



Enterprise Grade Wireless LAN Client

Intel® PROSet/Wireless Software 9.0

Executive Summary

Intel® PROSet/Wireless Software version 9.0 is a leading-edge wireless LAN management solution designed for the enterprise. It addresses the most pressing needs of IT administrators when it comes to deploying and managing wireless computing in the enterprise: state-of-the-art, standards-based security; innovative tools for easily managing client machines; and an easily deployed solution. It includes a powerhouse of features intended to make administrators' lives simpler. At the same time, it is designed to make wireless computing easier for employees to use when they are mobile, maximizing their productivity and reducing the volume and duration of costly support calls. This blend of innovative design and robust features make Intel PROSet/Wireless Software an ideal choice for a wireless management solution in the enterprise.

With version 9.0, Intel PROSet/Wireless Software has been completely re-engineered and upgraded. Significant effort has been invested to create a solution that makes wireless computing easier for the mobile user who needs to connect to the corporate network. The solution includes a simplified, intuitive user interface, automatic detection of and connection to wireless access points based on adapter preferences, detection of access point security levels, an enhanced single sign-on system that lets users enter their credentials only once for easy connection to the enterprise network, easy and secure switching between networks, a troubleshooter and log, a home access point configuration wizard, SIM-based Wi-Fi network authentication for one bill roaming and more. These ease-of-use features are intended to enable easy connectivity to Wi-Fi networks, boost employee productivity and help reduce the volume and duration of costly technical support calls for a potentially enhanced return on investment (ROI).

An equal amount of effort has been put into making the lives of IT administrators easier by giving them greater control over client machines. The solution enables them to create connection profiles that can be distributed over a network and remotely managed, to set global policies for client machine connections to access points, to run log-in scripts during the log-in process, to remotely manage client machines even when no user is logged in, and more. The solution is very easy for administrators to deploy, with an automated command line installer and selective install options.

Based on the recently released IEEE 802.11i standard that includes the new 802.1X authentication protocol, and designed for WPA2 Wi-Fi Alliance* certification, the solution provides enterprise-grade security for wireless connections. It works with other standards-based wireless devices and access points, so that interoperability issues are minimized and related support requests reduced. The solution supports WEP, TKIP and AES data encryption along with 802.1X based PEAP (GTC and MS-CHAP v2), EAP-TLS, EAP-TTLS, EAP-SIM authentication. EAP-SIM enables SIM credentials to be used for Wi-Fi access as well as one-bill roaming. What's more, it supports the widely used Cisco Client Extensions* including LEAP* and EAP-FAST wireless LAN security extensions.‡

Intel PROSet/Wireless Software was specifically developed for the Intel PRO/Wireless 2200BG Network Connection and the new 2915ABG Network Connection wireless network adapters—the adapters that are integrated components of Intel® Centrino™ mobile technology.† The solution supports Microsoft Windows* XP Professional, Windows XP Home Edition, Windows XP Tablet and Windows 2000-based operating systems. Intel PROSet/Wireless Software is available at no extra charge to all OEMs offering Intel Centrino mobile technology-based platforms. Software updates are available from <http://downloadfinder.intel.com>

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Intel is scheduled to release Linux* drivers for the adapters with source code available for download from <http://ipw2200.sourceforge.net> and <http://ipw2915.sourceforge.net>. Support will be limited to basic IEEE 802.11 functionality.

Intel PROSet/Wireless Software fits into Intel's overall vision for mobile technology by advancing Intel's wireless LAN capability with industry-leading tools for manageability and security. As an Intel Centrino mobile technology offering, it complies with the new Intel Stable Image Platform Program (Intel® SIPP) which Intel created to help address the need for stable image hardware platforms. Like all Intel products, it has been tested, tuned and validated extensively.

