UM11797

NXP Wi-Fi and Bluetooth Debug Feature Configuration for RW61x Evaluation Board

Rev. 2.0 — 16 April 2025 User manual

Document information

Information	Content
Keywords	Debug configurations, RW610, RW612, RW61x, EVK board
Abstract	Describes the debug configurations to generate various Wi-Fi driver/feature logs and Bluetooth protocol debugging methods

1 About this document

1.1 Purpose and scope

This document describes the debug configurations to generate various Wi-Fi driver/ feature logs and Bluetooth LE protocol debugging methods. It details Wi-Fi/Bluetooth LE sample application using RW61x EVK board for debugging. The purpose of this document is to provide more flexibility to the user for the debug configurations and a quick understanding of the debugging techniques.

1.2 Considerations

This document does not include RW61x product information, hardware interconnection, board settings, bring-up, IDE setup, SDK download, as these are covered in the following user manuals:

- Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS (ref.[1])
- NXP Wi-Fi and Bluetooth Demo Applications for RW61x (ref.[2])

2 Wi-Fi debug features and configurations

This section shows the list of user-configurable Wi-Fi debug macros available in RW61x MCUXpresso SDK and how to get different Wi-Fi debug logs based on the features by enabling/defining these macros at the time of application execution.

2.1 Wi-Fi debug configurations

To enable the debug logs, use the macros listed in the table below along with the source file name. Some of the debug macros are already defined and others can be defined in the header file.

For example, to define `CONFIG_ENABLE_ERROR_LOGS` macro, add the following line in *wifi_config.h* file.

```
#define CONFIG_ENABLE_ERROR_LOGS 1
```

Table 1. Wi-Fi debug log configuration

Debug macros	Default macro value	File name	Details
CONFIG_ENABLE_ERROR_LOGS	1	*wifi_config.h*	Enable error logs for Wi-Fi (Includes DHCPD, lwIP, os [port], WLCM, Wi-Fi driver modules)
CONFIG_ENABLE_WARNING_LOGS	1	*wifi_config.h*	Enable warning logs for Wi-Fi (Includes DHCPD, WLCM, Wi-Fi driver modules)
CONFIG_WLCMGR_DEBUG	Undefined	*wifi_config.h*	Enable wireless connection manager debug logs
CONFIG_WIFI_EXTRA_DEBUG	Undefined	*wifi_config.h*	Additional debugging information for the Wi-Fi driver
CONFIG_WIFI_EVENTS_DEBUG	Undefined	*wifi_config.h*	Dump event codes received from the Wi-Fi firmware
CONFIG_WIFI_CMD_RESP_DEBUG	Undefined	*wifi_config.h*	Enable host command and response debug logs (no hex dump)
CONFIG_WIFI_PKT_DEBUG	Undefined	*wifi_config.h*	Enable data packet debug logs
CONFIG_WIFI_SCAN_DEBUG	Undefined	*wifi_config.h*	Enable scan debug logs
CONFIG_WIFI_IO_INFO_DUMP	Undefined	*wifi_config.h*	Enable information dump about input/output data packets
CONFIG_WIFI_IO_DEBUG	Undefined	*wifi_config.h*	Enable IO debug logs
CONFIG_WIFI_IO_DUMP	Undefined	*wifi_config.h*	Enable send/receive dump
CONFIG_WIFI_MEM_DEBUG	Undefined	*wifi_config.h*	Enable Wi-Fi module memory related debug logs like allocation and free
CONFIG_WIFI_AMPDU_DEBUG	Undefined	*wifi_config.h*	Enable AMPDU debug level logs
CONFIG_WIFI_TIMER_DEBUG	Undefined	*wifi_config.h*	Enable timer debug level logs
CONFIG_WIFI_FW_DEBUG	Undefined	*wifi_config.h*	Enable Wi-Fi Firmware debug logs

3 Bluetooth LE debug features and configurations

This section shows the steps to capture HCI logs for Bluetooth using *peripheral_ht* application. The HCI logs are used to analyze the communication between Bluetooth Host and Controller.

3.1 Bluetooth LE debug configurations

To enable the debug logs, use the macros listed in the table below along with the source file name.

