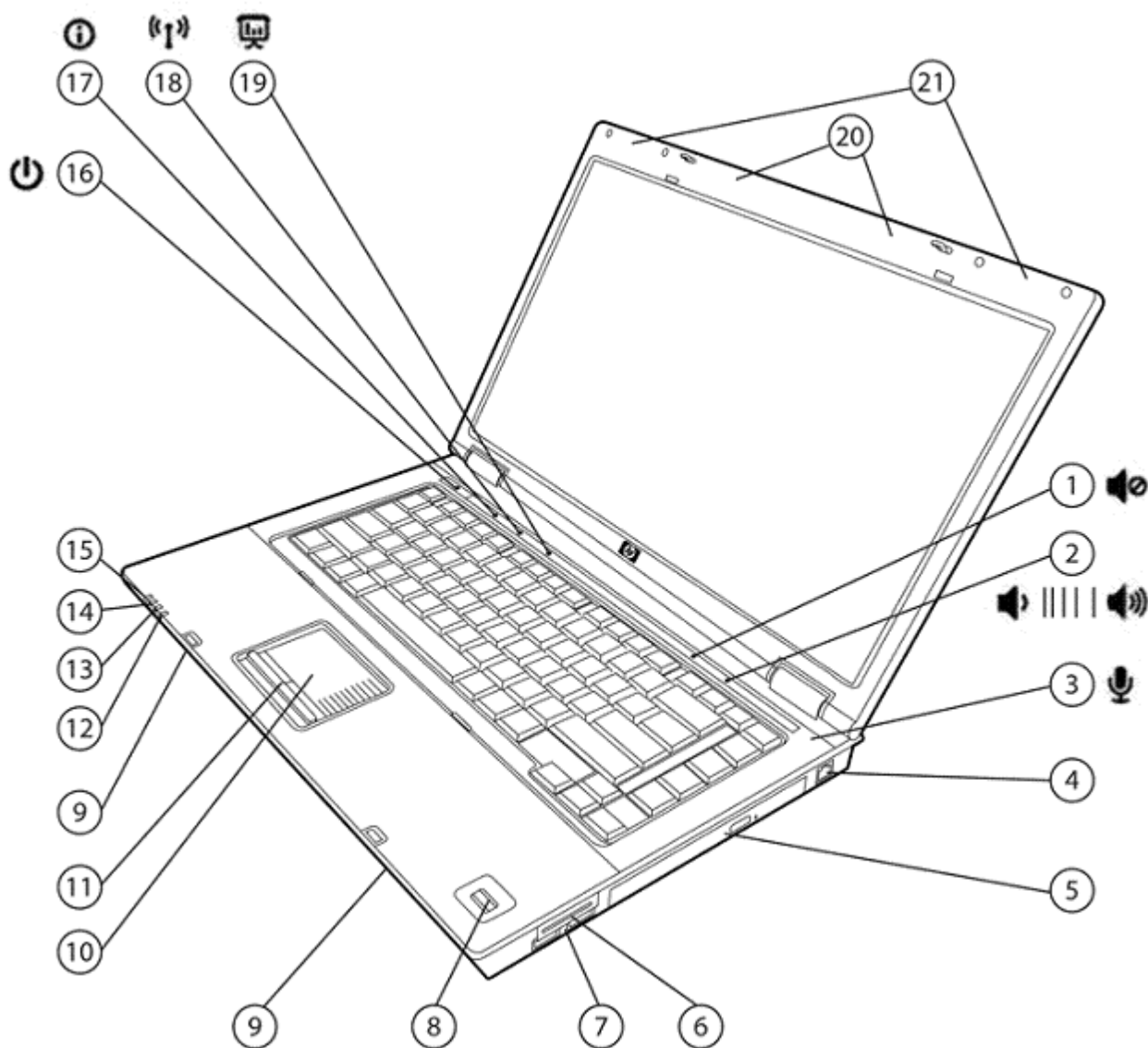


Overview

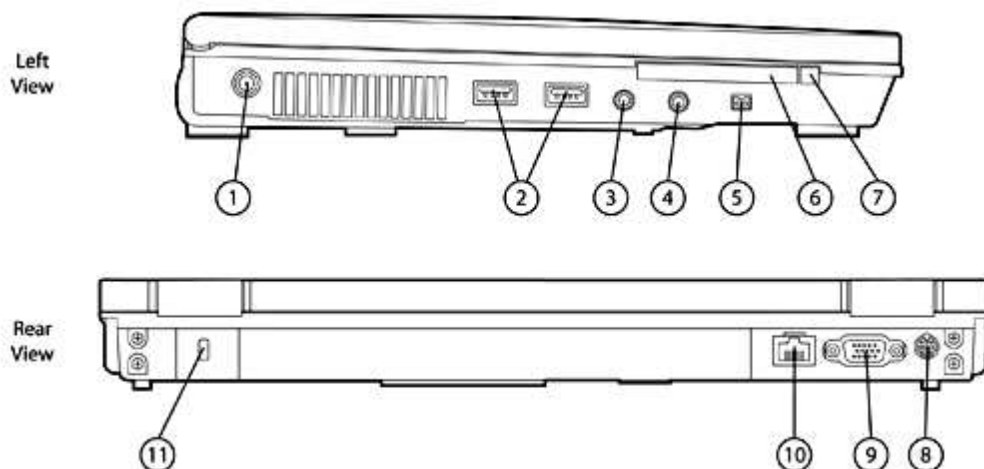
HP recommends Windows Vista™
Business



1. Volume mute button with LED indicator
2. Volume scroll zone with up/down LED indicators
3. Integrated microphone
4. RJ-11/modem port
5. Optical drive
6. Media Card Reader
7. 2 USB 2.0 ports (from 4 in total)
8. HP Fingerprint Sensor
9. Integrated stereo speakers
10. Touchpad with scroll zone
11. Touchpad buttons

12. Hard drive activity / HP 3D DriveGuard LED
13. Battery charging LED
14. Power/standby LED
15. Wireless on/off LED
16. Power button with LED
17. HP Info / HP QuickLook button with LED indicator
18. Wireless on/off button with LED indicator
19. HP Presentation button with LED indicator
20. WLAN antennas (with WLAN option)
21. WWAN antennas (with WWAN option, available 3Q 2007)

Overview



- | | |
|--------------------------------------|-----------------------------------|
| 1. Power connector | 7. PC Card eject button |
| 2. 2 USB 2.0 ports (from 4 in total) | 8. S-Video TV out |
| 3. Stereo headphone/line out | 9. VGA/external monitor connector |
| 4. Stereo microphone in | 10. RJ-45/Ethernet port |
| 5. 1394a port | 11. Kensington Lock slot |
| 6. Type I/II PC Card slot | |

At A Glance

- Genuine Windows Vista Business 32/64, Genuine Windows Vista Home 32, Genuine Windows XP Professional, or FreeDOS
- Widescreen 15.4-inch diagonal display anti glare with optional wide-viewing angle, HP Privacy Filter support
- Flexible wireless connectivity options:
 - Integrated HP ev2200 1xEV-DO or HP hs2300 HSDPA Broadband Wireless module (available June 2007)
 - Integrated 802.11 a/b/g/draft-n, a/b/g, or b/g wireless LAN module
 - Bluetooth®
- Intel® Core™ 2 Duo processors
- Thin, lightweight design starting at 2.59 kg and 34.9 mm thin at front
- Security features including Drive Encryption for HP ProtectTools, HP Fingerprint Sensor, TPM 1.2*
- HP QuickLook on Windows Vista models for instant access to email, calendar, and contact information
- Up to 160-GB 5400 rpm or 80-GB 7200 rpm user-removable hard drive with HP 3D DriveGuard protection
- Media Card Reader
- Touch-sensitive controls for HP Info Center, HP QuickLook, wireless on/off, HP Presentation button, external volume up, volume down, and mute
- Integrated optical drive, including optional DVD+/-RW SuperMulti DL LightScribe Drive
- Up to 4 GB of 667-MHz DDR2 SDRAM, dual channel memory support
- Mobile Intel Graphics Media Accelerator X3100, with up to 384-MB shared system memory
- Broadcom NetLink Gigabit Ethernet Controller
- Touchpad with scroll zone

* TPM module disabled where not permitted by law (for example, Russia).

