Bluetopia®

MSP432 Bluetopia Release Notes

TEXAS INSTRUMENTS

Document Version: 1.0

Bluetopia Release: 4.0.3.0

Bluetooth™

Revision Control

Rev	Update	Date	Author	Approver
1.0	Initial Release	Apr 8,2016	K. Leibovich	

Table of Content

Terms & Abbreviations

Abbreviation /Term	Meaning / Explanation
A2DP	Advanced Audio Distribution Profile
AVRCP	Audio Video Remote Control Profile
BAS	Battery Alert Service
DID	Device ID Profile
FMP	Find Me Profile
FTP	File transfer profile
GAP	Generic Access Profile
GATT	Generic Attribute Profile
GAVD	Generic Audio/Video Distribution Profile
HDP	Health Device Profile
HFP	Hands free Profile
HID	Human Interface Device
HOGP	Hid Over GATT profile
HRP	Heart Rate Profile
HRS	Heart Rate Monitor Service
HSP	Headset Profile
L2CAP	Logical Link Control and Adaptation Protocol
MAP	Message Access Profile
OPP	Object Push Profile
PAN	Personal Area Network
PBAP	Phonebook profile
PXP	Proximity Profile
SDP	Service Discovery Protocol
SPP	Serial Port Profile
SPPLE	Serial Port Profile Low Energy (TI Propriety Service)

1. Introduction

Thank you for selecting the TI's solution.

This release adds Bluetooth support to the TI's MSP432P401R LaunchPad platform based on NoOS. The Bluetooth stack and profiles were cross-compiled with 32-bit ARM Cortex-M4 compilers and are provided with sample application projects that support the Code Composer Studio, IAR Embedded Workbench for ARM and Keil uVision IDEs.

This release includes the core protocol stack with Bluetooth Smart support and includes the Legacy Bluetooth profiles and various Low Energy services. Sample applications that demonstrate the use of each of the profiles are a part of the release.

This release has been ported to TI CC256x controller only.

Please Contact Texas Instruments for any technical support issues.

2. Overview

TI's dual-mode Bluetooth stack implements the Bluetooth 4.0 specification to enable Legacy Bluetooth and Bluetooth Low Energy. The Bluetooth stack is fully Bluetooth Special Interest Group (SIG) qualified, certified and royalty-free. It provides simple command line sample applications to speed development.
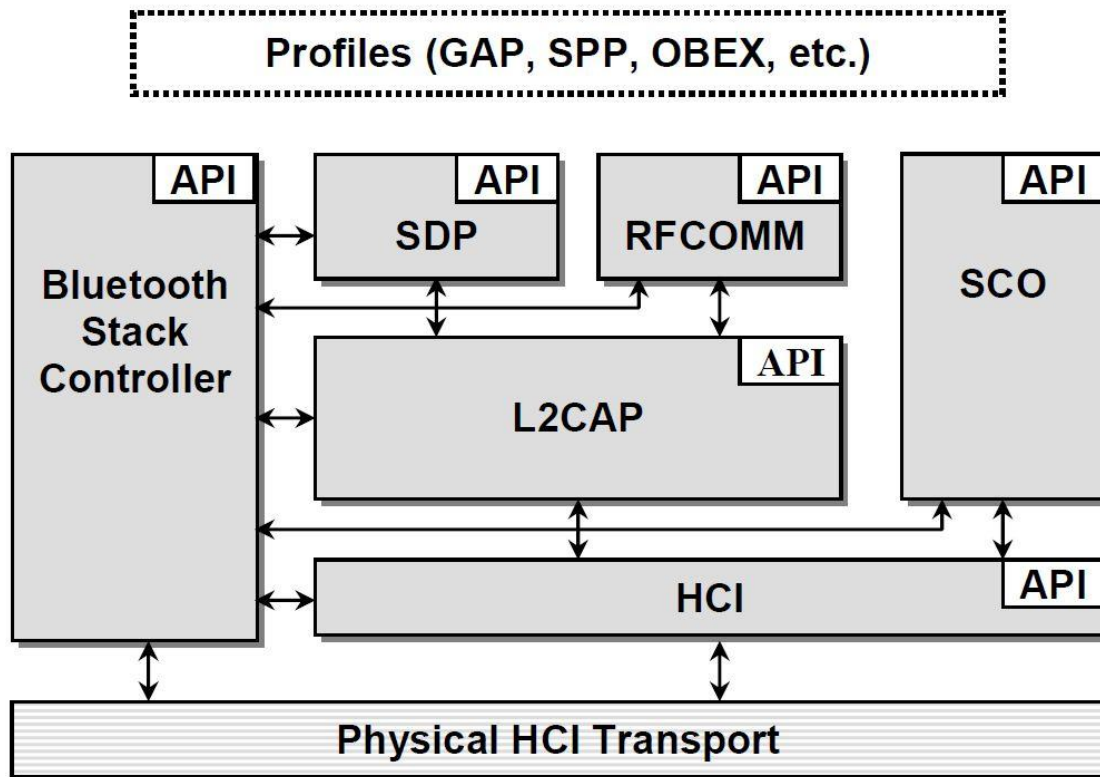
This release provides support for the MSP432P401R LaunchPad platform. It includes pre-compiled libraries of the core stack and for specific profiles.

