

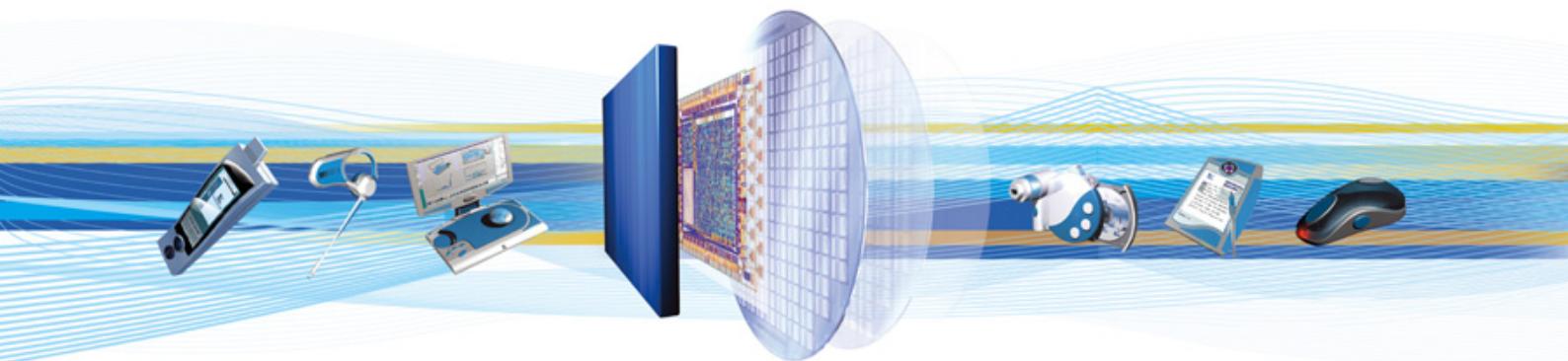


BlueLab™

PSTool

User Guide

December 2005



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1 Introduction

This document describes the PSTool utility provided with BlueLab and BlueSuite.

1.1 PSTool

PSTool is an editing tool that allows you to read and modify the Persistent Store of BlueCore chips. The Persistent Store consists of key-value pairs that modify the operation of the firmware.

BlueCore is a very flexible device with many setup options. PS Keys must be set correctly for BlueCore to work in a particular design. Some of the keys must be calibrated for each individual chip.

Important Note: Do not modify Persistent Store values unless you have a clear understanding of what they do and the affect that changing the value will have. Careless changes to the Persistent Store can prevent the firmware from executing correctly or can stop BlueCore from communicating with the PC. In some cases, it may not be possible to restore the BlueCore device to the state in which it was supplied.

Refer to CSR documentation on PS key settings before editing values.

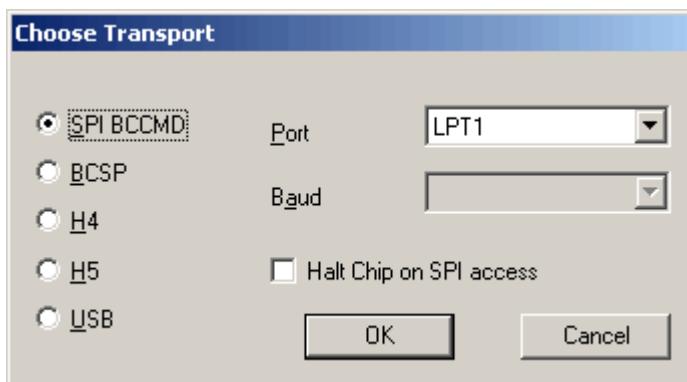
Perform a backup using BlueFlash or E2Util as appropriate before editing PS Keys.

2 Opening the PSTool Application

To open the PSTool utility:

1. Browse to the location of the PSTool executable:
C:\BlueLab_version\tools\bin\PSTool.exe
2. Double-click PSTool.exe.

The Choose Transport window displays:



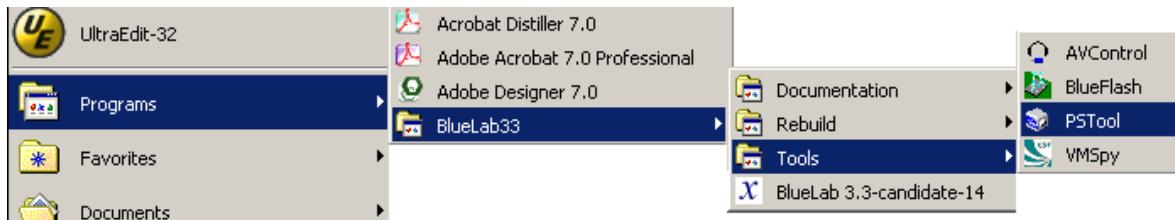
The transport options are described in section 2.1

3. Select the appropriate options for the required transport.
4. Click **OK**.

The PSTool main window displays.

