Bluetooth 4.0 Solutions for Apple iOS Devices

Bluegiga Technologies
Agenda

- Introduction
- How to build Bluetooth 4.0 applications
- Compatible Bluegiga products
- What is Bluetooth low energy?
- Summary
Introduction
Compatible Apple products

- **Bluetooth 2.1 + EDR compatible devices are:**
  - iPhone 3G, 3GS, 4 and original
  - iPod Touch 2nd generation and later
  - iPad and iPad2

- **Bluetooth 4.0 compatible devices are**
  - iPhone 4S
  - MacBook Air
  - Mac Mini
Supported *Bluetooth* profiles

**Bluetooth 2.1 + EDR**

<table>
<thead>
<tr>
<th>Device</th>
<th>Hands-Free Profile (HFP 1.5)</th>
<th>Phone Book Access Profile (PBAP)</th>
<th>Advanced Audio Distribution Profile (A2DP)</th>
<th>Audio/Video Remote Control Profile (AVRCP)</th>
<th>Personal Area Network Profile (PAN)</th>
<th>Human Interface Device Profile (HID)</th>
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<tbody>
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<tr>
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**Bluetooth 4.0**

Profiles are developed as Apps available from App Store
Supported *Bluetooth 4.0 profiles*

- On iOS devices the profiles are implemented as Applications
  - Downloaded from App Store

- Profiles are developed with Apple xCode SDK
  - Provides CoreBluetoothFramework APIs

- API provides access to
  - Discover devices
  - Connect devices
  - Exchange data

- No authentication chip, no license fee to Apple
How to build *Bluetooth 4.0* applications
The Device

- Integrate BLE112 Bluetooth 4.0 single mode module
  - Contains Bluetooth 4.0 single mode radio
  - Peripheral interfaces (I²C, GPIO, ADC, SPI, USB, UART etc.)

- Integrate BLE112 Bluetooth 4.0 single mode software
  - BLE112 contains Bluetooth 4.0 single mode stack
  - Develop profile with Profile Toolkit™
  - If you have external MCU
    - Use BGLib library to control BLE112
  - No external MCU in the product
    - Develop the application into BLE112 with BGScript™
    - Examples exists for several applications

- No Bluetooth qualification for parts Bluegiga has qualified

- No authentication processor needed
iPhone 4S

- Develop the Bluetooth profile as application
  - Profiles are very simple and require little specification
  - Specs available at: www.bluetooth.org/spec

- Develop the user interface and other application functionality
  - Use xCode SDK and APIs from Apple

- Use Bluegiga’s example application as a starting point
  - Shows how to discover and connect Bluetooth 4.0 devices
  - Basic data transfer examples

- No Bluetooth qualification needed for applications
Compatible Bluegiga products
**Bluetooth 4.0 single mode module**

- **Bluetooth v.4.0, single mode compliant**
  - Supports master and slave modes
  - 4+ connections in master mode*

- **Integrated Bluetooth low energy stack**
  - GAP, GATT, L2CAP, SMP
  - *Bluetooth* low energy profiles

- **Radio performance**
  - Transmit power: +3 dBm to -23dBm
  - Receiver sensitivity: -87dBm to -93dBm

- **Ultra low current consumption**
  - Transmit: 27mA (0 dBm)
  - Receive: 19.6mA
  - Sleep mode 3: 0.5uA

- **Programmable 8051 processor for embedding full applications**

- **Bluetooth end product, CE, FCC and IC qualified*”

* In progress
**Bluetooth 4.0 single mode USB dongle**

- **Bluetooth v.4.0**, single mode compliant
  - Supports master and slave modes
  - 4+ connections in master mode

- Integrated **Bluetooth** low energy stack
  - GAP, GATT, L2CAP, SMP
  - **Bluetooth** low energy profiles

- **Radio performance**
  - Transmit power: +3 dBm to -23dBm
  - Receiver sensitivity: -87dBm to -93dBm

- **Integrated USB device classes**
  - USB communications device class
  - USB HID device class*

- **Bluetooth** end product, CE, FCC and IC, South-Korea and Telec qualified*

* In progress
**Bluetooth 4.0 single mode stack software**

- **Bluetooth v.4.0, single mode compliant**
  - Supports master and slave modes in a single firmware
  - 4+ connections is master mode

- **Supports following protocols**
  - SMP, ATT, L2CAP signalling

- **Supports following profiles**
  - GAP, GATT
  - Any standard Bluetooth GATT profile (with Profile toolkit)
  - Any manufacturer specific GATT profile (with Profile toolkit)

- **Integration options**
  - BGAPI binary host protocol over UART, USB or SPI
  - BGLib host library (ANSI C) – implements BGAPI
  - BGScript™ scripting lanugage for application on-board BLE112

- **Ultra low memory requirements**
  - RAM: 2kB
  - Flash: 40-50kB

- **Bluetooth v4.0 host subsystem qualified**
Summary
Summary

Bluegiga’s solution enables quick development
- **No** Bluetooth hardware development required
- **Very little** Bluetooth software development needed
- **No** Bluetooth qualification needed for Bluegiga qualified parts
- Development time: 1-3 months

Bluegiga’s solution enables simple development
- Profiles are developed with simple XML schema
- Simple BGAPI protocol and BGLib C-library for the host exist
- For standalone applications simple BGScript scripting can be used
- Development time: 1-4 weeks
Summary

Quick development of Apps and Bluetooth profiles
- Profile can be developed as App - No need to wait for the profile to be supported by the phone manufacturer
- Profiles are very simple
- Sample application available for Bluegiga
- Development time: 1-3 weeks

Bluegiga enables fast time to market for accessory vendors
- Short hardware and software development times
- Very little – if no qualification needed at all

Bluegiga lowers the development costs
- Development costs in the range of $5-20k
Summary

- Join MFi program
  - Gives you access to Apple documents and tools

- Buy Bluegiga’s Bluetooth 4.0 products

- Develop the product
  - [http://techforum.bluegiga.com](http://techforum.bluegiga.com)
  - support@bluegiga.com

- Go to production
What is *Bluetooth* low energy?

*Bluetooth* low energy (*Bluetooth* 4.0) is designed for new emerging applications such as:

- Health and fitness
- Consumer medical
- Smart energy
- Security
- Proximity and presence

It still embraces the same features we already know from the classical, well established *Bluetooth* technology:

- Robustness and reliability
- Security
- Global availability
- Interoperability

*Bluetooth* low energy devices come in two flavours:

- **Single-mode** - devices that only support *Bluetooth* low energy and are optimized for low-power, low-cost and small size solutions.
- **Dual-mode** - devices that support *Bluetooth* low energy and classical *Bluetooth* technologies and are interoperable with all the previously *Bluetooth* specification versions.
Thank you!

www.bluegiga.com