



## Zephyr Memory Map Addendum for MCUXpresso IDE Lab

Rev1.1, August 17, 2022

### Objectives

In this lab, you will learn

- How to configure the MCUXpresso IDE project memory map to match the Zephyr application

### Introduction

When using MCUXpresso IDE to download and debug a Zephyr application, some IDE projects may require the memory map to be modified to match the Zephyr application. One example where this step is required is when using a device with Cortex-M33 core, and has separate memory maps for Secure and Non-Secure code. For example, a Zephyr application built for the MIMXRT595-EVK board will default to using the Secure flash memory base at address 0x1800\_0000. But a default project created in MCUXpresso IDE will instead be setup for the Non-Secure flash base address of 0x0800\_0000. Other MCUs with a Cortex-M33 core that may require this step include the LPC55xx family and the i.MX RT600.

For some debug probes, the memory map in the IDE project needs to be changed to enable the same flash memory map. JLink probes do not require this. LinkServer (CMSIS-DAP) probes may require this change.

### Pre-Requisites

Follow the lab guide [Zephyr\\_MCUXpresso\\_IDE\\_Debug\\_Lab.pdf](#) to create a Debug project and Debug Configuration for MCUXpresso IDE.

- Download the latest [MCUXpresso IDE](#), v11.6.0 or later required for some Zephyr OS features

### Hardware Requirements

This lab guide uses the i.MX RT500 MCU as an example when this memory map change is required. The hardware used in this lab includes:

- MIMXRT595-EVK
- Micro-USB cable
- A LinkServer (CMSIS-DAP) debug probe. This can be the on-board debugger of the EVK with CMSIS-DAP firmware. Or other boards can be debugged with NXP's [MCU-LINK](#).



## Running the lab

### Build the Zephyr application

Follow the steps in Zephyr\_MCUXpresso\_IDE\_Debug\_Lab.pdf to build a Zephyr application. But instead, use the West command below to build for the MIMXRT595-EVK board:

1. In the command window, build the synchronization sample application using west. NOTE: when pasting this line into the command window, be sure to get both lines below as a single command. You may need to paste the 2<sup>nd</sup> line separately to the end of the 1<sup>st</sup> line for the full command:  
**west build -b mimxrt595\_evk\_cm33 -d ..\build-RT500 samples\synchronization --pristine -- -DCONFIG\_DEBUG\_THREAD\_INFO=y -DCONFIG\_INIT\_STACKS=y**

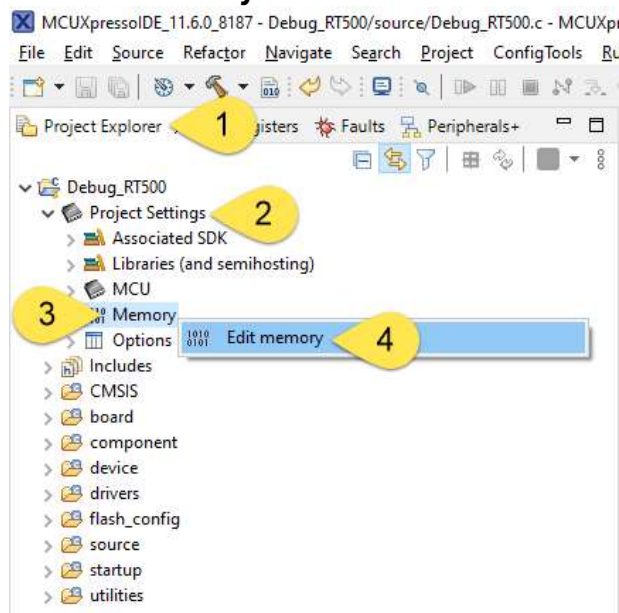
### Create a Debug project for MCUXpresso IDE

Follow the steps in Zephyr\_MCUXpresso\_IDE\_Debug\_Lab.pdf to create a Debug project. But instead, use the key differences below to work with the MIMXRT595-EVK board:

- When installing the SDK plugin, select the board **evkmimxrt595**
- When creating the new project for the IDE, select the board **evkmimxrt595**