Note: Later versions of BlueLab (from v3.3 on) have added a shortcut to the Start menu that can also be used to open PSTool:

Start\Programs\BlueLab x\Tools\PSTool.



2.1 Transport Options

PSTool initially opens a Choose Transport window that allows selection of the interface used to access the Persistent Store.

The options available are:

- SPI BCCMD
- BCSP
- H4
- H5
- USB

These options are described in sections 2.1.1 and 2.1.2.

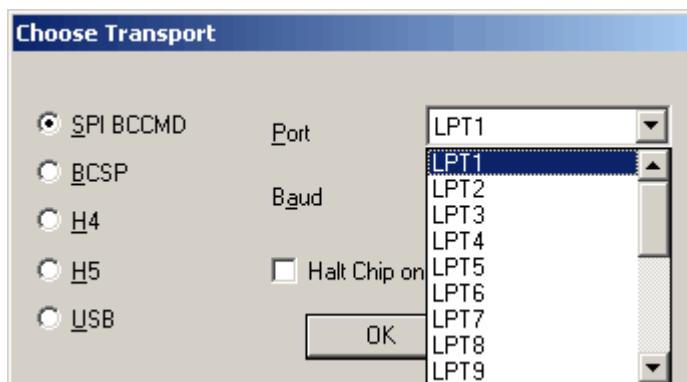
2.1.1 SPI BCCMD

SPI BCCMD uses the BlueCore Command (BCCMD) Protocol over the Serial Peripheral Interface layer. It is a relatively robust transport that also provides some error detection.

Note: To connect using SPI, an SPI cable connection between the PC printer port and the SPI connection on the development board is required.

To make the connection using this protocol:

1. Select the SPI BCCMD Radio button.
2. Select a printer port (LPT1 to LPT20) from the Port drop-down list:



3. Tick the Halt Chip on SPI access check box if this is the required behaviour.

Note: This option is only required when the device is running v15 firmware.

4. Click **OK**.

Note: SPI BCCMD is the recommended transport protocol when editing the Persistent Store from BlueLab, since it does not depend on any particular Host Interface.

2.1.2 Connecting PSTool Using Other Transport Interfaces

Before selecting other transport interfaces in the Choose Transport window, certain PS keys must be set to the appropriate values using an SPI connection.

The alternative transport interfaces available and their configuration is briefly described in the rest of this section.

BCSP

To connect PSTools using the BCSP protocol:

1. Using an SPI connection set the following PS Keys:
 - 1.1. HOST_INTERFACE - select **UART link running BCSP** from drop-down list and click **Set**.
 - 1.2. UART_CONFIG_BCSP - check this key is set to 0806.

Note: These two keys can be set using the canned operation @bcsp.

 - 1.3. UART_BAUDRATE - select the preferred Baud rate (bits/s) from the drop-down list and click **Set** (this value is required later when connecting using the BCSP option). Unless your PC has a fast UART, speeds above 115Kbaud may not work.
2. Click **Reset**.

Note: Ensure there is cable connection from a COM port on the PC to the BlueCore development board.

3. Click **Reconnect**.
4. In the Choose Transport window:
 - 4.1. Select the BCSP Radio button.
 - 4.2. Select a COM Port (COM 1 to COM 50) from the drop-down list.
 - 4.3. Select the required Baud (bits/s) rate (this must match that set on the BlueCore chip in step 1.2).
 - 4.4. Click **OK**.

BCSP uses BlueCore Serial Port protocol over the UART interface.

H4

To connect PSTools using the H4 protocol:

1. Using an SPI connection set the following PS Keys:
 - 1.1. HOST_INTERFACE - select **UART link running H4** from drop-down list and click **Set**.
 - 1.2. UART_CONFIG_H4 - check this key is set to 0x08a8.
Note: these two keys can be set using the canned operation @h4.
 - 1.3. UART_BAUDRATE - select the preferred Baud (bits/s) rate from the drop-down list and click **Set** (this value is required later when connecting using the BSCP option). Unless your PC has a fast UART, speeds above 115Kbaud may prove unreliable.
2. Click **Reset**.
3. Ensure there is cable connection from a COM port on the PC to the BlueCore development board.
4. Click **Reconnect**.
5. Re-open PSTool and in the Choose Transport window:
 - 5.1. Select the H4 Radio button.
 - 5.2. Select a COM Port (COM 1 to COM 50) from the drop down list.
 - 5.3. Select the required Baud rate (this must match that set on the BlueCore chip in step 1.3).
 - 5.4. Click **OK**.

H4 is a Host Control Interface (HCI) five-wire UART transport protocol. It is the simplest of the Bluetooth standard host transports and has the advantage of simplicity and speed but this is generally outweighed by the disadvantage of poor error detection.

