Principled Technologies®

TEST REPORT
JULY 2008

Notebook competitive analysis

Executive summary

Dell commissioned Principled Technologies (PT) to test the performance and features of five notebook systems in their out-of-the-box (OOB) configurations:

- Acer TravelMate 4720
- Dell Latitude D630
- Dell Latitude E6400
- HP Compaq 6910p
- Lenovo ThinkPad T61

We conducted three evaluations:

- Most wireless connectivity options
- Fastest download and upload speeds (802.11n)
- Fastest to upgrade hardware components

Dell specified the test systems, defined the major areas of testing, and provided one of the notebook systems (a pre-production sample of the Dell Latitude E6400). PT developed detailed testing methodologies, purchased and set up the remaining four systems, and executed all tests.

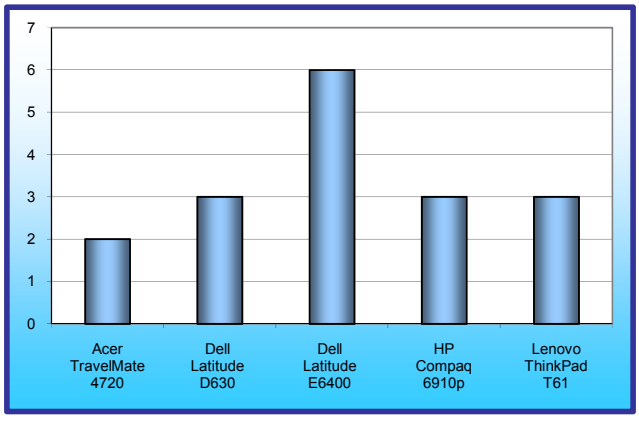
The Test results section provides more detail on our key findings, while the Test methodology section explains how we ran the tests. Appendix A details the system configurations.

Key findings

- The Dell Latitude E6400 supported two to three times more wireless connectivity options as the other four notebook systems we tested (Figures 1 and 2).
- The Dell Latitude E6400 achieved download speeds 16 percent to 92 percent higher than the other four notebook systems we tested (Figures 3 and 5).
- The Dell Latitude E6400 achieved upload speeds 12 percent to 256 percent higher than three of the other four notebook systems we tested and within 2 percent of the fastest system (Figures 4 and 5).
- On the Dell Latitude E6400, our technicians upgraded the RAM from 40 percent to 90 percent faster than on the other four systems we tested, upgraded the hard disk from 24 percent to 52 percent faster than on three of the other four systems (the fourth was 12 percent faster than the Dell Latitude E6400), and upgraded the broadband wireless card from 25 percent to 62 percent faster than the three notebooks with wireless cards.

Test results

Most wireless connectivity options



We thoroughly examined each notebook to determine the number of wireless network technologies it supported. For greater detail on the test, see the Test methodology section.

As Figures 1 and 2 show, the Dell Latitude E6400 supports six of the seven wireless technologies for which we tested; the Dell Latitude D630, the HP Compaq 6910p, and the Lenovo ThinkPad T61 all supported three technologies; and the Acer TravelMate 4720 supported two.

Figure 1: Total number of wireless technologies the five test systems support. Higher numbers are better.

	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
Bluetooth	0	1	1	0	1
Broadband wireless	0	1	1	1	1
GPS	0	0	1	0	0
Infrared	1	0	0	1	0
WiFi - 802.11n	1	1	1	1	1
WiMAX	0	0	1	0	0
Total number of wireless technologies the system supports	2	3	6	3	3

Figure 2: Wireless technologies the five test systems support. Higher numbers are better.

Fastest download and upload speeds (802.11n)

This test used file transfer protocol (FTP) to measure the wireless upload and download speeds of the test systems. It also measured the wireless download speed from the Web. For greater detail on the test, see the Test methodology section. As Figures 3 and 5 show, the Dell Latitude D630 achieved the fastest speed on both download tests, with speeds 16 percent to 92 percent higher than the other four laptops.

As Figures 4 and 5 show, the Dell Latitude E6400 achieved upload speeds 12 percent to 256 percent higher than three of the other four notebook systems we tested and within 2 percent of the fastest system, the Lenovo ThinkPad T61.

