NCR Appendix

# Cost of Ownership Comparisons

## 16 User Configuration

| | HP Model F10<br>16 MB RAM, 566 MMB disk | | NCR Model 3445<br>16 MB, 670 MB disk | |
|---|---|---|---|---|
| | | **List** | | **List** |
| | HP Model F10 | $11,250 | NCR Model 3445 | $ 7,425 |
| | 16 MB RAM | inc. | 16 MB memory | 1,775 |
| | 566 MB disk | inc. | 670 MB disk | 2,250 |
| | 2 GB DDS drive | inc. | 1.3 GB DDS tape | 2,500 |
| | LAN | inc. | LAN | 749 |
| | 2 User license | inc. | 16 user license | 1,295 |
| | Console | inc. | Console | 329 |
| | +Upgrade 16 user license | 3,150 | | |
| | Total hardware and OS | $14,400 | | $16,323 |
| | 3 Year Support | 8,030 | | 6,108 |
| | Total 3 year CCO | $22,430 | | $22,431 |

## 128 User Configuration

| | HP Model G30<br>96 MB RAM, 2.0 GB disk | | NCR Model 3450 (2 processors)<br>96 MB, 2.0 GB disk | |
|---|---|---|---|---|
| | HP Model G30 | $20,000 | NCR Model 3450 (2) | $ 38,995 |
| | 32 MB memory | inc. | 96 MB memory | 21,000 |
| | 566 MB disk | inc. | 2 GB disk | 8,200 |
| | 2 GB DDS drive | inc. | 2.0 GB DAT | 3,600 |
| | LAN | inc. | LAN | 749 |
| | 2 User license | inc. | 128 User license | 15,095 |
| | Console | inc. | Console | 329 |
| | +64 MB memory | 6,400 | | |
| | Upgrade 128 user lic. | 17,875 | | |
| | Upgrade 2 GB disk drive | 4,700 | | |
| | Total hardware and OS | $48,975 | | $ 87,968 |
| | 3 Year support | 17,047 | | 13,950 |
| | Total 3 year COO | $66,022 | | $101,910 |

## 256 User Configuration

| | HP Model H50 | | NCR Model 3550 (2 processors) | |
|---|---|---|---|---|
| | 256 MB RAM, 5.0 GB disk | | 256 MB, 5.2 GB disk | |
| | HP Model H50 | $ 72,000 | NCR Model 3550 (2) | $ 76,150 |
| | 64 MB memory | inc. | 256 MB memory | 134,400 |
| | 1 GB disk | inc. | 5.2 GB disk | 40,000 |
| | 2 GB DDS drive | inc. | 1.3 GB DAT | 5,000 |
| | LAN | inc. | LAN | 749 |
| | 2 User license | inc. | 256 User license | 22,095 |
| | Console | inc. | Console | 329 |
| | +192 MB memory | 32,000 | | |
| | Upgrade 256 user lic. | 22,075 | | |
| | Upgrade 5 GB disk drive | 13,800 | | |
| | Total hardware and OS | $139,875 | | $278,723 |
| | 3 Year support | 25,750 | | 18,714 |
| | Total 3 year COO | $165,635 | | $297,437 |

Seven levels of computing

To provide the seven levels of computing the System 3000 uses three computing architectures: uniprocessing, tightly coupled multi-processing, and loosely coupled parallel processing. The seven levels of computing are as follows:

*Level 1*--System 3100 models are window-compatible portable computers, including notepad and notebook models. The notepad model supports DOS, and the notebook model supports DOS and OS/2.

*Level 2*--System 3200 models are entry-level desktop computers, offering a broad performance range, yet packaged in a small-footprint cabinet. These models will support DOS, OS/2, SCO UNIX, and UNIX System V Release 4.0.

*Level 3*--In the 3300 level, NCR made available three uniprocessor models; the NCR 3320, 3340, and 3345. Each functions as a fully configurable, high-performance workstation as well as an entry-level, workgroup server. Scalable power is achieved through the use of an Intel 386SX 20 MHz or a 486 25 MHz or 33 MHz processor, providing from 7.5 to 27 MIPS. Memory options range from 2 to 64 MB with internal disk storage of up to 680 MB. A 4-slot, 20 MB MCA I/O bus is standard and supports up to 32 direct connections or 64 local area network (LAN)-based connections. These desktop systems offer broad configurability and a wide range of performance, while still maintaining a footprint suitable for office environments. These models support DOS, OS/2, SCO UNIX, and UNIX System V Release 4.0.

*Level 4*--In the 3400 level, NCR is actively marketing the 3445, a uniprocessor server based on an Intel 486 33 MHz microprocessor that provides 27 MIPS of computer power. It uses tightly coupled microprocessor architecture. This model features memory options of 4 MB to 64 MB, SCSI up to 5.0 MB per second, and internal disk storage options of up to 3.3 GB. A processor/memory/bus, with a bandwidth of 176 MB per second and a 7-slot, 20 MB per second MCA I/O bus are included. The NCR 3445 can support up to 128 connections in any combination of direct or LAN attachments. The NCR 3445 supports DOS, OS/2, SCO UNIX, and UNIX System V Release 4.0.

