Entry-level servers

Dave Mitchell serves up a pedigree from 12 budget workhorses

The small business networking market continues to see tremendous growth and represents an area of huge potential for manufacturers. Networking can bring many benefits to small companies, not least in terms of increased productivity, while sharing resources reduces operating costs. However, the ever increasing number of server-based applications is forcing companies to look beyond the basic peer-to-peer network and consider a full client/server environment. For many small businesses, this may represent a big step forward in terms of technology investment, so they need to get it right to avoid making a costly mistake.

The entry-level server is an ideal starting point, as it combines all the necessary features and comes at a price to suit those on a budget. To help you with your buying decisions, we've invited 12 vendors to this month's group test and asked them to supply an entry-level server.

We played devil's advocate when it came to the specification, because we wanted to see what each vendor considered a suitable system for the small business. We wanted to look at entry-level servers where value is a key factor. Target companies would be SMEs (small- to medium-sized enterprises) looking to move from a peer-to-peer network into a client/server environment, but on a strict budget. Typical applications would be file and print services – plus maybe email and Internet connection sharing – but the server should have sufficient capacity and expansion potential to grow with demand at least for a couple of years. We didn't lay down a strict price restriction, but expected the £1,000 mark would seem fair.

Some businesses may decide the best approach is to lease all their equipment from a specialist company. In the long term, this could prove to be comparatively costly, but the leasing company should be able to deliver a complete network tailored to your requirements and provide training and support. One reason why you may not want to lease your network services comes courtesy of the Inland Revenue. First year capital allowances of 100 per cent are available to small businesses investing in information and communications technology. The discount depends on the highest rate of tax your company pays, but it means you can get immediate relief on all of your investment.

Three classes of assets apply, with 'Computer Equipment' the most interesting. Not only do new servers and workstations qualify, but so do peripherals, dedicated electrical systems for computers and data connection cabling. The bottom line is that you could also claim on upgrades, including new motherboards

...a good internal design ensures the server is down for the minimum of time

or memory, modems and all networking equipment, such as cabling and network cards. To qualify, your business shouldn't have more than 50 employees or a turnover in excess of £2.8 million, but you'll need to get moving, as the offer is only open until 31 March 2003. See **www.inlandrevenue.gov.uk/news/budget/fya.pdf** and **www.inlandrevenue.gov. uk/e-commerce/sme4a.htm**

Many companies may be tempted into thinking that a well-specified PC would be a good candidate for a server, but this would be a false economy. It may well be able to run your choice of network operating system and applications, but remember that all your data is now stored in a single location – if the system dies, it could take your company with it. A purpose-built server is a far more sensible investment, as it offers features that the average PC can't hope to match. You may require 24-hour operations without any interruptions, so build quality must be top-notch.

Upgrade potential in all areas needs to be good, allowing processing power, memory and storage to be improved as demand increases. Furthermore, when it comes to adding extra components or carrying out maintenance, you'll need to get in and out quickly – a good internal design ensures the server is down for the minimum of time. Management is also a key feature, because a server-specific motherboard allows you to monitor critical areas such as disk activity, cooling fan status and internal temperatures. Sensors on the motherboard are able to pass this vital information to management software running on a remote system to help you keep a close eye on server performance and system integrity, and receive early warnings if a problem develops.

We were impressed with the majority of servers supplied, since they offered good specifications for the price, with nearly all vendors including at least a 1.13GHz Pentium III processor and reasonable amounts of memory. Toshiba even managed to squeeze in dual processors and still deliver a budget-priced system. At this price point, IDE-based storage systems are the order of the day, with a couple of systems also offering low- cost IDE RAID controllers. Over in the core logic department, ServerWorks is no longer having its own way – the VIA Apollo Pro chipset is proving to be just as popular for server applications, because it also delivers a 133MHz FSB and supports low-cost PC133 SDRAM. Overall, the 12 servers in the group test offer a wide variety of specifications, with all but one falling into a tight price bracket. Read on to find out more.

