



# Location Deployment Guide

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# Introduction

Welcome to the Mist vBLE Deployment Guide. In this guide we learn about how Mist location works, go over basic understandings of the Mist vBLE array, best practices for deploying location, use cases, asset visibility and the four steps for location. This guide will also reference certain sections back to the Mist support pages for easy access to additional information related to the section.

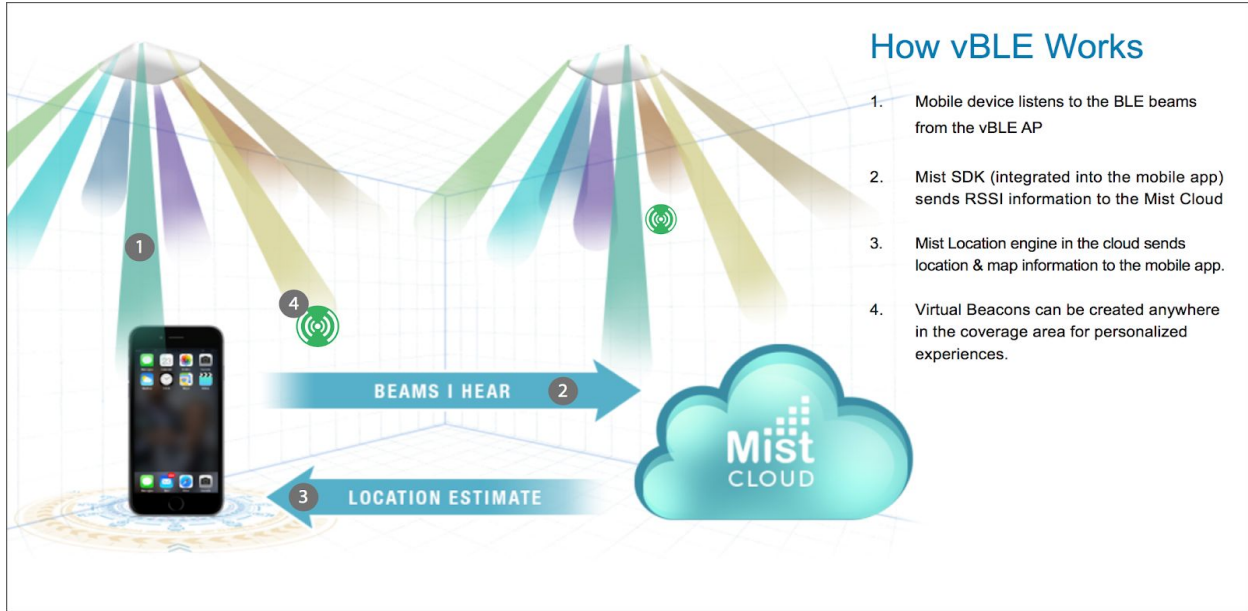
Mist is the first company to introduce an enterprise-grade platform for indoor BLE location services with groundbreaking features including a dynamic BLE 16 antenna array integrated into Mist's Access Points, machine learning in the Mist cloud eliminating the need for expensive site surveys, and patented virtual beacon (vBLE) technology. The Mist architecture is also unique in its ability to both send and receive BLE signals, which makes it ideal for the following BLE services (offered by Mist):

1. Contextual engagement services, such as wayfinding, alerts, and proximity messaging via BLE
2. Operational efficiency applications, like asset & people visibility leveraging 3rd party BLE (Bluetooth Low Energy).

## How the Mist Location Works for Engagement

Mist works off this idea of "Probability Surfaces" instead of triangulation. Where the more beams your client hears from the Mist APs the more RSSI (Received Signal Strength Indicator) data there is for location engine to work with in creating a sum of probability surfaces, which provides the best possible location accuracy in real time with sub second latency.

Essentially your mobile device, with the Mist SDK, listens to the BLE coming from the beams from the Mist AP, once the Mist SDK receives the beams the SDK will then send the mobile information to the cloud where location engine will calculate and respond back with an x,y coordinate to your mobile device.

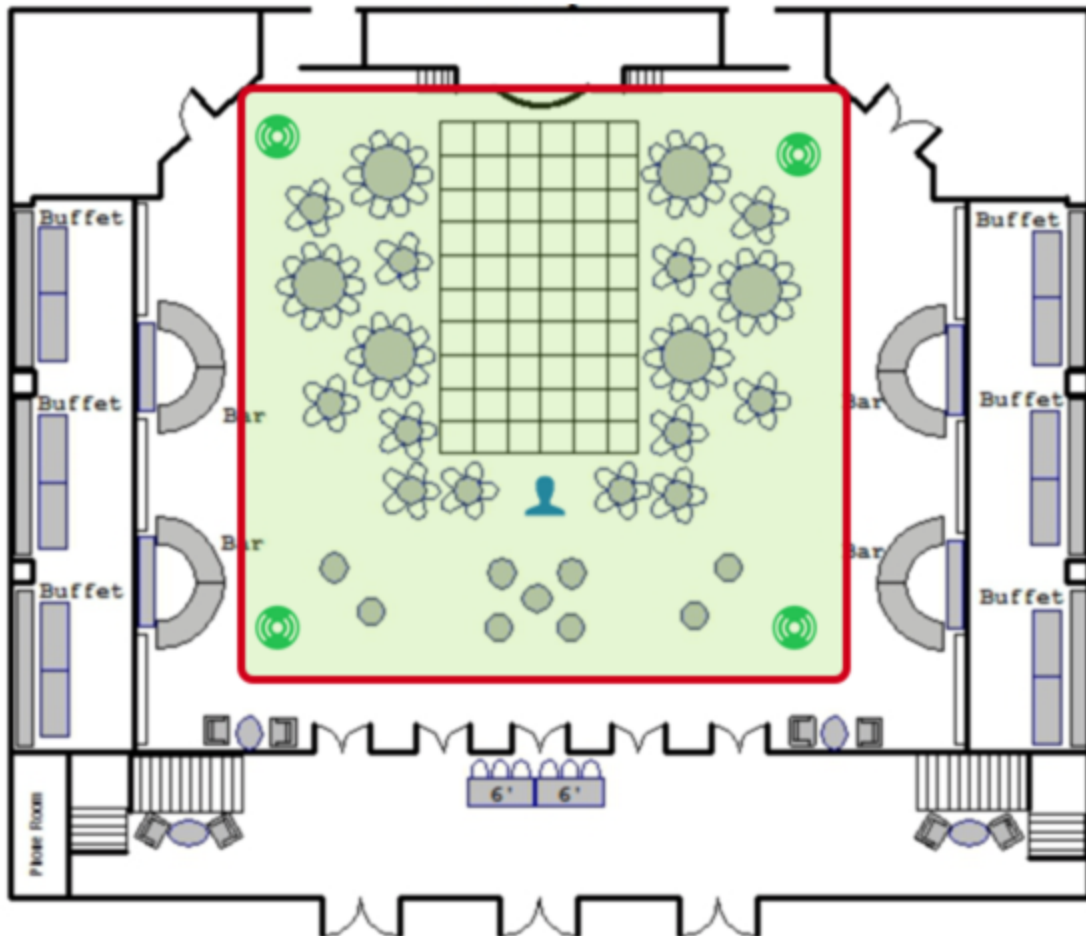


So the more beams your client sees from neighboring APs the more accurate your location will be as these probability surfaces builds up. This leads into the machine learning aspect where machine learning is taking in this RSSI data and changing the Path Loss Formula (PLF) constantly, eliminating the need for site surveys.

Below is an example of the probability surface where the center of the red blob is the peak of the surface and the highest probability of where you are and the blue is the least probability where you can be.



When deploying for location you would want to follow the **Best Practices and AP Design** section and make sure that your deployed APs are deployed in a way that encompasses the user in the areas of interest for location. This is known as the Rubber Band Model, where the idea is you want to be inside the “Perimeter” of your deployed APs for the best location accuracy possible.



**Rubber Band Model**



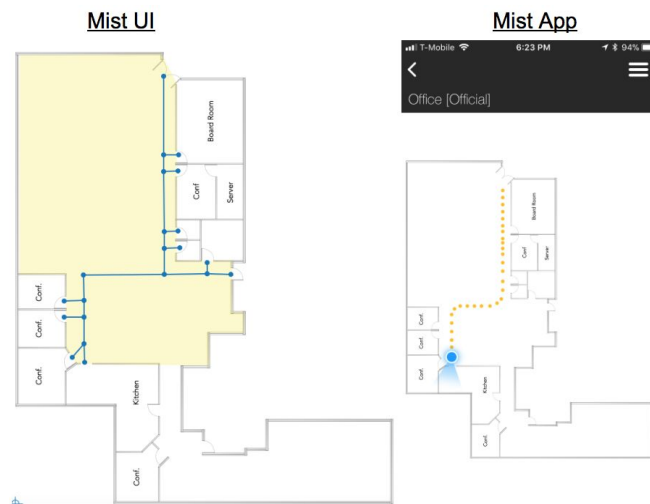
You want your **Client** to be enclosed inside the **Rubber Band Model** of the deployed **APs** for the best location accuracy possible. Going outside the Band will decrease in accuracy the further you go away.

Note: Assets are the opposite when comparing to an SDK client. Instead of the SDK client listing and receiving RSSI information from the beams of the Mist vBLE array assets instead beacon out and the APs receive the RSSI information from the when the assets beacon based on how many beams were heard from the asset at the time. Please see “**Asset Visibility**” section for more in depth details.

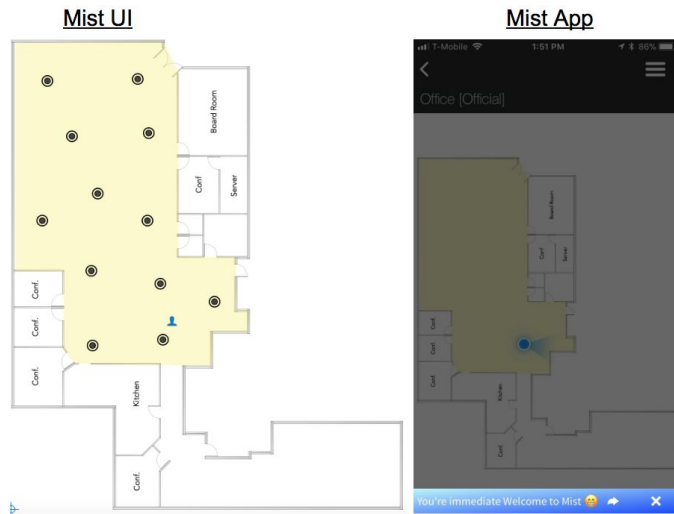
## Location Use Cases

There are primarily three uses cases when it comes to deploying for location, which are Way-finding, Proximity Messaging with Virtual beacons and Asset Visibility.

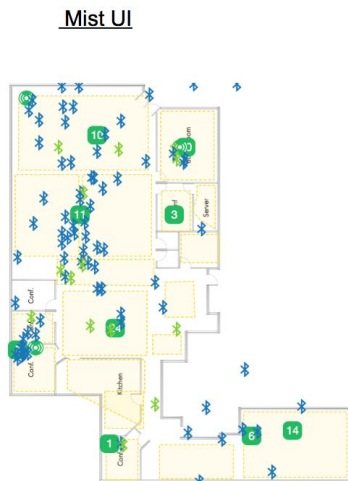
**Wayfinding** is the most common use case revolved around having a location estimate stick to a way-finding path as the user walks towards a destination. This is very similar to google maps but for indoor solutions.



**Blue Dot & virtual beacons for proximity messaging** is all about an accurate location estimate in an open xy space. The blue dot is your SDK client where the location engine is essentially voting on your location from neighboring Mist APs and building up a probability surface of where you are at given location. This in turn gives the user free motion to move around and can be able to trigger a push notification when approaching a virtual beacon.



**Asset Visibility** is a location feature where the Mist AP can operate in either a concurrent transmit / receive mode or a dedicated receive only mode, listening to any device transmitting within the vicinity of the deployed Mist APs such as smart watches, fitbits, headsets as well as off the shelf 3rd party BLE asset tags. The basic principle applies for “assets” as they do for SDK clients, where the more RSSI information is sent to location engine in the Mist cloud the more accurate the location estimate.



# Best Practices

- **Mounting the AP**

- The Mist APs must be mounted on the ceiling with the LED facing toward the ground. Please avoid putting APs on the walls (vertical mounted), on top of objects, inside of objects, or having the LED facing up towards the ceiling.
- You cannot point the AP up towards the ceiling because the system assumes the AP is always facing down. Doing so will result in your location being flipped and inaccurate.
- Link to Hardware Installation guide for AP61, AP41, AP21 and BT11  
<https://www.mist.com/support/>

- **AP Height**

- Placing APs between 8 to 15 feet (2.5 to 4.5 meters) high is highly recommended. Higher heights will work as well, and will require potentially more density of APs to deliver high accuracy, depending on the environment and use case.
- Keep in mind though the higher the APs are deployed the more their directionality is lost and becomes more like an omni regardless if your client can hear all the beams.

