BLUEPYC Unconventional. Smart. Wireless.

BluEpyc Beacon Wake-Up Activator System

The new BluEpyc designed hybrid system, consisting of a Beacon Activator device with low-frequency radio for the activation (awakening) of the Tag Beacon and of a Wake-Up Beacon with ultra-low battery consumption. It's an evolutionary step aimed to improve the capability of Bluetooth in the indoor localization of people and assets.

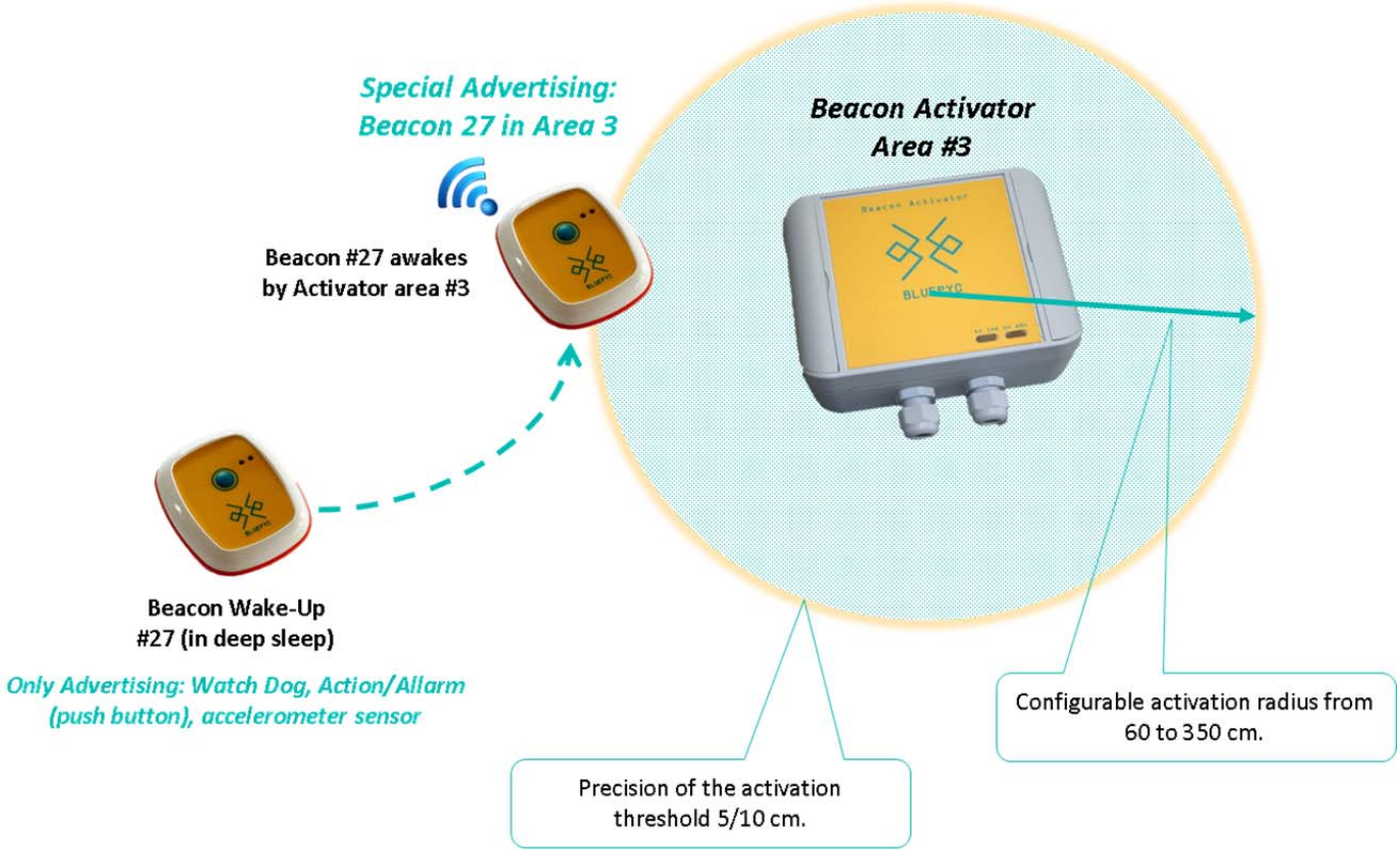
How it works

- Special **BluEpyc Beacon Wake-Up** (attached to person/item) usually in **deep-sleep**: battery life up to 4/5 years.
- **BluEpyc Beacon Activator** generates an accurate "Wake-Up area" (encoded LF field) of the Beacon Wake-Up in deep sleep. Activation area (3D bubble): **0.6-3.5 mtr. radius**.
- When the **BluEpyc Beacon Wake-Up** enters the activation zone (**accuracy 5/10 cm.**), it transmits an Advertise with the **code of the Beacon Activator** that woke it up.
- It can operates both via Bluetooth connection and in **Stand-alone mode**.
- **Some application scenarios**: vehicle & people access control (also stand alone), home & building management, safety (hospital, construction site, etc…), process automation, asset & facility management, smart city (parking, leisure & tourism, etc…)