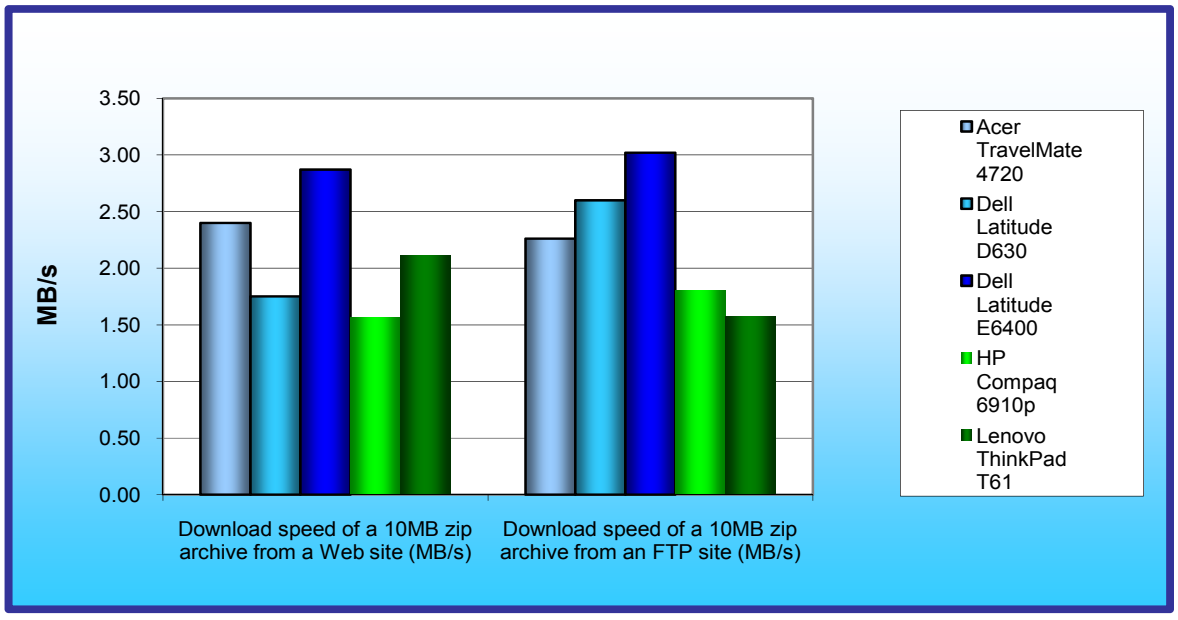


Figure 3: Download speeds in MB/s for the five test systems. Higher numbers are better.

