP) and Compact Insight Manager	Insight Manager is an application for managing network desktops and servers. Becomes standard with any Compaq server. Insight Manager reduces administrative costs and increases uptime by providing a) insight into server functionality and b) allowing efficient management of Compaq Internet servers.
	Layered device driver architecture	Engineer Hot Plug Driver for volume expansion. Start of High Availability and PCI Hot Plug: Fault Detection, Fault Tolerance, and Fault Prevention.
1994	Novell Directory Services (NDS)	Jointly test the integrated family of directory-based services that accelerate user access to intranets and the Internet; centrally manage user-access privileges and security across the intranets and extranets; and provide proxy, firewall, and virtual private network services.
	Network devices characterization optimization for Compaq drivers and Novell ODI stack	Jointly develop and test Compaq drivers and Novell Network Driver Model.
	NetFlex-3 Family	Compaq designs first Ethernet and VG adapters for PCI and EISA using a single driver for NetWare.
	Compaq Survey Utility	Jointly test Compaq integration software with NetWare operating systems.
1995	Redundant NIC failover	Jointly develop, modify, and test failover technology.
1994-1996	Multiprocessing architecture and optimization	In December 1995, engineers from Novell and Compaq formed a team to design an industry-standard software architecture to provide PCI Hot Plug technology for integration with Novell NetWare and other operating systems.
	4 GB RAM	Compaq was first to take four (4) four gigabytes of Random Access Memory to Novell.
	SMP (symmetric multiprocessing) in NetWare 4.10	Jointly develop, test, and modify SMP in NetWare 4.10.
	Hardware-assisted tool for optimization analysis	Jointly test tool.
	Clustering techniques	Join design reviews since 1995. Compaq and Novell are working together to bring you clustering solutions that deliver unprecedented levels of scalability and high availability. Improved clustering techniques available in 1999.
1996-1997	PCI Hot Plug	In 1997, Compaq pioneers the PCI Hot Plug technology and raise the fault tolerant capabilities of industry-standard servers. With this capability, a system can be up and running when a controller fails. Without any downtime, an identical controller could replace the failed one. Novell was the first company to market with support for PCI Hot Plug and first to ship PCI Hot Plug with its operating systems.
	Fibre Channel (FC)	Extraordinary capacity and performance. Immediate mount. Supports shared storage; optimizes performance for array controllers; jointly tests/tunes in 3.6TB FC Lab; jointly present customer briefings.
	Intelligent I/O (I ₂ O)	An industry standard that allows server to offload I/O traffic from the host processor to additional I/O processor. It reduces host processor CPU utilization and, hence, allows it to support more applications.

Table 4. Joint Compaq and Novell engineering (cont)

Year (s)	Product/Service	Definition
1996-1997	NetWare Peripheral Architecture (NWP/A)	Jointly design and test the latest Novell storage driver model.
	SmartStart CD-ROM (major revisions)	Intelligent integration tool that makes the most of web browsing, a web server, directory services, and the high-performance Novell operating systems: NetWare 3.2, NetWare 4.11 (intraNetWare), and NetWare 5.
1998-	Shared storage > 4 processors	Jointly test Fibre Channel shared storage and redundant path to storage.
	NIS (formerly called PSF) Network installation services	This new NetWare 5 install provides the infrastructure for creating an installation program. Works in conjunction with Compaq SmartStart.
	Java Virtual Machine (JVM)	Jointly design for extensibility.
	JAVA optimizations	Both Compaq and Novell support JavaSoft initiative by Sun Microsystems. Novell provides a Java execution environment for NetWare 4.11 (intraNetWare) and NetWare 5, and enables NDS for the Internet so users can reap the benefits of open-standards technology.
	Console One	Java front-end, graphic-user interface for management. ConsoleOne allows data to be moved closer to the user with no loss of control. Jointly test and debug.
	GroupWise	Leading family of email, calendaring, task management, workflow manager, with over 7 million users. Access is either through a web browser or client software. In Novell space, Compaq owns 65% of market share.
	Z.E.N.works (Zero Effort Networking)	Design Client/NDS integration product. Allows administrators the ability to define a digital persona for each person in the company, and no matter where they log in, see the same desktop configuration.
	PCI Hot Add (Hot Expansion)	With Hot Add/Hot Expansion capabilities, you can eliminate planned downtime by adding additional storage devices, array controllers, configuration cards, and so forth, while the system remains up and running.
	ManageWise	Management software that provides through NDS, a single-point of management for servers, printers, and SMPT devices. Integrated with Compaq Insight Manager.
	NetWare 5	The Novell next-generation OS that leverages Internet technology. Joint efforts include the following: (1) Novell develops NetWare 5 on Compaq servers and storage. (2) Compaq works with Novell to improve installation process for NetWare software purchased from resellers. (3) Compaq launches activeAnswers for NetWare 5. (4) Compaq includes integration of PCI Hot Expansion. (5) SmartStart 4.2 helps customers optimize Compaq servers for performance.
Novell Storage Services (NSS)	The Novell next-generation, 64-bit, indexed storage system that shatters current file limitations and remount times. Jointly develop using the Compaq Maximum Configuration Lab.	
1999-	8-way symmetric processing	Continue to jointly develop and test 8-way symmetric processing.
	Advanced clustering techniques	Continue to jointly develop and test advanced clustering techniques.