● SPECIFICATIONS AND FEATURES

	Compaq ProLiant ML330 G2	Dell PowerEdge 1400SC	Evesham SilverEdge 500ANplus	Fujitsu Siemens Primergy Econel20	HP server tc2100	Hi-Grade Hi-Serv 1000
Overall score	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★☆☆☆	★★★☆☆
Supplier	Compaq 0845 270 4000	Dell 0870 907 4155	evesham.com 0870 160 9700	Fujitsu Siemens 01344 475555	Hewlett-Packard 0845 474747	Hi-Grade 020 8532 6113
Manufacturer's Web site	www.compaq.com	www.dell.com	www.evesham.com	www.fujitsu-siemens.com	www.hp.com	www.higrade.com
Price (exc VAT)	£899	£2,242	£1,249	£749	£779	£1,240
Basic warranty	1yr on-site	1yr on-site	3yrs on-site	3yrs on-site	3yrs on-site	1yr on-site
CASE						
Height x width x depth (mm)	423 x 189 x 510	452 x 205 x 440	430 x 220 x 655	360 x 196 x 340	465 x 200 x 460	465 x 200 x 460
PSU rating (W)	300	330	300	200	250	400
Installed/maximum PSUs	1/1	1/1	1/1	1/1	1/1	1/1
MOTHERBOARD						
Make	Compaq	Dell	Intel SAI2	Fujitsu Siemens	HP	Asus CUV4X-DLS
Chipset	ServerWorks Entry ServerSet LE	ServerWorks Entry ServerSet LE	ServerWorks Entry ServerSet LE	Intel 845	VIA Apollo Pro 133	VIA Apollo Pro 133
Maximum FSB speed (MHz)	133	133	133	400	133	133
Processor socket type	FC-PGA	FC-PGA	FC-PGA	FC-PGA	FC-PGA	FC-PGA
Processor type	1.13GHz Pentium III	1.4GHz Pentium III	1.26GHz Pentium III	1.7GHz Pentium 4	1.13GHz Pentium III	1GHz Pentium III
Installed/max processors	1/2	1/2	1/2	1/1	1/1	1/2
MEMORY						
Type	PC133 SDRAM	PC133 SDRAM	PC133 SDRAM	DDR SDRAM	PC133 SDRAM	PC133 SDRAM
RAM fitted	128Mb	1Gb	512Mb	256Mb	128Mb	256Mb
Maximum RAM	4Gb	2Gb	4Gb	1.5Gb	1.5Gb	4Gb
Free/total sockets	3/4	0/4	2/4	0/2	2/3	3/4
HARD DISK						
No./make/model	Maxtor 5T020H2	3 x Fujitsu MAN3184MP	2 x Western Digital WD800	Seagate ST380021A	Maxtor D540X-4K	Maxtor Atlas 10K III
Total capacity (unformatted)	20Gb	54Gb	160Gb (RAID-0)	80Gb	40Gb	18Gb
Controller type	IDE RAID controller	Dell PERC3 RAID	Promise FastTrak100 TX2	IDE (ATA 100)	IDE (ATA 100)	LSI 53C1010
Controller location	Feature board	PCI card	PCI card	Motherboard	Motherboard	Motherboard
Other controllers	IDE (1)	Adaptec AIC-7899G IDE (1)	IDE (2)	✖	✖	IDE (2)
NETWORK INTERFACE						
Make and model	Compaq NC3163	Intel PRO/100+	Intel PRO/100+	Intel PRO/100+	HP NetServer	Intel PRO/100+
Location	Feature board	Motherboard	Motherboard	Motherboard	Motherboard	Motherboard
SLOTS						
64-bit PCI free/total	4/4 (33MHz)	3/4 (33MHz)	2/2 (66MHz)	0/0	0/0	0/0
32-bit PCI free/total	1/1	2/2	3/4	3/3	5/5	5/5
DRIVE BAYS FREE/TOTAL						
Front 5.25in	3/4	1/2	4/5	1/2	2/3	2/3
Front 3.25in	1/2	1/1	3/5	0/1	0/1	0/1
Internal 5.25in	0/0	0/0	0/0	0/0	0/0	0/0
Internal 3.25in	0/0	1/4	0/0	1/2	1/2	1/2
ADDITIONAL PERIPHERALS						
CD-ROM	LG CRD-8482B	LG CRD-8482B	LG CRD-8520B	Mitsumi FX4830T	Lite-On LTN4865	LG CRD-8522B
Other	✖	✖	✖	✖	✖	✖
GRAPHICS ADAPTOR						
Make and model	ATi Rage XL	ATi Rage XL	ATi Rage XL	ATi Radeon	ATi Rage XL	ATi Rage Fury Pro
Location	Feature board	Motherboard	Motherboard	AGP card	Motherboard	AGP card
Video memory	8Mb	4Mb	8Mb	32Mb	4Mb	32Mb
INTERFACES						
Ports (see Key below)	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 4USB
Monitor included	✖	✖	✖	✖	✖	✖
Keyboard	✔	✔	✔	✔	✔	✔
Mouse	✔	✔	✔	✔	✔	✔
Software supplied	SmartStart, Insight Manager XE	Dell OpenManage, IT Assistant	Winbond Hardware Doctor	ServerStart ServerView	HP DiagTools	Intel LDCM 6

Key: RTB=Return to base, S=Serial port, P=Parallel port, USB=Universal Serial Bus

● HOW WE TESTED

Testing servers in a real-world environment is more involved than for standalone PCs, because you need to know how efficiently the system can deal with network requests from multiple users. To simulate this type of workload, we used BAPCo's (Business Applications Performance Corp) SYSmark for Servers. Rather than simply flood the server with I/O requests and calculate overall throughput, SYSmark runs a group of nine real-world applications that are all installed on the server and executed across the network. The application suite is designed to cover a wide a range of business uses such as word processing, database queries, graphics design and email and includes Lotus 1-2-3, Microsoft Word and Excel, cc:Mail, WordPerfect and Paradox.

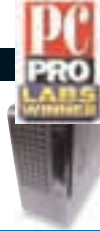Each server had Windows 2000 Server installed and the SYSmark software copied down to it. This includes utilities to create a new username for each client and set up appropriate network shares. All that each test client requires locally is a small batch file that assigns a unique number to each workstation and determines which application they should start first. After each client has logged on to the server under test, the benchtest is started. A control workstation waits until they're all synchronised and then sends a 'go' command to each one so the tests begin simultaneously.

Each application is loaded on to the workstation from the server, where it executes a macro or a script created from Microsoft's Test automation utility. As well as carrying out calculations or document manipulations, each application sends numerous print requests to a shared printer on the server. The server must process each print request, but a null printer adaptor was attached to its parallel port to remove the printer response time from the calculations.

SYSmark monitors each workstation's progress through the test suite and logs the run-time for each application. It then processes the results and creates a report showing a breakdown of each client's timings. The average time for a client to complete the entire suite of programs from three separate runs was used to determine a server's performance.