The NCR 3450 is an entry-level, multiprocessor (1-4 asymmerical

multiprocessor) server which operates under the NCR UNIX V.4 multiprocessing operating system. Scalable performance results from the use of 1-4 Intel 486 50 MHz microprocessors providing from 40 to 160 MIPS. The model offers memory options of 4 MB to 256 MB, SCSI up to 10 MB per second, internal and external disk storage options of up to 6 GB and 50 GB respectively, including an arrayed disk option. An 8-slot 80 MB per second MCA I/O bus and dual 32-bit processor/memory busses, with a combined bandwidth of 200 MB per second, support up to 256 connections in any combination of direct or LAN attachments. The multiprocessor model supports UNIX System V Release 4.0 and DOS applications under VP/ix. The availability for the 3445 is immediate and the 3450 is 45-60 days.

*Level 5*--The level 3500, model 3550, is a symmetric, multiprocessor, mainframe-class computer system. The 3550 uses the new NCR UNIX V.4 multiprocessing operating system. Incremental performance results from the use of 2 to 8 Intel 486 50 MHz microprocessors, providing 80-320 MIPS. Memory options range from 16 MB to 256 MB, with internal disk storage up to 13 GB and external disk array capacities of up to 50 GB. Two 8-slot, 80 MB MVA busses provide an aggregate throughput of 160 MB per second and dual 64-bit processor/memory busses result in a combined bandwidth of up to 400 MB per second. Mainframe-class reliability, data integrity, configurability, and performance through scalable, symmetric, tightly coupled multiprocessors. These models support UNIX System V Release 4.0 and DOS applications under VP/ix. The 3550, the only member of this level available, has a 6-8 week availability.

*Level 6*--System 3600 model is NCR's new successors to expensive mainframe clusters. Using loosely coupled parallel processing, these models are the first fruits of the NCR's joint development with, and investment in, Teradata. These models support UNIX System V Release 4.0 and DOS applications under VP/ix. The NCR System 3000/3600 is available for orders. According to International Data Corporation (IDC), the 3600 is considered NCR's UNIX database engine. It incorporates technology from NCR, Teradata, and Sybase. This system is not a conventional mainframe, and NCR is not positioning it as such. While NCR will achieve up to 8-way SMP performance on off-the-shelf software, its parallel performance shines best when running Teradata's SQL engine. Disadvantages: NCR faces a shortage of development

tools and lacks experience selling million-dollar systems to MIS. (NCR will target traditional retail and banking customers early on.)  IDC does not expect significant revenues or competitive impact until second half 1992.

*Level 7*--System 3700 models offer enormous total performance. Configured with up to thousands of processors, these models are targeted to support the most demanding enterprise applications. Using loosely coupled parallel processing, these models are optimized for online transaction processing and decision support.  These models will support UNIX System V Release 4.0 and DOS applications under VP/ix.

## NCR System 3000 Comparison

| | Model 3600 Model 3445/3447 | Model 3450 | Model 3550 | AP AMP |
|---|---|---|---|---|
| SPECIFICATIONS: | | | | |
| Processor i486 | i486 | i486 | i486 | i486 |
| Clock Speed 33 MHz | 3445: 33 MHz<br>3447: 50 MHz | 50 MHz | 50 MHz | 50 MHz |
| No. of Processors per AP[10] | 1**<br>1 per AMP[11] | 1 to 4 | 2 to 8 | 2 to 8 |
| MIPS each AP | 27<br>27 each AMP | 40-160 | 80-320 | 80-320 |
| I/O Bus Channel-E, | Micro Channel,<br>SCSI-II | Micro Channel-E,<br>SCSI-II | Micro Channel-E,<br>SCSI-II | Micro<br>SCSI-II |
| Transfer Rate MB/sec, MB/sec | 20/MB/sec,<br>5 MB/sec | 80 MB/sec,<br>5 MB/sec | 80 MB/sec,<br>5 MB/sec | 80<br>5 |
| Processor Memory Bus NA Bus | 32-Bit<br>Dual Bus | 32-Bit<br>Dual Bus | 64-Bit<br>Dual Bus | 64-Bit<br>Dual |
| Memory 512 MB | Up to 64 MB<br>16 MB | Up to 256 MB | Up to 512 MB | Up to |
| Error Detection ECC | EDAC/<br>Parity[##] | EDAC | EDAC | EDAC |
| Interleaving Levels | 0-4 | 0-4 | 2-4 | 2-4 |
| Yes Cache Memory Internal 4 KB (OS)/ 8 KB | 8 KB | 8 KB | 8 KB | 8 KB |
| External NA | NA | 128 KB | 128 KB read<br>32 KB write | 128 KB |
| Cabinet Type | Deskside<br>Floorstanding | Deskside<br>Floorstanding | Floorstanding | |
| Micro Channel Expansion Slots AP | 7<br>NA<br>6 - 32-Bit<br>1 - 16-Bit | 8<br>8 - 32-Bit | 16<br>16 - 32-Bit | 8 per |
| Power Fail Recovery | Optional<br>Optional | Optional<br>Optional | Optional | |

