

Setting Up Bluetooth Wireless Connections

The majority of high-end notebook computers now come with both [Wi-Fi](#) and [Bluetooth](#) adapters. It's also possible to add Bluetooth capabilities to computers that didn't include a built-in capability. Bluetooth is a cable replacement technology that uses radio waves to transmit data to a distance of up to 30 feet. After a year of inertia on the part of consumer networking vendors, suddenly there are a number of add-on USB Bluetooth adapters and peripherals available. Bluetooth-equipped PDAs like [Windows Mobile 2003-based Pocket PCs](#) have finally made their way into the retail channel. Bluetooth devices are no longer just super geeky toys available from the Web or by mail order.

Windows XP users often ask me what to do with the Bluetooth adapter that's embedded in their new laptop computer. They want to know how it works and how it compares to Wi-Fi. They also want to know if they can use Bluetooth connectivity for something other than a mouse or keyboard.

In this column, I'll provide an overview of Bluetooth technology and explain how it differs from Wi-Fi. I'll cover Bluetooth network software setup and explain how pairing and security works on Bluetooth networks. I've included a section on extended connectivity with a Pocket PC and I've also included information on a very cool Bluetooth wireless music network.

Overview of Bluetooth Technology

Bluetooth uses the same 2.4 GHz Industrial, Scientific and Medical (ISM) radio bands that 802.11b/g networking uses (known as the S-Band ISM). Therefore, Bluetooth is interoperable world wide in a similar manner as Wi-Fi equipment. The wireless standard allows hardware from differing vendors to work together (provided the same Bluetooth services are available). Nearly all Bluetooth devices on the market today are what are called **Class 3** devices. These support only low-power, short-range connectivity up to approximately 30 feet.

Bluetooth uses a completely different type of modulation than 802.11b/g called Gaussian frequency shift keying (GFSK). 802.11b/g devices use a static single channel that never changes. Bluetooth devices hop between channels dynamically at extremely fast intervals. Bluetooth uses frequency hopping spread spectrum (FHSS) to hop at up to 1600 hops per second. It uses 79 channels, spaced at 1 MHz between channels. What does this mean in my Wi-Fi saturated environment? Because of the very fast FHSS employed by Bluetooth devices, there is usually no discernable interference with Wi-Fi networks in range that are using 802.11b/g. Technically, if the signals collide, interference can occur.

For a technical discussion of Bluetooth versus 802.11b LANs, see [Bluetooth and 802.11b High Rate DSSS Wireless LANs](#). For a technical discussion of interference with 802.11g LANs, see [Co-Existence Warrants a Second Glance](#). My "best of all possible worlds" solution is to use the embedded 802.11a wireless adapter in my ThinkPad with my [D-Link Tri-mode](#) DWL-7100AP a/b/g access point. Since 802.11a uses a completely different band (the 5 GHz C-Band ISM), I avoid all potential interference.

Use Bluetooth to Sync a Pocket PC and Laptop

Bluetooth is perfect for wireless personal area networks (WPANs). I've been able to keep my HP iPAQ 4150 [Windows Mobile 2003-based Pocket PC](#) in sync with my laptop and access the Internet using the iPAQ through my ThinkPad.

I could use Wi-Fi and sync over one of my wireless networks, but I'd have to configure all devices for WEP and not the stronger WPA-PSK. (You can read about WPA-PSK in my [WPA Security for Home Networks](#) column.) Because Windows Mobile 2003 doesn't include support for the stronger security offered by WPA-PSK, Bluetooth networking is a more attractive connectivity solution than Wi-Fi. Bluetooth offers a different type of secured connection called **pairing**. I secured the Bluetooth connection with a configuration step that paired the iPAQ with a computer.

Bluetooth has a maximum data rate of 723.2 Kbps. This is slower than Wi-Fi, but still provides a solid transport over which to exchange data between my computers and my iPAQ. Although I wrote about using infrared (IR) Active Sync in [Have I Got Connections](#), I never found IR to be reliable. More often than not, the connection would drop before the synchronization session was completed. The good news is that I've never experienced this with Bluetooth Active Sync.

The majority of Bluetooth adapters used in both personal computers and PDAs, including Windows Mobile 2003, use the [Widcomm](#) Bluetooth networking stack and installation software. Windows XP Service Pack 2 (SP2) includes support for the Bluetooth technology, but if you're already using Widcomm software, it should continue to work seamlessly. You may need to download Widcomm updates from the manufacturer of your particular devices for compatibility.

My IBM ThinkPad includes a built-in Bluetooth wireless radio. After I realized how easy it was to sync my iPAQ using Bluetooth, I decided to add Bluetooth support to my Windows XP Media Center Edition desktop computer. I now use a [D-Link DBT-120](#) USB Bluetooth adapter to sync my iPAQ to the desktop.

