BlueCore™

Casira™ User Guide

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1 Introduction

The Casira™ User Guide is intended to help you set up your Casira and to quickly familiarise yourself with its development tools. This document will guide you through the installation of software and provide you with instruction on how to use Casira's features.

This guide provides a brief overview of CSR's BlueSuite™, a suite of development tools that contains all of the **BlueCore™** utilities. BlueSuite includes BlueChat2, BlueFlash, PSTools, BlueTest and BTCLI. These utilities will help you with your own Bluetooth® wireless technology development program.

Section 7, Other Applications, describes additional useful applications. It introduces the Device Firmware Upgrade (DFU) software and tools to upgrade Casira's flash memory, the BlueLab™ Solo Software Development Kit (SDK) for embedded application development, the Bluetooth for Windows® software development kit, and TesEngine and TestFlash to develop test applications.

Section 8, Technical Support, provides contact information for technical assistance.

In addition to the firmware and documentation provided with your Casira Development Kit, more information and updates are available on the CSR support website at www.csrsupport.com.

1.1 Casira Overview

The Casira unit features the following:

- Motherboard containing host I/O and man-machine interface elements including RS232 and USB drivers and external connector, audio codec and external audio socket for a headset, plus internal connectors for PIO lines, audio PCM stream and synchronous serial interfaces.
- Module, which includes the following items:
  - BlueCore chip (an advanced single-chip Bluetooth device)
  - Flash memory device (which stores BlueCore's firmware and Persistent Store)
  - Antenna (which allows communication with other Bluetooth devices)

Casira ships with BlueCore2-External devices. The BlueCore2-External module design is a Class 2 device (see the BlueCore2 Class 2 module design BC2MOD2C on the CSR support website). Datasheets for BlueCore2-External are available on the CSR support website.

2 Parts List

Table 2.1 lists the contents of a Casira Development Kit. If an item is missing, contact your CSR sales representative.

Quantity	Description
2	Casira Bluetooth development pods (each pod contains a BlueCore-based module)
2	Power supplies
2	Power cords
2	Country-specific electrical adaptor plugs
2	SPI programming cables
2	5 metre long RS232 cables
2	Audio headsets
1	Casira Bluetooth Development Kit CD ROM, containing documentation and software, BlueLab Software Development Kit and Bluetooth for Windows software
1	Screwdriver

Table 2.1: Casira Case Contents

Notes:

CSR recommends using the provided power supplies; otherwise, there is a risk of damaging the Casira unit(s).

Casira documentation is included on the Casira CD ROM. Check the CSR support website regularly for the latest updates on documentation, tools and firmware for Casira at www.csrsupport.com/newupdated.php.

3 System Requirements and Operating System Platforms

Minimum system requirements for the Casira utilities are:

- Pentium processor-based personal computer
- 64MB of RAM is recommended
- 10MB of available hard disk space

Casira utilities can be used on the following operating systems:

- Microsoft Windows 98(1)
- Microsoft Windows Me(1)
- Microsoft Windows 2000
- Microsoft Windows NT v4.0 (Service Pack 3 or later)
- Microsoft Windows XP

Important Notes:

Windows NT v4.0 does not offer native Universal Serial Bus (USB) support. Support can be added via patches, but performance is not always dependable. CSR does not recommend carrying out development work using Windows NT and USB, as USB patches are not supported.

(1) CSR no longer guarantees support for Windows 98 and Windows Me. New releases of BlueSuite will not be tested on these operating systems. However, it is likely that some of the utilities shipped with BlueSuite will continue to function correctly on these operating systems.

4 Initial Steps

The following instructions will take you through the software installation and back up procedures for your Casira units. Your first action should be to back up the firmware. Follow the back-up instructions in section 4.5, Back Up New Casira Units. Each Casira module has settings that are unique to that module, such as its Bluetooth Device Address and Crystal Trim Value. This data is stored in the Persistent Store as PS Keys. The Persistent Store also contains values that are specific to a particular design, e.g., whether it uses the Universal Asynchronous Receiver Transmitter (UART) in H4 or BlueCore Serial Protocol (BCSP) mode.

4.1 Register Online

Register online on the CSR support website at www.csrsupport.com upon receipt of the kit. This site is one of the most important resources for development. The site includes the latest application notes, datasheets, RF reference designs, design guidelines, firmware, software, tools and training presentations.

When you register, you will receive a user name and password by the next business day. When you log in you will see the categories available to you to access files pertaining to Casira and BlueLab.

Click on **Access** to view your access list. If you do not have access to the Casira or BlueLab products, request changes to access via the User Group Access Request.

4.2 Installing BlueSuite

Run the installer supplied on the accompanying CD ROM.

4.3 Installing BlueSuite CE Software

This installation contains Windows CE versions of the PC software. To install the CE versions follow these instructions:

1. Identify the target platform.

   CE devices run one of the following versions of Windows CE:

   - Pocket PC (Palm-sized device, small portrait screen, no keyboard)
   - HPC Pro 2.11 (Older small notebook-sized PC with keyboard and glide pad)
   - HPC 2000 (Palmtop device with touch screen and keyboard)
   - Palm-sized PC 2.11. (Older palmtop-sized PC with keyboard and touch-screen)

   The CE version defines the screen size and user-input type for the device (e.g., touch-screen or glide pad, keyboard present, handwriting recognition present, etc.). Identify your CE version from the above list.

2. Identify the processor to be used:

   On your Windows CE device, identify the processor used in the device. On most platforms, this is found in **Control Panel** / **System** / **Device tab**. On Pocket PC platforms, select **Settings** / **System** / **About** / **Version**.

3. Copy the CE Version of Software to the Device.

   The Casira CD ROM contains versions of BlueSuite software for various popular Windows CE devices, all as .CAB files. These files are supplied on the CD ROM.

   Select the version for your device from the .CAB files available. If an appropriate version is not available, contact your distributor, or CSR.

   Right-click on the .CAB file and select **Copy**.

   If you have not already done so, establish an ActiveSync connection to your CE device. The device should now appear as a directory in Windows Explorer. There is more information about ActiveSync at the end of this installation instruction.

   Copy the correct .CAB file to the device by locating the ‘My Documents’ folder on the device. Right-click and select **Paste**.

4. Install BlueSuite on the device.

   Install BlueSuite CE by running the .CAB file on your CE device from the directory to which you saved it. You may need to use the CE File Explorer to navigate to the .CAB file.

4.3.1 ActiveSync 3.7.1

Microsoft ActiveSync® 3.7.1 is the latest and significantly improved synchronisation software for Microsoft Windows Powered Pocket PCs. ActiveSync 3.7.1 is easy to install and use and offers the best levels of reliability to date. ActiveSync 3.7.1 also brings you up to date with compatibility to Microsoft Office XP and Windows XP. If you do not have this on your computer go to: www.microsoft.com/mobile/pocketpc/downloads/activesync37.asp.

4.4 Installing USB Drivers

There are two sets of device drivers for BlueCore (CSR and WIDCOMM™). Each set contains drivers for BlueCore to use in normal operation and in DFU mode. The CSR DFU driver offers better reliability and performance. Use the CSR DFU Wizard if you use the CSR DFU driver. WIDCOMM Bluetooth for Windows (BTW) software works only with the WIDCOMM driver.

CSR's BlueSuite software was tested using both sets of drivers.

If you installed previous versions of BlueSuite and CSR USB drivers, note that they will not work with the WIDCOMM BTW software. The CD ROM provided with your Casira Development Kit will allow you to remove the old USB drivers and install the new version, which co-exists with both software programs.

4.4.1 Selecting the Driver

If you plan to use only the BlueSuite software to develop your Bluetooth application(s), CSR recommends that you use the CSR drivers referenced in csrbc01.inf.

If you plan to use both CSR and WIDCOMM software, CSR recommends that you use the drivers referenced in btwusb_csr_dfu.inf. This file uses the WIDCOMM driver for normal USB operation, but it uses the CSR driver for DFU operation. Use the CSR DFU Wizard to perform DFU operations over USB as this offers best performance and reliability.