Currently Compaq has the industry's largest team of NetWare engineers. This team remains focused on making sure Novell products run optimally/reliably on Compaq server and options products. With a proven history of high-quality, integrated products and services, NetWare engineers and support personnel help companies lay the foundation for highly integrated, cost-effective systems. Working together, the C and N team can architect, implement, and maintain your company's intranet.

Joint Training and Support

Compaq and Novell have also joined forces in a worldwide alliance that provides one of the most responsive, integrated approaches to technical support in the industry. Over the last decade, the partnership has continually enhanced the reciprocal training of technical support staff. This ensures efficient solution of compatibility issues, reduces duplication of effort, and speeds issue resolution.

As part of the worldwide Accredited Systems Engineer (ASE) programs, engineers undergo extensive training to become certified experts in Compaq product technology and integration. Novell promotes similar training for its engineers, the Certified Novell Engineer (CNE) program. Currently, Novell has more than 200,000 CNEs.

Most impressive, seventy percent of Compaq ASEs (1,173 engineers) have completed the requirements for both accreditation programs and 37 Associate ASEs are currently working on CNEs or Master CNEs. Since so many of these engineers are certified experts in both areas, they provide strong guidance with sales, support planning, and optimization of Compaq and Novell platforms.

Other support agreements include the following:

- Global Service and Support Provider program (GSSP)
- Technical Support Agreement (TSE)
- Cross training: support, sales, resellers, ASE, and MCP
- Joint field pre-sales support

According to Mike Lyons, VP, Americas Support Center, Novell Technical Services, "Compaq outstanding customer support to Novell users is largely due to the Compaq demonstrated commitment to continually upgrade the skills of its Novell-dedicated engineering team."

As an illustration, on March 25, 1998, Compaq received the first annual Novell Support Connection Service Excellence Award that recognizes Novell allies who have made service excellence an integral part of their business. Compaq was the only OEM provider of the 18 recipients.

The bottom line: when you need answers, fast, Compaq and Novell deliver them.

Joint Marketing Efforts

Ever since the NE3200 NIC, the first array controllers, the Systempro 386, and NetWare 386, Compaq and Novell have not only engineered, integrated, and jointly tested their products, they have also jointly promoted products, options, and services. Some key promotions and their results are listed in "Partnership Highlights" section.

A Partnership Focuses on the Future

Envision the day when your computing environment is absolutely secure; easy to understand, and simple to use. Imagine the ability to bring the world to your fingertips and, with a snap of the hand, any networking product would work *hand-in-glove* with another networking product.

In 1997, standards-based platforms represented 70% of hardware spending worldwide. By the year 2001, that number is expected to exceed 75%. "In fact," predicts Pfeiffer, "I foresee a day when enterprise applications will work almost as plug-and-play modules. An information

manager will take the software module, plug it into his information infrastructure and see an immediate ROI [return on investment].” Compaq and Novell see an opportunity to set the standards for a new world of computing, one that expands upon their vision of standards-based computing.

What will differentiate the C and N Partnership from their competitors is the proven ability to (1) innovate with industry-standards, (2) help customers achieve real value from their IT investment, and (3) respond more quickly and effectively to customer needs.

Partnership Strategies

The C and N Partnership strategy focuses on five key areas that will ultimately provide customers with higher levels of computing values and satisfaction.