The following source files, which are part of this release, were ported to support MSP432P401R:

- **BTPSKRNL.c** – O/S abstraction layer
- **HCITRANS.c** –HCI UART transport abstraction layer

Porting documentation for the required functions is included for reference.

Finally, this release contains sample applications in source format. Those applications are fully functional applications that show the following usage:

- Initializing/shutting down of the stack

- Device Discovery (Inquiry and SDP)

- Device Pairing

- BR/EDR profiles

- LE usage – demonstrated through a proprietary SPP like service

- LE profiles and services

- Local Device Management (class of device, local name, device address, connectability modes, discoverability modes, pairability modes, etc).

The samples applications provide a command line interface (through a UART or some other mechanism) that can be used to issue commands in real-time and watch the results. These samples should easily be modifiable to add/change features during testing/development.

3. Supported Profiles and Services

This release includes the core protocol stack and platform manager layer with the following classic Bluetooth and GATT-based profiles and services:

Supported Classic Bluetooth Profiles

Profile	Profile Version	Role	Sample Application
Advanced Audio Distribution Profile (Assisted mode – A3DP)	A2DP 1.2	Source Sink	Supported
Audio/Video Remote Control Profile	AVRCP 1.4	Target Controller	Supported
Device ID Profile	DI 1.3	N/A	Supported
File Transfer Profile	FTP 1.1	Server Client	Not Supported
Generic Access Profile	GAP (BT 4.0)	N/A	Supported
Headset Profile	HSP 1.2	Audio Gateway Headset	Supported
Health Device Profile	HDP 1.0	Source Sink	Not Supported
Hands Free Profile	HFP 1.6	Audio Gateway Hands Free Unit	Supported
Human Interface Device Profile	HID 1.0	Host Device	Supported
Message Access Profile	MAP 1.0	Server Client	Supported
Object Push Profile	OPP 1.1	Server Client	Not Supported
Phonebook Access Profile	PBAP 1.0	Server Client	Supported
Serial Port Profile	SPP 1.1	Device A Device B	Supported

TEXAS INSTRUMENTS

Supported BLE Profiles

Profile/Service	Profile Version	Role	Sample Application
Alert Notification Profile	ANP 1.0	Server Client	Support
Battery Service	BAS 1.0	N/A	Not Supported
Current Time Service	CTS 1.0	N/A	Not Supported
Device Information Service	DIS 1.1	N/A	Supported
Find Me Profile	FMP 1.0	Target Locator	Supported
Generic Access Profile Service	GAPS (_BT 4.0_)	N/A	Supported
Generic Attribute Profile	GATT 1.0	Server Client	Supported
Glucose Profile	GLP 1.0	Collector Sensor	Not Supported
Health Thermometer Profile	HTP 1.0	Collector Thermometer	Supported
Heart Rate Profile	HRP 1.0	Collector Sensor	Supported
HID over GATT Profile	HOGP 1.0	Host Device	Supported
Immediate Alert Service	IAS 1.0	N/A	Supported
Link Loss Service	LLS 1.0	N/A	Not Supported
Next DST Change Service	NDCS 1.0	N/A	Not Supported
Phone Alert State Profile	PASP 1.0	Server Client	Supported
Proximity Profile	PXP 1.0	Monitor Reporter	Supported
Reference Time Update Service	RTUS 1.0	N/A	Not Supported

Scan Parameters Profile	SCPP 1.0	Server Client	Not Supported
TX Power Service	TPS 1.0	N/A	Not Supported
SPP Emulation over GAT (SPPLE)			Supported
iBeacon Demo			Supported

4. QDID Support

- Bluetopia 4.0 Profile Subsystem

  https://www.bluetooth.org/tpg/QLI_viewQDL.cfm?qid=25552

- Bluetopia Host Subsystem 4.0

  https://www.bluetooth.org/tpg/QLI_viewQDL.cfm?qid=25551

5. Hardware/Software Requirements

- **MSP-EXP432P401R** – MSP432 LaunchPad Board.

  see http://www.ti.com/tool/msp-exp432p401r.