Install and Configure Bluetooth Networking Devices

You'll need to establish the initial partnership between a Pocket PC and a Windows XP-based computer through a USB or wired serial connection first and then configure the Bluetooth connectivity.

The first step in configuring my desktop was to install and configure the Widcomm Bluetooth software on that computer. Widcomm provides a setup wizard that simplifies the process. Here are the steps I used to configure Bluetooth for Active Sync with my iPAQ:

1. Enter the security or licensing code for the Bluetooth adapter. (This will be printed either on the device or on the CD sleeve that was provided with the adapter. If it isn't printed on the device, it's a good idea to write down this code and keep it in a safe place.) Some vendors have provided an additional option that lets you receive the code over the Internet. If you're configuring an internal adapter (like the built-in adapter on a ThinkPad) this step will not be needed and you will not be prompted for this information.
2. You may need to allow the installation of unsigned drivers and you should select the option in the wizard to suppress prompts. If you're installing on a system running Windows XP SP2, it may be necessary to configure your system to allow unsigned driver installation before starting the wizard. Be sure to set this back to **Prompt** after completing the Widcomm installation. To do this, click **Start**, right-click **My Computer**, and then click **Properties**. On the **Hardware** tab, click **Driver Signing** to make the change.
3. When the **Initial Bluetooth Configuration** page opens, add icons to all three places, and then click **Next**.
4. The default **Computer Name** for your PC is shown. This is the name that will be displayed to other Bluetooth devices when you elect to make your computer discoverable.
5. The **Bluetooth Setup Wizard** opens. To start configuring for Active Sync, click **I want to find a specific Bluetooth device and configure how this computer will use its services**.
6. The **Bluetooth Device Selection** page opens. After verifying that the Pocket PC is turned on and Bluetooth is active, **Search** quickly finds the iPAQ and displays it with the correct device name.
7. Next, configure the services that the computer will offer by selecting **Bluetooth Serial Port**, as shown in the figure below. Then click **Configure**.

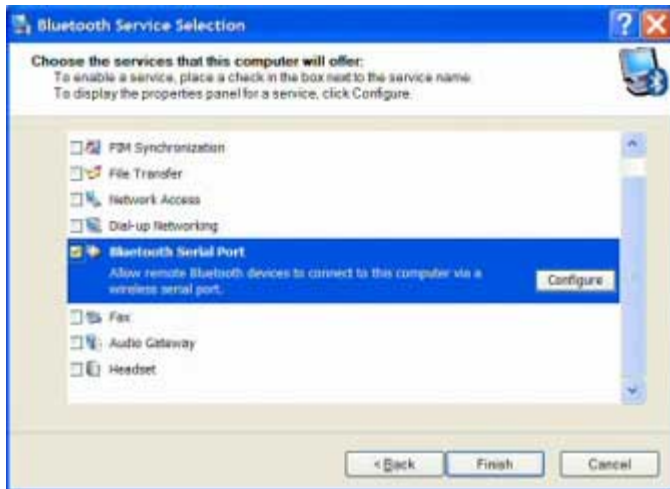


Figure 1: The Bluetooth Service Selection page shows the available services on the computer.

8. In the **Bluetooth Properties** dialog box, verify that both **Startup Automatically** and **Secure Connection** are checked. Note that a COM Port was added by the installation program and that the COM port number that will be used for Bluetooth serial connections is listed. Make a note of this COM port number.

If ActiveSync isn't installed on the computer, it should be installed and a partnership should be established using USB or other connection method before using Bluetooth for the first time. You should download the newest version of ActiveSync and upgrade any previously installed version. [Microsoft ActiveSync® 3.7.1](#) has compatibility fixes for Windows XP users. After the partnership is established, prepare for Bluetooth Active Sync by disconnecting the USB cable from the cradle, turning off your Pocket PC, and following these steps:

1. If the ActiveSync window is not open, double-click the ActiveSync icon in the Windows XP notification area.
2. On the ActiveSync **File** menu, click **Connection Settings**.
3. Select the **Allow serial cable or infrared connections to this COM port** check box.
4. Verify that the COM Port number from step 8 in the procedure above is shown in the list.
5. Verify that the **Status** shows the COM Port as available. The figure below shows all connection methods turned on, including the needed serial connection.



Figure 2: The Connection Settings dialog box.

6. Click **OK** and close the ActiveSync window.

Set Up Bluetooth ActiveSync on the Pocket PC

On my iPAQ 4155 running Windows Mobile 2003 for the Pocket PC, Bluetooth is opened from an icon in the lower right corner of the Pocket PC notification area.

1. Tap the icon, tap **Bluetooth Manager**, and then tap **New**.
2. A wizard opens and if you've prepared Active Sync as explained earlier, at the end of the process the discovered computer will be shown on the Pocket PC. The figure below shows the three-step wizard. (Note that for other Pocket PCs with add-on Bluetooth adapters, the process might be slightly different. For example, Ambicom's compact flash card used with older iPAQs requires tapping Blue Neighbors and then searching for devices).

