



Instructions for Installing Noccela
system

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CONFIDENTIAL

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2 Equipment needed

Equipment needed to setup system with four beacons can be seen in the table below.

List of equipment for the system with at least 4 beacons and 10 tags

Quantity	Item	Note	Packed
1 PCS	VPN ROUTER	Preconfigured by Noccela, Note EU power plug. An adapter is needed in the UK and US.	x
1 PCS	PoE SWITCH	Preconfigured by Noccela, Note EU power plug. An adapter is needed in the UK and US.	x
4 PCS	PoE SPLITTER	Preconfigured to provide 5V output.	x
4 PCS	USB power cable, 1.5 meters	Cable between Noccela beacon and PoE splitter	x
5 PCS	1.5-meter CAT6 UTP ethernet cable	Cable between Noccela beacon and PoE splitter and between router and PoE switch	x
1 PCS	CAT6 UTP ethernet cable	Cable from VPN router to customer's ethernet socket/switch/etc.	x
4 PCS	CAT6 UTP ethernet cables	Cable between PoE switch and beacon PoE splitter	
4 PCS	Noccela beacon	The beacons contain European M10 thread, in typical installation the beacon is connected to the roof using threaded rod. Therefore, the height position is somehow adjustable. For a temporary installation, it is possible to utilize cable ties or kind to install mechanically. Installation is covered on further chapters. NOTE: Latest Noccela beacon 3 have M8 thread instead of M10.	x
4 PCS	M10 threaded rod	NOTE: Noccela provides only short threaded rods for a temporary installation. Any mechanical items possibly needed to extend this length, or to create another installation method, should be purchased separately.	
10 PCS	Noccela smart tags		x

3 Installation

Installation technicians can install the system without the presence of a Noccela engineer. After the mechanical installation, distance measurements and configurations are completed, Noccela engineers are able to verify the installation remotely. The installation is quite straightforward, plugging the items together and then carefully measuring the Noccela beacons positions in 3D space to get proper X, Y and Z coordinates. Configuring the beacon coordinates into cloud using partner portal tool finalize the installation.

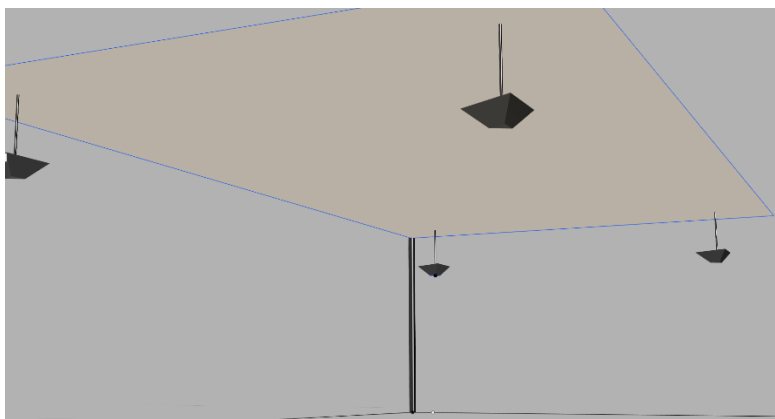


Figure 1 Noccela beacons installed to the ceiling

Typically testing area is 10 x 20-meters, the beacons are connected to the ceiling or lighting rails using threaded iron rods. About 1-meter of empty space should be left between the beacons, walls or all kinds of objects to get the best performance and accuracy. Temporary installation could be made example with tripods, cable ties or tables.

3.2 Mechanical installation

Tools: 17 mm wrench, tape measure, laser measurement, Torx-T20 screwdriver

A permanent mechanical installation is typically done by using threaded steel rods attached to the ceiling, lightning rails etc. by a method easiest for each installation location. The Noccela beacons have M10 thread for this purpose. Turn the rod gently until the end of the thread, turn back ¼ round and use a locking washer and nut to lock the rod.



Figure 2 M10 thread in a bottom of a Noccela beacon

Noccela beacon 3

The latest version of the Noccela beacon, called beacon 3, have a new mechanical design. There is also integrated PoE splitter, therefore external PoE splitter is not needed and CAT6 cable can be connected directly from PoE switch into the Noccela beacon 3. Beacon is significantly smaller (15 cm x 7 cm) and lightweight. Mechanical installation can be done using threaded steel rods but surface mounting is possible using the mounting plate.



Note: Beacon 3 early prototypes does not have M8 thread, instead there is ½ inch NPT pipe thread for pipe installation. Suitable adapter can be used to change the thread type as seen in image above.

Danger: Do not turn rod more than 1 cm from bottom of the beacon enclosure, beacon can be damaged permanently if rod pass the electronics inside beacon. This concern only to the limited prototypes, latest design has mechanics to prevent this to happen.

Turn and lock threaded steel in bottom, assemble rod into ceiling, connect CAT 6 cable into connector in bottom of beacon. If sticker in bottom can't be read after installation, write it down now, it is needed when coordinates are configured using partner portal tool.



The following images illustrate some examples of the mechanical installations.



Figure 3 100cm x 50cm

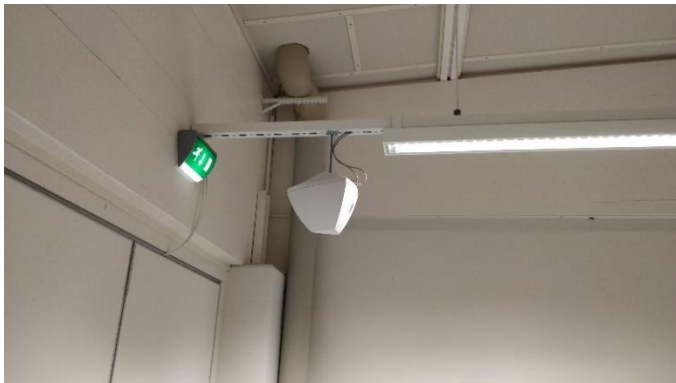


Figure 3 & 4 Examples of a perfect installation. There is a lot of empty space around the beacon



Figure 5 Part of the office has a partially lowered ceiling; therefore, the beacon is installed quite low to support also this low area



Figure 6 Example of beacon 3 mounting plate installation.

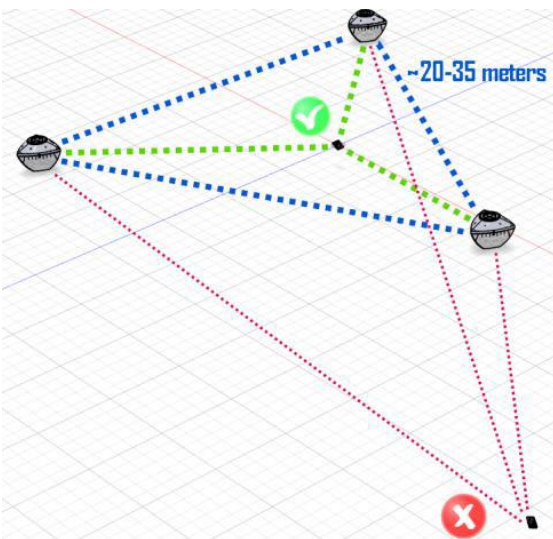
Examples of temporary installation methods.



Figure 7 Examples of a temporary installations.

3.3 Beacon positioning

Beacons with line of sight with each other should create a triangle. Inside this triangle, the positioning is the most accurate. If there are large objects or reinforced concrete walls between the beacons, beacon moving is recommended for best possible accuracy. Depending on the material of an obstacle the performance impact varies. Seek for the 100cm x 50cm free space for the beacon, for the best possible accuracy.



3.4 Electrical installation

Beacon 3 have integrated PoE splitter, therefore this chapter concern only older type of beacon. Beacon 3 should be connected directly into PoE switch. Connect PoE splitters to the beacons using 1.5-meter USB and an ethernet cable. Use cable ties to have beautiful cable management. The splitter can be hidden above the ceiling if possible.

Remember to check the voltage settings of the PoE splitter (5V), incorrect settings damage the beacon.