- **Line of Sight**

- Line of sight from your device to at least 2 APs is highly recommended.
- It is best to place the AP at junction points whenever possible. This will help maximize both coverage and line of sight for corners.
- Deploying Mist APs above ceilings is not recommended but it is highly recommended to contact a Mist SE ([support@mist.com](mailto:support@mist.com)) for guide for non-line of sight deployments.
- In-room accuracy will require an AP being inside said room to guarantee location accuracy.

- **AP Distance from other APs**

- Deploy APs between 25 to 50 feet (8 to 15 meters) from neighboring APs for optimal coverage in a spread out offset fashion.
- Keeping each AP with line of site of the other neighboring APs is highly recommended.
- Keep in mind, all you are doing is blanketing an area with BLE energy. Don't spread the APs too far apart, as the location error on the edges of the coverage range degrades quickly.



- If APs are too far from each other, then we call the non-coverage area in between the APs “no man's land” -- meaning there is no optimal coverage. Location accuracy will suffer if a device is in “no man's land.”
- **AP Coverage Range**
  - The APs have a BLE coverage range of around 2,500 square feet (15 meters).
  - Keep in mind that the further away you are from an AP, the lower the RSSIs are from the device the less your accurate your location will be. This is why having APs within line of sight of neighboring APs -- and spreading them out to create an overlap of BLE coverage -- helps improve accuracy; when a client moves further away from one AP, in turn, it moves closer to another.
- **APs must be on floor plan:**
  - An AP must be placed on the map for location to happen. APs that are powered up but not placed on a map will be ignored for location.
- **APs in rooms**
  - For any location accuracy to be guaranteed in room an AP must be placed in the middle of the room.

## Engagement

How to enable engagement for location services for SDK clients and turning the vBLE arrays for all Mist APs on on an site level.

*Please Note: This feature is only available if you purchased the location license. If you didn't purchase the license then Engagement will be disabled until a license is purchased.*

The screenshot shows the Mist dashboard 'Monitor' page for a site named 'Kevin's Home'. The top navigation bar includes 'Monitor', 'WIFI Service Levels', 'Location Service Levels', 'Insights', and a dropdown for 'site Kevin's Home'. A sidebar on the left contains navigation icons for Monitor, Clients, Access Points, Location, Analytics, Network, and Organization. The main content area features a map of the site location, a summary card with '1 Access Points', '2 Associated Clients', and '0.04 Mbps', and a data rate graph. A dropdown menu is open over the 'Organization' icon, with 'Site Configuration' highlighted in red. Below the map, there are sections for 'Site Events' (0 events), 'Access Points' (1 Total, 1 Connected), and 'Clients' (3 Total, 0 Connected). The 'Access Points' table is as follows:

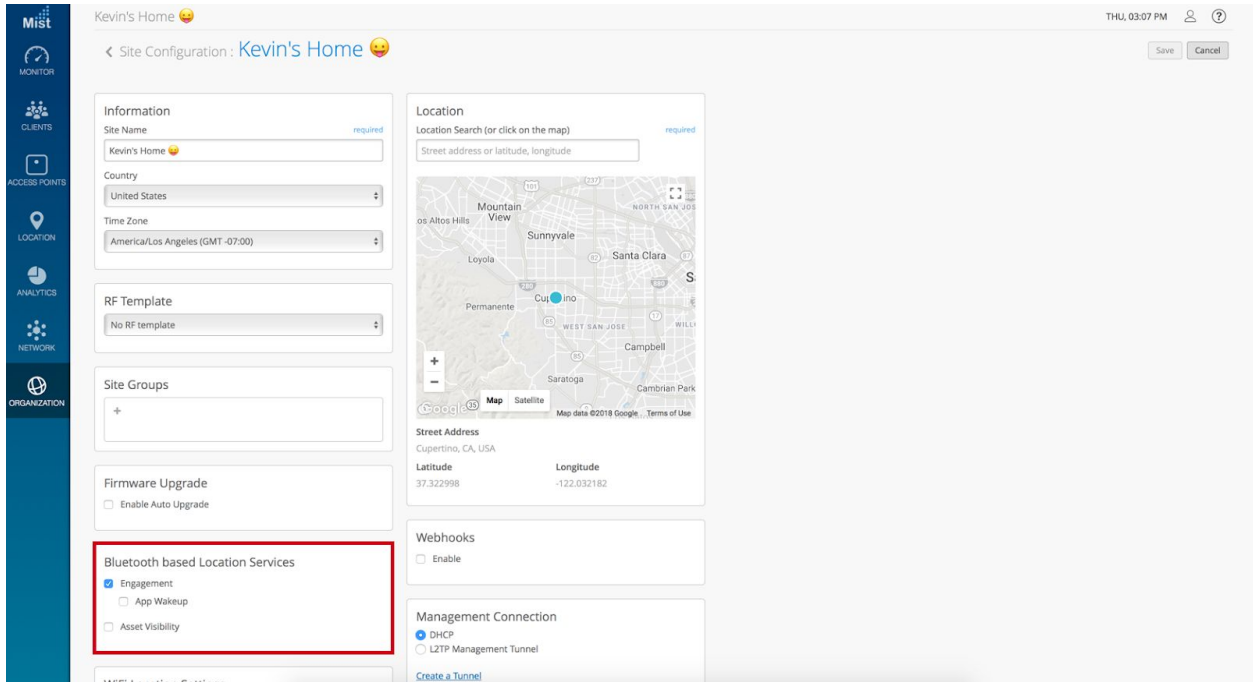
Name	Connected	Reboot	Disconnected	MAC Address	Uptime	Clients	Bytes	LLDP Name	LLDP Port
AP41	Connected			5c:5b:35:0e:07:c1	7d 4h 44m	--	4.4 GB		

1. Go to "Organization" and select "Site Configuration"

The screenshot shows the Mist dashboard 'Site Configuration' page. The top navigation bar includes 'Monitor', 'WIFI Service Levels', 'Location Service Levels', 'Insights', and a dropdown for 'site Kevin's Home'. A sidebar on the left contains navigation icons for Monitor, Clients, Access Points, Location, Analytics, Network, and Organization. The main content area features a 'Create Site' button and a table of sites. The table is as follows:

Name	Country	RF Template	Time Zone	Address	Labels	Notification
Kevin's Home	United States	--	America/Los_Angeles	Cupertino, CA, USA		🟢

1. Select the site of interest



1. Select "Engagement" under "Bluetooth based Location Services"
  - a. This will enable the vBLE array on **ALL** Mist APs for the selected site

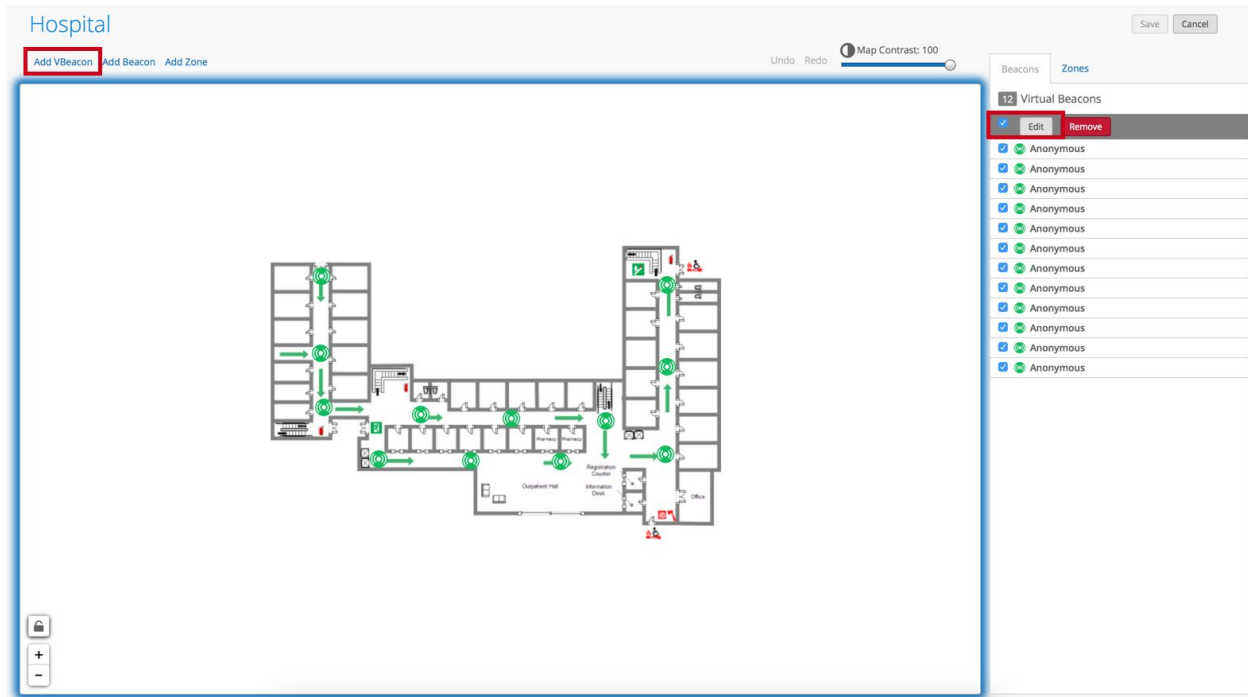
## AP Design

In this section we will go over an example of where to deploy Mist APs and in turn how many APs you need for your deployment based on a customer's **Use Case** and following **Best Practices**. This will be a step-by-step process, which should be simple and straightforward. Even though the AP designs might vary depending on certain use cases, the same principle applies, follow **Best Practices** and the **Rubber Band Model**.

**Important Note:** Make sure to scale the map properly before starting your AP design. Please review the first section of "The Four Steps" titled "Scale Floor Plan". You may also check the link

<https://support-portal.mist.com/hc/en-us/articles/234751268-Loading-and-scaling-floor-plan-and-adding-AP-s> as well. This needs to be done first as the correct scale of the map will give the most accurate calculations for the BLE coverage range.

## Adding vBeacons to simulate AP placement:

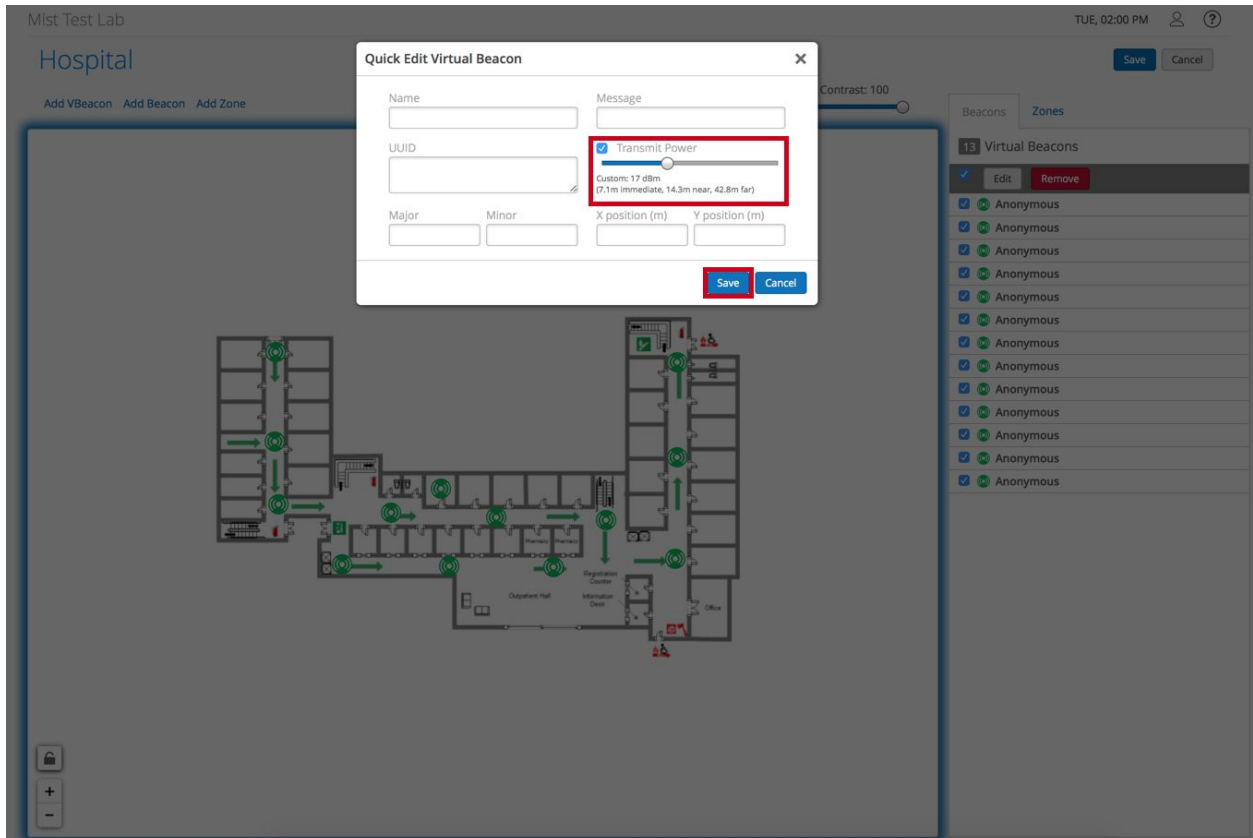


1. Go to the scaled map of interest you want to do the AP design
2. Click on **Beacon and Zones**
3. Click **Add vBeacon**
4. Add a couple vBeacons on the map (These will be used as a simulated AP placement), follow the **Best Practices** section for AP placements.
  - You may have noticed that there is one vBeacon in a room. If you require any for location for in-room accuracy you must put an AP in the room.
5. Click the **grey square** to select all recently created vBeacons and edit them at once
6. and then click **Edit**.