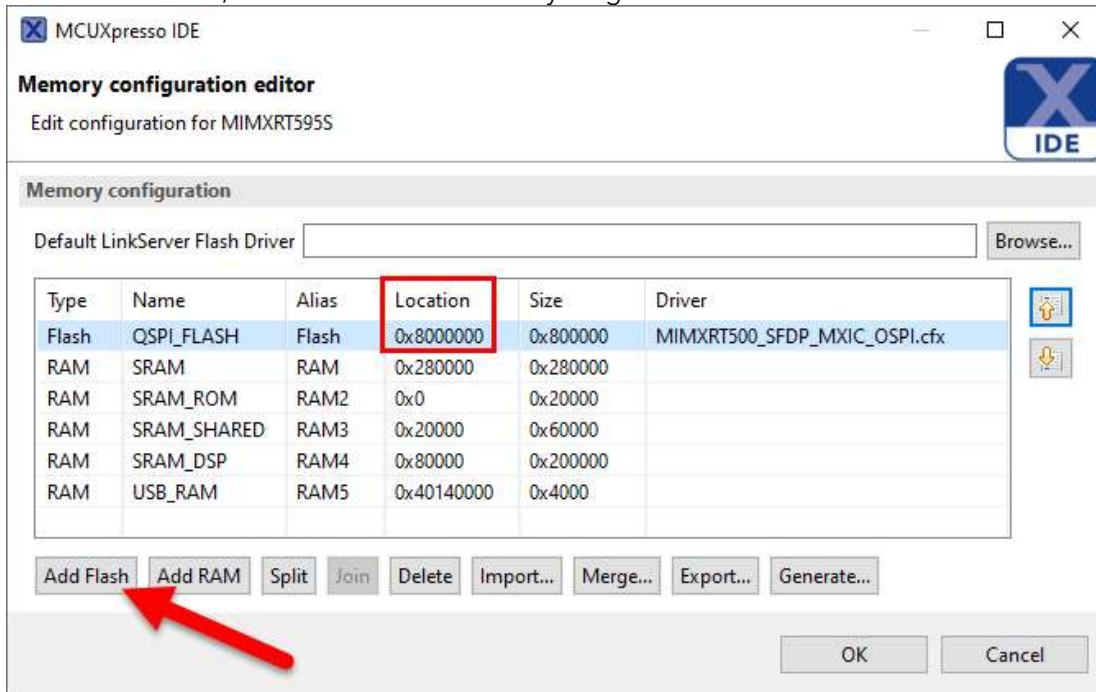
### Modify the IDE project memory map

2. Edit the project Memory Map:
  - a. in the **Project Explorer View**
  - b. under the project name (Debug\_RT500), **expand the Project Settings**
  - c. Right-click on **Memory**
  - d. Select **Edit memory**