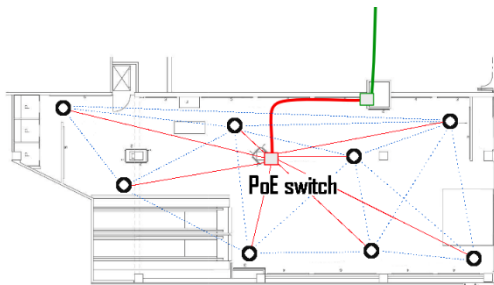
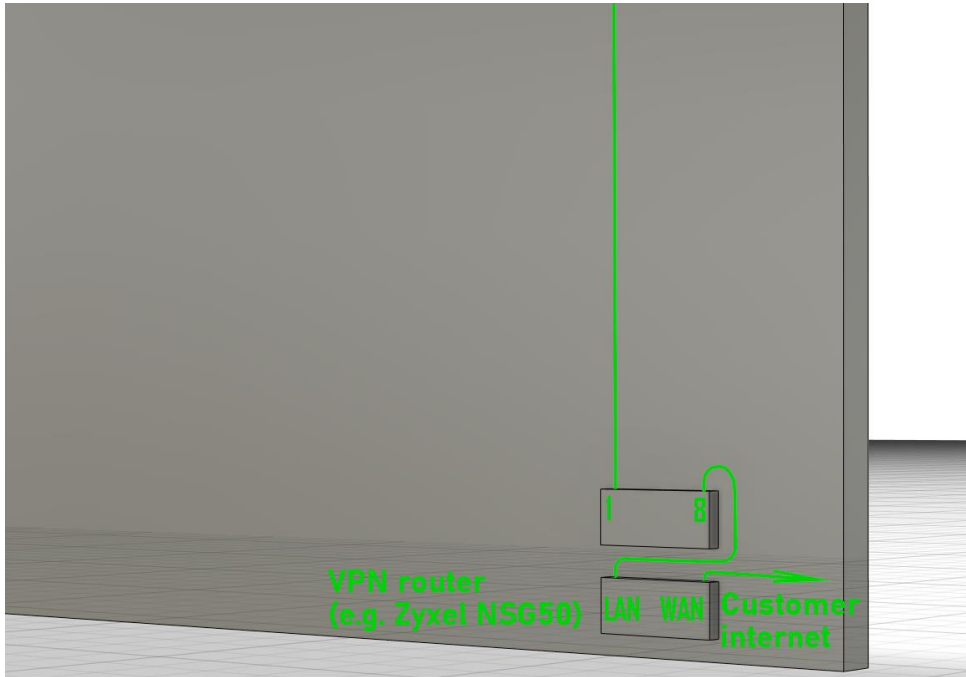


Connect the PoE splitters into a PoE switch using a long enough CAT6 U/UTP (or CAT6 S/FTP with beacon3) ethernet cable. Write down the serial number of the beacon and corresponding ethernet port number. This can also be done directly into cloud using partner portal tool as described in further chapter 4.



Connect the PoE switch into a VPN router using e.g. 1.5-meter CAT6 ethernet cable. Connect the VPN router to the internet. DHCP is used if nothing else is agreed. Static IP is not required. Incoming access is not required.

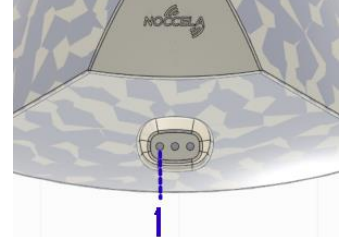
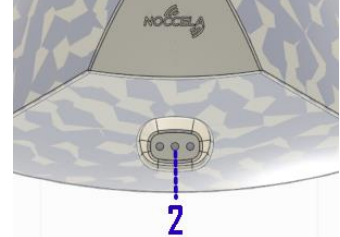
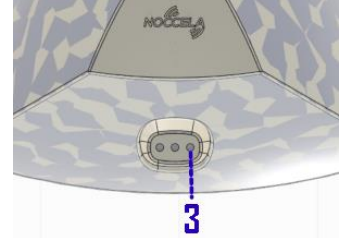
VPN router requires outgoing access to TCP ports 443 and 6667 and UDP ports 123 and 1317.




Pull one CAT6 cable in middle of the area for efficient cablework. In this example, switch is installed in area ceiling.

Successful connection is indicated by three blue led lights. Two led lights should light up and one of them should blink.

Troubleshooting, beacon 2

	<p>LED 1 no light: The beacon does not have power, check the PoE switch and splitter connection. Typically, the PoE switch has a LED to indicate if it delivers power over ethernet.</p>
	<p>LED 2 no light: The beacon has no ethernet link, check the ethernet cable between the PoE splitter and the beacon. Also, the cable between the splitter and the switch should be checked. Typically, incorrectly assembled ethernet connector cause this.</p> <p>LED 2 lit yellow: The beacon has an ethernet link, but there is no internet connection or beacon is not able to connect to the Noccela cloud. This happens typically if the PoE switch is not correctly connected into the VPN router, or if the router is not connected to the internet or if there is blocked port in the customer's internet system.</p>
	<p>LED 3 does not blink blue: If the LED does not start blinking in 10 min, the beacon can be rebooted by disconnecting the PoE or USB cable. If the problem persists, contact Noccela and give them the serial number of the beacon.</p>

Troubleshooting, beacon 3

	<p>LED no light: The beacon does not have power, check the PoE switch and CAT6 cable between switch and beacon. Typically, the PoE switch has a LED to indicate if it delivers power over ethernet.</p>
	<p>LED blink yellow: The beacon has no ethernet link, check the ethernet cable between the PoE switch and the beacon. Typically, incorrectly assembled ethernet connector cause this.</p>
	<p>LED lit yellow: The beacon has an ethernet link, but there is no internet connection or beacon is not able to connect to the Noccela cloud. This happens typically if the PoE switch is not correctly connected into the VPN router, or if the router is not connected to the internet or if there is blocked port in the customer's internet system.</p>
	<p>LED does not blink blue: If the LED does not start blinking in 10 min, the beacon can be rebooted by disconnecting the PoE cable. If the problem persists, contact Noccela and give them the serial number of the beacon.</p>

Note: If yellow LED lit, it's possible the problem is caused by blocked ports of the customer internet router. Laptop can be used to check if ports are open, connect laptop to the Noccela switch and check if internet

browsing is working. If beacon can't connect to Noccela cloud but internet is ok, some of the required port described in the previous chapter is probably blocked.

4 Configuration of the site using partner portal tool

Partner portal tool can be used to load blueprint image, configure beacon positions etc. If partner portal account is not available it's also possible to measure beacons into image map and send this information to Noccela to complete configuration.

Note: Using Google Chrome browser is recommended.

<https://partner.noccela.com/>

Login with your email/account name and password received from Noccela, main page lists all the sites available for configuration. If the site is missing please contact Noccela Customer support and implementation team (<https://www.noccela.com/#contacts>). As shown in the image below there is available a site named "Demo Kit Not Sent 1" and there is granted permission to use site designer for configuration purpose. If other permissions are needed, please contact Noccela.



Figure 6 Partner portal main page

Click the Site Designer button to open the designer. Main page opens, this site has four beacons already defined as four green circles as seen in Figure 8 below. This view shows the map, called also blueprint image together with beacons of the site. Blueprint image is not yet uploaded therefore only beacons can be seen. It is possible to zoom and locate on the map on using slider in the view and also using mouse wheel and buttons.

