



**BlueConnect
Development Kit
User's Guide**

Document Number: BCDK-UG-012401-1200

Revision 1.7

WIDCOMM, Inc.
Wireless Internet and Data Communication
© Copyright 2000-2001. All rights reserved.
9645 Scranton Road, Suite 205
San Diego, CA 92121
Voice: (858) 453-8400 Fax: (858) 453-5735
Email : info@WIDCOMM.com or support@WIDCOMM.com

FCC Statement

Widcomm Inc.

9645 Scranton Road, Suite 205

San Diego, CA 92121

858-453-8400

BlueConnect

WDC-WBC-1000

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and, (2) This device must accept any interference received including interference that may cause undesired operation.

Per CFR 47, PART 15, Paragraph 15.21: User changes or modifications not expressly approved by the party responsible for compliance could void the users authority to operate the equipment.

© Copyright 2000 – 2001, WIDCOMM, Inc. ("WIDCOMM"). All rights reserved. This documentation may be printed and copied solely in connection with developing products in accordance with the license agreement provided to you with this documentation. Only two (2) copies of this documentation may be made for archival and backup purposes. Except for the foregoing, no part of this documentation may be reproduced or transmitted in any form or by any means or used to make any derivative work (such as translation, transformation or adaptation) without the express written consent of WIDCOMM.

WIDCOMM, the WIDCOMM logo, and BlueConnect are trademarks of WIDCOMM, Inc.

Bluetooth is a trademark owned by the Bluetooth SIG, Inc., and used by WIDCOMM under license.

Handspring and Visor are registered trademarks of Handspring, Inc. HotSync, Palm Computing, and Palm OS are registered trademarks of Palm, Inc. Microsoft and Windows are registered trademarks of Microsoft Corporation.

Other brand and product names may be registered trademarks or trademarks of their respective holders.

Table of Contents

1	INTRODUCTION	1
2	REQUIRED MATERIALS.....	2
3	INSTALLATION AND SETUP	2
3.1	INSERTING AND CONFIGURING THE BLUECONNECT MODULE	2
3.2	CONNECTING TO A REMOTE DEVICE (INQUIRY AND DISCOVERY).....	4
3.2.1	<i>Clients, Servers, and Services</i>	4
3.2.2	<i>The Server Mode</i>	5
3.2.3	<i>The Client Mode</i>	6
4	LAUNCHING APPLICATIONS	13
4.1	ON THE SERVER.....	13
4.2	ON THE CLIENT.....	13
5	CLOSING APPLICATIONS AND COMMUNICATIONS SHUTDOWN	14
6	TROUBLESHOOTING	15
6.1	ERROR MESSAGE: COULDN'T OPEN BLUETOOTH LIBRARY	15
6.2	BEHAVIOR: DEVICES NEVER CONNECT	15
6.3	ERROR MESSAGE: (DURING DISCOVERY PROCESS) CONNECTION FAILED.....	15
6.4	BEHAVIOR: THE SERVER AND CLIENT DO NOT CONNECT.....	15
6.5	BEHAVIOR: DISCOVER APPLICATION DOES NOT WORK	15
6.6	BEHAVIOR: STALE ENTRIES ON "DEVICES" SCREEN	17
6.7	BEHAVIOR: STALE ENTRIES ON "SERVICES" SCREEN	17
6.8	BEHAVIOR: FATAL ERROR WHEN THE REMOVING BLUECONNECT CARD	18
6.9	BEHAVIOR: "UNABLE TO OPEN THE SERIAL COMMUNICATIONS LIBRARY".....	19

1 Introduction

This document describes the basic procedures for proper use of the BlueConnect module for the Handspring Visor. is a part of the BlueConnect Development Kit and it describes the basic procedures for proper use of the BlueConnect module for the Handspring Visor. The BlueConnect module comes with code libraries and some applications already burned into ROM. The libraries are:

- **Bluetooth** – The WIDCOMM *Bluetooth* API libraries. These appear as *Bluetooth Library* and *Bluetooth Library 2* on the application info screen of your Visor.
- **Discover** – The libraries for supporting device discovery. These appear as *Discover Library* and *Discovery Database* on the application info screen of your Visor.

These libraries are loaded into the Visor's RAM from the BlueConnect module ROM once the BlueConnect module is plugged into the Visor. Since these applications reside on the BlueConnect card, they will only show up on the application info screen of your Visor whenever the BlueConnect card is inserted. If you remove the BlueConnect card, your Visor will reset and the libraries will vanish. In addition to these libraries, the module also holds the following applications:

- **Bluetooth** – allows the user to select serial port and debug options.
- **BT-Pong** – an amusing game.
- **Discover** – lets you find other *Bluetooth* devices and discover services on them.
- **WidChat** – a sample chat application.

The applications residing on the BlueConnect module ROM can be identified by the fact that their names have a square bullet icon next to them. An interesting example of this is the Discover application. The BlueConnect card comes with a Discover application burned into ROM. If you plug the card into your Visor, you will see an application with the following icon:



The BlueConnect ROM-based version of Discover

Notice the small square icon next to the word “Discover”. This indicates that the application resides on the BlueConnect module.

The source code for the Discover application is also supplied in your BlueConnect development kit. You can compile this application, HotSync it to your visor, and the previous icon will be replaced by the following:



The RAM-based version of Discover

This does not mean that the application on the BlueConnect module ROM was erased. You have merely overwritten the copy of Discover that resided in the Visor RAM. The fact that there is no longer a box icon next to the word “Discover” indicates that this is an application

that resides solely in Visor RAM. Applications that reside on Visor RAM take precedence over the same applications that reside on the BlueConnect module's ROM.

