AN14634

Kconfig Memory Optimizer

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Document information

Information	Content
Keywords	Kconfig memory optimizer, host memory saving, i.MX RT1060 EVKC, IW416, 88W8987, IW610, IW612, FRDM-MCXN947, FRDM-IW416, macros, flash memory, SRAM
Abstract	Explains how to configure host memory saving on IW416, 88W8987, IW610, or IW612.

1 About this document

The MCUXpresso SDK provides options to reduce the host memory usage with build-time configuration parameters referred to as Kconfig memory optimizer. The configuration parameters are used to reduce the use of the flash memory and SRAM. This document explains how to enable the host memory saving configurations within the Wi-Fi and Bluetooth drivers of NXP wireless devices.

1.1 Supported devices

The document applies to the following NXP host platforms and wireless devices:

- i.MX RT1060 EVKC + IW416 module (Murata 1XK)
- i.MX RT1060 EVKC + 88W8987 module (Murata 1ZM)
- i.MX RT1060 EVKC + IW612 module (Murata 2EL)
- i.MX RT1060 EVKC + IW610 module (Murata 2LL)
- FRDM-MCXN947 + FRDM-IW416 (AW-AM510)

Note: *The document includes the host memory usage numbers for i.MX RT1060 EVKC and FRDM-MCXN947 using IW416 module and SDK 25.06.00.*

1.2 Prerequisites

This document assumes that you are familiar with MCUXpresso SDK and the flashing of examples onto the i.MX RT1060 EVKC + Murata 1XK (IW416 module) and FRDM-MCXN947 + FRDM-IW416. For more information, see ref.[1].

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2 Host memory saving options for Wi-Fi

The standalone FRDM-MCXN947 board has a low memory footprint. When FRDM-IW416 is attached to FRDM-MCXN947, the configurations for host memory saving are enabled by default (set to 1) with the Kconfig memory optimizer . But when IW416 module (Murata 1XK) is connected to i.MX RT1060 EVKC, the configurations for host memory saving are disabled by default (set to 0) and must be enabled.

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2.1 i.MX RT1060 EVKC + IW416 module (Murata 1XK)

This section explains how to reduce the host memory usage on i.MX RT1060 EVKC + IW416 module (Murata 1XK).

Table 1 shows the average memory usage when the Kconfig macros are enabled or disabled.

Table 1. Memory usage of i.MX RT1060 EVKC + IW416 module (Murata 1XK)

Kconfig macros	Flash usage (kB)	SRAM usage (kB)
All disabled	820	420
All enabled	796	411

The default values of Kconfig macros are set in the file *wifi_config_default.h* file located in *<SDK_PATH>/middleware/wifi_nxp/incl/* directory. By default, the macros are disabled (set to 0).

To reduce the use of the flash and SRAM, change the settings of the Kconfig macros listed in the file *wifi_config.h* located in *<path-to-SDK_Wi-Fi-Example>* directory. The new settings in the *wifi_config.h* file override the default values in the *wifi_config_default.h* file.

Table 2 lists the Kconfig macros and respective memory usage.

Table 2. i.MX RT Kconfig macros and respective memory usage

Kconfig macro	Description	Memory usage	
		Flash (kB)	SRAM (kB)
CONFIG_WIFI_SLIM_ROAM	Disables CONFIG_ROAMING, CONFIG_11R	815	420
CONFIG_WIFI_SLIM_STA	Disables CONFIG_CLOUD_KEEP_ALIVE CONFIG_WIFI_EU_CRYPTO CONFIG_TX_AMPDU_PROT_MODE CONFIG_WNM_PS CONFIG_TURBO_MODE CONFIG_AUTO_RECONNECT CONFIG_DRIVER_OWE CONFIG_OWE CONFIG_WIFI_FORCE_RTS CONFIG_WIFI_FRAG_THRESHOLD CONFIG_COMBO_SCAN CONFIG_SCAN_CHANNEL_GAP	801	411
CONFIG_WIFI_SLIM_UAP	Disables CONFIG_UAP_STA_MAC_ADDR_FILTER CONFIG_WIFI_MAX_CLIENTS_CNT	819	420
CONFIG_FREERTOS_LOW_MEMORY_FOOTPRINT	If the macro is enabled, the heap memory usage is reduced by 10 kB (70 kB to 60 kB)	820	420
CONFIG_LWIP_LOW_MEM_FOOTPRINT	Curtails lwIP stack parameters, reduces data throughput, and disables data net-stats	820	420
Nonblocking firmware download mechanism	Disables CONFIG_FW_DNLD_ASYNC	820	420

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2.2 FRDM-MCXN947 + FRDM-IW416

This section explains how to reduce the host memory usage on FRDM-MCXN947 + FRDM-IW416.