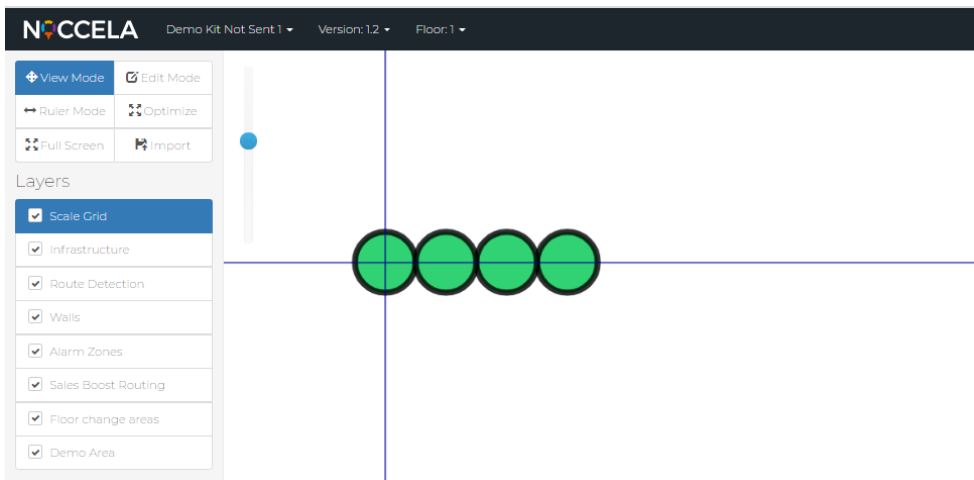
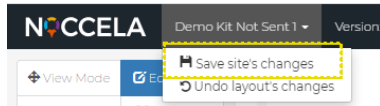


Figure 7 Designer main view

Note: If you are in Edit Mode and blueprint image has focus, moving map by clicking inside image will change the origin. This will also move all beacon positions and EAS functionality is not anymore what it was beforehand. Therefore, be carefully with this feature.

If something is accidentally changed, reloading page will restore the most recent saved version. Undo is not functional in this web-based tool.

Note: During editing item properties it is possible the property dialog box disappears while zooming is done. If this happen and it will not appear if the item is re-selected or if navigating between menu items, the only option is to reload the page. Therefore, it's good to Save site configuration when each configuration step is completed correctly.



Add blueprint image (map)

It's recommended to use landscape orientation; external image editor can be used to rotate image beforehand. Click Edit Mode -> New Layer -> Blueprints from the dialog box -> layout editor dialog box opens.

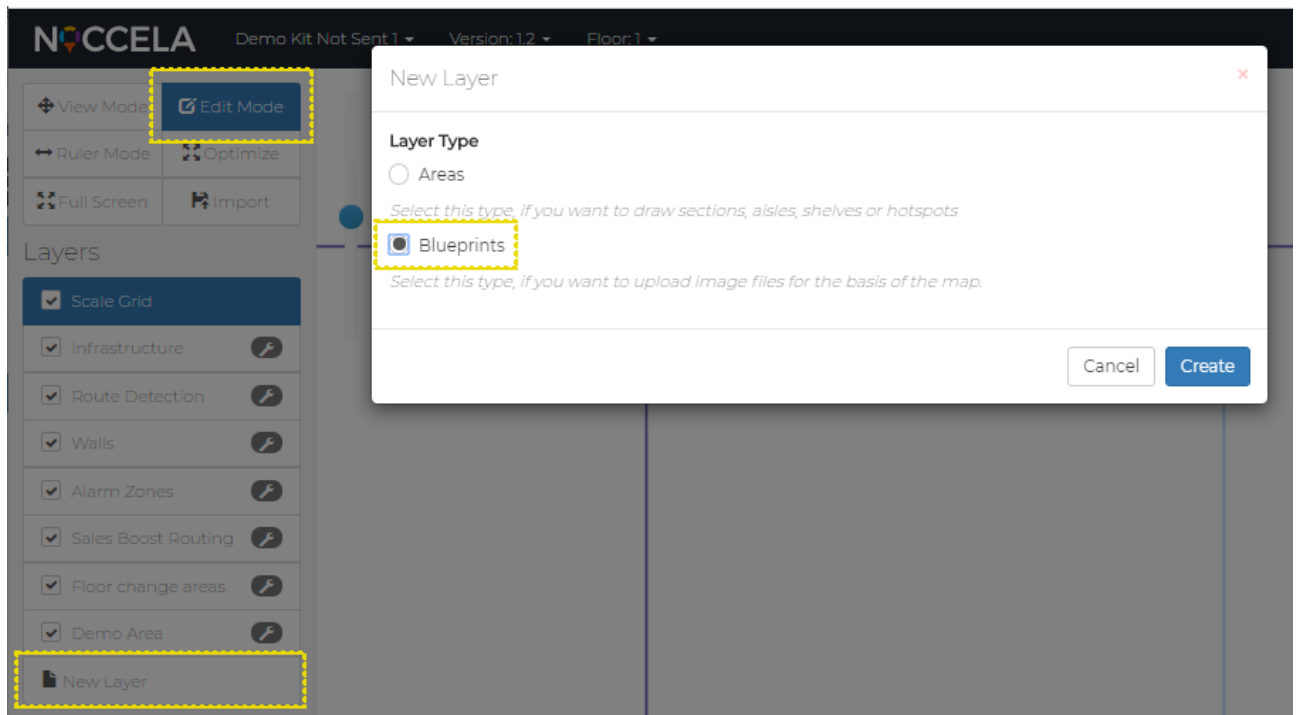


Figure 8 Adding layer for the blueprint image

Adjust Opacity to be 60-80% to get better visibility, if the blueprint image map has high contrast this adjustment will improve visibility in my.noccela portal. Blueprint layer have now been created; we can upload the actual image. It is possible to load several images into same layer but typically there is only one.

File can be uploaded by selecting 'New Blueprint' from the left menu bar and then selecting "Choose File" as seen in the Figure 10 below.

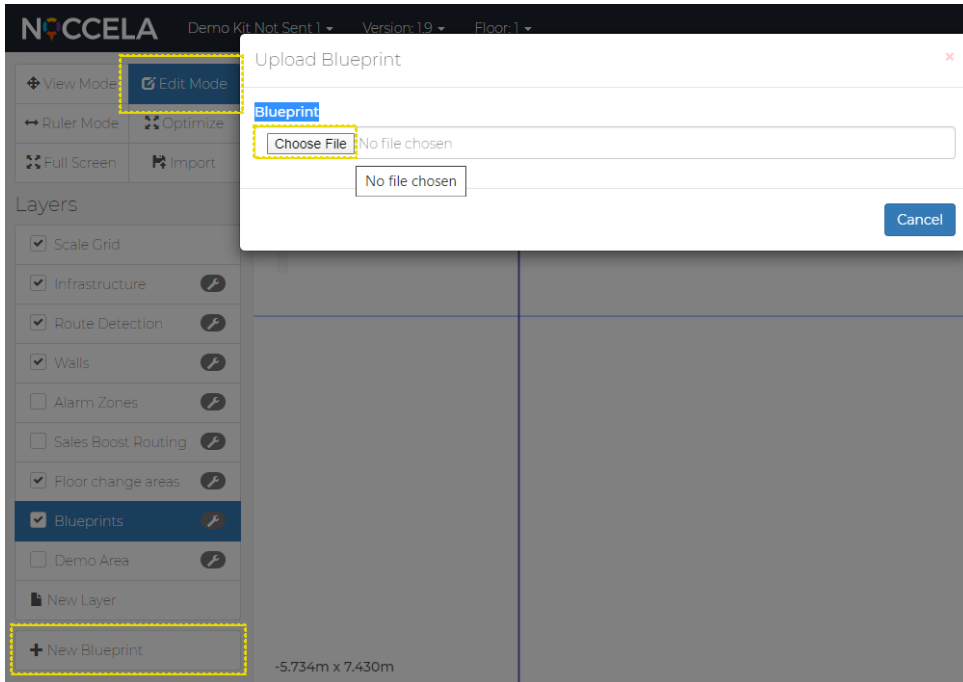
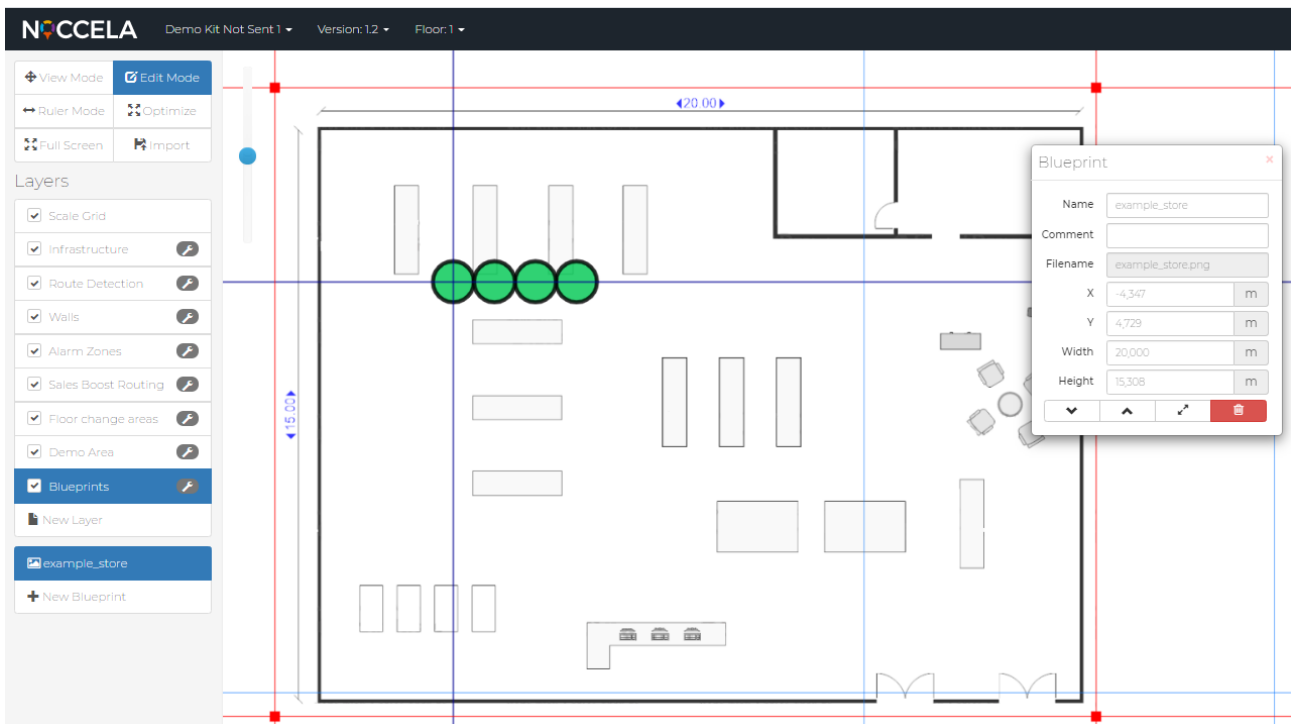