Wireless Computing Trends in the Enterprise

Over the last few years, as notebook computers have become ubiquitous in the enterprise, there has been an increase in the use of wirelessly-enabled laptops. Wireless notebook computers are used by employees that are traveling or working from home; increasingly they are also being used within the workplace itself as more and more corporations deploy wireless networks. Employee demand for onsite wireless networks has risen as employees seek to access the corporate network from anywhere within a corporate campus: in conference rooms, cafeterias, other employee cubicles—wherever work gets done.

Many companies have invested in wireless LAN technology because the ROI can be significant due to increased employee productivity, and the break-even point for investment can come quickly. According to a study by the Wireless LAN

Association (WLANA) in 2002, the average time to fully pay back the initial costs of WLAN installations was 8.9 months, and productivity benefits quantified were found to be 48 percent of the total ROI. 97 percent of customers said that wireless LANs met or exceeded their expectation to provide their company with a competitive advantage.

At the same time, other companies have held back from investing in wireless network technology due to concerns about security, ease-of-use and manageability.

Design Goals

Over the last two years, Intel has surveyed enterprise IT managers to find out specifically what their concerns are with deploying and managing wireless networks. The design goals of Intel PROSet/Wireless Software 9.0 directly mirror the concerns of IT managers.

Security

The primary piece of feedback we received was that current solutions are not perceived as being sufficiently secure. The perception in the IT community up to this point has been that deploying a wireless network is risky, because doing so could open up new avenues for hackers to break into the corporate network.

Current wireless technology is based on the Institute for Electrical and Electronics Engineers (IEEE) standard, 802.11. This standard includes an encryption algorithm called WEP (Wired Equivalent Privacy) that was touted as having the same level of security as a wired network. But within a few months of the standard's ratification in 1999 hackers were able to break into these networks, seriously undermining the security claims.

Flaws were found in the design of the WEP algorithm. A major problem is WEP's reliance upon a secret key that is shared between a client machine such as a laptop and an access point that is used to encrypt packets before they are transmitted. In practice, most installations use a single key that is shared between all client machines and access points. This is a serious security drawback, because with a shared key, an enterprise can't differentiate among the users logging into the wireless network. The WEP key can also be recovered by a malicious user after eavesdropping on the network for a few hours. The recently approved IEEE 802.11i standard, addresses known issues with the WEP encryption algorithm, and adds the AES (Advanced Encryption Standard) security

protocol to the 802.11 standard. It provides a stronger level of security than that found in the current Wi-Fi Protected Access2 (WPA2)* security certification from the Wi-Fi Alliance. A primary goal in the design of Intel PROSet/Wireless Software 9.0 was to support this new IEEE 802.11i standard. What's more, the update adds authentication functionality by including a port-based authentication protocol called 802.1X.

Interoperability

In addition to supporting the 802.11i standard, the solution is designed to meet the certification requirements of the Wi-Fi Alliance for WPA2. Certification assures tested and proven interoperability among wireless computer components.

Ease of Management

The IT administrators we spoke with seek solutions that will empower them to manage wirelessly-enabled client machines efficiently, so that they can maintain the integrity of the corporate network. Up to this point, administrators have had little control over client machines once a wireless network is in place. For instance, an employee using a wirelessly-enabled laptop to work at home may change settings that not only compromise the machine's security but make it impossible for the employee to connect once they are back in the office—prompting a call for technical support. More importantly, administrators often have no way to perform tasks that are standard for wired networks such as downloading patches when no user is logged on.

An important goal in the design of Intel PROSet for Wireless Software was to enable IT administrators to have remote management capabilities on the clients that are running the software, with the intention of making it possible for them to perform the same kinds of administrative tasks they can perform on wired networks.

Ease of Use

A high priority in the design of Intel PROSet for Wireless Software was to make it extremely easy for Wi-Fi users. The goals here are to simplify wireless connectivity, thereby increasing user productivity; to help reduce support calls from frustrated users by enabling them to solve simple problems themselves; and to enable better problem resolution by technical support by providing them with enhanced data (or session logs) to help debug the issue more effectively.