| | | | | |
|---|---|---|---|---|
| UPS<br>Internal/<br><br>External | External | Internal | Internal | Internal |
| Implementation<br>Full | Ord.<br><br>Shutdown<br>Recovery | Full<br><br>Recovery<br>Recovery | Full<br><br>Recovery | Full |
| SCSI Adapter(s)<br>Dual | ---<br>2 Channels | 2 Single/Dual | 8 Dual | Up to 8 |
| Mass Storage: | | | | |
| No. of Bays<br>NA | 6 HH/3 FH or<br><br>2 HH/5 FH | 6 HH/3 FH | 56 HH/28 FH | 4 FH |
| (HH/FH)[1] | | | | |
| Internal Fixed Disk<br>3.2 GB | 213 MB-<br>NA<br>7.0 GB | 327 MB-<br><br>7.0 GB | 327 MB-<br><br>36 GB | Up to |
| Internal Flex Disk<br>NA | 3.5 in.<br><br>1.44 MB | 3.5 in.<br><br>1.44 MB | 3.5 in.<br><br>1.44 MB | 3.5 in.<br><br>1.44 |
| MB | | | | |
| External Fixed Disk[2]<br>300 GB | Up to 25 GB<br>10 GB per AMP | Up to 25 GB | Up to 50 GB | Up to |
| External Tape<br>MB/525 MB | 150 MB/525 MB<br>NA<br>QIC/2.5 GB | 150 MB/525 MB<br><br>QIC/2.5 GB | 2.5 GB (8 mm) | 150<br><br>QIC/1.3 |
| GB | | | | |
| mm) | (8 mm) | (8 mm) | | DAT (4 |
| DAT | | | | 2.3 GB<br><br>(4 mm) |
| External Flex Disk<br>NA | 120 MB/<br><br>200 MB/<br>525 MB/<br><br>2.5 GB (8 mm) | 200 MB/<br><br>525 MB/<br>2.5 GB (8 mm) | 525 MB###/<br><br>1.3 GB DAT<br>(4 mm) | NA |
| NA | | | | |
| Internal Tape<br>NA | 1.3 GB DAT<br><br>(4 mm) | 1.3 GB DAT<br><br>(4 mm) | NA | 4.6 GB<br><br>(8 mm) |

Comparison continued on next page.

## NCR System 3000 Comparison Continued

| | Model 3600 | | | |
|---|---|---|---|---|
| | Model 3445/3447 AMP | Model 3450 | Model 3550 | AP |
| Connectivity: | | | | |
| LANs[3] | Up to 4 NA | Up to 8 | Up to 8 | Up to 4 |
| WAN Lines[4] | Up to 4 NA | Up to 4 | Up to 12[5] | Up to 4 |
| TTY Connections | | | | |
| Direct | 96 Via AP | 96 | 96 | NA[8] |
| LAN-based per AP | 256 Via AP | 512 | 1024 | 1024 |
| Operating Systems | UNIX V.4, TOS SCO UNIX, OS/2, DOS | UNIX V.4, SCO, UNIX, OS/2, DOS | UNIX V.4, | UNIX V.4 |
| PHYSICAL SPECIFICATIONS: | | | | |
| Height | 29.0 in. 5.6 in. (737 mm) (142 mm) | 29.0 in. | 5.6 in. (142 mm) | 5.6 in. |
| Width | 7.5 in. 28.0 in. (191 mm) (711 mm) | 7.5 in. | 34.0 in. (864 mm) | 28.0 in. (711 mm) |
| Width with feet | NA NA | 14.0 in. (361 mm) | NA | NA |
| Depth | 29.5 in. 36.0 in. (749 mm) (914 mm) | 29.5 in. | 28.0 in. (711 mm) | 36.0 in. (914 mm) |
| Weight | 80 to 125 lb 6500 lb (36.4 to (1430 kg) 56.8 kg) | 80 to 125 lb (36.4 to 56.8 kg) | 800 lb fully configured (363.6 kg) | 700 lb (1540 |

* 3335 is the same as 3345 except for the 25 MHz processor.
** 3450 has two processor upgrades (box swap):
\# System memory can be configured to 16 MB through third-party memory boards.
\## Choice of Parity or EDAC memory. Parity memory limited to 16 MB.
\### 3550 includes 525 MB internal tape.
[1] HH=Half Height, FH=Full Height.
[2] Assumes at least 3 or 4 SCSI ports used for other purposes.
[3] Any combination of Token Ring/Ethernet.
[4] Use of WAN card (2 Lines per card) preempts use of slot for LAN or other purposes.
[5] Use of WAN card (3 lines per card) preempts use of slot for LAN or other purposes.
[6] Using Terminal Server

[7] Using 8-Port Serial Controller Boards

[8] All TTY devices are connected via terminal servers or controllers (160/AP using 32-port terminal servers.

