Three methods to change firmware on KC Wirefree Bluetooth modules.

- **SPI Firmware Load (All modules, including Low Energy)**
  All modules can load a complete fresh firmware image using the SPI interface. This is a factory load, and will require a BT Address to be assigned after loading the image firmware. This method uses our own kcFwLoader.exe application, which is capable of loading Audio, Data, and Low Energy images. Also, it can easily assign a Bluetooth address.

- **USB Firmware Update (BlueAudio modules)**
  Our kcGateway and kcHeadset audio firmware editions are configured to use the USB port for device firmware updates (DFU). This method uses the DfuWizard.exe application from the BlueSuite toolkit.

- **UART Firmware Update (BlueData modules)**
  Our kcKeyboard and kcSerial data firmware editions are configured to use the UART port for device firmware updates (DFU). This method uses the DfuWizard.exe application from the BlueSuite toolkit.

**BlueSuite toolkit applications**

http://www.kcwirefree.com/docs/BlueSuite_2.6.2.zip

This CSR utility toolkit includes several utility applications for loading firmware, updating firmware, testing hardware, and accessing register settings in flash memory. Some applications need SPI access only, while others can operate in the DFU mode (using USB or UART as originally configured by KC Wirefree). It also includes a full set of device drivers for DFU mode operation and SPI devices.
SPI Firmware Load

DROP DOWN SELECTION boxes will select the Uart Port (optional), the Firmware Image, and the Spi Port to use.

The OPEN/CLOSE button opens and closes the selected Uart port.

The UART button opens a Uart dialog box to change baud and other terminal settings.

The SPI button performs a device reset using the SPI port. A quick method to determine if the SPI is properly configured and connected to the Bluetooth device.

The ATCMD button is a terminal command entry box. It will send the command string via Uart to the Bluetooth device.

The LOAD button starts a firmware image load.

The BTADDRESS box contains the Bluetooth Address to load following a successful image load. The first six digits are assigned to KC Wirefree, and the second six digits are uniquely assigned to each Bluetooth device.

SPI Adapter

This CSR USB-SPI adapter is available from Digikey, Arrow, and Future Electronics. It device operates at 3.0V signal levels. If you experience any connectivity problems, you may need to substitute the 3.0V LDO regulator for a 3.3V LDO regulator. This 3.3V regulator fits: AP2112K-3.3TRG1.

Part Number: DK-USB-SPI-10225-1A  Cost: Under $15

Simple connections from SPI to module:  CLK <-> CLK, CSB <-> CSB, MOSI <-> MOSI, MISO <-> MISO, GND.
Power module separately or from SPI Adapter. Module needs ENABLE pin held HIGH during programming.
USB Firmware Upgrade (Typically kcAudio firmware)

SETUP

1. Install BlueSuite tools.
2. Run \BlueSuite 2.6.2\drivers\win64\DPInst.exe to install USB SPI device driver.
3. Power up Demo board or module (USB/Recharge is not plugged in yet).
4. Enter DFU mode. Firmware editions may vary, but typically issue AT Dfu command via Terminal program using the Uart interface to the module. Alternatively, hold PIO 2 HIGH during power up (cannot be charging).
5. Connect USB cable from PC to Demo board or module. D+, D−, and GND.
6. Verify that the Demo board or module is recognized in Device Manager. If the new USB device is not recognized, see the manual device driver installation instructions at the end of this document.

LOAD

7. Launch DFUWizard.exe firmware upgrade program.
8. Select USB transport option.
9. Find KC Wirefree DFU file (such as kcSerial_v3.0.070_KC21.dfu).
10. Start DFU procedure.
11. Reset
UART Firmware Upgrade (Typically kcSerial firmware)

SETUP

1. Install BlueSuite tools.
2. Connect all 4 UART module pins to a PC COM port, typically using a USB-UART adapter.
   Note: if connecting directly to a PC Serial COM port, you will need a TTL voltage level shifter.
   (Flow control pins may not be necessary).
3. Power up module, and open COM port using a terminal application to communicate with module UART.
4. Issue AT HciMode command. Module will Reboot and output ?@A?@A?@A ... or similar.
   Note: UART settings for HCI/DFU mode change to 115200-7-E-1.
5. Close COM port in terminal application.

LOAD

7. Select COM port transport option.
8. Select COM port number.
9. Find KC Wirefree DFU file (such as kcSerial_v3.0.070_KC21.dfu).
10. Start DFU procedure.
11. Reset
Device Firmware Upgrade Wizard

1) **LAUNCH** DFUWizard.exe

2) **SELECT** USB or COM port.

3) **SELECT** A download option.
4) **FIND** Firmware upgrade image file.

5) **NEXT**

6) **UPGRADING**
7) VERIFICATION

The firmware upgrade process is in progress. Please wait while the upgrade is completed.

Upgrade procedure:
- Downloading firmware to device
- Processing - 81 seconds

When the process is complete, the device will automatically boot and perform an upgrade.

8) SUCCESS!

The firmware upgrade was successful.

The firmware of your device has been upgraded using the firmware version 5.0.17. The new version appears to be operating correctly.

Successful Upgrade
- Time taken: 02 minutes 24 seconds
- Total time: 02 minutes 39 seconds

The previous version of firmware is described as: 5.0.17_20170105_0555_2200

The device will automatically boot and perform the upgrade.
USB Manual Driver Installation

1) SELECT Browse my computer for driver software.

2) SELECT Let me pick from a list of device drivers...

3) SELECT Have Disk.

4) FIND \CSR\BlueSuite 2.4\drivers\win64\CSRBlueCoreUSB.inf

5) SELECT CSR BlueCore Bluetooth driver.
6) **SUCCESS!**

![Image of a Windows update successful message]

Windows has successfully updated your driver software.

7) **VERIFY** Device Manager recognizes CSR BlueCore Bluetooth, or CSR BlueCore Device in DFU mode when it is in DFU mode, and is located in the Universal Serial Bus controllers section. BlueSuite can access the BlueCore device displayed here.

![Image of Device Manager]

8) **NOTE** If using the **CSR Bluetooth Device** driver, the device is displayed in the Bluetooth USB section, and is usable as a standard Bluetooth dongle device by the system, but cannot be used with the BlueSuite application tools.
BlueSuite Tools Overview

Applications: BlueFlash.exe, BlueTest3.exe, DFUWizard.exe, PSTools.exe
BlueFlash

BlueFlash loads binary firmware image files (*.xuv) using the SPI interface.
PSTools

PSTools provides direct access to firmware configuration registers within the flash memory. Please contact KC Wirefree for specific register details if access is necessary. PSTools can access the module using the USB (audio modules) or UART (data modules) interface, when the device is in DFU/HCI mode.

Using USB mode:

Using UART mode:

Accessing flash memory configuration registers (Read, Set, Delete, Close):
User configuration registers are here:

![User Configuration Registers](image)

Keys PSKEY_USR0 to PSKEY_USR49 are for use by host and on-chip application specific code to allocate as it chooses.

PSKEY_USR50 to PSKEY_USR99 may only be changed by DPU by placing them in the application protected section of the file and signing them with the application private key. These PS keys are never included in DPU files uploaded from a BlueCore. This makes them suitable for storing module specific or sensitive information, and keys in the range PSKEY_USR25 to PSKEY_USR49 if such protection is not required.

**Host Device**

```
0174 01F4 03F4 0074 01F8 0082 004A 004A 0001 0044 0074 006
```
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