Ease of Deployment

IT administrators seek solutions that are easy to deploy, with a minimal learning curve. Intel PROSet/Wireless Software was designed to be easy to install, with a minimum number of clicks by administrators and transparency for users. Install options include silent install which requires minimal user intervention and the ability to remotely distribute profiles to user machines.

Ease of Use for Wi-Fi Users

Finally, a major concern for IT administrators has been that employees often find wireless computing technology difficult to use. Although wirelessly-enabled notebook computers have given employee productivity a boost by enabling employees to connect to the corporate network while traveling, at the same time, this ability has created serious technical support headaches. The number of steps required for connection to a corporate network, and the amount of arcane security information needed, simply make the process too complex for many users. Frustrated employees typically resort to calling technical support for help, at great expense to the enterprise.

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Extensibility

Intel PROSet/Wireless Software was designed with an Application Programming Interface (API) that enables select third-party software vendors to create value-added features and embed them in the solution.

Support of Cisco Compatible Extensions* Solutions

In addition to supporting standards-based solutions, Intel PROSet/Wireless Software was designed to support the most popular proprietary wireless solutions on the market today. These include Cisco Compatible Extensions* v. 2.0. Intel is also working closely with Cisco to support future Cisco Compatible Extensions releases.

Benefits of the Intel PROSet for Wireless Solution for the Enterprise

The feature-rich Intel PROSet/Wireless solution is a result of the research Intel did to understand what enterprise IT managers are seeking in a wireless LAN management solution. Most of the features directly correlate to the feedback we received from enterprise IT managers and administrators.

Ease of Management

IT administrators will find many unique features that help them manage client machines.

Remote Creation and Distribution of Connection Profiles

Intel PROSet/Wireless software contains a Profile Manager with unique functionality. It enables an administrator to centrally create and edit profiles, and to export password-protected profiles so that they can be easily distributed over a network.

This reduces the need for employees to manage their own profiles, thus helping to reduce support calls. These profiles can be installed at run time or they can be deployed at install time or they can be deployed remotely after the user has connected to the network. Once an employee's remote computer receives a profile, it is automatically available for use from the client's profile list. In addition to IT administrator created "common" profiles, the solution also supports user created or "user-based" profiles. The GUI for the Profile Wizard is extremely user-friendly: administrators can easily create profiles remotely and distribute them using the tools they use for software distribution.

Remotely-managed Global Policies

Intel PROSet/Wireless software has features that go above and beyond profiles to give administrators an unprecedented level of control over client machines. This unique solution gives administrators the ability to create and change global policy settings for client machines down to a granular level. For example, administrators can use global policies to limit connectivity based on location. If manufacturing employees are only supposed to connect to the network when their laptops are on the manufacturing floor, and not connect when they are upstairs in the marketing department, a global policy can be created for manufacturing employees that limits their connection profile to only connect with the manufacturing network. That way, even if the client machine finds another network, it won't be able to connect to it.

As another example, administrators can control which access points client machines can connect to. A client machine may have the ability to connect to multiple networks via a multi-band 802.11a, b and g combination radio. But if corporate policy requires that certain employees only connect on the 802.11b band, the administrator can remotely send a profile to those employees' machines that will only allow them to connect to the desired band.

Enhanced Administrative Resources: PROSet IT Administration Tool

Intel PROSet for Wireless Software includes an enhanced IT resource called the PROSet IT Administration Tool. It provides administrators with run-time configurable system-wide options, global policy settings, and configurable install-time options. It also offers optional caching of user credentials, enables IT administrators to define user password-caching policy and offers run-time selections such as a password-protected configuration file.