You could easily restore the ROM resident copy of Discover by deleting the RAM resident copy using the Palm OS interface. Once the RAM resident application was removed, you would once more be able to see the ROM based application on your visor screen:



Deleting the RAM-based Discover will restore this

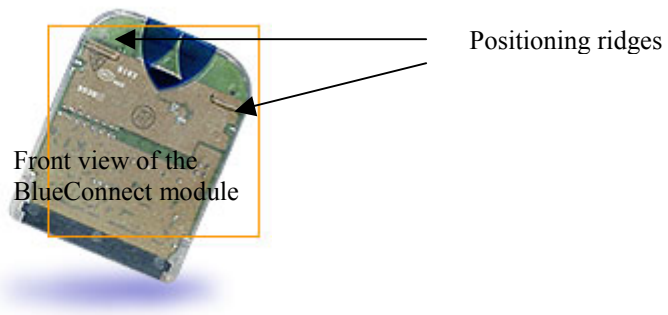
2 Required Materials

The minimum requirements for use of the BlueConnect module are one BlueConnect module with firmware version 2.2 or higher, one Handspring Visor with 120K of available memory, and a second, suitable (*Bluetooth* enabled) device for remote connection.

3 Installation and Setup

3.1 Inserting and Configuring the BlueConnect Module

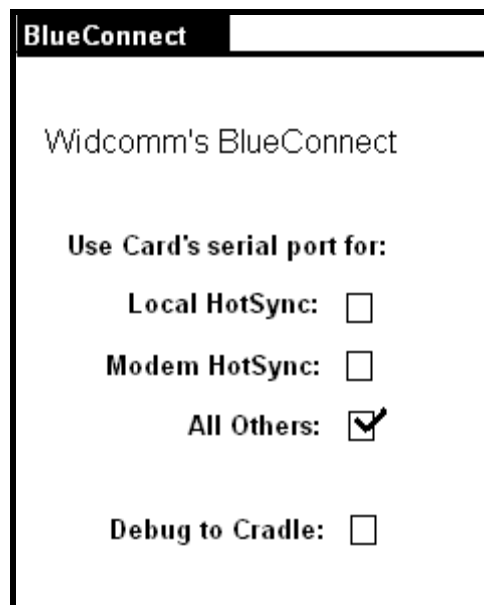
Insert the BlueConnect module into the Handspring Visor Springboard slot.



The BlueConnect card has two sides. The front of the card has two positioning ridges just below the curved top of the card. When holding the Visor with the screen facing you, the card must be inserted with Widcomm sticker facing you, and the beveled side away. The card should be seated firmly with the bottom of the beveled edge of the card touching the top of the Springboard expansion slot.



Once the card is inserted, the applications and libraries that reside in the BlueConnect card's ROM will be loaded into the RAM, which resides on your Visor. The BlueConnect welcome application will launch.



This application allows the user to select serial port and debug options. The application will launch with the “All Others” option selected. This is the default and should be selected for normal operation. The Local and Modem HotSync options are for HotSync over *Bluetooth*.

To HotSync the Visor to a PC using the *Generic Serial* service, select the *Local HotSync* option.

To HotSync the Visor to a remote PC using the Dialup Networking service, select the Modem HotSync option.

After selecting the desired options, tap the “Home” silkscreen to return to the Visor's main menu. To return to this application at any time, tap the “Bluetooth” icon as shown below:



The “Home” Silkscreen



The “Bluetooth” Icon

3.2 Connecting to a Remote Device (Inquiry and Discovery)

3.2.1 Clients, Servers, and Services

The term “*Bluetooth* wireless technology” refers to a standard for the wireless exchange of data between two devices. In order to exchange data, two *Bluetooth* devices must establish a connection to one another. There are two sides to every connection and two roles that every device can fulfill.

Before a connection is established, one device must request the connection from another. It is just like two people starting a conversation. One person must initiate the conversation and the other person must respond. In the *Bluetooth* wireless technology world, the same rules apply. One device begins by requesting a connection from another device. The other device can then accept the connection or reject it. The device that initially requests a connection is known as the *client*. The device that accepts or rejects the connection is known as the *server*. An easy way to remember this is to think of a restaurant: the *client* comes in and requests services from the *server*.

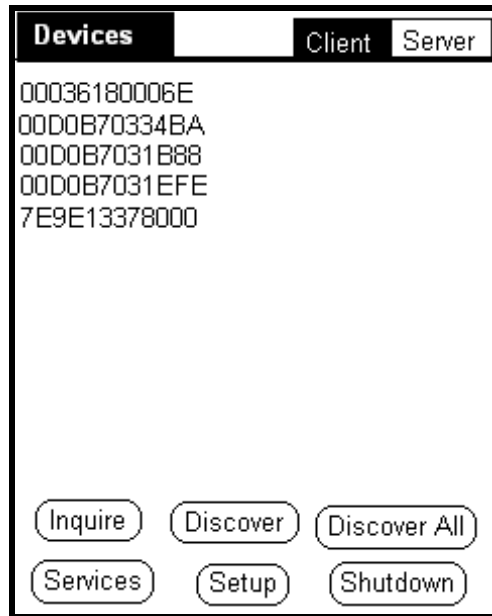
These roles are fundamental and important from an operational standpoint. A *Bluetooth* wireless technology device can act as either a client or a server – it depends on whether the device is prepared to take an active or passive role. By definition, the client takes an active role in any exchange of data. In order to be a client, a *Bluetooth* device must run a software program that will request a connection to another device as part of its normal operation. In other words, a client device must “do something” before any connection can be established. Becoming a client normally requires an active decision on the part of the device operator.

The role of server, however, is passive. Every *Bluetooth* wireless device must be prepared to respond to connection requests at all times. As a result, there must be some kind of software that is always running on each *Bluetooth* device that is prepared to respond to connection requests from remote clients. The software that allows a device to act as a server is known as a *service*. Services run as a background task.

To configure the Visor for use in a specified mode, tap the “Discover” icon.



Upon launching this application for the first time, the *Bluetooth* software will self-initialize. This process will take about four seconds, after which the user will be presented with the devices screen.



