

# **BLUEGIGA BLUETOOTH LOW ENERGY SOFTWARE**

## **RELEASE NOTES**

Wednesday, 2 December 2020

Version 6.1



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# 1 Changes: 1.10.0 (Build 153) compared to 1.9.0 (Build 150)

**Date:** December 2nd, 2020

## **Quality Improvements:**

- Implemented protection against Authentication of the LE Legacy Pairing Protocol and Impersonation in the Passkey Entry Protocol vulnerabilities
- Fixed issues with expiring link supervision timeout when establishing connection from devices with Snapdragon 665 processor
- Fixed device hang up when triggering disconnection on the other end during encryption process
- Fixed keyboard example to be compatible with newer iOS versions

## 2 Changes: 1.9.0 (Build 150) compared to 1.8.0 (Build 143)

**Date:** March 23th, 2020

### **New Features**

- Changed default configuration parameter for I2C interface in hardware.xml

### **Quality Improvements:**

- Implemented protection against SweenTooth vulnerabilities
- Fixed issues with USB devices (BLE112 and BLED112) enumeration when resetting device in a loop
- Implemented protection mechanisms against flash memory corruption

### 3 Changes: 1.8.0 (Build 143) compared to 1.7.0 (Build 142)

**Date:** September 6th, 2019

#### **New Features**

- Added event hardware\_radio\_error

#### **Quality Improvements:**

- Fixed problems with UART communication in command-line dfutool
- Implemented protection against CVE-2019-2102 vulnerability
- Updated <sleposc> description in AN980 document

## 4 Changes: 1.7.0 (Build 142) compared to 1.6.0 (Build 140)

**Date:** December 10th, 2018

### **New Features**

- Added command to delay system reset
- Added command to get bootloader checksum
- Added command to get the current value of the internal timer
- Added command to get the USB enumeration status
- Added event when USB enumeration occurs
- Added support for configurable stack size of BGScript

### **Quality Improvements:**

- Added support for script stack overflow detection
- Made impossible to enable sleep oscillator on BLE112
- Added syntax validation of the configuration file, hardware configuration and main project
- Added configurable i2c clock frequency for BLE113/BLE121
- Added i2c timeout to prevent interface's freeze
- Improved BleUpdate Tool
- Fixed problem with deleting bonding
- Added support for interrupts for Port 2 on BLE113/BLE121
- Fixed not working cmd\_slave\_latency\_disable command on BLE113 with specific case
- Improved interrupt status events behavior when pin/button bounces
- Improved USB communication for specific packets
- Updated signing certificates. However drivers do not require this change since they do not expire
- Improved BGScript handling
- Improved sleep oscillator handling in time of power mode changing

## 5 Changes: 1.6.0 (Build 140) compared to 1.5.0 (Build 137)

**Date:** December 14th, 2017

### **New Features**

- Added support for dynamic firmware size allocation with maxfwsz attribute
- Added support for different values of ppm parameter

### **Quality Improvements:**

- Improved BGBuild message concerning advertising services order
- Fixed saving of bondingbitmask
- Fixed sporadic Bluetooth freeze during advertising and scanning
- Fixed USB buffer handling
- Improved ble\_cmd\_flash\_read\_data command in case of offset not dividable by 4
- Fixed attribute values transfer during enabling/disabling scanning
- Fixed not working slave latency during channel map update procedure
- Fixed constant GATT values update over OTA
- Improved BleUpdate Tool to prevent crash on some Windows configurations
- Fixed behaviour of authentication characteristics in Just Works mode

## 6 Changes: 1.5.0 (Build 137) compared to 1.4.2 (Build 130)

Date: December 19th, 2016

### New Features

- Added command to enable/disable sleep mode
- Added new command to set pairing distribution keys
- Added support for most recent IAR Embedded Workbench in CSDK installer
- Added non-resolvable address in peripheral privacy mode
- Added non-resolvable address in central privacy mode