H5

To connect PSTools using the H5 protocol:

1. Using an SPI connection set the following PS Keys:
 - 1.1. HOST_INTERFACE - select **UART link running H5** from drop-down list and click **Set**.
 - 1.2. UART_CONFIG_H5 - check this key is set to 1806.
Note: These two keys can be set using the canned operation @h5.
 - 1.3. UART_BAUDRATE - select the preferred Baud (bits/s) rate from the drop down list and click **Set** (this value is required later when connecting using the BSCP option).
2. Click **Reset**.
3. Ensure there is cable connection from a COM port on the PC to the BlueCore development board.
4. Click **Reconnect**.
5. Reopen PSTool and in the Choose Transport window:
 - 5.1. Select the H5 radio button.
 - 5.2. Select a COM Port (COM 1 to COM 50) from the drop-down list.
 - 5.3. Select the required Baud rate (this must match that set on the BlueCore chip in step 1.3).
 - 5.4. Click **OK**.

H5 is an HCI three-wire UART transport protocol which provides error detection and correction.

USB

To connect PSTools using USB protocol:

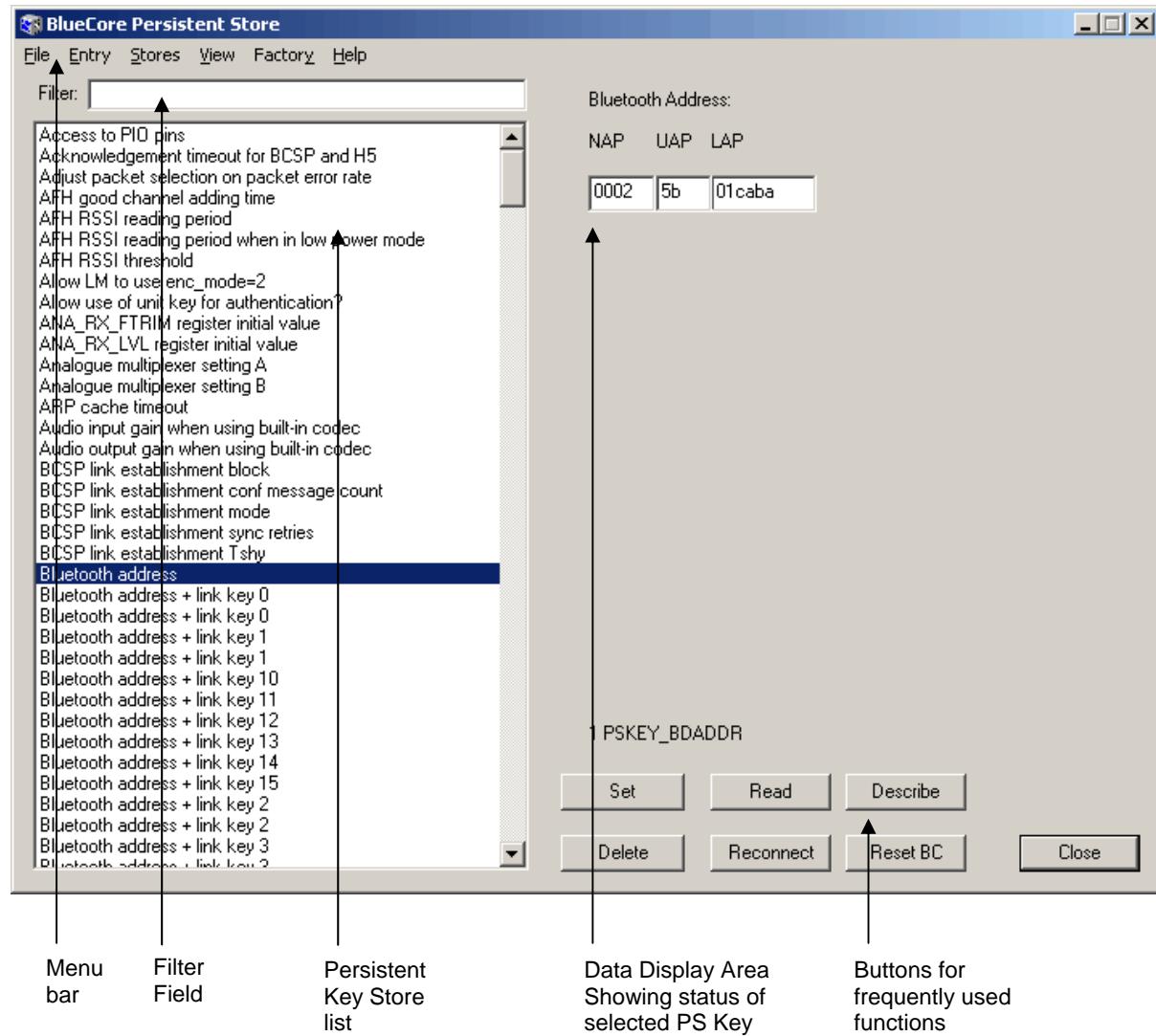
1. Using an SPI connection set the following PS Keys:
 - 1.1. HOST_INTERFACE select **USB link** from drop-down list and click **Set**.
 - 1.2. USB_VM_CONTROL set this key to False.
Note: These two keys can be set using the canned operation @usb.
2. Click **Reset**.
3. Ensure there is a USB cable connection between the PC and the BlueCore development board.
4. Click **Reconnect**.
5. Reopen PSTool and in the Choose Transport window:
 - 5.1. Select the USB Radio button.
 - 5.2. Select the device from the drop down list of USB devices.
 - 5.3. Click **OK**.

