ModusToolbox™

WICED Execute-in-Place (XIP) Application Support Guide

Document Number. 002-22870 Rev. *C

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Contents

About This Document

This document explains how to use the Execute In-Place (XIP) feature on Cypress WICED Bluetooth platforms.

Purpose and Audience

This document is intended for application developers creating and testing designs based on Cypress Bluetooth Software Development Kit (BTSDK) for platforms that support the XIP feature.

Scope

The scope of this document is to provide information to the developers, so that they can use the XIP feature on WICED Bluetooth platforms.

Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use.

For a comprehensive list of acronyms and other terms used in Cypress documents, go to www.cypress.com/glossary.

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1 Introduction

The Execute-in-Place (XIP) feature allows you to enable applications to run in-place from either on-chip flash (OCF) or external flash in Cypress WICED Bluetooth devices that support the XIP feature. Platforms based on the CYW208xx or CYW89820 devices use XIP; others do not.

1.1 Features Overview

The XIP feature implements support for building an application to run in-place from OCF. This feature is helpful for applications with large code size and limited SRAM constraints. By placing the application and the profile library code in flash, the application can save SRAM space. The *.text* section and *.rodata* section from the application and the profile libraries execute from flash. The remaining sections are loaded to SRAM. Patches will be executed from the patch RAM.

The flash start address to place the XIP section is calculated by adding `CY_CORE_APP_SPECIFIC_DS_LEN` (default set in *<TARGET>.mk*) to `ConfigDSLocation`, from the platform *btp* file found in the platform folder *wiced_btsdk/dev-kit/baselib/<device>/platforms*. Currently, the `CY_CORE_APP_SPECIFIC_DS_LEN` value is set to a minimal offset of 0x80 (128) bytes. This allows just enough room for some required early DS configuration records. It is not recommended to modify this. The XIP itself occupies a special DS configuration record and is part of the DS Section as shown in Figure 2-1. Other DS configuration records follow the XIP record to make up the rest of the DS section.

Executing the code from flash will impact the speed and power. Therefore, do not place time critical functionality (such as interrupt service routines) in the XIP section. A named section attribute has been defined for this in the baselib header files:

```
#define PLACE_TEXT_IN_RAM __attribute__((section(".text_in_ram")))
```

Place the part of the application code ram using the section attribute as below:

```
PLACE_TEXT_IN_RAM void foobar(void)
{
0
}
```

2 Flash Layout and Compilation Command

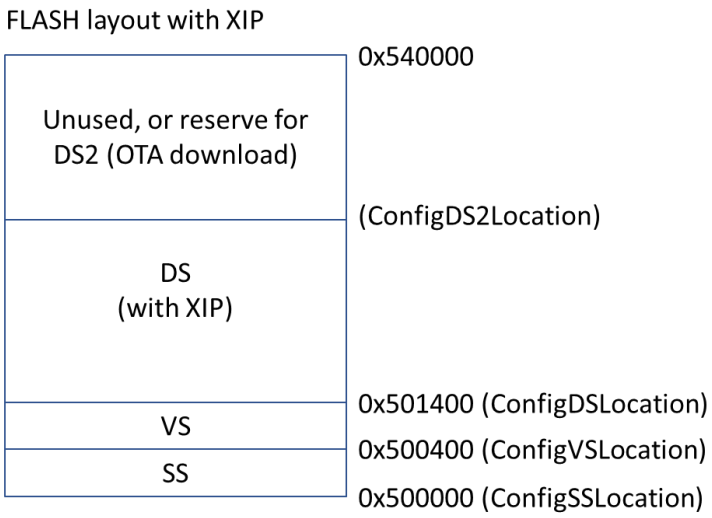

Figure 2-1. Typical 208XX Flash Layout with XIP Image

In the flash layout with XIP image:

- SS = Static Section, where `BD_ADDR` and location of other sections are stored
- VS = Volatile Section, where Link keys and app NV data are stored
- DS/DS2 = Dynamic Section, where patches, configuration, and application code are stored. There are two sections to support fail-safe OTA upgrades.

Document Revision History

Document Title: WICED Execute-in-Place (XIP) Application Support Guide

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Revision	ECN	Issue Date	Description of Change
**	6488609	02/19/2019	Initial release
*A	6556127	04/24/2019	Removed Associated Part Family Updated for BT SDK release
*B	6700917	10/16/2019	Updated path and filename references for ModusToolbox 2.0
*C	6792083	01/29/2020	XIP is now embedded in DS record structure.

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