For example, to define `CONFIG_BT_SNOOP` macro, add the following line in *app_config.h* file.

```
#define CONFIG_BT_SNOOP 1
```

Table 2. Bluetooth LE debug log configurations

Debug macros	Default macro value	File name	Details
CONFIG_BT_SNOOP	Undefined	app_config.h	Enable the HCI logs capturing and store data in USB driver
CONFIG_BT_DEBUG	Undefined	app_config.h	Enable the debug print feature.
CONFIG_BT_DEBUG_HCI_ CORE	Undefined	app_config.h	Enable the debug prints for HCI interface.
CONFIG_BT_DEBUG_CONN	Undefined	app_config.h	Enable the debug prints for connection.
CONFIG_BT_DEBUG_GATT	Undefined	app_config.h	Enable the debug prints for GATT module.
CONFIG_BT_DEBUG_ATT	Undefined	app_config.h	Enable the debug prints for ATT module.
CONFIG_BT_DEBUG_L2CAP	Undefined	app_config.h	Enable the debug prints for L2CAP module
CONFIG_BT_DEBUG_KEYS	Undefined	app_config.h	Enable the debug prints for Bluetooth security keys
CONFIG_BT_DEBUG_RPA	Undefined	app_config.h	Enable the debug prints for RPA module
CONFIG_BT_DEBUG_SETTINGS	Undefined	app_config.h	Enable the debug prints for Bluetooth storage
CONFIG_BT_DEBUG_SMP	Undefined	app_config.h	Enable the debug prints for SMP module
CONFIG_BT_DEBUG_SERVICE	Undefined	app_config.h	Enable the debug prints for Bluetooth services

3.2 Capture and analyze HCI logs

This section describes the use of *peripheral_ht* application on RW61x EVK board to capture Bluetooth HCI logs. For more details on *peripheral_ht* application usage and configuration, see ref.[2].

3.2.1 Software download and RW61x image setup

For the SDK download and image setup steps, see ref.[1].

3.2.2 Pre-requisites before running the application

- **Add**`CONFIG_BT_SNOOP` macro definition to *app_config.h* file in *peripheral_ht* project
- **Build** and **flash** *peripheral_ht* image to RW61x EVK
- **Connect** the USB Flash Drive
  Plug the USB drive in the USB OTG (J12) slot on i.MX RW61x EVK board. Since J12 is a Micro USB slot, use a USB drive with a Micro USB to USB converter.

Note: *Format a USB 2.0 drive as a Fat32 disk. Other types like NTFS are not supported.*

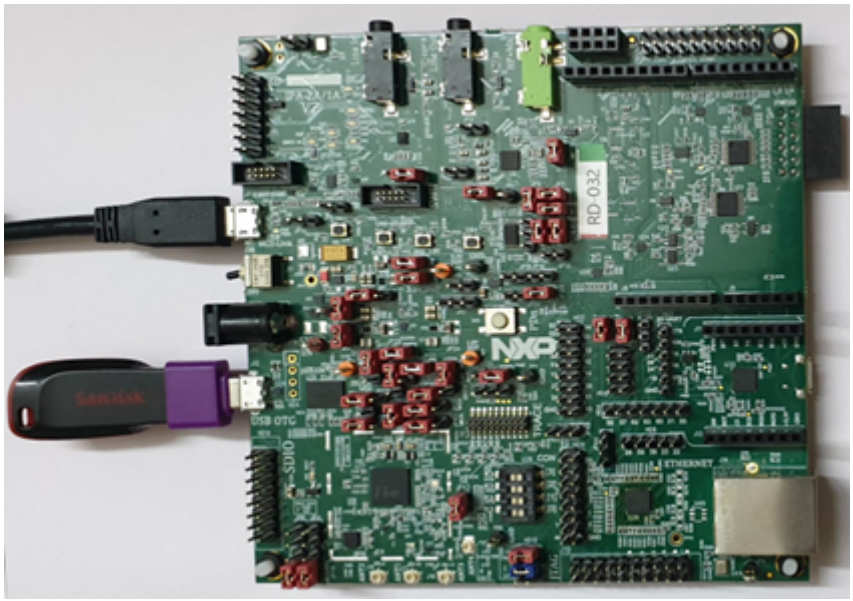


Figure 1. USB drive plugged into RW61x EVK board

- **Install** and **launch** the *IoT Toolbox* application on the smartphone
  IoT Toolbox can be downloaded from Google and Apple application store.
- **Set up***Wireshark* tool
  The Wireshark tool is required to open and analyze the HCI logs.
  Download and **install** *Wireshark* tool for Windows and Mac OS (ref.[3]).

The following are the steps to install *Wireshark* tool on a computer running Linux Ubuntu:

```
sudo add-apt-repository ppa:wireshark-dev/stable
sudo apt update
sudo apt install wireshark
```

3.2.3 Run the Bluetooth demo application

This section describes how to capture the Bluetooth HCI logs saved in the USB drive plugged into RW61x EVK board. The *peripheral_ht* application exposes the health thermometer (HT) GATT Service by default. Peer devices that subscribe to receive temperature indications get temperature readings every second.

Once *peripheral_ht* image is flashed to the board, power reset the RW61x EVK board.

