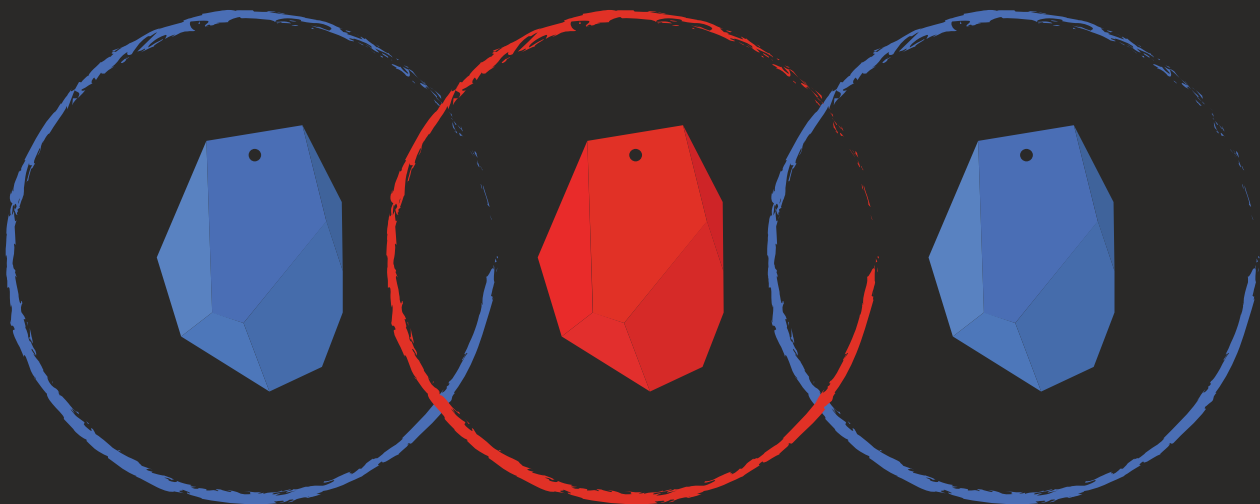


# USER GUIDE

Indoor Location



# Indoor Location - Instructions

## Physical Placing of your beacons

Each beacon corresponds to a specific region and the precision of indoor location feature depends on the quantity of beacons you will use, the range values you will set, as well as **the way you will physically place them**.

In action: For physical placing of your beacons, please ensure that they are **all placed at same height (around 2 meters high)**, and **not surrounded by metal surfaces**, as metalwork of any kind impairs the quality of the results. For example, if a beacon is surrounded by heavy metalwork, then most probably their transmission range will be around zero. (Warning: **water** can also impair the quality of the results of the beacons transmission range); if you need to place beacons in places where such conditions apply, we strongly recommend to first test the beacons (standalone) behavior there prior to continuing with their setup for indoor location feature.

## Prepare Beacon Devices

### B1. Unique ID & Advertising Interval

After placing the beacons (having in mind their transmission power), then you have to prepare them, by setting a unique ID value as well as defining their advertising interval.

QR-Patrol supports both ibeacon (made by Apple) and eddystone (made by Google) beacon protocols.

- For ibeacon protocol this ID must be a unique combination of **UUID, major** and **minor** values. We suggest that you keep UUID value the same for all beacons, and that you distinguish them by setting different value to one (both) of the major/minor values.

- For eddystone protocol, the ID must be a unique combination of **namespace ID (nid)** and **beacon ID (bid)**.

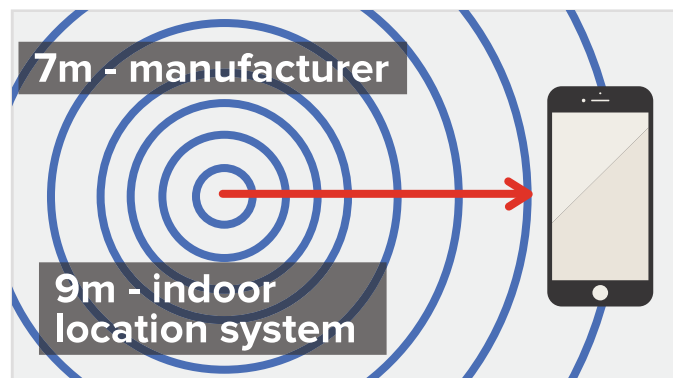
We suggest that you set the advertising interval to be around 200-300 ms (milliseconds).