In previous server group tests, we've run SYSmark over Ethernet and Fast Ethernet to show the benefits of moving to the faster technology. Now that all servers and workstations come with dual-speed network cards as standard, we opted to run the benchmarks only over Fast Ethernet with all clients and servers connected to an Intel Express 510T dual-speed Ethernet switch. Suffice to say that if you're still running 10Mbit
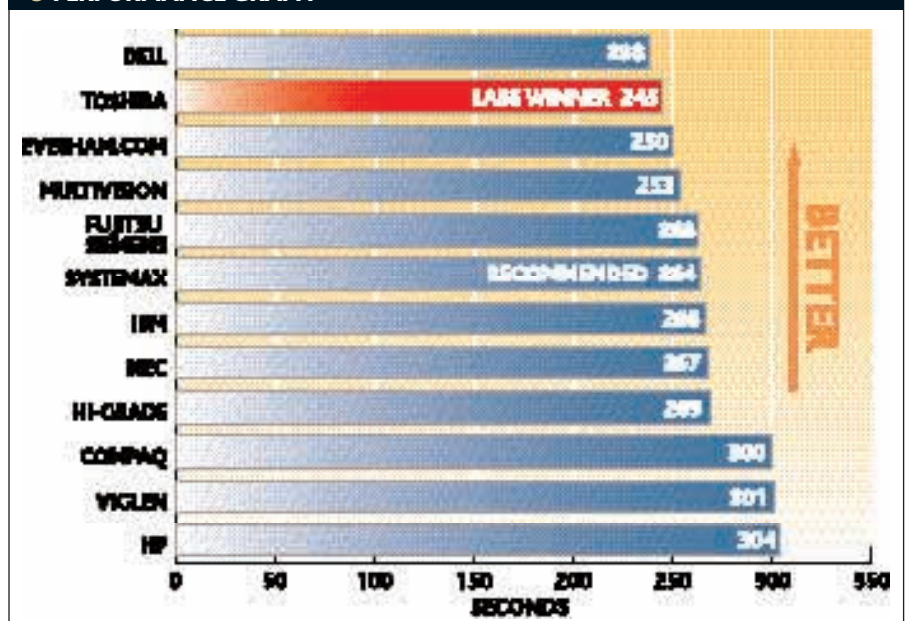
	IBM xSeries 200	Multivision Titan Server 1000	NEC Express5800 TM1300	Systemax Mission P1000CP	Toshiba Magnia 550D	Viglen CX115P Server
Rating	★★★	★★★★	★★★★	★★★★★	★★★★★	★★★
Manufacturer	IBM	Multivision	NEC	Systemax	Toshiba	Viglen
Phone	023 9256 1000	0870 066 0880	0870 010 6325	0870 729 7365	01932 828828	020 8758 7000
Web	www.ibm.com	www.multivision.co.uk	www.nec-online.co.uk	www.systemaxpc.co.uk	www.toshiba.co.uk	www.viglen.co.uk
Price	£961	£999	£789	£999	£1,274	£1,299
Warranty	3yrs on-site	2yrs on-site	3yrs on-site	3yrs on-site	3yrs on-site	3yrs RTB
Dimensions	466 x 165 x 496	627 x 190 x 445	445 x 175 x 455	450 x 222 x 595	447 x 190 x 490	540 x 204 x 466
	330	300	300	300	300	300
	1/1	1/1	1/1	1/1	1/1	1/1
Motherboard	MSI MS-6333	MSI MS-6377	MSI MS-9105	SuperMicro P3TDL3	Gigabyte GA-6VTXD	AOpen DX34 Plus-U
Chipset	VIA Apollo Pro 133	ServerWorks Entry ServerSet LE	VIA Apollo Pro 266T	ServerWorks Entry ServerSet LE	VIA Apollo Pro 133	VIA Apollo Pro 133
	133	133	133	133	133	133
	FC-PGA	FC-PGA	FC-PGA	FC-PGA	FC-PGA	FC-PGA
CPU	1.26GHz Pentium III	933MHz Pentium III	1GHz Pentium III	1GHz Pentium III	1.13GHz Pentium III	1.13GHz Pentium III
	1/1	1/2	1/2	1/2	2/2	1/2
Memory type	PC133 SDRAM	PC133 SDRAM	DDR266 SDRAM	PC133 SDRAM	PC133 SDRAM	PC133 SDRAM
Memory	256Mb	512Mb	256Mb	256Mb	512Mb	128Mb
Max	1.5Gb	3Gb	2Gb	4Gb	2Gb	3Gb
Slots	2/3	3/4	3/4	3/4	2/4	2/3
Hard disk	IBM Ultrastar	Seagate ST336938LW	Hitachi DK32DJ-18MW	Seagate ST318406LW	2 x Fujitsu MPG3204AT	Fujitsu MAN3184MP
Capacity	18Gb	36Gb	18.4Gb	18Gb	40Gb	18Gb
Controller	Adaptec 29160LP	Adaptec AIC-7899G	Adaptec 29160LP	Adaptec AIC-7892B	IDE (ATA 100)	Adaptec AIC-7899G
Location	PCI card	Motherboard	PCI card	Motherboard	Motherboard	Motherboard
	IDE (2)	IDE (2)	IDE (2)	IDE (2)	✘	IDE (2)
Network	Intel PRO/100+	2 x Intel's PRO/100+	Intel PRO/100+	Intel PRO/100+	D-Link DFE-530TX	Intel PRO/100+
Location	Motherboard	Motherboard	Motherboard	Motherboard	PCI card	Motherboard
	0/0	2/2 (66MHz)	0/0	2/2 (33MHz)	0/0	0/0
	4/5	3/3	4/5	3/4	4/5	5/5
	1/2	4/6	1/2	2/3	3/4	2/4
	1/2	1/2	1/2	0/1	0/3	1/2
	0/0	0/0	0/0	0/0	0/0	0/0
	3/4	1/2	3/4	4/5	0/0	3/4
CD	Lite-On LTN4865	LG CRD-8521B	GoldStar CRD-8484B	BTC BCD F562B	Matsushita CR-594	Samsung SC-152L
Tape	✘	Seagate ST8000	✘	✘	✘	HP SureStore DAT DDS-3
Graphics	ATi Rage XL	ATi Rage XL	Nvidia Vanta	ATi Rage XL	Nvidia Vanta	ATi Rage XL
Location	AGP card	Motherboard	AGP card	PCI card	AGP card	AGP card
	8Mb	8Mb	8Mb	8Mb	8Mb	8Mb
Ports	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB	2S, 1P, 2USB
Monitor	✘	✔ (17in)	✘	✘	✘	✔ (15in)
	✔	✔	✔	✔	✔	✔
	✔	✔	✔	✔	✔	✔
Software	ServerGuide IBM Director	PC Alert III	KickStart, ESMPRO Agent Norton AntiVirus Corporate Edition	Intel LDCM 6	HarnessEye/WEB	ASM Lite, TapeWare XE, Unicenter TNG

PERFORMANCE GRAPH

Performance graph (time in seconds, lower is better):

- DELL — 248
- TOSHIBA — LABS WINNER 248
- EVESHAM.COM — 250
- MULTIVISION — 253
- FUJITSU SIEMENS — 256
- SYSTEMAX — RECOMMENDED 264
- IBM — 266
- NEC — 267
- HI-GRADE — 269
- COMPAQ — 300
- VIGLEN — 301
- HP — 304

BETTER

Ethernet, you can expect to see as much as a 50 per cent improvement by upgrading to 100Mbits/sec.

The test results demonstrate what impact various components can have on performance, with memory making the biggest difference. However, speed alone doesn't make a great server. True, this is an important consideration, but there are other factors that must be taken into account. Cost is a key factor – a server should be seen as a long-term investment. Does the system look like it's built to last the course and does the warranty provide long-term cover if things do go wrong? When compiling the scores and choosing the best from the rest, we looked at every aspect of the server – expansion potential, specification, management tools, build quality, physical security – all important factors that you need to know about.

