WHITE PAPER

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Bluetooth wireless technology* and iPAQ Pocket PCs

The purpose of this White Paper is to provide an overview of Bluetooth technology and how it is used in iPAQ Pocket PCs.

Bluetooth is a Radio-Frequency (RF) specification for short-range, point-to-point and point-to-multipoint voice and data transfer. Bluetooth enables users to connect to a wide range of computing and telecommunications devices without the need for cables. HP devices such as iPAQ Pocket PCs take advantage of Bluetooth technology to operate in this wireless environment.

For a more comprehensive technical overview of Bluetooth, read the Bluetooth Technology Overview White Paper *located on the HP website at:*

http://www.compaq.com/products/wireless/wpan/

* **Note:** A standard WLAN infrastructure, other Bluetooth-enabled devices, and a service contract with a wireless airtime provider may be required for applicable wireless communications. Wireless Internet use requires a separately purchased service contract. Check with your service provider for availability and coverage in your area. Not all Web content is available.

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Bluetooth technology overview*

Bluetooth™ is the name of a technology specification for small form factor, low-cost, short-range radio links between PCs, handhelds, mobile phones and other computing and electronic devices. Bluetooth is a very low power technology that operates in the 2.4 GHz frequency band. The maximum range of operation for Bluetooth communication varies between devices from 10 meters (30ft) to 100 meters (250 ft).

The communication behavior between two Bluetooth devices is referred to as a profile. A profile dictates what type of communication can take place between two devices. For two devices to communicate accordingly, they both have to support the same profile. The iPAQ Pocket PC supported profiles are defined in the following sections.

Bluetooth products are identified by the use of the following Bluetooth logo:

benefits and uses

The ability to form an ad hoc network of up to 8 devices (known as a piconet) is one of the biggest benefits of this technology. As an example, this would mean that a piconet could be established in a conference room during a meeting to connect several devices so that information could be shared.

The fact that Bluetooth operates in a wireless environment means users can be much more mobile in their daily operations. For example, with Bluetooth, someone can now print to a Bluetooth local printer instead of a network printer.

Another positive is that Bluetooth does not require a line of site between Bluetooth devices to establish a connection as is needed for infrared communication. Because Bluetooth operates on RF technology, the connection signal is able to pass through walls or from within a bag or briefcase.

With Bluetooth technology, an iPAQ Pocket PC user can perform tasks such as:

- Synchronize information with their Bluetooth desktop or notebook PC.
- Exchange files with other Bluetooth PDAs.
- Access the Internet by connecting to and dialing a Bluetooth mobile phone.
- Print to Bluetooth printers.

Bluetooth security

The Bluetooth specification is designed to be unambiguous and comprehensive. It includes up to 128-bit security to help insure acceptance in the corporate environment. The specification also includes a logo certification program to ensure compatibility among all the various devices incorporating Bluetooth.

Bluetooth uses 4 basic keys in its security mechanism. A 48-bit fixed public address that is unique for each device, a 128-bit random number generated for each transaction, & two secret keys. The two secret keys are a 128-bit private user authentication key and a private user encryption key that can vary from 8-bits to 128-bits. The encryption key can vary in length to allow for export restrictions. From these basic keys, other keys are generated for each link to ensure that other Bluetooth devices that are not part of the piconet cannot either inadvertently or intentionally eavesdrop on a Bluetooth connection.

The Bluetooth specification calls for three levels or modes of security. These modes are as follows:

- Non-Secure – a device will not initiate any security procedure. This mode will allow anyone walking up to the device to take advantage of its services. This mode was envisioned for use with public devices such as printers where a user can walk up, establish an ad-hoc connection, download the job to the printer, and walk away.
- Service Level Enforced Security – in this mode, permission to access a device is dependent on the service requested. For example, creating the ability to download files to a PC but not allowing access to calendar or phonebook applications.
- Link Level Enforced Security – this is the most secure mode and requires authentication and authorization before being granted access to any service available on the device. This mode is for devices such as cell phones that are only to be used by an individual or a limited number of individuals.