Bluetooth LE Device Role

- HT thermometer: *peripheral_ht* application running on RW61x EVK
- HT collector: *IoT Toolbox* application running on the smartphone

Run *peripheral_ht* application on RW61x EVK

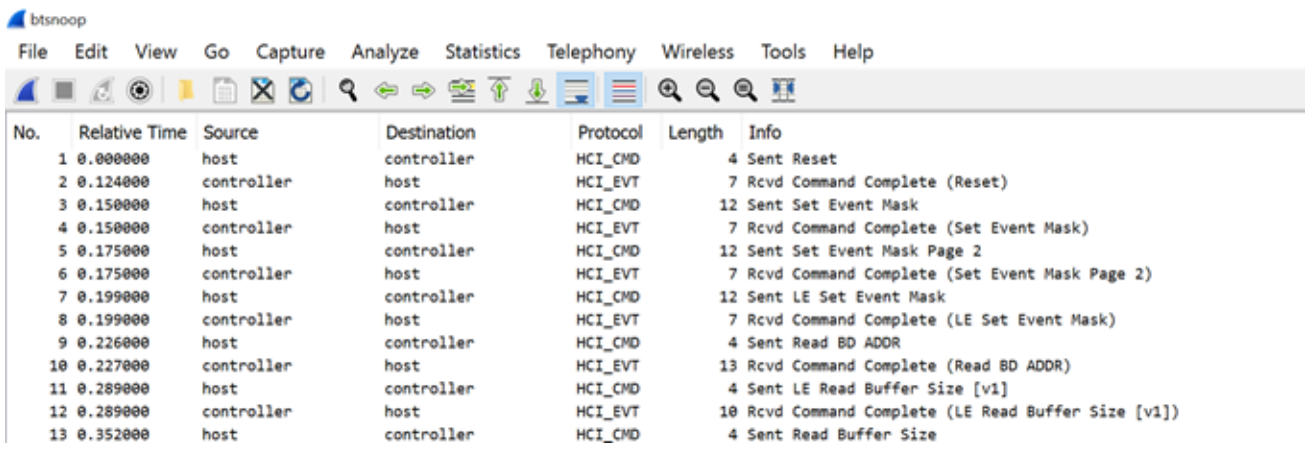
```
Bluetooth initialized
Advertising successfully started
```

Select Thermometer on IoT Toolbox application to scan the available devices using the Health Thermometer service and connect a peer device.

Figure 2. IoT Toolbox application

Unplug the USB drive from RW61x EVK and connect the drive to the Laptop.

The file named *btsnoop* is available in the USB drive. The *Wireshark* tool can be used to open the file and analyze the logs.



No.	Relative Time	Source	Destination	Protocol	Length	Info
1	0.000000	host	controller	HCI_CMD	4	Sent Reset
2	0.124000	controller	host	HCI_EVT	7	Rcvd Command Complete (Reset)
3	0.150000	host	controller	HCI_CMD	12	Sent Set Event Mask
4	0.150000	controller	host	HCI_EVT	7	Rcvd Command Complete (Set Event Mask)
5	0.175000	host	controller	HCI_CMD	12	Sent Set Event Mask Page 2
6	0.175000	controller	host	HCI_EVT	7	Rcvd Command Complete (Set Event Mask Page 2)
7	0.199000	host	controller	HCI_CMD	12	Sent LE Set Event Mask
8	0.199000	controller	host	HCI_EVT	7	Rcvd Command Complete (LE Set Event Mask)
9	0.226000	host	controller	HCI_CMD	4	Sent Read BD ADDR
10	0.227000	controller	host	HCI_EVT	13	Rcvd Command Complete (Read BD ADDR)
11	0.289000	host	controller	HCI_CMD	4	Sent LE Read Buffer Size [v1]
12	0.289000	controller	host	HCI_EVT	10	Rcvd Command Complete (LE Read Buffer Size [v1])
13	0.352000	host	controller	HCI_CMD	4	Sent Read Buffer Size

Figure 3. Analyze btsnoop log in Wireshark

4 Note about the source code in the document

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5 Abbreviations

Table 3. Abbreviations

Abbreviation	Definition
AMPDU	Aggregate – MAC protocol data unit
EVK	Evaluation kit
HCI	Host controller interface
IDE	Integrated development environment
OTG	On the go
RPA	Resolvable Private Address
SDIO	Secure digital I/O
SDK	Software development kit
SMP	Security Manger Protocol
USB	Universal serial bus
WLCM	Wireless connection manager

6 References

[1] User manual – UM11798: Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS
[2] User manual – UM11799: NXP Wi-Fi and Bluetooth Demo Applications for RW61x (link)
[3] Webpage – Wireshark (link)

7 Revision history

Table 4. Revision history

Document ID	Release date	Description
UM11797 v.2.0	16 April 2025	• Document access changed to public. No other changes.
UM11797 v.1.0	9 May 2022	• Initial version

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