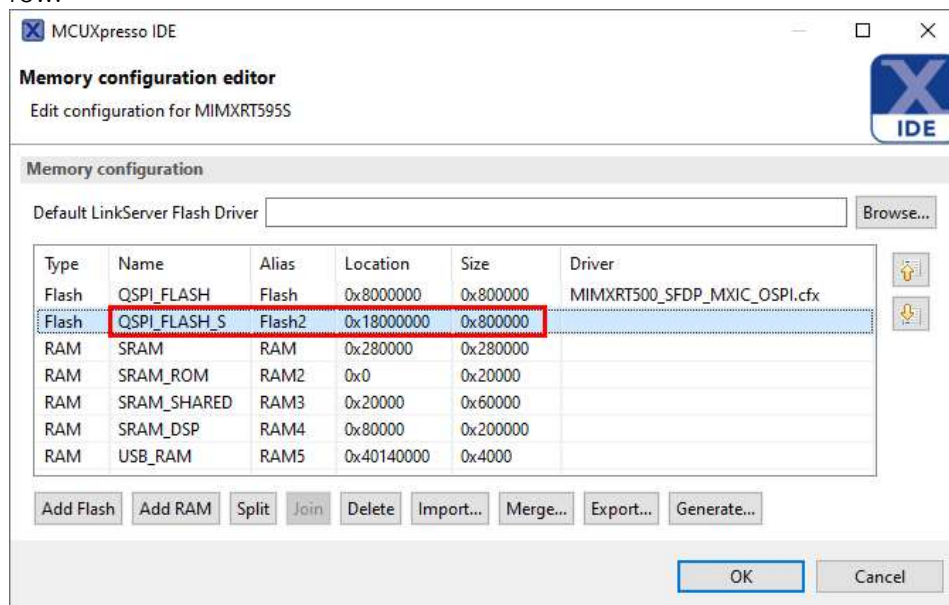




3. Notice the base address for the flash is using the Non-Secure address of 0x0800\_0000. Click the button **Add Flash**, to add the Secure memory range

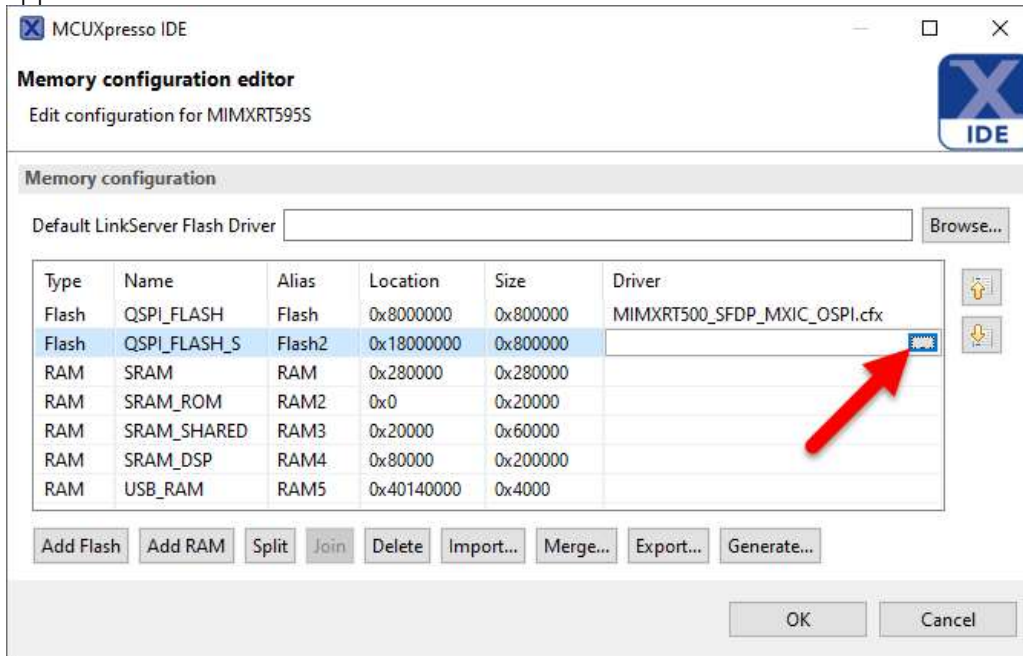


4. In the new flash row added, make these changes:
  - a. Give the flash region a name for your application, shown here as **QSPI\_FLASH\_S**
  - b. Set location to the Secure flash base address **0x18000000**. This location is specific to the MCU. Refer to the MCU's Reference Manual or User Manual for the memory map details.
  - c. Set the size to **0x800000**. This size is specific to the flash, and is copied from the original flash row.