Standard Features

Processors

Intel Core 2 Duo Processor T7700 (2.40-GHz, 800-MHz FSB, 4-MB L2 cache)*
 Intel Core 2 Duo Processor T7500 (2.20-GHz, 800-MHz FSB, 4-MB L2 cache)*
 Intel Core 2 Duo Processor T7300 (2.00-GHz, 800-MHz FSB, 4-MB L2 cache)*
 Intel Core 2 Duo Processor T7100 (1.80-GHz, 800-MHz FSB, 2-MB L2 cache)*

* Intel's numbering is not a measurement of higher performance.

NOTE: Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

Operating System

Preinstalled

Genuine Windows Vista Business 32/64*
 Genuine Windows Vista Home Basic 32*
 Genuine Windows XP Professional
 FreeDOS

Supported

Genuine Windows Vista Enterprise*

Certified

SuSE Linux Enterprise Desktop 10

* Certain Windows Vista product features require advanced or additional hardware. See

<http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx> and

<http://www.microsoft.com/windowsvista/getready/capable.mspx> for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <http://www.windowsvista.com/upgradeadvisor>.

Chipset

Mobile Intel GM965

Graphics

Mobile Intel Graphics Media Accelerator X3100, up to 384-MB shared system memory
 Microsoft DirectX 9 capable

Display

Internal

15.4-inch diagonal WXGA anti-glare (1280 x 800 resolution)
 15.4-inch diagonal WSXGA+ WVA anti-glare (1680 x 1050 resolution)

External

Up to 32-bit per pixel color depth
 VGA port supports resolutions up to 2048 x 1536 at 75 Hz, and lower resolutions at up to 100 Hz
NOTE: Resolutions are dependent upon monitor capability, and resolution and color depth settings.

Memory

Standard

512-MB, 1024-MB, 2048-MB, or 4096-MB 667-MHz DDR2 SDRAM; two SODIMM slots supporting dual channel memory

Maximum

Upgradeable to 4096-MB maximum (2048-MB SODIMM in slots 1 and 2)

Dual-channel

Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.

NOTE: Due to the non-industry standard nature of some third-party memory modules, we recommend HP branded memory to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed.

Standard Features

Communications

Integrated Broadcom NetLink Gigabit Ethernet Controller (10/100/1000 NIC)*
56K V.92 modem**

* The term "10/100/1000" or "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

** Designed for downloads from 56K modem compliant sources. Maximum achievable download transmission rates currently do not reach 56 KB/s, and will vary with line conditions. Modem availability is subject to country regulatory approval.

Wireless Devices

Support for a broad range of secure, integrated wireless LAN and wireless WAN options featuring support for the latest industry standards. Wireless LAN is factory configurable or available as an option to be added later. Broadband Wireless (WWAN) requires Windows Vista Business or Windows XP Professional and is available in select countries as a standard, factory configurable feature only. Integrated Bluetooth is also available (factory configurable only) and can be combined with any of the supported wireless LAN and wireless WAN options.

HP hs2300 HSDPA Broadband Wireless Module (available 3Q 2007)

Integrated WWAN module that provides connection to GSM, GPRS, EDGE, UMTS, and HSDPA mobile networks in many countries. Currently supported networks are the Cingular network in the U.S. and Vodafone networks in Australia, France, Italy, Germany, Netherlands, New Zealand, Spain, and UK, and roaming on Cingular and Vodafone partner networks in more than 100 countries.

NOTE: Separately purchased mobile network operator service is required. Two 800/900/1800/1900/2100-MHz antennas integrated in the top of the display panel support current and future WWAN technologies.

All 802.11a/b/g integrated wireless LAN options

Wi-Fi certified
Cisco Compatible Extensions support (Version 4.0) with Microsoft Windows XP
Wired Equivalent Privacy (WEP) support up to 128-bit keys
Wi-Fi Protected Access (WPA) and WPA2 support
802.1x authentication support, including EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, and LEAP
Advanced Encryption Standard (AES) support
WiFi certified for WPA2, WMM
Dual antennas integrated in the display enclosure

Intel Wireless WiFi Link 4965AGN*

Integrated support for 802.11a, b, g, and draft-n
Up to 300-mbps data rate

Intel Wireless WiFi Link 4965AG*

Integrated support for 802.11 a, b and g
Up to 54-mbps data rate

Intel PRO/Wireless 3945ABG Network Connection*

Integrated support for 802.11 a, b and g
Up to 54-mbps data rate

Intel PRO/Wireless 3945BG Network Connection*

Integrated support for 802.11 b and g
Up to 54-mbps data rate

Broadcom 4311AG 802.11a/b/g WiFi Adapter

Integrated support for 802.11 a, b and g
Up to 54-mbps data rate

Broadcom 4311BG 802.11b/g WiFi Adapter

Integrated support for 802.11 b and g
Up to 54-mbps data rate

Standard Features

HP Integrated Module with Bluetooth Wireless Technology	Bluetooth Specification v2.0 compliant Works with a wide range of Bluetooth devices
<i>* Requires Intel Core 2 Duo processor</i>	

Keyboard	The 101/102-key compatible keyboard features an industry standard, full-pitch key layout with desktop keyboard features, such as the isolated inverted-T cursor control keys, editing keys, both left and right control and alt keys, and 12 function keys. U.S. and International key layouts are available. Other features include an integrated numeric keypad, hotkeys for instant access to power conservation, brightness, and other features, 19-mm x 19-mm key pitch (center-to-center spacing), 2.5-mm stroke, and comfort-dished keycaps.
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Touch-sensitive controls	Touch-sensitive controls provide easy access to the following features: HP Info Center, HP QuickLook, wireless on/off, HP Presentation button, external volume up, volume down, and mute
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Pointing device	Touchpad with scroll zone, two pick buttons
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Expansion card slots	1 Type I/II PC Card slot	Supports 32-bit CardBus and 16-bit PC Cards
	or	
	Optional Integrated Smart Card Reader (replaces PC Card slot)	Compatible with ISO 7816 compliant Smart Cards PC/SC interface support
	Media Card Reader	Supports SD (Secure Digital), MMC (MultiMedia Card), Memory Stick, Memory Stick Pro, Memory Stick Duo*, xD-Picture card
<i>*NOTE: Memory Stick Duo Adapters are required and sold separately. Inserting a Memory Stick Duo Card directly into your notebook could damage the memory card and/or notebook.</i>		