### Quality Improvements:

- Wake-up pin with state="down" now triggers on correct, falling edge
- Fixed "Device has run out of memory" problem in BLEGUI during OTA update
- PM2 sleep mode now works correctly when both scanning and advertising are enabled
- Timer1 and Timer3 now work correctly when both are activated
- Improved handling disconnection event in sleep mode
- Fixed supervision timeout during slave connection
- Improved enabling slave latency
- Fixed flow control in DFU mode
- Fixed releasing digital pin after ADC use
- Improved cleaning temporary files by BGBuild
- Fixed OTA support for firmware above 96KB
- Fixed sporadic Connection Timeout problem
- Fixed problem with intermittent disconnects returning "LL Response Timeout" message
- Fixed problem with slow connection when more than 2 devices are connected
- Improved BleUpdate Tool to prevent "Missing license problems"
- Corrected characteristic length handling
- Fixed low RSSI problem after coming out from PM3 sleep mode
- Fixed module crash when dim command is used
- Corrected path selections in SDK installer
- Fixed conflict when Timer1 is used together with SPI
- Fixed problem with scan results delay when slave device is connected with long connection interval
- Fixed problem with OTA flash write on newest iOS (v9.3.4 and above)
- Fixed UART RX glitch during DFU boot
- Fixed problem with still lasting connection after calling end\_procedure
- Improved handling attempt to write out of range during DFU in UART and USB mode
- Improved scanning procedure
- Added CSDK OTA template for BLE113-M256
- OTA file is now correctly read from file system in BLEGUI
- Added missing SDK examples for BLE113-M256



## 7 Changes: 1.4.2 (Build 130) compared to 1.4.1 (Build 128)

**Date:** February 24th, 2016

### **Quality Improvements:**

- read\_by\_type\_req return characteristic handler when error occurs
- <pmux regulator\_pin="7" /> entry is not obligatory any more for BLE121LR module
- Improved going to low power modes of BLE121LR in CSDK
- Improved DFU over UART, corrected order of parameters in config\_hwddata structure for backward compatibility
- Updated CSDK paths to ble-1.4 in IAR templates
- Corrected hardware initialization for OTA and DFU bootloader
- Corrected implementation of OOB\_Not\_Available error
- Fixed Authentication Requirements error sending
- Fixed problem with OTA for BLE112 module
- Added cleaning of temporary files when BGbuild fails

## **8 Changes: 1.4.1 (Build 128) compared to 1.4.0 (Build 127)**

**Date:** January 19th, 2016

### **Quality Improvements:**

- Updated examples with missing <uartboot> entry

## 9 Changes: 1.4.0 (Build 127) compared to 1.3.2 (Build 122)

Date: December 3rd, 2015

### New Features

- MAC address change on request added
- Watchdog feature added
- New command *ble\_cmd\_set\_initiating\_con\_parameters* added for configuring scanning parameters for Initiating State (establish connection)
- Added feature which allows to temporarily disable slave latency during runtime
- Updated BLE tools to Qt5 (SDK and BLE GUI Qt libraries)
- Increased maximum BGScript size from ~30KB to 62 KB
- Multiple listeners for a single event in BGScript
- Bluetooth v4.2 specification compliant devices bonding support added

### Quality Improvements:

- Persistent store defragmentation improved to prevent data loss
- Fixed some idle state problems
- Fixed problem with RX processing for USB endpoint when received data are less than watermark or data aren't read before receive next packet
- Fixed problem with sending 64 or more bytes to USB endpoint
- Fixed problem with Dongle hang when running flash\_ps\_dump over USB
- Improved script execution speed
- Fixed problem with calculating maximum characteristics limitation for user characteristics
- Fixed problem with DFU update using USB 3.0
- BGBuild now correctly returns error if user data exceeds the maximum size
- Fixed problem with slow connection speed, when master was already connected with a long connection interval
- Fixed problem with LL\_CHANNEL\_MAP\_REQ confirmation to master
- New attribute *<uartboot>* added, to fix problem with BgScript when UART dfu bootloader is used