PSTool connects to the module using USB.

Note: When a USB cable is connected to a Casira unit, the RS232 port does not work.

3 Description of PSTool Main Window

When the transport selection has been completed the PSTool main window appears:



3.1 General

The PSTool main window provides the main user interaction with the PS key values.

The menus in the menu bar provide access to the full range of PSTool functionality, as described in chapter 4.

The Data Display Area displays the value of the currently selected PS Key in a user-friendly format. Here developers can read the existing value for a selected PS Key and amend it if required.

Note: PS Key values displayed in this area are presented in a user-friendly format. Where appropriate, drop-down lists of alternative settings for the PS Key are provided to simplify setting alternative values otherwise values can be changed using the keyboard.

To save changes made to the value of a PS Key click **Set** before selecting another PS Key.

The buttons displayed on the main PSTool window are provided for convenience. They perform the same function as frequently used functions that are otherwise accessed from menus in the menu bar.

4 Description of PSTool Functionality

4.1 File Menu

The File menu consists of four menu items:

- Merge
- Run Query
- Dump
- Exit

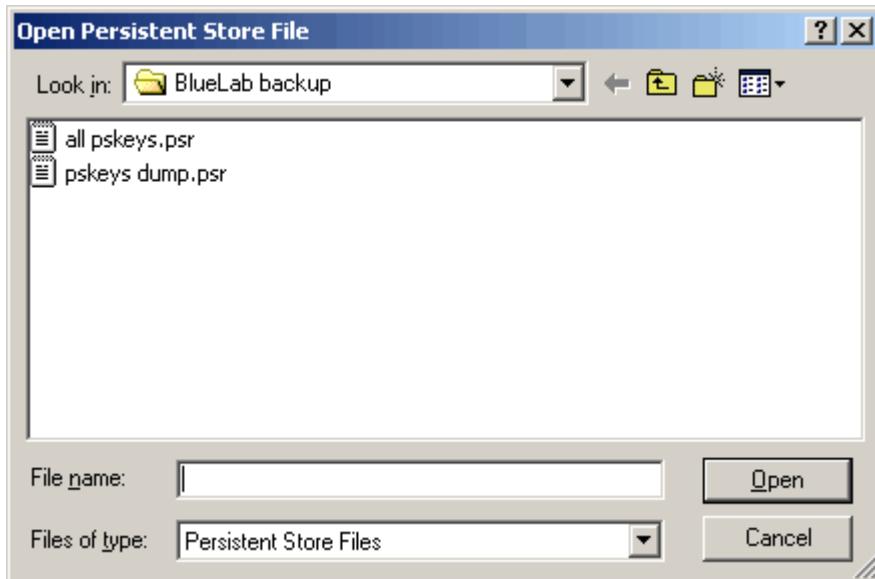
4.1.1 Merge

This facility sets PS Keys to those contained in a previously saved .psr file (.psr files are created by the dump and query processes described in the following sections).

To use a .psr file to set the values of PS keys:

1. Select **Merge** from the **File** menu.

An Open Persistent Store File window appears:



2. Browse to the location of the .psr you want to merge.
3. Select the required file and click **Open**.

The window closes and the PSKey values in the .psr file are downloaded to the BlueCore chip.

4.1.2 Run Query

This option allows you to run a simple query to read the value of specific sets of PS Keys. To do this the user must prepare a .psq file to list the PS Keys to be read.