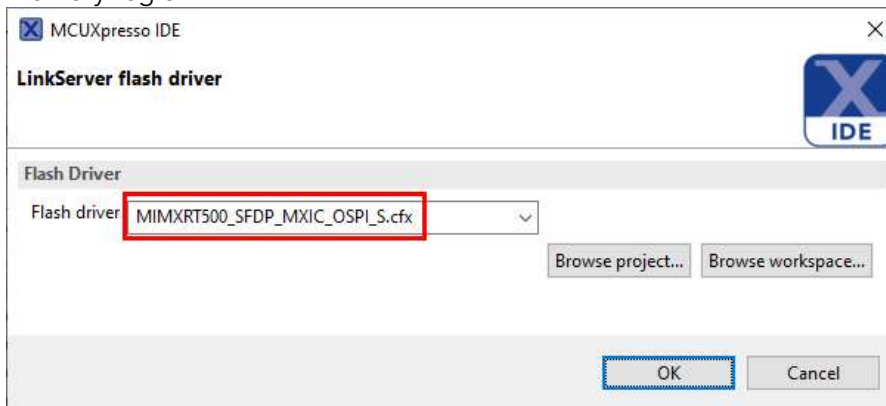




5. The flash driver also needs to be added. Click in the driver field, and then the Browse button will appear. Click this **Browse button** to edit

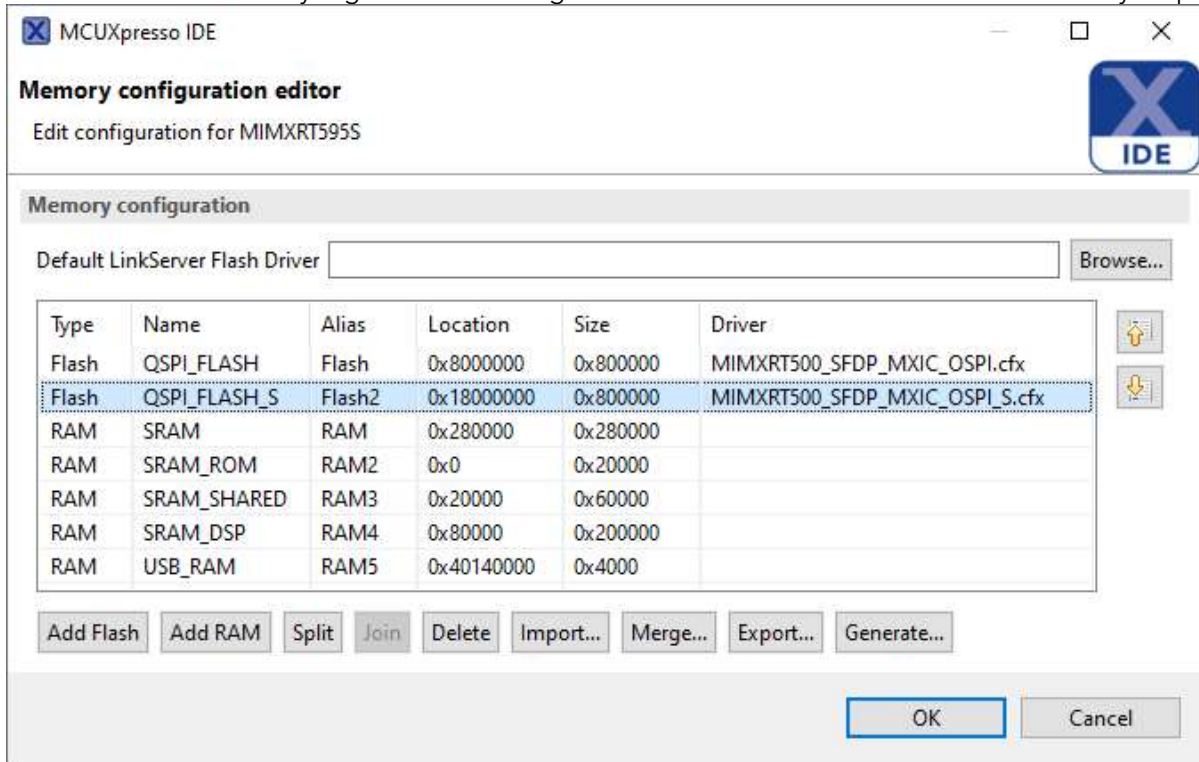


6. Paste the driver name **MIMXRT500\_SFDP\_MXIC\_OSPI\_S.cfx**, and click OK. It is very important here to include the "\_S" at the end of the filename. This tells the IDE to use a different Secure driver for this memory region.





