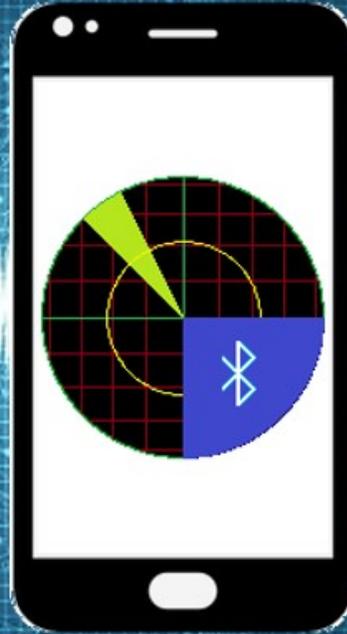




*Locate and track
your beacons*



Beacon Radar V1.24 Users Guide

© CelerSMS, 2019-2021

www.celersms.com

Introduction

The Beacon Radar is an application compatible with mobile phones, tablets, TV boxes and other Android devices. It can be used to monitor Bluetooth beacons (BLE), tags and sensors. Depending on the device capabilities, it's possible to detect presence, estimate distance and monitor the battery state of charge, temperature and relative humidity.



A beacon is a wireless device, usually the size of a watch or pen drive, capable of transmitting periodically a certain signal with minimal power consumption. The typical signal range is around 100m, while long range devices can reach up to 1km. Depending on the signal strength and transmission frequency the beacon can work autonomously for several months or years, without recharging the internal battery. Some beacons rely on USB power instead of internal battery.

A typical use case consists of attaching a beacon to a person, pet or some object, like a bag or vehicle. The Radar can be used to detect when the beacon gets close or goes far away. For example, it can help with picking up your [baggage at the airport](#), [locating a runaway pet](#), among other uses.

The Radar can monitor the internal beacon battery state of charge to detect when it's about time to recharge or replace the batteries.



Many beacons are equipped with temperature and/or humidity sensors. The Radar can be used to monitor the temperature and humidity if this kind of sensors are available.



There is a freeware version "**Radar Lite**". If you like the application consider supporting the developers by upgrading to "**Radar Pro**", which has additional features. The differences between both versions are explained in this document.

Specifications



The Beacon Radar application is compatible with Android 4.3 (Jelly Bean) or later. It is recommended to use at least Android 5.0 (Lollipop). Android Go is supported as well.

There are several standard beacon protocols and many proprietary. The Beacon Radar application supports all protocols described in the following table. If the BLE device uses a different protocol it might be detected by the Radar as a generic device.

Protocol	Description
 iBeacon	<p>iBeacon is the protocol implemented by Apple in 2013. Currently it's one of the most widely used beacon protocols, supported by many BLE equipment manufacturers. Each iBeacon device has a unique numerical identifier named UUID.</p> <p>Beacon+ and MkiBeacon protocols, which are iBeacon extensions, are also supported.</p>
 Eddystone	<p>Eddystone is the protocol introduced by Google in 2015. It can be used to advertise a link to a website (URL) and/or a telemetry frame (TLM), which can include a temperature sensor. The information can be encrypted. KSensor is a proprietary telemetry protocol based on Eddystone TLM.</p>
 AltBeacon	<p>AltBeacon is an open source standard authored by Radius Networks in 2014. It is mainly used in proximity beacons. The protocol is similar to iBeacon, except that it's an open standard.</p>
 RuuviTag	<p>RUUVi covers several protocols used for sensor monitoring (temperature, humidity, air pressure, acceleration and so on). The Radar supports RAWv1 and RAWv2, which are the main RUUVi protocols in use nowadays. The Encrypted Environmental Data protocol, also known as RuuviTag Data Format 8, is detected as well.</p>
 BeaconX	<p>BeaconX is a proprietary protocol used by Moko Technology (MOKOSmart™) in their BeaconX and BeaconX Pro devices. It can include an H&T frame for the corresponding humidity and temperature sensors.</p>
 Kontakt.io	<p>Kontakt.io provides a variety of beacons and tags, featuring sensors (temperature, humidity, luminosity, acceleration and so on). The sensor data and movement detection uses proprietary protocols supported by the Radar.</p>
 BlueMaestro	<p>BlueMaestro features various beacons and high-accuracy sensors: temperature, humidity, movement detection, acceleration. Accurate proximity estimation is not supported in most devices. They are mainly intended for telemetry.</p>

iBeacon™ is a trademark of Apple Inc. EddyStone™ is a trademark of Google Inc.