Highlight

- Operation Frequency: 2,4 GHz. **Bluetooth 5.1 Low Energy**. Bluetooth integrated antenna.
- **Multifunction** BluEpyc Beacon Wake-Up.
- **Customizable system**: BluEpyc Start, Android App./ special Firmware, possibility of custom applications on-board (on request)
- IoT & Active RFID application. **Real Time Location System & Location Based Services**.

BluEpyc's Beacon Activator & Beacon wake-up system allows you to calculate its position more accurately than a standard Bluetooth Low Energy architecture.



Since the Beacon Activator transmits the data with its own identification code, the Beacon Wake-up, not only comes out of the deep-sleep state and wakes up, but it's also able to know the accurate position: the Beacon transmits an advertising whose dataset also contains the ID of the Beacon Activator that woke it up.

BluEpyc BLE Beacon Wake-Up on trigger

Ultra low power & fully configurable Beacon With accelerometer sensors - push button - accurate position detection

IoT & Active RFID application. Real Time Location System (zone method).

Highlight

- Special **BluEpyc Beacon Wake-Up** (attached to person/item) usually in **deep-sleep**, is switched on by the **BluEpyc Beacon Activator** (accuracy 5/15 cm).
- **On board**: Wake-Up LF, accelerometer, temperature, push button. Status LEDs (bi-color)
- **Multifunction Beacon Advertising**: Presence (Watch Dog), Wake-Up (with Area Code), Action/Allarm (push button), accelerometer (transmission on movement or free fall). All the functions can be activated and fully customized separately.
- **Responsive** to specific application: custom on-board applications (special firmware) allows to adapt the device to specific and custom uses.
- Protection rating suitable for outdoor use. Replaceable battery CR2032 3V Li; life up to 5 years (depending on use).
- Some **application scenarios**: Location Based Services, safety of warehouse operators, production management and traceability, precision access control, application in the Health sector, etc...

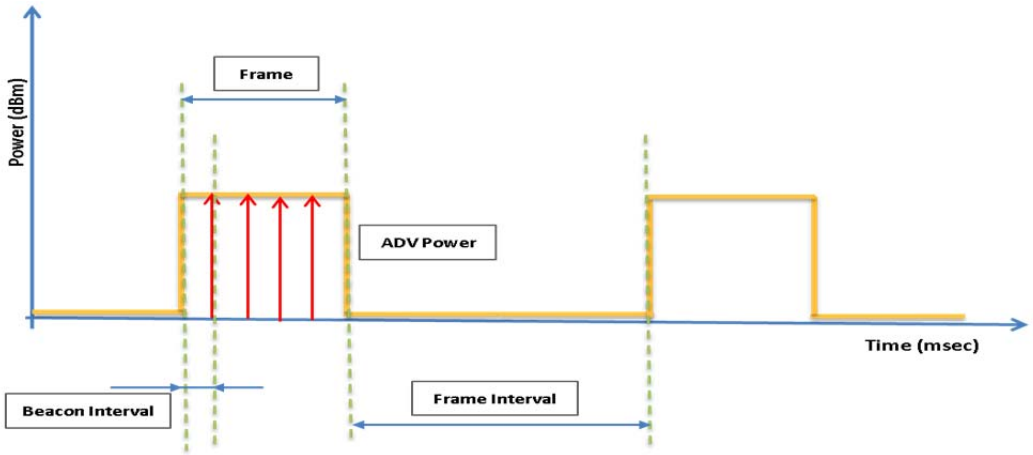
Standard Functionality

The BluEpyc BLE Beacon Wake-Up firmware exposes configuration services via BLE OTA (Android App).

- **Power on/off button**: if pressed for more than 2 seconds, the status switches from deep-sleep to operational or vice versa.
- **Commissioning phase**: when the Beacon is switched on, it transmits a connectable advertising frame of duration, beacon interval and preset power useful for connection and customization of operating parameters (see table below); the advertising package contains, besides other information, also the version of the installed firmware.
- **Presence or Watch Dog**: when the Beacon works, it transmits (if enabled) advertising frames with customizable characteristics and format specified in the parameters (see table below).
- **Button (Action)**: can be configured to transmit advertising packages, called "Action", with different format, timing, power and sending parameters (see table below).

