使用空中编程工具为 KW45B41Z/K32W148 创建固件更新映像

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应用笔记

文档信息

信息	内容
关键词	AN13860, OTAP, KW45B41Z, 固件更新映像
摘要	本应用笔记介绍了在 KW45/K32W1 评估套件板上创建和升级映像的步骤



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1 介绍

本文档介绍了在 KW45/K32W1 评估套件 (EVK) 板上创建和升级映像的步骤。

该示例可以使用两个应用运行:

- OTAP 客户端-嵌入式应用
- 空中编程 PC 端应用

OTAP 客户端-嵌入式应用有两个版本:ATT 版本和 L2CAP 版本。每个版本使用不同的传输方法。

OTAP 客户端是一个 GAP 外设,它发布低功耗蓝牙(Bluetooth LE)OTAP 服务,并等待来自 OTAP 服务器的 连接。在与 OTAP 服务器连接后,OTAP 客户端等待其写入 OTAP 控制点 CCCD,然后开始通过 ATT 指示发送 命令。

该示例应用默认使用外部存储。只有当内部闪存中有足够的空间用于升级映像时,内部存储才可用。在这种情况下,闪存的大小必须至少是最大应用程序的两倍。

2 前提条件

要创建一个映像进行升级,需要以下前提条件:

- MCUXpresso IDE v11.6.0 或更新的版本,或面向 Arm 的 IAR EW,其可以从 MCUXpresso-IDE 下载
- 空中编程工具 1.0.4.1 或更新的版本,其可以从空中编程下载
- KW45B41Z/K32W148 电路板
- 一部安装了恩智浦物联网工具箱应用(IoT toolbox NXP app)的智能手机, 支持安卓和 iOS 系统

3 使用 IAR 进行软件设置

请按照以下步骤来配置软件:

- 1. 要使用外部存储,必须做一些更改。需要在源文件和工具链的链接器选项中设置几个配置选项:
 - a. 在 app_preinclude.h 中,确保 gAppOtaExternalStorage_c 设置为"1"。
 - b. IAR EW IDE 的 OTAP 演示应用在链接器选项中的设置如图1所示。

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2. 要使用内部存储,需要在链接器配置中设置 gUseInternalStorageLink_d=1 符号,并将 gAppOtaExternalStorage_的值设置为 "0"。

注意:

gEraseNVMLink_d=1 链接器标志位将一些虚拟字节放置在 NVM 区域,以使数据无效,并强制应用擦除整个 NVM 区域。当生成 OTA 升级的映像时,这个标志位以及 gUseNvmLink_d 标志位都应该设置为 "0"。这样, 可以减少传输映像的大小并降低功耗。如果升级完成后需要擦除 NVM 区域,则必须使用擦除扇区位图将 NVM 扇区标记为可擦除。

3.1 OTAP 映像格式文件

Bluetooth LE OTAP 映像文件采用二进制文件格式。它由一个文件头和若干个子元素组成。文件头描述了文件的 一般信息。文件中有一些预定义的子元素,而终端制造商可以添加制造商特定的子元素。文件头中不包含子元素 的详细信息,但每个部分的类型都有描述。

要使 IAR Embedded Workbench 能够为嵌入式应用创建一个 SREC 和 BIN 文件,步骤如下:

- 1. 打开目标属性。
- 2. 转到输出转换器 (Output Converter) 选项卡。
- 3. 激活生成额外输出 (Generate additional output) 复选框。
- 4. 从输出格式 (Output format) 下拉菜单中选择摩托罗拉或原始二进制 (Motorola or Raw Binary) 选项。