If you plan to use mainly WIDCOMM software, CSR recommends that you use the WIDCOMM drivers, as referenced in btwusb.inf.

4.4.2 Changing the Driver

1. Unplug the USB device.
2. Run **install.exe** from the CD ROM. Select **Purge system of USB drivers** for CSR chips. Clear all other options. Click **Install** to run the option.
3. Insert the device. When prompted, select the appropriate driver (refer to section 4.4.1, Selecting the Driver).

4.5 Back Up New Casira Units

The following steps take you through the process of backing up your Casira firmware. Back up the firmware as your first action with a new Casira. Making a back-up when you upgrade firmware allows you to return to a known state in the event you incur problems as a result of the upgrade. You can back up the firmware at any time.

To backup Casira firmware:

1. Open the Casira unit. Access to the SPI header is required. Open the Casira case by unscrewing all three screws located on the underside. Remove the case top.
2. Check the module serial number. The heart of a Casira kit is the radio module, held in place by the blue clip in the centre of the motherboard. The motherboard itself provides a stable environment for the radio module as well as easy access to all the important signals.

   Each radio module has a unique serial number (this is not the same as the motherboard serial number). Before proceeding, check the module serial number. Slide the clip up toward the connectors on the top edge of the motherboard. The module will pop up. Remove the module and look on the underside for the serial number (in the format S/Nxxxxx). Note the serial number.

   To replace the module, fit the top edge of the module into the blue clip. Press down gently until the module is correctly in place. Slide the clip down to lock it in place.
3. Connect the SPI cable. Take one of the SPI cables and connect it to the CN16 header on the Casira motherboard. Take the other end of the SPI cable and connect it to the LPT port on your PC.

   Note:

   Ensure that the LPT port is in Normal mode and not in ECP/EPP mode. This can be configured with the Device Manager under the System utility in the Windows Control Panel. For some PCs, it may be necessary to change the BIOS settings. If you have any doubts about changing the port's mode and the effect it may have on any other interfacing devices, contact your Information Systems department for advice.
4. Power up. Using the appropriate country specific AC adaptor, connect the power supply unit to the mains supply. Plug the power supply unit output into the Casira power input.
5. Run BlueFlash. Start the BlueFlash application (installed as part of BlueSuite on the accompanying CD ROM).
6. Select the LPT port. In the top drop down menu, select the LPT port to which the SPI cable is connected. LPT1 is the default.
7. Check the connection. The BlueFlash window displays the status of the processor. The status of the chip should state that it is idle. The button **Stop Processor** should not be greyed out.

   A connection to BlueCore has not been established if BlueFlash is still trying to identify the flash memory. The message "Identifying Flash…." will indicate this state. The flash identification process should take two to three seconds.

   If the flash is not identified, ensure that the LPT port is in Normal mode in the Windows Device Manager.

   If the flash is still not identified, try to remove jumper CN18 on the Casira motherboard (near the SPI connector). Due to different configurations of the LPT port on some PCs (particularly laptops), the Casira's reset circuit may be being asserted by a connection in the SPI cable to the PC LPT port. This causes Casira to reset itself continuously. Removing jumper CN18 disconnects the reset pin on the SPI cable from the Casira reset circuit. Reset the Casira, close BlueFlash and repeat Steps 4-7.
8. Stop the BlueCore Processor. Click **Stop Processor**. If you successfully connected to the module, the BlueFlash window indicates recognition of the flash memory type and displays device information in the top status bar as Figure 4.1 indicates.
9. Verify that the processor has stopped. When the processor has stopped, the **Stop Processor** button changes to Start Processor. You can now upload or download the BlueCore firmware.
10. Click on **Dump**. To upload the entire Casira flash memory contents to a PC file, click on **Dump**.
11. Select a filename. A **Save as** window displays. Select a safe location and create a folder where the backup will be stored. The firmware dump contains calibration information for the module including host interface settings. CSR recommends that you use a descriptive filename that includes the module serial number, your name or company and the Casira setup to make identification easy. For example: "SN10337 – John Doe – Factory Settings"

12. Save the file. Click **Save**. BlueFlash saves the backup into the specified location. The status bar indicates the upload status during the backup. Do not interrupt this process as doing so may corrupt the data.
13. Wait for the upload to complete. The backup is complete when the file name displays **complete**. Two files will be created: one with .xpv extension, the other with .xdv extension. Both files are required to restore the firmware (.xpv contains the firmware program space; .xdv contains the data space).
14. Repeat steps if required. Repeat Steps 1-13 of this section for additional Casira units.
15. If your Casira fails to operate properly due to erroneous PS Key modifications or failed firmware updates, perform a recovery to restore the original firmware and settings with which the Casira was shipped.

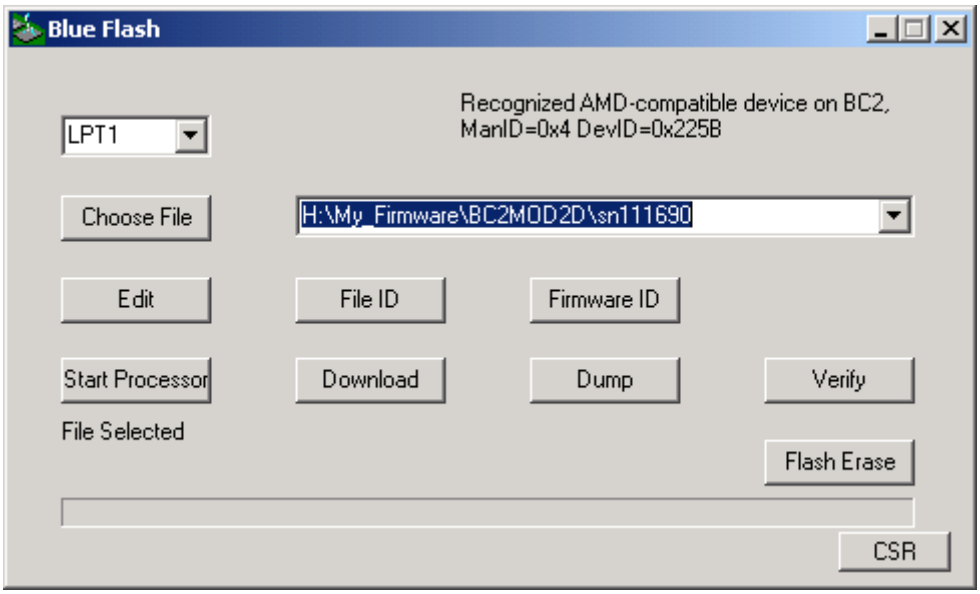

Figure 4.1: BlueFlash Processor Stopped

5 BlueCore Utilities in BlueSuite

This section describes the BlueCore utilities incorporated in BlueSuite, which includes the following applications:

- **BlueFlash** upgrades the BlueCore firmware.
- **PSTools** edits the PS Keys.
- **BlueChat2** creates simple ACL and SCO connections (HCI firmware only).
- **BlueTest** exercises the radio for test purposes.
- **BTCLI** allows sending HCI commands.
- **RFCLI** enables RFCOMM primitives to be sent and received by the chip (as well as other protocols).

It also includes examples of the most commonly used features for each of these utilities.

5.1 BlueFlash

BlueFlash is a utility that allows you to download and upload firmware to and from the flash memory on the Casira kit modules or on your own BlueCore designs.

Important Note:

Do not click **Flash Erase** unless this is your definite intention.

Erasing the flash will remove all Persistent Store settings. Firmware upgrades from the CSR support website do not contain Persistent Store settings, thus the current settings are preserved. Firmware dumps that you make do contain Persistent Store settings, therefore, any existing ones will be overwritten if you re-flash using a previously dumped file. **Flash Erase** should only be used in the event that there may be a problem with the Persistent Store and you want to reload a previous known working version.

5.1.1 BlueFlash User Interface

BlueFlash opens with a user interface window as Figure 5.1 indicates.