Kontakt.io™ is a trademark of Kontakt.io Inc. BlueMaestro™ is a trademark of Blue Maestro Ltd.

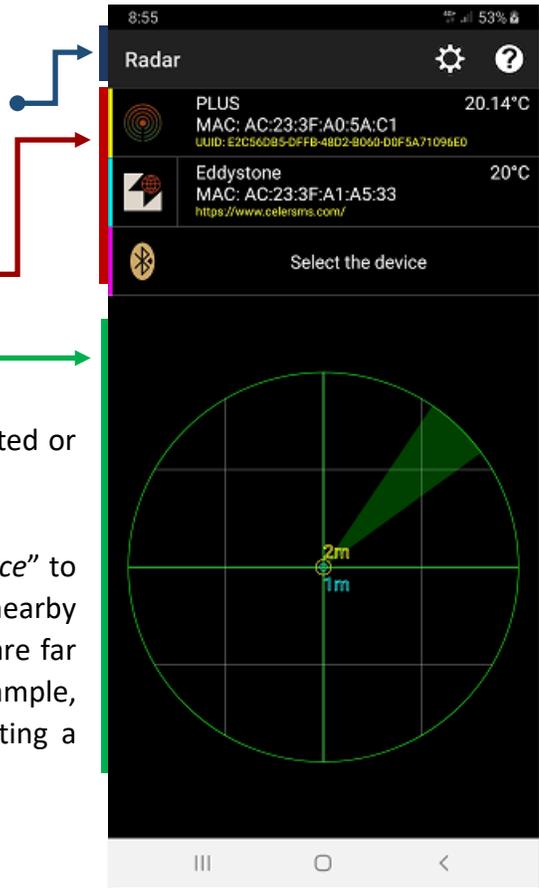
User Interface

When the application is installed or launched for the first time the permission for location tracking will be requested. This permission is necessary to enable the beacon tracking. It is not used to track the handset location.



The main User Interface consists of 3 sections:

- The **action bar** contains the buttons to access:
 - The **settings**
 - The **about box**
- The selected **devices**
- The **radar** widget



The **radar** widget is inactive if there is no device selected or Bluetooth is disabled or not available.

If there is no device selected let's click "Select the device" to display the list of nearby devices. Detecting and listing nearby devices can take some time, especially if the devices are far away or the advertisement frequency is low. For example, some beacons advertise every 5 sec or more. Detecting a specific device may require multiple cycles.



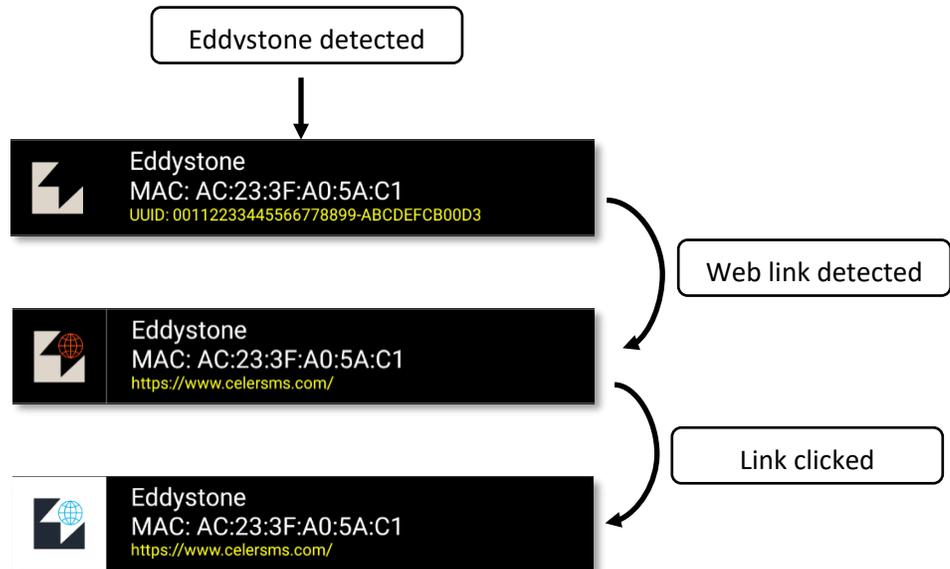
Radar Lite allows selecting a single device, while **Radar Pro** allows tracking up to 6 devices at the same time.