.psq files

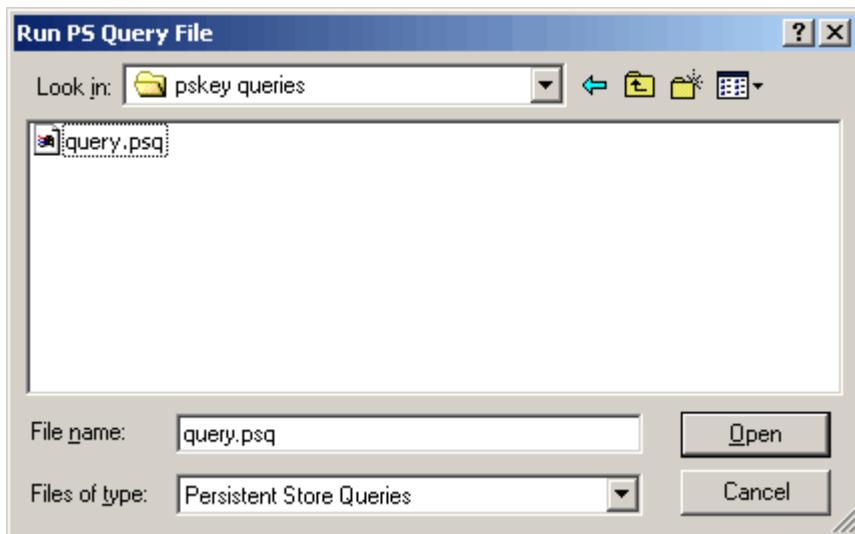
.psq files can be written using a plain text editor such as Notepad. The syntax for a .psq files is in the form:

```
?1234=          // read and dump the value of PS key "1234".  
?1234~ 5678 9adc // read and dump value of PS key "1234" if it differs from the data specified.
```

Using the Run Query facility

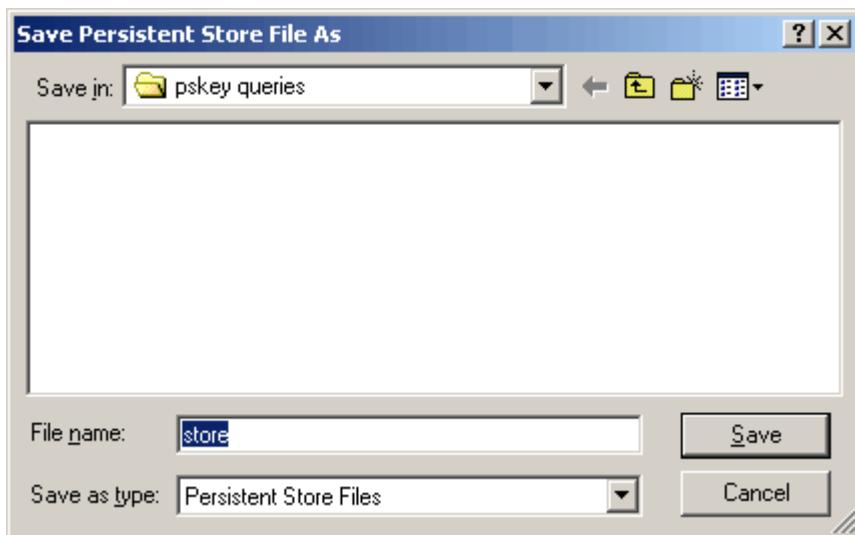
1. Select **Run Query** from the **File** menu.

A Run PS Query File window appears:



2. Browse to the location of the .psq file.
3. Select the required .psq file and click **Open**.

A Save Persistent Store File As window appears:



4. Enter a name for the query results file and click **Save**.

The file will be saved as a .psr file in the selected location and the window will close.

5. The file can then be opened from its saved location. The file will contain the values dumped as a result of the query.

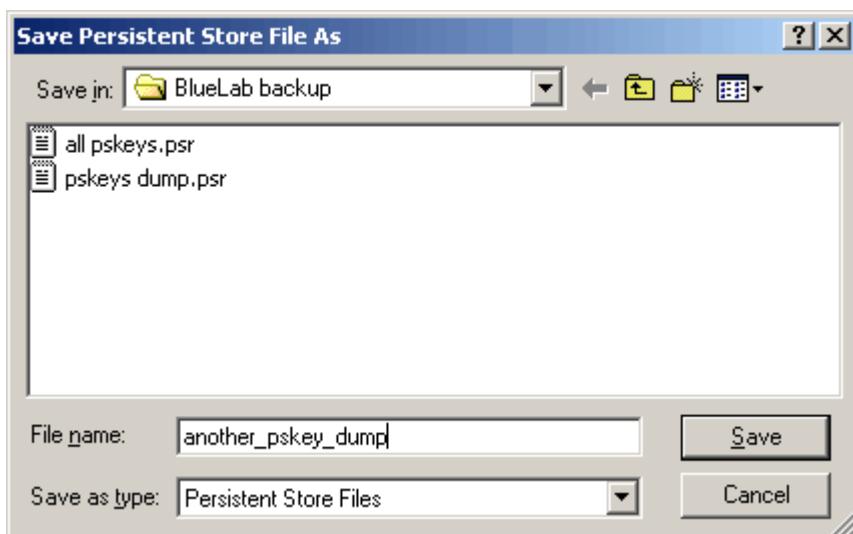
4.1.3 Dump

This facility allows a copy of the PS Key as set on the BlueCore module to be saved as a .psr file. This can be used to reset these values using the Merge facility described in section 4.1.1.