Compaq ProLiant ML330 G2

PRICE £899 (exc VAT)
INTERNET www.compaq.com
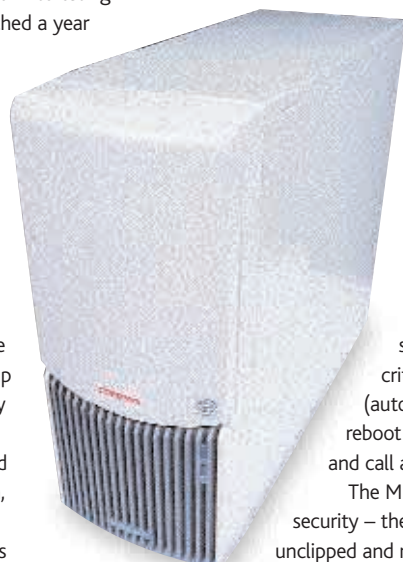**SUPPLIER** Compaq 0845 270 4000
BASIC WARRANTY One year on-site
VERDICT A bargain bundle that looks an ideal first choice for small businesses, as the low price includes an integrated IDE RAID controller and quality management tools.

Targeting small businesses with less than 100 employees, Compaq's ProLiant ML330 introduced a number of interesting features when it was launched a year ago. The G2 (second generation) builds on these successes and adds a few choice components of its own, such as dual processor support and integrated IDE RAID.

Management options are excellent, as Compaq includes the same software as found with its workgroup servers. A SmartStart utility guides you gently through hardware configuration and operating system selection, while the bundled Insight Manager XE software offers plenty of management and monitoring utilities. For local server management, you'll find lots of information on offer about the various system components. You can also check on processor use and areas such as system board operating temperatures and cooling fan status. It's possible to link the information to an alert log and use it to send emails or call a pager if anything untoward is spotted. In the event of a critical failure, Compaq's ASR2 (automatic server restart) will reboot the server, log the fault and call a pager number.

The ML330 G2 includes no physical security – the server's front panel can be unclipped and removed easily, and behind this lurk four 5.25in bays. Expansion potential is good, as the floppy drive bay below has room for two hard drives, and Compaq also offers trays for fitting drives into the 5.25in bays. The side panel is simple to remove and, once inside, you'll find the ML330 G2 offers a number of features that make it stand out from the crowd. Internal design is very clean, making upgrades and maintenance an almost effortless task, and the motherboard uses the ever popular ServerWorks core logic chipset. There's plenty of room to expand, as the ML330 G2 offers four 64-bit and one 32-bit PCI slots. A proprietary slot below is occupied by Compaq's Server Feature board – a neat solution that does away with the need to integrate components on the motherboard, since it combines graphics, a dual-speed Ethernet adaptor and even an IDE RAID controller that supports RAID-0, -1 and -0+1.

Clearly, the ongoing merger negotiations with HP haven't stopped Compaq from delivering a first-class entry-level server. Overall, this is a superb package for a very low price, with good expansion potential and excellent management facilities included.

PC PRO RESULTS

PERFORMANCE	★★☆☆☆☆
FEATURES	★★★★★☆
VALUE FOR MONEY	★★★★★☆
OVERALL	★★★★☆☆

Dell PowerEdge 1400SC

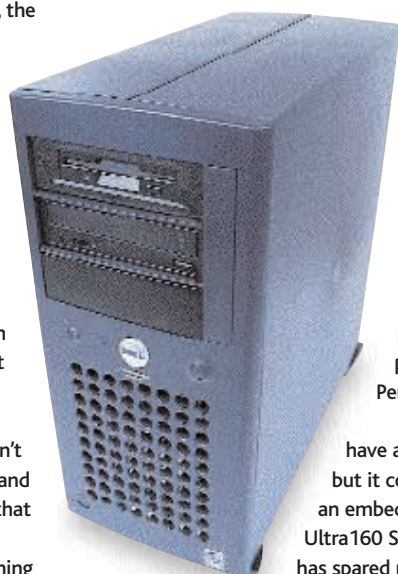**PRICE** £2,242 (exc VAT)
INTERNET www.dell.com
SUPPLIER Dell 0870 907 4155
BASIC WARRANTY One year on-site
VERDICT A fine specification, excellent performance and room to expand – a good choice for those with a generous budget allowance.

Ever since its inception, the PowerEdge range of servers has continued to impress, thanks to a solid combination of build quality, value and features. However, Dell seems to have let its enthusiasm get the better of it, as the specification and price of the 1400SC on review is way beyond what we'd have expected to see in an entry-level server.

The sturdy chassis hasn't seen any notable changes and is essentially the same as that introduced by the *PC Pro* Recommended award-winning PowerEdge 1300 (*see enterprise, issue 61*). As one of the smaller servers on review, the 1400SC presents a very busy interior. The Dell motherboard stretches the full height of the chassis, with the four memory sockets hidden behind a chunky power supply, which can be released and swung upwards out of the way. Below this is a pair of processor slots, one populated by a 1.4GHz Pentium III module.

Not only does the 1400SC have a pair of IDE interfaces, but it compliments them with an embedded dual-channel Adaptec Ultra160 SCSI chipset. However, Dell has spared no expense and ignored these in favour of its PERC3 SCSI RAID controller and even hitched this up to a trio of 18Gb Fujitsu Ultra160 hard disks configured in a full RAID-5 array. This combination clearly made its presence felt in the performance tests, with the 1400SC taking the gold medal.

Dell's software bundle is excellent. First-time installation is aided admirably by its Server Assistant, while IT Assistant is a browser-based utility used to configure, manage and monitor the server and remote systems that have the agent software installed. You can set up alerts to keep you informed of any problems, flash a system's BIOS, shutdown or wake up WOL (Wake-on-LAN) compliant systems and run basic inventories. RAID controller management is accessible directly from here as well, and the server can be automatically rebooted if a hardware problem is detected.

There's no doubt the 1400SC offers a tasty specification packaged into a system with good expansion potential and plenty of management tools. However, our main concern is that many small businesses on a strict budget will not be able to afford it.

PC PRO RESULTS

PERFORMANCE	★★★★★
FEATURES	★★★★☆☆
VALUE FOR MONEY	★☆☆☆☆☆
OVERALL	★★★★☆☆

Evesham SilverEdge 500ANplus

PRICE £1,249 (exc VAT)

INTERNET www.evesham.com

SUPPLIER evesham.com 0870 160 9700

BASIC WARRANTY Three years on-site

VERDICT A solid Intel partnership that delivers excellent performance and high expansion potential. Management and monitoring are weak, though, and the internal layout could be better.