3.2.2 The Server Mode

3.2.2.1 *Bluetooth* Device Addresses and Device Names

The designers of the *Bluetooth* standard had to create a way of telling one *Bluetooth* device from another. In order to do this, they created a unique *Bluetooth* Device Address (BDA) that could be assigned to every *Bluetooth* device. This address consists of a forty-eight-bit binary value that is often displayed in hexadecimal format. This address is fixed when the device is manufactured and cannot be changed by the user.

A valid BDA: 00D0B7032E9F

This is fine when one *Bluetooth* device is talking to another, but it is not easy for us (as human beings) to relate to. Fortunately, the designers of the *Bluetooth* wireless technology standard supplied an alternative. Each *Bluetooth* device can also be assigned a user-friendly name that will distinguish it from the other *Bluetooth* devices in the vicinity. This name is fully programmable and you can select any name for your device that you wish. Here are some examples:

A valid user-friendly name: Bob's PC

A valid user-friendly name: John Q. Public's PDA

These names make it easy for you to recognize the PCs belonging to your friends, acquaintances, and business associates. If you wanted to transfer a business card to an associate named *John Q. Public*, you could easily locate them in the list shown above.

The "Setup" screen of the Discover application lets you set a valid-user friendly name for the Visor and also lets you see the Visor's BDA.

Tap the Discover icon to enter the discover application. Then tap the "Setup" button to enter the configuration screen.

Devices

Set Connect Mode

Client Server

Set Device Name

My BlueConnect

My BD Address

00-D0-B7-03-24-55

Inquiry Control

Devices Services Shutdown

Here, you can:

- View the module's *Bluetooth* Device (BD) address. "00-D0-B7-03-24-55" in the example shown above.
- Enter a device name—a human readable name to identify the device. "My BlueConnect" in the example shown above.
- Set the connection mode (Client or Server). The selected connection mode is viewed as white text on a black background. To change connection mode, tap within the desired mode box.

If the device has been configured for server use, an alert will appear with the message "Visor started successfully as server." This alert may also appear when launching the Discover application if the Visor was last used in *Bluetooth* Server mode. Clear the alert by tapping the "OK" button.

Once your Visor has been configured as a server, no other action on your part is required. Your BlueConnect device will advertise its available services to all other *Bluetooth* units that are within range. These remote devices are then free to connect to the available services on your Visor.

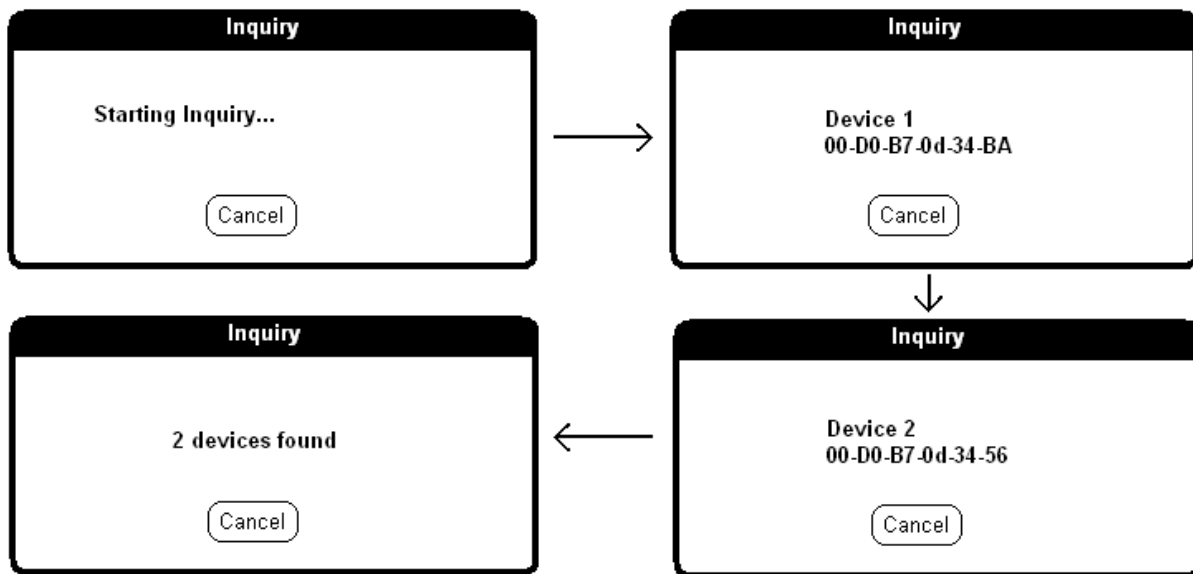
3.2.3 The Client Mode

If you receive the message "Visor started successfully as server" upon launching discover, the device is currently in server mode. You must return the device to client mode before you can attempt to initiate a connection to a remote device. Tap the "Setup" button and then tap "Client." An alert will appear with the message "Visor closed as server. Client services only." Clear the alert and tap the "Devices" button to return to the devices screen.

3.2.3.1 Inquiry (Displaying Nearby *Bluetooth* Devices)

The devices screen displays a list of nearby *Bluetooth* devices that are within range of your unit.