To save a dump of a modules PS Key values:

1. Select **Dump** from the **File** menu.

A Save Persistent Store File As window:



2. Browse to the location in which you wish to save the .psr file.
3. Enter a name for the file.
4. Click **Save**.

The file will be saved in the selected location.

4.1.4 Exit

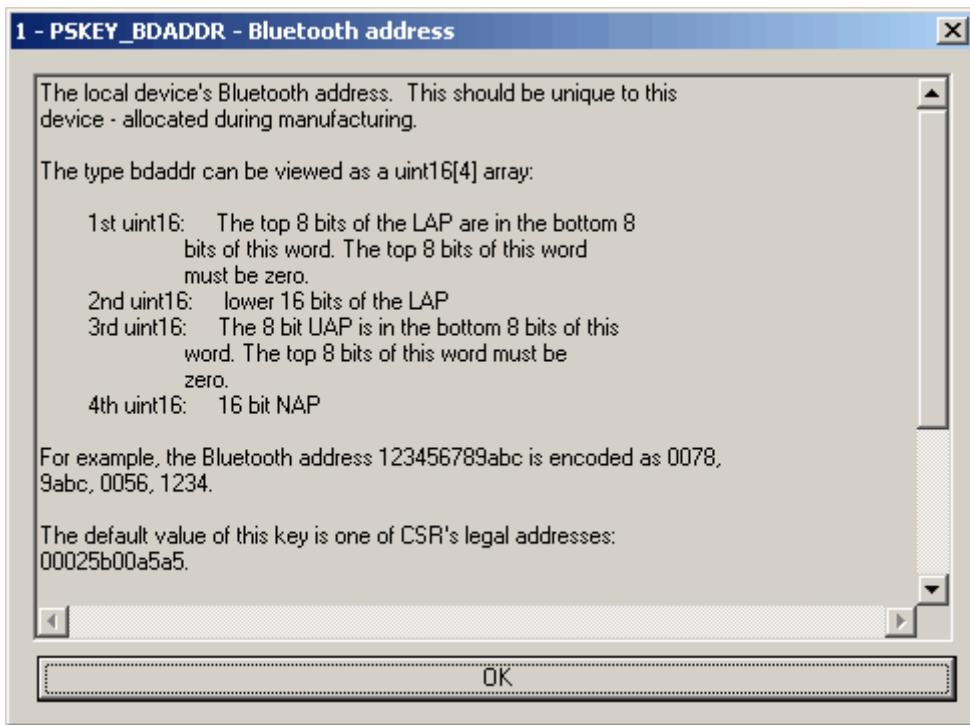
This option closes the PSTool application.

4.2 Entry Menu

The Entry menu provides a range of options and facilities:

- **Read Entry:** reads the value of the PS key selected in the Persistent Key Store list and displays the value in the status area. This menu item performs the same function as the **Read** button.
Note: A read is automatically performed when a key is selected from the Persistent Store list.
- **Set Entry:** writes the value displayed in the status area to the selected PS Key. This menu item performs the same function as the **Set** button.
- **Delete Entry:** removes the selected PS Key. If required, the stack creates the key using a default value the next time the stack reboots. Otherwise the key displays Not Present when selected in the list. This menu item performs the same function as the **Delete** button.
- **Describe:** displays a brief description of the currently selected PS Key in a separate window.

For example:



This menu item performs the same function as the **Describe** button.

- **Edit raw:** allows the user to edit the raw words of the selected PS Key value rather than the user-friendly presentation in the data display area of the main PSTool window.
- **Canned Operations:** allows the user to select from a list of predefined operations. These write individual keys or combination of keys to the required values for the selected option.

For example, selecting @bcsp writes values to two keys PSKEY_HOST_INTERFACE (to UART link running BCSP) and PSKEY_UART_CONFIG_BCSP (the UART configuration key for BCSP) and sets them to the required values to allow BCSP transport communication with the host.

4.3 Stores Menu

This menu allows the user to select which of the various layers available to the Persistent Store that PSTool will interact with.