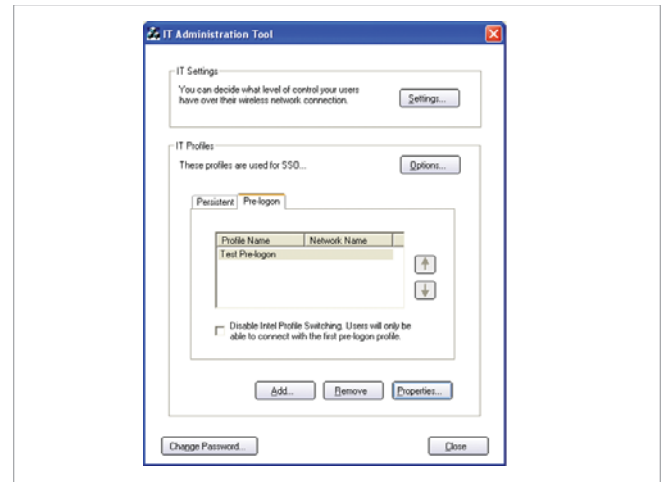
Most software available today allows users to change their machine settings, with unfortunate consequences for security. For example, many wirelessly enabled machines give users the ability to do peer-to-peer networking using Wi-Fi, a function that can leave client machines open to security breaches. The peer-to-peer function can be turned off using other solutions, but typically a user retains the ability to go in and turn that function back on if they want to. With the Intel PROSet IT Administration Tool, once a feature such as peer-to-peer networking is turned off, a user is locked out from accessing that function unless they have the correct password.

Login Script Capability: Pre-login Connect

The Intel PROSet for Wireless technology solution includes two unique, optional patent-pending features that help to empower IT staff to conduct some of the same kinds of administrative tasks that they do on wired networks. The first is referred to as Pre-login connect. Typically, there is a lag between the moment a user enters credentials onto a laptop and the moment they are actually connected to the corporate network. Through a patent-pending process, an IP address is assigned to the user's machine during this lag-time, so that the user has a working IP address even before they are authenticated. This IP address enables an administrator to run a login script without user intervention, emulating what they can do with a wired network.

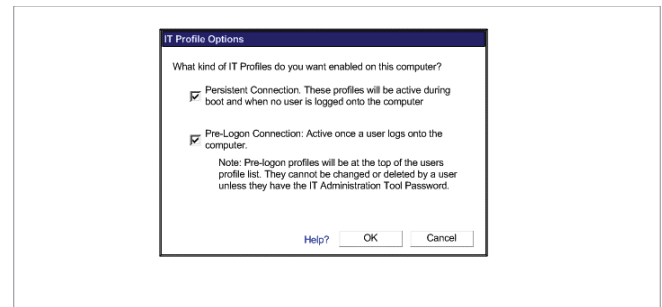
The ability to run login scripts can save a lot of time and headaches for support staff. The administrator can download critical security patches, service tags, operating system

Figure 1 IT Administration Tool



patches or anti-virus DAT files. Or the administrator can run a log-in script that connects a user to a shared network drive even before authentication, so the user doesn't have to think about re-connecting to the shared network.

Figure 2 IT Profile Options



“Lights-out” Remote Management: Persistent Connection

This innovative technology also enables a machine's WLAN connection to be maintained even when no user is logged in, a feature referred to as a Persistent Connection. Administrators can use it to push critical security updates and other software onto client machines and keep them in compliance with corporate security standards regardless of whether users are logged onto the network.

Ease of Deployment

Several features included with Intel PROSet/Wireless software make it relatively easy to deploy in an enterprise setting.

Command Line Installer

The solution includes an automated command line installer (silent—optional) so that when an administrator installs the

solution, he or she doesn't need to double-click on the software and click "next" repeatedly. This makes it easier for a corporation to deploy the solution either via user download or via deployment as an image file, with no user intervention required.

Selective Install Options

The software has a modular design, so that the administrator has the ability to install only the desired components of the software, rather than the entire solution. This selective install can be done several ways: via a single executable-type silent install, through command line parameters, or via an easy graphical user interface (GUI) which allows the user to check off the desired components.

Enhanced, Standards-based Security Features

Intel PROSet/Wireless software supports the 802.11i standard and is expected to be certified by the Wi-Fi Alliance for WPA2 by the end of 2004. In addition, the solution supports 802.11-based EAP-SIM authentication, which enables one-bill roaming. (EAP-SIM authentication is discussed further in the Ease of Use section below.)