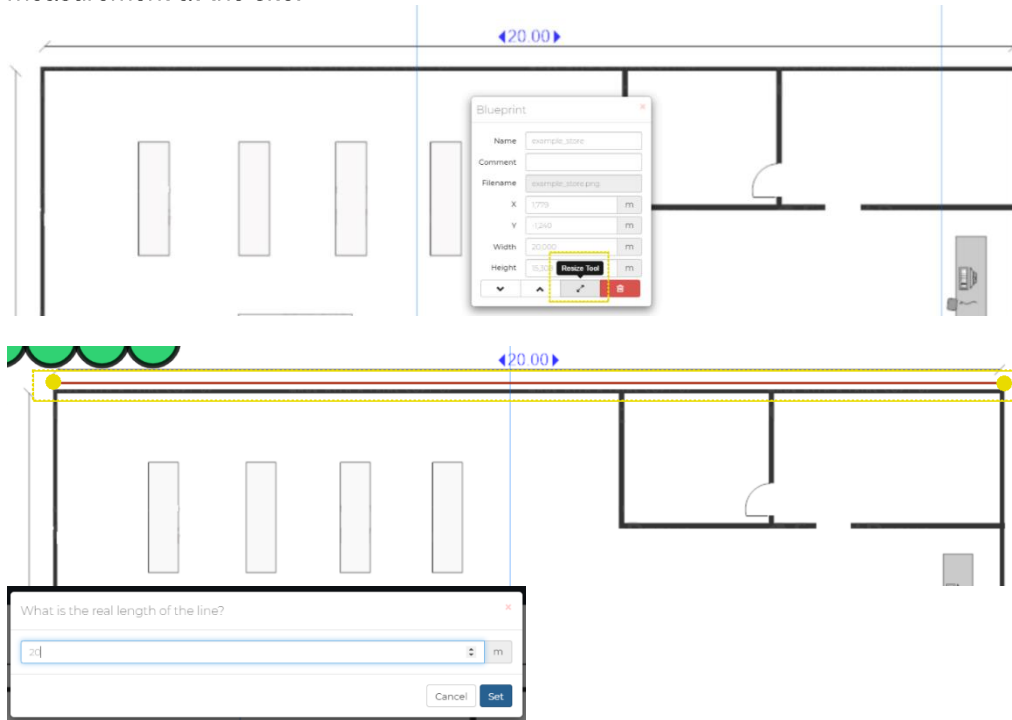
Figure 9 Uploading blueprint image

Designer displays the selected blueprint image. Origin of the image is marked using blue crossing lines, and four beacons can now be seen in the room.



Scaling the image and defining the X and Y origin is the next task. There are couple methods to scale the image to correspond with the real world. Width and height can be defined directly into the Blueprint dialog box, but typically image contain some random margins and image width in real world can't be defined. Another easy method is to use the ruler mode, two points are selected from the image, real distance of these points is given and tool will calculate correct scaling factor. If image does not contain dimension information manual measurements in the site should be done using laser ranger or kind measurement tool. In this example we know the width of the room is 20 meters. Select Resize Tool from the Blueprint dialog box, "Draw a line to map which real length you know" dialog box is opened, click Ok and click both upper

corners of the room. Red line is drawn and finally “What is the real length of the line?” dialog box will be opened. Enter a value of 20 meters and click Set button.
If you do not have marked measurements in the blueprint, measure as long surface as possible with laser measurement at the site.



Now the scaling is completed. It is possible to verify and finetune the image scaling from the blueprint properties box, to verify select Ruler mode from the left menu bar, and select again two points from the image. The tool will calculate the real length of given points as seen in Figure 11.

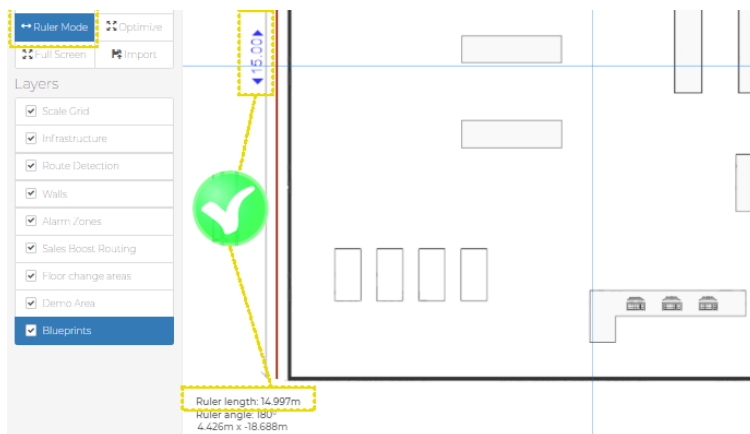
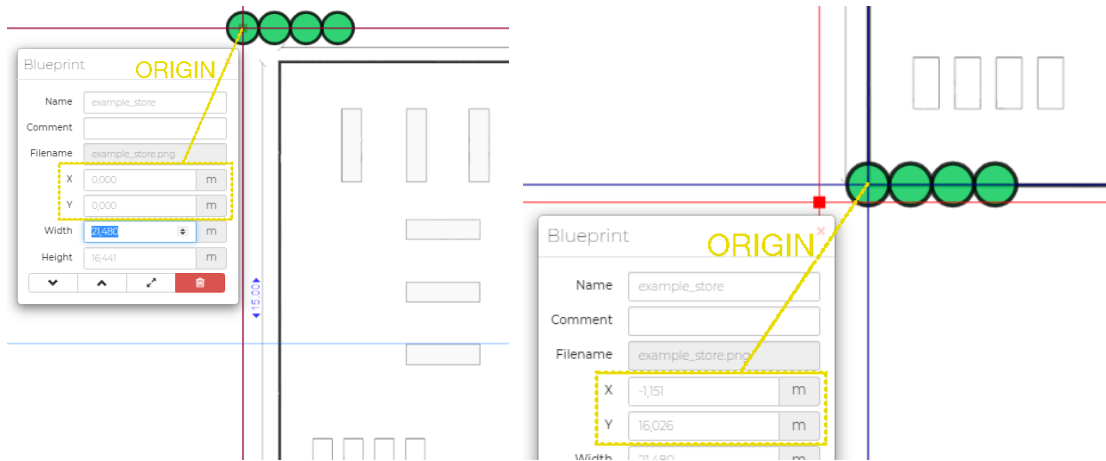