IMPORTANT NOTE: The Discover application stores the results of the last inquiry and discovery process, and these results will appear on the devices screen. To make sure that only currently available devices are displayed, tap the “Inquire” button. Depending on the number of available devices, a series of notices will appear showing the number of *Bluetooth* devices found, as well as displaying their BD addresses as shown below:



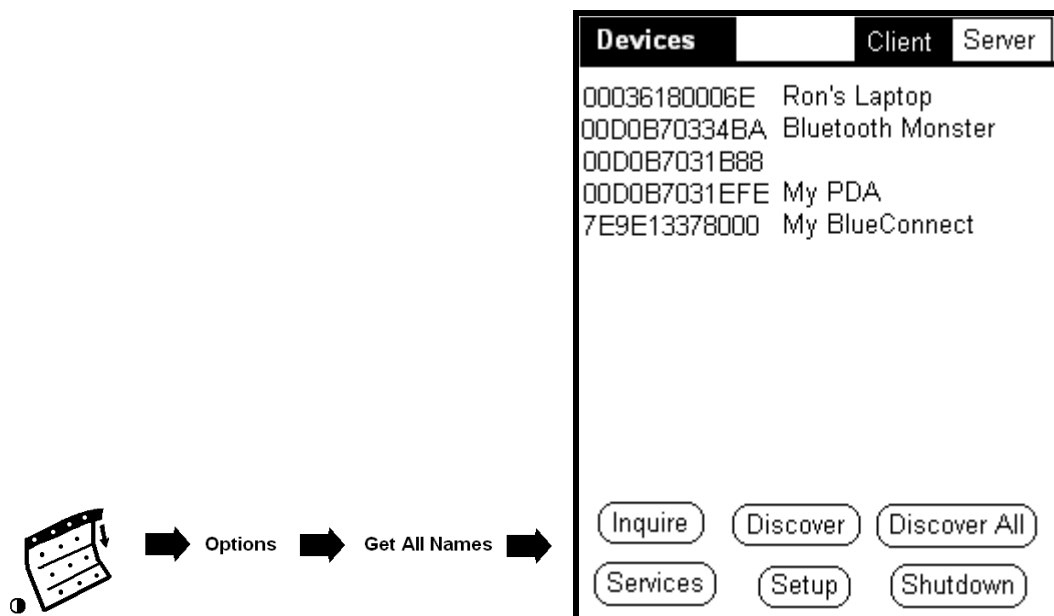
After the inquiry process is complete, these addresses will be listed according to the order in which they were found.

3.2.3.2 Viewing devices by BD Address or Device Name

In the devices screen you can choose to view devices by the BD Address or by the device name. To view the devices by their device names, tap on the “menu” silkscreen and from the “Options” menu bar select the “Get Name” item (to retrieve the name of the currently selected address) or the “Get All Names” item (to retrieve the device names of all of the devices on the display).

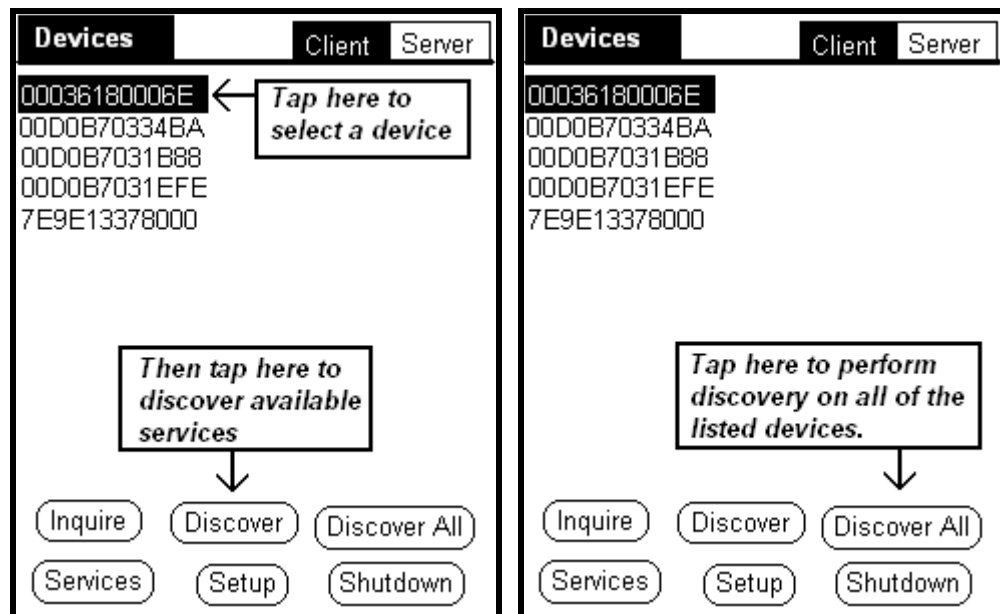
The device names that correspond to the BD Addresses will be shown. If the device name could not be retrieved then only the BD Address will be shown.

NOTE: These device names will be saved in the database and can be used when viewing services (see *Section 3.2.3.6: Viewing Services by BD Address or Device Name*).