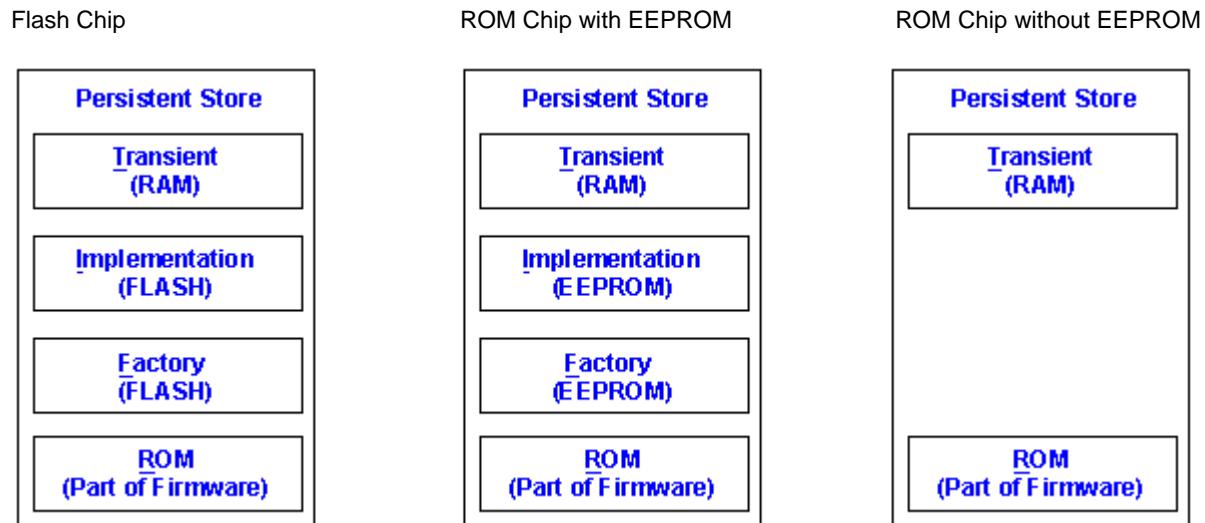
Note: During development the layer storing the PS Key value can be largely ignored. The distribution between stores only becomes significant during production (some keys are set during module production, some later – it is at this point that the layer used to store the PS Key value becomes more significant)

The options are:

- All (TIFR)
- Implementation Only (I)
- ROM Only (R)
- RAM Only (T)
- Factory Only (F)
- Not RAM (IFR)

The architecture of the various stores can be represented as shown below:

Persistent Store Architecture for:



Default values of PSKeys defined by the firmware are stored in ROM.

Keys that are set during product manufacture are generally set in the Factory and Implementation area, while keys that are set during runtime as a result of user interaction with the product are generally stored in Transient.

At runtime the value stored at the highest level is used.

Note: If an attempt is made to write the same value for a PSKey in the layer immediately above the layer in which the value is currently stored, the write command is aborted.

If Flash is not identified on the chip and there is no E2 supported in the firmware, writes are made in the Transient layer by default.

Important: ROM chips that use an EEPROM device to store PSKeys require the EEPROM to be initialised before PSTools. It can be used to set values by TrueTest, E2Write or E2Util.. The amount of space appropriate for the store is dependent on the BlueCore ROM variant. Refer to the i²C EEPROMS for use with BlueCore Application Note (CSR ref: bcrc-an-008) for recommendations for specific BlueCore variants.

4.4 View Menu

The View menu provides options that control the way PSKeys are displayed in the Persistent Key Store list.

The list can be displayed using either their Friendly names or by Programmer IDs and can be ordered alphabetically (Sort by name) or by number (Sort by ordinal).

4.5 Factory Menu

The factory menu contains:

- **Factory Set:** when a PSKey has a value currently set in the Implementation level selecting Factory Set applies the setting at the Factory level.
- **Factory Restore:** if the selected PSKey is set in the Factory level this option removes any values set at the higher levels.
- **Factory Set All:** selecting this option removes any values set in the higher levels for the full range of PS keys for which values have been set in the Factory level.

4.6 Help Menu

The Help menu contains:

- **Firmware version:** reports the version of firmware currently running on the BlueCore chip.
- **Describe key:** see section 4.2.
- **About:** opens a separate window displaying version information for PSTool.

4.7 Filter Field

Typing characters in this field will filter out any PS Keys that do not contain the character or sequence of characters typed. This can be used to quickly locate specific PS keys.

4.8 Button Functions

The PSTool main window contains the following buttons:

- **Set:** clicking this button saves the value displayed/entered in the data display area to the selected PSKey.
- **Read:** clicking this button gets the Persistent Store value for the selected key and displays it in the data display area.
- **Describe:** see section 4.2.
- **Delete:** clicking this button removes the selected PS Key from the Persistent Store.

Note: If required, the stack creates the key using a default value the next time the stack reboots. Otherwise, the key continues to be reported in the data status area as 'Not present'.

- **Reconnect:** clicking this button brings up the Choose Transport window allowing the user to reconnect after a device resetting or if the transport was disrupted for some reason.
- **Reset BC:** clicking this button resets the BlueCore device.

Note: The device must be Reset and the stack rebooted before changes made to PSKeys using PSTools take effect.

- **Close:** clicking this button closes the PSTool application.

Note: Changes to PSkeys are not written unless the Set button is clicked before closing.

5 Troubleshooting

The most common fault experienced when using PSTool is a communication failure with the BlueCore chip.

Note: A failure to communicate with the chip is indicated when PSTool reports ENTRY NOT PRESENT – Click to add for a PS Key that is known to store a valid entry e.g. Bluetooth Address.