[9] 256 MB of memory with MP upgrade kit.

[10] Up to 256 processors per system.

[11] Up to 32 processors per system.

-- Information not available.

## Migration plans to the NCR 3000 platform

According to users and industry executives, AT&T/NCR's merged product line will give the new company a strong technology offering in distributed computing with solid connectivity and network management products, and a head start in the emerging technology of cooperative computing (see migration chart).

The networking architecture for the combined operation will be NCR's standard-based Open Cooperative Computing Architecture (OCCA see appendix for details), which has superb SNA connectivity, filled out with AT&T's Stargroup LAN Manager for connections to desktop PCs and Apple Macintoshes. The new company's network management strategy will use AT&T's system manager and computer manager which has UNIX system connectivity. Regarding cooperative computing, the combined organization is relying on cooperation from NCR.

NCRAPX02.HPG;4.565";3.356";HPGL

The story on the hardware side is largely one Intel architecture line being replaced by another, as AT&T products get phased out and replaced by NCR's new System 3000 line.

NCRAPX03.HPG;4.565";3.356";HPGL

The two major products that are being eliminated entirely are the Motorola-based NCR Tower line and AT&T 3B2 with its proprietary Western Electric processor.

NCRAPX04.HPG;4.565";3.356";HPGL

AT&T recently released a MIPS RISC-based 3B2 (3B2/1000 R3). And will now OEM Pyramid's MIPS RISC-based MIserver S Series. AT&T calls it the System 7000/R3. The 3B2 is expected to be supported by AT&T through 1993. The System 7000 Series, which AT&T currently OEMs from Pyramid Technology, is expected to begin migrating to the Model 3500 by the end of 1992. The combined organization will continue support for the StarServer FT, a fault-tolerant machine OEM'ed from Tandem.

Overall, users of AT&T products will continue to be supported as long as they wish to stay with the AT&T line.  The plan is to eventually phase out the AT&T product line.

## AT&T 3B2 System Comparison

| | | |
|---|---|---|
| | 3B2/310<br>3B2/500 | 3B2/400 |
| Introduced | 10/85<br>9/87 | 6/85 |
| Central Processor: | | |
| Processor | WE32100<br>WE32100<br>WE32100 | |
| Math Acceleration Unit | WE32106<br>WE32106<br>WE32106 | |
| Word Size (bits) | 32<br>32 | 32 |
| Clock Rate | 10 MHz<br>18 MHz;<br><br>22 MHz opt. | 10 MHz |
| Cache (bytes) | NA<br>6 K virtual | NA |
| Rated Performance (MIPS) | 1.1<br>4.0 | 1.1 |
| Memory: | | |
| Min/Max RAM (bytes) | 1 M/4 M<br>4 M/8 M; up to<br><br>16 M w/22 MHz<br><br>option | 1 M/4 M |
| Increments (bytes) | 1 M, 2 M<br>2 M, 4 M, 16 M | 1 M, 2 M |
| Memory Management Unit | WE32101<br>WE32101<br>WE32101 | |
| I/O Characteristics: | | |
| Max Serial Connections | 34<br>50 | 90 |
| No. of Concurrent Users | 6-14<br>25-40 | 14-25 |
| No. of SCSI Adapters | 1 or 2 (opt.)<br>Up to 8 | 1 or 2 |
| Data Communications: | | |
| Networks<br>STARLAN,<br><br>DATAKIT<br><br>SNA; | AT&T STARLAN,<br>AT&T STARLAN,<br>3BNET, DATAKIT,<br>3BNET, DATAKIT<br>ISN; IBM SNA;<br>ISN; IBM SNA;<br>Ethernet, X.25<br>Ethernet, X.25<br>Ethernet, X.25 | AT&T<br><br>3BNET,<br><br>ISN, IBM |
| Protocols<br>SNA.3270, | IBM SNA/3270,<br>IBM SNA/3270,<br>BSC/3270,<br>BSC/3270, | IBM |

| | | |
|---|---|---|
| | BSC/3270, SNA/RJE, SNA/RJE, LU6.2; TCP/IP | SNA/RJE, LU6.2; TCP/IP |
| Mass Storage: | | |
| Diskette Storage (bytes) | 720 K 720 K | 720 K |
| Min/Max Disk Storage | 30 M, 14 G 147 M/14 G | 30 M/14 G |
| Tape Storage M | 23 M, 60 M 60 M, 120 M cartridge, cartridge, cartridge, 9-track SCSI 9-track SCSI | 23 M, 60 M 9-track SCSI |
| Software: | | |
| Operating System | UNIX System V UNIX System V | UNIX |
| Languages | BASIC, C, BASIC, C, COBOL, FORTRAN, COBOL, FORTRAN, Pascal, UNIBOL Pascal, UNIBOL | BASIC, C, COBOL, FORTRAN, Pascal, UNIBOL |