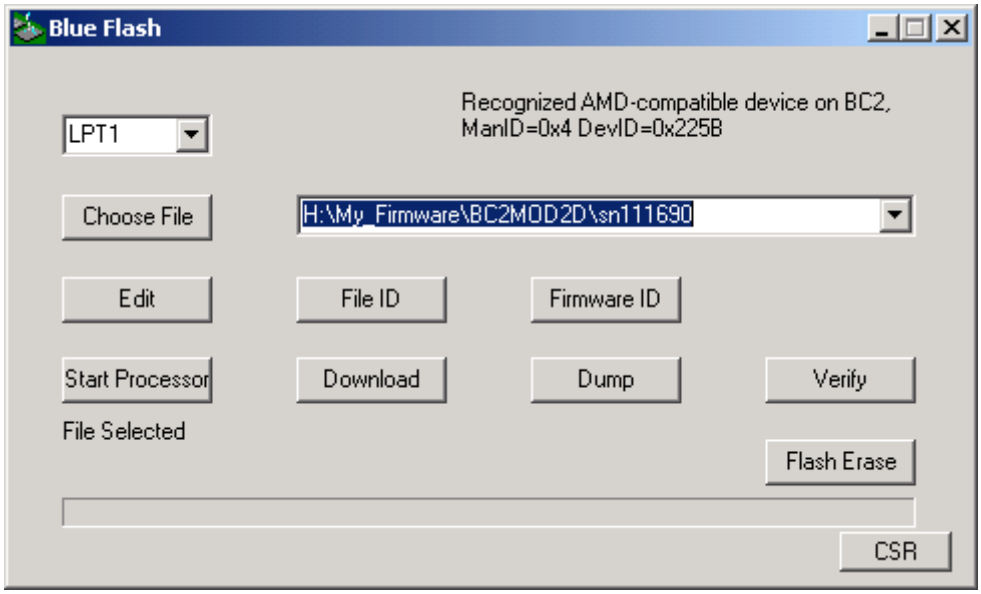

Figure 5.1: BlueFlash User Interface

The function of each button or area is described as follows:

Choose File: Opens a dialogue box for selection of the *.xpv file to download to the flash on the BlueCore Module.

Note:

The .xdv file must be present in the same folder as the .xpv file. **Edit**: Opens a hexadecimal-editing window. CSR recommends that you do not edit the *.xpv file in any way. If the code is edited, the Bluetooth protocol stack may behave erratically and it may no longer be Bluetooth qualified.

Download: Downloads the selected file to the flash on the BlueCore module. This process will update each flash block as required and verify them in turn.

Verify: Compares the selected file with the code programmed into the flash on the BlueCore module. Any differences will be reported in the status area.

Status: Provides a text report of the status of the current download, upload or verify.

Activity Bar: Displays a visual indication of progress for the current download, upload or verification.

Start Processor: Changes depending on the status of the processor. If it says **Stop Processor**, the processor is running. It should be stopped before attempting to download code. Once the new code has been loaded, the processor can be restarted by clicking on **Start Processor**.

Firmware ID: Identifies which version of firmware is currently loaded on the module. BlueFlash does not identify firmware created before Beta 10 release. If BlueFlash is unable to identify the firmware version, you will still able to upgrade the firmware using this utility.

Dump: Allows the user to download the contents of the flash to a file on the PC hard drive. The data can be stored either as BlueCore .xpv/.xdv files or as a binary file. The file also contains all of the Persistent Store settings, allowing you to restore to a known firmware build and Persistent Store settings.

Flash Erase: Provides options for erasing some or all of the flash memory including the Persistent Store area.

File ID: Displays the name and version of firmware of the file selected for download on the module.

File Selection: This area displays the name and location of the file selected for download.

Flash Type: This area displays the type of flash memory that has been identified on the BlueCore module. Flash type is identified when the processor is stopped. Different types of flash memory may have different memory block structures that require adjustments to BlueCore's memory map. If the flash type indicates `Unrecognised Flash assuming SST`, either the flash on the BlueCore module is not supported, or there is a problem with the SPI connection. See section 5.1.3, Troubleshooting BlueFlash, for further information.

LPT Selection: This pull-down menu allows the user to select the LPT port to which the SPI cable is connected.

CSR: This indicates the version of the BlueFlash application in use. CSR advises using the most up to date version. Refer to the CSR support website for available updates.

5.1.2 BlueFlash Firmware

Refer to section 4.5, Back Up New Casira Units, and section 6.2, Install the Latest Tools, for the steps to upload and download BlueCore firmware.

There are four possible components in a firmware file:

- **Stack**: This is the main runtime code for BlueCore. There are two versions of stack, one contains all stack layers up to HCI, plus an HCI version of the Virtual Machine (VM); the other contains stack layers up to HCI, plus L2CAP, RFCOMM, SDP and the Virtual Machine (an RFCOMM version). Both stack versions uses both program and data space.
- **DFU Driver**: Device Firmware Upgrade allows for updating the stack, Persistent Store and VM application over the HCI transport. You cannot use a DFU operation to upgrade the DFU driver.
- **Persistent Store**: The Persistent Store holds all the setup and calibration information for BlueCore. Most settings are design-specific, but some are module specific. The Persistent Store resides entirely in the data space.
- **Virtual Machine Application**: BlueCore allows small applications to be run on-chip using CSR's BlueLab. These applications reside in a special area of the data space. Refer to section 7, Other Applications, or to the CSR support website for more information about BlueLab.

BlueFlash firmware is held in *.xpv files (which correspond to the program space) and *.xdv files (which correspond to the data space). There is a single *.dfu file for DFU. Not all files contain all firmware components.

Downloading a firmware file only to flash memory overwrites the components contained in the file; all others remain intact. This affects only the calibration information in the Persistent Store. Downloading to flash memory ensures that you can return the module to a known calibrated state if the Persistent Store becomes corrupted beyond repair.

If firmware with no Persistent Store component is downloaded onto a blank flash, the stack code will create a new Persistent Store using default values suitable for use on a Casira module. However, some keys will require calibration per module for optimal performance.

For more information, refer to CSR documentation on PS Key Settings.

The **Verify** function compares the contents of a firmware file to the contents of flash memory and reports any differences (comparing only components contained in the file).

5.1.3 Troubleshooting BlueFlash

Problem:

- BlueFlash cannot identify flash type
- BlueFlash fails to stop processor
- BlueFlash times out trying to make a connection to BlueCore

Solution:

Ensure that the following actions have been completed:

Run InstParSpi.bat (**C:\Program Files\CSR\BlueSuite**) to copy and register the parspi.sys device driver.

You need administrative rights to install the device driver on a Windows NT or Windows 2000 system. Reboot your PC.

Ensure that the driver has been installed in the registry by looking for HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Parspi.

Ensure that the SPI cable is correctly connected.

Check for conflicts with other drivers, especially printer drivers (this includes the PDF converters).

Conflicting printer drivers should be removed. To amend or remove a driver, go to **Start** / **Settings** / **Printers**. Right-click for **Server Properties**. Click on the **Ports** tab. Move the port to another location or delete the device.

Ensure that another SPI application is not trying to access the SPI port. SPI uses Mutexes around port access, therefore another application may lock the port. Close all SPI-based applications (use Task Manager if necessary) and retry. Reboot if necessary.

Problem:

BlueFlash cannot identify the current build of firmware on BlueCore.

Solution:

Check the firmware version. (BlueFlash cannot identify firmware versions prior to Beta 10.)

5.2 PSTools

PSTools is an editing suite that allows you to read and modify the Persistent Store. The Persistent Store consists of configuration keys 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 PS Keys must be calibrated for each module.

Important Notes:

Do not modify Persistent Store values unless you have a clear understanding of what they do. Careless changes to the Persistent Store could 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 before editing PS Keys.

5.2.1 Access Levels

PSTools has two customer access levels. At the higher access level, there are more PS Keys available for editing. The customer levels are:

- User: A minimum number of frequently used keys, e.g., UART baud rate
- Developer: All the keys that a developer may need to modify

Note:

There is a level of keys reserved for CSR use only (All). Changing some of the keys in this mode can degrade performance or completely prevent BlueCore from working.

The PSTools utility defaults to Developer level access at start up. To access User level, right-click on the blue title bar and select **Access**. Select **User** from the list. The code to return to the Developer level is 1812.

