Infineon Linux Bluetooth® release notes

About this document

Scope and purpose

This document offers a summary of the Bluetooth® firmware release, highlighting known bug fixes and updated specification specific to the AIROC™ combo chip (CYW4373, CYW43439, CYW55573/2/1) in the latest Linux release. It also includes information on the proprietary Bluetooth® stack (AIROC™ Bluetooth® Stack) and related code examples.

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1 Overview

1.1 High Level Summary

This document captures new features, bug fixes done for CYW4373, CYW43439, CYW55573/2/1 on Bluetooth® Linux software release.

This software release includes the following:

1. Compliant with the recent Bluetooth® specifications.
2. Bug fixes.
3. Bluetooth® stack update.
4. Code examples.

1.2 Firmware version

Device	Bluetooth® firmware version
CYW4373	001.001.025.0118.0000
CYW55573/2/1	001.002.087.0254.0000
CYW43439	001.003.016.0063.0000

AIROC™ Bluetooth® Stack v3.7.1 validated on Linux Kernel version: 6.1 with RPI CM4.

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2 Summary of changes

This section includes issues and solutions for changes that may impact various designs.

2.1 CYW4373

2.1.1 Bug fixes

- Bluetooth® certification:
  - Fix for mismatch in the Bluetooth® version in LL_version_IND PDU.
  - Fixed error code being different while rejecting SCO Connection request when AES-CCM encryption is enabled.
  - Failing to reject or to accept the role switch fixed.
  - Fixed failing to terminate the connection upon receiving the unexpected LL PDU packet

2.1.2 Known issues: NA

2.2 CYW43439

2.2.1 Bug fixes

- Bluetooth® certification:
  - Fixed LL feature missmatch according to ICS.

2.2.2 Known issues

- Bluetooth® Scatternet: Lower BR/EDR throughputs observed with 7 ACL connections.
- Bluetooth® LE dual mode: Low TxRx MOS observed in WBS throughput testing
- 2nd SCO connection failing with “Connection Rejected due to Limited Resources” in BR mode.

2.3 CYW55573/2/1

2.3.1 Bug fixes

- Fix for LE ACL connection issues.
- Bug fixes in Bluetooth® LE stack specific to Bluetooth® 5.2 features
- Certified BTSTACK compliance to TCRL November 2023.

2.3.2 Known issues:

- For two unicast streams to IUT as peripheral, the streams must be disconnected in reverse order of creation, else the corresponding ACL link is also dropped.
- IUT as Auracast source, when stressed with create-terminate sequence, is unable to terminate BIG.
- IUT as simultaneous stereo unicast central and HFP AG sees glitches on second unicast stream due to collision between the two tasks if role switch is performed during Bluetooth® ACL creation.
- Detaching of multiple unicast streams requires waiting for one detach to complete before initiating the next detach.

- If multiple SDUs are received in the same unicast event, the time stamp of these SDUs is same. This impacts LE unicast sink applications which use the timestamp to correctly play the audio.
- Bluetooth® ACL disconnection happens when using EV3 on eSCO and 2/3MBps packet on Bluetooth® ACL as IUT does not respond to 2/3MBps data packets on Bluetooth® ACL.

2.4 BTSTACK updates - v3.7.1

- Supports HCI_LE_Set_Extended_Advertising_Parameters that's part of Bluetooth® Core Spec 5.4
- New APIs added (See API documentation for details):
  - *wiced_bt_gatt_server_enable_caching*: Enables GATT database hashing calculations on the server.Required to called for servers which need support for robust caching.
  - *wiced_bt_gatt_server_enable_signing*: Enables code for enabling and checking data signing on the server and client.
- Optimised the stack library code size. Relevant stack code that is used by application is included in the linked image.
  - Applications which do not create GATT/ACL connections or those which do not need SMP may override the default initializations done in the stack by defining the macro DISABLE_DEFAULT_BTSTACK_INIT in the application Makefile. #Set DISABLE_DEFAULT_BTSTACK_INIT=1 DEFINES+=DISABLE_DEFAULT_BTSTACK_INIT=1
  - GATT Server applications which need to implement GATT Robust Caching will need to invoke wiced_bt_gatt_server_enable_caching in the BTM_ENABLED_EVT.
  - GATT applications work with signed data will need to invoke wiced_bt_gatt_enable_signing in the BTM_ENABLED_EVT
- Bug fixes for A2DP Sink related to certification. (A2DP/SNK/AVP/BI-20-C, A2DP/SNK/AVP/BI-10-C failures)
- Updated document for following APIs -
  - `wiced_bt_l2cap_enable_update_ble_conn_params`
  - `wiced_bt_avdt_write_req`
  - `wiced_bt_l2cap_update_ble_conn_params`
- Fix to Correct macro names used for S=2 and S=8 coding in *wiced_bt_ble.h*

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3 Bluetooth® Linux code example and supported chips