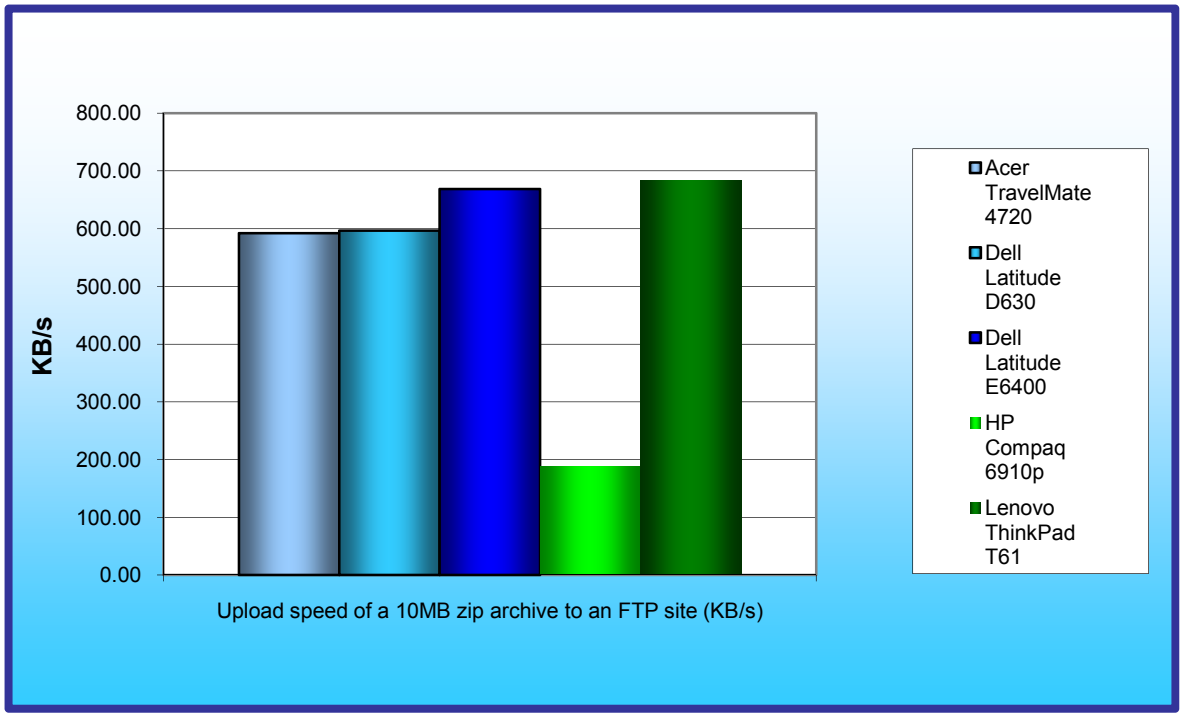


Figure 4: Upload speeds in KB/s for the five test systems. Higher numbers are better.

	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
Download speed of a 10MB zip archive from a Web site (MB/s)	2.40	1.75	2.87	1.56	2.11
Download speed of a 10MB zip archive from an FTP site (MB/s)	2.26	2.60	3.02	1.80	1.57
Upload speed of a 10MB zip archive to an FTP site (KB/s)	591.70	596.37	668.67	188.00	684.13

Figure 5: Upload and download speeds for the five test systems. Higher numbers are better.

Fastest to upgrade hardware components

This test measured the ease or difficulty and time required when upgrading a notebook's hard disk, RAM, and broadband wireless card on the five test systems (Note: The Acer TravelMate 4720 had no broadband wireless card). Three technicians completed the tasks; we report the average of their times. For greater detail on the test, see the Test methodology section. As Figures 6 and 7 show, with the exception of upgrading the hard disk on the Dell Latitude D630, upgrading these hardware components was quickest on the Dell Latitude E6400.

On the Dell Latitude E6400, our technicians upgraded the RAM from 40 percent to 90 percent faster than on the other four systems we tested, upgraded the hard disk from 24 percent to 52 percent faster than on three of the other four systems (the fourth was 12 percent faster than the Dell Latitude E6400), and upgraded the broadband wireless card from 25 percent to 62 percent faster than the three notebooks with wireless cards.

Note: The Acer TravelMate and Dell Latitude E6400 each had one 1 GB stick of memory. The other three systems each had two 512 KB sticks of memory.