Bluetooth has built in encryption and authentication and is thus very secure in any environment. In addition a frequency-hopping scheme with 1600 hops/sec is employed. All of this together with an automatic output power adaptation to reduce the range exactly to requirement makes the system difficult to eavesdrop.

supported Bluetooth profiles

Bluetooth supports a variety of profiles. For information about the most current profiles supported by Bluetooth, visit the Bluetooth Web site at **www.bluetooth.com**. For information about what profiles your iPAQ Pocket PC supports, see the section "iPAQ Pocket PCs and Bluetooth" later in this paper.

basic imaging

This profile defines a method for transferring images from one Bluetooth device (such as a camera) to another Bluetooth device (such as a desktop PC) for storage, editing, or printing.

basic printing

This profile enables simpler printing from a Bluetooth device to a Bluetooth printer. Using this profile does not require specific printer drivers. Instead, the printer has the capability to decipher the information sent to it so that it can produce the desired format.

cordless telephony

With this profile, a Bluetooth device that has voice capability can act as a cordless phone when it is in the vicinity of a Bluetooth access point or other Bluetooth device that has a connection to a voice network.

dial-up networking

This profile defines the link between a mobile phone and a computer. The profile is defined so the computer can either initiate the data call or receive the data call depending on the user setup.

file transfer

This application allows one Bluetooth device to browse a file system on, create or delete files/folders on, or transfer files from/to another Bluetooth device.

generic access

These are generic procedures related to discovery, link establishment, and security levels between two Bluetooth devices. This profile defines the general procedures used for establishing connections to other Bluetooth devices that accept connections and service requests regardless of the devices' manufacturer.

generic object exchange (OBEX)

This profile defines procedures used by applications performing object exchanges, such as Contacts, Calendar, Tasks, and Notes. It defines these processes for transactions such as file transfers, object pushes and pulls, and synchronization.

handsfree

This profile enables your vehicle to communicate with a mobile Bluetooth device that comes in its vicinity.

hard copy replacement

This profile enables a Bluetooth device to communicate with a Bluetooth printer directly for advanced printing capabilities, including management of print jobs, access to specific printer drivers for greater control over formatting, and other printing features. Specific printer drivers are required to use this profile.

headset

This profile enables monaural audio to be transferred between one Bluetooth device, such as a mobile phone or an iPAQ Pocket PC, and a headset. The most common uses for this profile include making phone calls and recording voice data using a wireless headset.

human interface device

With this profile, input devices, such as a keyboard or mouse, can be wirelessly connected to a Bluetooth device.

intercom

Two Bluetooth devices that have voice capability can communicate directly with each other without the need to connect to a voice over IP network or a cellular network. The experience is similar to using two-way radios.

LAN access

This application relates to how Bluetooth devices connect to LANs using Point-to-Point Protocol (PPP). This function allows a Bluetooth device to connect to Bluetooth devices that already participate in a LAN. After you are connected, you will have access to that LAN's resources such as network printers.

object push

This profile defines the process of pushing or pulling small objects such as a business card, calendar appointment, or a task from one device to another.

personal area networking (h5400 Series)

This personal area networking (PAN) profile concentrates on general Internet protocol (IP) networking (including security) in an ad hoc connection environment between Bluetooth devices. Basically it is the ability to set up your own personal network with other Bluetooth devices such as printers, phones, desktops, and fax machines. Within this framework you have access to all of these devices with your iPAQ Pocket PC. The size of the network is limited to eight devices (known as a piconet).