Storage	Hard drives	80/120/160-GB 5400 rpm SMART SATA 80-GB 7200 rpm SMART SATA
	<i>NOTE: These hard drives are customer removable and will withstand multiple insertion/removal cycles. Up to 10 GB is reserved for the system recovery software.</i>	
	HP 3D DriveGuard	The hard drive is mounted directly to the notebook frame, reducing the transmission of shock to the hard drive. Uses three-axis digital motion detection with intelligent sensitivity to help protect the hard drive during normal use from shock and vibration. The digital accelerometer temporarily halts all data transfer and parks the hard drive when abrupt motion is detected.
	Fixed optical drives	DVD-ROM Drive DVD/CD-RW Combo Drive DVD+/-RW SuperMulti DL Drive DVD+/-RW SuperMulti DL LightScribe Drive

Standard Features

Interfaces	PC Card slot	One Type I/II PC Card slot or optional Smart Card Reader
	External monitor	One – VGA
	1394a	One
	Stereo microphone in	One
	Stereo headphone/line out	One
	Power connector	One
	RJ-11/modem	One
	RJ-45/Ethernet	One
	S-video TV out	One (Support for NTSC/PAL)
	USB 2.0	Four
	Docking connector	One
	Secondary battery connector	One
	LED status indicators	Fifteen

Audio	High Definition Audio support w/24-bit DAC
	Integrated stereo speakers
	Integrated microphone
	Touch-sensitive controls for volume up, volume down, and mute
	Stereo headphone/line out
	Stereo microphone in

Software	Preinstalled software with Windows Vista or Windows XP	PDF Complete HP Backup and Recovery Manager HP Help and Support Center HP QuickLook (Windows Vista only) HP OpenView Radia Management Agent HP Universal Print Driver HP ProtectTools Security Manager: BIOS Configuration for HP ProtectTools Credential Manager for HP ProtectTools Device Access Manager for HP ProtectTools* Drive Encryption for HP ProtectTools Embedded Security for HP ProtectTools HP Quick Launch Buttons HP Wireless Assistant Microsoft Office Ready with 60-day Office Professional 2007 Trial Edition (select models) Roxio Creator 9 (for optional DVD+/-RW and DVD/CDRW drives) Synaptics Touchpad Driver Symantec Norton Internet Security with complimentary 60-day live update Intervideo WinDVD – DVD Player
	Additional software available from the web	HP Client Manager Java Card Security for HP ProtectTools

* Download available from hp.com for Windows Vista; preinstalled with Windows XP.

Standard Features

HP Backup and Recovery Manager	Each unit is shipped with HP Backup and Recovery Manager. HP Backup and Recovery Manager can provide data and system file protection for HP business PCs to enable fast recovery if the system becomes corrupted or if important information is accidentally deleted. HP Backup and Recovery Manager can perform scheduled or manual backups of the entire drive or individual files and folders. Up to 10 GB of the hard drive is reserved for the system recovery software. HP Backup and Recovery Manager can also create software recovery CDs or DVDs (requires optional hardware).
SMBIOS Version 2.4	System Management BIOS, previously known as DMI BIOS, is used to store system management information.
HP ProtectTools Security Manager	HP ProtectTools Security Manager is the security platform for business notebooks and desktops. The HP ProtectTools Security Manager is an extensible client security console that delivers enhanced security capabilities through add-on software modules. Modules currently available are: • BIOS Configuration for HP ProtectTools • Credential Manager for HP ProtectTools • Device Access Manager for HP ProtectTools • Drive Encryption for HP ProtectTools • Embedded Security for HP ProtectTools • Java Card Security for HP ProtectTools

Security	<table><tr><td>Standard Features</td><td>HP ProtectTools Security Manager HP Fingerprint Sensor Configuration Control Hardware Memory Change Alert Ownership Tag Setup Password Power-On Password TPM 1.2 Embedded Security Chip* TPM Enhanced DriveLock* HP Disk Sanitizer HP 3D DriveGuard Kensington Lock Slot Support for Computrace / LoJack for Laptops (must be purchased separately)</td></tr><tr><td>Optional Features</td><td><table><tr><td>Smart Card Reader (replaces Type I/II PC Card slot)</td><td>Compatible with ISO 7816 compliant Smart Cards PC/SC interface support</td></tr><tr><td>HP Privacy Filter</td><td>Narrows viewing area so that screen data is visible only to persons directly in front of the monitor</td></tr></table></td></tr></table>	Standard Features	HP ProtectTools Security Manager HP Fingerprint Sensor Configuration Control Hardware Memory Change Alert Ownership Tag Setup Password Power-On Password TPM 1.2 Embedded Security Chip* TPM Enhanced DriveLock* HP Disk Sanitizer HP 3D DriveGuard Kensington Lock Slot Support for Computrace / LoJack for Laptops (must be purchased separately)	Optional Features	<table><tr><td>Smart Card Reader (replaces Type I/II PC Card slot)</td><td>Compatible with ISO 7816 compliant Smart Cards PC/SC interface support</td></tr><tr><td>HP Privacy Filter</td><td>Narrows viewing area so that screen data is visible only to persons directly in front of the monitor</td></tr></table>	Smart Card Reader (replaces Type I/II PC Card slot)	Compatible with ISO 7816 compliant Smart Cards PC/SC interface support	HP Privacy Filter	Narrows viewing area so that screen data is visible only to persons directly in front of the monitor
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*NOTE: TPM module disabled where use is restricted by law; for example, Russia and China. For more information on HP security solutions refer to http://www.hp.com/go/security.									

Standard Features

Power Supply	External 90-watt Smart AC adapter, 1.8-meter power cord included. Total length including external AC adapter is 3.66 meter. HP Fast Charge*
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*HP Fast Charge recharges your battery up to 90% within 90 minutes when the system is off. HP Fast Charge does not apply to 12-cell Ultra-Capacity batteries.

Battery	Primary battery	6-cell (55 WHr) Lithium-Ion battery
	Optional HP Extended Life Battery	8-cell (52 WHr) high capacity Lithium-Ion battery
	Optional HP Ultra-Capacity Battery	12-cell (95 WHr) high capacity Lithium-Ion battery

Battery Life	Primary battery	55 WHr: Up to 5 hours and 15 minutes
	Primary battery and optional HP Extended Life Battery	55 WHr: Up to 10 hours and 45 minutes
	Primary battery and optional HP Ultra-Capacity Battery	55 WHr: Up to 14 hours and 30 minutes

NOTE: The listed battery life measurements were taken on models running Microsoft Windows XP Professional. Battery life will vary depending on the product configuration, product model, applications loaded on the product, power management settings of the product, and the product features used by the customer. As with all batteries, the maximum capacity of this battery will decrease with time and usage.

System Standby Time	Up to 1 week
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Power Conservation	Supports enhanced Intel SpeedStep technology with Intel Core 2 Duo processors (allows Battery Optimized Mode, Maximum Performance Mode, or Automatic mode) Intel Display Power Saving technology Hibernation Standby ACPI compliance
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Standard Features

Docking and Stands

- HP 3-in-1 NAS Docking Station
- HP Advanced Docking Station
- HP Basic Docking Station
- HP Standard Monitor Stand
- HP Adjustable Notebook Stand
- HP External MultiBay II

HP's shared docking solutions provide simple and convenient port replication and cable management. Features include Gigabit NIC pass through, modem pass through, legacy parallel and serial ports, S-video TV out, USB 2.0 ports, integrated security mechanism*, integrated MultiBay II and ExpressCard** slots. These docking solutions are compatible across multiple Business Notebook platforms enabling a lower total cost of ownership.

