Introduction:

This note addresses an issue where a user wants to do OTA updates to 2 separate regions of memory that are not juxtaposed. In particular, the user needs to update a program running in Flash and a data structure residing in QSPI.

MCUboot is used to handle image verification and swapping/reverting images. MCUboot treats an image as contiguous from its start address to length. Since the program is at 0x00000000 and the data structure starts at 0x60000000 that’s over 4 gigs! There is currently no provision for this in FSP.

The solution proposed here is to split the application image into two separate binaries and call boot\_go(&fap) twice before vectoring to the application. The original const **flash\_map[]** structure is replaced with a ram-based structure, and a function is defined to fill it. First, with the flash map for the application and then with the flash map for the “resource” ie. the data structure.

Samples of applications are created that link the data structure in the code. Therefore, the linked image has both the application, down in the 0x000000ish area, and the data structure mapped at 0x60000000 region. Post build batch files use srec\_cat to split the image into its application (ap) and resources (rs) components. Then each is signed or encrypted/signed and the two are concatenated for 1 upload image with a size of ap\_size and rs\_size.



Procedure:

Required equipment:

* EK-RA6M4 (or EK-RA4M3 and ad-lib filenames)
* A PMOD UART/USB (or suffer with the virtual console)

A blue circuit board with black and white chips

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* Collateral here: <https://github.com/daledrinkard/mcuboot_ms>
* srec\_cat utilities: <https://srecord.sourceforge.net/>
* jlink utilities: <https://www.segger.com/downloads/jlink/>
* Have python installed and setup according to the MCUboot ap note.
* FSP 5.8 e2 2025-01

System checkout:

From the Collateral site, select the e2\_projects/bootcamp.zip and import the following projects:

[IMAGE]

From scratch:

This section explains how to create the multiple section boot support beginning with the example project [bla bla bla].

Tools:

load.bat loads things into Flash and QSPI using Jlink. The first argument specifies what type of image: b=bootable s=signed e=encrypted and r=srec

* load b|s|e|r binary|srec project [address]
  + **load s ap RA6\_primary\_L 0x30000** : loads the ap.bin.signed image from the RA6\_primary\_L project to the MCU Flash at address 0x30000
  + **load r x2RA6\_boot x2RA6\_boot** : loads the x2RA6\_boot.srec (the boot loader for encrypted images) file. Address is not needed.
  + **load e RA6\_update\_L RA6\_update\_L 0x60800000** : loads the encrypted combined image into QSPI at 0x6080000 (the update image area)

Download the collateral. Open e2studio and choose Rename and import existing project into workspace.

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Navigate to the mcuboot\_ms/lab/lab\_resources folder and select the **MCUboot\_Encryption\_QSPI\_Solution.zip** archive. Name the project RA6\_boot and select the ra\_mcuboot\_ra6m4\_swap\_enc\_qspi project.

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Import RA6\_boot\_scripts and tools projects from **mcuboot\_ms/e2\_projects/mcuboot\_ms\_x1\_042425.zip**

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Right-click on the RA6\_boot project that was imported and open a command prompt.

Enter srec\_cat -version and verify it is installed and the path is correct

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Type jlink --version and verify it is installed,

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Type python --version

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Connect the EK debug cable. Right-click on the tools project and select System Explorer

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Double-click on the erase\_qspi\_all.bat to run it.

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This will take more than 2 minutes to complete and will erase the entire contents of the QSPI. ^C to break or press the spacebar to continue. If you’re not sure the QSPI is erased press the spacebar to erase it.

A progress dialog will pop up if all is working correctly.

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Modify RA6\_boot.

Remove encryption by changing the Encryption scheme in the MCUboot properties.

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Change the debugger output for MCUboot by edting the properties of the MCUboot logging module.

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Logging calls printf. Implement printf.

There are 2 choices for implementing printf: virtual console or SCI. The virtual console does not require any additional hardware but is limited in function and ONLY works while debugging. SCI9 printf is much preferred and works whether in debug or not.

If using virtual debugger:

* Set the linker misc other linker flags to **--specs=rdimon.specsA screenshot of a computer

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* Add this declaration in hal\_entry.c: **extern void initialise\_monitor\_handles(void);**
* Call initialise\_monitor\_handles(); at the top of hal\_entry(void) function.
* Add printf(“hal\_entry\n”); after the initialize as a test.

If using a pmod adapter and SCI 9:

* In the pin configurations tab, change the DEBUG0 pinning to this: A screenshot of a computer

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* In the pin configurations tab, change SCI9 to this: A screenshot of a computer

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* Copy mcuboot\_ms/lab/lab\_resources/printf\_redirect folder to the RA6\_boot/src folder
* Add a SCI\_uart module and configure it like this: A screenshot of a computer

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* Set the linker misc option to --specs=nosys.specs: A screenshot of a computer

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* Remove call to initialise\_monitor\_handles if virtual console was used previously.

Import the tools and RA6\_boot\_scripts projects from the archive mcuboot\_ms\e2\_projects\mcuboot\_ms\_x1\_042425.zip

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