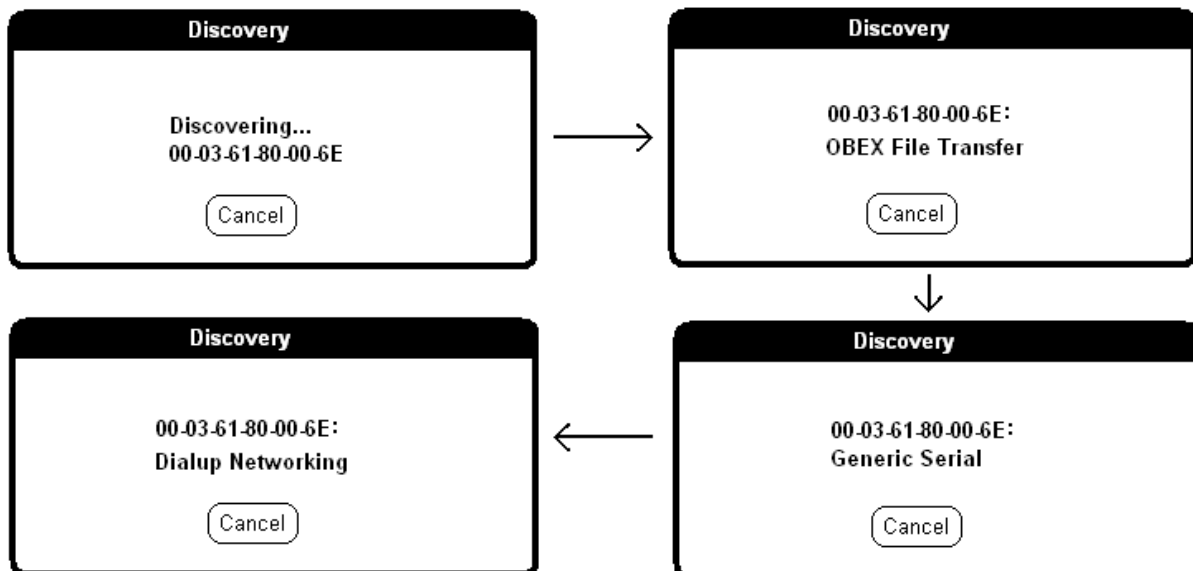


3.2.3.3 Service Discovery

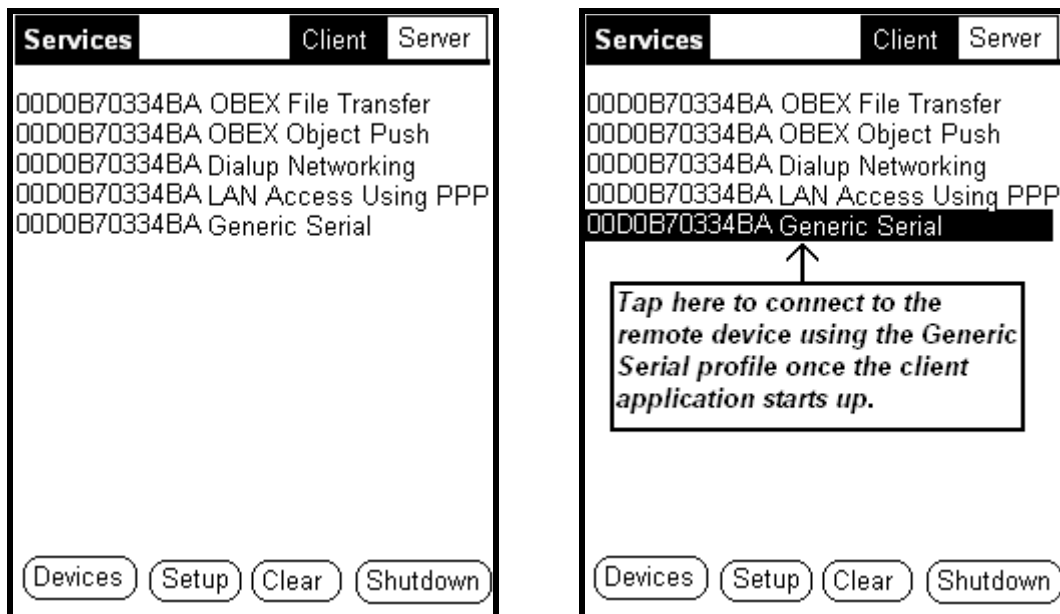
To discover the available services on a remote *Bluetooth* device, tap the desired device address to highlight it, then tap “Discover.”



If the device is available for discovery, a series of notices will appear, briefly displaying the names of available services.



When the discovery process is complete, the display will change to the services screen.



Tap the desired service to highlight it and the client configuration process is complete.

IMPORTANT NOTE: Selecting the remove service does not actually connect to the remote device at this point. You will not connect until you leave the client setup and run an application that attempts to access the remote unit using the generic serial service.

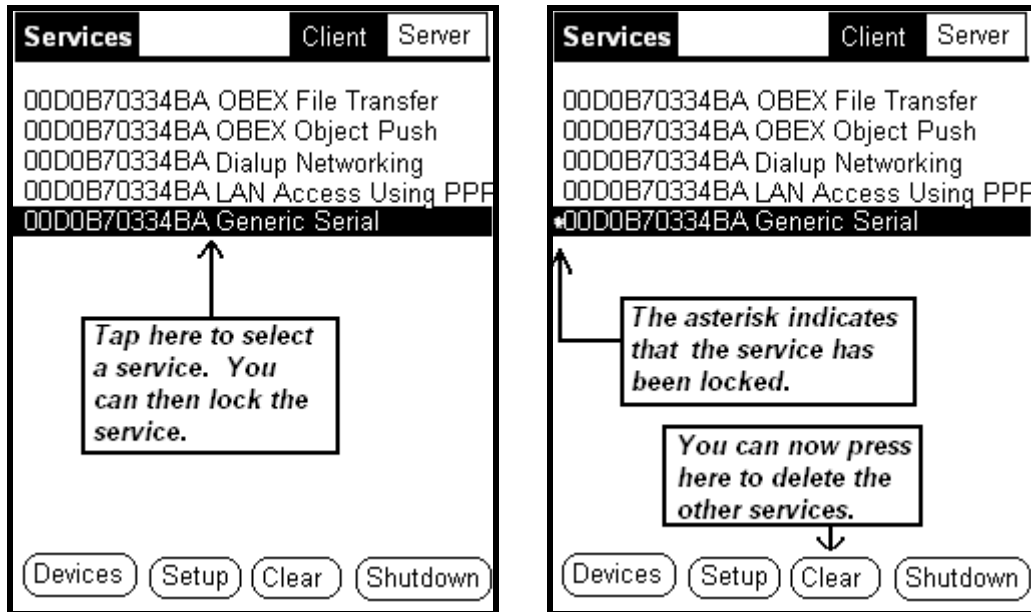
3.2.3.4 Clearing the Services Database

Services remain in the service discovery database until you tap the “Clear” key. If you see services from devices other than the one that you originally selected, it would be wise to clear the database and rediscover the device.