Configurable parameters for both presence type ADV (Watch Dog) and Action (push button)

Parameter	Options / Range
Advertising status	Active or inactive
Advertising Type	Standard, Apple iBeacon, Google Eddystone UID/URL, Custom
Connettibile ADV	Yes or Not
Frame interval	From 100 ms to 100 min. (only presence type)
Frame Number	From 1 to 65535
Beacon interval	From 100 ms to 10000 ms (10 secs)
ADV Power	From -10 dBm to +8 dBm



Accelerometer Functionality

If activated, the BluEpyc Beacon Wake-up transmits advertising packages following specific events:

Beacon Wake-up movement:

- When the Beacon acceleration exceeds a certain configurable threshold, a 'Movement' type of Advertising packet is sent, containing the acceleration data on 3 axes (X, Y, Z).
- The threshold sensitivity can be set on a scale from 1 to 10 (1 = high sensitivity)

Free Fall:

- When the Beacon is in free fall, the 'Free Fall' type advertising package is transmitted, containing acceleration data on 3 axes (X, Y, Z).
- The activation sensitivity can be configured on a scale of values from 1 to 10 (1 = high sensitivity)

When the BluEpyc Beacon Wake-up enters the electromagnetic field produced by the Beacon Activator, an advertising package in BluEpyc format is generated containing the following information:

- **Current ID Beacon Activator**: contains the identification code (0-4095) of the Beacon Activator in whose monitoring area the Beacon Wake-up has entered and activated
- **Previous Beacon Activator ID**: contains the identification code (0-4095) of the Beacon Activator in which area has previously entered the Beacon Wake-up, if any, otherwise this field contains the value "0"
- **Counter**: contains a packet counter, designed to prevent the host from processing redundant data
- **Beacon Wake-up Data**: This 11-byte field is fully user-configurable and can be used to send additional information in the Wake-up package.

For the configuration of the Wake-up the standard parameters are provided among which:

- Activating/deactivating Wake-up
- Packages sent Connectable/Non-connectable
- Number of packages to send
- Transmitting Power & Beacon Interval

Special parameters related to the functional behavior of the Beacon in Wake-up mode:

- **Valid Time**: validity time for sending new advertising packages (0 – 65535 sec.)
- **Mode**: Preemptive/non Preemptive (refer to the table below)
- **Out Time**: time spent outside the area (0 – 65535 sec.)

Valid Time Mode	Mode of Operation
Disabled	Beacon broadcasts advertising every time it enters a Beacon Activator field.
Enabled Non-Preemptive	Beacon transmits advertising when it enters a Beacon Activator field and simultaneously activates the Valid Time count. As long as the Valid Time has not expired, the Beacon does NOT broadcast new Wake-up advertising packages whether it remains in the current Beacon Activator field or enters a new Beacon Activator field.
Enabled Pre-emptive	Beacon transmits advertising when it enters a Beacon Activator field and simultaneously activates the Valid Time count. If the Beacon remains in the current Beacon Activator field, it will NOT send new advertising packages until the Valid Time has expired. If the Beacon enters a new Beacon Activator field, regardless of the Valid Time (expired/not expired), it sends advertising packs for the new Beacon Activator field. If the Beacon leaves the current Beacon Activator field and re-enters the current Beacon Activator field, the advertising packet is broadcast: o if Valid Time has expired or o if Valid Time has NOT expired, but the Beacon has remained outside the current Beacon Activator field for a time greater than or equal to out time

BE-BW51

BluEpyc BLE Beacon Wake-Up on trigger

Ultra low power & fully configurable Beacon with accelerometer sensors - push button - accurate position detection