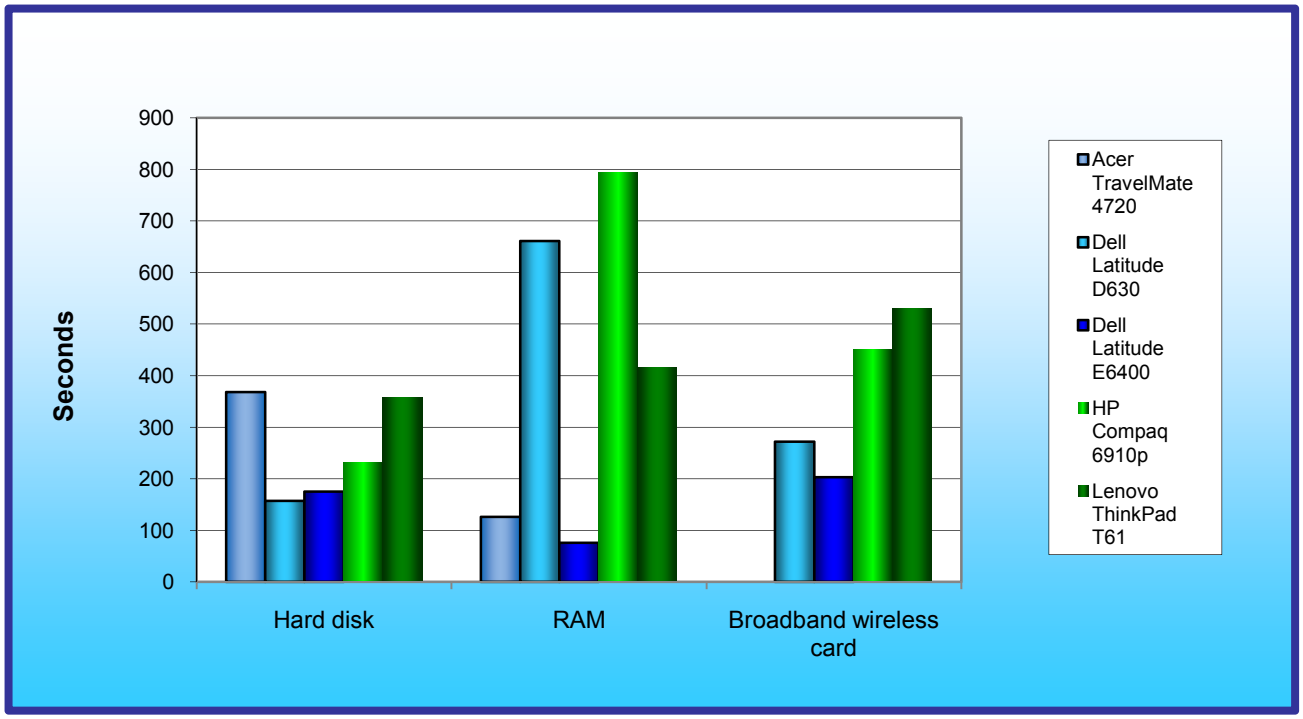


Figure 6: Time in seconds to upgrade a notebook's hard disk, RAM, and broadband wireless card. Shorter times are better. Note: The Acer TravelMate 4720 had no broadband wireless card.

	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
Hard disk	06:08.0	02:36.6	02:55.4	03:51.5	05:57.0
RAM	02:06.6	11:00.8	01:15.9	13:12.7	06:55.6
Broadband wireless card		04:31.5	03:22.6	07:29.5	08:49.7
Total of upgrades		18:08.91	07:33.79	24:33.63	21:42.27

Figure 7: Time in minutes:seconds to upgrade a notebook's hard disk, RAM, and broadband wireless card as well as the total time. Shorter times are better. Note: The Acer TravelMate 4720 had no broadband wireless card and thus does not have a total.

Test methodology

This section details the methodologies we followed in testing the systems.

Base test image creation

PT conducted all testing on the original factory image.

We powered on each notebook, and if a notebook vendor required us to respond to specific system preparation steps, we did so until the Windows desktop appeared. Once each installation was complete, PT ran Windows Update and installed all updates available as of 5/21/2008, including Service Pack 3 for Windows XP if that update was not already on the system. At that point, PT used Symantec's Ghost product to create an image of the disk with that out-of-box software setup. Those images facilitated repeatable testing and experimenting. We made them by following this process:

1. Insert a bootable Ghost CD.

2. Power down the computer.
3. Attach an external USB hard disk.
4. Power on the computer.
5. At the Symantec Ghost screen, click OK.
6. Select Local→Disk→To Image.
7. Click OK.
8. Select the Primary disk, and click OK.
9. Select the external hard disk in the copy image to drop-down box, name the file `BASE`, and click Save.
10. At the Compress Image dialog, select Fast.
11. At the Proceed dialog, select Yes.
12. When the ghost image is complete, click OK, and exit Ghost.
13. Power down the computer.
14. Disconnect the USB hard disk.
15. Reboot the computer.

Most connectivity options

We thoroughly examined each notebook and listed the number of wireless network technologies, including it supported. We used each connection once to verify it functioned as expected.

- Bluetooth – connect a Microsoft Wireless Entertainment Keyboard 7000 using My Bluetooth Places to add a connection
- Broadband wireless – connect to the AT&T network and browse to www.cnn.com
- Infrared – link a PDA to the notebook and beam a file to the notebook
- WiFi – connect to the test 802.11n access point and browse to www.msn.com

Fastest download and upload speeds (802.11n)

This test used FTP to measure the wireless upload and download speeds of the notebooks. It also measured the wireless download speed from the Web. For this test, we disabled all OEM software that would slow upload and download speed by real-time scanning, such as anti-virus or firewall software.