## 10 Changes: 1.3.2 (Build 122) compared to 1.3.1 (Build 119)

**Date:** December 29th, 2014

### **Quality Improvements:**

- PS keys are defragmented in case PS key save fails in order to overcome the possible issue with frequent PS key saving
- Connection reliability is improved when large slave latency values are used
- Improved reliability of connection establishment
- Fixed an issue that caused the firmware to hang when directed connectable mode was canceled before advertising timeout occurs
- Improved the reliability of advertising in three different channels when advertising and scanning are used simultaneously.
- Temperature calibration improved and thus improving the stability of the TX power for BLE121LR
- Configuring Port 2 over API does not anymore cause resetting Port 0/1.
- I2C pin states retained when sleeping
- Boot event is always generated when entering DFU mode.
- Chaining BGScript events has been enabled
- Binary shift left operator fixed
- C-SDK templates and environment configurations improved
- BLE SW Update Tool updated to preserve the temperature calibration value

## **11 Changes: 1.3.1 (Build 119) compared to 1.3.1 (Build 118)**

**Date:** September 10th, 2014

### **Quality Improvements:**

- Analog comparator interrupt fixed

## 12 Changes: 1.3.1 (Build 118) compared to 1.3.0 Beta (Build 110)

**Date:** September 2nd, 2014

**Note:** Release 1.3.1 Build 118 is the first mass production version for *Bluetooth* Low Energy Software v.1.3 with BLE121LR Module

### New Features

- New ***Send Attribute*** API command added for controlling the notifications and indications.
- New ***Whitelist Bonds*** API command added which adds the bonded devices to the white list.
- A new configuration options added into the ***config.xml*** file, which can be used to disable DFU updates.

### Quality Improvements:

- I/O interrupt handler updated to avoid overflow of the I/O interrupts. The change allows only one I/O interrupt for each port to be queued by disabling the port interrupt until the corresponding I/O interrupt event is generated.
- Interrupt handling improved when reading the internal temperature sensor and unnecessary interrupts events will not occur any more.
- Writing to the end of user data region in the flash is fixed.
- UART priority adjusted to improve UART reliability under high load for example when encrypted Bluetooth connections are used.
- TX power control fixed for BLE121LR Bluetooth Low Energy Long Range Module.
- Reliability of ***Get Bonds*** API command improved.
- An error event is returned if the encryption key is not present locally and a remote device tries to make a pairing using an old encryption key.
- Interoperability improvements with Windows Phone 8.1, LG D802 model, and with some un-compliant iBeacon implementations
- C SDK environment now supports BLE121LR Bluetooth Low Energy Long Range module.
- OTA DFU script and example improved for BLE121LR *Bluetooth* Low Energy Long Range module.

## 13 Changes: 1.3.0 Beta (Build 110) compared to 1.2.2 (Build 100)

**Date:** May 20th, 2014

**Note:** Release 1.3.0 Build 110 is a beta release for BLE 1.3 SW and BLE121LR Module

### New Features

- Bluetooth Low Energy software now supports the new BLE121LR hardware
- BLE Software Update tool now also support the new BLE121LR hardware
- SDK examples haven been updated and restructured to support the BLE121LR and the new DKBLE development kit
- New API command added for turning On/Off USB Interface on BLE112
- New API command added to access the AES128 hardware encryption engine
- New API command added to reduce the RX sensitivity and shorten the range.
- OTA firmware update now supports just upgrading the BGScript application and GATT database
  - ~90% smaller firmware file and faster and lower power OTA updates
  - Enables OTA update on the hardware variants that only have 128kB flash