Traditionally, evesham.com has been a big fan of Intel's server components, so it's no surprise to see the SilverEdge 500ANplus composed of an SC5100 chassis and SAI2 motherboard. The chassis is the largest on review and offers remarkable expansion potential – even with the LG CD-ROM drive, there's still room for four more devices underneath. A separate hard disk cage below can handle five drives, and each bay comes with a slide-out tray. Chassis security is reasonable, as the front door can be locked shut and the side panel has an intrusion detector fitted, although the review system's cables weren't connected to the motherboard.

The chassis dimensions dwarf the Intel SAI2 motherboard and, as a consequence, the ribbon cables have to be longer to reach the various front-mounted devices. The board uses a ServerSet III LE chipset, which supports up to 4Gb of PC133 SDRAM, of which evesham.com provided a generous 512Mb helping. A single 1.26MHz Pentium III processor occupies one of the processor slots, and the amount of free space around the main board makes for swift upgrades.

The SAI2 only offers a pair of ATA/100 interfaces, but evesham.com opted to add a Promise IDE RAID controller card linked to a brace of 80Gb Western Digital WD800 drives and configured as a RAID-0 striped array. Designed for performance, the array delivers a whopping 150Gb of storage, but provides no fault tolerance. The card supports up to four drives, but the IDE cables were too short to stretch to the extra drive bays above the installed disks. Cooling is handled efficiently, with two fans at the rear and a large pair behind the drive bays. The latter are mounted in a polystyrene block, which may look ugly but does reduce operational noise.

We'd expected to see Intel include some decent management software, so it was a disappointment to find the SAI2 only offers basic monitoring facilities. Although the bundled Winbond Hardware Doctor provides a comprehensive readout showing processor temperatures, voltages and chassis and system fan operations, all you get is a simple warning message if a fault is detected. Overall, the SilverEdge 500ANplus is an impressive beast, but look elsewhere if floor space is at a premium.

PC PRO RESULTS

PERFORMANCE	★★★★★
FEATURES	★★★
VALUE FOR MONEY	★★★
OVERALL	★★★★

Fujitsu Siemens Primergy Econel20

PRICE £749 (exc VAT)

INTERNET www.fujitsu-siemens.com

SUPPLIER Fujitsu Siemens 01344 475555

BASIC WARRANTY Three years on-site

VERDICT The most compact system on review, but the Econel20 is really just a well-specified PC pretending to be a server.

Although we can admire the compact dimensions of the Econel20, we have to question the wisdom of basing this system around a Pentium 4 processor. Intel's processor most notably targets multimedia and graphics performance, so there's little benefit from using it in a server. The choice of core logic chipset causes further brow furrowing, as Intel's 845 is aimed specifically at the performance and mainstream PC market.

So are there any advantages to this combination? Obviously, dual processing isn't an option, although the chipset does support DDR 200/266MHz memory – Fujitsu Siemens chose to install PC133 memory.

Minimal performance gains have been made, with the Econel20 taking fifth place overall, averaging a SYSmark score similar to the Pentium III systems with the same amount of memory. It's the smallest chassis on review, but a number of sacrifices had to be made to shoehorn the Fujitsu Siemens motherboard into such a small space. The biggest casualty is access. The cover is easily removed, but inside you'll find all but the three PCI slots and the disk bay inaccessible. A bracing bar runs across the middle and has the power supply mounted on top. This sits directly in front of the Pentium 4 module, while plastic ducts allow its internal fan to double up as a processor cooler. Graphics are overendowed, as the AGP slot is home to an ATi Radeon with 32Mb of memory, and a closer look reveals a full set of audio sockets. In fact, checking out the Fujitsu Siemens PC range shows the Econel20 is really a Scenic T in disguise.

The Econel20 does come with decent management software in the shape of ServerView. The inventory option provides a wealth of system information, but the ASR (automatic server recovery) feature isn't supported – information on fan operations, voltages and temperatures can't be gathered from the system board, so failures can't be detected.

The Econel20 is worth considering if you're on a tight budget, but there's little here that's server-specific. You should look elsewhere if you want better security, management and expansion potential.

PC PRO RESULTS

PERFORMANCE	★★★★
FEATURES	★★
VALUE FOR MONEY	★★★
OVERALL	★★★

HP server tc2100

PRICE £779 (exc VAT) SUPPLIER Hewlett-Packard 0845 474747
INTERNET www.hp.com BASIC WARRANTY Three years on-site
VERDICT A very low price, but the well-designed chassis delivers a modest set of features, low performance and no management tools.

We've always been impressed with the management and monitoring tools bundled with HP's servers, so it came as something of a disappointment to find the new tc2100 devoid of these facilities. We tried downloading and installing HP's latest Instant TopTools, but it refused to run on this server. Still, at only £779, perhaps we're expecting too much for our money.

Lack of management features aside, the server tc2100 does provide a good specification gathered together in a well-designed chassis, which bears more than a passing resemblance to the Hi-Grade Hi-Serv 1000 chassis. The tc2100 offers plenty of expansion, with a spare pair of 5.25in bays at the front. A large locking wheel at the rear provides good physical security. With this released, the side panel can be easily removed. The tc2100 is of similar dimensions to Toshiba's Magnia 550D and offers an equally spacious interior. However, the HP motherboard supports a single Pentium III processor and, although it also uses the same VIA Apollo Pro chipset, HP only quotes support for up to 1.5Gb of memory as opposed to 2Gb in the 550D.

The single 40Gb Maxtor IDE drive is mounted in a separate carrier underneath the expansion bays and can be easily released if you want to add a second drive. HP even provides a conversion tray as standard, so you can slot a third drive in the lowest main bay as well. Total integration means all five PCI slots are free for use, and HP also offers a SCSI version of the tc2100, which comes with an Ultra160 adaptor card. The motherboard uses an embedded Intel 82559 Fast Ethernet controller, which supports adaptor teaming, so you could easily add another compliant PCI card and create a high-speed, fault-tolerant network link.

Although not as sophisticated as HP's NetServer navigator tools, basic installation assistance is provided by a bootable CD-ROM with tools for creating driver disks, helping load your chosen operating system and checking the BIOS settings. The system can be booted directly to a diagnostic tool that runs simple tests on the main hardware components to verify correct operations, while an advanced option drills down to individual components for deeper troubleshooting.