5.2.2 PSTools Transport Interface

PSTools initially opens with a window that allows you to select the interface used to gain access to the Persistent Store. There are several transport interface options as follows:

SPI BCCMD: Casira uses the BlueCore Command (BCCMD) Protocol running over the SPI transport layer to edit the Persistent Store. See Figure 5.2.

Important Note:

SPI BCCMD is the recommended method for editing the Persistent Store.

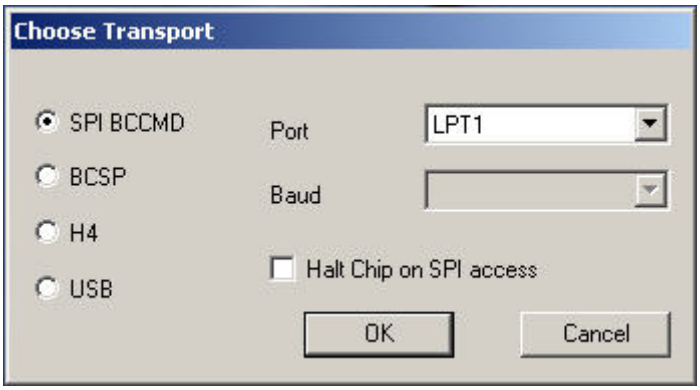

Figure 5.2: SPI BCCMD interface

BCSP: Casira uses the BCCMD Protocol running over BCSP to edit the Persistent Store. BlueCore must be configured for BCSP via PS Keys. When using this mode, ensure that you are using the correct baud rate settings.

H4: Casira uses the BCCMD Protocol running over H4 to edit the Persistent Store. BlueCore must be configured for H4 via PS Keys. When using this mode, ensure that you are using the correct baud rate settings.

USB: Casira can use the BCCMD Protocol running over USB to edit the Persistent Store. BlueCore must be configured for USB via PS Keys. Section 5.2.3, Changing Transport Interface, details how to configure BlueCore for USB operation.

5.2.3 Changing Transport Interface

To change the transport interface, enable the Developer access level (see section 5.2.1, Access Levels).

Refer to CSR documentation for more information on transport interfaces.

To change to **USB**:

1. Change the Host Interface.
   - Select the Host Interface PS Key (505 PSKEY_HOST_INTERFACE).
   - Set to USB `link` using the pull-down menu.
   - Click on **Set** to update the Persistent Store.
2. Set D+ Pull-Up
   - Select the USB d+ Pull-up PIO Line PS Key (720 PSKEY_USB_PIO_PULLUP).
   - Set the key to the PIO output that drives the USB D+ pull-up resistor. This is PIO[2] on Casira modules. This key should be set to `0x02`. If no value is present, then no pull-up is used. PIO[0] is used if the value is `0x00`.
   - Click on **Set** to update the Persistent Store.
3. Reset BlueCore.

The module is now configured for USB mode.

Note:

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

To change to **BCSP**:

1. Change the Host Interface.
   - Select the Host Interface PS Key (505 PSKEY_HOST_INTERFACE).
   - Set to UART `link running` BCSP using the pull-down menu.
   - Click on **Set** to update the Persistent Store.
2. Configure the UART interface.
   - Select the PSKEY UART configuration bitfield (517 PSKEY_UART_CONFIG).
   - Set this value to `6`.
   - Click on **Set** to update the Persistent Store.
3. Set baud rate.
   - Select the UART baud rate PS Key (516 PSKEY_UART_BAUD_RATE).
   - Set to the required baud rate (e.g., 115.2 kbaud).
   - Click on **Set** to update the Persistent Store.
4. Reset BlueCore.

This configures the BlueCore module to use BCSP over the UART.

The UART configuration Bitfiled key is a presentation key. Setting this to `6` configures the following keys:

- UART: Stop Bits PS Key to `One stop bit`
- UART: Parity Bit PS Key to `Even Parity`
- UART: Hardware Flow Control? PS Key to `Disabled`
- UART: RTS Asserted? PS Key to `False`
- UART: Enable BCSP-specific hardware PS Key to `Enabled`

To change to **H4**:

1. Change the Host Interface.
   - Select the Host Interface PS Key (505 PSKEY_HOST_INTERFACE).
   - Set to UART `link running` H4 using the pull-down menu.
   - Click on **Set** to update the Persistent Store.
2. Configure the UART interface.
   - Select the PSKEY UART configuration bitfield (517 PSKEY_UART_CONFIG).
   - Set this value to `168`.
   - Click on **Set** to update the Persistent Store.
3. Set baud rate.
   - Select the UART baud rate PS Key (516 PSKEY_UART_BAUD_RATE).
   - Set to the required baud rate (e.g., 115.2 kbaud).
   - Click on **Set** to update the Persistent Store.
4. Reset BlueCore.

This configures the BlueCore module to use H4 over the UART.

The UART configuration Bitfiled key is a presentation key. Set this to `168` configure to the following keys:

- UART: Stop Bits PS Key to `One stop bit`
- UART: Parity Bit PS Key to `No parity`
- UART: Hardware Flow Control? PS Key to `Enabled`
- UART: RTS Asserted? PS Key to `True`
- UART: Enable BCSP-specific hardware PS Key to `False`

5.2.4 PSTools User Interface

Once the transport interface has been selected, PSTools opens with a user interface window, as shown in Figure 5.4. The function of each button or area is described as follows:

Persistent Store Key List: This window lists all of the PS Keys that are available at the current access level.

Set: This button programs the values in the data area into the currently selected PS Key.

Delete: This button removes a PS Key from the Persistent Store. If required, the stack will create the key using a default value the next time the stack reboots. Otherwise, the key will continue to be reported in the status area as "Not present".

Read: Clicking this button reads the value of the selected PS Key into the data area. A read is also performed every time a new PS Key is selected.

Reconnect: This button brings up the transport interface selection window, allowing you to reconnect after resetting or if the transport was disrupted for any reason.

Reset BC: This button resets the BlueCore device. Any changes to the PS Keys will take effect only after the device is reset and the stack reboots.

Close: This shuts down PSTools.

Describe: This button brings up a description of the currently selected PS Key.

Status Area: This area provides details such as PS Key number and Friendly Name or Programmer ID plus the status of the transport interface. If this shows "Entry is not present" for a key that should always be present (such as the Bluetooth Address) then there are probably problems with the transport interface.

Data Area: This area shows the data that is stored in the selected PS Key and allows you to edit it.

Dump: This button allows you to save PS Keys as you choose. PS Keys can be retrieved through the **Merge** function. See Figure 5.4.

Merge: This button opens PS Keys that were saved through **Dump**. See Figure 5.4.

Edit Raw: This item allows you to change the default PS Key setting to one of your own preference (e.g., baud rate). **Describe** provides more information about each PS Key setting. See Figure 5.5.

The menu bar offers various other features including a low level PS Key editor, the ability to alter the PS Key List to display Friendly Names or Programmer IDs and to sort using Name or Number. It also duplicates may of the button functions.

Important Note:

Changes to a PS Key will not take effect until BlueCore resets and the stack reboots.