3.2.3.5 Keeping Some Services While Clearing the Rest

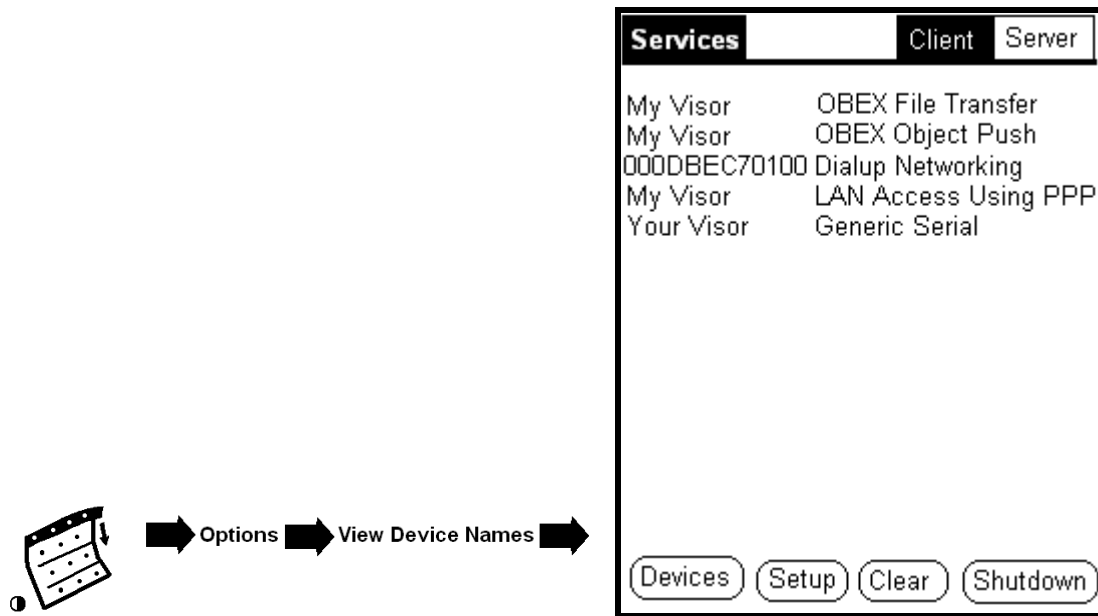
To keep the services that you want in the database, select the service and tap the menu silkscreen while on the “Services” screen. From the “Options” menu bar select the “Lock Service” menu. Locked services have a star, or asterik, (*) before the device name or device address.



You can then press the “Clear” button. All services that are not locked are deleted from the Discover database. Services that are locked will remain in the database. To unlock a service, just select the service, tap the “menu” silkscreen and from the “Options” menu bar select the “Unlock Service” item.

3.2.3.6 Viewing Services by BD Address or Device Name

In the services screen you can choose to view devices that host a particular service either by the device's BD Address or by the device's name. To view the devices by their device names, tap on the "menu" silkscreen and from the "Options" menu bar select the "View Device Names" menu. The device names that correspond to the BD Addresses will be shown if they are in the database. If the database does not contain a corresponding device name then only the BD Address will be shown. You can revert back to device addresses on the "Services" screen by selecting the "View BD Addresses" menu.



In the example shown above, notice that some services are tagged with the device name and some with the BD address.

IMPORTANT NOTE: The device names can only be displayed if they are currently stored in the Visor discovery database. To load the discovery database, use the "Get All Names" function from the "Devices" screen. See *Section 3.2.3.2: Viewing devices by BD Address or Device Name* for information on how to do this.

4 Launching Applications

BlueConnect on the Visor is designed to operate using the Generic Serial profile.

Applications which use the Handspring serial library to communicate through the default serial port can transfer data between two *Bluetooth* wireless technology devices just as if they were connected by a modem or other serial device. Any application that is capable of using regular Handspring serial I/O library calls may be used to talk to another *Bluetooth* device in this manner.

You can communicate using BlueConnect by using the following sequence.

4.1 On the Server

IMPORTANT NOTE: The Server device should start the application before the Client device.

- 1) Using the Discover application, configure your unit to the role of Server.
- 2) Tap the “Home” silkscreen to return to the main menu
- 3) Tap the icon of the desired application.

For normal applications, a status window will appear with the message “Status: Waiting for Connection” (or similar – this is application specific) followed by a spinning activity character. At this point the client should try to connect.

4.2 On the Client

IMPORTANT NOTE: The Server device should start the application before the Client device.

- 1) Using the *Discover* application, configure your unit to the role of client. Discover the *Generic Serial* service on the remote unit and select it on the *Services* screen.
- 2) Start the application on the remote server device.
- 3) On your local device (the client), tap the “Home” silkscreen to return to the main menu
- 4) Tap the icon of the desired application.

A status window will appear with the message “Status: Waiting for Connection” (or similar – this is application specific) followed by a spinning activity character. At this point the two applications should connect.

When the connection is established, the client device will emit a series of tones to signify a successful connection. Both devices will then be available for use of the application. For an example please refer to the *BlueConnect Development Kit Quick Start Guide*.

5 Closing Applications and Communications Shutdown

The application may be terminated at any time by either device by tapping the “Home” silkscreen.



The “Home” Silkscreen

When no further *Bluetooth* communications are needed, it is recommended that power be removed from the device – since this powers down your BlueConnect card, it will preserve battery life on your Visor. This may be done by either removing the module from the Springboard slot or, if the module is to remain in the slot, by shutting down *Bluetooth* services.

To shut down *Bluetooth* services, tap the “Discover” icon. Then tap the “Shutdown” button. The application will perform necessary tasks to power down the BlueConnect module and will then return to the main menu. This process takes approximately two seconds.

6 Troubleshooting

6.1 Error Message: *Couldn't Open Bluetooth Library*

Possible cause: A device has not been selected in the “Devices” screen of the Discover application. Or a service has not been selected in the “Services” screen of the Discover application.

Solution: In the Discover application, tap “Inquire.” This will refresh the list of available devices. Select a device and tap “Discover.” Make sure a service is highlighted before returning to the main menu.

6.2 Behavior: *Devices never connect*

Description: Both devices show “Status: Waiting for Connection” but never connect.