PC PRO RESULTS

PERFORMANCE	★☆☆☆☆
FEATURES	★★☆☆☆
VALUE FOR MONEY	★★★★☆
OVERALL	★★☆☆☆

Hi-Grade Hi-Serv 1000

PRICE £1,240 (exc VAT) SUPPLIER Hi-Grade 020 8532 6113
INTERNET www.higrade.com BASIC WARRANTY One year on-site
VERDICT Similar chassis to HP's tc2100, but a better choice of motherboard and far superior management and monitoring tools.

If imitation is the sincerest form of flattery, then Hi-Grade will no doubt be pleased to see that the chassis it chose for the Hi-Serv 1000 is virtually identical to that employed by HP's server tc2100.

However, removing the lockable side panel shows a more adventurous choice of motherboard – Hi-Grade has plumped for an Asus CUV4X-DLS. It still uses the same VIA Apollo Pro core logic chipset, but, along with a pair of ATA100 interfaces, it adds an embedded LSI 53C1010 chipset to the recipe, which brings into play a pair of Ultra160 SCSI channels. Hi-Grade has put these to good use, as one of the channels is connected to the single 18Gb Maxtor Atlas 10K hard disk; the other has been sensibly routed through to the rear, allowing external devices such as tape drives or more storage to be easily connected. The price includes a single 1GHz Pentium III processor, while the 256Mb of PC133 memory came supplied on a single module. Internal expansion follows the same road as the tc2100 – the small hard disk cage is easily released by depressing a locking tab and has room for one more drive.

Hi-Grade has gone overboard in the graphics department by supplying a mighty ATi Rage Fury Pro AGP card equipped with 32Mb of video memory – a cheaper card with 4Mb or 8Mb of memory would have been quite enough. Another unnecessary addition is the small header card, which provides an extra pair of USB ports, but loses a PCI slot in the process. Overall internal design is very clean – access to the pair of processor sockets and four memory slots is unimpeded and all SCSI cabling has been tidily routed round the side of the motherboard. Cooling could be better, as the chassis relies on a single fan at the rear to draw air over the hard disks and memory.

Management options are good, since you get Intel's excellent LANDesk Client Manager (LDCM) 6, which provides a smart browser-based interface from where you can monitor the motherboard sensors locally and on remote systems with the LDCM agent installed. Setting thresholds for each hardware categories will ensure that alerts are generated if any of these values are exceeded.

PC PRO RESULTS

PERFORMANCE	★★★☆☆
FEATURES	★★★☆☆
VALUE FOR MONEY	★★★★☆
OVERALL	★★★☆☆

IBM xSeries 200

PRICE £961 (exc VAT)　　　　**SUPPLIER** IBM 023 9256 1000

INTERNET www.ibm.com　　　　**BASIC WARRANTY** Three years on-site

VERDICT Dual processing should be an option at this price, but the xSeries 200 does deliver exemplary build quality and simple tool-free design.

Representing the starting point of IBM's Intel-based server range, the xSeries 200 makes a tempting proposition to small businesses, as it offers a good specification in a well-designed system. The chassis is extremely solid and the meaty side-panel can be locked down and tied in with an intrusion detector for extra security.

We expected to see an IBM motherboard in residence, so it was a surprise to find an MSI MS-6333 fitted instead. It's not a bad choice, as it uses a VIA Apollo Pro chipset, which supports up to 1.5Gb of PC133 SDRAM memory, but dual processing isn't an option. Instead, you get a single 1.26GHz Pentium III module topped off with a mighty heatsink and dedicated fan. Cooling is well catered for, as an easily removable bracing bar stretches the entire depth of the chassis and is used to suspend a large fan and ducting over the motherboard. Team this up with a rear-mounted fan and you have one very cool customer.

The interior is tidy – IBM was an early adopter of tool-free maintenance, so you'll find all components are held in place with plastic locking clips. The hard disk bay can be released and swivelled around to add a further three drives, and the PCI slots use a single plastic clip to lock in the cards. A pair of ATA/100 IDE interfaces are available, but IBM fitted an Adaptec Ultra160 PCI card instead and linked this up to the 18Gb IBM Ultrastar drive. Graphics are served up by an ATi Rage XL AGP card, but the server could do without the audio ports at the rear.

The system wasn't supplied with an installed operating system, but we found IBM's ServerGuide a fine companion, as it provided plenty of installation assistance from a bootable CD-ROM. IBM's Director software certainly delivers on the management front, although small businesses may find the plethora of features more than they need. Designed to manage multiple servers from a single location, Director can monitor system health, provide comprehensive alerting facilities and run hardware inventory, and display the collected data. It also offers tools for automated software distribution, although the complete package looks overly complex for the target market.

PRO RESULTS

PERFORMANCE	★★★☆☆☆
FEATURES	★★★★☆☆
VALUE FOR MONEY	★★★☆☆☆
OVERALL	★★★☆☆☆

Multivision Titan Server 1000

PRICE £999 (exc VAT)　　　　**SUPPLIER** Multivision 0870 066 0880

INTERNET www.multivision.co.uk　　　　**BASIC WARRANTY** Two years on-site

VERDICT The cumbersome chassis hides a good motherboard with dual network ports. Even with a slow processor, the price also includes a backup device and monitor.

The Titan Server 1000 certainly lives up to its name, as the chassis is the tallest in the group test by a fair margin. Initial impressions are of an enormous expansion potential, but a brief investigation behind the six 5.25in bays shows that the power supply only provides two extra power connectors.

Multivision has made a good choice for the Titan's motherboard, since the MSI MS-6377 is aimed particularly at server applications and comes equipped with the common ServerSet LE chipset, which supports dual processing. The four memory slots are also canted over at around 25 degrees, indicating that MSI has considered low-profile rack server applications as well. An embedded Adaptec AIC-7899G chipset delivers fast Ultra160 SCSI services with one channel connected to a 36Gb Seagate Barracuda hard disk. Upgrade storage options are more limited, as there's only room for two more drives in the small removable cage.

The chassis interior is tidy, although internal cooling is limited to a single chassis fan at the base of the front panel, where it will be of limited value. Total component integration means that all the PCI slots are available, two of which are the faster 64-bit, 66MHz variety. We were impressed with the Titan's network services – it was the only system to come with a pair of integrated Intel PRO/100+ network adaptors. Once you've installed the ProSet II utility, you can team the two adaptors together for a fault-tolerant link or a high-speed connection, where the utility will balance the network load across both adaptors.