Because Internet traffic is unpredictable and varies according to time of day, measuring file downloads and uploads to and from public FTP and Web sites would yield results that were approximations at best. Therefore, we created an isolated test network with a Web and FTP server (Q6600 2.4GHz on a DQ965GF motherboard, 2 GB of DDR2-667 RAM, Intel 82566DM Gigabit Ethernet NIC) running Windows Server 2003 with Service Pack 2, and a Linksys WRT600N Wireless-N Gigabit Router using 128-bit encryption. We measured the upload and download speed of a 10MB zip archive to and from our FTP server with Wget for Windows and hand-timed and calculated kbps manually as a backup.

1. Configure the notebook to connect to a WLAN.
2. Download Wget for Windows (version 1.10.2) from wput.sourceforge.net, and copy to the root of C:.
3. Download Wputt for Windows (version 0.6) from users.ugent.be/~bpuype/wget/, and copy to the root of C:.
4. Reboot, and wait 2 minutes for the system to fully load.
5. Click Start→Run, and type `cmd` into the Run dialog to open a command prompt.
6. Type `C:\wget ftp://192.168.1.106/ftptest.zip,` and press Enter.
7. Record the speed the Wget session reports.
8. Delete the test file from the notebook, and repeat steps 3 through 6 twice.
9. Reboot, and wait 2 minutes for the system to fully load.
10. Click Start→Run, and type `cmd` into the Run dialog to open a command prompt.
11. Type `C:\wget http://192.168.1.106/webtest.zip,` and press Enter.
12. Record the speed the Wget session reports.
13. Delete the test file from the notebook, and repeat steps 8 through 11 twice.
14. Reboot, and wait 2 minutes for the system to fully load.
15. Click Start→Run and type `cmd` into the Run dialog to open a command prompt.

16. Type `c:\wput.exe upload.zip ftp://192.168.1.106,` and press Enter.
17. Record the speed the Wget session reports.
18. Delete the test file from the ftp server, and repeat steps 14 through 17 twice.

We executed each test three times and use the average result of each set of three as the representative score for that test.

Fastest to upgrade hardware components

This test measured the ease or difficulty and time required when upgrading a notebook's hard disk, RAM, and broadband wireless card.

To avoid the cost of purchasing spare a hard disk, RAM, and broadband wireless cards, we removed the notebook's existing hardware and then put that same hardware back in the notebook, thus simulating an upgrade. Because one upgrade may be more difficult than another, we timed each separately to more accurately report the level of difficulty with each hardware upgrade.

This test requires two people, a stopwatch, hand tools, a protractor, and a digital video camera.

As the technician performs the simulated upgrade, the proctor executes a number of tasks:

- Videotaping and timing each step of the process.
- Recording the number and name of parts removed and the number of steps the technician required to perform each upgrade.
- Recording anything out of the ordinary, not specifically attributable to the notebook, that happens during the test. (We will note any such incident that increases the duration of the upgrade process.)

Three technicians performed all upgrades on each system; we use the average result of each set of three as the representative score for that test on that system.

Because a technician is likely to become faster with each subsequent notebook, the proctor delivered the notebooks to each technician in a different order. Though our three-person sample is too small to yield statistically significant results, this approach reduced the amount of bias that the learning process might induce.

Note: Because the process of upgrading a notebook's hard disk, RAM, and broadband wireless card differs from system to system, this methodology uses generic terms.

1. The proctor starts the digital video camera and states the name of the test and the make and model of the notebook.
2. The technician places the powered down notebook on the bench, right-side up with the lid closed.
3. The proctor prepares the stopwatch.
4. The proctor counts down to zero, and starts the stopwatch at zero.
5. The technician turns the notebook over, removes the hard disk from the notebook, and removes the hard disk from the drive holder, if present.
6. The proctor notes every step in this process, stops the stopwatch when the technician completes this process, and records the time to remove the hard disk.
7. The proctor prepares the stopwatch.
8. The proctor counts down to zero, and starts the stopwatch at zero.
9. The technician replaces the hard disk into the drive holder, if present, and re-installs the hard disk.
10. The proctor notes every step in this process, stops the stopwatch when the technician completes this process, and records the time to replace the hard disk.
11. Repeat steps 2 through 10 with the RAM and broadband wireless cards.

We executed each test three times, using three people, and use the average result of each set of three as the representative score for that test.