**Showing what the way-finding paths would look like with the current AP placement above with regards for BLE coverage**

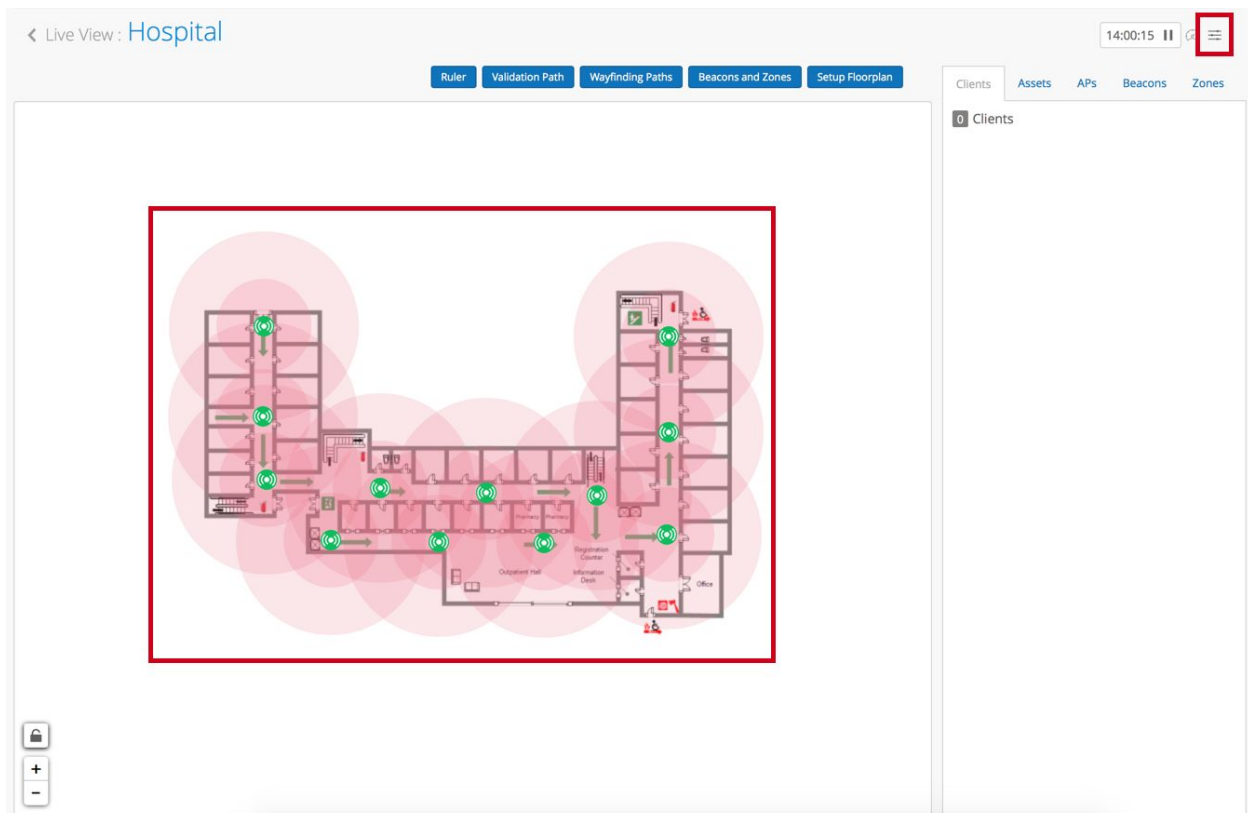


## Editing selected vBeacons



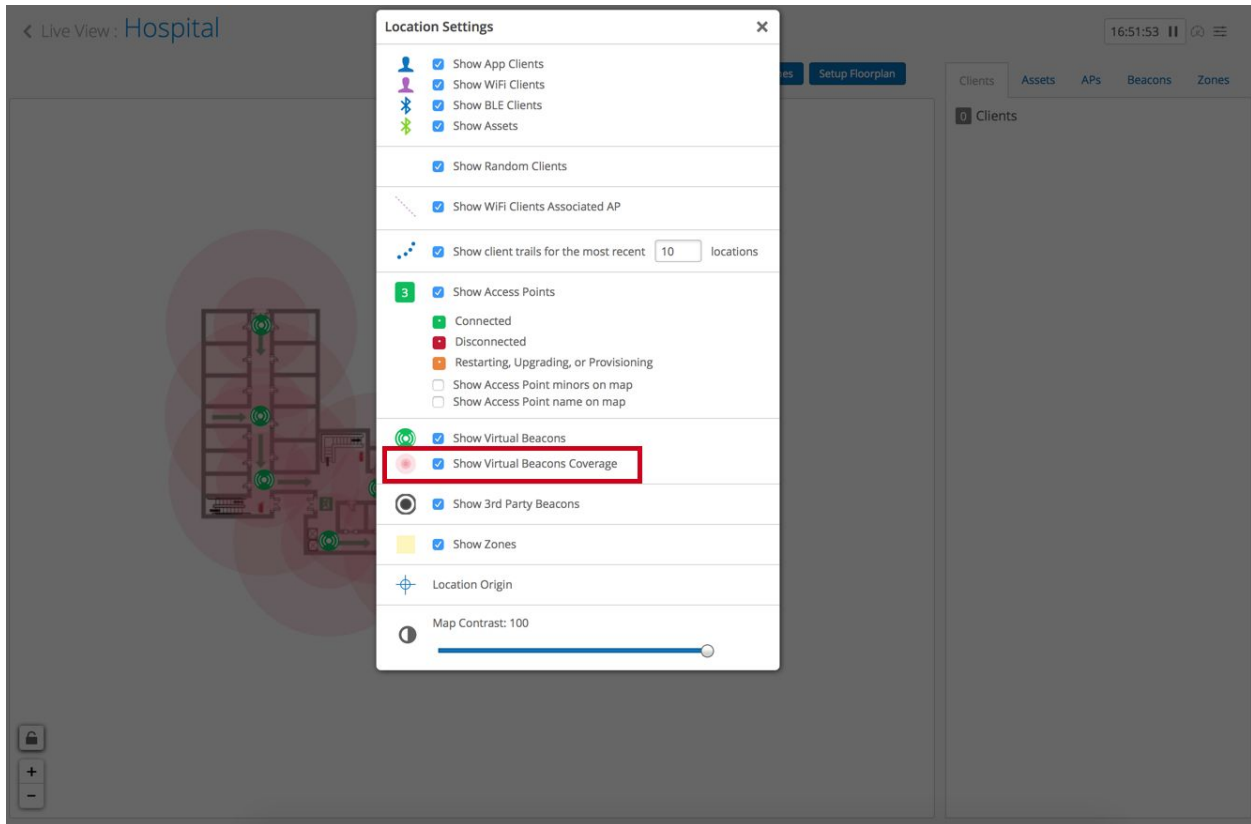
1. Once editing the vBeacons click "Transmit Power".
2. Select the scale and move it till it says "17dBm"
3. Make sure the power is set to 17dBm and that the "near" value is 14.3 meters (you only want to focus on the "near" measurement)
4. Once done click "Save"

## Viewing edited vBeacons placements and coverage range



1. You should now be able to see your simulated AP placement and BLE coverage
2. You want a good amount of BLE overlap as this helps to provide adequate coverage throughout your deployment
3. If you don't see the red circles for the BLE coverage range don't worry. In the top right hand corner of the screen click the **Hamburger Menu**, which will take you to the **Location Settings**

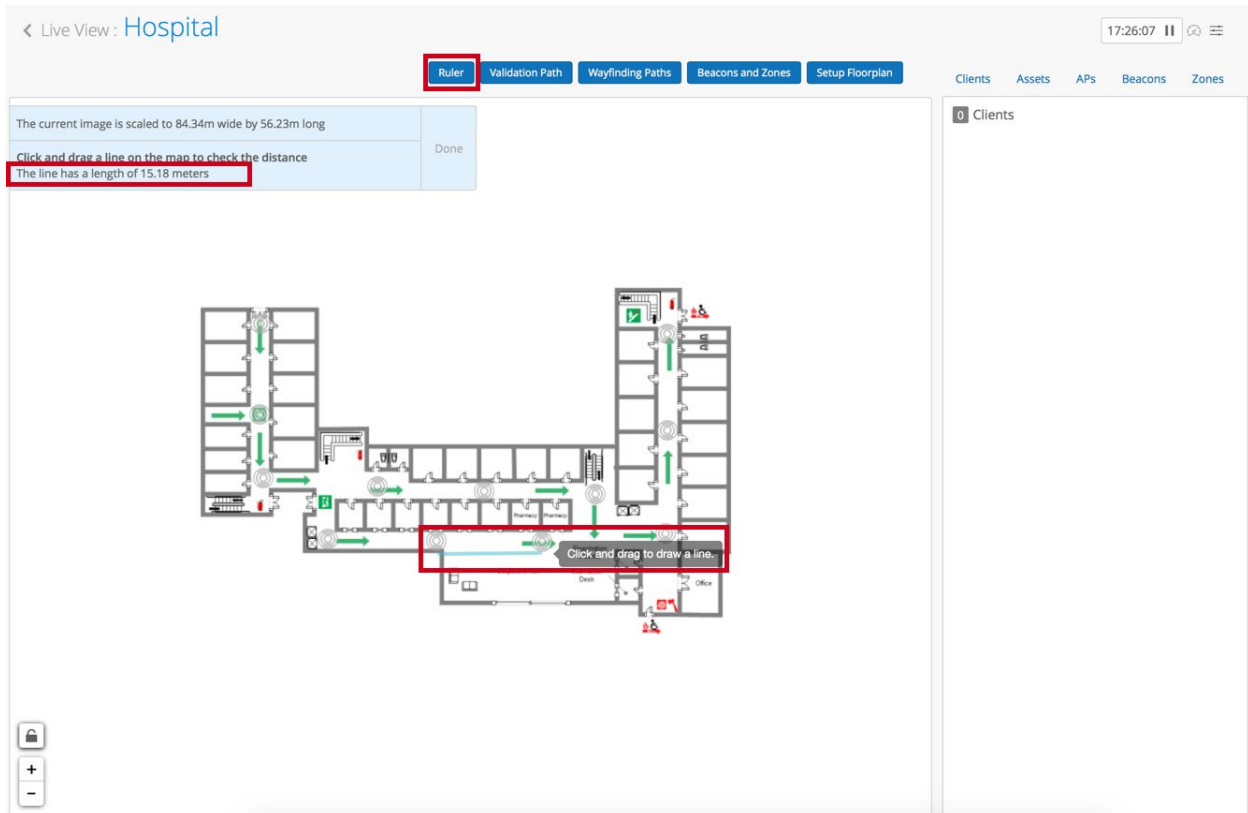
## Location Settings



1. Once in the location settings look for **Show Virtual Beacon Coverage**
2. Select **Show Virtual Beacon Coverage**
3. Click the **Cancel Icon** in the top right hand corner to apply the settings
4. You should see the red circles