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0	Options for node "otap_client_att_	_bm"	×	
	Category: General Options Static Analysis Runtime Checking	drud	Factory Settings	
	C/C++ Compiler U Assembler Output Converter Custom Build Build Actions Linker Debugger Simulator CADI CMSIS DAP GDB Server I-jet J-Link/J-Trace TI Stellaris Nu-Link PE micro ST-LINK Third-Party Driver TI MSP-FET TI XDS	Generate additional output Output format: Motorola S-records Output file Override default otap_client_att_bm.srec		
c	Dptions for node "otap_client_att,	_bm"	OK Cancel	
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	C/C++ Compiler Assembler Output Converter Custom Build Build Actions Linker Debugger Simulator CADI CMSIS DAP GDB Server I-jet J-Link/J-Trace TI Stellaris Nu-Link PE micro ST-LINK Third-Party Driver TI MSP-FET TI XDS	Generate additional output Output format: Raw binary Output file Output file Override default otap_client_att_bm.bin		
-			OK Cancel	
图 2. 新映像的输出格式				

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使用 MCUXpresso 进行软件设置 4

要为应用程序创建映像,必须在工作区中部署**二进制(Binaries)**图标。在.axf 文件上单击鼠标右键,然后选择 二进制工具 (Binary Utilities) > 创建 S-记录 (Create S-Record)。该 S-Record 文件将保存在工作区中的 Debug 文件夹中, 扩展名为.srec。



摩托罗拉 S-record(SREC)文件是一个包含二进制信息的 ASCII 格式文件。常见的文件扩展名 有.srec, .s19, .s28, .s37 等。大多数现代编译器工具链都可以生成 SREC 格式的可执行文件。在 MCUXpresso IDE 中,转到项目属性 (Project properties) > 设置 (Settings) > 构建步骤 (Build steps) 窗口,并按下构建后步骤的编辑 (Edit) 按钮。接着将显示构建后步骤 (Post-build steps) 窗口,必须在其中 添加以下命令:

该窗口的截图如图4所示。

arm-none-eabi-objcopy -v -O srec --only-section=.text --only-section=.data -

only-section=.ARM.exidx "\${BuildArtifactFileName}"

[&]quot;\${BuildArtifactFileBaseName}.srec"

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	Properties for kw45b41zevk_w	ireless_uart_bm — 🗆 🗙
	type filter text	Settings Or The settings
	 > Resource Builders ✓ C/C++ Build Build Variables Environment 	Configuration: Debug [Active] V Manage Configurations Manage Configurations B Cold starts C Configuration C Build Adding C Binary Burger C Even Burger I full
	MCU settings Settings Tool Chain Editor > C/C++ General MCUXpresso Config Tools	Pre-build steps
MCUXpresso Config flog Project Natures Project References > Rurv/Debug Settings Task Tags	Project Natures Project References > Run/Debug Settings Task Tags > Validation	Edit 11 fsl. Description: 11 fsl. 12 app 13 app 14 Fur 14 box
	> Validation	Post-build steps Command: BuildAntifactFileBaseName].srec"; ≠ checksum -p \${ [largetChip] -d "\${BuildAntifactFileBaseName].bin" → Edit Edit Edit Edit
	Post-build steps	×
 Commands are execut Commands are execut (not the Windows com A comment character Enter one command pa After editing, comman 		Linux compatible shell rocessori. Jes ALL FOLLOWING COMMANDS. oncatenated with a ^{cy} separator.
	arm-none-eabi-size "\${BuildArti arm-none-eabi-objcopy -v -O si # checksum -p \${TargetChip}-d	factFielbame)' rec -only-section.text -only-section=.dataonly-section=.ARM.exidx "\${BuildArtifactFileName}" "\${BuildArtifactFileBaseName}.srec" "\${BuildArtifactFileBaseName}.bin"
	¢	>
		OK Cancel
图 4. 创建 SREC 格式文	件的步骤	

5 如何使用 OTAP 工具创建映像

本节将介绍为 KW45B41Z-EVK 创建映像所需的步骤:

1. 导航到空中编程 (Over the Air Programming) 工具。

Over The Air Programming					-		×
Select OTA Protocol:	Browse File	Clear File	Save Fil	e as Binary	₩ » <u>%</u> (ð	ĩ
🗱 OTAP Bluetooth LE 🛛 - 🤤		D	an & drop J	in/srec files here			
Select Server Port:	Diag & diop.ong			igaree mea nere			
$\sqrt[q]{9}$ No Serial Ports Detected $\sqrt[q]{3}$	OTA Header Upgrade File Identifier:	0x81EF11E	Í	OTA Transfer Details			
Select Baud Rate:	Header Version:	0x0100					
∬∬ 115200	Header Length:	0x0					
Filter Binaries by Processor Type: 33 NONE - ⊕ ☑ Filter:	Manufacturer Code: Image Type: Image Version: Stack Version: Header String:	0x01FF 0x0001 0x0111111141000005 0x0002 NXP BLE OTAP Demo Imag]				
	Security Credential Version:	0x01	Include				
	Upgrade File Destination: HW Version Minimum HW Version:	0xFFFF 0x1	Include				
	Maximum HW Version:	0x2028	✓ Include	Save Session Log	Clear L	og	
	<u></u> t_c₀	nnect to OTAP Serve		Start OTAP	Cancel	Transf	er
	Selected Processor: NONE						Х
图 5. 空中编程工具							

- 2. 拖放.s19 /.srec /.文件。
- 3. 要处理该二进制文件,请选择 KW45。

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	Processor Selection		-		×	
	A binary or S-record firmware file has been selected. Select the development board processor and additional options, if available:					
	KW45 KW36/ QN9090/K32W061	KW38 🔿 KW41Z	O QN9080			
	Selected Processor: KW45					
	Contains bootloader					
	✓ Preserve NVM					
	Store OTAP file on server.					
			ОК	Cancel		
图 6. 选择处理器为 KW4	15					

4. 现在可以选择要升级的映像类型。类型可以是应用程序(M33)或 KW45 无线通讯(M3),也可以这两者 皆选。

Images Information				_	
Selected file:	kw45b41zevk_wireless_uart_bm.srec				
Will update:	KW45Z (MCU)				v
Start address:	0x0000000		lmage size:	217628 bytes	
M3 settings					
Selected file:	Drag & d	drop files here		Clear	Browse
Will update:	KW45B (radio)				
Start address:	0x48800000		Image size:	0 bytes	
Secured transfer settings — Final Enable secured transfer The 256-bit key, used to e	rr ncrypt the image, can be modified below				
0x7AA7EF9813B3561257E	38837DAB26225301DF3511217F2733C71	DADCD447722D1			
External Flash Settings					
Use External Flash					
Make sure that the "OTA C	Client" application is also configured to pl	lace the OTA storage in the IN	NTERNAL flash	n l	
				01/	- ·

5. 将此文件保存在一个已知位置。

6 测试 OTAP 软件

测试 OTAP 软件的步骤如下:

- 1. 打开**物联网工具箱 (IoT Toolbox)** 应用并选择 OTAP 示例。
- 2. 要开始扫描合适的广播源,请单击**扫描 (SCAN)。**

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3. 单击打开 (Open) 按钮并搜索无线 OTAP SREC (Wireless OTAP SREC) 文件。

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	← IoT Tool OTAP	DISCONNECT	SET PHY READ PHY
(F	File Information	
F	File Name	FSL BLE	OTAP Demo Image File
F	File Version		0x0111111141000005
,	File Size		1000 KB
s	Status		Valid File
		Open	
	0%	mware Update 3 6% Cancel	¢
		NP	(!)
Sta	atus: Connected		
	•	۲	•
」联网工具箱上传的映像			

4. 要开始传输,请单击上传 (Upload)。然后等待,直到显示确认消息。

5. 等待几秒钟, 直到 OTAP bootloader 完成对新映像的编程。无线 UART 应用程序会自动启动, 同时 RGB LED 会闪烁。

7 修订历史

表1列出了自初版发布以来对本文档所做的实质性变更。

表 1. 修订历史

版本号	日期	实质性变更
第1版	2023年3月21日	• 更新了 <u>第 2 节</u> 中的 otap 工具的下载链接
		• 将标题更新为"使用空中编程工具为 KW45B41Z/K32W148 创建固件更新映像"
第0版	2023年2月10日	初版发布

AN13860 **应用笔记**

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