**NOTE:** To retrieve/program these values, use the Application provided by your Beacon supplier. (e.g. Estimote)

## B2. Transmission Power

Next, you have to choose the transmit power of each beacon

Note: The beacon values you can define are specific (you cannot manually enter any value), i.e. the manufacturer allows (through the application) to set values by selecting from a predefined set (e.g. a set could be {3.5m, 7m, 15m, ...}). The transmit range value you need to set depends on the precision you wish to achieve and of course also depends on the number of beacons you plan to use.



It is often the case that the transmission power values do not correspond to real use, i.e. in reality the transmission power is higher than what you have defined. In most manufacturers we tested, it is around 20% more. So, we suggest choosing the transmission power (actual target value) that fits your needs in the Beacon supplier application but we also recommend setting the desired beacon accuracy in the web app (i.e. <https://followmystaff.com/>) by inserting a value that corresponds to 20% more than your actual target value, under Checkpoints -> Edit Beacon -> “Geofence Radius” field. For example, if you wish to have a transmission power of 3,5m in the Beacon range, you should set the Geofence Radius of the beacon to around 5m in the web application (followmystaff.com), while if you wish to have around 7m transmission power the value you should set in Geofence Radius of the beacon is around 9m. That impairs the precision of user’s location but the results are trustworthy.

## C. Set Indoor location Beacons – Web application

For each beacon (ibeacons and eddystone beacons types are both supported) you will use for indoor location, follow the steps below:

Next, you need to mark the beacon checkpoint as “indoor”:

- While under Company Checkpoints, press on Edit for the target beacon
- Set the exact coordinates of its physical location (latitude and longitude)
- Enable Geofence and set the desired beacon accuracy by inserting the corresponding value under “Geofence Radius” field (i.e. 20% more than transmission power of beacon, see section B.2 above)
- Enable indoor feature for that beacon
- Press on Confirm button to save your changes

Note: Marking a beacon as indoor will cause it not to be considered as checkpoint anymore i.e. it will not be available for adding to schedules or scanning by the guard etc.!

The screenshot shows a form with the following fields and values:

- Check Point Code: 282b258e-b81b001-44db234-81c44-61888f24e5b2-fb4238ad
- Check Point Name: Front door
- Client Point Notes (Max Length 256 characters): Check the front entrance
- Branch Office: Branch Office 1
- Assign Client: CRI
- Assign Site: CRI HQ
- Lock:
- Latitude: 10000
- Longitude: 10000
- Geofence Radius: 31
- Geofence Enabled:
- Client Site Code: Branch Office 1
- Check Point: Branch Office 1
- Custom Maps: Select an option
- Indoor:  (highlighted with a red box and arrow)
- Floor: 0

Buttons: Cancel, Confirm

You also need to enable indoor location feature and tracking for each guard, by following the steps below:

Company -> Guards -> Edit a specific guard

- Enable tracking with the interval of your preference
- Enable indoor location feature

## Test Guard

### Details

Full name

ID

PIN

Customer Code

Licenses  QR-Patrol  Ptt

### Branch Office

### Location

Accuracy (m)