Appendix A. Test system configuration information

As per Dell's request, PT purchased four notebook systems for this test. Dell provided the fifth, the pre-production sample of the Dell Latitude E6400. Figure 8 presents detailed configuration information for the systems.

System	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
					
General					
Processor and OS kernel: (physical, core, logical) / (UP, MP)	1P2C2L / MP	1P2C2L / MP	1P/2C/2L / MP	1P2C2L / MP	1P2C2L / MP
Number of physical processors	1	1	1	1	1
Single/Dual Core processors	Dual	Dual	Dual	Dual	Dual
System power management policy	Acer ePower Management Battery: Word Processing Plugged In: Maximum Performance	Portable/ Laptop	Portable/ Laptop	Portable/ Laptop	Energy Star
Processor power-saving option	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	13-1/8" x 9-1/2" x 1-1/4"	13-1/4" x 9-5/16" x 1-1/4"	13-1/4" x 9-5/8" 1-1/4"	13" x 9-1/2" x 1-1/4"	13-1/4" x 9-5/16" x 1-1/4"
System weight	5 lbs. 11 oz.	5 lbs. 5 oz.	5 lbs. 4 oz.	5 lbs. 1 oz.	5 lbs 4 oz.
CPU					
Vendor	Intel	Intel	Intel	Intel	Intel
Name	Mobile Core 2 Duo	Mobile Core 2 Duo	Mobile Core 2 Duo	Mobile Core 2 Duo	Mobile Core 2 Duo
Model number	T7300	T8100	P8400	T8100	T8100
Stepping	A	6	6	6	6
Socket type and number of pins	Socket P (478)	Socket P (478)	Socket P(478)	Socket P (478)	Socket P (478)
Core frequency (GHz)	2.0	2.10	2.26	2.10	2.10
Front-side bus frequency (MHz)	800	800	1,066	800	800
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)

System	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
L2 cache	4 MB (1 x 4,096 KB)	3 MB (1 x 3,072 KB)	3 MB (1 x 3,072 KB)	3 MB (1 x 3,072 KB)	3 MB (1 x 3,072 KB)
Platform					
Vendor	Acer	Dell Inc.	Dell Inc	HP	Lenovo
Motherboard model number	Biwa	0KU184	0RX493	30BE	7658CTO
Motherboard chipset	Intel GM965	Intel GM965	Intel GM45/GM47	Intel GM965	Intel GM965
Motherboard revision number	C0	C0	07	C0	C0
System/ motherboard serial number	LXTKJ060158 031746D2999	H932BG1	CF07CG1.CN 1296184N214 2	CND820J8N8	L3-L7702
Bios name and version	Phoenix Technologies LTD V1.31 (1/17/2008)	Dell Inc. A08 (2/28/2008)	Dell Inc X30 (6/08/2008)	HP 68MCU Ver. F.14 (04/14/2008)	Lenovo 7LETB7WW (2.17) (4/25/2008)
BIOS settings	Default	Default	Default	Default	Default
Memory module(s)					
Vendor and model number	Samsung M4 70T2864DZ3-CE6	Qimonda 64T64020EDL 3SB2	Nanya Technology NT1GT64UH8 C0FN-AD	Micron Technology 4HTF6464HY-667E1	Hynix HYMP164S64 CP6-Y5 AB
Type	PC2-5300	PC2-5300	PC2-6400	PC2-5300	PC2-5300
Speed (MHz)	667	667	667	667	667
Speed running in the system (MHz)	667	667	667	667	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-15	5-5-5-15	6-6-6-18	5-5-5-15	Unknown
Size	2,048 MB	1,024 MB	1,024 MB	1,024 MB	1,024 MB
Number of memory module(s)	2 x 1,024 MB*	2 x 512 MB	1 x 1,024 MB	2 x 512 MB	2 x 512 MB
Chip organization (single-sided, double-sided)	Double-sided	Double-sided	Double-sided	Double-sided	Single-sided
Channel (single/dual)	Dual	Dual	Single	Dual	Dual
Hard disk					
Vendor and model number	Toshiba MK1637GSX	Hitachi HTS722080K9 A300	Hitachi HTS722012K9 A300	Seagate ST980813AS	Hitachi HTS722010K9 SA00
Size	160 GB	80 GB	120 GB	80 GB	100 GB
Buffer size	8 MB	16 MB	16 MB	8 MB	16 MB
RPM	5,400	7,200	7,200	7,200	7,200
Type	SATA 3 Gb/s	SATA 3 Gb/s	SATA 3 Gb/s	SATA 3 Gb/s	SATA 1.5 Gb/s