Possible cause: The client application started before the server application

Solution: Tap “Cancel” to end waiting (disregard the resulting serial library error) and retry. Start the server application first, and then start the client application.

6.3 Error Message: *(During Discovery process) Connection Failed*

Possible causes: The remote *Bluetooth* device powered on but its *Bluetooth* software is not enabled. The remote device may not be configured for server operation.

Solution: Make sure that remote *Bluetooth* device's host computer has *Bluetooth* software installed and enabled. You may need to check the remote device's software documentation to find out the correct procedure for installing and enabling *Bluetooth* software. Also, verify in Discover application's setup screen that the remote device is configured for server operation.

6.4 Behavior: *The server and client do not connect*

Possible causes: The incorrect service (or no service) is selected on the client

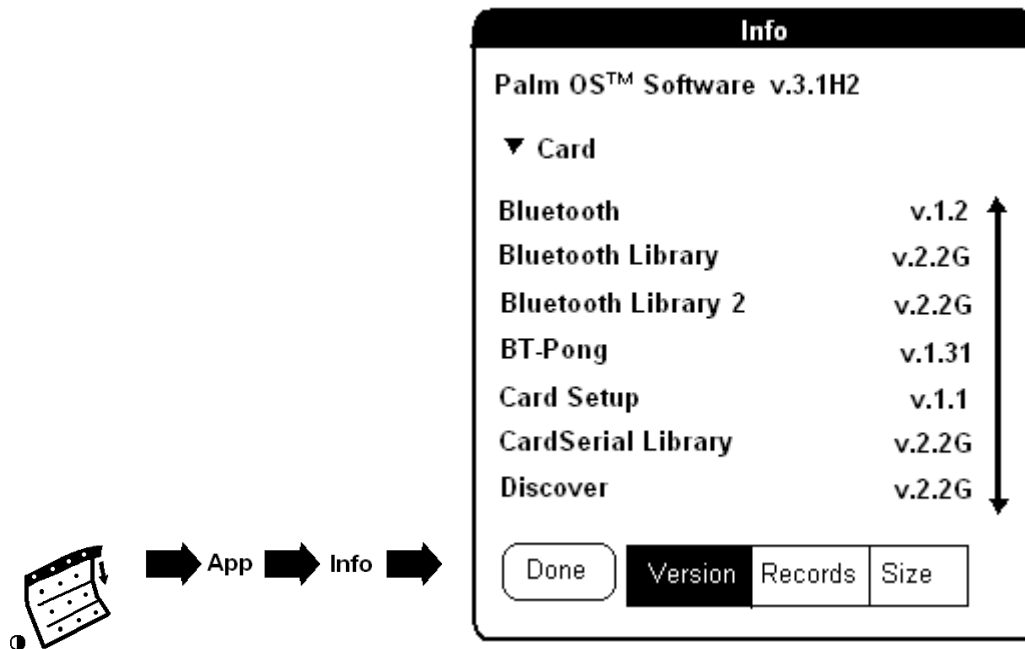
Solution: Make sure that the service that the client is trying to connect to has been selected in the “Services” screen of the Discover application. Many devices may have the same service on them. You have to make sure that the service that you have chosen is on the device that you want to connect to.

6.5 Behavior: *Discover Application does not work*

Possible causes: The correct version of the Discover application is not loaded into Visor RAM.

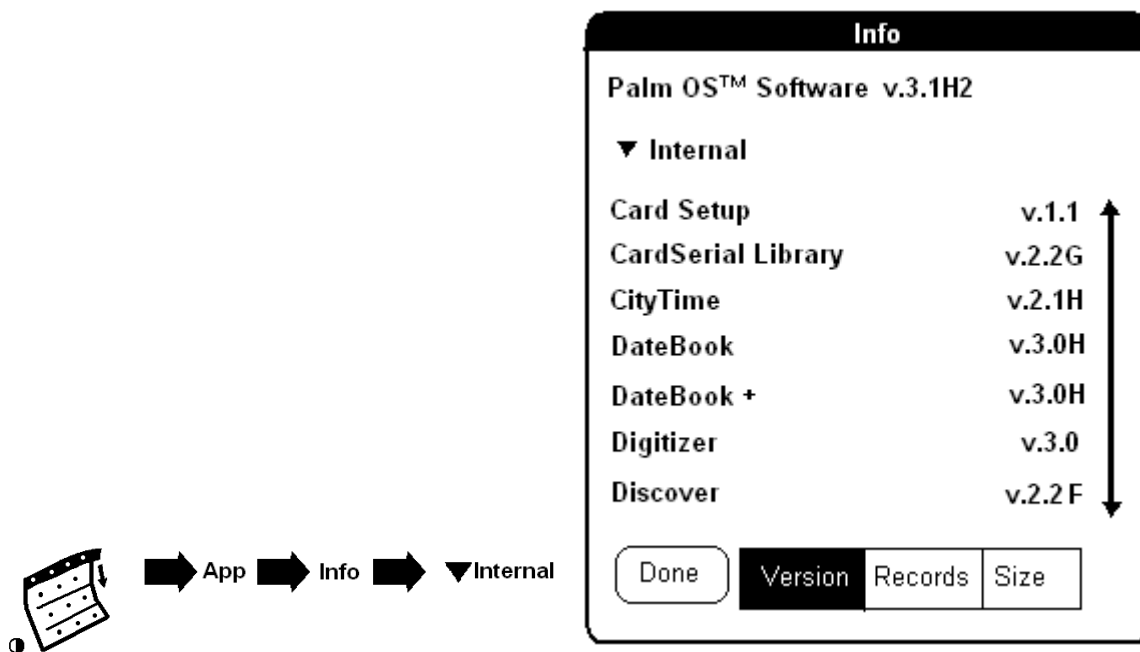
Solution: The correct version of the Discover application needs to be loaded onto the Visor.