## Validating AP design



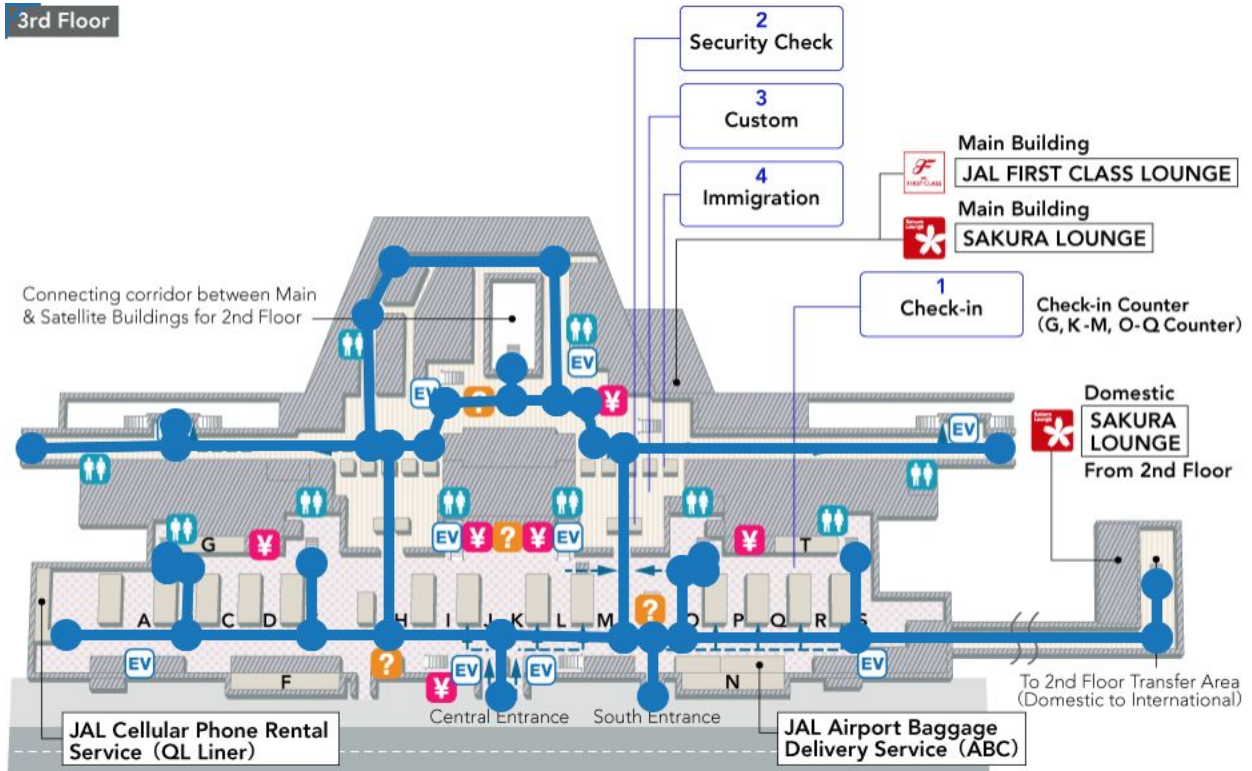
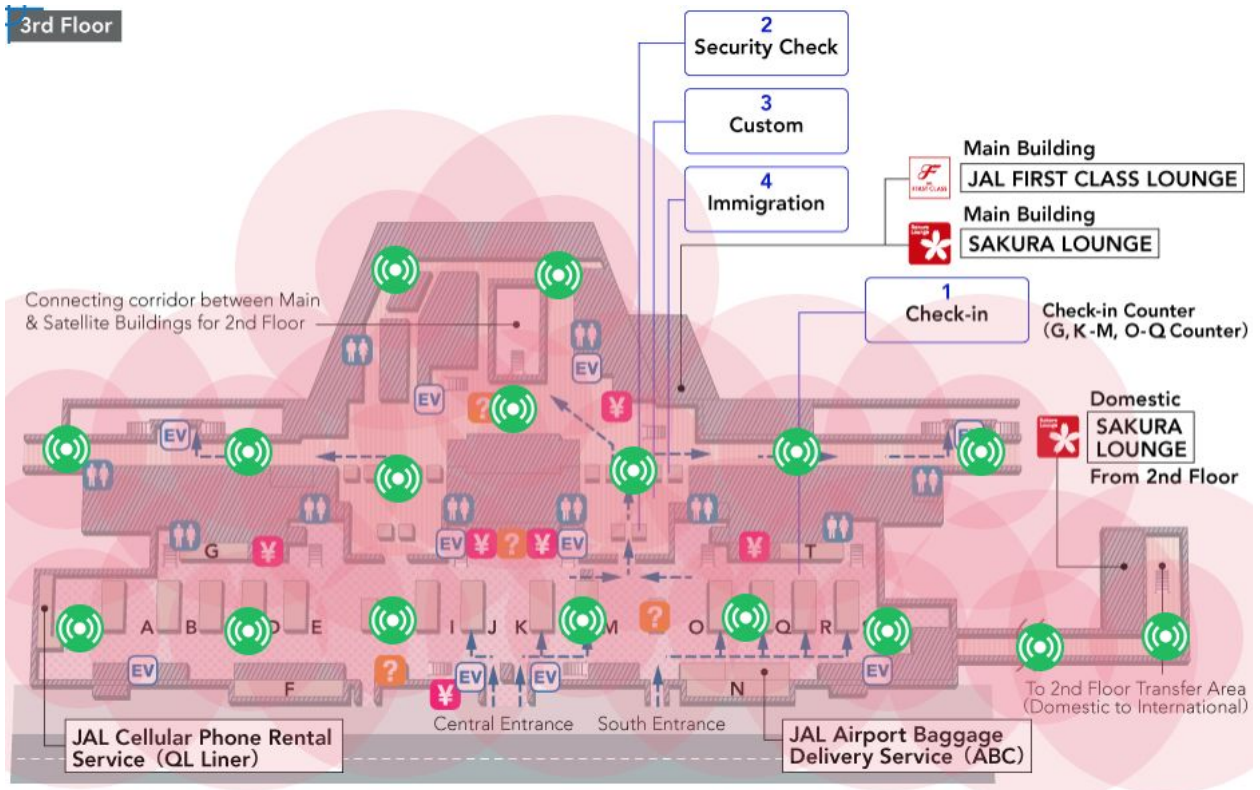
1. Once all said and done you can double check the distance between APs
2. Remember you want to place APs anywhere between 8 - 15 meters AP from each other
3. Select **Ruler** and click and drag from one AP to the next AP
4. In the top left hand corner you should see the length of the line you have created. Telling you what the distance is in meters.

Congratulations you just did your first AP design. Once more familiar with this process it is a nice method to quickly see how many APs you would need and where to put them and gives you a sense of the density for deployments. It also is a nice way to visualise seeing the BLE coverage range as well.

## Sample AP Designs

We will take a look at a couple of sample AP designs for each main use case, way-finding, Blue Dot & virtual beacons for proximity messaging and assets.

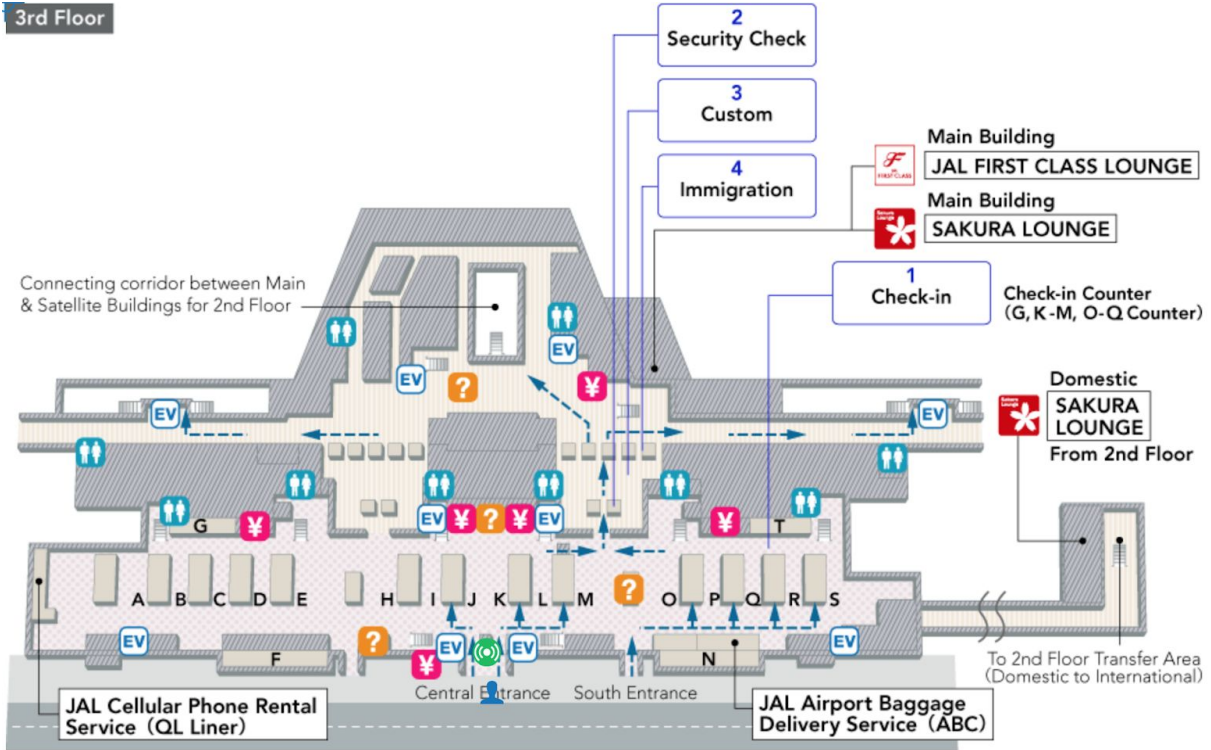
# Way-finding

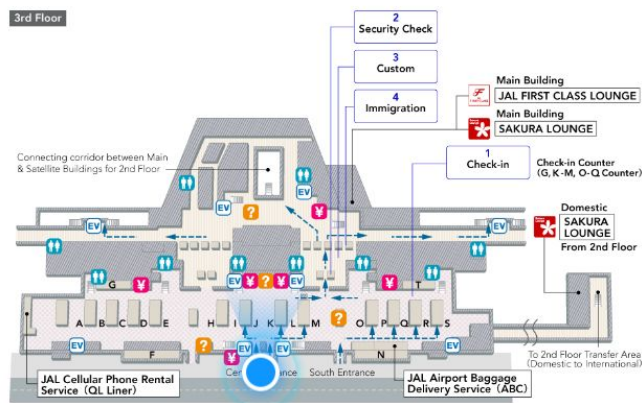
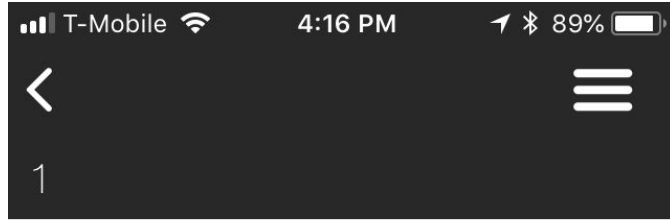


This is for the use case of wayfinding, where SDK clients locations will snap to a path (blue lines) as the client walks the main paths.