In addition to supporting these standards, Intel PROSet/Wireless also supports proprietary WLAN security solutions such as Cisco LEAP [with Cisco Compatible Extensions support]. The Lightweight Extensible Authentication Protocol (LEAP) security solution provides rogue access point detection as an enhanced security feature.

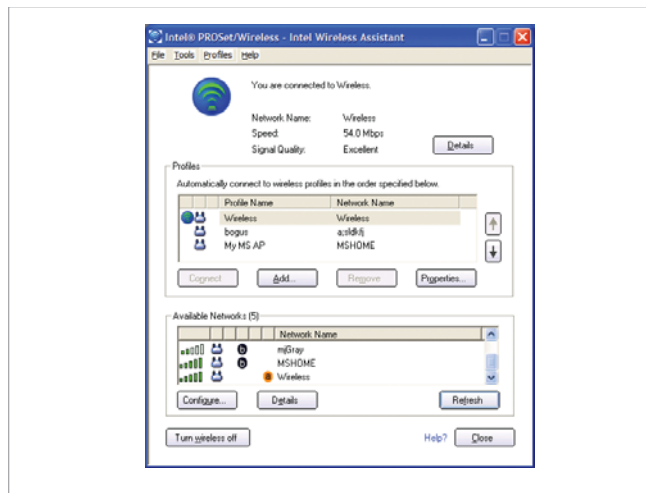
Ease of Use

Intel PROSet/Wireless software includes a plethora of features that make the wireless computing experience easier for enterprise end-users.

Simplified User Interface

With version 9.0, the GUI for Intel PROSet/Wireless Software has been completely redesigned, based on extensive research and customer feedback. The new look and feel includes a single screen that provides an overview of the LAN environment, available network information, details of the current connection, profile management, and access to advanced functions.

Figure 3 Intel® PROSet/Wireless— Intel Wireless Assistant



Integrated Single Sign-on

One of the most frustrating aspects of using a computer wirelessly today is that in order to connect to a corporate network, a user typically must enter different profile sets of credentials at different points in the process. (Credentials refer to a user ID, password and sometimes other information such as a domain name.) The user must first log onto the client machine with one set of credentials using one application, then enter another set of credentials with another application to access the wireless network by authenticating to the enterprises' Remote Authentication Dial-In User Service (RADIUS) server and Active Directory.

Intel PROSet/Wireless technology does away with the need to enter multiple credentials, with a feature referred to as Single Sign-on. The solution integrates the entire login process at a basic architectural level, so that a single set of credentials authenticates a user to the wireless network and to the machine/domain during the Windows login session. Now, when a user enters credentials into the local machine, the credentials are captured and passed to the wireless access point and then all the way on to the RADIUS server and Active Directory. It makes getting onto the wireless network far easier for the user. Intel has applied for a patent for certain elements of this innovative technology.

Easy and Secure Switching Between Networks

Intel PROSet/Wireless software makes it much easier for a user to switch between wireless networks. This solution enables multiple profiles, each with its own security settings, allowing the user to automatically and more securely connect to networks with different security settings. Each client machine has a readily accessible list of saved connection profiles. If the software detects other networks within the range of the wire-

less adapter, an optional notification dialog is displayed that allows the user to switch to another profile if it is likely to provide a better connection, or to continue uninterrupted.

Automatic Connection to and Detection of Access Points

Typically, when connecting to a wireless network, users must use a software utility to search for access points that are within range of their machine's wireless adapter. Intel PROSet/Wireless software searches for access points automatically, and provides automatic connection in the 2.4 GHz and 5.8 GHz environments to available networks that are within range of the wireless adapter.

This feature is constantly monitoring the connection status of the wireless adapter in the background. If no profiles are found that match specified user preferences, a dialog box automatically displays the available network access points within range of the wireless adapter (optional). This feature is especially useful with a dual-mode WLAN connection such as the Intel PRO/Wireless 2200BG Network Connection or the dual-band tri-mode Intel PRO/Wireless 2915ABG Network Connection³. With either one of these adapters, the GUI displays available wireless networks and the user can choose between 802.11b or 802.11g networks, or between 802.11a, 802.11b or 802.11g. In other words, the user can choose the best connection within the coverage area.