Figure 10 Ruler mode is used to verify image scaling

Now beacons can be positioned into the map, if beacon position will be measured relatively to some reference point it should be marked into blueprint image as an origin. Typically, some corner is selected as an origin. Select Edit mode and click blueprint image from left menu. Move image using mouse or by giving X and Y coordinates of the image upper left corner. Move image until two wide blue lines crosses in the origin point. Best accuracy is achieved by zooming which is available e.g. by mouse wheel. Note: Whenever blueprint image is moved by dragging with mouse, it will also move beacons relatively to the image. Therefore, image should not be moved anymore if beacons positions have been defined.



Position beacons using property dialog box

Beacons can be positioned into the map either by moving with mouse or by giving exact X, Y and Z coordinates. Note that Z coordinate must always be given from the property dialog box, from 2D image map it's not possible to point Z value. Proper Z coordinate is important even if there is 2D map in use, the positioning algorithm does calculation in 3D space and different beacon installation heights are taken into account. Select Edit Mode and select Infrastructure from the left menu bar. Typically, site have all the beacons already listed, this has been done by Noccela when the beacons are sent to the customers. If this has not been done it is possible to add more beacons by selecting "New Sensor", and selecting the serial number which is printed in the beacon sticker which can also be read from the barcode. If beacon serial number can't be found from the list please contact Noccela.

Note: Current user interface of partner portal uses word "Sensor" instead of "Beacon".

Note: Beacon serial number (NDID) has been associated to each site when Noccela have delivered beacons. Therefore, beacons can't be swapped between sites. If there is anyhow need to do that or replace beacon with a new one, please contact Noccela and provide serial number (NDID) of beacon which should be added to the site.

All the beacons are listed into left menu bar whenever Edit Mode and Infrastructure is selected as seen in Figure 12.

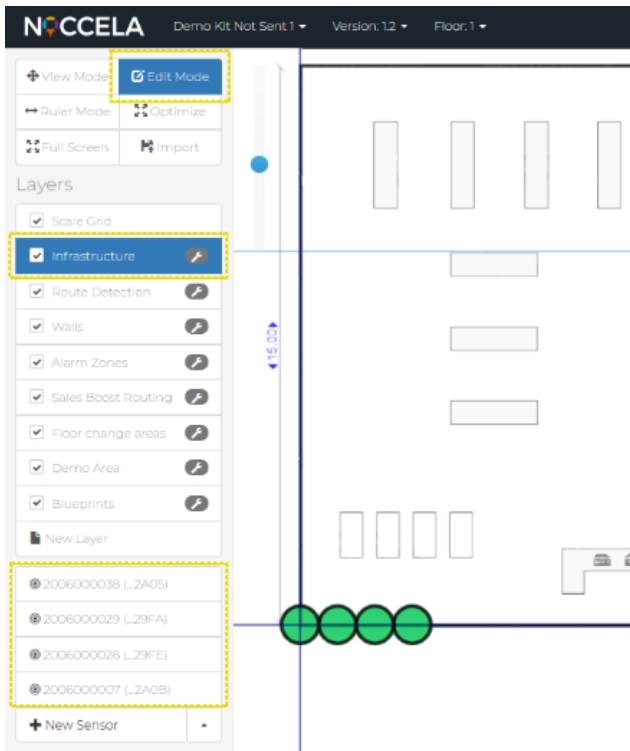
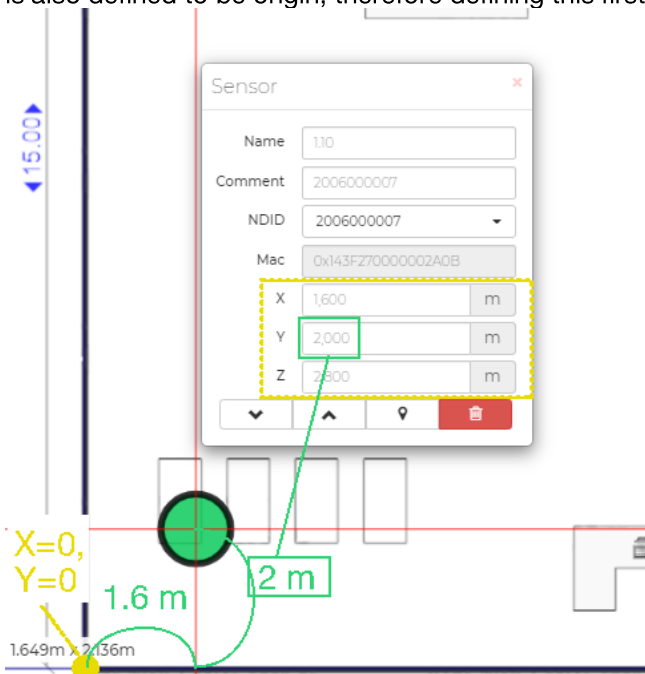


Figure 11 Four beacon serial numbers defined for this site

Beacons can be moved freely in the map, in this example both left beacons are installed into the lighting rail which is measured to be 1.6 meter from the left wall. Therefore, X position will be 1.6 meter for both. Height is measured to be 2.8 meter from the floor. Y position is measured to be 2 meters from the bottom wall which is also defined to be origin, therefore defining this first beacon was really easy, X=1.6, Y=2, Z=2.8.



Note: Choose correct beacon serial number (NDID) to each corner, if two beacons are accidentally swapped the positioning calculation does not work at all.

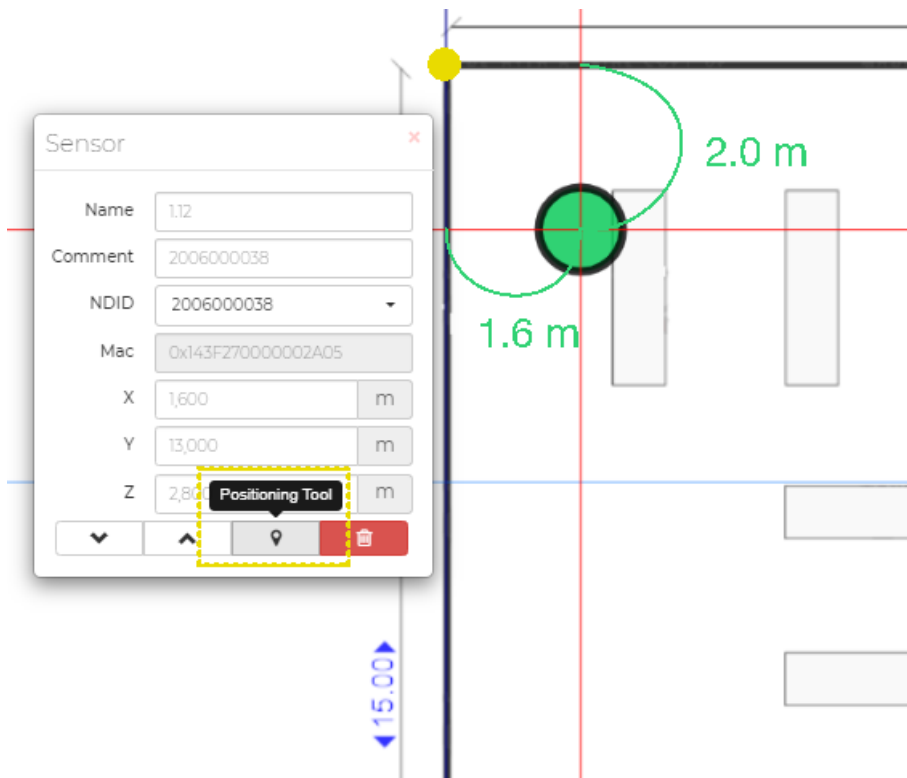
At this point it's good to give a name for the beacon, it will help if some cable diagnostic is needed to be done later.