### Quality Improvements:

- In BGAPI packet mode the length checks have been added and too short or long BGAPI packet will produce an error
- Advertising mode (scannable and non-connectable) while connected to an other device enabled
- Enhancements made to BGScript engine that allow more efficient use of RAM

## 14 Changes: 1.2.2 (Build 100) compared to 1.2.1 (Build 91)

Date: Feb 16th, 2014

### New Features

- Added the support of BLE113 with the internal 256kB flash memory
- Added software support for Over-the-Air (OTA) firmware update for the internal 256kB memory
- Added support for SPI interface and pin selection for external SPI flash to be used with OTA updates.
- Added a compiler option to generate a separate firmware file for OTA firmware updates
- Added APIs for reading (Read Data), writing (Write Data), and erasing (Erase Page) the user area data on the internal flash memory
- Added APIs for handling I/O port interrupts (Io Port Irq Enable) and setting the directions (Io Port Irq Direction)
- Added API's for handling the comparator functionality under HW commands and events.
- Added testing APIs for sending and receiving data (Phy Tx, Phy Rx, Phy End) for *Bluetooth* testing purposes
- BGScript code can now be split into multiple files with the new IMPORT and EXPORT directives.

### Quality Improvements:

- OTA firmware update reliability improved
- BGScript fixed when sign extensions are used
- Bonding robustness improved in the cases when encrypted link in use



## 15 Changes: 1.2.1 (Build 91) compared to 1.2.0 (Build 89)

**Date:** October 25th, 2013

### **Quality Improvements:**

- Interoperability improvements, which make pairing and connection establishment more reliable with new Android devices supporting *Bluetooth* Low Energy.
- Enhanced broadcasting improved and connection reliability improved for devices that are in reliable advertisement mode.
- BGBuild compiler will now produce errors if BGScript variables use reserved names.
- BLE Update tool's Windows compatibility improved.

## 16 Changes: 1.2.0 (Build 89) compared to 1.2.0 (Build 88)

**Date:** October 14th, 2013

### **Improvements:**

- CC debugger drivers now included in the *Bluetooth* Low Energy Software and SDK installation package.

## 17 Changes: 1.2.0 (Build 88) compared to 1.1.1 (Build 71)

**Date:** September 26th, 2013

### **New Features**

- Production quality firmware for BLE113 Bluetooth Low Energy Module.
- Enhanced Broadcasting added, so a peripheral device is able to check whether advertisements are received by a master device.
- Both non-connectible advertising and active/passive scanning without ability to connect, enabled at the same time, are now possible for a slave during a connection. When connected and in master mode, active/passive scanning with ability to connect is additionally possible, for the master to be able to connect to multiple slaves.
- Security: Fixed passkey support added for bonding. A fixed six digit passkey can be pre-determined and then used during the bonding procedure.
- DFU: Over-the-Air (OTA) firmware upgrade feature added to enable wireless software updates. Requires additional flash, such as an external 128 kB flash memory module connected via SPI.
- DFU : DFU over UART feature added.
- BGScript: BGScript applications can now use functions (procedures). memset() functionality added.
- BGAPI: Added new commands to investigate the RF channel quality (RSSI) or by measuring packet loss during a connection.
- BGAPI: Validation of BGAPI commands added, BGAPI protocol produces errors for invalid or incomplete BGAPI commands sent by a host.
- BGAPI: New event is added which is generated when a bonding is attempted but the bonding list is already full.
- BLEGUI: DFU over UART, USB or OTA can now be done using BLEGUI.
- SDK: Beta-level C-language libraries and IAR Embedded Workbench for 8051 compatible SDK is now available via special request.
- SDK: Bluetooth Low Energy SDK comes now as a self-installing executable, including BLE Update firmware flashing tool.

### **Quality Improvements:**

- BLE113 software has reached production quality, improving power consumption and connection timing.
- Defragmenting of flash memory is enabled by default.
- USB functionality (BLE112 and BLED112) made more robust in general and when USB 3.0 ports are used.
- Robustness improvements done for advertising, scanning, and connections.