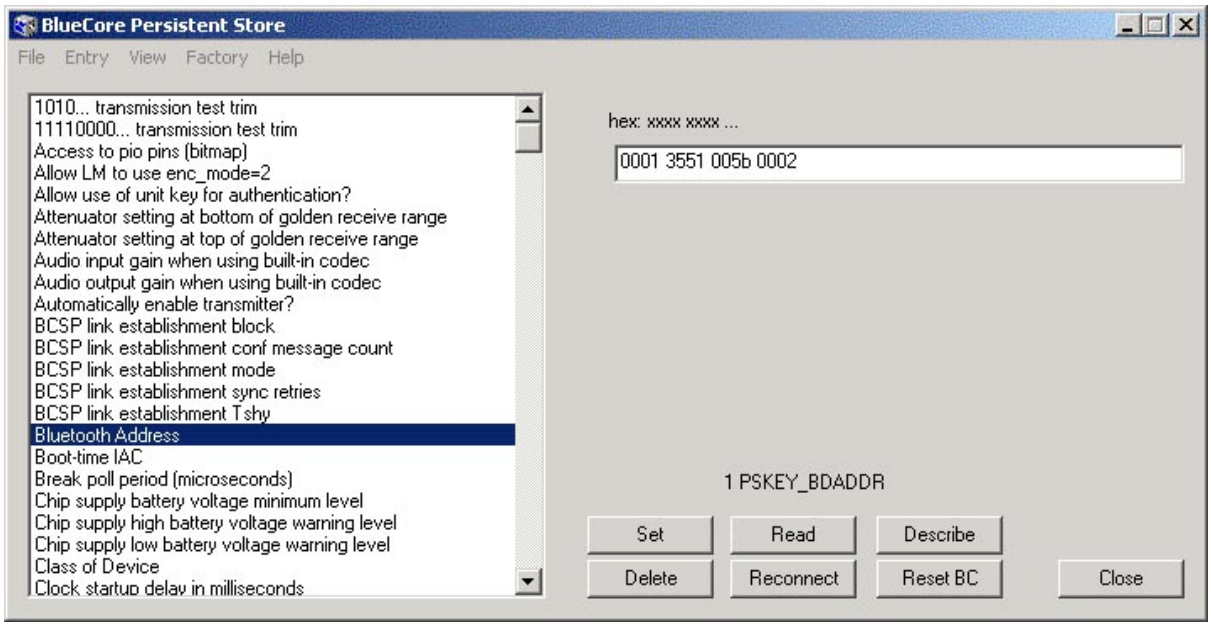

Figure 5.3: PSTools User Interface

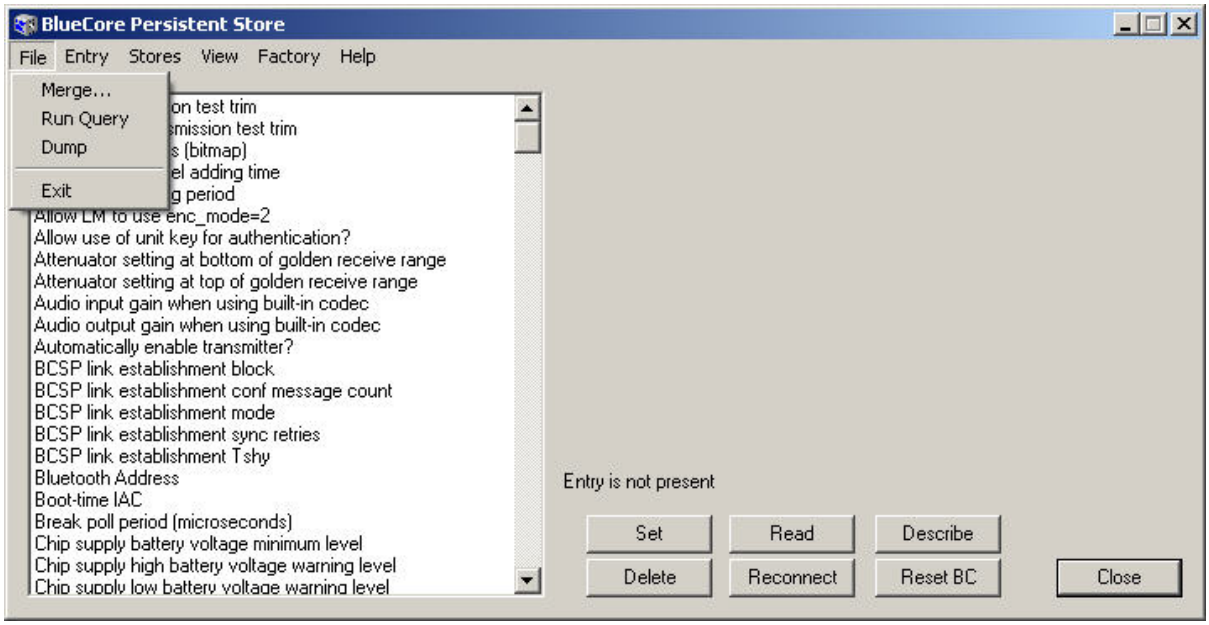

Figure 5.4: PSTools Merge and Dump

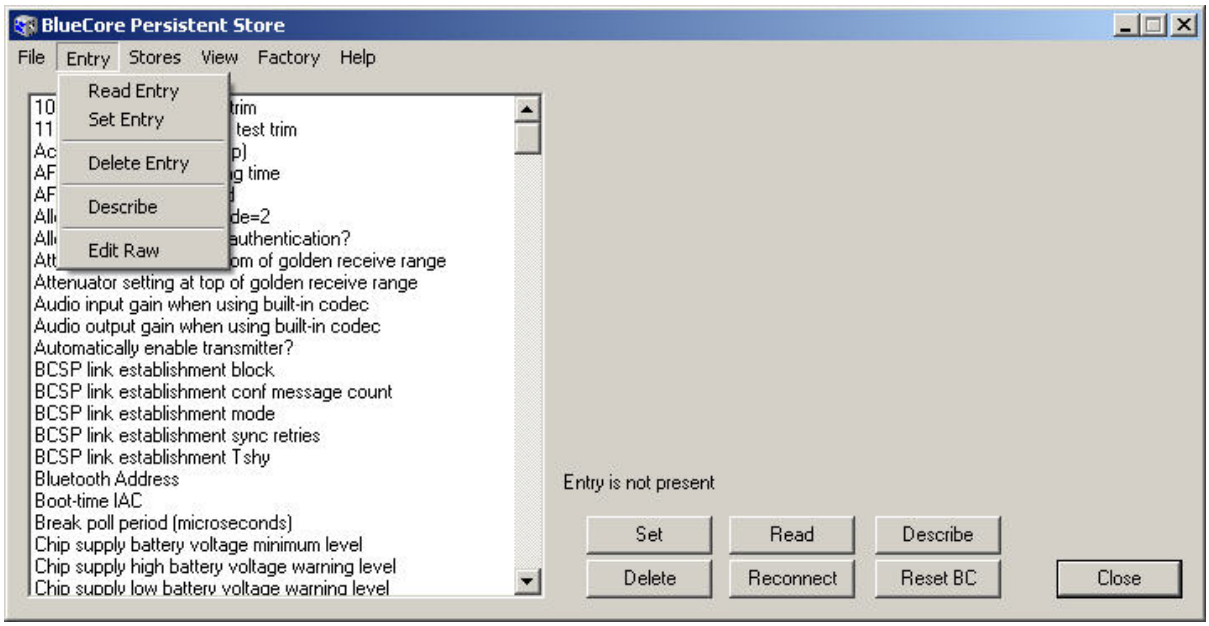

Figure 5.5: PSTools Edit Raw

5.2.5 Changing Baud Rate

A wide variety of baud rates are available when running BCSP or H4 over the UART. PSTools provides a pull-down menu that allows you to set BlueCore quickly to use common baud rates. Non-standard baud rates must be programmed manually using PSTools' **Edit Raw** function under the **Entry** menu. Contact CSR Technical Support for assistance in calculating non-standard baud rates.

To change the baud rate:

1. Set baud rate.
   1.1. Select the UART baud rate PS Key.
   1.2. Set to the required baud rate (e.g., 38.4 kbaud) using the pull-down menu.
   1.3. Click on **Set** to update the Persistent Store.
2. Reset BlueCore.

This configures the BlueCore module to use the new baud rate.

5.3 BlueChat2

BlueChat2 allows users to create an asynchronous connectionless link (ACL) between two devices to send text or a file and add a synchronous connection orientated (SCO) link for a voice connection between the two devices. Users can select between BCSP, H4 (UART), or USB host interfaces.

BlueChat2 was originally conceived as a demonstration/marketing tool. It is not Bluetooth compliant. It should be used only for demonstration and evaluation purposes. Do not use BlueChat2 for development purposes. Use BTCLI for development work (see section 5.5,BTCLI).

The current version of BlueChat2 can only support a point-to-point connection and will only work with HCI firmware.

5.3.1 BlueChat2 User Interface

BlueChat2 opens with a user interface window, as Figure 5.6 indicates. The function of each button or area is described as follows:

Role: Selects the role for the device as either the master or the slave.