The **device** button can be clicked again anytime to select another device. If you want to keep the currently selected device just press the "< Back" button to cancel the selection. This is useful if the device button was clicked accidentally and you don't intend to select another device.

If the **radar** widget is active it can be touched to start scanning the selected devices continuously. Each scan cycle takes approximately 10 seconds. Touching the widget again stops the scan. While scanning is in progress an animation will be displayed and the screen will remain active. While scanning is in progress, if a new application is launched or another application comes to foreground or the screen is turned off, then the Radar can either continue scanning or stop scanning depending on the application [settings](#).

While scanning is in progress the **device** buttons will display the available updates, if any. For example, if the beacon supports the battery level of charge monitoring or is equipped with a temperature and/or humidity sensor the measurements will be updated continuously.

If the beacon device is an Eddystone with a web link it can take some time to capture the link. This is so because the link is not always broadcasted in every advertisement cycle. As soon as the link is received it will be displayed. The beacon icon on the left side will change to a clickable button to allow opening the link in the web browser, for example:



Warning! Don't open the link if you don't trust it. A beacon can contain a link to any kind of website. For safety, the Radar will request an explicit confirmation before opening the link.

The **Eddystone**, **Ruuvitag** and **Kontakt.io** beacons can optionally support encryption. If a beacon uses encryption the Radar will display a lock icon next to the beacon name, for example:



If the beacon is transmitting encrypted metrics (e.g. temperature) the metrics will be hidden, but the beacon can still be used for proximity detection.

Settings



In mobile phones and tablets the settings menu can be opened by pressing the  button in the action bar.

In Android TV the settings menu can be opened by pressing the **MENU** or **SETTINGS** button in the controller. If the controller doesn't have those buttons the alternative is to press and hold for a few seconds the select button.



Currently the following settings are available:

Radar Accuracy

These options are available in Android 5.0 and later.

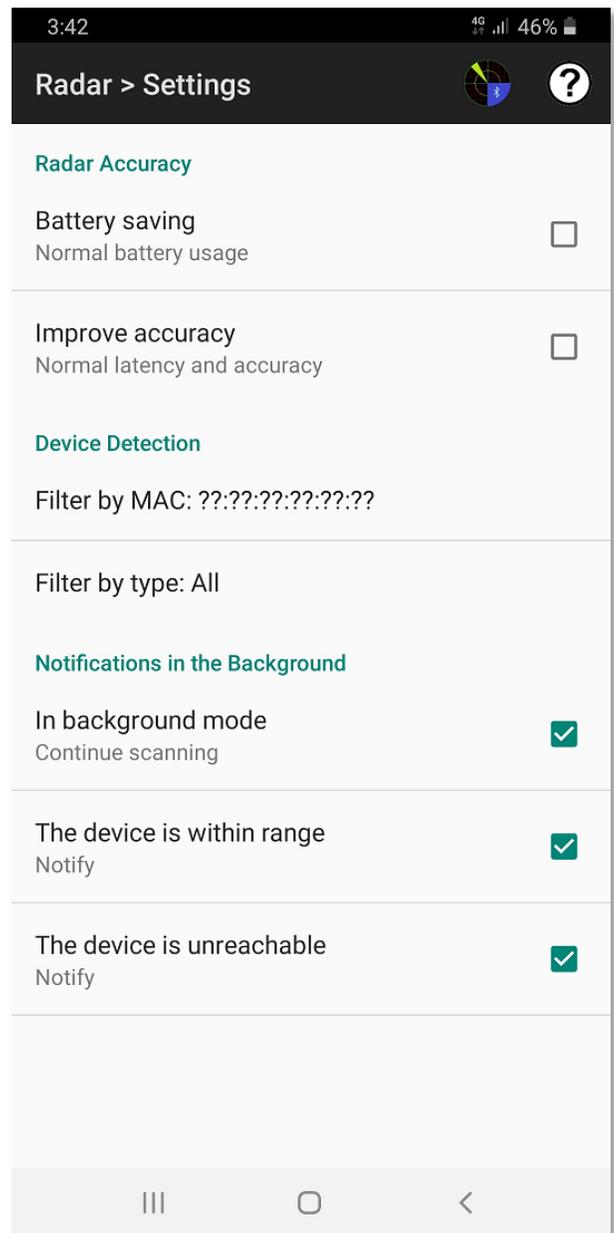
If **“Battery saving”** is enabled the Radar will run in energy saving mode. It will use less battery, but the accuracy and responsiveness of the Radar will be significantly reduced. It is not recommended to activate this option unless battery saving is really necessary.