The solution also monitors for the "resume status" after a notebook is turned off or activity is suspended for whatever reason. When this occurs, the solution re-enables the Automatic Connection Service, and the connection is restored without user intervention. Lastly, scanning for access points is done automatically, but the user can also manually detect AP's. The latter lets a user monitor a location for access points any time they choose. So if a user is already connected and wants to set up a new access point, they can reconnect without rebooting.

Security Level Detection: Intel Security Assistant

Intel PROSet/Wireless Software incorporates a trio of useful features called the Intel SMART Wireless Solutions v.1. One of these features, the Intel Security Assistant, makes users' lives easier by reducing the guesswork when they are trying to connect to a wireless access point at a new location, such as a hotel room or hotspot. Current solutions typically do not inform the user about a particular access point's security requirements, such as whether a user needs to enter a WEP key. They may even allow a user to

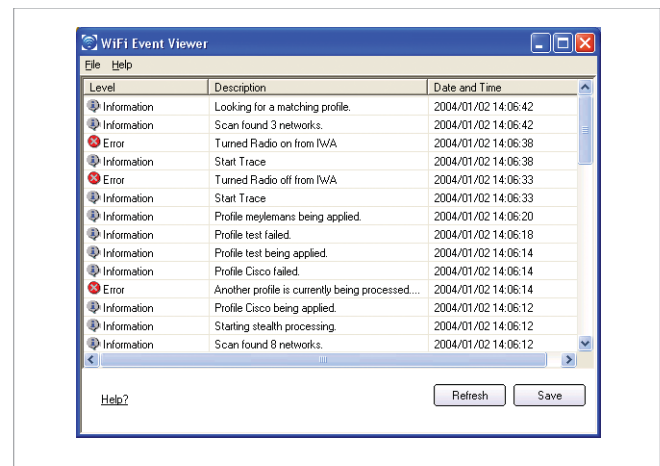
create a profile, leaving them scratching their heads wondering why they still cannot connect to the Internet. Inevitably, a frustrated corporate user will call the support desk for help.

The Intel Security Assistant helps mitigate user frustration. When a user is connected to an access point for the first time, the solution automatically scans the access point for supported security settings. It selects the appropriate security type from a drop-down menu; all the user needs to do is to enter a password. This assistance can help reduce the amount and length of support calls, a potentially significant savings.

Intel Wireless Troubleshooter and Log

The Intel SMART Wireless Solutions v.1 trio also includes a wireless connection troubleshooter and log that are activated when a user is having trouble connecting. It helps the user with tips, such as how many characters are needed for the WEP key, or tells them they have an incorrect WEP key or SSID. At the same time, it logs the sequence of events that occurred when the user was trying to connect. This way, if a user resorts to calling technical support, IT can review the event log and try to decipher the problem. IT staff can view the event log remotely, or else the user can read it or email it to them. This can reduce the length of support calls, lowering corporate TOC. Currently, this is the only solution on the market with an event viewer functionality.

Figure 4 WiFi Event Viewer



Home Access Point Configuration Help: Wireless Network Configuration Wizard

The final feature in the Intel SMART Wireless Solutions v.1 trio is a Wireless Network Configuration Wizard. This is primarily helpful to users who are trying to connect to their home network wirelessly. The penetration of home networking is growing, so it's more and more common for an employee to have a wireless access point at home. The Wireless Network

Configuration Wizard walks a user through the process of configuring their home access point via their laptop. For the enterprise market segment, this feature is helpful because it can reduce support calls from employees who are having trouble using their corporate laptops to work from home.

