BLED112 *Bluetooth*® Smart USB Dongle

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Key Features

- ***Bluetooth* v.4.0, single mode compliant**
  - Supports master and slave modes
  - Up to 8 connections
- **Integrated *Bluetooth* Smart stack**
  - GAP, GATT, L2CAP and SMP
  - *Bluetooth* Smart profiles
- **Radio performance**
  - Transmit power : +0 dBm
  - Receiver sensitivity: -93dBm
- **USB host interface**
  - Supports USB/CDC (virtual COM port)
- **Programmable 8051 processor for stand-alone operation**
- ***Bluetooth*, CE, FCC, IC, Japan and South-Korea qualified**

Benefits

- **Integrated *Bluetooth* stack**
  - No *Bluetooth* stack needed on the host
  - Operating system independent
- **Wide Operating System support**
  - Windows®
  - Linux
  - MAC OS
  - Android
- **BGAPI™ software interface**
  - An OS independent API between the dongle and the host
- **On-dongle applications**
  - Developed with simple BGScript™ scripting language
  - Enables stand-alone operation
- ***Bluetooth*, CE, FCC, IC, South-Korea and Japan qualified**
  - Proven interoperability
  - No qualification costs

BLED112 Overview

- ***Bluetooth* low energy radio**
  - Frequency: 2402 – 2480 MHz
  - TX power: 0 dBmRX sensitivity: -93 dBm
  - Modulation: GFSK
  - Symbol rate: 1 Mbps
- **Antenna**
  - Integrated PCB antenna
- **Typical line of sight range:**
  - +0dbm: 20-40 meters
  - -20 dBm: ~5 meters

BLED112 Overview

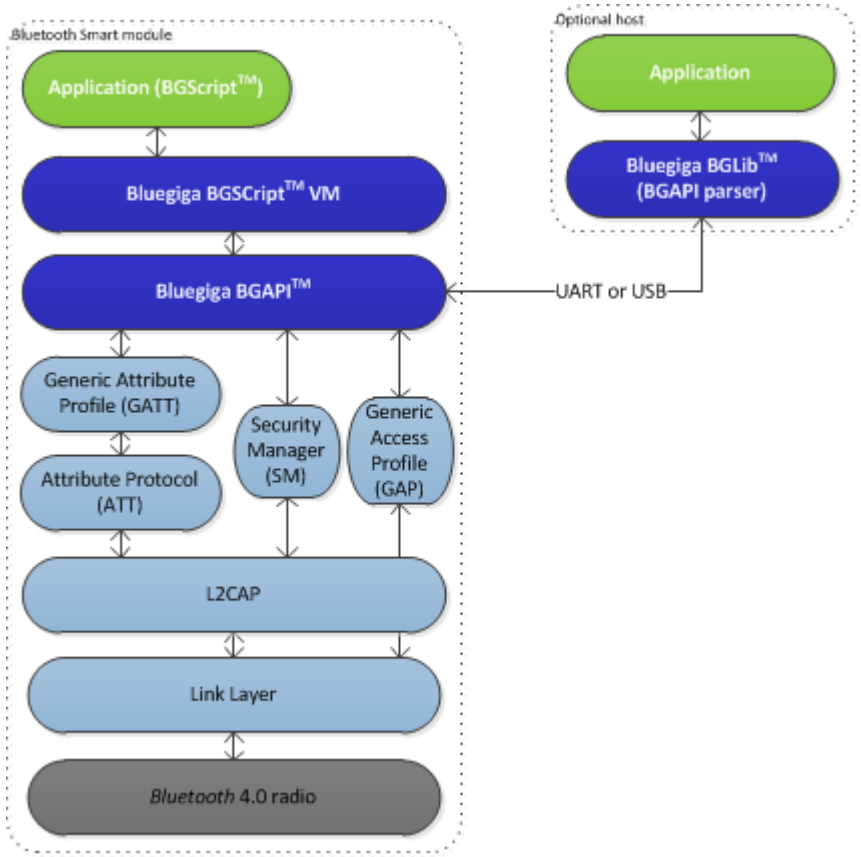
A programmable 8051 microcontroller

- **Architecture**
  - 8-bit, 8051 architecture
- **SRAM**
  - 8 kB
- **Flash**
  - 128kB