* HP/Kensington Cable Lock required (purchased separately)

** HP 3-in-1 NAS Docking Station and HP Advanced Docking Station only

Service and Support

HP Services offers limited 3- year, 1-year and 90-day warranty options depending on country; 1-year limited warranty on primary battery. On-site service and warranty upgrades are also available.

NOTE: Certain restrictions and exclusions apply. Consult the HP Customer Support Center for details.
<http://h20000.www2.hp.com/bizsupport/TechSupport/ProductRoot.jsp>.

Options

Memory	HP 512-MB (DDR2 667 MHz) SODIMM	EM993AA
	HP 1-GB (DDR2 667 MHz) SODIMM	EM994AA
	HP 2-GB (DDR2 667 MHz) SODIMM	EM995AA
MultiBay II Storage (9.5-mm) NOTE: Requires HP 3-in-1 NAS Docking Station, HP Advanced Docking Station, or HP External MultiBay II	HP MultiBay II DVD-ROM Drive	PA849A
	HP MultiBay II DVD/CD-RW Combo Drive	PA850A
	HP MultiBay II DVD+/-RW SuperMulti DL Drive	PA851A
	HP 80-GB 5400rpm MultiBay II Hard Drive	PH357A
Other Storage	HP 120-GB 5400rpm Primary SATA Hard Drive	RT080AA
	HP DVD+/-RW SuperMulti DL LightScribe Drive	ET353AA
	HP Notebooks USB Diskette Drive	DC361B
Expansion Solutions	HP Docking Station with Smart Adapter	EN488AA#xxx
	HP Advanced Docking Station with Smart Adapter	EN489AA#xxx
	HP 3-in1 NAS Docking Station with Smart Adapter	EM537AA#xxx
	HP Standard Monitor Stand	PA507A
	HP Adjustable Notebook Stand	PA508A
	HP External MultiBay II Cradle (EMEA)	PA509A#B13
Power	HP (EMEA) 2-Bay Battery Charging Station	EW424AA#B13
	HP Battery Adapter Kit (EMEA)	PK403A
	HP 90W Smart AC Adapter	ED495AA#xxx
	HP 65W AC/Auto/Air Combo Smart Adapter	ED993AA#xxx
	HP 6-Cell Li-Ion Primary Battery	PB994A
	HP 8-cell Extended Life Battery	PB993A
	HP 12-cell Ultra-Capacity Battery (EMEA)	EJ092AA#B13
Carrying Cases	HP Value Nylon Case	RR314AA
	HP Universal Nylon Case	RR315AA
	HP Executive Leather Case	RR316AA
	HP Deluxe Nylon Backpack	RR317AA
Security	HP PC Card Smart Card Reader with Java Card	EL347AA
	HP ProtectTools Java Card – 10 units	EL348AA
	HP/Kensington MicroSaver Security Lock	PC766A

Options

Input/Output Devices	HP PS/2 Keyboard (EMEA)	DT527A#xxx
	HP USB Keyboard (EMEA)	DT528A#xxx
	HP USB/PS2 Optical 2-Button Scroll Mouse	DC369A
	HP USB Optical Travel Mouse	F2100A
	HP Bluetooth PC Card Mouse	RJ316AA

Memory

Support for up to 4096 MB of 667-MHz DDR2 SDRAM
Two DIMM slots
DIMM sizes supported: 512 MB, 1024 MB, and 2048 MB

- Standard Memory
- 512 MB (512 MB x 1)
 - 1024 MB (1024 MB x 1 or 512 MB x 2)
 - 2048 MB (2048 MB x 1 or 1024 MB x 2)
 - 4096 MB (2048 MB x 2)

Optional Memory Upgrades

Support for up to 4096 MB of memory is available (with the installation of optional DDR2 SDRAM memory kits). Both memory slots are user accessible. Please refer to the Hardware and Software Guide for installation procedures. Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.

Up to	Slot 1	Slot 2
1024 MB	1024 MB	Empty
1024 MB	512 MB	512 MB
1536 MB	1024 MB	512 MB
2048 MB	1024 MB	1024 MB
4096 MB	2048 MB	2048 MB

NOTE: This chart does not represent all possible memory configurations. Due to the non-industry standard nature of some third-party memory modules, we strongly recommend using only HP branded memory modules to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed.

Memory Upgrades	HP 512-MB (DDR2 667 MHz) SODIMM	EM993AA
	HP 1024-MB (DDR2 667 MHz) SODIMM	EM994AA
	HP 2048-MB (DDR2 667 MHz) SODIMM	EM995AA

Storage

Removable Media Drive Support

	Quantity Supported	Drive Bay
DVD-ROM Drive	One	Fixed optical drive bay
DVD/CD-RW Combo Drive	One	Fixed optical drive bay
DVD+/-RW SuperMulti DL Drive	One	Fixed optical drive bay
DVD+/-RW SuperMulti DL LightScribe Drive	One	Fixed optical drive bay

Hard Drive Support

	Quantity Supported	Drive Bay
Primary Hard Drives		
160-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
120-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
80-GB 5400 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay
80-GB 7200 rpm SMART SATA Hard Drive	One	Dedicated hard drive bay

Technical Specifications

System Unit	Dimensions (HxWxD)	34.9 mm (at front) x 357.0 mm x 265.0 mm
	Weight	Starting at 2.62 kg
	NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 6-cell battery, 80-GB hard drive, and optical drive. Weight varies by configuration and components.	
Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	18.5 V
	Average Operating Power	12.5 W
	Max Operating Power	< 90 W
Temperature	Operating	0° to 35° C (not writing optical) 5° to 35° C (writing optical)
	Non-operating	–20° to 60° C
Relative Humidity	Operating	10% to 90%, non-condensing
	Non-operating	5% to 95%, 38.7° C maximum wet bulb temperature
Shock	Operating	125 G, 2 ms, half-sine
	Non-operating	200 G, 2 ms, half-sine
Random Vibration	Operating	0.75 grms
	Non-operating	1.50 grms
Altitude (unpressurized)	Operating	–15.24 to 3,048 m
	Non-operating	–15.24 to 12,192 m
Industry Standard Certifications	UL	Yes
	CSA	Yes
	FCC Compliance	Yes
	Energy Star Compliant	Yes
	ICES	Yes
	GS	Yes
	Australia / NZ A-Tick Compliance	Yes
	CCC	Yes
	Japan VCCI Compliance	Yes
	MIC	Yes
	BSMI	Yes
	CE Marking Compliance	Yes
	BNCI or BELUS	Yes
	CIT	Yes
	GOST	Yes
	Saudi Arabian Compliance (ICCP)	Yes
	SABS	Yes
	UKRSERTCOMPUTER	Yes

Technical Specifications

HP 90W Smart AC Adapter	Dimensions	13.3 x 5.8 x 2.9 cm
	Weight	390 g
	Input	100 to 240 VAC
	Input Efficiency	83% min at 115 VAC
	Input frequency range	47 to 63 Hz
	Input AC current	1.5 A at 90 VAC, 0.75 A at 180 VAC PFC Version
		2.4 A at 90 VAC, 1.2 A at 180 VAC NON PFC Version
	Output	Output power 90W
		DC output 18.5V
		Hold-up time 5 msec at 115 VAC input
		Output current limit <11A, Over voltage protection- 29V max automatic shutdown
	Connector	3 pin/grounded, mates with interchangeable cords
	Environmental Design	Operating temperature 0° to 40° C)
		Non-operating (storage) temperature -20° to 65° C
EMI and Safety Certifications	Altitude	0 to 3,048 m
	Humidity	20% to 80%
	Storage Humidity	10% to 90%
	CE Mark – full compliance with LVD and EMC directives; Worldwide safety standards – IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals – C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE; MTBF- over 200,000 hours at 25°C ambient condition.	