If **“Improve accuracy”** is enabled the Radar will run in low latency mode. The accuracy and responsiveness will improve, but the battery usage will increase.

It's recommended to keep both options unchecked to let the Radar balance between accuracy and battery usage.

Device detection

It can be difficult to find a specific device if there are too many beacons nearby. For example, there can be hundreds of beacons at airports, malls. It's possible to limit the device discovery by activating the optional filters. This can be useful if you know the beacon type and/or the MAC address.



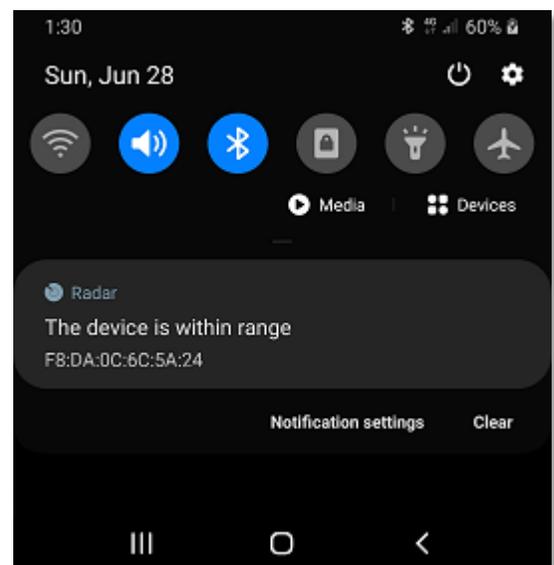
The **MAC** address is a unique 12 digit ID. Sometimes it is printed on the device casing. The first digits of the MAC address are specific to the beacon manufacturer or model. Therefore, it's possible to specify the first digits of the MAC to filter the nearby devices by manufacturer and model. If you specify the complete MAC address the Radar will scan a single device only.

The **filter by type** can be useful to scan for specific device types only. The filter by MAC and filter by type can be combined to refine the filtering.

Notifications in the Background

If the option to “**Continue scanning**” in background mode is active, the Radar will not stop scanning automatically when a new application is launched or another application comes to the foreground or the screen is turned off. This option is disabled by default because continuous scanning in the background uses battery.

However, there are cases when keeping scanning in the background can be convenient. For example, if the user is waiting to claim the baggage at the airport and at the same time needs to use a messenger or web browser or any other application. In that case it can be useful to enable scanning in the background along with the “**Notify**” when the device is within range or out of range options. As soon as the device is detected or becomes unreachable a notification will popup.



 Don't forget to stop scanning manually in the Radar screen or turn off scanning in the background when it's not needed any longer.

After modifying the settings you can go back to the main screen by clicking the Radar button on the action bar or pressing “< **Back**”.