Beacon naming convention: <<POE switch number>>.<<POE port number>>
Example: 1.10 = POE switch number 1, port number 10

This will help diagnostic if some cable problem occurs. In further chapters it is described how information of the POE switches and VPN routers are stored into the system.

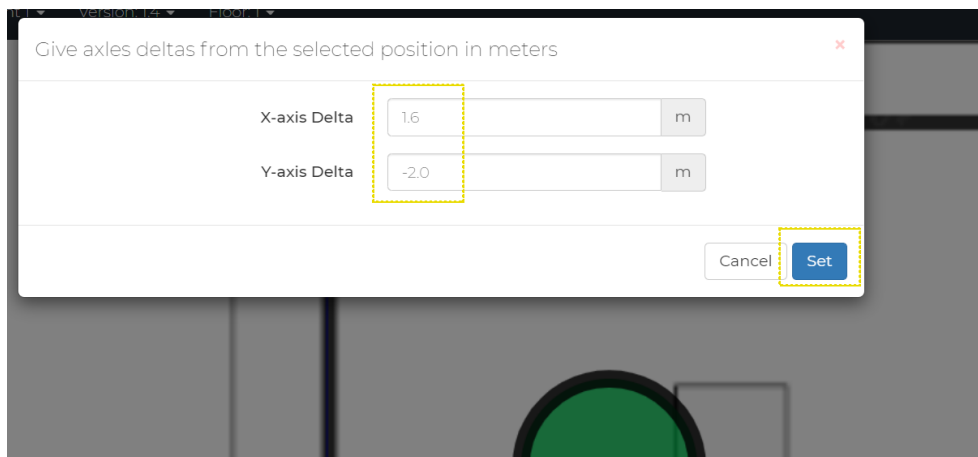
Position beacons using positioning tool

Positioning tool can be used to calculate Beacon position if measurement to some corner or wall has been done. In this example upper left beacon have been measured to be 2 meters from the upper wall and it's in the same lighting rail 1.6 meter from side wall. Select correct beacon to open correct properties dialog box, click Positioning Tool button. Select the reference point by clicking the upper left corner of the room.



'Give axes deltas from the selected position in meters' dialog box opens. Beacon is 1.6 meters right side of the wall and 2 meters *below* upper wall, therefore enter 1.6 and -2.0 meters and click Set button, the tool will calculate correct X and Y position relatively to origin and new beacon position can be seen.

Remember to set Z coordinate from the properties dialog box.



Verification of the beacon positions

Verification of positions can be done using Ruler mode. In this example distance between two beacons is measured to be 9.2 meters using laser ranger, and verified from the designer as seen in the Figure 13.

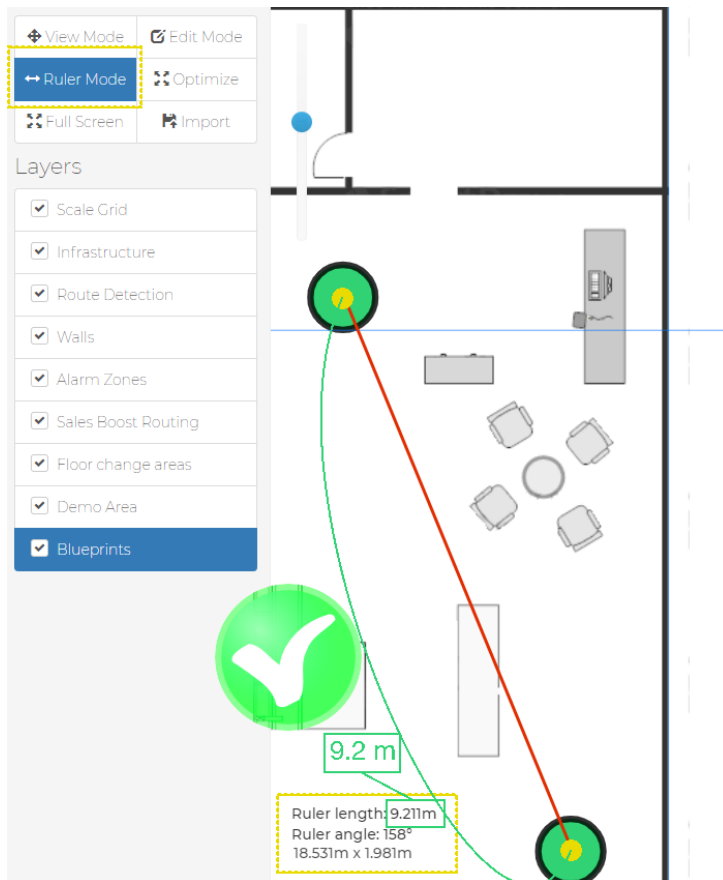


Figure 12 Using ruler mode to measure beacon distance in the image map

Define PoE switch and VPN router location into the map

It's important at installation phase to mark the equipment locations into the map. Select Edit Mode -> Infrastructure, from the arrow up button in bottom of left menu, select Device as illustrated in Figure 14. New Device button appears.

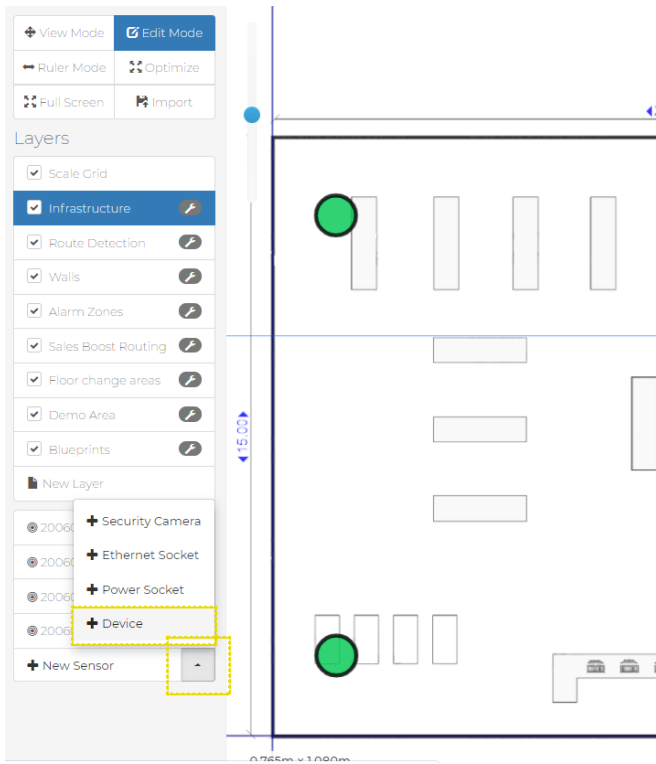
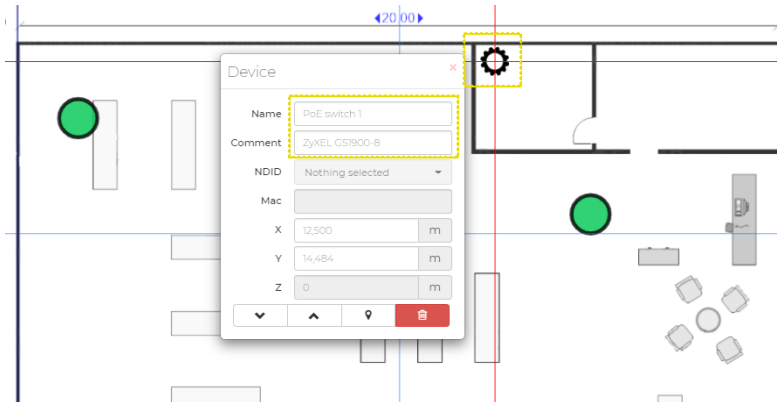


Figure 13 Adding device information into image map

Select New Device, define and drag the PoE switch into correct position. Define and name all devices accordingly.