Table 3 shows the memory usage when the all Kconfig macros are enabled or disabled.

Table 3. Total memory usage of FRDM-MCXN947 and FRDM-IW416

Kconfig macros	Flash usage (kB)	SRAM usage (kB)
All disabled	629	190
All enabled	612	182

Table 4 lists the Kconfig macros and respective memory usage.

To reduce the use of the flash and SRAM, set to "1" the Kconfig macros (set to "1") in the file *wifi_config.h* located in *<path-to-SDK_Wi-Fi_Example>* directory.

Table 4. FRDM-MCXN947 and FRDM-IW416 Kconfig macros and respective memory usage

Kconfig macros	Description	Memory usage	
		Flash (kB)	SRAM (kB)
CONFIG_WIFI_SLIM_ROAM	Disables CONFIG_ROAMING, CONFIG_11R	626	190
CONFIG_WIFI_SLIM_STA	Disables CONFIG_CLOUD_KEEP_ALIVE CONFIG_WIFI_EU_CRYPTO CONFIG_TX_AMPDU_PROT_MODE CONFIG_WNM_PS CONFIG_TURBO_MODE CONFIG_AUTO_RECONNECT CONFIG_DRIVER_OWE CONFIG_OWE CONFIG_WIFI_FORCE_RTS CONFIG_WIFI_FRAG_THRESHOLD CONFIG_COMBO_SCAN CONFIG_SCAN_CHANNEL_GAP	615	182
CONFIG_WIFI_SLIM_UAP	Disables CONFIG_UAP_STA_MAC_ADDR_FILTER CONFIG_WIFI_MAX_CLIENTS_CNT	629	190
CONFIG_FREERTOS_LOW_MEMORY_FOOTPRINT	If the macro is enabled, the heap memory usage is reduced by 10 kB (70 kB to 60 kB)	629	190
CONFIG_LWIP_LOW_MEM_FOOTPRINT	Curtails lwIP stack parameters, reduces data throughput, disables data net-stats	629	190
Nonblocking firmware download mechanism	Disables CONFIG_FW_DNLD_ASYNC	629	190

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3 Host memory saving options for Bluetooth LE

The *wifi_cli_over_ble_wu* application is used to reduce memory usage of i.MX RT1060 EVKC and FRDM-MCXN947. By default, *wifi_cli_over_ble_wu* application is enabled with minimal Bluetooth LE features (central, peripheral, and only one device connection).

The *wifi_cli_over_ble_wu* application is located in the latest SDK under:

- *<RT1060_SDK>\boards\evkcmimxrt1060\edgefast_bluetooth_examples* for i.MX RT1060 EVKC
- *<FRDM_SDK>\boards\frdmmcxn947\edgefast_bluetooth_examples>* for FRDM-MCXN947

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4 Firmware download option

By default, the SDK downloads the combo firmware for Wi-Fi and Bluetooth. The size of the combo firmware is larger than the size of the standalone Wi-Fi firmware or Bluetooth firmware. To enable the download of the standalone Wi-Fi or Bluetooth firmware, set the following macros to 1 in *<SDK_Wi-Fi_Example_PATH>/wifi_config.h file*.

- CONFIG_WIFI_IND_DNLD
- CONFIG_BT_IND_DNLD

Note: *The memory usage presented in the TABLE [add xref] reflect the use of wifi_cli application.*

Table 5. Memory usage for FRDM-MCXN947 + FRDM-IW416

Macro	Description	Memory usage	
		Flash (kB)	SRAM (kB)
CONFIG_WIFI_IND_DNLD	Download Wi-Fi firmware only	612	182
CONFIG_BT_IND_DNLD	Download Bluetooth firmware only	733	182

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5 Abbreviations

Table 6. Abbreviations

Abbreviation	Definition
LWIP	Lightweight IP
SDK	Software development kit
SRAM	Static random access memory

6 References

[1] GitHub – nxp-mcuxpresso/mcusdk-manifests (link)

7 Revision history

Table 7. Revision history

Document ID	Release date	Description
AN14634 v.1.0	12 August 2025	• Initial version

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