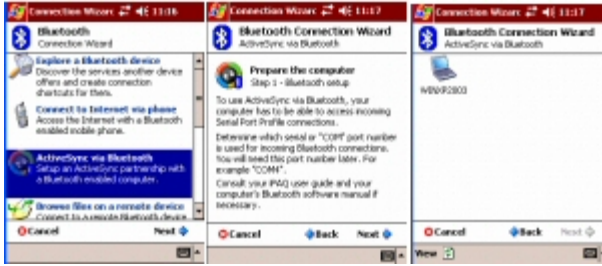


Figure 3: The Bluetooth Connection Wizard opens.

Pair the Computer and the Device

The final step is to pair the computer and the device. This ensures that only secure connections are made by authorized Bluetooth-enabled devices.

1. Double-tap the computer name in the **Bluetooth Manager** on the Pocket PC.
2. When prompted, supply a **pairing code** (PIN number) that you can easily remember.
3. A message saying that that a remote device wishes to initiate pairing opens in the notification area of the computer. Click the message to open the **Bluetooth Service Authorization** window.
4. Click **OK** and select the **Always allow this device to access this service** check box. Click **OK**.
5. On the **Bluetooth Security Setup** page, enter the same pairing code you specified on the device.

Start ActiveSync

After you've successfully paired the devices, always start Bluetooth ActiveSync from the Pocket PC. On my iPAQ, I tap the Bluetooth icon in the Pocket PC notification area and then tap **Bluetooth Manager**. I can double-tap the shortcut to start the ActiveSync session. The figure below shows the shortcut icon during an active session with the devices connected. The icon changes depending on the status of the connection.



Figure 4: An Active Sync session shows both devices connected.

Bluetooth, 802.11, and the Mars Rovers

While I'm connected to a computer using a Bluetooth connection, if the host computer is connected to the Internet, I have a pass-through connection that allows me to use programs that reside on my Pocket PC that directly access the Internet. This includes programs like Internet Explorer for the Pocket PC. I can also download e-mail directly to the Pocket Outlook Inbox on my iPAQ. I've added a very cool piece of software that accesses information and images from the Internet.

I'm a space junkie. I was totally caught up on the broadcasts and images when man first set foot on the moon and am equally captivated by the current Mars mission. I found a wonderful program for any Pocket PC running Windows Mobile 2003 from SurvivorSoft called [@SAT](#) that lets me download the NASA images from both Mars Rovers, as well as the Hubble telescope. The figure below shows the missions and devices that are currently available.



Figure 5: Track space missions with this tool.

I fire up this program after I complete each ActiveSync session with my ThinkPad. This laptop is currently connected using 802.11a through a [D-Link DWL-7100AP](#) tri-mode access point that is connected to one of my routers behind a cable modem connection. Next I start the @SAT program on my iPAQ, select the Mars Rovers, and alternate between Spirit and Opportunity.

I've used Windows Movie Maker on my Windows XP Professional-based laptop to put together a little [movie](#) that demonstrates just how cool @SAT is. As you can see, I download the newest current NASA images and companion text from the Internet directly onto the iPAQ over the Bluetooth connection. Thumbnails of all available images are displayed on the Pocket PC. Newer images are displayed at the top of the screen. Tapping a thumbnail displays an image already stored on the iPAQ or initiates the download from the Internet.

My co-workers and friends are delighted at the Mars Rover images I show them on my iPAQ. The technology is amazing. I feel as though while sitting in my living room, my Wi-Fi/Bluetooth network extends all the way to Mars. And I've been unable to stop thinking of the line from Peter Pan, "Second to the right and straight on till morning."

Windows XP Media Center Edition PC and Music

I like to combine different types of technology to improve my lifestyle. Getting decent quality music onto the deck of my condo has been one of my pet projects. Much of my music collection is digitized and stored on a [Windows XP Media Center Edition PC](#) that resides on the third floor of my home. Listening to it outside has been problematic.

D-Link provided me with a [DSM-920BT USB Stereo Adapter Kit](#), which is a special Bluetooth-powered transmitter/receiver combination that lets me transmit sound wirelessly to a set of powered speakers. This type of device doesn't require drivers and "just works" on Windows XP. I've got an older Cambridge Soundworks PC Works system (stereo speakers with a subwoofer) that is no longer connected to any computer system. I set up this highly portable stereo system on my deck. I plugged the Bluetooth USB audio transmitter into my Media Center PC and organized a playlist just for today using Remote Desktop from my laptop to that computer. I'm sitting on the deck of my condo in southern New Hampshire and finishing up this column. Barbra Streisand's *Sweet Inspiration* is streaming perfectly over my Bluetooth music network.
