
AprilBeacon 227A

<http://aprbrother.com>

Bluetooth Low Energy® (4.0) + iBeacon compatible device

Introduction

Key Features

- Broadcast data packets based on Bluetooth LE® (4.0)
- Compatible with all Bluetooth 4.0 (BLE) devices
- Compatible with Apple iBeacon™ standard
- Configurable parameters
- Proximity UUID, Major and Minor values
- Transmission power level
- Messaging / advertising intervals
- Protected by passwords
- Over-The-Air firmware upgrade
- Fleet management through mobile app and
- Over 12 months of battery lifetime on default settings (24/7/365 usage at full power)
- Battery is replaceable without damaging the beacon



Applications

- Micro-location and movement tracking
- Indoor / outdoor navigation and directions assistance
- Contextual offer promotion and advertising
- Customer loyalty and reward programs
- Enter / exit events
- Providing menus, catalogs, and inventory overviews
- Inventory tracking and logistics
- Healthcare and patient tracking
- Interactive tours and exhibitions e.g. museums and conferences
- City games and geocaching
- Contactless payments
- Contactless identification

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- Security and perimeter fencing
 - ...and much much more...

General Description

April Beacon are small electronic devices based on Bluetooth Low Energy® (BLE) that broadcast continuous radio signals – essentially operating as a sensor and transmitter. These signals can be received without pairing to any devices, and only requires a device equipped with Bluetooth 4.0 to be in range e.g. all iPhones™ from 4S and later, to the latest Android and Windows mobiles.

When receiving data packets, beacons can precisely estimate their distance and relative location without using power hungry and expensive systems like GPS. This opens up many new opportunities to use beacons in a variety of applications – such as providing interactive experiences, offering guidance, and providing targeted offers based on contextual data.

- Power is supplied by two AAA batteries to operate, but due to the low power consumption our Beacons can run 12 months or longer on two cells only (assuming 24/7/365 usage at full power).
- The maximum broadcast range depends on set transmission power and the environment where it is used (because the signal can be diffracted and absorbed).
- Default value is set at 0dBm, but this can be changed after the first connection
- Other parameters can be changes as well, such as the duration of advertising intervals (default 600ms), some parts of the messaging packet, and the connection password.
- Users can also update firmware over-the-air.

Packets Structure

The Beacon can broadcast the “advertising packet”, where the Beacon continuously “advertises” its presence, and waits to make contact with another BLE-enabled device (such as your smartphone).

Advertising Packet

April Beacons start broadcasting advertising packets as soon as the battery is installed. These packets are compatible with Apple’s iBeacon™ standard and has the structure shown below in table 1.

After 9 bytes of constant preamble; Proximity UUID, Major and Minor values are

transmitted. The UUID is 16 bytes long, while the Major and Minor values are 2 bytes long. Together they form a unique ID, so other devices (like smartphones) can recognize which Beacon they are approaching.

The next byte is used to calculate the distance from Beacon (note: multiple beacons can be connected to use triangulation / trilateration). It presents value of RSSI (Received Signal Strength Indication) measured 1 meter from the Beacon. This byte is changed automatically when users set another transmission power.

Table 1. April Beacon default advertising packet structure

Byte	Default value	Description	Properties
1	02	Data length – 2 bytes	constant preamble
2	01	Data type – flags	constant preamble
3	06	LE and BR/EDR flag	constant preamble
4	1a	Data length – 26 bytes	constant preamble
5	ff	Data type - manufacturer specific data	constant preamble
6	4c	Manufacturer data	constant preamble
7	00	Manufacturer data	constant preamble
8	02	Manufacturer data	constant preamble
9	15	Manufacturer data	constant preamble
10	e2	Proximity UUID byte	set user UUID
11	c5	Proximity UUID byte	set user UUID
12	6d	Proximity UUID byte	set user UUID
13	b5	Proximity UUID byte	set user UUID
14	df	Proximity UUID byte	set user UUID
15	fb	Proximity UUID byte	set user UUID
16	48	Proximity UUID byte	set user UUID
17	d2	Proximity UUID byte	set user UUID
18	b0	Proximity UUID byte	set user UUID
19	60	Proximity UUID byte	set user UUID
20	d0	Proximity UUID byte	set user UUID
21	f5	Proximity UUID byte	set user UUID
22	a7	Proximity UUID byte	set user UUID
23	10	Proximity UUID byte	set user UUID

24	96	Proximity UUID byte	set user UUID
25	e0	Proximity UUID byte	set user UUID
26	00	Major byte	set major value
27	00	Major byte	set major value
28	00	Minor byte	set minor value
29	00	Minor byte	set minor value
30	c4	Measured power	signal power value

Connection

User can connect with Beacons using any BLE-enabled device. In order to change the Beacon's settings you will need a special app installed to do this. For example the AprilBeacon app is available free from the App Store.

Services

The Beacon has four services implemented by default. Two of these services are standard Bluetooth SIG's with 16-bits Universally Unique Identifiers (UUID).

Service 1	
UUID	0xFFFF0
Characteristic 1	
UUID	0xFFFF1
Name	Proximity UUID
Description	Set the new proximity uuid
Properties	32 hexadecimal numbers; readable, writable after correct password
Characteristic 2	
UUID	0xFFFF2
Name	Major
Description	Set new major
Properties	4 hexadecimal numbers; readable, writable after correct password
Characteristic 3	

UUID	0xFFFF3
Name	Minor
Description	Set new minor
Properties	4 hexadecimal numbers; readable, writable after correct password
Characteristic 4	
UUID	0xFFFF4
Name	Measured power
Description	Set new measured power
Properties	2 hexadecimal numbers; readable, writable after correct password
Characteristic 5	
UUID	0xFFFF5
Name	Tx power
Description	Set new tx power
Properties	2 hexadecimal numbers; See the table 3 below.
Characteristic 6	
UUID	0xFFFF6
Name	Passcode
Description	Set new passcode
Properties	24 hexadecimal numbers; readable, writable after correct password
Characteristic 7	
UUID	0xFFFF7
Name	Advertising interval
Description	Set new advertising interval
Properties	2 hexadecimal numbers; readable, writable after correct password
Characteristic 8	
UUID	0xFFFF8
Name	AT Command
Description	Input AT command
Properties	40 hexadecimal numbers; See Table 4.

Table 3. Available transmission power values [dBm]

Hexadecimal value	Decimal value
00	0
01	4
02	-6
03	-23

Table 4. Available AT commands

Command Name	Description	Examples
AT+RESET	Reset April Beacon	
AT+AUTH	Input the passcode to make the beacon writable	AT+AUTHAprilBrother
AT+DPLOY	Deploy mode. Make the beacon unconnectable	

Electronic Parameters

Item	Value	Remarks
Firmware	AprilBeacon	2.0
Battery Model	AAA*2	3.0V, 2 pcs
Operation Voltage	2.0-3.6V	DC
Operation Frequency	2400-2483.5MHz	Programmable
Frequency Error	+/- 20KHz	
Standby current	100uA	Depends on duty cycle / broadcasting frequency
Broadcasting Frequency	600ms	Programmable
Output Power	0dBm	Default setting, programable
Transmission distance	30 meters	BER<0.1%, Open space
Antenna	50 ohm	External antenna
Size	66 * 36 * 22	mm