NA Not applicable

## AT&T 3B2 System Comparison

| | | |
|---|---|---|
| | 3B2 1000 | 3B2 |
| 1000 | 3B2 1000 | |
| | Model 60 and 70 | Model |
| 80 | R3 | |
| Introduced | 3/89 | 3/89 |
| | 9/91 | |
| | | |
| Central Processor: | | |
| Processor | WE32100 | |
| | WE32200 | -- |
| Math Acceleration Unit | WE32206 | |
| | WE32206 | -- |
| Word Size (bits) | 32 | 32 |
| | -- | |
| Clock Rate | 22 MHz | 24 MHz |
| | -- | |
| Cache (bytes) | 4 K physical | 4 K |
| physical | -- | |
| Rated Performance (MIPS) | -- | 9-16 |
| | -- | |
| | | |
| Memory: | | |
| Min/Max RAM (bytes) | 4 M/64 M | 16 M/64 |
| M | 256 M | |
| | (Model 60) | |
| | 16 M/64 M | |
| | (Model 70) | |
| Increments (bytes) | 2 M, 4 M, 16 M | 2 M, 4 |
| M, 16 M | -- | |
| Memory Management Unit | WE32201 | |
| | WE32201 | -- |
| | | |
| I/O Characteristics: | | |
| Max Serial Connections | 90 | 90 |
| | -- | |
| No. of Concurrent Users | Up to 64 | 100 + |
| | 10-100+ | |
| | (Model 60) | |
| | Up to 80 | |
| | (Model 70) | |
| No. of SCSI Adapters | Up to 8 | Up to 8 |
| | -- | |
| | | |
| Data Communications: | | |
| Networks | AT&T STARLAN, | AT&T |
| STARLAN, | -- | |
| | 3BNET, DATAKIT, | 3BNET, |
| DATAKIT | | |
| | ISN; IBM SNA; | ISN; IBM |
| SNA; | | |
| | Ethernet, X.25 | |
| | Ethernet, X.25 | |
| Protocols | IBM SNA/3270, | IBM |
| SNA/3270, | -- | |
| | BSC/3270, | |
| | BSC/3270, | |
| | SNA/RJE, | SNA/RJE, |
| | LU6.2; TCP/IP | LU6.2; |
| TCP/IP | | |
| | | |
| Mass Storage: | | |
| Diskette Storage | | |
| (bytes) | 720 K | 720 K |
| | -- | |
| Min/Max Disk | | |
| Storage | 300 M/14 G | 600 |
| M/14 G | Up to 50 G | |
| | (Model 60) | |

| | | | |
|---|---|---|---|
| | Tape Storage | 600 M/14 G (Model 70)<br>120 M<br>--<br>cartridge, cartridge, 9-track SCSI | 120 M<br><br><br>9-track |
| | SCSI | | |

Comparison continued on next page.

**AT&T 3B2 System Comparison Continued**

| | | |
|---|---|---|
| | 3B2 1000 | 3B2 |
| 1000 | 3B2 1000 | |
| | Model 60 and 70 | Model |
| 80 | R3 | |
| Software: | | |
| Operating System | UNIX System V | UNIX |
| System V | UNIX V.4 | |
| Languages | BASIC, C, | BASIC, |
| C, | COBOL, FORTRAN, | COBOL, |
| FORTRAN, | Pascal, UNIBOL | Pascal, |
| UNIBOL | | |