Xfer Type: Selects which type of data is sent.

Chat Link: Used to send and receive text data.

Host Controller Interface Messages: HCI commands and responses are displayed here.

Disconnect: Closes the link between the two devices.

Connect: Establishes a connection to the selected device by setting up an ACL link. If Xfer Type is set to **Audio**, a SCO link is also created.

Inquiry / Cancel Inquiry: If the device is the master, this button controls inquiry for other Bluetooth device in the area. If the local device is selected to be the slave, this button will be greyed out.

Bluetooth Device Address: This lists the address of the local device and, in the pull-down selection box, the addresses of any devices found during an inquiry. Use the selection box to highlight the Bluetooth device to which you wish to connect.

File Transfer: Active when connected to another device and Xfer Type “Data” is selected. This displays the name and the location of the file to be transferred. There are also status bars that show the progress of files that are being sent or received. Use the send button to start sending the data to the selected Bluetooth device.

Note:

A dialog window may appear, indicating that a communication error occurred. If the HCI Messages that appear in the BlueChat User Interface dialog window are similar to those shown in Figure 5.6, click **OK**. A connection actually will be made.

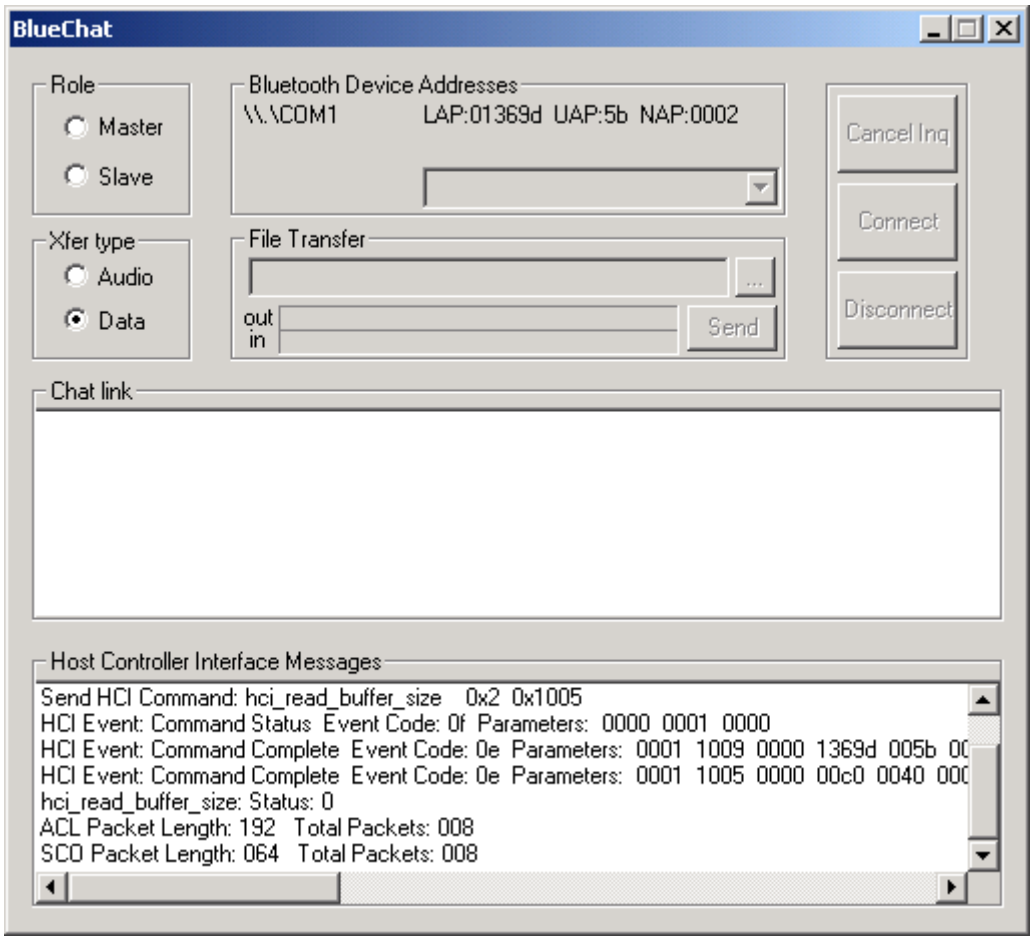

Figure 5.6: BlueChat2 User Interface

Examples

To establish an ACL link:

1. Connect both Casira units to a PC (via their host interface).
2. Power up each Casira unit.
3. For each Casira, open a BlueChat2 utility and select the appropriate protocol and baud rates. The baud rate must be the same as the current setting of the PSKEY_UART_BAUD_RATE in the Persistent Store. Casira modules are supplied set to SP with a baud rate of 115.200kbps.
4. BlueChat2 will find the local device and display its Bluetooth Device Address in the Device On: field.
5. The HCI window displays the HCI traffic used to configure the device.
6. Select the role of the device. Put one device into Master mode and one into Slave mode.
7. Selecting the Master will allow the **Inquire** button to be used.
8. Selecting the Slave will put the device into Inquiry Scan mode to allow the Master to connect to it.
9. On the Master's BlueChat window, click the **Inquire** button and the Master will perform an inquiry to find any slave devices in the area.
10. After the inquiry is finished (which should take about 20 seconds), the Master will show the addresses of the Bluetooth devices it found during the inquiry. You can cancel the Inquiry at any time by clicking **Cancel Inquiry** (any devices found before cancellation will display).
11. Select the address of the Bluetooth device you want to connect to in the Bluetooth Address Box.
12. To connect, click on **Connect**.
13. After connecting, select **Data** in the Xfer type field.
14. You now should have a connection between the two devices. You can send messages through the chat window or transfer files.

To Establish a SCO link:

1. Using PSTools in developer mode, edit the MAP_SCO_OVER_PCM PS Key (427 PSKEY_HOSTIO_MAP_SCO_PCM) and set it to true on both Casiras.
2. Reset Casira.
3. Plug in headsets to Casiras.
4. Follow steps 1 through 8 as for an ACL link above.
5. Select audio in the Xfer field.
6. You now should be able communicate with headsets over an audio SCO link to the other Casira.

5.4 BlueTest

BlueTest is a program that allows you to execute BlueCore's Built-In Self-Test (BIST) functions for RF testing. The BIST functions consist mainly of low-level radio tests (transmitting a continuous wave at a proscribed frequency or receiving pseudo-random data and calculating bit error rates). Included are tests for the PCM port and other internal blocks. Refer to CSR documentation on BlueTest for more information.

5.4.1 BlueTest User Interface

BlueTest opens with a user interface window as shown in Figure 5.7. The function of each button or area is described as follows:

RF Test Mode: Shows the list of available tests and allows you to choose which one to execute.

Save to File: The results of each test can be saved to a file when this is selected. The default name of file is logfile.txt.

File Location: Shows the name and location of file being saved.

Test Results: When running the tests, the results will be displayed in this dialog box.

PS: This button opens a low level PS Key editor similar to the Edit Raw function within PSTools. You must enter the PS Key's identification number in hex and edit the key in hex as well. Not for the faint-hearted.

Reset Chip: Resets the chip.

Execute: Executes the selected test using the current parameters.

Close: Exits the program.

Display: Two modes of display can be used to view results. Standard and Bit Error. The Bit Error mode provides a constantly updated table of the BER results. It will work only with BER tests. The standard mode setting is the default and shows a scrolling window containing the individual test results.

Test Results: This field is where the test results are handled.

Test arguments: The arguments and parameters for each test can be viewed or set for some tests.

For a more detailed description of BlueTest, see the BlueTest Instruction Manual (available from the CSR support website).