Watch Timeout

Check Interval

### Emergency Settings

Phone 1

Phone 2

Phone 3

### Tracking

Enabled

Check interval

### Map

Enabled

### Unsent Events Notifier

Enabled

Check Interval

### Man Down (Experimental)

Enabled

### Indoor Location

Enabled

### Beacon Settings

Scan Mode

Auto Mode Interval

### SOS Buttons

Seperation Alert

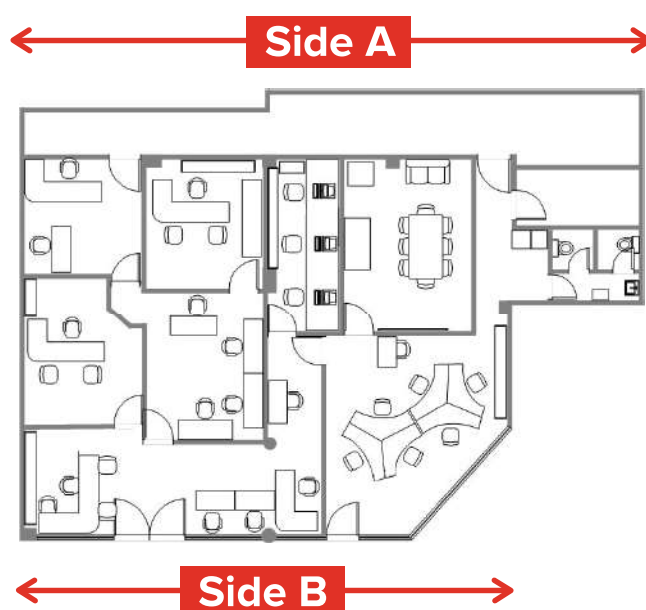
Note: We recommend only enabling this feature for the Guards who need it (i.e. that will patrol within the indoors area(s) you have defined), since this feature requires Bluetooth functionality enabled which affects battery consumption.

# Setting Up Beacons for Indoor Location

Use case of a small office

## Option A - Small Office - General Location Range (3m-9m) - Use of 3 beacons.

To begin with, we choose the longest building side to place the first beacon (in this example named “side A” (picture\_001)).



We need to decide about the physical placing of the beacons. A general suggestion is not to place them in corners (i.e. in this example in corners of side A), in order to achieve better coverage with smaller number of beacons. Side “A” is almost 20 m. Thus, the range of the beacon should be set to under 20 m – our selection depends mostly on the accuracy we would like to achieve – we also plan to use two beacons on Side A, thus the range value should be around 10m. The beacon manufacturer allows setting of transmit range from the following set of values {0.25m, 3.5 m, 7m, 15m, ...}. Having in mind our rule (“choose the transmission power (actual target value) that fits your needs in the Beacon supplier application but we also recommend to set the desired beacon accuracy in the web app (i.e. <https://followmystaff.com/>) by inserting a value that corresponds to 20% more than your actual target value”), we set the beacon transmit range to 7m and we set the Geofence radius in the web app at 9m (<https://followmystaff.com/>).

**1** So, first beacon (“Beacon01”) has to be placed at around the half of the range of 9m (i.e. of the real range value as explained above) i.e. around 4,5m from the start of side A. For that reason and always having in mind the office architecture (at 4,5m there is a physical obstacle), we choose to place Beacon01 around 6m from the top left corner (start of side A).

**2** The second beacon (“Beacon02”) will have the same transmit range as “Beacon01”. It has to be placed on the same side (side A) but having a maximum distance of 18 m (i.e. of the sum of their Geofence radius) from Beacon01 - otherwise an area within those two beacons would be left without coverage by any of them:

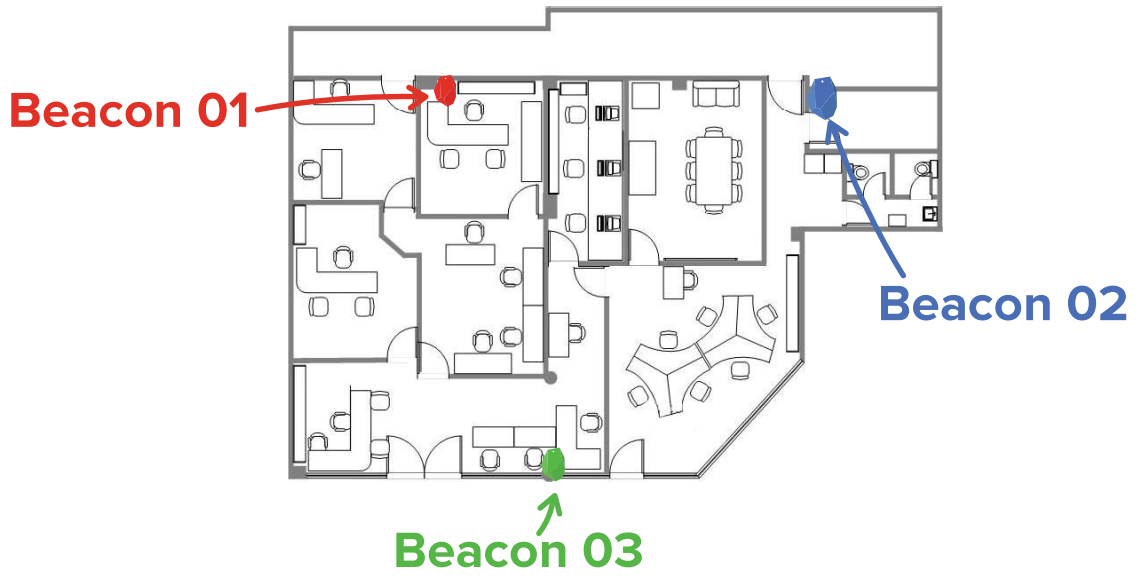


Additionally, it is better to have it in distance greater than 9m (i.e. the beacons Geofence radius) from “Beacon1”.

**3** So far, we have addressed coverage for side A, but the area near “side B” has no coverage by any beacon. Notice that “side B” is much shorter than “side A”: thus we can cover it by using only one beacon around the middle of that side (side B) and setting its beacon transmit range to 7m (Geofence radius 9m).

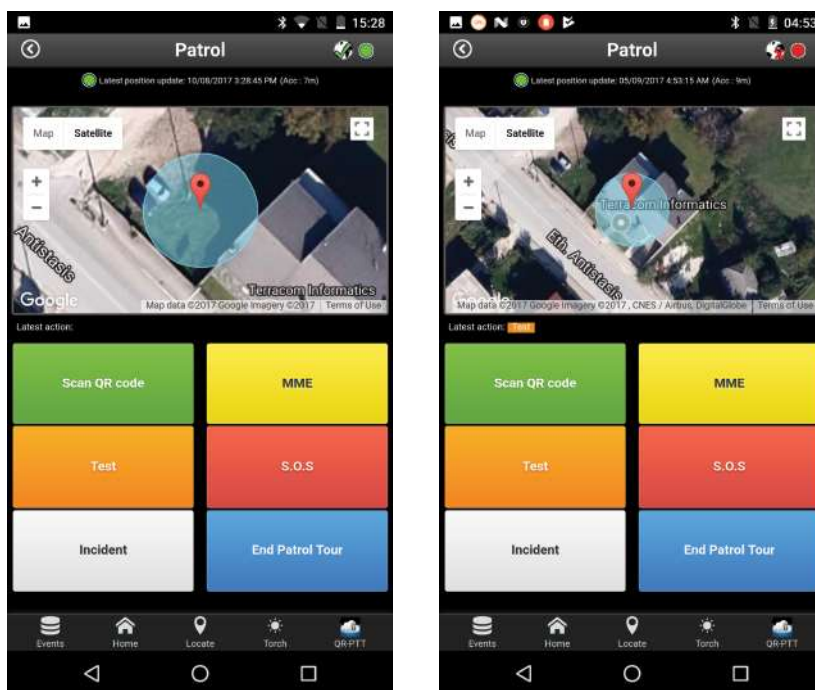
Final step is to set the beacon values on the web application (refer to section C.2. Set Indoor location Beacons – Web application above). The desired beacon accuracy for all three beacons should be 9m (i.e. the desired range value).

The end result will look as depicted in the next page.