Along with Viglen, Multivision thought backup was important and fitted a Seagate ST8000 tape drive, although some backup software and a tape to get you started wouldn't have gone amiss. Basic server monitoring comes courtesy of MSI's PC Alert III utility, which provides plenty of detail about motherboard voltages, temperatures and fan speeds, but can only display a warning message if anything is amiss.

For an entry-level server, the Titan is a brute. It doesn't need to be this large, and insufficient power connectors limits the number of expansion bays that can be used. However, it has been filled with a fine specification that includes a server-specific motherboard, tape drive and fast SCSI-based storage.

PRO RESULTS

PERFORMANCE	★★★★☆
FEATURES	★★★☆☆☆
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★☆☆

NEC Express5800 TM1300

PRICE £789 (exc VAT)
INTERNET www.nec-online.co.uk
SUPPLIER NEC 0870 010 6325
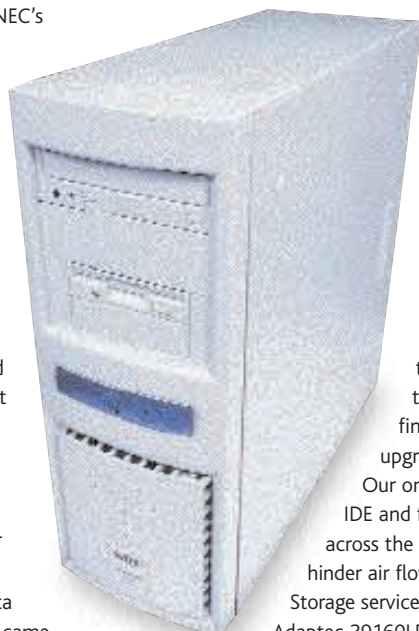**BASIC WARRANTY** Three years on-site
VERDICT A good combination of motherboard, DDR memory and Ultra160 SCSI services. An average performance, but all for a very fair price.

From a modest start, NEC's entry-level servers have gone from strength to strength and now look particularly good value. Representing the starting point of the Express5800 series, the TM1300 looks to offer a fair specification for the price.

For a while, NEC used its own motherboards, but this time it has opted for an MSI version – a more interesting choice than some, as the MS-9105 sports an Apollo Pro 266T core logic chipset, which supports DDR (double data rate) SDRAM. The system came supplied with 256Mb on a single module, and the motherboard can take a maximum of 2Gb of memory. NEC fitted a single 1GHz Pentium III processor – the slowest the board supports – but dual processing is an option. Physical security is limited to a padlock on the side door, but inside the compact chassis you'll find plenty of space for upgrades and maintenance. Our only complaint is that the IDE and floppy cables are draped across the memory sockets and will hinder air flow across the modules. Storage services are handled by an Adaptec 29160LP Ultra160 PCI adaptor

card – a strange choice as Adaptec has targeted rack server environments with this dual channel card. It's also a 64-bit card, although it won't see its full potential, because the TM1300 only offers five 32-bit PCI slots.

The PCI slots are the tool-free variety, but the snap-in locking plate has a few surprises – the blanking plates for the empty slots will all drop out once it's removed. Surprisingly, the TM1300 came equipped with a single Hitachi 18.4Gb drive. There's plenty of room to add more storage, as the removable disk cage has enough depth to take three more drives and is equipped with a pair of powerful cooling fans.

Installation is helped along nicely by NEC's KickStart utility, but management options are minimal, since the TM1300 only comes with the ESMPRO agent software. This allows the server to be managed and monitored remotely by another server running the ESMPRO management console, which isn't supplied with this server. However, the bundled ten-user copy of Symantec's Norton AntiVirus Corporate Edition does go some way to make up for this.

PC PRO RESULTS

PERFORMANCE	★★★☆☆☆
FEATURES	★★★★☆☆
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★☆☆

Systemax Mission P1000CP

PRICE £999 (exc VAT)
INTERNET www.systemaxpc.co.uk
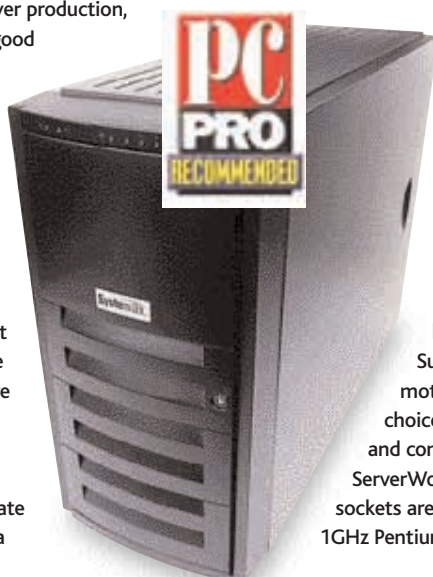**SUPPLIER** Systemax 0870 729 7365
BASIC WARRANTY Three years on-site
VERDICT The spacious server chassis makes a fine partner for the SuperMicro motherboard. It offers massive expansion potential, a good specification and all at a very reasonable price.

Systemax is no stranger to the pages of *PC Pro* and its PCs have knocked up some notable successes in recent group tests. Turning its hand to server production, it has produced some good results, as the Mission P1000CP delivers a fine specification for the price and packs it all into a sleek black chassis with tons of expansion potential. The VS-6000 chassis is offered with a variety of options, but Systemax opted for the model that doesn't have the sextet of hot-swap drive bays and SCSI backplane. Instead, you get a single 18Gb Seagate Cheetah drive fixed in a tray at the top of the disk bay and room for four more underneath. There's space for more devices with two spare 5.25in bays above.