Blue Dot & virtual beacons for proximity

3rd Floor



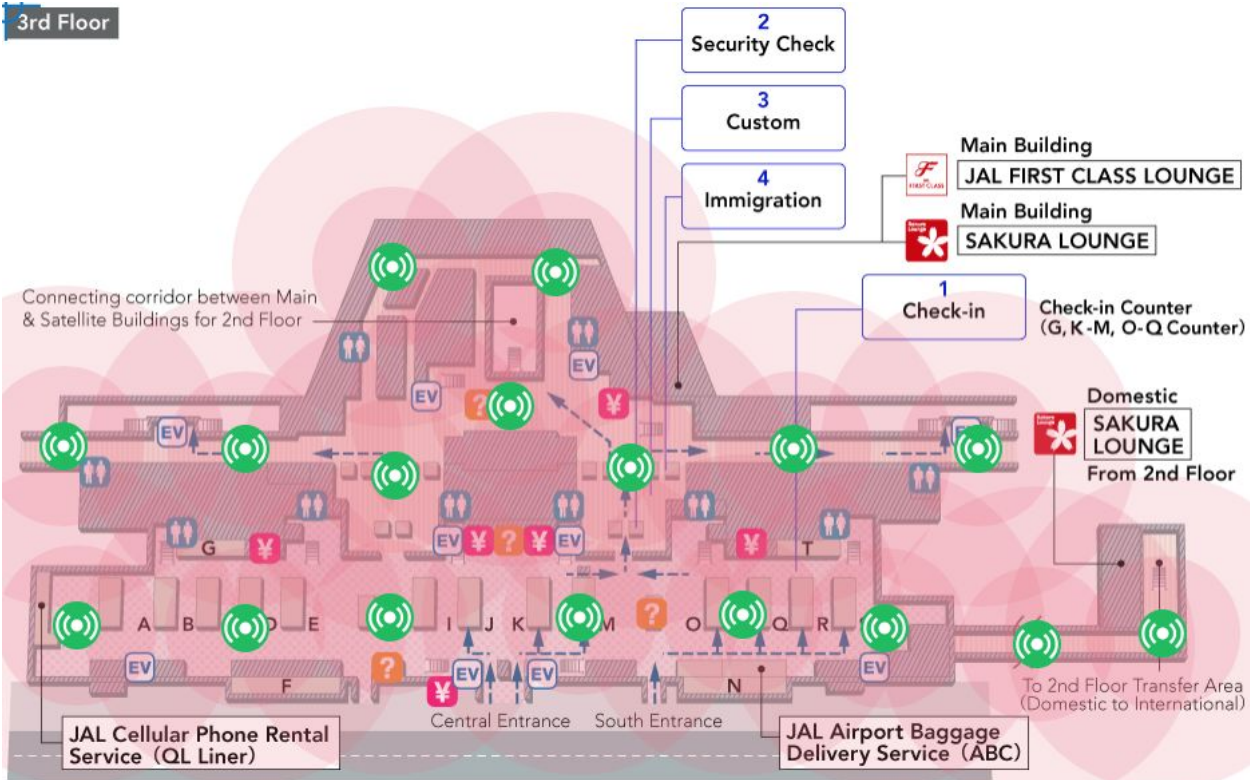


This is for the use case of blue dot & virtual beacons for proximity, where the SDK client can prompted up a message through push notifications to alert users when entering a certain area.

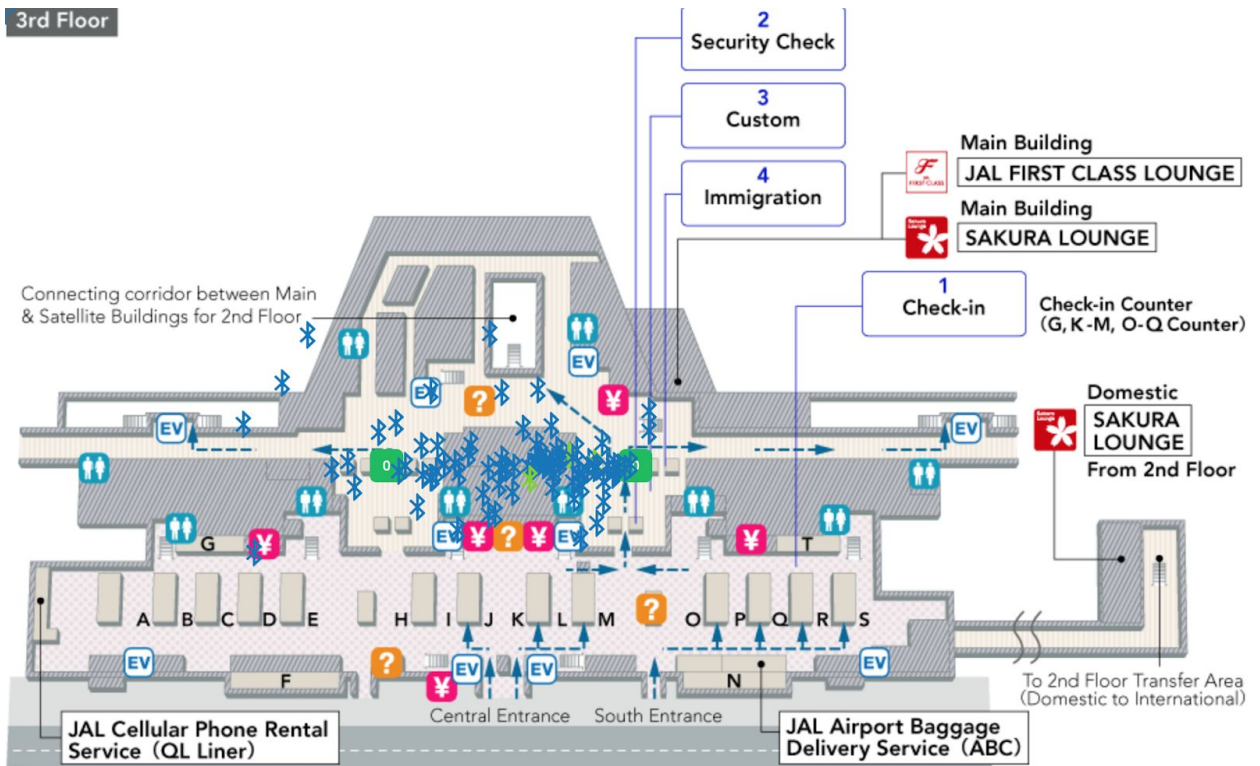
Asset Visibility



3rd Floor



3rd Floor



This is for the use case of asset visibility, where the Mist APs passively listen to the RSSI signal of BLE devices.

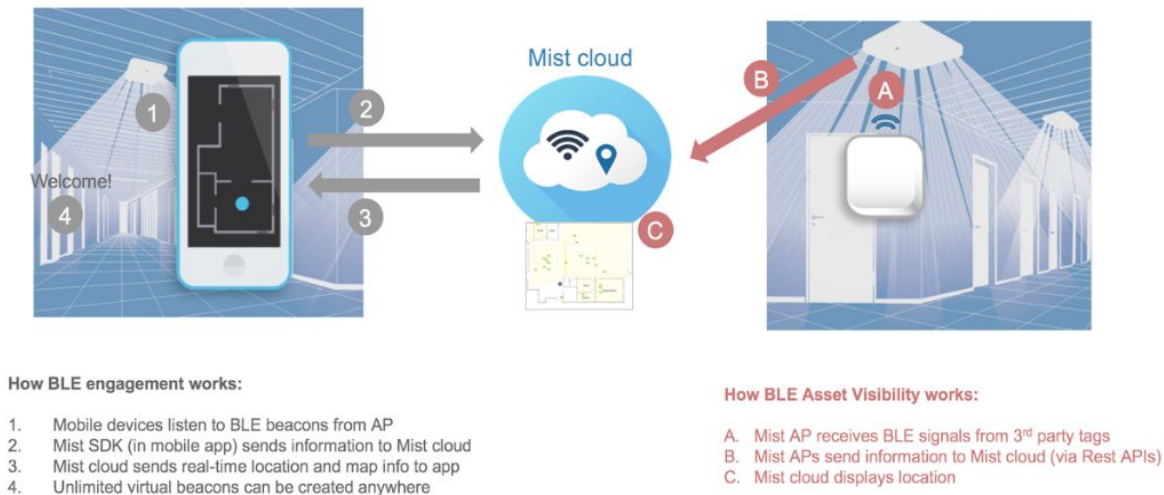
## Asset Visibility

Here we will go through how to set up for “Asset Visibility” and understand some basic principles of “BLE clients” aka asset tags / beacons as well as tag vendors and configurations.

Figure 1 shows the difference between SDK and BLE client in how RSSI information is collected, same idea as SDK clients, the more beacons heard the more RSSI information is used to give the best location accuracy.

*Please Note: This feature is only available if you purchased the asset license. If you didn't purchase the license then Asset Visibility will be disabled until a license for assets is purchased.*

Figure 1:



# Enabling Asset Visibility

1. To enable the “Asset Visibility” feature go to your “Organization” and select “Site Configuration”.

The screenshot shows the Mist Monitor dashboard for 'THE TRUE Mist Office [PRODUCTION]'. The left sidebar contains navigation icons for Monitor, Clients, Access Points, Location, Analytics, Network, and Organization. The 'Organization' icon is selected, and a dropdown menu is open, highlighting 'Site Configuration' (Create and manage sites and site groups). Other menu items include Settings, Config Templates, Labels, RF Templates, Administrators, Mobile SDK, and License. The main dashboard area shows a map of the 'Office [PRODUCTION]' location with statistics: 10 Access Points, 16 Associated Clients, and 0.05 Mbps. Below the map is a 'Site Events' section with 0 events and an 'Access Points' table with 14 total and 10 connected.

Name	Country	RF Template	Time Zone	Address	Labels	Notification
Office [PRODUCTION]	United States	--	America/Los_Angeles	1655-1687 S De Anza Blvd, Cupertino, CA 95014, USA		⊗
Office [PRODUCTION]	United States	--	America/Los_Angeles	1655-1687 S De Anza Blvd, Cupertino, CA 95014, USA		⊗

2. In “Site Configuration” select which site you would like to enable “Asset Visibility” for.

The screenshot shows the 'Site Configuration' page in the Mist Monitor dashboard. The page title is 'Site Configuration' and it includes a 'Create Site' button. Below the title is a table listing sites. The first row is highlighted with a red border.

Name	Country	RF Template	Time Zone	Address	Labels	Notification
Office [PRODUCTION]	United States	--	America/Los_Angeles	1655-1687 S De Anza Blvd, Cupertino, CA 95014, USA		⊗
Office [PRODUCTION]	United States	--	America/Los_Angeles	1655-1687 S De Anza Blvd, Cupertino, CA 95014, USA		⊗



3. In your selected site under “Bluetooth based Location Services” you can enable “Asset Visibility” by simply clicking on the check box and pushing “Save” once done.

THE TRUE Mist Office [PRODUCTION] MON, 02:35 PM ALL IS GOOD

< Site Configuration: Office [PRODUCTION] Delete Site Save Cancel

**Information**

Site Name  required

Country

Time Zone

**RF Template**

**Site Groups**

**Firmware Upgrade**

Enable Auto Upgrade

**Bluetooth based Location Services**

Engagement

Sensor Fusion

App Wakeup

Asset Visibility

**Location**

Location Search (or click on the map)