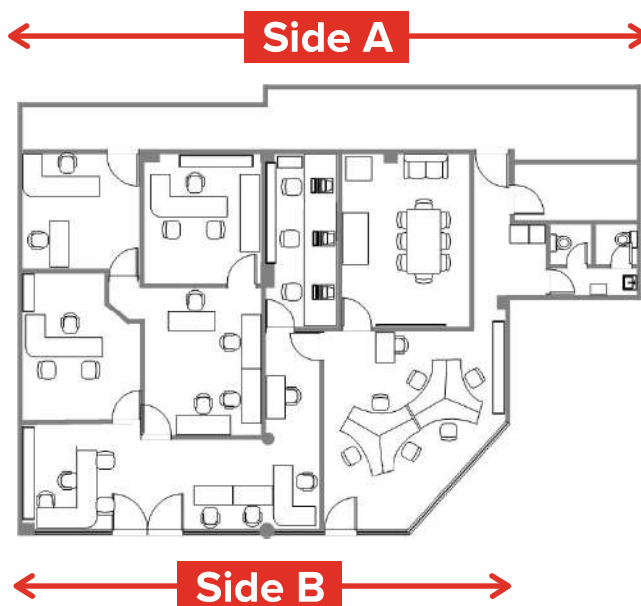


Note how the office has full coverage and various defined areas within. Now, the system will be able to track the guard position when they are within those areas, offering you a pretty accurate view of their location!



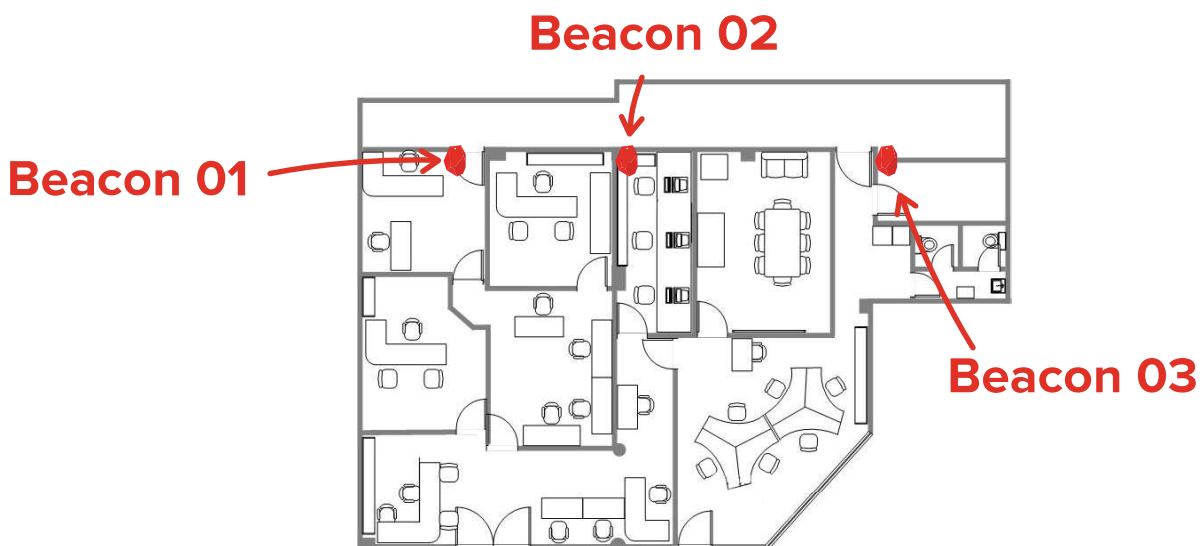
## Option B – Small Office - General Location Range (1,8m-5m) – Better precision - Use of 7 beacons

Let us again consider side A and side B:



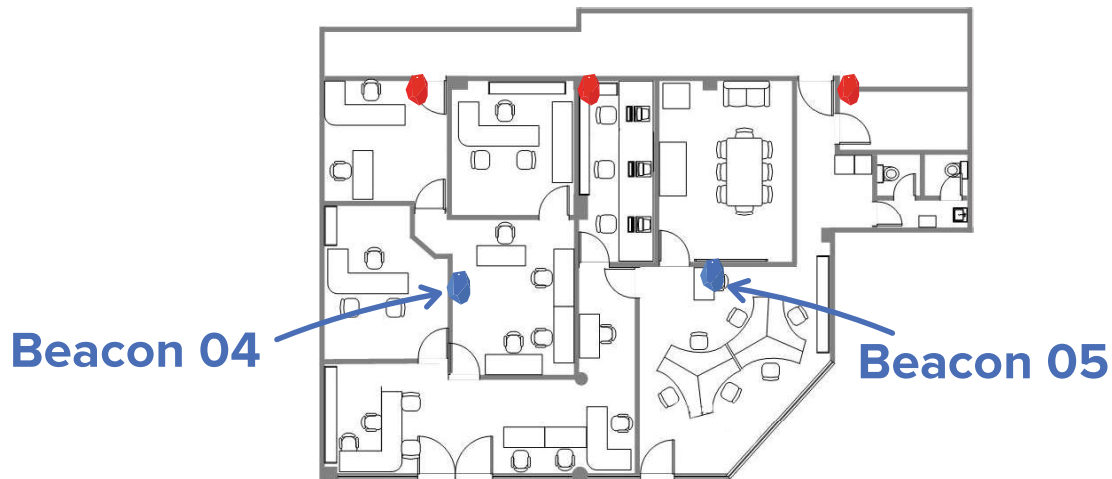
We need to choose the transmit power of each beacon: As mentioned before the values set through the manufacturer application are a bit more in reality, for that reason we suggest to calculate each distance by 20% more. Having that in mind and also aiming to achieve better precision, we choose to transmit in a range of 3.5m (will correspond to almost 5m in reality).

- 1** Using the same rationale as before, first beacon (“Beacon01”) has to be placed at around the half of the range of 5m (i.e. of the real range value as explained above). Having in mind also the office architecture, we choose to place Beacon01 around 3m from the top left corner (start of side A). The second beacon (“Beacon02”) will have the same transmit range as “Beacon01”. It has to be placed on the same side (side A) but having a maximum distance of 10 m (i.e. of the sum of their Geofence radius) from Beacon01. Additionally, it is better to have it in distance greater than 5 m (i.e. the beacon’s Geofence radius) from “Beacon1”.
- 2** Next beacon (“Beacon02”) has to be set on the same side but at least 5m until 10m from the first beacon. “Beacon02” will have the same radius with “Beacon01” and for that reason it has to be at a distance of that radius until the double. In other case there will be a field without
- 3** Using the same rationale we also place “Beacon03” on side A (same transmit range and Geofence radius as Beacons01, 02); the result so far can be depicted in the image below:



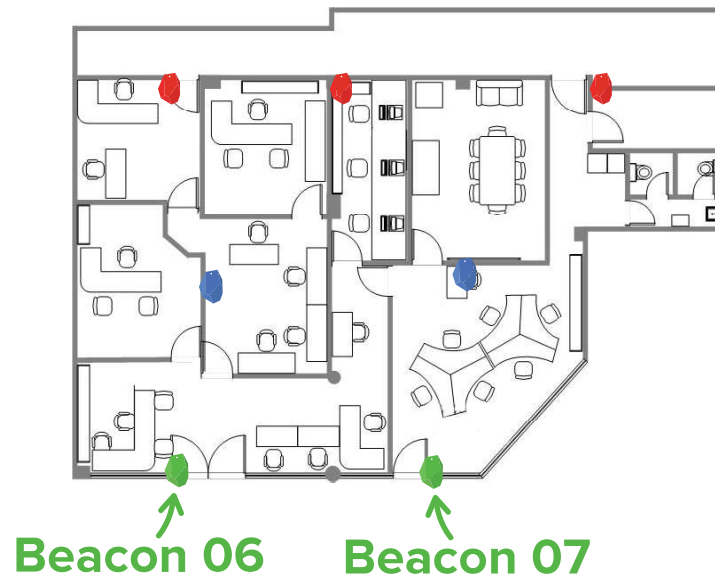
4

In order to physically place the next beacons, we take into account the fact that the distance between “side A” and “side B” is greater than 10m (almost 12m); thus, we could not place them to “side B”, but we have to set at least another two beacons to almost the middle of the distance (the same rules we used before apply here as well in order to decide where to place them).



5

Similarly, we place another two beacons on “side B”.



Final step is to set the beacon values on the web application (refer to section C.2.). The end result in terms of coverage is depicted in the following image:



Note how the office has again full coverage but a greater number of (and smaller/more accurate) defined areas within. The system can track the guard position when they are within those areas, offering you an even more accurate view of their location!