The large side panel doesn't have a locking device, but an intrusion detection switch can be used to sound an audible warning. Inside, a very clean interior awaits – Systemax has neatly folded all cables and secured them out of harm's way. The SuperMicro P3TDL3 motherboard looks a fine choice, as it's server-specific and comes with the ubiquitous ServerWorks chipset. Two processor sockets are available, one filled with a 1GHz Pentium III CPU, while 256Mb of PC133 SDRAM memory resides in one of the four DIMM sockets alongside. SCSI options abound, since the embedded Adaptec AIC-7892B single-channel chipset provides Ultra160 and Ultra Wide connectors plus Ultra SCSI for attaching legacy devices. With the Intel 82559-based network adaptor integrated on the motherboard, expansion potential looks good with a pair of 64-bit and four 32-bit PCI slots. Only one 32-bit slot is in use, with a serviceable ATi Rage XL graphics card in residence. The motherboard is showing its age now with its largely redundant ISA expansion slot. Cooling is handled efficiently by a mighty fan at the rear of the chassis, while the processor is equipped with a large heatsink and dedicated fan.

Server management comes courtesy of Intel's LANDesk Client Manager (LDCM) 6, tweaked to pick up information specific to SuperMicro motherboards. From the browser interface, you'll find plenty of information available, including processor temperatures, fan speed and voltages, plus a full rundown on hard disk space and memory usage.

PC PRO RESULTS

PERFORMANCE	★★★★☆☆
FEATURES	★★★★★☆
VALUE FOR MONEY	★★★★★☆
OVERALL	★★★★★☆

Toshiba Magnia 550D

PRICE £1,274 (exc VAT)
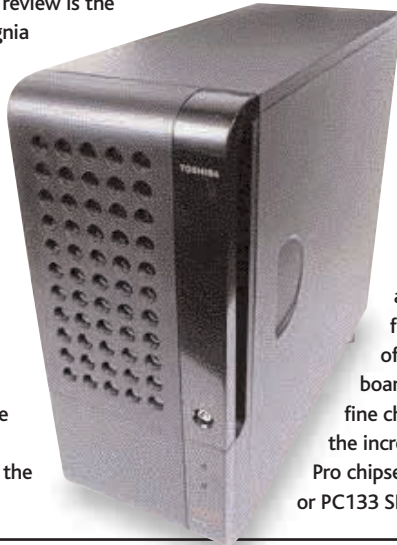
INTERNET www.toshiba.co.uk

SUPPLIER Toshiba 01932 828828

BASIC WARRANTY Three years on-site

VERDICT A choice specification for the price that includes dual processors and plenty of memory. Excellent performance and high levels of storage make the 550D a bargain.

Toshiba's onslaught on the European server market over the past few years has resulted in an impressive range of products covering the entry-level arena right up to the enterprise. This review is the very first look at the Magnia 550D, which replaces the elderly 510D.

On price alone, the 550D looks a tempting proposition. It offers a choice specification comprising a brace of 1.13GHz Pentium III processors and a healthy 512Mb of memory – a pairing that undoubtedly delivers in the speed stakes, with the 550D taking a well-deserved second place in the performance tests.

The sleek black chassis is well built and provides good security, as the front door can be locked to prevent access to the front bays and side panel screws. There's lots of room for expansion too – even with the CD-ROM fitted there's still space for three more 5.25in devices. Early entry-level servers used Intel motherboards, and a peek inside the 550D shows that Toshiba has moved away from this reliance by fitting a GA-6VTXD – one of a range of server-specific boards from Gigabyte. This is a fine choice, because it uses the increasingly popular VIA Apollo Pro chipset, allowing either PC100 or PC133 SDRAM to be fitted.

The spacious interior is well designed, with easy access to the processors and memory sockets. Two Fujitsu IDE hard disks are mounted below the floppy and more can be added in the bays above using conversion trays. Minimal component integration loses a couple of expansion slots, with an Nvidia Vanta AGP card serving up graphics, while a D-Link PCI Ethernet adaptor looks after the network connection. Even so, this still leaves four spare PCI slots up for grabs.

Toshiba also gets the thumbs up for management features – its new HarnessEye/WEB utility offers good local and remote browser-based management facilities. An agent provides information about motherboard voltages, temperatures and cooling fan status, and a management proxy can collect information from remote servers and pass it on to the system running the management console. An alert log can be used to send out email warnings and an ASR (automatic server restart) feature will reboot the server if it hangs.

PRO RESULTS	
PERFORMANCE	★★★★★
FEATURES	★★★★☆
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

Viglen CX115P Server

PRICE £1,299 (exc VAT)

INTERNET www.viglen.co.uk

SUPPLIER Viglen 020 8758 7000

BASIC WARRANTY Three years return-to-base

VERDICT A basic specification delivering low performance, although there's plenty of room for upgrades and the price includes a tape drive and monitor.

It was with some trepidation that we opened the CX115P Server, as earlier versions of this chassis have revealed an extremely cramped interior with poor access to many components. However, our fears proved unfounded – an increase in height, a substantial internal redesign and better choice of motherboard have improved access and expansion potential immeasurably.

The chassis side panels can now be removed separately, as opposed to the entire shell, and an integral locking mechanism beefs up physical security. Viglen is the only vendor in this group test to pick an AOpen motherboard, but this looks a fine choice, as it's specifically designed for server applications and offers a good list of features.

The increasingly popular VIA Apollo Pro chipset provides support for PC133 SDRAM, although Viglen only supplied a modest 128Mb on a single module. At this price point, we'd have expected to see double this amount of memory, especially as it clearly has the biggest impact on performance. Basic system-monitoring tools are provided by an Advanced System Manager Lite utility, although the simplistic interface may not appeal to many business users.

A single 1.13GHz Pentium III module resides in one of the pair of processor sockets, and the three DIMM sockets alongside allow memory to be increased to a maximum of 3Gb. Upgrades should prove reasonably painless, as the SCSI and IDE ribbon cables have been tied neatly out of the way. The embedded Adaptec AIC-7899G chipset provides fast SCSI services with a pair of Ultra160 channels each supporting up to 15 devices. Storage is handled by a single 18Gb Fujitsu drive, but adding extra disks shouldn't prove problematic, since the two drive cages are only held in place by a quick-release lever. There's room to expand at the top as well, with a pair of spare of 5.25in bays up for grabs.

The CX115P is far superior to Viglen's previous entry-level offerings and, although the asking price looks comparatively high, bear in mind that Viglen has sensibly included an HP DAT DDS-3 tape backup unit offering a 12Gb native cartridge capacity and transfer rates of around 65Mbytes/min. Not only that, but the price includes a 15in monitor as well, making the CX115P look even better value.

PRO RESULTS	
PERFORMANCE	★★☆☆☆
FEATURES	★★★★☆
VALUE FOR MONEY	★★★☆☆
OVERALL	★★★☆☆