- **BOOST-CC2564MODA** – Dual-mode Bluetooth CC2564 Module with Integrated Antenna BoosterPack.

  See http://www.ti.com/tool/boost-cc2564moda.

- **CC320AUDBOOST**- SimpleLink CC3200 Audio BoosterPack. OPTIONAL: For audio and voice sample application.

  See http://www.ti.com/tool/cc3200audboost.

- **MSPWare_3_20_00_37** - MP432 Software Development Kit

  See http://www.ti.com/tool/mspware

- One of the following Supported Integrated Development Environments (IDE):

  o **Code Composer Studio 6.1.x** and up

    See http://www.ti.com/tool/ccstudio

  o **IAR Embedded Workbench 7.50/7.3** and up for ARM

  o **Keil uVision 5.18.0.0** and up

5.1. HW modification for PCM audio related Sample apps

No HW modifications are needed.

5.2. HW Restrictions

The MSP432 doesn't have an I2S interface so external codec is supported through direct connection to the CC256x (i.e. through A3DP only).

5.3. ARM Cross-Compiler Support

New set of build options were added for every profile and core libraries. In addition each library was built to support 3 different IDEs: Code Composer Studio (CCS), IAR Embedded Workbench and KEIL uVision.

Pre-built Core libraries are located under **\Bluetopia\lib\[TOOLCHAIN-FOLDER]**, and include the following files:

- o **Bluetopia_BR_EDR.lib** – this core stack library was built to support Bluetooth Classic (BR/EDR) applications only.

- o **Bluetopia_LE.lib** – this core stack library was built to support Bluetooth Low Energy applications only.

- o **Bluetopia_Full.lib** – this core stack library was built to support both BT classic and Low Energy applications.

Where **TOOLCHAIN-FOLDER** can be one of the following:

- o **ccs –** libraries built for code composer studio IDE.

- o **keil –** libraries built for KEIL IDE.

- o **ewarm –** libraries built for IAR IDE

Every profile will also have a complete set of library support.

PBAP is an example. The libraries are located under **\Bluetopia\profiles\PBAP\lib\[TOOLCHAIN-FOLDER]** and include the following folders and files:

- o **SS1BTPBA.lib** – this phone book library was built to support applications that enable PBAP.

For information on customization of the libraries for specific use cases please refer to Appendix B - Flexible Build Library.

5.4. CCS Automatic Target-Configuration Management

Target configuration in Code Composer Studio should be managed automatically (i.e. targetConfigs ccxml file will be generated automatically from definitions within the available project files).

Make sure to enable the "Manage the project's target-configuration automatically" checkbox in Project/Properties/General.

6. Change Log

6.1. 4.0.3.0 Updates

This is the initial MSP432 release and serves as baseline for future updates.

7. BT Init scripts

The Host is detecting the BT Rom version automatically and downloads the respective init script. Init scripts are stored as "C" array defined in the BTPSVEND.c platform file (available in source format). They are based on TIInit_6.7.16.bts version 1.3 and can be updated (and recompiled) later with new service packs.

Note that due to CC256x design, it cannot enable BLE and A/V Processor (e.g. A3DP or WBS) in parallel so different Init script are injected based on user request.

Please refer to http://processors.wiki.ti.com/index.php/CC256x_Downloads for more info on the scripts and how to use them.

8. Known Issues

8.1. General

8.1.1. Warnings during MSP driver lib compilation

The MSPWare 3.20.00.37 driverlib (on which the release is based) issues few warnings during compilation. These might be avoided in a more updated MSPware release.

8.2. HSPDemo

8.2.1. Error after opening multiple HSP servers

A call to OpenServer fails with MEMORY_ALLOCATION_ERROR after several servers were already opened.
Note: Opening multiple servers on the same channel is not a likely use case.

Appendix A - Further Reading

Please refer to http://www.ti.com/tool/tibluetoothstack-sdk for TI dual mode Bluetooth stack user guide and more information.

Appendix B - Flexible Build Library

The Flexible Build Library (FBL) is a mechanism that allows the user to generate different versions of the Bluetopia library tailored to the specified use case. This allows the user to reduce the flash memory requirements of the Bluetopia stack by removing code that is not needed by the user's specific application. Some examples are adding or removing Low Energy support, adding or removing SPP support and adding or removing SCO audio support.

FBL options were updated to support different sets of libraries per different tool-chains and different profiles selection.

Please refer to **Using the Flexible Build Library.pdf** document for more info.