NA Not applicable

## AT&T StarServer System Comparison

| | StarServer S<br>StarServer E<br>StarServer FT | |
|---|---|---|
| System Characteristics: | | |
| Min/Max Memory (bytes) | 4 M/6 M<br>16 M/40 M per processor | 8M /512 M per processor |
| Expansion Increments (bytes) | 4 M, 16 M<br>8 M, 16 M, 32 M SIMMS | 8 M, 32 M |
| Min/Max Storage (bytes) | 300 M/36 G<br>600 M/17 G | 200 M/1 G |
| No. of Processors | 1<br>1-3 | 1-4 |
| No. of Terminals | 114<br>96 | 128 |
| Maximum No. of Users | 64 clients or 80 users<br>96 | 128 |
| Date First Installed | 11/90<br>3/90 | 7/90 |
| Central Processor & Memory: | | |
| Computer Type | 32-bit<br>32-bit | 32-bit |
| Processor Model | i486<br>MIPS | i486 |
| Memory Type | Parity<br>-- | ECC |
| FP Co-processor | Weitek 4167<br>MIPS 2010 | Weitek 4167 |
| Cache Memory (bytes) | 128 K each<br>64 K inst./ 64 K data | 256 K each |
| Performance Characteristics: | | |
| Multiprocessing Capability Symmetrical (Y/N) | --<br>No | Yes |
| Master/Slave | --<br>No | -- |
| MIPS | 26.5<br>12-15.6 | 27-108 |
| Proc. Clock Speed | 33 MHz<br>16.67 MHz | 33 MHz |
| I/O Transfer Rate (bytes/sec) | 33M<br>-- | 267 M |
| Expansion Slots | 10<br>12 | -- |
| Purchase Price (basic config.) | $14,995<br>$184,000 | $29,000 |
| Memory/Storage included (bytes) | 4 M + 300 M<br>16 M HDU | 8 M |
| Sold Through | Direct, Dealers<br>Direct, Dealers | -- |
| Manufacturer's Support Options | From 8-5<br>From 8-5 weekdays to | -- |

| | |
|---|---|
| | weekdays to<br>24 hours,<br>24 hours,<br>7 days/week<br>7 days/week |

-- Information not available

## AT&T Series 7000 R3 System Comparison

| | 7020 R3<br>7120 R3 | 7040 R3 |
|---|---|---|
| CPUs | 1-2<br>1-12 | 1-4 |
| MIPS | 30-60<br>30-360 | 30-120 |
| Memory | 32-160 MB<br>32-512 MB | 32-512 MB |
| I/O slots | 14<br>Up to 54 | Up to 54 |
| Disks | Up to 23 GB<br>Up to 128 GB | Up to 128 GB |
| Users | Up to 128<br>Up to 1024 | Up to 512 |
| TPC-A* | 20-35<br>20-140 | 20-70 |
| VAX Equivalent MIPS (VUPS) | 25-300<br>25-300 | 25-300 |

* Estimates

## AT&T Series 7000 System Comparison

| | 7020<br>7120 | 7040 |
|---|---|---|
| CPUs | 1-2<br>1-8 | 1-4 |
| MIPS | 14-28<br>14-112 | 14-56 |
| Memory | 16-64 MB<br>32-256 MB | 32-128 MB |
| Disks | 323 MB-15 GB<br>470 MB-64 GB | 470 MB-64 GB |
| Users | 128<br>1,000 | 256 |

-- Information not available

## NCR Tower System Comparison

| Model | Tower<br>Tower<br>Tower<br>Tower<br>Tower<br>32/300<br>32/500<br>32/700<br>32/825<br>32/850 | |
|---|---|---|
| System Characteristics: | | |
| Min/Max Memory (bytes) | 4 M/32 M | 4 |
| M/64 M | 4 M/64 M | 8 |
| M/128 M | 16 M/384 M | |
| Expansion Increment (bytes) | 4 M | 4 M |
| | 4 M | 4 M, |
| 8 M, | 4 M, 8 M, | |
| | | 16 M |
| | 16 M | |
| Min/Max Storage (bytes) | 126 M/ | 170 |
| M/ | 170 M/ | 170 |
| M/ | 170 M/ | |
| | 380 M | 1.1 |
| G | 1.1 G | 20 G |
| | 20 G | |
| Number of Processors | 1 | 1 |
| | 1 | 1-6 |
| | 1-6 | |
| Number of Workstations | 16 | 32 |
| | 64 | 256 |
| | 512 | |
| Max/Recommended # of Users | 16/8 | |
| | 32/16 | |
| | 64/32 | |
| | 256/128 | |
| | 512/256 | |
| Date First Installed | 12/89 | |
| | 11/89 | 9/89 |
| | 3/89 | |
| | 3Q/88 | |
| Central Processing Unit & Memory: | | |
| Computer Type | 32-bit | 32- |
| bit | 32-bit | 32- |
| bit | 32-bit | |
| Processor Model | MC68030 | |
| | MC68030 | |
| | MC68030 | |
| | MC68020 | |
| | MC68020 | |
| Memory Type | ECC | ECC |
| | ECC | ECC |
| | ECC | |
| Floating Point Co-processor | Optional | |
| | Optional | |
| | Optional | |
| | Optional | |
| | Optional | |
| | MC68882 | |
| | MC68882 | |

| | | | |
|---|---|---|---|
| | MC68882 | | |
| | MC68881 | | |
| | MC68881 | | |
| Cache Memory (bytes) | Opt. | 16 K | 16 K |
| | | 32 K | 40 K |
| | | 40 K | |
| Performance Characteristics: | | | |
| Multiprocessing Capability (Y/N) | | N | N |
| | | N | Y |
| | | Y | |
| Proc. Clock Speed (MHz) | | 20 | 20 |
| | | 30 | 30 |
| | | 30 | |
| I/O Transfer Rate (bytes/sec) | | -- | -- |
| | | -- | 40 M |
| | | 40 M | |
| Basic Configuration: | | | |
| Memory/Storage included (bytes) | | 4 M/126 M | 8 |
| | | M/380 M | 16 M/760 M | 24 |
| | | M/1.3 G | -- | |