Optional HP Ultra-Capacity Battery	Dimensions (H x W x L)	3.33 x 15.25 x 26.88 cm
	Weight	0.803 kg
	Cells/Type	12-cell Lithium-Ion
	Energy	Watt-hour Capacity 95Wh
	Temperature	Operating (Charging) 0° to 45° C
		Operating (Discharging) -10° to 60° C
		Non-operating -20° to 60° C
	Battery Re-Charge Time	Smart Adapter 3 to 4 hours
		System ON 4 to 5 hours (depending on system power consumption)
	Fuel Gauge	When pressed, LEDs light indicating level of charge remaining on battery

Technical Specifications

Optional HP Extended Life Battery	Dimensions (H x W x L)	2.5 x 10.0 x 22.0 cm	
	Weight	0.455 kg	
	Cells/Type	8-cell Lithium-Ion	
	Energy	Watt-hour Capacity	52Wh
	Temperature	Operating (Charging)	0° to 45° C
		Operating (Discharging)	–10° to 60° C
		Non-operating	–20° to 60° C
	Battery Re-Charge Time	System in OFF mode or Standby	3 hours
		System ON	3 to 5 hours (depending on system power consumption)
		HP Fast Charge	Charges the battery up to 90% within 90 minutes when system is OFF
Fuel Gauge	When pressed, LEDs light indicating level of charge remaining on battery		

6-Cell (55WHr) Lithium-Ion battery	Dimensions (H x W x L)	2.0 x 5.3 x 20.3 cm	
	Weight	0.335 kg	
	Cells/Type	6-cell Lithium-Ion	
	Energy	Watt-hour Capacity	55Wh
	Temperature	Operating (Charging)	0° to 45° C
		Operating (Discharging)	-10° to 60° C
		Non-operating	-20° to 60° C
	Battery Re-Charge Time	System in OFF Mode or Standby	2.5 hours
		System ON	3 to 5 hours (depending on system power consumption)
		HP Fast Charge	Charges the battery up to 90% within 90 minutes when system is OFF

15.4-inch WSXGA+ wide-viewing angle, anti-glare	Dimensions (W x H)	33.1 x 20.7 cm	
	Diagonal Size	39.1 cm	
	Surface Treatment	Anti-glare	
	Contrast Ratio	300:1 (typical)	
	Refresh Rate	60 Hz	
	Brightness	200 nit (typical)	
	Pixel Resolution	Pitch	0.197 mm
		Format	1680 x 1050
		Configuration	RGB stripe
	Backlight	CCFL	
	PPI	129	
	Viewing Angle	±60° Horizontal, ± 50° Vertical (minimum)	

Technical Specifications

15.4-inch WXGA anti-glare	Active Area (W x H)	33.1 x 20.7 cm	
	Diagonal Size	39.1 cm	
	Surface Treatment	Anti-glare	
	Contrast Ratio	300:1 (typical)	
	Refresh Rate	60 Hz	
	Brightness	200 nit (typical)	
	Pixel Resolution	Pitch	0.259 mm
		Format	1280 x 800
		Configuration	RGB stripe
	Backlight	CCFL	
PPI		98	
Viewing Angle		±30° Horizontal, ±10° Vertical (minimum)	

Hard Drives

80-GB 7200 rpm SATA	Drive Weight	113 g	
	Capacity	80 GB	
	Height	9.5 mm	
	Width	70 mm	
	Interface	ATA-7 / SATA 1.0a	
	Transfer Rate	Synchronous (maximum)	100 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track	1 ms
		Average	10 ms
		Maximum	18 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	5° to 60° C [case temp]	
	Features	ATA Security	

Technical Specifications

160-GB 5400 rpm SATA	Drive Weight	101 g
	Capacity	160 GB
	Height	9.5 mm
	Width	70 mm
	Interface	ATA-7 / SATA 1.0a
	Transfer Rate	Synchronous (maximum) 100 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	312,581,808
	Operating Temperature	5° to 60° C [case temp]
	Features	ATA Security

120-GB 5400 rpm SATA	Drive Weight	101 g
	Capacity	120 GB
	Height	9.5 mm
	Width	70 mm
	Interface	ATA-7 / SATA 1.0a
	Transfer Rate	Synchronous (maximum) 100 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	234,441,648
	Operating Temperature	5° to 60° C [case temp]
	Features	ATA Security

80-GB 5400 rpm SATA	Drive Weight	101 g
	Capacity	80 GB
	Height	9.5 mm
	Width	70 mm
	Interface	ATA-7 / SATA 1.0a
	Transfer Rate	Synchronous (maximum) 100 MB/s (Drive Capability)
	Seek Time (typical reads, including settling)	Single Track 3 ms
		Average 13 ms
		Maximum 24 ms
	Rotational Speed	5400 rpm
	Logical Blocks	156,301,488
	Operating Temperature	5° to 60° C [case temp]
	Features	ATA Security

Technical Specifications

Removable Storage Drives

DVD-ROM Drive	Access Times	Random	<116 ms CD <125 ms DVD
	Max Data Transfer Rate	24X CD-ROM 8X-DVD	3,600 KB/s 10,800 KB/s
	Transfer Mode	Multiword DMA Mode 2	
	Interface	EIDE	
	Supported Media (read)	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW	
	Supported Media (write)	None	
	Max Media Capacity (read)	4.7 GB	
	Transport	Tray Loading	

DVD/CD-RW Combo Drive	Access Times	Random	<110 ms CD <130 ms DVD
	Max Data Transfer Rate	24X CD-ROM 8X DVD 24X CD-R 24X CD-RW	3,600 KB/s 10,800 KB/s 3,600 KB/s 3,600 KB/s
	Transfer Mode	Multiword DMA Mode 2	
	Interface	EIDE	
	Supported Media (read)	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW	
	Supported Media (write)	CD-R, CD-RW	
	Max Media Capacity (read)	8.5 GB	
	Max Media Capacity (write)	700 MB	
	Transport	Tray loading	

Technical Specifications

DVD+/-RW SuperMulti DL Drive	Access Times	Random	<175 ms CD <230 ms DVD
	Max Data Transfer Rate	24X CD-ROM	3,600 KB/s
		8X DVD	10,800 KB/s
		24X CD-R	3,600 KB/s
		16X CD-RW	2,400 KB/s
		8X DVD+R	10,800 KB/s
		4X DVD+RW	5,400 KB/s
		8X DVD-R	10,800 KB/s
		4X DVD-RW	5,400 KB/s
		2.4X DVD+R(9)	2,700 KB/s
		5X DVD-RAM	6,750 KB/s
	Transfer Mode	Multiword DMA Mode	
	Interface	EIDE	
	Supported Media (read)	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	
	Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM	
	Max Media Capacity (read)	8.5 GB	
	Max Media Capacity (write)	8.5 GB	
	Transport	Tray Loading	