## 18 Changes: 1.1.1 (Build 71) compared to Beta 2 (Build 55)

- **This is the the official 1.1.0 build for BLE112 and BLED112 modules. Bluegiga license key is required in the module, and if it is missing, it needs to be applied with BLE Update via the CC debug programming pins.**
- BLE113 support added. SW is not considered yet to be fully qualified for BLE113, and the possible changes and improvement for BLE113 will still take place.
- Few semantics changes for command, the set\_txpower command uses range 0-15. timer behaviour improvement - Cancelling previous timer if new repeating timer is added,
- Various improvements and fixes from multi-connection features, e.g., connection interval desgined be in range  $2.5 \times \text{max\_connections}$ , reliability improved up to 8 simultaneous connections,
- Multiple quality improvements, e.g., validating supervision time-out when connecting, connection reliability with slave latency improved, de-fragmenting PS store at boot-up, watermarks working properly over USB too, fixing issue with too short SW timer, robustness improvement related to scanning and connection establishments
- PC GUI SW improved - E.g., logview clearing, performance improved when long log traced

## 19 Changes: 1.1.0 Beta 2 (Build 55) compared to Beta (Build 46)

- Packet mode option added for easing up the flow control when using BGAPI over UART (See hardware.xml/usart)
- Throughput options added for higher throughput (See config.xml/throughput)
- BG Script performance improved for having the faster scripts
- BG Script watchdog timer added (See config.xml/script\_timeout)
- Cable Replacement iPhone reference implementation included (a separate Zip file at Tech Foun)
- New BLE SW update tool for BLE SW (a separate zip at Tech Forum), this is to be used instead TI SW update tool (SmartRF).
- User Read Response and User Write Response API's implemented.
- Various fixes done based on the feedback to Beta build (e.g, script functions like memcmp, I2C functionality)

Note: Final 1.1.0 SW release will require a Bluegiga license key in the module, and this will need to be applied with BLE Update via the CC debug programming pins..

### 19.1 Known Issues with Build 55

- Multi-connection (master mode) is not fully stable in highly stressed use cases
- Calling `system_endpoint_tx` command multiple times in a row can crash the script
- C examples with BGLib not yet make compatible with 1.1.0 SW.

## 20 Changes: 1.1.0 Beta compared to 1.0.3

- Multi-connection support added to the master side (i.e., central). Verified up to 4 simultaneous connections.
- API's supporting the cable replacement use case, e.g., for enabling E2E flow control
- Chipset's PWM capability accessible via BGAPI.
- BGAPI changes for I2C usage
- Multiple new BG script features such as logical AND, WHILE loop, bit shifting.
- Flexible build-time memory management added, e.g., removing BGscript size limitation when operating with the available flash memory size
- Several smaller improvements for quality and stability.

Note: Final 1.1.0 SW release will require the Bluegiga license key at the module and this will need to be entered to the modules through the programming pins.

## 21 Changes: 1.0.3 compared to 1.0.2

- BGScript activation for BLED112 fixed.
- SetScanParameter (related to scanning window) reliability improved.
- Transitions to PM3 (power mode 3) improved for decreasing unnecessary power consumption.

### 21.1 Memory Limits for 1.0.x

- Combined GATT database and BGScript size is limited to 2KB flash
- 256 bytes is reserved for script buffers and variables
- 2KB GATT attribute values stored in ram
- PS - Store size is 14KB

Note: These limitations are not applicable as such to 1.1.x SW branch where the flexible build-time memory management is supported.

## **22 Changes: 1.0.2 compared to 1.0.1**

- Commands returning variable length data works in BGScript.
- ADC functionality fixed if using analog pin as reference.



## **23 Changes: 1.0.1 compared to 1.0.1**

- SW is also released through Bluegiga tech forum
- Few final fixes done.

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