With a PAN, users can chat with each other, play games against each other, and share or exchange information between their devices.

serial port

This allows the use of an emulated serial port for applications that traditionally use a wired serial port interface, such as synchronizing information between and iPAQ Pocket PC and a desktop PC using Microsoft™ ActiveSync, or printing to a Bluetooth printer.

service discovery

This application discovers services available in other Bluetooth devices. This establishes whether or not one device can communicate with the other and to what extent.

synchronization

This profile allows for the exchange of personal information between devices such as calendar and phonebook data. Also, it defines the ability of a mobile phone or computer to automatically start synchronization when two Bluetooth devices are in range. This synchronization can occur even if the two devices do not have compatible operating systems or applications.

iPAQ pocket PCs and Bluetooth*

The iPAQ Pocket PC uses Bluetooth technology for many purposes. This section describes some of the current Bluetooth functions available with select Bluetooth iPAQ Pocket PCs. Please note that not all iPAQ Pocket PCs have Bluetooth capability. All h3100, h3600, h3700, and h3800 Series iPAQ Pocket PCs support an optional Bluetooth Wireless Expansion Pack with CF Card Slot. Certain h3800, h3900, and h5000 Series units ship with integrated Bluetooth.

For detailed instructions on how to perform the following functions, refer to the documentation that accompanied your Bluetooth iPAQ Pocket PC. Also, for more information concerning HP product compatibility with the Bluetooth technology, visit the following website:

http://www.compaq.com/products/wireless/wpan/btcompmatrix.html

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accessing dial-up connections

This function allows your iPAQ Pocket PC to be connected wirelessly to a Bluetooth mobile phone or modem so that you can create a dial-up connection. You can call your Internet Service Provider (ISP) to set up email and Web browsing capabilities or you can connect to your company's remote access server. You can also initiate a call over a GPRS or 1xRTT/1xEVDO cellular channel to achieve higher data transfer speeds.

connecting to serial ports

This function allows you to set up a virtual serial port on your iPAQ Pocket PC for those devices or applications that require a serial port connection. Likewise, it allows you to connect to another device's virtual Bluetooth serial port to utilize certain applications and hardware. You can synchronize information between your iPAQ devices and a desktop, print to a Bluetooth printer, or transfer information between devices using a Bluetooth serial port connection.

connecting to the Internet or an Intranet

With your iPAQ Pocket PC you can access the Internet in several ways:

- By connecting with a Bluetooth mobile phone and performing a dial-up connection or an always-on Internet connection such as with GPRS.
- By connecting to your desktop or notebook computer over Bluetooth and using its network connection.
- By connecting to a Bluetooth access point.

printing

In order to print using an iPAQ Pocket PC, a third-party printing application such as PrintPocketCE or hp mobile printing, is required. The printer must also be Bluetooth compatible. Before printing, the third-party printing software should be installed. Then, using the Bluetooth Manager, the printer must be discovered and saved. Finally, using the third-party software you can successfully print to the printer.

sending or exchanging business cards

This function works on the same principle as sending files or PIM data. With this function you can send your electronic Business Card to another Bluetooth device such as another PDA. This process can be performed in the Bluetooth Manager application, or in the contacts application by tapping and holding on a contact.

Exchanging business cards is also similar, but in this case, if the receiving device has a card to send to you, your device picks it up during the exchange. This function is done only from the Bluetooth Manager.

synchronizing with a PC

This process involves synchronizing your iPAQ Pocket PC with your Bluetooth desktop PC or notebook. This process does not involve any cabling or any third-party. Your desktop or notebook must first be designated as an ActiveSync partner by using the serial or USB connection manually between itself and the iPAQ Pocket PC.

transferring files

With this function you can send various types of files to other Bluetooth devices. This is useful, for example, when you are in a meeting and want to send a copy of a file to someone else in the room with a Bluetooth device. In the h5450 iPAQ Pocket PC and in later models, you can allow another device to access, browse, copy, and edit documents in a particular folder on your device.

This function also allows you to transfer Personal Information (PIM) files such as your Contacts, Calendar entries, or Tasks from your iPAQ Pocket PC to other Bluetooth devices. This can be performed from each of the PIM applications by tapping and holding on the item to be sent.

SUMMARY

Bluetooth is the latest technology that is allowing us to become a more mobile society in our personal and business environments. HP understands the importance of staying connected and has harnessed the power of Bluetooth technology into select notebooks, desktops, printers, and handhelds to give you greater mobility while sustaining your everyday computing needs. To see the full line of HP's Bluetooth offerings, visit HP's Website at **www.hp.com/**.