Most home access points available today do not have security turned on by default or have a way to help the user configure security. It's very important from an enterprise perspective for security to be enhanced on the home access points of employees, because if employees are using their corporate laptops to work wirelessly from home, corporate assets can be put at risk. The Wireless Network Configuration Wizard helps a user to enable enhanced security on their home access point by taking them step-by-step through the process.

SIM-based Wi-Fi Network Access and One-bill Roaming

Employees that travel frequently can benefit from a unique ease-of-use feature that stems from Intel PROSet Technology's support of 802.11-based EAP-SIM authentication for GSM cellular networks. GSM cell-phone technology makes use of Subscriber Identity Module (SIM) cards to store a user's authentication information. Currently, GSM cell-phone users can roam from one network to another without disruption of their cellular service, as long as the two networks have a roaming agreement in place. The charges for both networks appear on the user's cellular provider bill.

Laptops can be enabled with SIM card readers. Intel PROSet/Wireless Software provides a method whereby a SIM-enabled laptop can access a Wi-Fi network that has an agreement with the user's cell-phone network. In effect, it retrieves and forwards the credentials that are stored in the SIM card to the GSM network's Home Location Registry (HRL) for authentication. The credentials are secured via the 802.1X protocol. This makes it much easier for users who are traveling to use Wi-Fi networks in locations outside their home network. It also enables one bill roaming, so that all charges show up on the user's cellular bill.

Tested and Validated for Compatibility and Interoperability

Because Intel wireless products comply with the IEEE 802.11 standard and are Wi-Fi CERTIFIED,* they are interoperable with access points made by any other vendors that also comply with the same standards. Device interoperability removes dependence on a single vendor for various wireless devices. It also minimizes the possibility that users will encounter hotspots that are

incompatible with their adapters. So there are likely to be far fewer support calls from users on the road. In addition to 802.11 standard support, Intel PROSet/Wireless software supports instant hotspot connection services from companies such as Boingo* and iPass* using the Configuration Service feature.

Power Management

Intel has gone to great lengths to enable great battery life through the integration of components in Intel Centrino mobile technology and other technological innovations. Intel PROSet/Wireless software makes its own contribution by adding a layer of power consumption management. If a user is close to an AP and doesn't require maximum adapter power to maintain access, it automatically turns down the amount of power being consumed by the Network Interface Card (NIC). Software from other vendors generally allows users to turn the NIC on or off, which does not impact battery life.

Intel PROSet software enables users to select for power conservation or adapter performance. Or, in Auto mode, the power settings are based on power source. Intel PROSet software also features an Ad Hoc mode, which allows for peer-to-peer wireless networking, in which connections can be made from a NIC in another laptop. This feature allows for transmitter power control in order to expand or confine a coverage area with respect to other wireless devices that could be operating nearby, thus minimizing the possibility of detection. Moreover, it reduces battery consumption. Reducing a coverage area in high traffic areas also improves transmission quality by reducing the number of missed beacons and noise in that coverage area.

Conclusion

Intel PROSet/Wireless Software 9.0 addresses the most pressing needs of IT administrators for state-of-the-art, standards-based security support, includes innovative tools for managing client machines, and is easily deployed. At the same time, it addresses the needs of corporate users for a solution that makes it easy for them to connect to the enterprise network. This blend of innovative design and robust features make Intel PROSet/Wireless Software the ideal choice for a wireless management solution in the enterprise today.



⁸ Some features and security solutions may not be supported by your PC's operating system and may require additional software and/or certain hardware as well as wireless LAN infrastructure support. Check with your PC manufacturer for details. Other names and brands may be claimed as the property of their respective owners.

¹ Wireless connectivity and some features may require you to purchase additional software, services or external hardware. Availability of public wireless LAN access points is limited, wireless functionality may vary by country and some hotspots may not support Linux-based Intel® Centrino™ mobile technology systems. System performance measured by MobileMark* 2002. System performance, battery life, wireless performance and functionality will vary depending on your specific operating system, hardware and software configurations. See http://www.intel.com/products/centrino/more_info for more information. *Other names and brands may be claimed as the property of their respective owners.

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