7. The Secure flash memory region is now configured. Click the OK button to save this memory map.

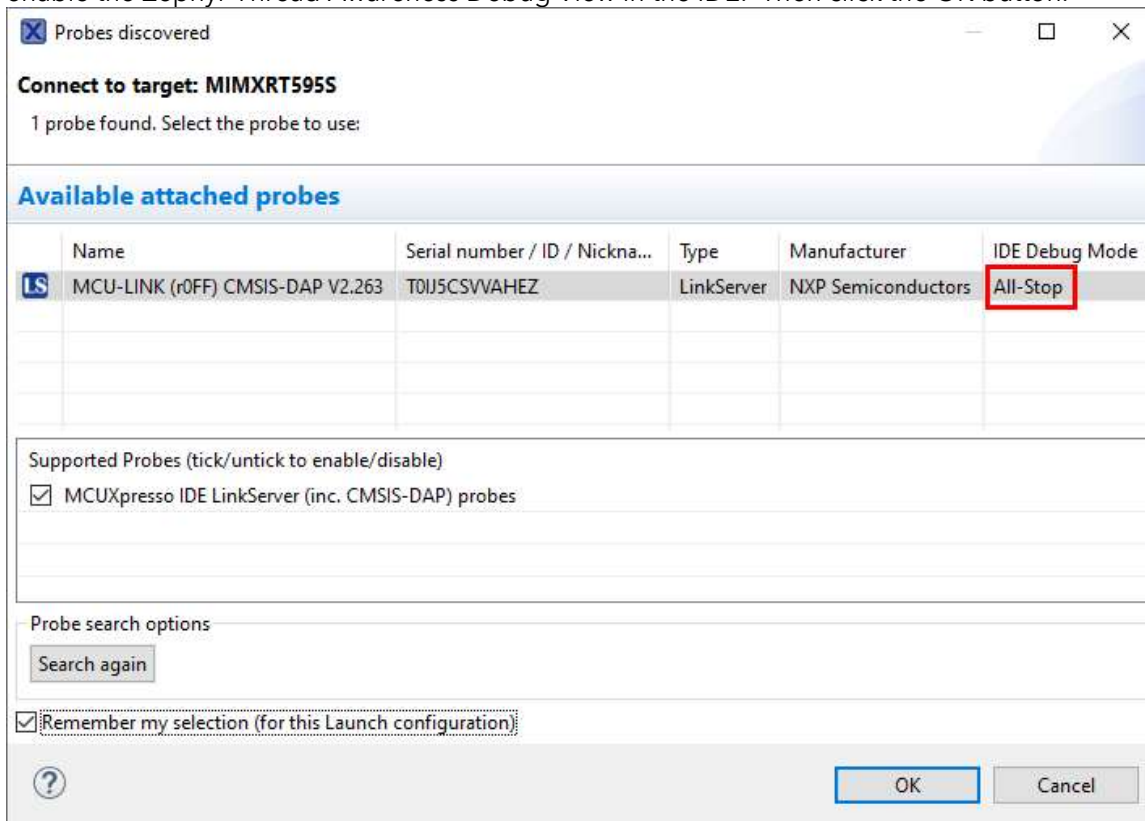


## Create a Debug Configuration

Follow the steps in [Zephyr\\_MCUXpresso\\_IDE\\_Debug\\_Lab.pdf](#) to create a Debug Configuration. But the step below is specific to using LinkServer (CMSIS-DAP) debug probes. This example shows the MCU-LINK debug probe from NXP. For other probes supported in MCUXpresso IDE, refer to the document installed with the IDE at `\MCUXpressoIDE_11.6.0_8187\MCUXpresso_IDE_ZephyrRTOS_Debug_Guide.pdf`.



- When the LinkServer probe is detected, change the IDE Debug Mode to **All-Stop**. This is needed to enable the Zephyr Thread Awareness Debug View in the IDE. Then click the OK button.



This completes this lab.

#### Revision History

Rev	Date	Details
1.0	8/15/2022	Initial Version
1.1	8/17/2022	Updated screenshots for Debug_RT500 Debug project