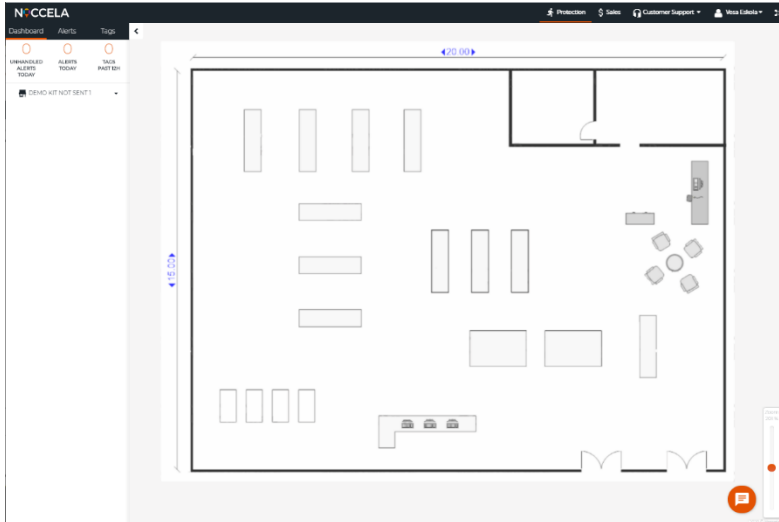


Note: In larger and permanent installations, it is strongly recommended to fill the installation minutes report. Please contact Noccela to get proper template for this and after installation send the file to Noccela.

Verification using my.noccela.com portal

Finally using my.noccela.com portal it's possible to verify the blueprint image existence, tags should also appear and positioning should happen whenever those are powered. Login with your email/account name and password received from Noccela. There is available separate user manual for my.noccela.com portal usage.

<https://my.noccela.com/>

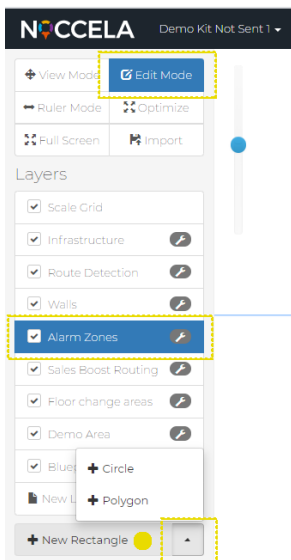


5 Configuring restricted and notification areas

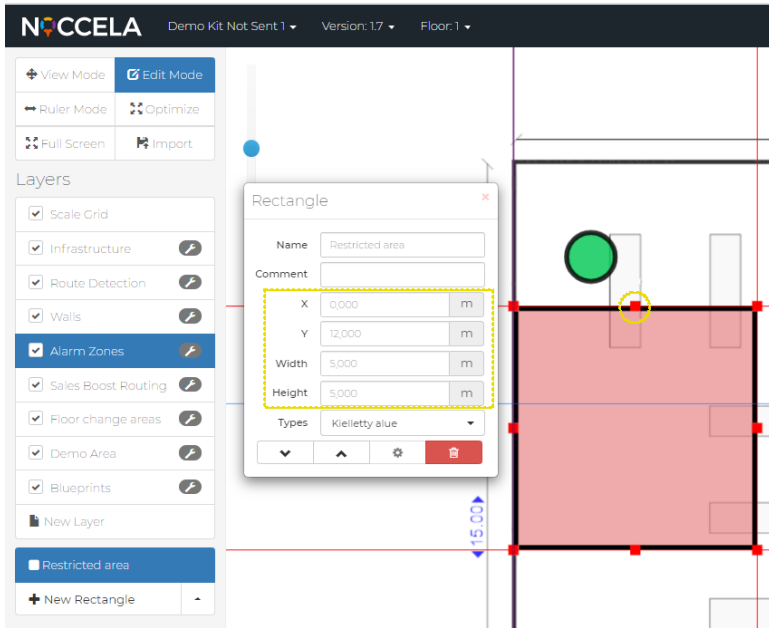
It is possible to create different areas into the map using partner portal tool. If Noccela system is used to prevent shoplifting with EAS functionality enabled, typically there is created one or more restricted and notification areas. When ever tag arrives to restricted area the system will generate an alert. This chapter generally describe how some simple areas are defined.

General area drawing tools

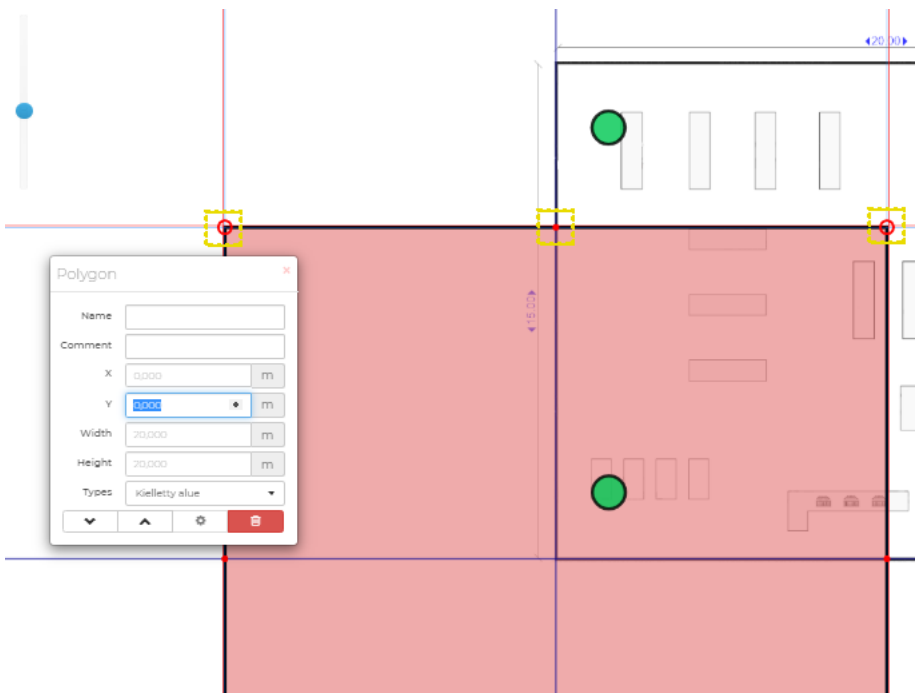
Edit Mode must be active, select the layer from the left menu, active drawing tool button appear on the bottom of menu. There is available Rectangle, Circle and Polygon tools.



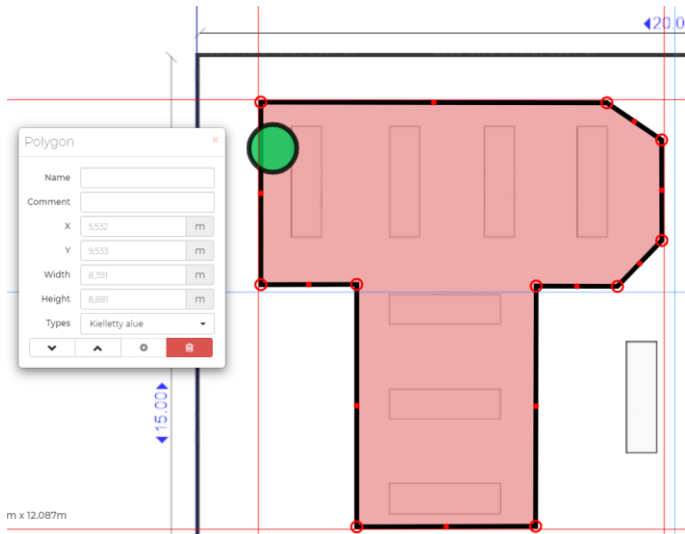
New area is created by clicking drawing tool button, area property dialog box is opened. In this example an alarm zone area is created using Rectangle tool, the property dialog box shows information related to that Alarm Zone layer and selected drawing tool. It's possible to define rectangle position and size using mouse or directly by giving coordinates. Giving name is not mandatory but strongly recommended, in future it will be easy to find correct area, e.g. "Exit Left", "Exit Right" and "Exit Elevator" are good names. Area can also be moved on the map using mouse.