Street address or latitude, longitude

Map Satellite Map data ©2017 Google Terms of Use

Street Address  
1655-1687 S De Anza Blvd, Cupertino, CA 95014, USA

Latitude 37.294864 Longitude -122.032678

**Webhooks**

Enable

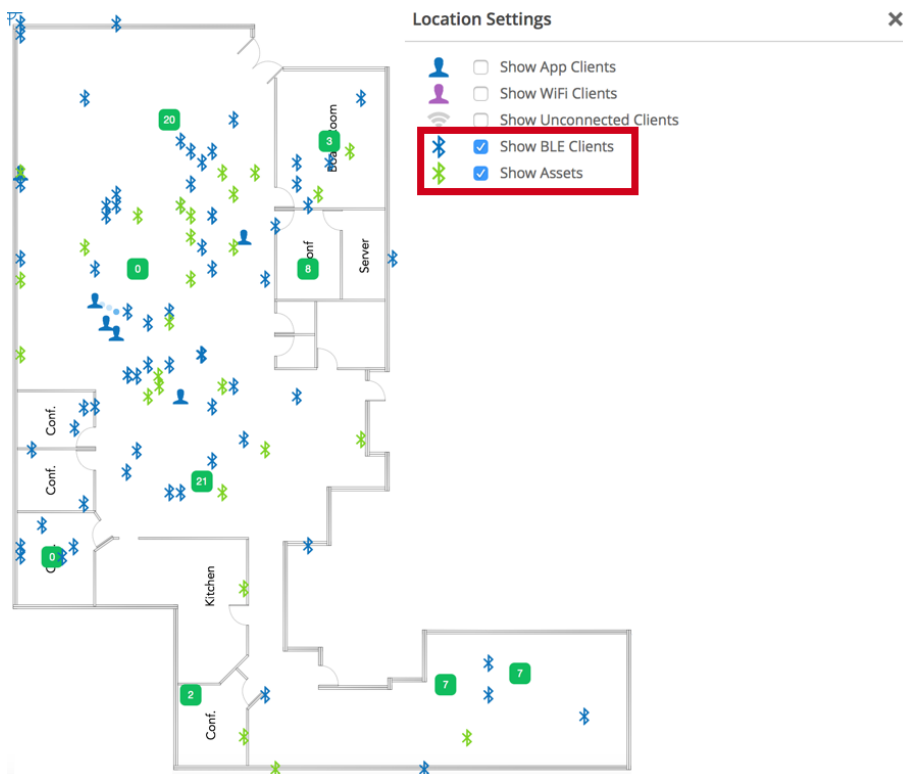
**Management Connection**

gRPC

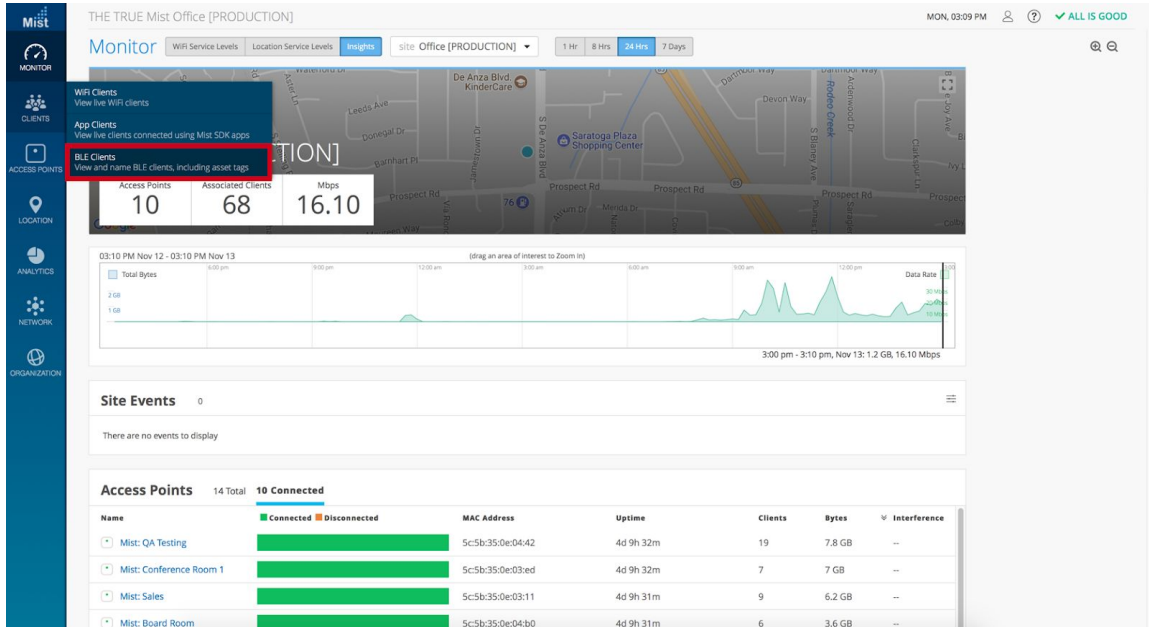
L2TP Management Tunnel

Create a Tunnel

4. Once saved you will be able to see “Newly Discovered Assets” in BLUE and “Name Assets” in GREEN on the “location live view” of your selected floor plan.



5. You can you also go to “BLE Clients” in the “Clients” section tab to view a list of all “Newly Discovered Assets” and “Named Asset”.



The screenshot shows the 'BLE Clients' page in the Mist Monitor interface, displaying a list of 177 clients. The table includes columns for MAC Address, Name, Connected status, Last Seen, Last Floorplan, Manufacturer, Labels, and Battery Voltage. The table is highlighted with a red border.

MAC Address	Name	Connected	Last Seen	Last Floorplan	Manufacturer	Labels	Battery Voltage
00:17:e9:65:7f:6b		●	03:09:05 PM, Nov 13	Office [Official]	Texas Instruments		
00:22:d0:c0:2c:10		●	03:09:44 PM, Nov 13	Office [Official]	Polar Electro Oy		
01:42:d5:f5:f1:92	test asset					test	
04:52:c7:fd1b:b0:e4		●	03:09:37 PM, Nov 13	Office [Official]	Bose Corporation		
07:16:7d:97:ab:7b		●	03:09:29 PM, Nov 13	Office [Official]	Unknown		
0c:f3:ee:0da:6:51	Wristband						
0c:f3:ee:0da:6:8d	Table 14 order						
0c:f3:ee:0da:7:e4	POS station (Rad Beacon)					Asset Accuracy Testing	
0c:f3:ee:0da:7:f5	Radius Networks (Kevin)						
0c:f3:ee:0fb:8:82		●	03:09:57 PM, Nov 13	Office [Official]	EM Microelectronic		
0d:98:f8:82:dd:68		●	03:09:33 PM, Nov 13	Office [Official]	Unknown		
13:58:38:5d:64:e4		●	03:09:56 PM, Nov 13	Office [Official]	Unknown		
17:50:49:f9:85:11		●	03:09:44 PM, Nov 13	Office [Official]	Unknown		
18:65:90:d9:92:28		●	03:09:32 PM, Nov 13	Office [Official]	Apple		
18:65:90:db:61:c4		●	03:09:54 PM, Nov 13	Office [Official]	Apple		
1cb5:18:f6:e9:f7		●	03:09:41 PM, Nov 13	Office [Official]	Unknown		
1ea2:bb:8e:e2:64		●	03:09:51 PM, Nov 13	Office [Official]	Unknown		
24:71:89:f2:28:6c		●	03:09:56 PM, Nov 13	Office [Official]	Texas Instruments		
24:71:89:f2:83:50		●	03:09:56 PM, Nov 13	Office [Official]	Texas Instruments		
28:57:bf:0d:9d:df		●	03:09:57 PM, Nov 13	Office [Official]	Unknown		
2a:93:14:63:39:30		●	03:09:53 PM, Nov 13	Office [Official]	Unknown		
2b:7b:ef:4f:c4:70		●	03:09:44 PM, Nov 13	Office [Official]	Unknown		
2e:a0:0b:2d:1b:32		●	03:09:42 PM, Nov 13	Office [Official]	Unknown		

## Tag Vendors / Configuration:

- **Tag Vendors:**
  - Any tag vendor will work with Mist as long as the APs are able to detect the tags. Tag vendors we've worked with the most;
    - Blue vision, kontakt.io and Radius Networks.
- **Tag / Beacon Configuration:**
  - For configuration for both tags and beacons we recommend setting tags to anywhere between 1000 - 500 ms interval rates and 0 dBm for power.

## Notes:

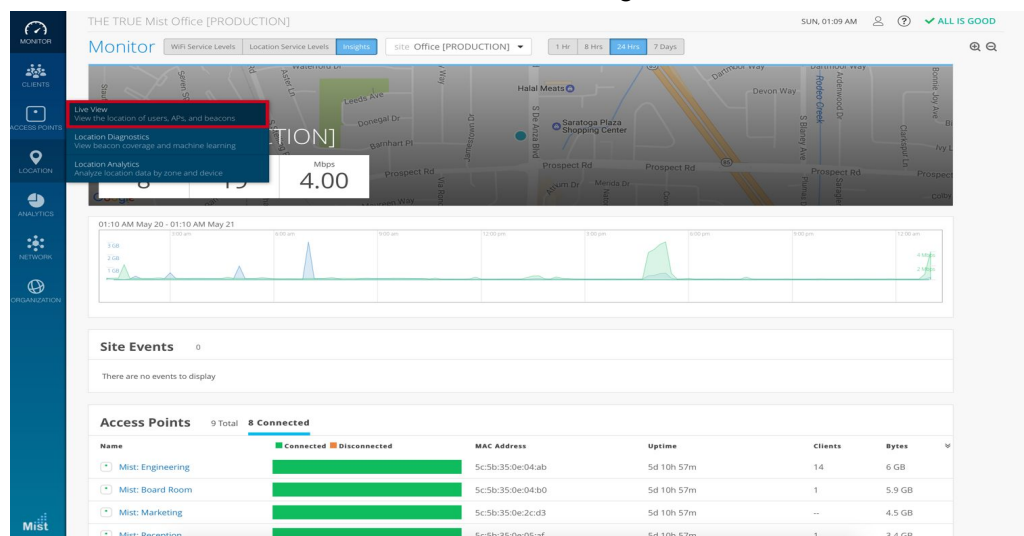
- **APs transmitting / Receiving:** Please be aware that when both “Engagement” (aka APs transmitting) and “Asset Visibility” (aka APs receiving) in the “Bluetooth based Location Services” under “Site Configuration” are enabled the AP is in a coextensive state of transmitting / receiving, meaning you are able to do both “SDK clients” and “Assets” simultaneously.
  - For more optimal performances for “Assets” disable “Engagement”. This will put the AP into a pure receive mode, which means the APs have more time to scan the room.
- **Bluetooth on Phones/Devices acting as a beacon:** Please note that when a phone's Bluetooth is enabled that does “NOT” mean the phone is advertising itself as a beacon. Phones do not typically transmit at the same rate as a beacon does, and only really receive unless explicitly told to do so. Hence the need many, if not all, of the times to have a 3rd party application on the phone to be able to perform that intended function of turning a phone into a beacon.
  - Link to Bluetooth LE Resource Center  
<https://www.mist.com/bluetooth-le-resources/>

# Deployment Validation (The Four Steps)

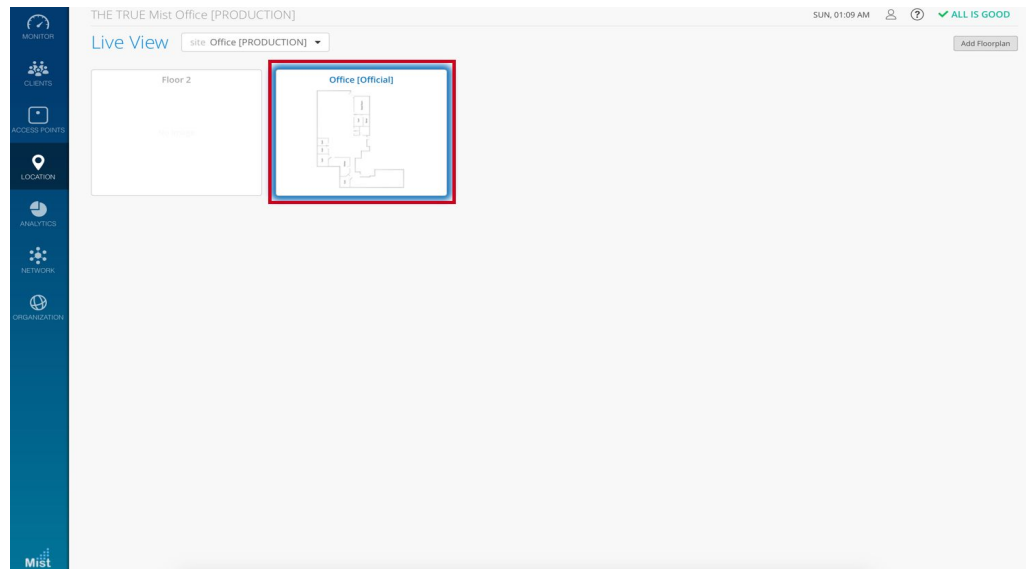
For any location deployment, these four steps shown below should be verified before proceeding with using location. After correctly performing these four steps, the system is then ready for machine learning to find an PLF (path loss model) for the area that the Mist AP is deployed and different client device models. The four steps are as follows:

## 1. Scale Floor Plan

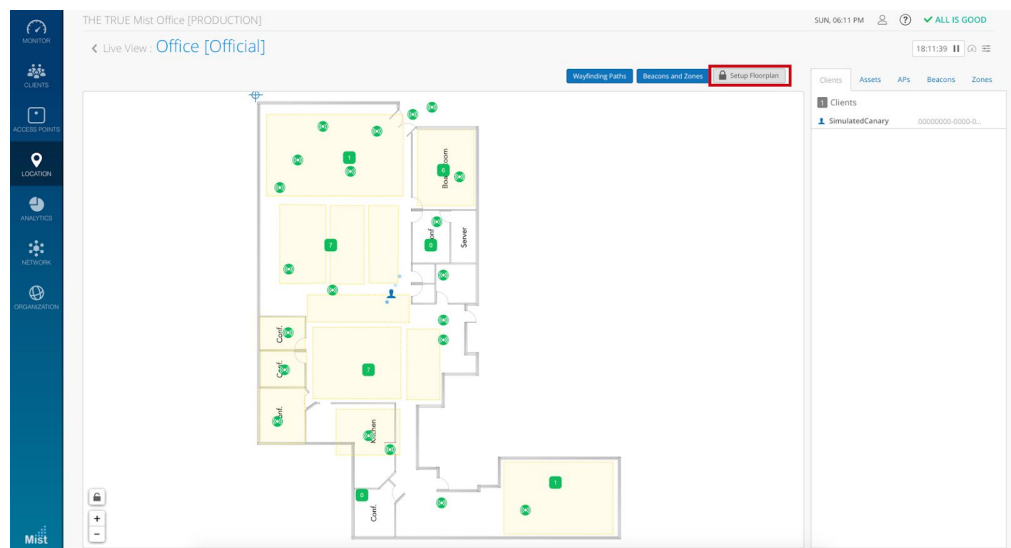
- To scale the floorplan,
  - i. Select “Live View” from the “Location” side navigation menu