DVD+/-RW SuperMulti DL LightScribe Drive	Access Times	Random	<175 ms CD <230 ms DVD
	Max Data Transfer Rate	24X CD-ROM	3,600 KB/s
		8X DVD	10,800 KB/s
		24X CD-R	3,600 KB/s
		16X CD-RW	2,400 KB/s
		8X DVD+R	10,800 KB/s
		4X DVD+RW	5,400 KB/s
		8X DVD-R	10,800 KB/s
		4X DVD-RW	5,400 KB/s
		2.4X DVD+R(9)	2,700 KB/s
		5X DVD-RAM	6,750 KB/s
	Transfer Mode	Multiword DMA Mode	
	Interface	EIDE	
	Supported Media (read)	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	

Technical Specifications

Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, LightScribe
Max Media Capacity (read)	8.5 GB
Max Media Capacity (write)	8.5 GB
Transport	Tray Loading

HP Fingerprint Sensor	Mobile Voltage Operation	3.0V–3.6V Single Supply
	Operating Temperature	32° – 158°F (0° – 70°C)
	Current Consumption @ 3.3V	Less than 70 mA peak imaging and scrolling Less than 25 mA hardware finger detection Advanced Power Management
	High-Rate Image Capture	Up to 240 image frames /sec
	ESD Resistance	IEC 61000-4-2 Level 4 (±15KV)
	Detection Matrix	192 x 16 Pixels 9.7 mm x 0.81 mm 500 ppi High-Resolution Images

Audio

Hardware	Implementation	ADI1981HD High Definition CODEC
	Touch-Sensitive Volume Controls	Volume up, volume down, and mute
	Full Duplex	Yes
	Sound Blaster Pro compatible	Yes
	Microphone In	Stereo
	Headphone/Line Out	Stereo
	Integrated Microphone	Yes

Audio Output Quality	Frequency Response	20 Hz – 20 kHz
	Signal to Noise Ratio	>85 dB
	Total Harmonic Distortion	0.01%
	Noise Floor	-110 dB
	Play/Record Sampling Rate(s)	8 kHz – 48kHz
	DAC	16, 20 or 24-bit
	ADC	16 or 20-bit

Technical Specifications

Integrated Stereo Speakers	Power Rating	2 Watts
	Impedance	4 Ohms

Communications

Integrated Broadcom NetLink Gigabit Ethernet Controller (10/100/1000 NIC)	Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3z and 802.3ab; IEEE 802.3 clauses 34-42) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s IEEE 802.1p QoS (Quality of Service) Support IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)
	Power Management	ACPI compliant -- multiple power modes Situation-sensitive features reduce power consumption
	Performance Features	TCP/IP/UDP Checksum Offload (configurable)
	Manageability	Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite
	Interface	PCI Express x1
	NIC Device Driver Name	Broadcom NetLink Gigabit Ethernet
	Drivers Available	Microsoft Windows Vista Microsoft Windows XP
V.92 56K Data/Fax Modem	Form Factor	MDC 1.5 Daughtercard
	Power Management Support	APM Revision 1.2, ACPI
	Approvals/Certifications	UL, CSA, NEMKO, CCIB, Industry Canada, FCC Part 68, CTR21, FCC Part 15 Class B, Canadian ICES-003 Class B, C.I.S.P.R.22, Australian ACA, CE Mark, Other Countries

Technical Specifications

Data Mode Capabilities	V.92 data
	V.8bis
	V.80
	V44, V.42bis, MNP5 (Compression)
	V.42 (LAPM, MNP2-4) (Error Correction)
	Optional symbol rates:
	2800, 3429
	Asymmetric Symbol rates
	Synchronous primary channel data signaling rates:
	3600, 31200
	Automatic rate re-negotiation
	V.34
	V.32bis
	V.32
	V.23
	V.22bis
	V.22
	V.21
	Bell 212A
	Bell 103J
Fax Mode Capabilities	TIA/EIA-578-B (Class 1)
	T.30, T.4 (Group 3)
	V.17
	V.29
	V.27ter
	V.21 Channel 2
Command Set	V.250 (Partial)
	TIA-602
	Identification: +GMI, +GMM, +GMR
	Port control: +IPR, +ICF, +IFC, +ILRR
	Modulation: +MS, +MR, +MA
	Error control: +ES, +ER, +EB, +ESR, +ETBM
	Data compression: +DS, +DR
	V.251

Technical Specifications

HP hs2300 HSDPA Broadband Wireless Module	Frequency Bands and Power Class	850/1900/2100MHz WCDMA Power class 3 (+24dBm) 850MHz GSM/GPRS/EDGE 900MHz GSM/GPRS/EDGE, 1800MHz GSM/GPRS/EDGE 1900MHz GSM/GPRS/EDGE EDGE E2 power GPRS/EDGE Multislot Class 12 GPRS PCS/DCS power class 1 GSM power class 4
	Wireless Protocol Standards	GPRS/EDGE: 3GPP R99 GERAN P1 WCDMA Release 5 (R5) High-Speed Downlink Packet Access (HSDPA) 3.6Mbps GSM Phase 2+
	Wireless Parametric Standards	Complies with 3GPP specifications
	Additional Standards Compliance	FCC parts 15/22/24, CE, Microsoft WHQL, R&TTE directive 1999/5/EC (health, safety, EMC, spectrum), GCF-CC (Module), European Union Directive 2002/95/EC (restrictions of the use of certain Hazardous Substances (RoHS) in electronic equipment), Infrastructure Interoperability Testing (IOT)
	Data Rates (Packet Mode)	Designed maximum data rate: EDGE 118 kbps UL / 236 kbps DL UMTS 384 kbps UL / 384 kbps DL HSDPA 384 kbps UL / 3.6 Mbps DL
	Chipset and Module	Qualcomm MSM6280 chipset; Sierra Wireless MC8775 module
	Maximum Output Power	32 dBm (+/-2) GSM/EDGE GMSK mode
	Power Consumption (maximum)	800mA
	Power Consumption, Sleep Mode	4 – 8mA
	Power Management	USB Selective Suspend sleep and standby mode
	Antenna Type	High efficiency 5- band antennae, mounted in the display enclosure
	Form Factor	PCI-Express MiniCard
	Weight	10 g
	Dimensions (Length x Width x Thickness)	51 x 30 x 4.5 mm
	Voltage, Operating	3.3v +/- 10%
	Temperature, Operating	-30° to 60° C (full RF performance) -30° to 75° C (reduced RF performance)
	Temperature, Non-operating, 96 hours (from MIL-STD 202 Method 108)	-40° to 85° C
	Humidity, Non-operating	85% relative humidity for 48 hours @ 85° C (non-condensing)
	LED Activity	LED Off – Radio Off; Solid LED On – Radio On
	Configuration Utilities	Varies per country and mobile network operator

Technical Specifications

Intel PRO/Wireless 3945ABG Network Connection	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g
	Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at http://www.hp.com/go/notebooks/WLAN)
	Frequency Band	2.4 GHz
	Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
	Security ¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST, EAP-SIM. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4).
	Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
	Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power (for CCK) ²	15 dBm
	Output Power (for OFDM; power varies by data rate) ²	15 dBm
	Power Consumption	Transmit: 1.8 Watts (max) Receive: 1.4 Watts (max) Idle mode ³ : 150 mW (nominal) Sleep mode: 30 mW (max)
	Power Management	ACPI compliant power management 802.11 compliant power saving mode
	Receiver Sensitivity ⁴	54 Mbps: -72 dBm, 11 Mbps: -88 dBm , 1 Mbps: -97 dBm
	Antenna Connections	2 U.FL type connectors, 50 ohm nominal impedance
	Range	802.11 a – Typical 600 feet – Outdoor Open Area (@6 Mbps) 150 feet – Indoor, Office environment 802.11 b – Typical 1200 feet – Outdoor Open Area (@1 Mbps) 300 feet – Indoor, Office environment 802.11 g – Typical 1200 feet – Outdoor Open Area (@1 Mbps) 300 feet – Indoor, Office environment
	Form Factor	PCI-Express MiniCard
	Weight	6 g
	Dimensions	4.75 x 29.85 x 50.8 mm
	Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%

Technical Specifications

Temperature	Operating	0° to 80° C
	Non-operating	–40° to 80° C
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	3,048 m
	Non-operating	15,240 m
Configuration Utility ⁵	Microsoft Windows 2000 or XP	
	Choice of Configuration Utility:	
	• Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)	
	Microsoft Windows Vista	
	• Microsoft Windows Vista Wireless Network Connection Manager	
LED Activity	LED Off – Radio OFF; Solid LED On – Radio ON	
1. Check latest software/driver release for updates on supported security features. 2. Maximum output power may vary by country according to local regulations. 3. In Power Save Polling mode. 4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation). 5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.		