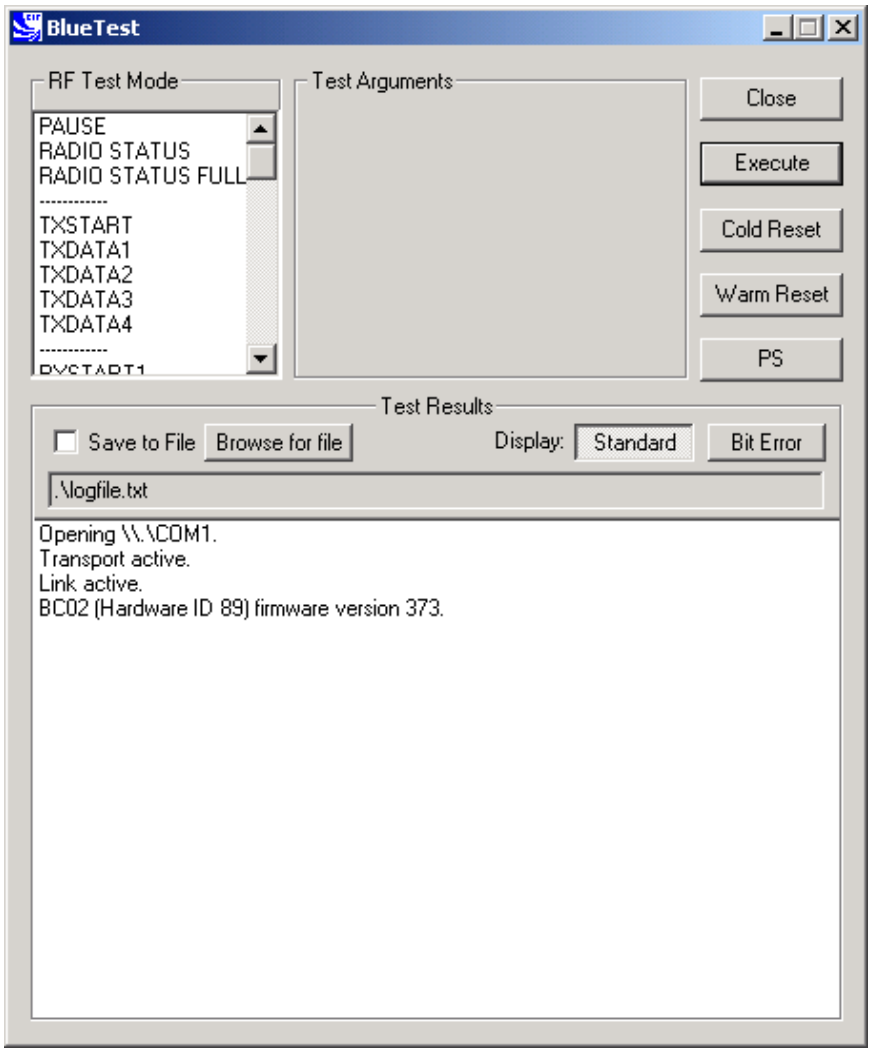

Figure 5.7: BlueTest User Interface

5.5 BTCLI

Bluetooth Command Line Interface (BTCLI) runs from a DOS prompt and provides a means of sending arbitrary HCI commands. Like most command line interface programs, it is very powerful but it is not very user-friendly. A basic user guide is provided as a text file (btcliug.txt) in the BlueSuite directory. Using this guide in conjunction with the Bluetooth specification, it is possible to exercise BlueCore's functionality thoroughly.

To run BTCLI, open a command prompt window (DOS window) and change into the BlueSuite directory. From there, run BTCLI with the appropriate arguments for the current host interface:

```
btcli <transport> <port> <baud rate>
```

For BCSP on COM port 1 at 115.2 kbaud, enter:

```
btcli bcsp com1 115200
```

For H4 on COM port 3 at 38.4 kbaud, enter:

```
btcli h4 com3 38400
```

USB is supported. No baud rate is required. Enter:

```
btcli usb \\.\csr0
```

or

```
btcli usb \\.\BTWUSB_0
```

The most common use for BTCLI is to activate Inquiry/Page Scan and allow the module to accept over-air test commands from an automated tester. With BTCLI this is very simple, involving only two commands: “slave” (which activates the scan mode and enables auto accept of connections) and “edutm” (which stands for Enter Device Under Test Mode). A printout from BTCLI carrying out these commands is shown below. Text entered by the user is shown in bold.

```
C:\> btcli bcsp com1 115200
btcli (built Apr 11 2001, 12:29:32)
Copyright © 2000-2001 Cambridge Silicon Radio
bcsp on com1 at 115200 bps
command_status pending nhcp:0x01 nop
slave
sef connection_setup all auto_accept
wpsa 0x0080 0x0040
wisa 0x0080 0x0040
wse inquiry_page
rba
command_complete nhcp:0x01 set_event_filter success
command_complete nhcp:0x01 write_page_scan_activity success
command_complete nhcp:0x01 write_inquiry_scan_activity success
command_complete nhcp:0x01 write_scan_enable success
command_complete nhcp:0x01 read_bd_addr success
edutm
command_complete nhcp:0x01 enable_device_under_test_mode success
```

5.6 RFCLI

RFCLI is a command line utility for communicating with RFCOMM firmware builds. It enables you to send and receive RFCOMM primitives to the chip (as well as other protocols). It also has a Tool Command Language (TCL) interpreter built in so you can write scripts. Refer to the RFCLI User Guide package on the CSR support website for more information.

6 Upgrading Casira Units

6.1 Download the Latest Tools

Upgrade your Casira unit(s) with the most up-to-date files available from the CSR support website. For the latest firmware and documentation, go to the **Development Hardware** / **Casira** section on the CSR support website and download the following items:

- Latest version of firmware
- Latest version of BlueSuite
- Latest Casira User Guide and other documentation

Click on the Casira icon to log on to the CSR support website (www.csrsupport.com).

If you do not already have a user name and password, you can request one by clicking on the appropriate link on the support website home page (http://www.csrsupport.com/register.php).

Note:

CSR product updates are published on the support website. Check this resource regularly for the latest updates on all issues (go to www.csrsupport.com/newupdated.php).

Automatic email notification of new and updated website listings can be requested by clicking on **Profile** on the home page. CSR will not post notifications without a user's consent. By enabling options to receive notifications, you are giving CSR authorisation to send emails to the email address listed for your account. Only technical update notifications and website related information will be sent. CSR does not sell or trade email address to third parties.

6.2 Install the Latest Tools

6.2.1 Install BlueSuite

Install BlueSuite by running the BlueSuite self-installing executable.

Follow the instructions on the Installation Wizard. CSR recommends that you restart your PC after installing new software.

6.2.2 Install Firmware

1. Unzip the latest firmware downloaded from the support website. Make a note of the directory to which the unzipped files were saved. The *.xpv and the *.xdv files must be in the same folder: both are used during the firmware download process.
2. Connect the Casira to your PC via the SPI as described in section 4.5, Back Up New Casira Units.
3. Power-up the Casira and open the BlueFlash utility.
4. When the BlueFlash dialog first appears, ensure that the interface you select is correctly connected to your Casira, e.g., LPT1.
5. Click on **Stop Processor**.
6. Click on **Choose File**. An Open window appears. Search for the *.xpv file you just unzipped. Select the file and open it. The file location and name will display in the BlueFlash window.
7. Click on **File ID** to indicate which version of firmware is currently selected for download. Click on **Firmware ID** to display details of the firmware that is currently loaded on BlueCore.
8. BlueFlash will not identify firmware builds prior to Beta 10. However, this does not prevent you from downloading or uploading these older firmware builds.
9. Click on **Download**.
10. After downloading completes, click on **Verify** to check the contents of the memory.
11. Reset the Casira unit. You can do this via a full power cycle or by pressing the small blue reset button on the far right side of the motherboard.

Important Note:

Do not click on **Flash Erase** prior to downloading. Erasing the flash will remove all Persistent Store settings. Firmware upgrades from the CSR support website do not contain Persistent Store settings, so the current settings are preserved. Firmware dumps that you make contain Persistent Store settings, thus any existing settings will be overwritten if you flash again using an uploaded dump file. Flash erase should only be used in cases where there may be a problem with the existing Persistent Store and you wish to reload a known working version.

7 Other Applications

7.1 Device Firmware Upgrade (DFU)

Device Firmware Upgrade allows firmware to be upgraded over the same transport as the HCI (i.e., USB or UART). It is a USB standard and full details of its operation can be found at www.usb.org. BlueCore can tunnel the same protocol over the UART transport.