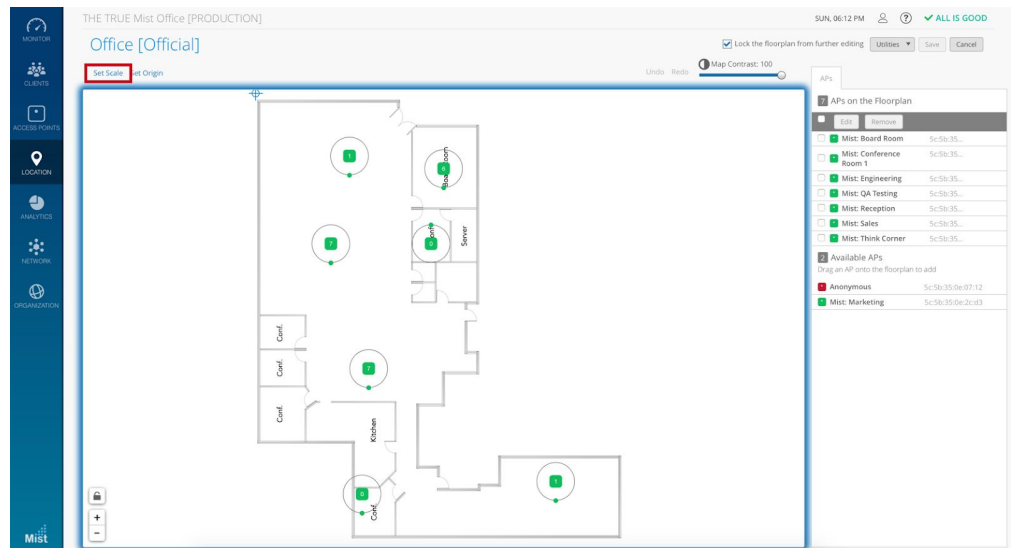
ii. Select the site and floor plan you want to scale



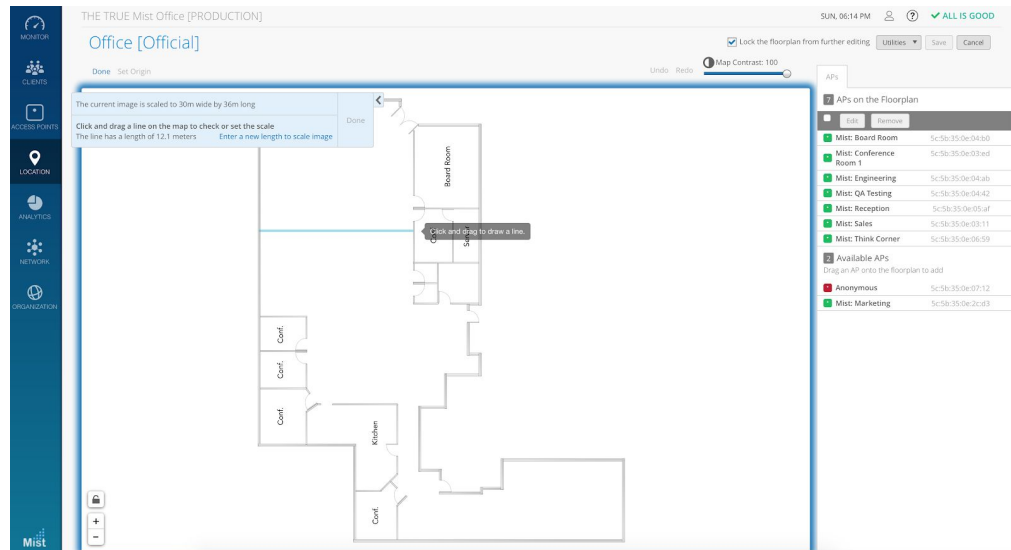
iii. Click on "Setup floor plan"



iv. Select the “Set Scale” option



v. Scale the floor plan and push done



- Scale can be thought of as the foundation for your location accuracy. If, for example, a room is 10 meters long but you scale the room to be 1000 meters long in the system, then when you physically walk 5 meters, the system UI would only reflect you as moving one inch. This gives the false impression that location is broken, but location has actually placed you correctly based on the provided scale. Thus, it is crucial that your floorplan is scaled properly.
- One trick if you don't know the scale of a floor plan is to look for a standard door and scale that door to be 0.91 meters (3 feet). This should scale the floor plan appropriately.

## 2. Set AP Placement

- To place an AP on the floor plan

i. Select "Live View" from the "Location" side navigation menu

The screenshot shows the Mist Monitor interface for 'THE TRUE Mist Office [PRODUCTION]'. The 'Location' menu item is highlighted in blue, and a sub-menu is open showing 'Live View' as the selected option. The main content area displays a map of the office location with a speed indicator showing 4.00 Mbps. Below the map is a line graph showing network activity over time. The 'Site Events' section is empty. The 'Access Points' table shows the following data:

Name	Connected	Disconnected	MAC Address	Uptime	Clients	Bytes
Mist: Engineering	14	0	Sc:5b:35:0e:04:ab	5d 10h 57m	14	6 GB
Mist: Board Room	1	0	Sc:5b:35:0e:04:b0	5d 10h 57m	1	5.9 GB
Mist: Marketing	0	0	Sc:5b:35:0e:2c:d3	5d 10h 57m	0	4.5 GB
Mist: Reception	1	0	Sc:5b:35:0e:05:af	5d 10h 57m	1	3.4 GB

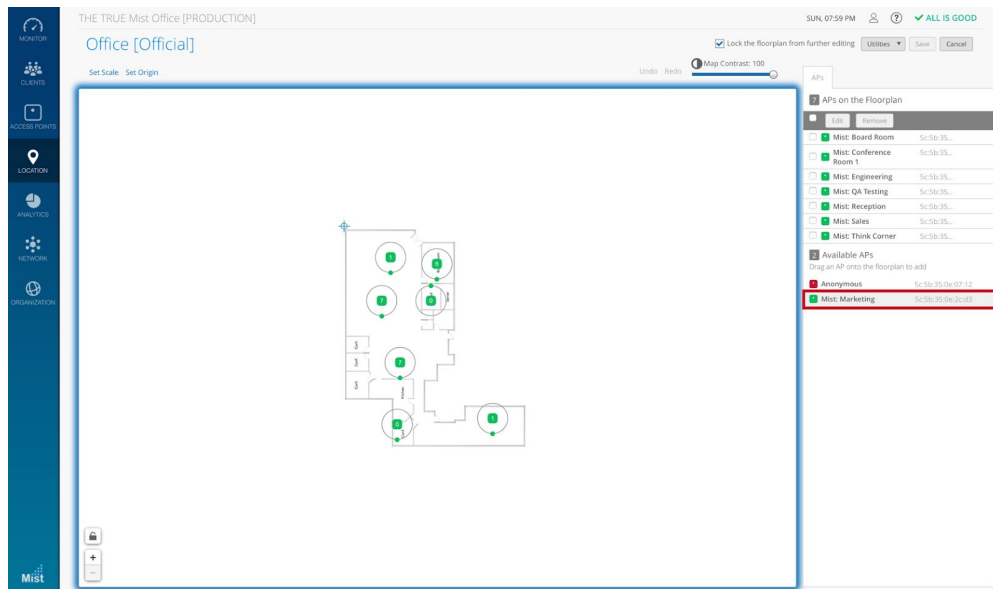
ii. Select the site and floor plan you want to scale

The screenshot shows the Mist Live View interface for 'THE TRUE Mist Office [PRODUCTION]'. The 'Live View' menu item is selected in the navigation menu. The main content area displays a floor plan for 'Office (Official)' on 'Floor 2'. The floor plan is highlighted with a red box. The interface includes a search bar and an 'Add Floorplan' button.

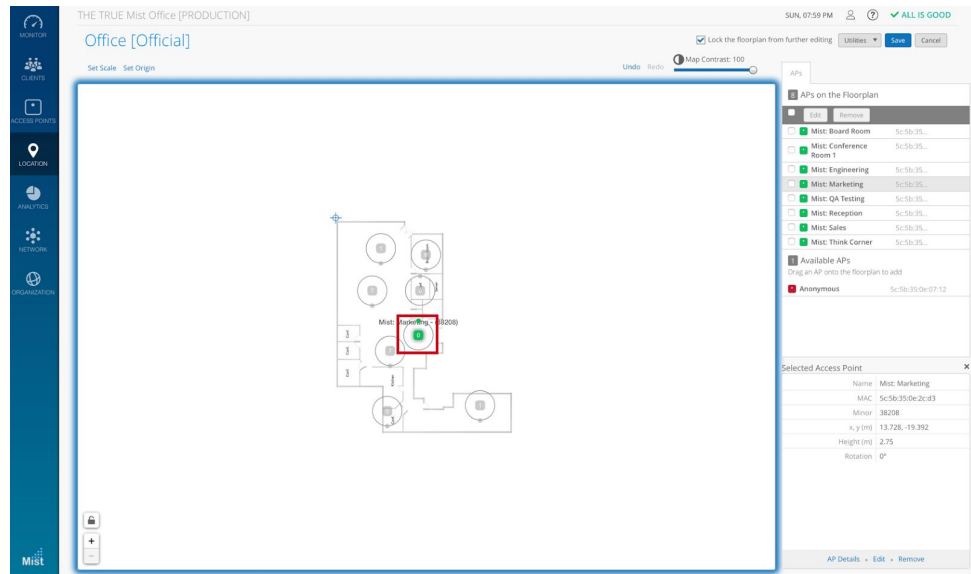
iii. Unlock the floorplan for editing



iv. Select the AP from the "Available APs" option



v. Drag and drop the AP on the floor plan



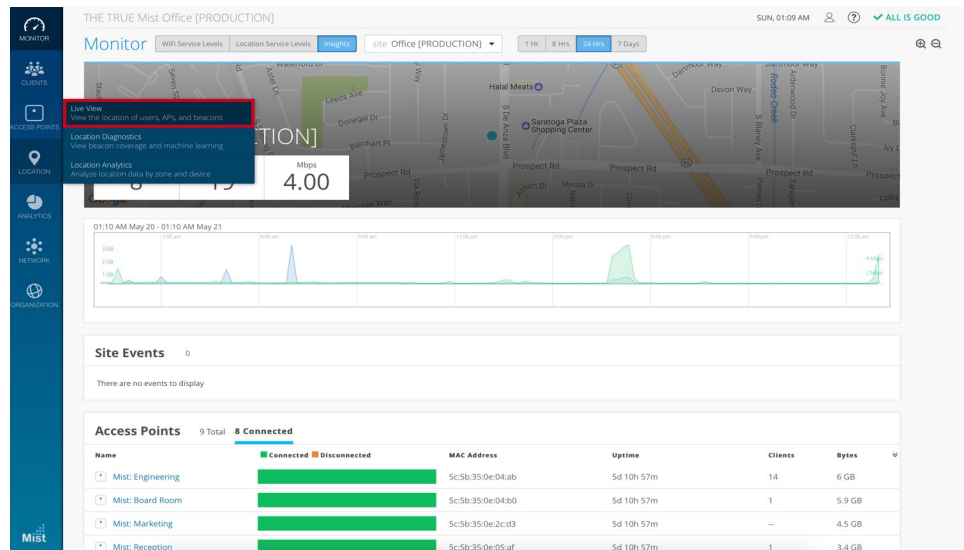
- AP placement is simple yet important. In the UI, just drag and drop the AP onto the floor plan where the AP is deployed in the real world. For example, let's say you have a 10 x 10 meter room and physically deploy the AP in the center of the room. You would do the same in the system by placing the AP on the middle of the floorplan in the UI. If you physically move that AP to the upper-right corner of the room, then you would also need to update the system by moving that AP to the upper-right corner of the floorplan.
- It is important to ensure that the MAC address of the AP placed in the system matches that of the AP in the physical deployment. If the APs and their placements do not match, this will give the false impression that location is broken; the system will show your location in a different area on the floor plan.