Bluetooth® Smart Software

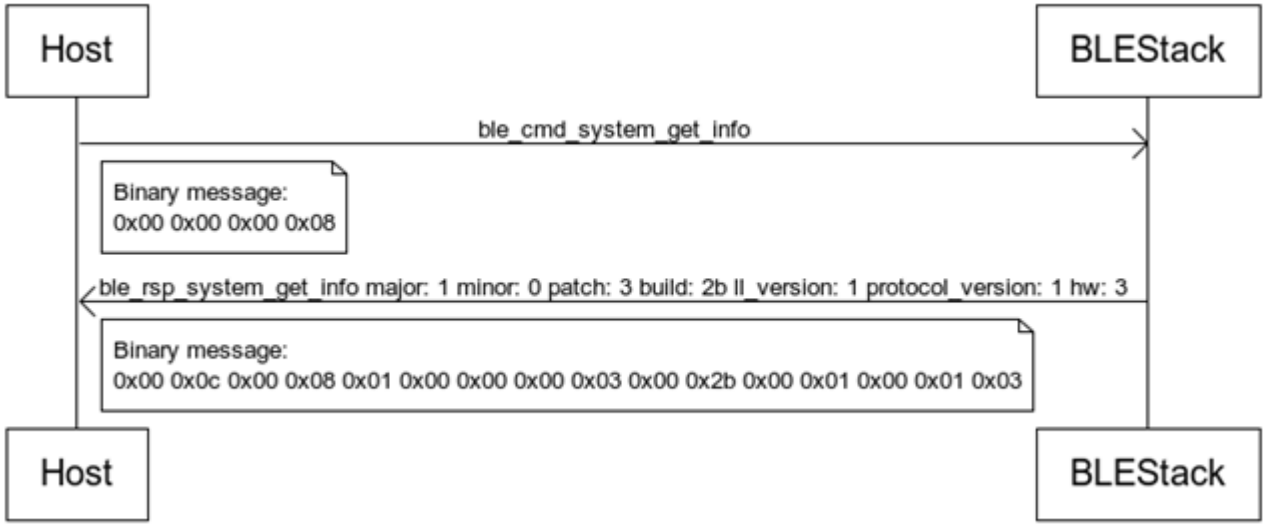
Bluetooth Smart Software

- ***Bluetooth v.4.0*, single mode compliant**
  - Supports master and slave modes
  - Up to 8 simultaneous connections
- **Implements all *Bluetooth* Smart functionality**
  - GAP, L2CAP, ATT, GATT
  - Security manager: bonding, encryption
  - *Bluetooth* Smart profiles
- **Simple API for external host processors**
  - BGAPI™ : A simple protocol over UART or USB interfaces
  - BGLib™ : A C library for host processors implementing BGAPI
- **Supports standalone applications as well**
  - BGScript™ : A simple scripting language for writing applications
  - **No separate host needed**
- **Blutoooth Smart Profile Toolkit™**
  - XML based development tool for Bluetooth Smat profiles
  - Fast and simple profile development
- **Small memory requirements**
  - ~4kB RAM
  - ~70kB flash (depending of used features/profiles)
- ***Bluetooth* qualified**



Bluegiga *Bluetooth*® Smart Software

- **BGAPI™ protocol** : A simple binary command, response and event protocol between the host and the stack
  - Used when a separate host (MCU) is used to control BLED112 over USB
  - Very small memory requirements size requirement and low implementation overhead



Bluetooth Smart Software

- **BGLib™ library** : A portable ANSI C library, which implements the BGAPI protocol
  - Easy to port to various architectures such as : ARM Cortex, PIC16/32 etc.
  - Uses fuction–call back architecture

C Functions

```
/* Function */
void ble_cmd_gap_connect_direct(
    bd_addr address ,
    uint8 addr_type ,
    uint16 conn_interval_min ,
    uint16 conn_interval_max ,
    uint16 timeout
);

/* Callback */
void ble_rsp_gap_connect_direct(
    uint16 result ,
    uint8 conn
);
```

Bluetooth Smart Software

- **BGScript™ scripting language** : A very simple BASIC-like application scripting language
  - Used when applications are implemented on the BLED112's 8051 controller
  - Enables very fast application development and allows programs to be executed directly on the BLED112 without the need of an external MCU

```
# System boot event listener : Executed when BLE112 is started
event system_boot(major ,minor ,patch ,build ,ll_version ,protocol_version ,hw )


    # Configure ADV interval to 1000ms and start advertisements an all channels
    call gap_set_adv_parameters(1600, 1600, 7)

    # Start generic advertisement and enable connections
    call gap_set_mode(2,2)

   #Start a continuous software timer, which generates interrupts every 1000ms
   call hardware_set_soft_timer(32768, 1, 0)
end
```

Bluetooth Smart Software

- **Why to use BGScript™?**

- **Very simple to use**
  - Fast development of simple *Bluetooth* Smart applications
  - Examples: Pairing, simple user interfaces, simple sensors

- **Free software development tools**
  - Code developed with any text or source code editor
  - Code compiled with Bluegiga's free compiler

- **Several example scripts available**
  - Heart Rate sensor
  - Proximity reporter
  - FindMe tag
  - Medical devices such as blood glucose

- **Cuts out the need for external MCU**
  - Reduced product eBoM
  - Smaller footprint
  - Faster time-to-market

Bluetooth Smart Software

- ***Bluetooth* Smart Profile Toolkit™**: A tool for creating *Bluetooth* Smart profiles
  - *Bluetooth* Smart profiles are very simple
  - Can be describes with a single file of XML
  - Profile toolkit is a Simple description language of *Bluetooth* Smart Profiles
- **Several example profiles and services available**
  - Heart Rate Sensor
  - Proximity Reporter
  - FindMe
  - Blood glucose

```
<?xml version="1.0" encoding="UTF-8" ?>
- <configuration>
  + <service>
  - <service>
      <uuid>3a00</uuid>
      <description>Heartrate Service</description>
    - <characteristic id="heartrate">
      - <properties>
          <read />
          <notify />
        </properties>
        <uuid>3a01</uuid>
        <value type="UINT8" />
        <description>Beats per minute</description>
      </characteristic>
    - <characteristic id="rr_interval">
      + <properties>
        <uuid>3a02</uuid>
        <value type="UINT16" />
        <description>R-R Interval</description>
      </characteristic>
    - <characteristic>
        <uuid>3a03</uuid>
      + <properties>
        <value type="SFLOAT" unit="kJ" />
        <description>Energy Expended</description>
      </characteristic>
    - <characteristic>
        <uuid>3a04</uuid>
      + <properties>
        <value type="UINT8" />
        <description>Sensor Status</description>
      </characteristic>
    + <characteristic type="aggregate">
    </service>
</configuration>
```

Certifications

- ***Bluetooth* 4.0**
  - BLED112: Controller subsytem
  - Software : Host subsystem
- **CE**
  - EN300328
  - EMC330489
- **FCC**
  - FCC Modular approval
- **Industry Canada**
  - IC modular certification
- **South Korea**
  - KCC certification
- **Japan**
  - ARIB-STD-66

Thank You