Allowing firmware upgrades can potentially initiate unwanted or accidental downloads (such as introducing a computer virus or by a user accidentally downloading firmware intended for another manufacturer's module). To protect against this, CSR offers digital signing for both original firmware and DFU upgrades. Only upgrade files with the same signature as the original firmware can be downloaded to flash memory.

Firmware and documentation updates for DFU are available on the CSR support website.

7.2 BlueLab Solo On-chip Software Development Kit

BlueCore can run upper stack layers and small applications on-chip. BlueLab Solo is an introduction to CSR's development tool and is a complete set of tools with programming examples. There is no charge for upper stack layers when run on chip. See the CD ROM incorporating BlueLab. Installation and additional documents are contained in this CD ROM.

7.3 Bluetooth for Windows Software

Bluetooth for Windows is provided on the CD ROM with your Casira kit. This software is a complete communication software solution for integrating Bluetooth wireless technology into a Windows operating system. It has all the necessary protocol and driver software to enable PC OEMs to bring wireless devices to market quickly and efficiently. It includes USB drivers, protocol stacks, Application Programming Interfaces (API), sample applications, support tools and documentation. It is designed to operate on any personal computer (desktop or notebook).

7.3.1 Features and Benefits

- Portability and flexibility
- Reduced development cost
- Powerful companion testing
- Interoperability
- Support and training

The Host software solution contains the following:

Bluetooth Specification compliant Windows protocol stack and profiles:

- Generic access profile
- Service discovery application profile
- Synchronisation profile
- Object push profile
- Dial-up network profile
- Serial port profile
- Headset profile
- Generic object exchange profile
- File transfer profile
- LAN access profile

Included with Bluetooth for Windows software:

- Support for Windows 98 SE, Millennium Edition (Me), 2000 and XP
- User Interface including Shell Extension, System Tray and Control Panel applications
- Extensive documentation that exposes and details Bluetooth wireless technology API
- Optional Test Spy test tool (trace, diagnostic and debug tools) to exercise the Host communication software
- Sample application programs demonstrating Bluetooth out of the box connectivity

7.4 TestEngine

TestEngine is a dynamically linked library (DLL) that allows programmers rapidly to develop a test application for use as either a bespoke bench test or a production test utility. It contains a large number of functions that allow access to CSR's built-in tests, Persistent Store read and write functions and simple HCI and Device Manager (DM) commands. The API is an extern 'C' interface with __stdcall calling convention. This means it can be called from a wide variety of programming languages such as 'C', 'C++', Visual Basic, Delphi and National Instruments™ LabView™.

TestEngine allows for rapid development of a test application, as only a few lines of code are required to initialise communication and call functions. This simple 'C' example shows how TestEngine can be used to communicate with a device and enable Bluetooth testmode. The full set of function descriptions are in the file TestEngine.h.

```
int main()
{
   char *transportDevice = "com1";
   // Set DMcommands to true for RFCOMM builds
   bool DMcommands = false;


   uint32 handle = init_prodtest(BCSP, transportDevice, 38400, DMcommands);
   if(handle)
   {
      if(DMcommands)
         do_dm_register_req(handle);

      do_slave(handle);
      do_enable_device_under_test_mode(handle);

      // Initialise Bluetooth tester HERE
      do
      {
         ::Sleep(100);

         // finished = state_of_bluetooth_tester();
      }while(!finished);

   }
   close_prodtest(handle);

   return 0;
}
```

7.5 TestFlash

TestFlash is a DLL that allows programmers rapidly to develop a BlueCore programming application. It contains functions that provide access to the SPI interface and allow firmware and Persistent Store write actions. The API is an extern 'C' interface with __stdcall calling convention. This means that it can be called from a wide variety of programming languages such as 'C', 'C++', Visual Basic, Delphi and National Instruments LabView. TestFlash supports a single SPI connection and the CSR gang programmer.

8 Technical Support

If you encounter difficulties using your Casira unit(s), send a detailed e-mail description of your issue and system set-up to your regional technical support group. Provide as much information as you can to help resolve your problem quickly.

When contacting technical support, please provide as much useful information as possible. Include the following details in your e-mail:

- Your full name (First and Last)
- Company name
- Company address
- Contact phone number
- Serial numbers for the Casira unit(s) with which you experience problems
- Software/firmware versions in use
- Description of hardware in use
- Where possible, provide specific details about your set-up. For example:
  - Windows platform in use
  - Version of firmware used on the modules
  - Any code or HCI commands used
  - Modes of use
  - Detailed description of issues

Ensure that you are using the latest version of firmware and BlueSuite from the CSR support website, www.csrsupport.com.

For Technical Support in North or South America, send e-mail to:TechsupportUS@csr.com.

For Technical Support in all other regions please mail Techsupport@csr.com.

As well as dedicated support addresses CSR also have industry standard NNTP newsgroups, go to http://www.csr.com/forum.htm for set up information.

9 Document References

Document:	Reference, Date:
Specification of the Bluetooth System	v1.1, 22 February 2001 and v1.2, 05 November 2003
BlueTest Instruction Manual	CSR reference AN047
BlueCore2 Class 2 Example Design	CSR reference BC2MOD2
BlueCore2 External Production Information Data Book	CSR reference BC212015LF-ds-001
RFCLI User Guide	CSR reference bcore-ug-003P

Acronyms and Definitions

BlueCore™	Group term for CSR's range of Bluetooth chips
BlueSuite™	Suite of development tools that contains all of the BlueCore utilities. BlueSuite includes BlueChat2, BlueFlash, PSTools, BlueTest and BTCLI
Bluetooth®	Set of technologies providing audio and data transfer over short-range radio connections
AC	Alternating Current
ACL	Asynchronous Connectionless (packet data transmitted over Bluetooth)
API	Application Programming Interface
BCCMD	BlueCore Command
BCSP	BlueCore Serial Protocol. A robust, channel based protocol
BT	Bluetooth
BTCLI	Bluetooth Command Line Interface. A command-line program for exercising and configuring CSR Bluetooth chips
BTW	Bluetooth for Windows®
Casira™	CSR's main Bluetooth development hardware
CSR	Cambridge Silicon Radio
DLL	Dynamically Linked Library
DFU	Device Firmware Upgrade
DM	Device Manager
ECP	Extended Capabilities Port
EPP	Enhanced Parallel Port
H4	Bluetooth serial protocol as described in section H4 of the Bluetooth specification (a simple packet-based protocol)
HCI	Host Controller Interface
LPT	Line Printer Terminal
NNTP	Network News Transmit Protocol
Persistent Store	Storage of BlueCore's configuration values in non-volatile memory
PS Key	Persistent Store Key
RFCOMM	Protocol layer providing serial port emulation over L2CAP; element of Bluetooth
ROM	Read Only Memory
SCO	Synchronous Connection Orientated. Continuous Stream data (e.g., voice) transmitted over Bluetooth, as opposed to ACL
SDK	Software Development Kit
SDP	Service Discovery Protocol; element of Bluetooth
SPI	Serial Peripheral Interface
TCL	Tool Command Language
UART	Universal Asynchronous Receiver Transmitter. A chip that turns parallel bus-based data into a signal that can run down just a few lines and back again.
USB	Universal Serial Bus
VM	Virtual Machine

Record of Changes

Date:	Revision	Reason for Change:
23 AUG 01	a	Original publication of this document (CSR reference: bc01-an-100a).
21 JAN 02	b	Revised and re-ordered document. Added information regarding installing BlueSuite CE software and USB drivers, BTCLI and Bluetooth for Windows (CSR reference: bc01-an-100b).
16 JUL 03	c	Updated: Casira is shipped with BlueCore2-External; added Microsoft XP operating system; added website registration instructions; corrected Access Levels, clarified Changing Transport Interface instructions; added RFCLI; added Test Engine and TestFlash to Other Applications section (CSR reference: bc01-an-100c).
30 MAR 04	d	Updated ActiveSync reference to v3.7.1. Added merge, dump and edit information in PS Tools User Interface.

Casira™ User Guide

bc01-an-100Pd

March 2004