System	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
Controller	Intel 82801HEM/ HBM	Intel 82801HBM (ICH8-ME)	Intel ICH8M-E/ICH9M-E SATA RAID	Intel 82801HBM (ICH8-M)	Intel 82801HBM (ICH8-M)
Driver	Intel 7.5.0.1017 (3/32/2007)	Intel 8.2.0.1011 (11/15/2006)	Intel 8.2.2.1001 (6/15/2008)	Intel 7.0.0.1020 (2/12/2007)	Intel 7.0.0.1020 (2/12/2007)
Operating system					
Name	Windows XP Professional	Windows XP Professional	Windows XP Professional	Windows XP Professional	Windows XP Professional
Build number	2600	2600	2600	2600	2600
File system	NTFS	NTFS	NTFS	NTFS	NTFS
Kernel	ACPI Multiprocessor PC	ACPI Multiprocessor PC	ACPI Multiprocessor PC	ACPI Multiprocessor PC	ACPI Multiprocessor PC
Language	English	English	English	English	English
Microsoft DirectX version	DirectX 9.0c	DirectX 9.0c	DirectX 9.0c	DirectX 9.0c	DirectX 9.0c
Graphics					
Vendor and model number	Mobile Intel 965	Mobile Intel 965	Mobile Intel GMA 4500MHD	Mobile Intel 965	Mobile Intel GMA X3100
Type	Integrated	Integrated	Integrated	Integrated	Integrated
Chipset	GMA X3100 Express Chipset Family	GMA X3100 Express Chipset Family	Mobile Intel 4 Series Express Chipset Family	GMA X3100 Express Chipset Family	Mobile Intel 965 Express Chipset Family
BIOS version	1471	1466	Intel Video BIOS	1478	1436
Total Available Graphics Memory	384 MB	256 MB	512 MB	384 MB	384 MB
Resolution	1,280 x 800 x 32 bit	1,280 x 800 x 32 bit	1,440 x 900 x 32 bit	1,280 x 800 x 32 bit	1,280 x 800 x 32 bit
Driver	Intel 6.14.10.4837 (6/5/2007)	Intel 6.14.10.4831 (5/16/2007)	Intel 6.14.10.4957 (6/11/2008)	Intel 6.14.10.4785 (2/26/2007)	Intel 6.14.10.4860 (8/9/2007)
Sound card/subsystem					
Vendor and model number	Realtek High Definition Audio	SigmaTel High Definition Audio	Intel High Definition Audio HDMI Service	SoundMAX Integrated Digital HD Audio	SoundMAX Integrated Digital HD Audio
Driver	Realtek Semiconductor Corp. 5.10.0.5423 (5/30/2007)	SigmaTel 5.10.0.5515 (5/10/2007)	Intel 5.10.0.1042 (4/29/2008)	AnalogDevices 5.10.1.5160 (1/9/2007)	Analog Devices 5.10.1.5410 (4/13/2007)
Ethernet					
Vendor and model number	Broadcom NetLink Gigabit Ethernet	Broadcom NetXtreme 57xx Gigabit	Intel 82567LM Gigabit Network Connection	Intel 82566MM Gigabit Network Connection	Intel 82566MM Gigabit Network Connection