If this occurs there are a few possible causes, which can be readily diagnosed and corrected if necessary:

1. Reset the chip and reconnect PSTool.
2. Check that **All (TIFR)** is selected in the **Stores** menu.
3. Check that the SPI cable is correctly connected and the device is powered.

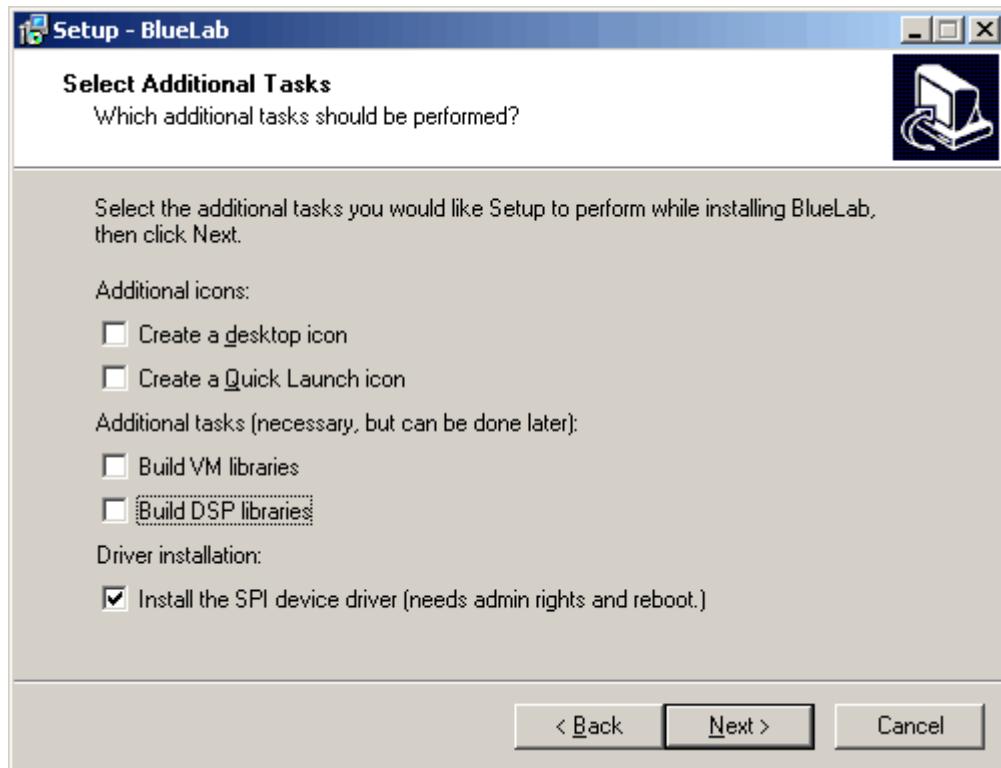
If neither of the above was causing the communication failure two other possible causes are commonly found to be the source of the problem:

4. **Cause:** There is no firmware running on the device or the firmware is not suitable for the BlueCore variant being used.

Solution: Download compatible firmware using BlueFlash.

5. **Cause:** The SPI device driver was not included during installation of BlueLab.

Solution: Install the SPI device driver by re-running BlueLab.exe ensuring the option to **Install SPI device driver** is selected in the **Select Additional Tasks** window:



Note: The Install the SPI device driver option is selected by default during installation.

If you only want to install the SPI device driver uncheck the other options before clicking **Next** to continue.

6 Technical Support

Further information on all CSR products can be found on the technical support website (<http://www.csrsupport.com>).

Developers are also recommended to view the public newsgroups hosted by CSR on the Internet news (NNTP) server news.csr.com. The newsgroups are a convenient forum for the Bluetooth community to exchange knowledge and are a valuable source of information.

For setup instructions and guidelines for the use of newsgroups, follow the links on the CSR Support website.

Terms and Definitions

| | |
|---------------|--|
| BlueCore™ | Group term for CSR's range of Bluetooth wireless technology chips |
| Bluetooth® | Set of technologies providing audio and data transfer over short-range radio connections |
| Bluetooth SIG | Bluetooth Special Interest Group |
| CSR | Cambridge Silicon Radio |
| BCSP | BlueCore Serial Protocol |
| H4 | Bluetooth defined UART transport |
| H5 | Three-wire UART transport |
| HCI | Host Communication Protocol |
| LPT | Line Printer Terminal |
| SPI | Serial Peripheral Interface |
| UART | Universal Asynchronous Receiver Transmitter |
| USB | Universal Serial Bus |

Document History

| Revision | Date | History |
|----------|-----------|---|
| a | 27 SEP 05 | Original publication of this document. (CSR reference: blab-ug-008Pa) |
| b | 01 DEC 05 | Updated to include a description of the filter field. (CSR reference: blab-ug-008Pb) |

BlueLab™

PSTool User Guide

blab-ug-008Pb**December 2005**

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