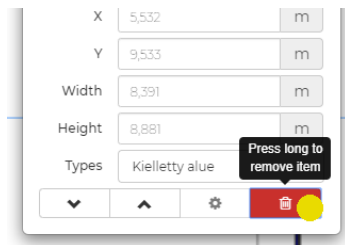
Polygon is the most complex drawing type. Defining polygon size can't be done from dialog box, use circle handles of polygon with mouse in the Polygon corners instead.



It's possible to add more handles by clicking the red small dots in middle of the sides to create more complex areas.

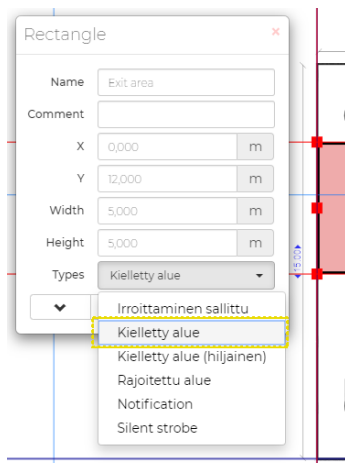


Area can be deleted when area is selected. Long click the Recycle button until red colour disappears.



Restricted area

This area is typically created into exit areas of shops to get alarm if tag is going out, typically in the case of shoplifting. Create a new area into Alarm Zones layer, and select "Kielletty alue/Restricted Area" from the Types drop down menu.

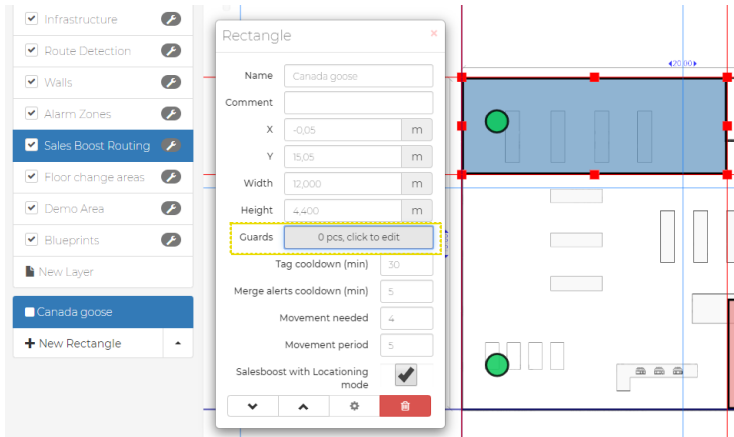


Tip: If there is Finnish language in the area types drop down menu here is vocabulary

Irroittaminen sallittu	Detach Allowed
Kielletty alue	Restricted Area
Kielletty alue (hiljainen)	Restricted Area (silent)
Rajoitettu alue	Quarantine

Sales boost area

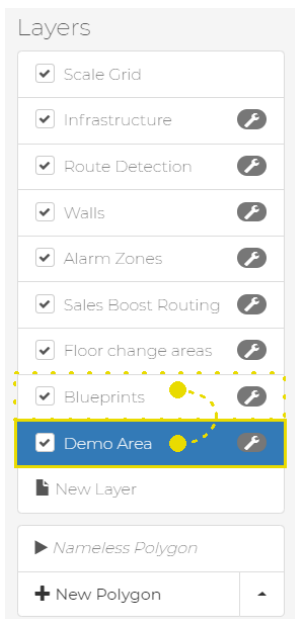
This area is created to increase sales, when ever tag detect certain movement there is given a notification to shop personnel. Notifications are sent typically into mobile phone application in their pockets just like alarms but the sound is different. Create a new area into Sales Boost Routing layer. Mobile phones which will receive this notification must be selected from the Guards button, if this is not done the feature is useless. Obviously, it is possible to see those sales boost events also from my.noccela web portal. Cooldown and movement settings are preconfigured for your site. Noccela will help you adjusting settings. Please contact Noccela if interest to learn more about it.



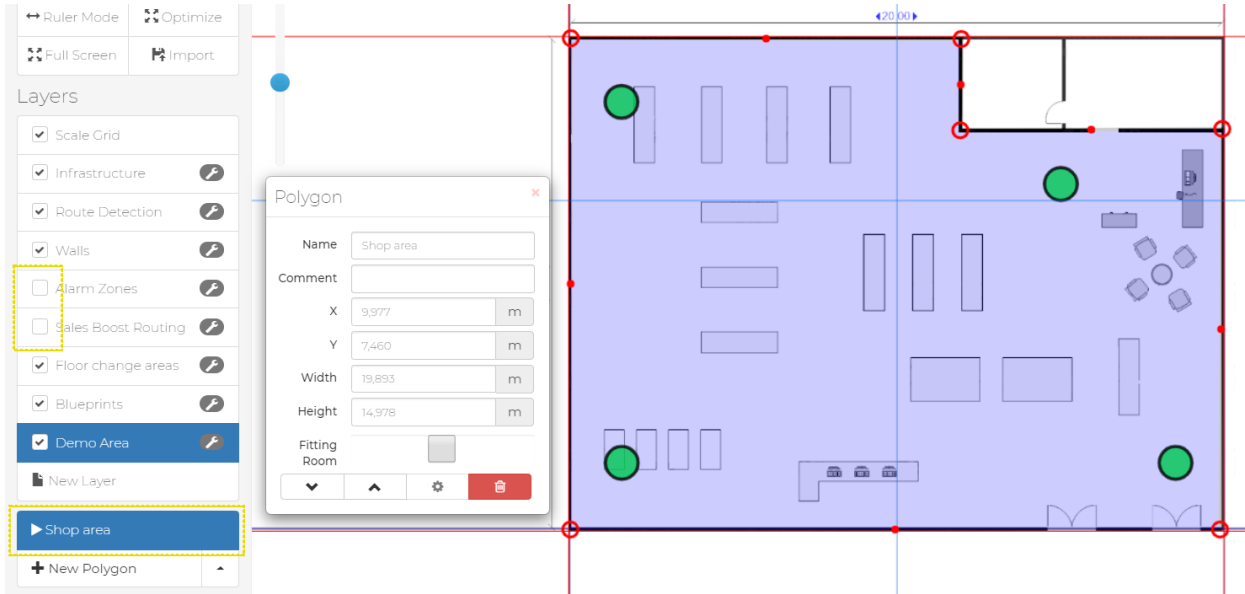
Add support for Noccela mobile application (Guard)

Noccela mobile application. This feature is mentioned only shortly here and is optional. Contact Noccela to get more information if mobile application is used.

Move “Demo Area” layer below of the Blueprints layer, this is done by dragging with mouse. If this is not done partner portal designer will hide Blueprint behind Demo Area layer.



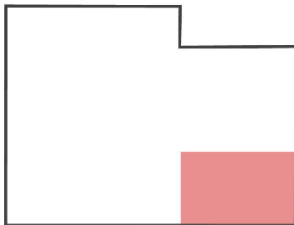
Draw a Rectangle or Polygon area to define Shop area. It is possible to hide some other layers to make it easier to draw new ones.



Guard will now display the Shop area and also the restricted area. Sales boost notification are is not shown but whenever notification happen there will be an icon to indicate event.



Demo Kit Not Sent 1



Tip: It's possible to rename layers, e.g. "Demo area" can be renamed to be "Meeting room" or "Shop area". Use tool icon in the layer button to open Layout editor dialog.

6 Important notices

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties.

The installation of Noccela system is allowed only by authorized personnel. Any electrical or technical modification of device is prohibited.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.