

In order to program the SPIFI flash, the flashloader has to be placed in to the RAM and execute from there.

The entire procedure can be described as follows:

1. Put the device into ISP mode
2. Synchronize USART ISP interface
3. Write the content of flashloader.bin to SRAMX (0x0000_0000)
4. Use Go command to start the execution of the flashloader
5. Communicate with the flashloader using blhost

For step 2-4, please refer to the attached archive, which contains a simple python script to download and execute the flashloader using the ISP commands. **Please also note this script is for reference only and comes without warranty, thus should not be used in production.**

In order to use the script, the following steps should be performed:

1. Extract the contents of the archive to a directory
2. Prepare Python3 environment
3. Open a command line window, navigate to the extracted directory, and execute: `pip install -r requirements.txt`
4. Connect the board's ISP UART to the computer and put the device into ISP mode
5. Modify the connection parameters located in `pyisp.py`, such as port and baud rate (see below).
6. In the same directory, execute: `python pyisp.py`

Parameter settings:

```
4 # Parameters, modify as needed.
5 SERIAL_NAME = 'COM3B' # ISP port name
6 SERIAL_BAUD = 115200 # ISP baud rate
7 BL_BASE_ADDR = 0 # Memory address to be written to
8 BL_READ_SIZE = 1024 # Number of bytes to be send to device in a single write command
9 BL_FILE_NAME = 'Flashloader.bin' # Flashloader to be downloaded to RAM
```

If everything has been set up correctly, the following output can be observed in the commandline window:

```
ISP start:
Write synchronization word...
ISP mode synchronized
Part ID: 0x01fd4018
Device is LPC54018JxM
Write 1024 bytes to 0x00000000...
Write 1024 bytes to 0x00000400...
Write 1024 bytes to 0x00000800...
Write 1024 bytes to 0x00000c00...
Write 1024 bytes to 0x00001000...
Write 1024 bytes to 0x00001400...
Write 1024 bytes to 0x00001800...
Write 1024 bytes to 0x00001c00...
Write 1024 bytes to 0x00002000...
Write 1024 bytes to 0x00002400...
Write 1024 bytes to 0x00002800...
Write 1024 bytes to 0x00002c00...
Write 1024 bytes to 0x00003000...
Write 1024 bytes to 0x00003400...
Write 1024 bytes to 0x00003800...
Write 1024 bytes to 0x00003c00...
Write 1024 bytes to 0x00004000...
Write 1024 bytes to 0x00004400...
Write 1024 bytes to 0x00004800...
Write 1024 bytes to 0x00004c00...
Write 1024 bytes to 0x00005000...
Write 1024 bytes to 0x00005400...
Write 1024 bytes to 0x00005800...
Write 1024 bytes to 0x00005c00...
Write 1024 bytes to 0x00006000...
Write 1024 bytes to 0x00006400...
Write 1024 bytes to 0x00006800...
Write 1024 bytes to 0x00006c00...
Write 1024 bytes to 0x00007000...
Write 1024 bytes to 0x00007400...
Write 1024 bytes to 0x00007800...
Write 448 bytes to 0x00007c00...
Write RAM done, total size: 32184
Boot command issued, now use blhost with the same UART port.
```

The flashloader should be running by now, and with blhost, we can communicate with the flashloader.

The source code of the flashloader can be obtained from SDK `bootloader_examples/flashloader`

Please refer to "Getting Started with LPC540xx/LPC54S0xx Flashloader User's Guide" for further configuration of the SPIFI flash. Note the connection mode should be UART instead of USB:

```
$ blhost -p COM38 -- list-memory
Ping responded in 1 attempt(s)
Inject command 'list-memory'
Internal Flash:
  No Internal Flash available
Internal RAM:
  Region 0: 0x00000000 - 0x0002ffff; Total size: 192 KB
  Region 1: 0x20000000 - 0x2000ffff; Total size: 64 KB
  Region 2: 0x20010000 - 0x20017fff; Total size: 32 KB
  Region 3: 0x20018000 - 0x2001ffff; Total size: 32 KB
  Region 4: 0x20020000 - 0x20027fff; Total size: 32 KB

$ blhost -p COM38 -- get-property 12
Ping responded in 1 attempt(s)
Inject command 'get-property'
Response status = 0 (0x0) Success.
Response word 1 = 0 (0x0)
Response word 2 = 0 (0x0)
Response word 3 = 536870912 (0x20000000)
Response word 4 = 536916659 (0x2000b2b3)
Reserved Regions =
  Region0: 0x20000000-0x2000b2b3 (44.676 KB)
```

The SPIFI configuration word should be placed outside of the reserved region:

```
$ blhost -p COM38 -- fill-memory 0x2000C000 4 0xC0000004
Ping responded in 1 attempt(s)
Inject command 'fill-memory'
Successful generic response to command 'fill-memory'
Response status = 0 (0x0) Success.
```

```
$ blhost -p COM38 -- configure-memory 0xa 0x2000C000
Ping responded in 1 attempt(s)
Inject command 'configure-memory'
Successful generic response to command 'configure-memory'
Response status = 0 (0x0) Success.
```

```
$ blhost -p COM38 -- get-property 25 0xa
Ping responded in 1 attempt(s)
Inject command 'get-property'
Response status = 0 (0x0) Success.
Response word 1 = 15 (0xF)
Response word 2 = 268435456 (0x10000000)
Response word 3 = 4896 (0x1000)
Response word 4 = 256 (0x100)
Response word 5 = 4896 (0x1000)
Response word 6 = 0 (0x0)
(Unknown) Attributes: Start Address = 0x10000000 Total Size = 4 MB Page Size = 256 bytes Sector Size = 4 MB
```

Then the user should be able to erase or program the external flash memory:

```
$ blhost -p COM38 -t 100000 -- flash-erase-region 0x10000000 0x100000
Ping responded in 1 attempt(s)
Inject command 'flash-erase-region'
Successful generic response to command 'flash-erase-region'
Response status = 0 (0x0) Success.
```

Please feel free to contact me if anything unclear about the tool or the ISP procedure.