



**ModusToolbox™**



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

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# Contents

<b>About This Document.....</b>	<b>3</b>
Purpose and Audience .....	3
Scope .....	3
Acronyms and Abbreviations .....	3
IoT Resources and Technical Support .....	3
<b>1 Introduction.....</b>	<b>4</b>
1.1 Features Overview .....	4
<b>2 Flash Layout and Compilation Command .....</b>	<b>5</b>
<b>Document Revision History .....</b>	<b>6</b>

## 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.

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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. If a device supports the XIP feature, there will be an entry in the platform *readme* file discussing the 'APP\_XIP' feature. The platform *readme* file can be found under the `<ModusToolbox_install>\libraries\<SDK name-X.X>\components\BT-SDK\<DEVICE_name>\Bluetooth\platforms\` folder.

## 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. The patches will be executed from patch RAM.

The flash start address to place the XIP section is calculated by adding PLATFORM\_APP\_SPECIFIC\_DS\_LEN (default set in *mainapp.mk*) to ConfigDSLocation, from the platform *bt* file found in the *platform* folder.

You can modify the XIP section length (PLATFORM\_APP\_SPECIFIC\_XIP\_LEN) by updating the platform makefile if the section size requirement is more than the default. If a larger section size is required, the compilation will fail with the following error message:

```
"region `xip_section' overflowed by xxxx bytes"
```

This error message indicates by how much the default length should be increased.

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. Place the part of the application code in the .text section using the section attribute as below:

```
__attribute__((section(".text"))) void foobar(void)
{
    0
}
```

## 2 Flash Layout and Compilation Command

FLASH layout with XIP

Unused, or reserve for DS2 (OTA download)	0x540000
XIP	ConfigDS2Location)
DS	0x501400 + PLATFORM_APP_SPECIFIC_DS_LEN
VS	0x501400 (ConfigDSLocation)
SS	0x500400 (ConfigVSLocation)
	0x500000 (ConfigSSLocation)

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, app NV data are stored
- DS/DS2 = Dynamic Section, where patches, configuration, and application code are stored. There are two sections, so that you can ping and pong for OTA upgrade
- APP XIP = XIP Section, where the application code intended to run from OCF

## Document Revision History

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Revision	ECN	Issue Date	Description of Change
**	6488609	02/19/2018	Initial release
*A	6556127	04/24/2019	Removed Associated Part Family Updated for BT SDK release

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