- Driving industry-standards technology throughout the enterprise
- Leading the industry in business-critical computing
- Delivering superior global service and support
- Deploying cost-effective solutions for the enterprise
- Building the best customer relationships in the world

At a more-detailed level, Compaq is driving the development of an open-standards specification of PCI Hot-Plug technology bringing to market the industry’s first open, recognized hot-pluggable network and I/O controller boards. Novell fully supports this effort that dramatically increase uptime for mission-critical environments.

Novell Directory Services, an integrated family of directory-based services; organizes, categorizes, and names all resources within a network. The result? Accelerated user access, increased security, and better network management. Since NDS also works well with SCO Unix and Microsoft Windows NT, it can be ported to other operating systems that use Compaq servers. Consequently, Compaq gains a competitive advantage in the marketplace.

In the area of business-critical computing, Pfeiffer states “that the new world of computing will be built on open, industry-standard technology and that Compaq would continue to invest in 64-bit computing. This commitment will enable the company to accelerate both new and existing technologies into industry-standard platforms and to deliver even more scalable and reliable systems.” Of course, Novell is also committed to 64-bit computing and is working closely with Compaq to develop NetWare 64.

With NetWare 5, enterprises will also be grappling with numerous issues in this upgrade—moving to IP, leveraging, managing mixed environments—and Compaq will be strategically positioned to help them solve these issues.

So, just what does this mean for the partnership’s mutual customers? This not only means effectively working together to provide industry-standards products, but also innovatively working together to make those products work seamlessly with the rest of the customers’ IT environment. As a result, our customers will enjoy these benefits:

- Wider choice and flexibility
- Faster return on IT investments
- Greater agility in adapting to a dynamic world
- Increased security and confidence

- Uncompromising quality and value

Future Products and Deliveries

According to International Data Corporation, the installed base of worldwide servers is expected to reach 17 million by the year 2000. Industry-standard computing solutions are improving pricing and performance in response to customers who require new innovative products and bundled solutions at low costs.

Novell is an expert in the development of network operating systems and standardized driver architectures. Compaq has the expertise in the development of systems hardware, systems configuration software, device drivers, and the design of high-availability solutions. Building on that same foundation today, Compaq and Novell are sharing standard Internet technology to develop web hosting and security solutions for the Internet and corporate intranets.

With a robust intranet, you can share resources, speed internal communications, and automate time-consuming tasks like merging accounting, or database information from divisions within your company. Compaq and Novell deliver the integrated products and people to make planning and installing your intranet easy and cost efficient.

SmartStart, the Compaq intelligent integration tool, makes it easy to install and optimize NetWare 4.11 (intraNetWare) and NetWare 5 on Compaq servers; and makes the most of web browsing, a web server, and directory services. SmartStart saves an enterprise countless hours by allowing it to designate an integration server for storing and deploying applications. More businesses are turning to Compaq and Novell for complete and simplified Internet solutions.

The open development platform encourages more applications to be developed for the server environment. Minimum server requirements, listed in Table 5, have also increased dramatically with NetWare 5 alone.

Table 5. NetWare server requirements and installed base

Server Requirements	NetWare 3.x	NetWare 4.x	NetWare 5
Memory	8-MB RAM	16-MB RAM	64-MB RAM
Processor	386	386/486	586 recommended
Installed Base	2M Servers	1.8M Servers	Unavailable

Novell BorderManager is the industry's first integrated family of directory-based network services that manages, secures, and accelerates user access to information at every network border.

BorderManager FastCache is the industry's fastest, most scalable Internet object caching solution for web-enabled companies and Internet Service Providers. Supporting all Microsoft Windows NT, SCO Unix, MacIntosh, and NetWare networks, BorderManager speeds user access to popular web information, reduces network bandwidth requirements, and accelerates company websites.

Simply put, Compaq and Novell are using standard Internet technology to turn traditional networks into powerful, easily manageable intranets.

The C and N Partnership managers have three key messages for enterprises seeking to invest in network solutions.

1. The Compaq and Novell decade-long history of joint partnership and innovation in networking services uniquely position the two companies to seamlessly deploy compatible solutions, for any size business, right out of the box.

2. C and N Partnerships in the field and in the channel combine with Compaq intelligent tools, to ensure fast, easy deployment of new applications and software on highly integrated, powerful platforms.
3. Compaq and Novell solutions provide the manageability and scalability features to easily manage, maintain, and update the seamless infrastructure of network.

When you invest in a Compaq solution, you gain the assurance of a solid history and the promise of a partnership uniquely positioned to leverage Internet technology. **Join our team and feel the synergy!**