Intel PRO/Wireless 3945BG Network Connection

Wireless LAN Standards	IEEE 802.11b IEEE 802.11g
Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at http://www.hp.com/go/notebooks/WLAN)
Frequency Band	2.4 GHz
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
Security¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST, EAP-SIM. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4).
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power (for CKK)²	15 dBm

Technical Specifications

Output Power (for OFDM; 15 dBm
power varies by data
rate)²

Power Consumption

Transmit: 1.8 Watts (max)
Receive: 1.4 Watts (max)
Idle mode³: 150 mW (nominal)
Sleep mode: 30 mW (max)

Power Management

ACPI compliant power management
802.11 compliant power saving mode

Receiver Sensitivity⁴

54 Mbps: -72 dBm, 11 Mbps: -88 dBm , 1 Mbps: -97 dBm

Antenna Connections

2 U.FL type connectors, 50 ohm nominal impedance

Range

802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment

Form Factor

PCI-Express MiniCard

Weight

6 g

Dimensions

4.75 x 29.85 x 50.8 mm

Operating Voltage

3.3V +/- 9%, 1.5V +/- 5%

Temperature

Operating	0° to 80° C
Non-operating	-40° to 80° C

Humidity

Operating	10% to 90% (non-condensing)
Non-operating	5% to 95% (non-condensing)

Altitude

Operating	3,048 m
Non-operating	15,240 m

Configuration Utility⁵

Microsoft Windows 2000 or XP
Choice of Configuration Utility:

- Microsoft Windows XP Wireless Network Connection Manager
- Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)

Microsoft Windows Vista

- Microsoft Windows Vista Wireless Network Connection Manager

LED Activity

LED Off – Radio OFF; Solid LED On – Radio ON

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. In Power Save Polling mode.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.

Intel Wireless WiFi Link
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Wireless LAN Standards

IEEE 802.11a
IEEE 802.11b
IEEE 802.11g
IEEE 802.11n (draft 1.02)

Technical Specifications

Interoperability	Wi-Fi certified (802.11abg only) Cisco Compatible Extensions Program compliant (802.11abg only) with Microsoft Windows 2000 and XP (details at http://www.hp.com/go/notebooks/WLAN) Tested with wireless access points from several major manufacturers (details at http://www.hp.com/go/notebooks/WLAN/draft-n)												
Frequency Band	2.4 GHz and 5 GHz												
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n (draft): 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n (draft) specification												
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM												
Security¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128, 192, and 256 bits), 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows 2000 and XP only.												
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.												
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK												
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)												
Roaming	IEEE 802.11 compliant roaming between access points												
Output Power (for CCK)²	15 dBm												
Output Power (for OFDM; power varies by data rate)²	15 dBm												
Power Consumption	Transmit: 2.3 Watts (average, with two spatial streams) Receive: 1.9 Watts (average with three receive chains) Idle mode³: 30 mW (average) Radio off: 20 mW (max)												
Power Management	ACPI compliant power management 802.11 compliant power saving mode												
Receiver Sensitivity⁴	300 Mbps: -68 dBm, 54 Mbps: -74 dBm, 6 Mbps: -90 dBm												
Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance												
Range	<table> <tr> <td>802.11 a – Typical (@6 Mbps)</td><td>600 feet – Outdoor Open Area</td></tr> <tr> <td></td><td>150 feet – Indoor, Office environment</td></tr> <tr> <td>802.11 b – Typical (@1 Mbps)</td><td>1200 feet – Outdoor Open Area</td></tr> <tr> <td></td><td>300 feet – Indoor, Office environment</td></tr> <tr> <td>802.11 g – Typical (@1 Mbps)</td><td>1200 feet – Outdoor Open Area</td></tr> <tr> <td></td><td>300 feet – Indoor, Office environment</td></tr> </table>	802.11 a – Typical (@6 Mbps)	600 feet – Outdoor Open Area		150 feet – Indoor, Office environment	802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area		300 feet – Indoor, Office environment	802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area		300 feet – Indoor, Office environment
802.11 a – Typical (@6 Mbps)	600 feet – Outdoor Open Area												
	150 feet – Indoor, Office environment												
802.11 b – Typical (@1 Mbps)	1200 feet – Outdoor Open Area												
	300 feet – Indoor, Office environment												
802.11 g – Typical (@1 Mbps)	1200 feet – Outdoor Open Area												
	300 feet – Indoor, Office environment												
Form Factor	PCI-Express MiniCard												
Weight	6 g												
Dimensions	4.75 x 29.85 x 50.8 mm												
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%												

Technical Specifications

Temperature	Operating	0° to 80° C
	Non-operating	–40° to 80° C
Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 90% (non-condensing)
Altitude	Operating	3,048 m
	Non-operating	15,240 m
Configuration Utility ⁵	Microsoft Windows 2000 or XP Choice of Configuration Utility: • Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support)	
	Microsoft Windows Vista • Microsoft Windows Vista Wireless Network Connection Manager	
LED Activity	LED Off – Radio OFF; Solid LED On – Radio ON	
	1. Check latest software/driver release for updates on supported security features. 2. Maximum output power may vary by country according to local regulations. 3. In Power Save Polling mode and on battery power. 4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation). 5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.	

Intel Wireless WiFi Link 4965AG	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g
	Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at http://www.hp.com/go/notebooks/WLAN)
	Frequency Band	2.4 GHz and 5 GHz
	Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
	Security ¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128, 192, and 256 bits), 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows 2000 and XP only.
	Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
	Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
	Network Architecture	Ad-hoc (Peer to Peer)
	Models	Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points

Technical Specifications

Output Power (for CKK) ²	15 dBm
Output Power (for OFDM; power varies by data rate) ²	15 dBm
Power Consumption	Transmit: 1.6 Watts (average) Receive: 1.1 Watts (average) Idle mode ³ : 30 mW (average) Radio off: 20 mW (max)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity ⁴	54 Mbps: -74 dBm, 6 Mbps: -90 dBm
Antenna Connections	2 U.FL type connectors, 50 ohm nominal impedance
Range	802.11 a – Typical 600 feet – Outdoor Open Area (@6 Mbps) 150 feet – Indoor, Office environment 802.11 b – Typical 1200 feet – Outdoor Open Area (@1 Mbps) 300 feet – Indoor, Office environment 802.11 g – Typical 1200 feet – Outdoor Open Area (@1 Mbps) 300 feet – Indoor, Office environment
Form Factor	PCI-Express MiniCard
Weight	6 g
Dimensions	4.75 x 29.85 x 50.8 mm
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%
Temperature	Operating 0° to 80° C Non-operating -40° to 80° C
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 90% (non-condensing)
Altitude	Operating 3,048 m Non-operating 15,240 m
Configuration Utility ⁵	Microsoft Windows 2000 or XP Choice of Configuration Utility: • Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows 2000 or XP (required for Cisco Compatible Extensions support) Microsoft Windows Vista • Microsoft Windows Vista Wireless Network Connection Manager
LED Activity	LED Off – Radio OFF; Solid LED On – Radio ON
1. Check latest software/driver release for updates on supported security features. 2. Maximum output power may vary by country according to local regulations. 3. In Power Save Polling mode and on battery power. 4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation). 5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.	