-- Information not available

## NCR I Series System Comparison

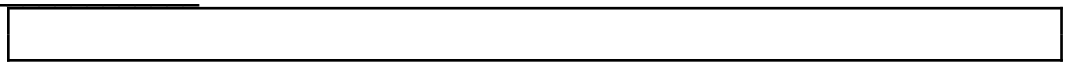
| Product | 10000 35<br>10000 85 | 10000 55 | 10000 65 | 10000 75 |
|---|---|---|---|---|
| Word Length (bits) | 32<br>32 | 32 | 32 | 32 |
| Disk Storage Capacity (bytes) | 405 M<br>NA | 20 G | 150 G | 150 G |
| Memory Range (bytes) | 4 M<br>84 M-128 M | 4 M-16 M | 8 M-24 M | 8 M-32 M |
| No. Terminals Supported | 16<br>250-1,000 | 198 | 760 | 1,000 |
| Target Markets | Business, Banking/ Finance<br>NA | Business, Banking/ Finance, Office | Business, Banking/ Finance, Office | Business, Banking/ Finance, Office |
| Central Processor: Manufacturer and Model | Proprietary<br>Proprietary | Proprietary<br>Proprietary | Proprietary | |
| Cycle Time (nanoseconds) | 150<br>NA | 150 | 110 | 110 |
| MIPS | 1.5<br>10 | 1.5 | 2.5 | 5 |
| Hardware Floating Point (precision) | Standard, triple<br>NA | Standard, triple | Standard, triple | Standard triple |
| Cache Memory (bytes) | NA<br>64 M | NA | NA | NA |
| Battery Backup | NA<br>NA | NA | NA | NA |
| Main Storage: Cycle/Access Time (nanoseconds) | 450/330<br>110 | 450/330 | 330 | NA |
| Storage Protection | NA<br>ECC | NA | NA | NA |
| Increment Size (byte) | NA<br>8 M | 4 M | 8 M | NA |
| Input/Output Control: Type of Bus | Multibus II<br>NA | Multibus II | Multibus II | Multibus II |
| No. of I/O Channels | 1-1<br>32-180 | 1-5 | 1-5 | 2-5 |
| Bandwidth per Channel (bytes/sec) | NA<br>1.2 M | NA | NA | NA |
| Communications: Max. No. of Lines Supported | 16<br>2,000 asynch | 198 | 760 | 1,000 |
| Protocols Supported | SDLC, SNA, HDLC, BSC, X.25, X.29<br>SDLC, SNA, X.25, X.400, HDLC, BSC, X.29, TCP/IP NETBIOS, BSC, X.29, TCP/IP | SDLC, HDLC, SNA, BSC, X.25, X.29, X.400, TCP/IP | SDLC, HDLC, SNA, BSC, X.25, X.29, X.400, TCP/IP | SDLC, SNA, X.25, X.400, TCP/IP |
| LANs Supported | Ethernet/ | Ethernet/ | Ethernet/ | Ethernet/ |

| | | | | |
|---|---|---|---|---|
| | Ethernet/802.3, 802.3 Token Ring /802.5 | 802.3 | 802.3 | 802.3 |

Comparison continued on next page.