CPU	Low Power High Performance 32-bit 38.4 MHz ARM Cortex®-M4 with DSP instruction and floating-point unit for efficient signal processing, 256 kB flash program memory, 32 kB RAM data memory.
Operating frequency	2,4 GHz. IEEE Standard: 802.15.1 (Bluetooth 5.1 Low Energy) integrated antenna.
Transmission	Data Rate up to 2 Mbit/s. Transmission Power up to +8 dBm. Range: up to 80 meters in open air (depending on environment & configuration setting).
Sensitivity	-90 dBm sensitivity @ 1 Mbit/s GFSK (2.4 GHz).
Transmission Security	General Purpose CRC. Random Number Generator. Hardware Cryptographic Acceleration for AES 128/256, SHA-1, SHA-2 (SHA-224 and SHA-256) and ECC
Power supply	Replaceable battery CR2032 3V Li (220mAh).
Battery life	Depends on parameter and sensor setting, environment, number of wakes up (LF, button, accelerometer) and transmission power. Intensive use: approximately 1/2 years. Average use: approximately 2/3 years. Optimal use: up to 4/5 years.
Low Energy Consumption	8.2 mA TX current @ 0 dBm output power at 2.4 GHz. Sleep status (low power waiting for awakening) 600 nA. 63 µA/MHz in Active Mode (EM0). 2.5 µA EM2 Deep Sleep current (full RAM retention and RTCC running).
Input/Output	Led bi-color (Red & Green) for status indication. 1 x push buttons for On/Off (Button 1) and special action advertising (fully configurable).
Case	Class Protection: IP65. Dimensions: 55 x 46 x 17 mm..
Temperature range	Operation: -25° C up to 75° C - Storage: -25° C up to 85° C
Customization	Operating parameters and customization through Bluetooth Low Energy GATT services (On the Air) using mobile phones (Setup Android App), BluEpyc BLE USB dongle or BluEpyc BLE Smart Gateway.
Standard Firmware	Different advertising modes: standard BLE, Apple iBeacon, Google Eddystone or custom. Fully configurable watch-dog advertising. Commissioning mode. 1 Action push button fully configurable with different special advertising. Upgradable Firmware. Possibility of custom applications on-board (on request).

BluEpyc BLE Beacon Activator

for an accurate activation area to wake-up the Beacons in deep sleep mode

Highlight

- Generates a trigger sphere of variable radius with an area identification code and high threshold accuracy.
- It can create a gate which allows people and objects identification, including transit directions.
- Possibility of **stand-alone solutions** (Advanced Edition).
- Easy to install and configure. Only requires mains power. Protection rating suitable for outdoor use.
- BluEpyc Beacon Activator is available in two models: **Standard & Advanced Edition**.
- **Responsive** to specific application: the possibility of custom on-board applications (special firmware) allows to adapt the device to specific and custom uses.
- Some **application scenarios**: Location Based Services, safety of warehouse operators, production management and traceability, precision access control, application in the Health sector, etc...

Parameters

Parameter	Function	Values
Activator ID	Identification Number of Beacon Activator (transmitted by the Beacon awakened).	Range: from 0 to 4095. Default: 0
Tx Power	Transmission power used by Beacon Activator to generate LF electro-magnetic field. The larger the value used, the more intense the EM field will be and consequently bigger the bubble generated. (Adjustable threshold radius: 70-350 cm.)	Power Range: from 1 to 100. Default: 50
Tx Period	Establish the period used to generate EM field. A period of 0 means continuous transmission of electro-magnetic field.	Range: 0 to 5000 msec.
Tx Type	Transmission LF electro-magnetic field active or disabled.	0 - transmission disabled 2 - transmission enabled

The parameters can be configured with a PC through a USB port or with the Android App supplied (Advanced version only).

Advanced Edition

In addition to the Standard Edition:

- Integrated **Bluetooth Low Energy 5.1 module with EchoBeacon functionality** (see documentation): EchoBeacon receives Beacon's data then re-transmit the collected data to the BLE Gateway, distance up to 200 mt.
- N. 2 on board relays (Location Based Services, access control, etc.).
- Possibility of **stand alone operation** (local processing, white list, etc.) & possibility of custom firmware.
- Adjustable parameters through BLE service & mobile APP (included): All Activator parameter, EchoBeacon ID, Reading Time, Transmission Time, Watch Dog Time, filtering parameter (adv mask & RSSI), Transmission Power (16 step), output relé.
- On Board Beacon ID white & black list (up to 180 Beacon UID) for conditional parametric action (adv transmission & output activation), useful for stand alone application (e.g. access control, alarms, hospital safety, etc…).
- Feature: EchoBeacon ID (2 byte); anti-collision (multi Beacons reading with buffer); read Beacons Advertising & RSSI; BLE notification; filtering on beacons mask & RSSI Level, output relé on beacon presence.

Enviroment

Power supply	11-26 Volt DC (not included)
Case	ABS (UL 94 HB) Outdoor Case Wall & Ceiling Mount. Class Protection: IP66. Dimensions: 140 x 110 x 60 mm.
Temperature range	Operation: -25° C up to 75° C - Storage: -25° C up to 85° C