### 3. Set AP Orientation

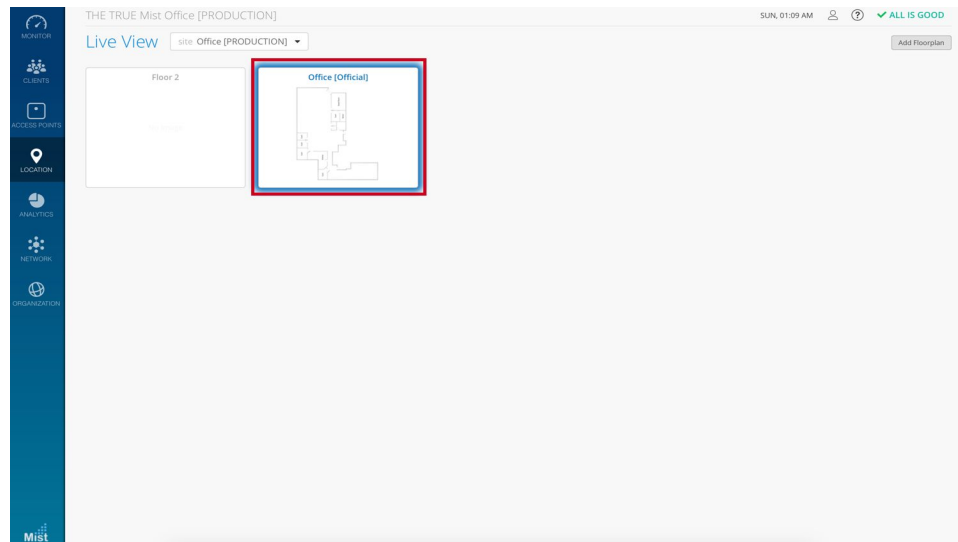
- Setting the AP orientation (rotation)



- i. Select “Live View” from the “Location” side navigation menu

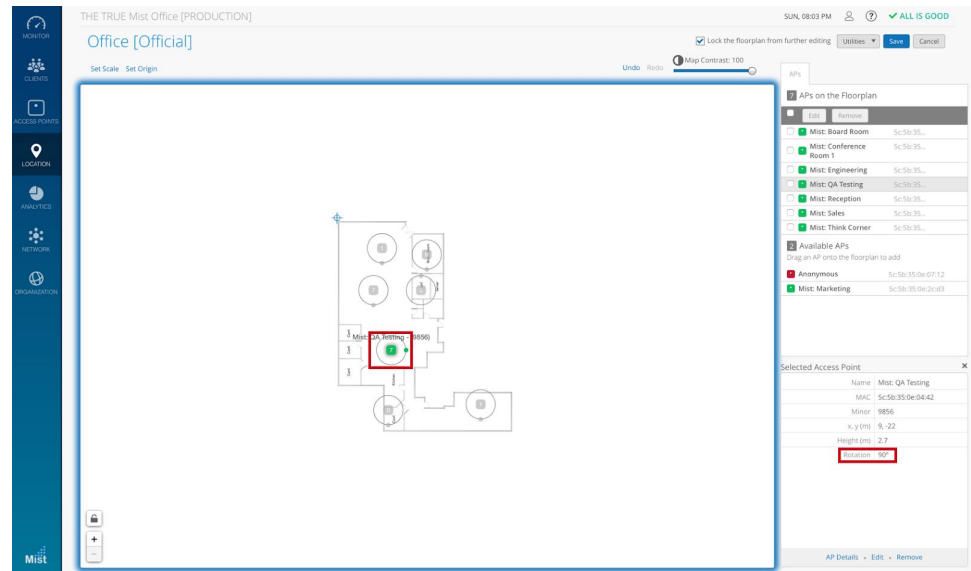


- ii. Select the site and floor plan you want to scale



- iii. Click “unlock for editing”, select the AP you want to set the orientation, and rotate the small green dot on the outer ring of the selected AP. You can also select all APs and set all selected APs orientation in the “edit”

section for a quick mass orientation edit.



- AP orientation is a crucial part of location accuracy. Wherever the AP's LED is pointing in relation to the map's perspective, that AP's orientation (or rotation) in the UI must match its orientation in the real world. If done incorrectly, the location engine will place your client's location somewhere else.
- Please note your map does not have to face true north. The easiest way to determine the AP's orientation is to find a reference point on the floorplan when comparing the UI with the real world.
- When setting the orientation in the UI, make sure the small green dot points in the same direction as the AP's LED. A good tip is to orient all of the AP's in a common space in the same direction, as this makes it easier to spot problems down the road.
- Imagine drawing a line from the Mist logo towards the LED and continuing drawing that line past the LED. This is your imaginary line of where the LED is facing.

#### 4. Set AP Height

- Setting the AP Height

i. Select "Live View" from the "Location" side navigation menu.

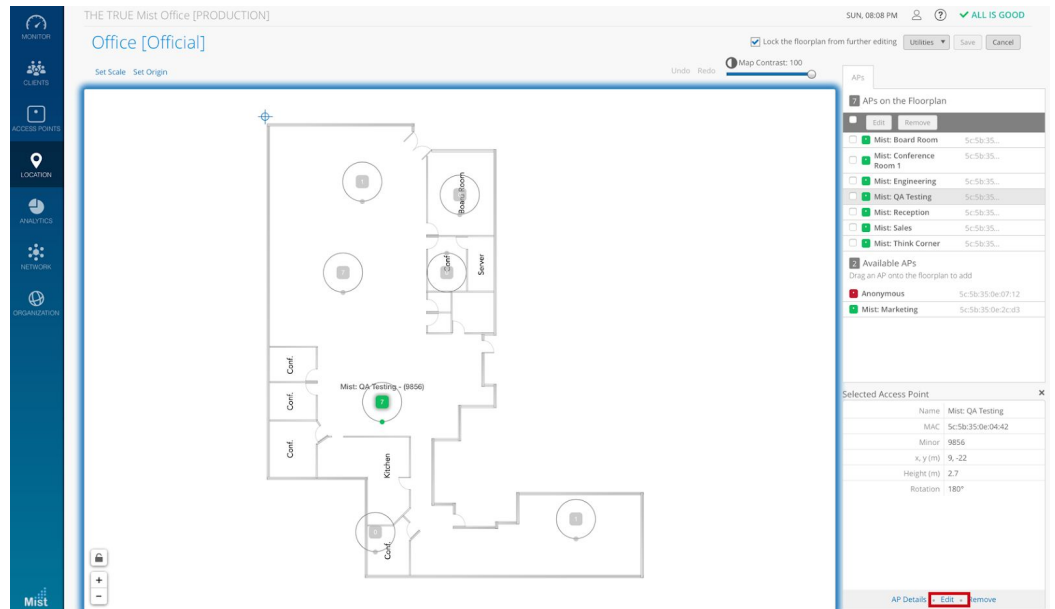
The screenshot shows the Mist Monitor interface for 'THE TRUE Mist Office [PRODUCTION]'. The 'Location' menu item is selected, and a dropdown menu is open, highlighting 'Live View'. Other options in the dropdown include 'Location Diagnostics' and 'Location Analytics'. The main content area displays a map of the office location with a speed indicator of 4.00 Mbps. Below the map is a line graph showing activity from 01:10 AM May 20 to 01:10 AM May 21. The 'Site Events' section shows 0 events. The 'Access Points' section shows 9 total and 8 connected APs, with a table listing details for each.

Name	Connected	Disconnected	MAC Address	Uptime	Clients	Bytes
Mist: Engineering	█	█	5c:5b:35:0e:04:ab	5d 10h 57m	14	6 GB
Mist: Board Room	█	█	5c:5b:35:0e:04:b0	5d 10h 57m	1	5.9 GB
Mist: Marketing	█	█	5c:5b:35:0e:2c:d3	5d 10h 57m	---	4.5 GB
Mist: Reception	█	█	5c:5b:35:0e:05:af	5d 10h 57m	1	3.4 GB

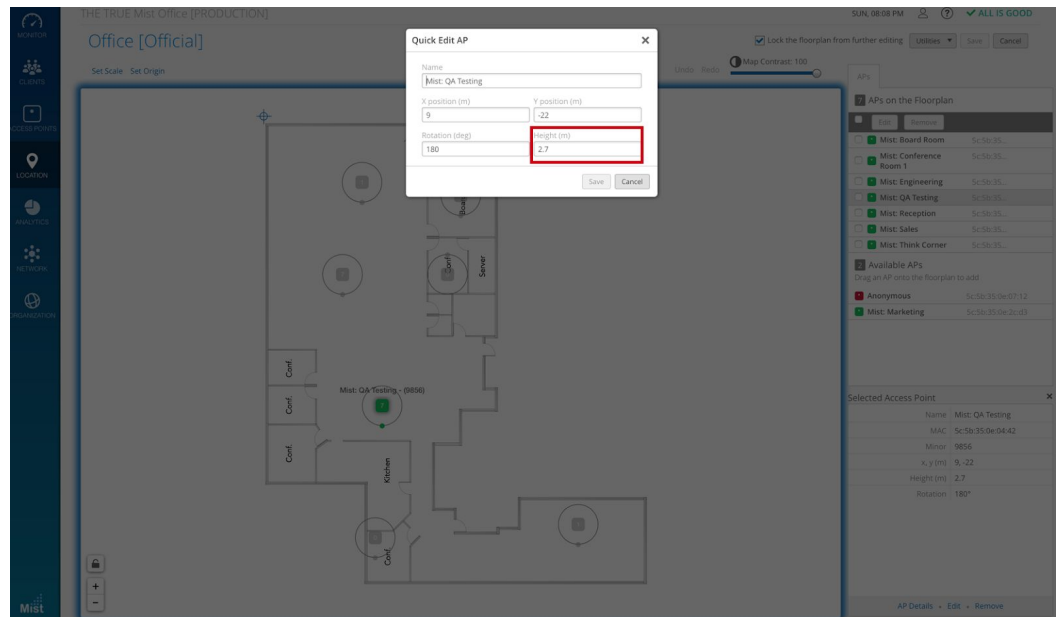
ii. Select the site and floor plan you want to scale.

The screenshot shows the Mist Monitor interface with 'Live View' selected in the 'Location' menu. The main content area displays a floor plan view of 'Office [Official]' on 'Floor 2'. The floor plan is highlighted with a red and blue border. The interface also shows a search bar and an 'Add Floorplan' button.

- iii. Select the AP you want to set the height and click “Quick Edit”



- iv. You can now change the height of the AP



- AP height is the last step in the initial deployment process and is important since the location engine takes this into account for machine learning.
- By default, we set all APs to 2.75 meters (9.02231 feet). Make sure to set the AP's height appropriately in the “Quick Edit” section of the Live View.

All in all, the message is simple; the system and real world deployments must match as closely as possible. They do not necessarily have to be perfect, but the closer the UI deployment reflects reality, the better location accuracy will be. After this, machine learning will continuously adjust and find a more optimal path loss formula (PLF) that works for your deployment. If you find your location experience is not ideal revisit these four steps. The majority of location issues comes from an incorrect AP setup. Below is a link to a video on how to do the setup for these four steps.

## vBLE Details

- **Mist vBLE Array**
  - The Mist AP has a vBLE array, which consists of a 16 Directional Antennae Bluetooth Array. Eight *unique* antennas are reflectors to help with directing the BLE energy outward away from the AP, and the other eight *unique* antennas are directional antennas that point in eight different directions, transmitting BLE energy in a flashlight-like fashion.
  - To better visualize this, imagine a flashlight shining narrow beams in eight different directions.
- **AP Directional Beam Angle**
  - The best directionality comes from about a 45 degree angle, with the AP's LED facing down towards the ground. Anything below 45 degrees acts more like a null radius, since you are directly under the AP at 0 degrees.
  - This is why the higher an AP is placed, the null radius under the AP increases and the RSSI from the client decreases.
- **AP Beams**
  - Each AP is transmitting on eight *unique* directional beams.
  - The Mist SDK on the device hears these beacons from the beams, and sends the RSSI and device sensor information back to the Mist cloud. Through either Wifi or cellular.
  - The more beams your device hears the more accurate your location will be, as there is more data for the location engine to make a better location estimate.

## Location Deployment Mistakes

- DO NOT install APs on the ground or on any object with the AP facing up or down.
- DO NOT install APs on the walls with the AP vertical to the wall.
  - You can install APs horizontally on walls as long as the LED is still facing down.
- DO NOT install two or more APs 1 meters from each other.
  - This is just poor use of coverage.
- DO NOT install APs near or up against metal, glass or concrete.

- DO NOT install APs more than 15 feet high.
  - If you do need to install APs more than 15 feet high please contact Mist ([support@mist.com](mailto:support@mist.com)) to have a Mist SE help advise as certain uses cases may require more dense AP deployment for higher ceiling deployments.
- DO NOT install APs above the ceiling.
  - Only certain use cases call for this, which would require advice from a Mist SE ([support@mist.com](mailto:support@mist.com)) on how to best deploy for such a use cases.

## Support

If you have any questions that were not answered in this guide or you have a very specific question that this guide did not cover you can go to our support page and email to submit a ticket. Below are two ways you can submit a ticket.

1. You can email your questions at [support@mist.com](mailto:support@mist.com)
2. You can go to <https://support-portal.mist.com/hc/en-us/requests/new>