System	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
Driver	Broadcom 10.26.0.0 (3/20/2007)	Broadcom 10.26.0.0 (3/6/2007)	Intel 9.50.14.2 (4/4/2008)	Intel 9.7.34.0 (2/1/2007)	Intel 9.7.240.0 (5/11/2007)
Wireless					
Vendor and model number	Intel Wireless WiFi Link 4965AGN	Intel Wireless WiFi Link 4965AGN	Dell Wireless 1397 WLAN	Intel Wireless WiFi Link 4965AGN	Intel Wireless WiFi Link 4965AGN
Driver	Intel 11.1.1.11 (4/30/2007)	Intel 11.1.1.22 (8/8/2007)	Broadcom 4.170.77.3 (3/21/2008)	Intel 11.1.0.86 (2/25/2007)	Intel 11.1.1.11 (4/30/2007)
Modem 1					
Vendor and model number	Agere Systems HAD Modem	Conexant HAD D330 MDC V.92 Modem	Conexant HAD D330 MDC V.92 Modem	Soft Data Fax Modem with SmartCP	ThinkPad Modem
Driver	Agere 2.1.77.9 (3/9/2007)	Conexant 7.68.0.0 (9/6/2007)	Conexant 7.74.0.0 (5/7/2008)	CXT 7.61.0.0 (12/19/2006)	CXT 7.62.0.0 (1/31/2007)
Modem 2					
Vendor and model number		Dell Wireless 5520 Cingular Mobile Broadband (3G HSDPA) Mini card	Dell Wireless 5720 VZW Mobile Broadband (EVDO Rev-A)	HP hs2300 HSDPA Broadband Wireless Modem	Sierra Wireless MC8775 HSDPA Modem
Driver		Novatel Wireless Inc 3.0.0.4 (2/28/2007)	Novatel Wireless Inc 3.0.3.0 (11/2/2007)	HP 2.0.16.0 (4/10/2007)	Sierra Wireless 2.0.13.0 (1/11/2007)
Optical drive(s)					
Vendor and model number	TSSTcorp CDDVDW TS-L632H	PDBS DS-8W1P	HL-DT-ST CDRWDVD MU10N	HL-DT-ST GSA-U10N	MATSHITA DVD-RAM UJ-862
Type	DVD+-RW / DVD-RAM	DVD+-RW	DVD/CD-ROM	Multibay II DVD RW DL	DVD+-RW / DVD-RAM
USB ports					
Number	4	4	3	3	3
Type	2.0	2.0	2.0	2.0	2.0
Other	Memory Stick, MultiMediaCard, SD Memory Card, XD-Picture Card, Memory Stick Pro	O2Micro OZ776 USB CCID Smartcard Reader	Ricoh R/RL/5c476(II) or Compatible CardBus Controller	RICOH SmartCard Reader	PC card slot and express card slot
IEEE 1394 ports					
Number	1	1	0	1	1
Monitor					
LCD type	WXGA	WXGA	WXGA	WXGA	WXGA
Screen size	14.1”	14.1”	14.1”	14.1”	14.1”
Refresh rate	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz

System	Acer TravelMate 4720	Dell Latitude D630	Dell Latitude E6400	HP Compaq 6910p	Lenovo ThinkPad T61
Battery 1					
Type	Li-Ion TM07B41	Dell Battery Module Type PC764 Lithium Ion	Li-Ion	HP HSTNN-UB28 Lithium Ion	Lenovo FRU P/N 42T5262
Size (length x width x height)	7-15/16” x 2-3/8” x 7/8”	7-1/4” x 2-5/8 x 13/16	8-1/4” x 1-5/8” x 1-1/4”	8” x 2” x 3/4”	8-3/4” x 2-1/2” x 3/4”
Rated capacity	7,200 mAh / 11.1V (80Wh)	5,045 mAh / 11.1V (56Wh)	5,045 mAh / 11.1V (56Wh)	5,100 mAh / 10.8V (55Wh)	5,200 mAh / 10.8V (56Wh)
Weight	1 lb.	11.5 oz.	11.6 oz.	10.6 oz.	11.3 oz
Battery 2					
Type	N/A	Dell Battery Module type TC030 Lithium Ion	Dell Battery Module type GN752 Lithium Ion	Hewlett-Packard Li-Ion HSTNN-OB24	N/A
Size (length x width x height)	N/A	11-1/8” x 3-5/8 x 13/16	12-11/16” x 8-1/2” x 5/8”	10-1/2” x 6” x 1”	N/A
Rated capacity	N/A	7,660 mAh / 11.1V (85Wh)	5680 mAh / 14.8V (84Wh)	6,420 mAh / 14.8V (95Wh)	N/A
Weight	N/A	1 lb. 1.8 oz.	1 lb 15.3 oz.	1 lb. 13 oz.	N/A

Figure 8: Notebook system configuration details.

*The Acer TravelMate 4720 shipped with two 1 GB sticks of RAM. We removed one stick for testing in order to test all five systems with a total of 1 GB of physical memory.

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