To read the version number of the ROM-based Discover application that resides on the BlueConnect card, tap the “Menu” silkscreen in the main menu. In the “App” menu bar choose the “Info” menu. This will take you to the “Info...” screen. Choose “Card” from the pop - up trigger that by default shows “Internal”. Now, tap on the Version button to view the version numbers of all the software on the BlueConnect module. Look for the “Discover” entry.



Reading the version number of the BlueConnect ROM-based Discover

To read the version number of the RAM-based Discover application that has been HotSynced to the Visor (if any), tap the “Menu” silkscreen in the main menu. In the “App” menu bar choose the “Info” menu. This will take you to the “Info...” screen. Choose “Internal” from the pop-up trigger that by default shows “Internal”. Now, tap on the Version button to view the version numbers of all the software on the BlueConnect module. Look for the “Discover” entry.

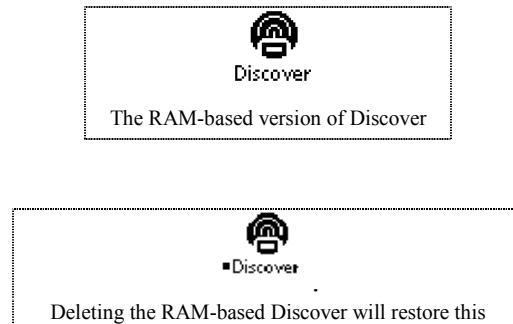


Reading the version number of the Visor RAM-based Discover

You can delete a RAM resident Discover application and return to the version of Discover that is already on the BlueConnect module ROM. To delete the application tap the “Menu” silkscreen in the main menu. In the “App” menu bar choose the “Delete” menu. This will take

you to the “Delete” screen. Select the Discover application and tap on the “Delete” button to delete it.

An application that resides on Visor RAM takes precedence over the same application residing on BlueConnect module ROM. You can tell whether the Discover application that you are using has been HotSynced to the Visor is has been loaded from the BlueConnect ROM by examining the application icon:



Notice the small square icon next to the word “Discover”. This indicates that the application resides on the BlueConnect module.

6.6 Behavior: Stale Entries on “Devices” Screen

Description: The “Devices” screen of the Discover application shows *Bluetooth* wireless technology devices that are no longer valid or no longer within range.

Solution: Tap the “Inquire” button. These device addresses are stored in a database in your Visor and will not be cleared until you force the unit to re-inquire.

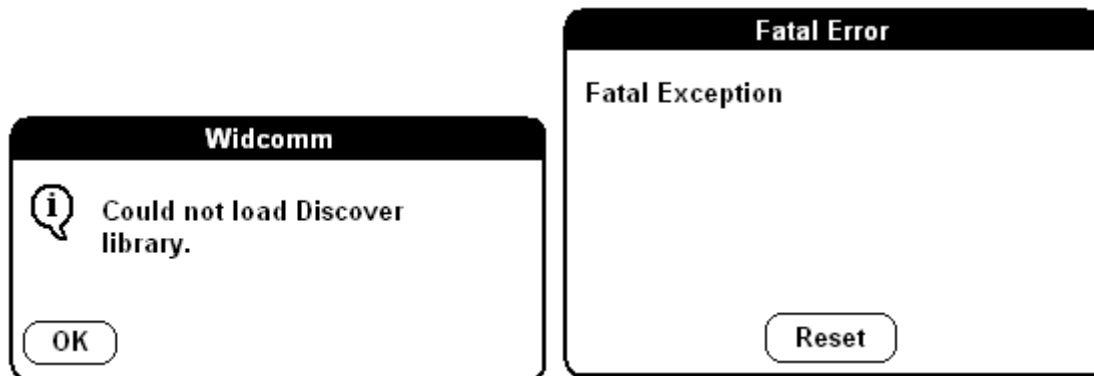
6.7 Behavior: Stale Entries on “Services” Screen

Description: The “Services” screen of the Discover application shows *Bluetooth* services that are no longer valid or reside on devices other than the one that you performed the discovery operation on.

Solution: Tap the “Clear” button. These services are stored in a database in your Visor. This database should be cleared before you discover services on another device. Once the display has been cleared, you can retry the discovery operation – this will result in a more accurate list of available services.

6.8 Behavior: Fatal Error when the Removing BlueConnect Card

Description: When you are running the Discover application and remove the BlueConnect card from the slot, the Discover application generates a fatal run-time error. You see the following two displays:



Cause: You are running the Discover sample application which you have HotSynced to your Visor.

Reason: The Discovery and Inquiry routines have been extracted from the Discover application and now reside in the Discover Library. This library resides on the BlueConnect module ROM and is loaded into the Visor RAM when the card is inserted into the Visor. The library is unloaded when the card is removed from the Visor.

In most cases, this behavior will not effect you. It does, however, have an effect when you are running the Discover sample application. Normally, you will use the Discover application that is loaded from the BlueConnect ROM. If you run this Discover application and pull the BlueConnect card from the slot, the application will disappear and the unit will immediately reset.

This is not true if you HotSync your compiled sample Discover application onto your Visor. The sample application will override the version that is loaded from the BlueConnect ROM. When you remove the BlueConnect card from the slot, the RAM resident Discover application will not immediately disappear. Without access to the Discover Library that resides in BlueConnect ROM, the sample application will generate a fatal run-time error. This is an expected behavior and is not the result of a fault in your BlueConnect hardware or software.

Solution: Delete the RAM resident copy of the Discover application. This will restore the ROM-resident application from your BlueConnect card and will prevent this problem from reoccurring.

6.9 Behavior: “Unable to Open the Serial Communications Library”

Description: Insert the BlueConnect card into the Visor and run the BT-Pong sample application. The application hangs in the “Starting Pong” mode and then returns “BT-Pong IO Error, Unable to Open the Serial Communications Library”.

Solution: You must run the “Discover” application must be run before using any of the sample applications. For further information, see the *BlueConnect Development Kit Programmer's Guide*.