Broadcom 4311AG
802.11a/b/g WiFi

Wireless LAN Standards IEEE 802.11a
IEEE 802.11b



Technical Specifications

Adapter	IEEE 802.11g
Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at http://www.hp.com/go/notebooks/WLAN)
Frequency Band	2.4 GHz and 5 GHz
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
Security ¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4).
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power (for CCK) ²	17.5 dBm
Output Power (for OFDM; power varies by data rate) ²	15 dBm
Power Consumption	Transmit: 2.0 W (max) Receive: 1.5 W (max) Idle mode ³ : 390 mW (nominal) Sleep mode: 20 mW (max)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity ⁴	54 Mbps: -72 dBm, 11 Mbps: -88 dBm, 1 Mbps: -97 dBm
Antenna type	High efficiency dual band antenna with spatial diversity, mounted in the display enclosure
Range	802.11 a – Typical (@6 Mbps) 600 feet – Outdoor Open Area 150 feet – Indoor, Office environment 802.11 b – Typical (@1 Mbps) 1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment 802.11 g – Typical (@1 Mbps) 1200 feet – Outdoor Open Area 300 feet – Indoor, Office environment
Form Factor	PCI-Express MiniCard
Weight	12 g
Dimensions	4.75 x 29.85 x 50.8 mm
Operating Voltage	3.3v +/- 10%
Temperature	Operating 0° to 80° C Non-operating -40° to 80° C

Technical Specifications

Humidity	Operating	10% to 90% (non-condensing)
	Non-operating	5% to 95% (non-condensing)
Altitude	Operating	3,048 m
	Non-operating	15,240 m
Configuration Utility ⁵	Microsoft Windows 2000 or XP	
	Choice of Configuration Utility:	
	• Microsoft Windows XP Wireless Network Connection Manager • Broadcom Wireless Configuration Utility (required for Cisco Compatible Extensions support)	
	Microsoft Windows Vista	
	• Microsoft Windows Vista Wireless Network Connection Manager	
LED Activity	LED Off – Radio OFF; Solid LED On – Radio ON	
	1. Check latest software/driver release for updates on supported security features. 2. Maximum output power may vary by country according to local regulations. 3. In Power Save Polling mode. 4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation). 5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.	

Broadcom 4311BG 802.11b/g WiFi Adapter	Wireless LAN Standards	IEEE 802.11b IEEE 802.11g
	Interoperability	Wi-Fi certified Cisco Compatible Extensions Program compliant with Microsoft Windows 2000 and XP (details at http://www.hp.com/go/notebooks/WLAN)
	Frequency Band	2.4 GHz
	Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM
	Security ¹	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4).
	Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
	Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power (for CCK) ²	17.5 dBm

Technical Specifications

Output Power (for OFDM; 15 dBm
power varies by data
rate)²

Power Consumption Transmit: 2.0 W (max)
Receive: 1.5 W (max)
Idle mode³: 390 mW (nominal)
Sleep mode: 20 mW (max)

Power Management ACPI compliant power management
802.11 compliant power saving mode

Receiver Sensitivity⁴ 54 Mbps: -72 dBm, 11 Mbps: -88 dBm , 1 Mbps: -97 dBm

Antenna type High efficiency dual band antenna with spatial diversity, mounted in the display enclosure

Range 802.11 b – Typical 1200 feet – Outdoor Open Area
(@1 Mbps) 300 feet – Indoor, Office environment
802.11 g – Typical 1200 feet – Outdoor Open Area
(@1 Mbps) 300 feet – Indoor, Office environment

Form Factor PCI-Express MiniCard

Weight 12 g

Dimensions 4.75 x 29.85 x 50.8 mm

Operating Voltage 3.3v +/- 10%

Temperature Operating 0° to 80° C
Non-operating -40° to 80° C

Humidity Operating 10% to 90% (non-condensing)
Non-operating 5% to 95% (non-condensing)

Altitude Operating 3,048 m
Non-operating 15,240 m

Configuration Utility⁵ Microsoft Windows 2000 or XP
Choice of Configuration Utility:

- Microsoft Windows XP Wireless Network Connection Manager
- Broadcom Wireless Configuration Utility (required for Cisco Compatible Extensions support)

Microsoft Windows Vista

- Microsoft Windows Vista Wireless Network Connection Manager

LED Activity LED Off – Radio OFF; Solid LED On – Radio ON

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. In Power Save Polling mode.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows 2000 or XP. WLAN may also be compatible with certain third-party software supplicants.

HP Integrated Module
with Bluetooth Wireless
Technology

Bluetooth Specification 2.0 Compliant
Dimensions 26 x 14 x 5.7 mm
Frequency Band 2402 to 2480 MHz

Technical Specifications

Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric
Transmit Power	-6 dBm to 4 dBm (Bluetooth Class II)
Receiver Sensitivity	Better than -80 dBm at 0.1 % raw bit error rate
Power Consumption	Peak (Tx) 264 mW Peak (Rx) 231 mW Sleep <1 mW
Antenna	Internally integrated within module
Range	Up 33 ft (10 m)
Electrical Interface	USB 2.0 compliant Microsoft Windows Plug and Play compliant
OS Support	Genuine Windows Vista Genuine Windows XP Genuine Windows 2000
Bluetooth Software Supported	Broadcom Bluetooth for Windows Microsoft Windows XP Bluetooth Software
Link Topology	Point to Point, Multipoint Pico Nets up to 7 slaves
Security	Full support of Bluetooth Security Provisions
Power Management	Microsoft Windows ACPI, and USB Bus Support Self configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff
Certifications	All necessary regulatory approvals for supported countries, including: FCC (47 CFR) Part 15C, Section 15.247 & 15.249 ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Temperature	Operating -20° to 70° C Non-operating -40° to 80° C
Humidity	Operating 10% to 90% Non-operating 5% to 95%
Altitude	Operating 4,572 m Non-operating 12,192 m

Technical Specifications

Bluetooth Profiles Supported

(with Bluetooth for Windows 4.0 software)
Serial Port Profile (SPP)*
Dial-Up Networking (DUN)*
Generic Object Exchange Profile (GOEP)
Object Push Profile (OPP)*
File Transfer Profile (FTP)
Synchronization Profile (SYNC)
Hard Copy Cable Replacement (HCRP)*
Personal Area Networking Profile (PAN)*
Human Interface Device Profile (HID)*
FAX Profile (FAX)
Basic Imaging Profile (BIP)
Headset Profile (HSP)
Hands Free Profile (HFP)
Advanced Audio Distribution Profile (A2DP)

* indicates the profile is also supported by Microsoft Windows XP SP2

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