## NCR I Series System Comparison Continued

| Product | 10000 35 | 10000 55 | 10000 65 | 10000 75 10000 85 |
|---|---|---|---|---|
| IBM 3270 Emulation | SNA 3270/ 3270/ NA | SNA 3270/ 3770, BSC | SNA 3270/ 3770, BSC | SNA 3270/ 3770, BSC |
| Peripheral Equipment: | | | | |
| Disk Supported (bytes): Fixed | 135 M | 4; 135 M, 280 M, 380 M-760 M | 4; 135 M, 300 M, 415 M | 4; 135 M, 280 M, 415 M |
| Disks Supported (bytes): Removable | 2; 135 M | 44; 135 M, 314 M-640 M | 356; 135 M, 280 M, 415 M | 44; 135 M, 300 M, 415 M |
| Disk Controller | SCSI NA | SCSI | SCSI | SCSI |
| Cartridge Drives Max. Capacity (bytes) | 60 M NA | 60 M | 60 M | 60 M |
| Reel-to-Reel Drives, Densities (bits/inch) | 1,600/3,200 1,600/3,200 6,250 | 1,600/3,200, NA 6,250 | 1,600/3,200 6,250 | 6,250 |
| Max. Capacity (bytes) | 180 M 6250 | 180 M | 80 M | 180 M |
| Max. Speed (ips) | 75 NA | 75 | 75 | 75 |
| Tape Controller | Proprietary Proprietary | Proprietary NA | Proprietary | |
| Line Printers (lpm) | 125 to 2,000 NA | 125 to 2,000 | 125 to 2,000 | 125 to 2,000 |
| Serial Printers (cps) | 33 to 400 NA | 33 to 400 | 33 to 400 | 33 to 400 |
| Nonimpact Printers (cps) | None NA | None | None | None |
| Page Printers (ppm) | 8 to 15 NA | 8 to 15 | 8 to 15 | 8 to 15 |
| Software: | | | | |
| Operating System Name | ITX ITX | ITX | ITX | ITX |
| Based on | Proprietary Proprietary | Proprietary NA | Proprietary | |
| Standard Adhered to | None NA | None | None | None |
| Operating System Type | Multiuser, Multiuser, Multitasking, Multitasking OLTP | Multiuser, Multiuser, Multitasking Multitasking | Multiuser, Multitasking | |
| DBMS Supported | Oracle Oracle | Oracle | Oracle | Oracle |
| Applications Development Tools | CorVision CorVision | CorVision NA | CorVision | |
| Compilers | BASIC, COBOL, COBOL, C | BASIC, COBOL, NA Pascal, C | BASIC, COBOL, Pascal, C | BASIC, Pascal, C |
| Principal Applications Available | Office NA | Office | Office | Office |



Comparison continued on next page.

**NCR I Series System Comparison Continued**

| Product<br>75<br>Pricing and Availability:<br>Typical System Config. | 10000 35<br>10000 85 | 10000 55 | 10000 65 | 10000 |
|---|---|---|---|---|
| | CPU,<br>NA | CPU | CPU | CPU |
| RAM | 4 MB RAM | 4 MB RAM | 8 MB RAM | 8 MB |
| DASD | 135 MB DASD | 135 MB DASD | 135 MB DASD | 135 MB |
| DASD | Tape | Tape | 300 MB DASD | 300 MB |
| | | | Tape | Tape, PC |

Up to four systems can be loosely coupled which is allowed for data sharing.

NA

Information not available

## NCR V Series System Comparison

| 9800 VRX/E |
| --- |
| System |
| Models 9811, 12, 21, 32, |
| 42, 44, 63, 66, 84, 88 |
| System Characteristics: |
| No. of CPUs |
| 1-8 (AP*) |
| No. of I/O Processors |
| 1-8 (DSP**) |
| Plug Compatible with |
| NA |
| Main Storage: |
| Type |
| 64 K-bit MOS |
| Cycle Time, nanoseconds |
| 100 |
| Access Time, nanoseconds |
| 330 |
| Minimum Capacity, bytes |
| 4 M per AP, 4 M per DSP |
| Maximum Capacity, bytes |
| 16 M per AP, 16 M per DSP |
| Increment Size, bytes |
| 4 M |
| Expanded Storage |
| NA |
| Cache Storage: |
| Type |
| NA |
| Cycle Time, nanoseconds |
| NA |
| Minimum Capacity, bytes |
| 1 M or 3 M (DSP) |
| Maximum Capacity, bytes |
| 1 M or 3 M (DSP) |
| Increment, bytes |
| NA |
| Central Processor: |
| Relative Performance, MIPS |
| 1 to 8 |
| Machine Cycle Time, nanoseconds |
| 100 (AP) |
| Word Length, bits |
| 32 |

| |
|---|
| Input/Output Control:<br>Integrated I/O Channels |
| Up to 128<br>Other I/O Channels |
| NA<br>Maximum I/O Data Range,<br>bytes/sec |
| 3 M |
| Communications:<br>Maximum No. of Lines |
| 54<br>Synchronous, speed |
| NA<br>Asynchronous, speed |
| 18<br>Protocols Supported |
| DLC, BMC, TTY, X.25 |
| Network Architectures<br>Supported |
| NCR/CNA, SNA |
| Peripheral Equipment:<br>Disk Drives |
| 133.7 MB-1.09 GB<br>Magnetic Tape Drives |
| PE/GCR, 21-200 ips<br>Line Printers |
| 360-2,000 lpm |

Comparison continued on next page.

**NCR V Series System Comparison Continued**

| 9800 VRX/E |
|---|
| System |
| Models 9811, 12, 21, 32, |
| 42, 44, 63, 66, 84, 88 |
| Other Peripheral Devices Supported |
| Terminals |
| MICR sorters, |
| multiplexers, |
| laser printers, |
| communications |
| Software: Operating Systems |
| VRX/E Programming Languages |
| VRX/E COBOL, NEATVS, |
| C, IVS Basic |
| Database Management System |
| DBSR, DBSN |

* Applications Processor
** Data Storage Processor
NA Information not available