Code example	Feature demonstration	Supported chips
LE Audio CIS Source	Implement the Unicast Source application using BTSTACK and LE-Audio profile library	CYW55573/CYW55572/CYW55571
LE Audio CIS Sink	Implement the Unicast Sink application using BTSTACK and LE-Audio profile library	CYW55573/CYW55572/CYW55571
LE Audio BIS Source	Demonstrates the ability of LE Audio broadcast	CYW55573/CYW55572/CYW55571
LE Audio BIS Sink	Demonstrates the ability to receive LE Audio broadcast	CYW55573/CYW55572/CYW55571
Linux Bluetooth® Find me	Demonstrates the Find Me profile which defines the behavior when a button is pressed on one device to cause an alerting signal on a peer device.	CYW55573/CYW55572/CYW55571
Linux Bluetooth® hello sensor	Demonstrates GATT database and device configuration initialization, sending data to the client and processing write requests from the client	CYW55573/CYW55572/CYW55571 CYW43439,CYW4373
Linux Bluetooth® Wi-Fi onboarding	Demonstrates feature that enables devices to connect to a Wi-Fi access point without requiring a physical interface.	CYW55573/CYW55572/CYW55571 CYW43439,CYW4373
Linux Bluetooth® Headset	Multiple profile CE which demonstrates the use cases and ability of audio-related functions like A2DP, AVRCP CT, HFP.	CYW55573/CYW55572/CYW55571
Linux Bluetooth® SPP	Two devices can establish a wireless communication link that emulates a traditional serial port connection	CYW43439,CYW4373

3.1 Changelogs for Linux Bluetooth® code examples

- Introduced new LE Audio code example support for CYW55573/2/1
- BTSTACK version updated to v3.7.1
- Added more chip support to existing code examples.

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3.2 Bluetooth® libraries

Libraries and middleware	Library details
bluetooth-linux	The bluetooth-Linux is the adaptation layer (porting layer) between the Linux Bluetooth® application code example and Infineon's BTSTACK running on the Linux-based platforms. The porting layer provides Bluetooth® stack initialization and implements platform interfaces to provide OS, memory services and enables communication between the BTSTACK and the Bluetooth® controller.
bt-audio-profiles	This Library has source and header files for A2DP, AVRCP, HFP and SPP profiles
btsdk-gfps	This library has source and header files for Google Fast Pairing Service
btstack	BTSTACK is Cypress's Bluetooth® Host Protocol Stack implementation. The stack is optimized to work with Cypress/Infineon Bluetooth® controllers. The BTSTACK supports Bluetooth® BR/EDR and Bluetooth® LE core protocols.
le-audio-profiles-linux	This library provides implementation of various LE Audio Profiles, GATT Inferface utility for LE Audio Code example, Audio Module library and ISOC data handler interface.
fw	This folder has different FW files for the AIROC™ combo chip (CYW4373, CYW43439, CYW55573/2/1)

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4 Abbreviations

Abbreviations	Description
A2DP	Advanced Audio Distribution Profile
ACL	Asynchronous Connection-Less
AES-CCM	Advanced Encryption Standard-counter with cipher block chaining message authentication code
AG	Audio Gateway
API	Application Programming Interface
AVRCP	Audio/Video Remote Control Protocol
BIG	Broadcast Isochronous Group
BIS	Broadcast Isochronous Stream
BR	Basic Rate
BTSTACK	Bluetooth® Stack
CIS	Connected Isochronous Stream
EDR	Enhanced Data Rate
eSCO	Enhanced Synchronous Connection Oriented
GATT	Generic Attribute Profile
HCI	Host Controller Interface
HFP	Hands-Free Profile
ICS	Implementation Conformance Statement
ISOC	Isochronous Channels
IUT	Instrument under test
LL	Link Layer
MBps	Mega Bytes per second
MOS	Mean Opinion Score
OS	Operating System
PDU	Protocol Data Unit
Rx	Reception
SCO	Synchronous Connection Oriented
SDU	Software Data Unit
SMP	Security Manager Protocol
SPP	Serial Port Profile
TCRL	Test Case Reference Lists
Tx	Transmission
WBS	Wide Band Scheme

5 Tools and documentation

See the following documents for more details:

Tools	Scope
MBT tool	The manufacturing Bluetooth® test tool (MBT) is used to test and verify the RF performance of the InfineonBluetooth® Classic and Bluetooth® Low Energy devices on Linux platforms. https://github.com/Infineon/mbt/tree/main/docs
AIROC™ Bluetooth®	AIROC™ Bluetooth® Test and Debug Tool is a GUI tool for testing and debugging Infineon Bluetooth® devices. AIROC™ Bluetooth® Test and Debug Tool connects to the Bluetooth® devices at HCI protocol layer and currently supports HCI UART and HCI USB transport interfaces. The tool allows user to send Bluetooth® HCI commands and receive Bluetooth® HCI events from the Bluetooth® controller of the connected devices. www.infineon.com/cms/en/design-support/tools/utilities/wireless-connectivity/airoc-bluetooth-test-and-debug-tool/

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